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Submission on: Proposed Plan Change 10 (Lake Rotorua Nutrient Management) to the BOP Regional Water and Land Plan.

My name is Lachlan McKenzie

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I am not a trade competitor for the purposes of this submission. If changes sought in the plan are adopted they will impact others in a positive way but I am not in direct competition with them.

I am an individual submitter and I wish to be heard as an individual.

I acknowledge the submission from Federated Farmers, Lake Rotorua Primary Producers Collective.
Areas of concern.

It is of great concern that the target load of 435T Nitrogen has been “taken as read” since the day it was proposed. The following scientific information gained mainly from BOPRC will demonstrate the reasons for my concerns. Currently PC10 is focused almost exclusively on N. Given what we know now PC10 would be significantly different. I support an adaptive management approach to managing Lake Rotorua. The mediated agreement reached in the RPS the target Nitrogen load was a 2032 aspirational target. The agricultural industry said they would support the direction of travel by helping farmers with farm plans. It was never intended that farm plans would become part of the consent process. **I fully support that intention.**

The lake scientific data shows the scope of PC10 should address reductions of P as the lake is now phosphorus limited.

For clarity I am not seeking changes to the RWLP TLI objective or to the RPS aspirational nitrogen reduction target at this time.

I am asking for the 2017 independent science Review to be carried out and changes should be informed from such a review. However, the objectives and targets have to be in scope for this submission as they are relevant to the approach proposed in the methods and rules.

Rotan and Overseer models. Until very recently it has been stated that there is no attenuation of Nitrogen between the root zone and the lake, development of PC10 has been carried out using Overseer 5.4. Overseer version 6.2 has rightly proven this assumption to be wrong. That attenuation happens and is now recognised, is cause for a pause and rethink is there a better way? During development of PC10 it has been assumed that the only way to achieving the N load target was to control N at source. Clearly now we can expand our portfolio of options to include enhancing attenuation of N along the transport pathway.

The scope of PC10 has to be a broader focus on than N, to have an enabling framework and to include a wider portfolio of options.

Farmers and the sub-catchment communities are willing to work on the “hot spots” and are keen to “get on” with cleaning the lake but not through PC10 package of rules. Much work has been done on farm and by our communities but we all want the outcome to be efficient effective.

I register in the very strongest terms my complete opposition to the rule requiring farmers to show in detail the actions they will undertake to achieve a 2032 target sixteen years in advance.

The default rule making farming a “non-complying” activity to me is abhorrent. The farming sector is the only sector singled out for this treatment.

The Council does not have an unrestricted licence to remove farmers from the land. Under the RMA a robust s32 analysis is needed. (Not the conceptual one done looking at averages on averages) and s85 tests against the unreasonable imposition of restrictions on private property. S85 tests must be answered in the specific case which has not been done. Even council minutes note that the impact on some farmers are likely to be “devastating”. Surely this should have given Council sufficient warning that PC10 notification should not have proceeded.

To date the economic analyses have been woefully short of the standard expected by our community and the RMA. There has been no council economic assessment of impacts to actual individual farming properties. Most properties still do not have a reliable and agreed benchmark or target and then every farmer has to second-guess the costs and implications on farm system changes to achieve a target sixteen years in advance.

Evaluation from a preliminary case study of five Dairy farms in the lake catchment showed four of the five farms have Nitrogen losses, as measured by Overseer, significantly below their 2001-2003 benchmark. (Farmers are doing their bit.) But the economic analyses show that there is not a straight line relationship between N loss reduction and Profit and the correlation varies on every farm. Of the farms modelled, what is consistent is that there is an ever increasing rate of profit loss per percentage of Nitrogen reduction.

Council has caused stress to farming families that is unacceptable in our democracy.

Summary of outcome sought:

1. **BOPRC Implement the intention of the mediated settlement on the lake target load in the regional plan.** The mediated agreement reached on RPS was that the target loads were a 2032 aspirational target. The agricultural industry said they would support the direction of travel by helping farmers with farm plans. It was never intended that farm plans would become part of the consent process. I was in the mediation.
Postpone the implementation of consent rules based on farm plans. All on farm monitoring should be by Overseer as it is the best tool to predict long term effects from farm system changes.
2. **That the 2017 science review be started intimately. That the terms of reference be open for true consultation with affected stakeholders and consensus be reached by affected parties before appointing reviewers. The results of this review will direct Council in changes to the RWLP and RPS.**

3. That a fully independent analysis to be done on feasibility and effectiveness of the range of oxygenation methods before any further land use rules are implemented.
4. An independent science analyses be carried out to understand the implications of Phosphorus Vs Nitrogen limited lake and communicate to affected stakeholders
5. An independent review of the implications to the lake of significant land use change to pine trees having regard to N: P ratio.
6. To carry out a full section 32 of RMA analysis of the effectiveness and efficiency of all the options to reduce Phosphorus Vs Nitrogen loading in the lake before implementing land use change rules.
7. That the implementation of the proposed rules be deferred until a review of all options to enhance catchment Nitrogen attenuation, what areas and sub-catchments are more responsive to such actions. (these results can feed into s32 in 6 above) Each sub catchment needs its own catchment action plan drawn up and managed by stakeholders within the catchment.
8. That a true economic impact analysis of the proposed rules be carried out using real farmer's data, farm systems, incorporating debt servicing and personal drawings. That the economic report analyses and explains the marginal changes to profit from each level of reduction in Nitrogen using real individual farm systems from the catchment. Not average models.
9. That a full list of catchment mitigation options with a cost and efficiency analysis be published. That an independent review be undertaken of the effectiveness and efficiency of all mitigation options along the source-transport-sink pathway. These reports fully disclosed to affected stakeholders to empower them to make the right decisions at each sub- catchment level.
10. That BOPRC facilitate the establishment of Sub-catchment action groups to implement shared goals and would include farmers, lifestylers and urban communities alongside science expertise and land management support.

Introduction of submitter and personal philosophy

I have lived at this address over 21 years and own 390 Ha of land and been actively involved in Lake Rotorua processes that BOPRC has micro managed for more than 15 years. At the initial proposal stage that Paul Deal managed the process for BOPRC I was a shareholder in a company leasing farms in the Rotoiti catchment. I do have significant feelings and attachment to Rotorua Lakes catchment rural and business communities. I have recognised from the first consultation that BOPRC have preconceived ideas as to the solutions and have not deviated from these during any consultation even when presented with significant evidence that it would not work or would inflict significant harm on individuals and the community. My background.

Graduating with BAgSci from Massey, worked as a Farm advisory officer of MAF, helping farmers understand and develop their farming systems, providing education on fertiliser use and economic management. The main role of a farm advisory officer was to interpret scientific information and trials and assist farmers understand how the latest information would work or otherwise within their farm systems to increase productivity for the benefit of all New Zealanders.

After four year working for MAF I ventured into my own farming career.

During the last twenty years I have had numerous political and government advisory roles. I served on the initial Small Business Advisory Group set up under the Clark government giving confidential advice to Ministers on the potential consequences to small business and the economy from many and varied government proposals and policies.

I served on the initial Dairy Environment Leadership Group that developed the first national dairy industry environmental policy

Served on the initial Land and Water forum for three years helping shape the first two reports. The first time agriculture industry and environmental groups had successfully work together to get an agreed policy document.

Federated Farmers Dairy chairman, National board member and environmental spokesperson for three-years dealing with both Dairy issues and environmental issues across the country.

Often expressing views that were noted nationally and internationally.

At the local level I kept informed by reading the public scientific and economic papers produced on lake Rotorua so consider myself well informed on the science of the lake and the interrelationship with the catchment. Having a background in science and economics allows me to see the consequences of BOPRC interpretation of such data and the proposed solution.

Served on the BOPRC's Land Use Futures board (LUF). Unfortunately, none of the stakeholder's opinions were deemed worthy enough to be incorporated into any of BOPRC policy of methods.

I am passionate about getting the management of Lake Rotorua's correct.

As part of the broader Rotorua community, friends and business colleagues, farm, run business and live within the catchment. The proposed rules will have a significant effect on many families and business. With the closing of farms will come the closure of some farm supply firms. This makes it harder for remaining farmers to secure farm supplies from local firms. This will have a downward spiralling effect for many years.

Environmentally I am very aware and have won Balance environmental awards the year our farm entered the competition.

Having followed the science data and the political decisions on setting lake targets I feel morally obliged to speak out against rules that will not achieve the environmental outcome sought.

It appears there has been no understanding of farm system dynamics and hence consequences of the proposed changes by BOPRC on individual farm/family entities so the true economic impact has been grossly underestimated in the economic reports.

Natural justice will not be served by the proposed rules.

I would like the opportunity to contribute to a truly open and transparent debate on the political setting of targets and the rules as this has not been allowed through the contrived and controlled processes of BOPRC.

The science of the lake.

It is of great concern that the target load of 435T Nitrogen has been "taken as read" since the day it was proposed. The following scientific information gained mainly from BOPRC gathered or paid for data will demonstrate my concerns.

Latest scientific data and Lake dynamics.

The BOPRC released report February 2015 by David Hamilton et al that summarises water quality data, assesses the effects of Alum dosing and models a range of possible management scenarios for Lake Rotorua.

I provide key points from the report and comments from Dr Mike Scarsbrook.

“Based on the evidence in the report there are three main conclusions

- *Water quality has shown improving trend since 2003*
- *Availability of P is controlling algal growth in the lake*
- *There are a range of management options available for maintaining Lake Rotorua’s water quality, including continued alum dosing. (Summary by Dr Mike Scarsbrook.) “*

Figure one in the report summaries the Trophic Level Index (TLI) for Lake Rotorua over the last 30-40 years. A trend of improving TLI from 2003 is evident The TLI in 2012 was lowest on record. The lake has reached the TLI of 4.2 and maintained on average below 4.2 for over four years.

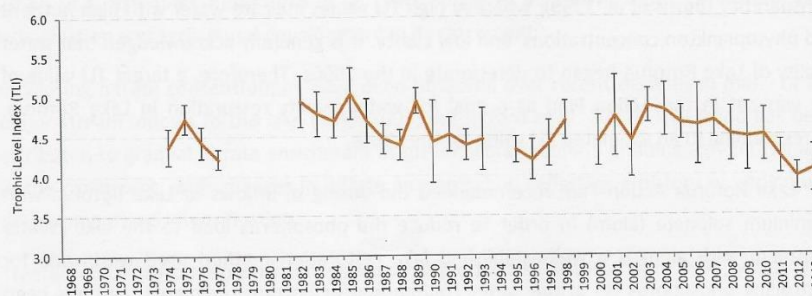
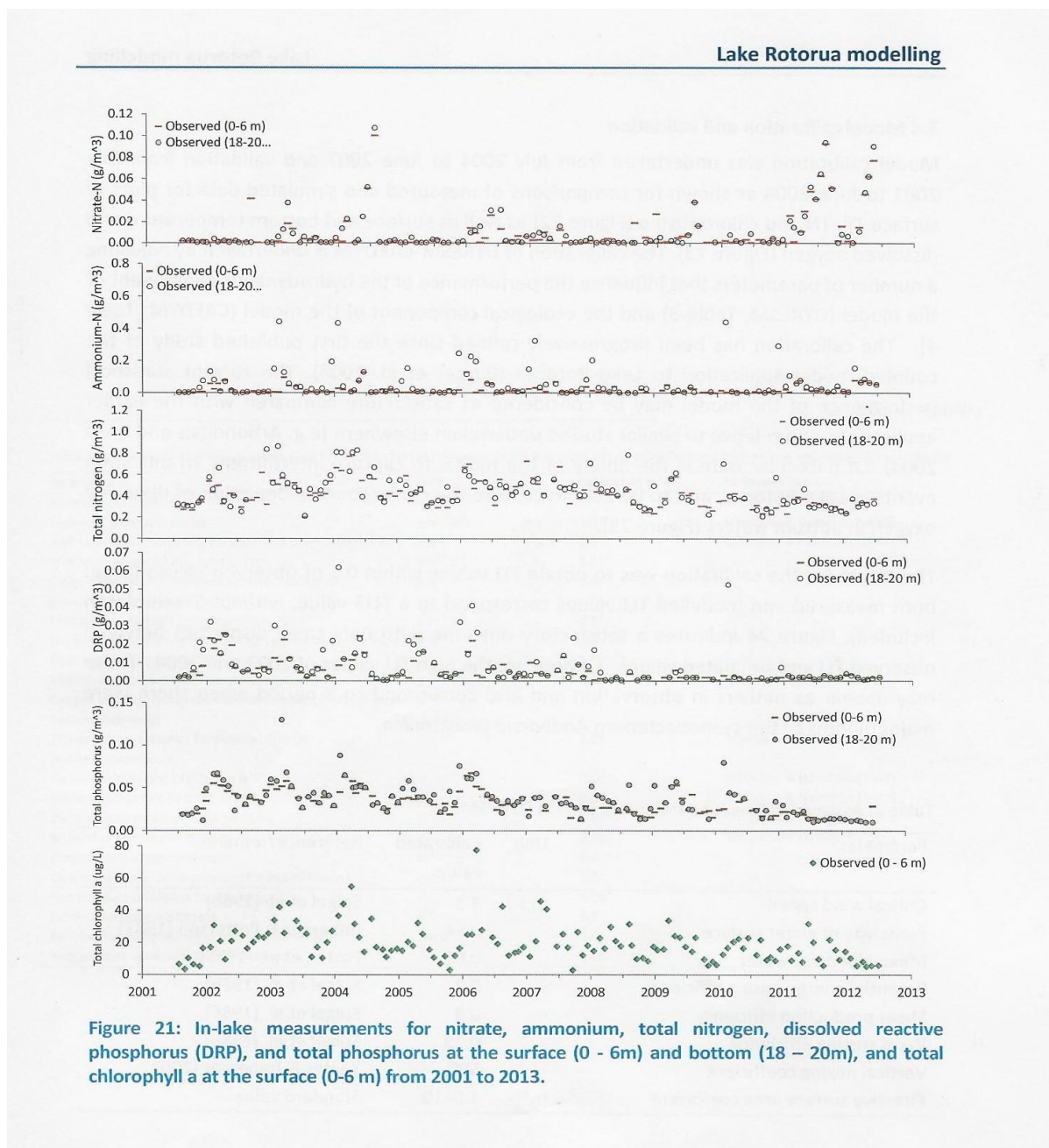


Figure 1. Trophic Level Index values from the 1970s to 2013. Values are plotted only when at least four months of data were available for all four constituent TLI variables (total nitrogen, total phosphorus, chlorophyll *a* and Secchi depth). Note also that analytical techniques have changed within the time period shown and may have affected inter-annual values. Error bars represent one standard deviation. Data from Bay of Plenty Regional Council records.

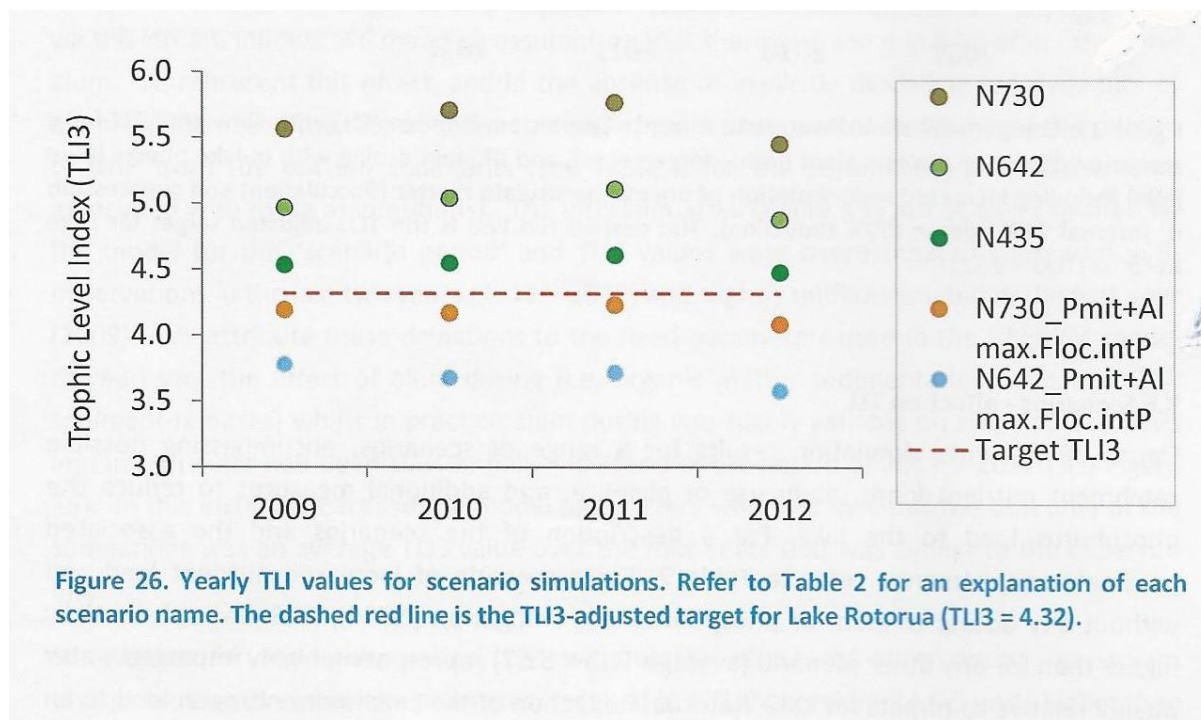


“The TLI is a composite index so it is important and often revealing to look at individual elements that contribute to it. Figure 21 of the report looks at individual components of the index. The graphs show that the availability of dissolved P (DRP) has been very low since 2008, there has been an increase in nitrates available for plant growth over the last few years (Nitrate-N) and the levels of algae in the surface water had trended down, particularly when you look at annual maximum values. (Total chlorophyll a) This evidence shows that available P is limiting the growth of algae in Lake Rotorua. The increased availability of nitrate is most likely the result of reduced algal uptake—a pattern often seen in other lakes around the world when P is controlled. (Dr Mike Scarsbrook)”

It has been stated by Professor David Hamilton and other scientists that the Phosphorus concentration in the lake water is low because of Alum dosing but it has to be noted that the trend started in 2003 several years before Alum dosing was initiated.

Figure 26 of the Hamilton report is a summary of modelled scenarios looking at the combined effects of different nutrient loads from the catchment, P mitigation and alum dosing on the

lake water quality. These scenarios predict there is a range of management approaches that could achieve the desired water quality (i.e. TLI of 4.2). The **greatest improvement** in TLI was predicted to occur from **maintaining current N loads from catchment** (currently 642 T/Yr vs the target of 435t/Yr.) and driving P down through mitigation actions in the catchment and continued alum dosing. (Light blue dots.)



Further relevant research data. From various papers and sources

Phosphorus limitation

“The limiting nutrient for the massive cyanobacterial growth and development is usually Phosphorus. (Smith 1983). Therefore, the first and most important step toward improving lake water quality and managing cyanobacterial blooms is elimination of external nutrient loading from the catchments up stream and controlling the internal phosphorus turnover (e.g. releasing of P from sediments). The **chance to sufficiently decrease nutrient runoff from watershed is often limited or this may be insufficient due to the internal recycling of nutrients in the lake.**” (Drabkova M., Marsalek B.: A review of in-lake methods of cyanobacterial bloom control.)

Dennis Trolle while completing his PhD on lake sediment nutrient loads demonstrated a clear link between sediment concentrations of P and N and subsequent P and N concentrations in the lake Rotorua water. The N and P sediment concentrations in 2006-2007 showed a decline on preceding years dating back to Fish and Andrew 1979. A lag of up to fifteen-years between sediment concentrations and water concentrations was shown. Thus if all else being equal the data showed that the lake would improve over the subsequent years. This has been proved to be correct as the lake TLI has continued to improve even before Alum was introduced into the two streams.

The report by Prof David Hamilton (April 2016 science presentation Rotorua) clearly showed a strong correlation between Chlorophyll *a* and total phosphorus ($r^2 = 0.74$) were as there is very poor correlation between Chl *a* and total N ($r^2 = 0.46$)

Relief Sought: That the science review be started intimately. That the terms of reference be open for true consultation with affected stakeholders and consensus be reached by affected parties before appointing reviewers. The results of this review will direct Council in changes to the RWLP and RPS.

The purpose of the review has to be to see if there are a combination of N and P targets that are more efficient and effective at maintaining the TLI while minimising the economic and social cost to the community.

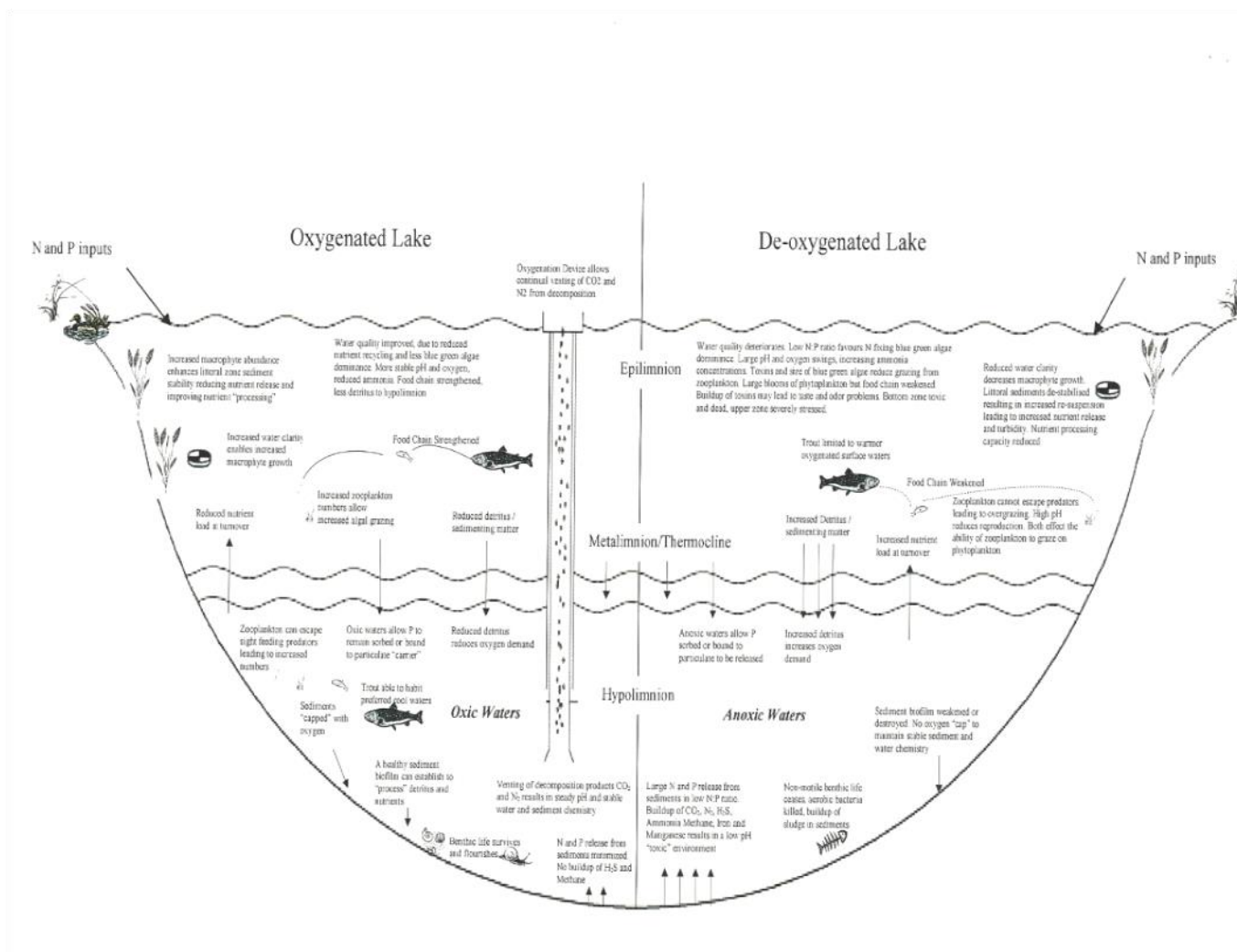
Lake stratification

The lake stratifies during warm still weather. At each stratification event there is potential for the bottom waters to become anaerobic.

Each time the lake bottom waters become anaerobic there are chemical reactions with the sediment that releases both Nitrogen and Phosphorus into the bottom waters. When the lake waters mix again these nutrients become available for algae growth.

Dave Burgers and others have shown that the internal load of N is up to 10 times greater than the external catchment load to the lake.

Some of the many process and the consequences of lake stratification are shown in diagram below.



Stratification of water through temperature differences is a natural process and in a lake the size of Rotorua physical means of keeping water mixed is problematic.

But the process of de-oxygenation is manageable.

Decaying algae deplete oxygen levels through the decay process.

The lake data is showing that as the lake now has a lower oxygen demand possibly due to less Algae growth (in turn due to lower P concentration in the water) the time taken for bottom water to become anaerobic is longer.

With P concentrations <20 ppb there is less periods of anaerobic conditions hence lower internal loads of both P and N. (ERI report no.49)

There are also numerous examples of lakes where oxygenation of deep cooler waters has made significant improvements in water quality.

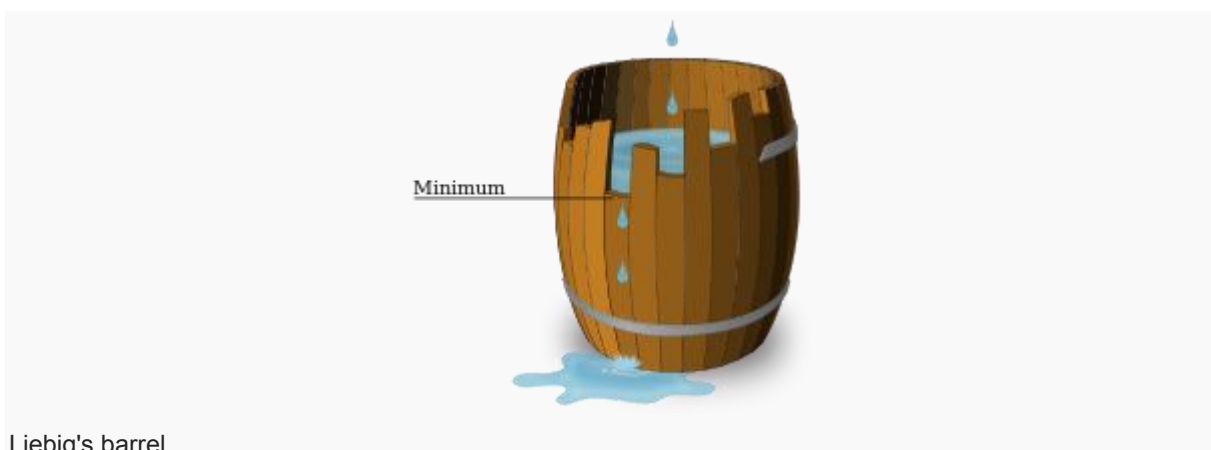
Relief sought: That a fully independent analysis to be done on feasibility and effectiveness of the range of oxygenation methods before any further land use rules are implemented.

Limiting nutrient

A brief comment on what is meant by limiting nutrient from Wikipedia.

[**Liebig's law of the minimum**, often simply called **Liebig's law** or the **law of the minimum**, is a principle developed in [agricultural science](#) by [Carl Sprengel](#) (1828) and later popularized by [Justus von Liebig](#). It states that [growth](#) is controlled not by the total amount of [resources](#) available, but by the scarcest resource ([limiting factor](#)).

This concept was originally applied to [plant](#) or [crop](#) growth, where it was found that increasing the amount of plentiful [nutrients](#) did not increase plant growth. Only by increasing the amount of the limiting nutrient (the one scarcest in relation to "need") was the growth of a plant or crop improved. This principle can be summed up in the aphorism, "The availability of the most abundant nutrient in the soil is only as good as the availability of the least abundant nutrient in the soil."



Liebig's barrel

Dobenecks^[1] used the image of a barrel—often called **Liebig's barrel**—to explain Liebig's law. Just as the capacity of a barrel with staves of unequal length is limited by the shortest stave, so a plant's growth is limited by the nutrient in shortest supply.

Scientific applications[\[edit\]](#)

Liebig's Law has been extended to biological [populations](#) (and is commonly used in [ecosystem models](#)). For example, the growth of an organism such as a plant may be dependent on a number of different factors, such as [sunlight](#) or [mineral nutrients](#) (e.g. [nitrate](#) or [phosphate](#)). The availability of these may vary, such that at any given time one is more limiting than the others. Liebig's Law states that growth only occurs at the rate permitted by the most limiting.]

Liebig's law of limitation applies to algae growth in Lake Rotorua. At the present time the lake data shows that the algae are being "limited" by the lack of Phosphorus in the water.

Nitrogen Phosphorus ratio in lake Rotorua.

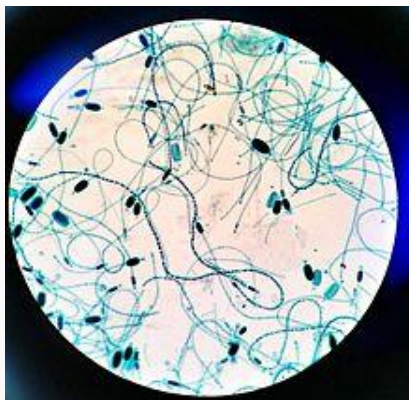
From the early work of the 1980's (science reports on BOP RC web page) there are comments that the ratio of N: P in the lake should to be greater than 20:1 and definitely needs to be greater than 12:1. Currently the lake is close to the 12:1 ratio at the bottom end for lakes.

The latest science presentation by Prof. David Hamilton in Rotorua (7th April 2016) commented on the conversations with Prof Val Smith University of Kansas and his concern with ensuring that lake Rotorua maintained a high N: P ratio to reduce the risk of cyanobacteria (Blue green algae) blooms

The risk of cyanobacteria (blue green algae) due to a low N: P ratio.

First an explanation on cyanobacteria's ability to "fix" its own nitrogen given high Phosphorus concentration in lake water.

From Wikipedia



Cylindrospermum sp.

Cyanobacteria can fix atmospheric nitrogen in anaerobic conditions by means of specialized cells called [heterocysts](#). Heterocysts may also form under the appropriate environmental conditions (anoxic) when [fixed nitrogen](#) is scarce. Heterocyst-forming species are specialized for nitrogen fixation and are able to fix nitrogen gas into [ammonia](#) (NH_3), [nitrites](#) (NO_2^- or [nitrates](#) (NO_3^-), which can be absorbed by plants and converted to protein and nucleic acids (atmospheric nitrogen is not [bioavailable](#) to plants, except for those having endosymbiotic nitrogen-fixing bacteria, especially the [Fabaceae](#) family, among others).

Cyanobacteria (Blue-greens) are not limited by Nitrogen.

Liebig's law of limitation and Cyanobacteria's ability to "fix" its own nitrogen (adds a further dimension to comments of P control "Smith et al" above) shows that the growth of Blue

greens cannot be limited by controlling N in the lake.

The rules and there effect on N:P ratio.

The sweet of proposed rules in PC10 are designed to force land use change from highly productive food production (with higher risks of N loss) to low N loss land use. The most common recommendation for such land use is pine trees.

Pine trees do have a lower Nitrogen loss particularly in second and subsequent rotations (27-30 Years per rotation.) But current research show that the Phosphorus loss per Ha over the first five years' post-harvest of pines equates to a life cycle P-loss that is greater than a well-managed pasture.

Thus if there are significant areas planted in Pines (as effected by the proposed rule change) there will be a reduction in N loss in the catchment in 20-30 years but there will be no reduction in P loss from this area. From a scientific view point there are significant risks to such a strategy. As shown in comments above if this rules deliver low N and relative high P loads to the lake that is the recipe for blue -green algae blooms.

Relief sought:

To carry out both these reviews before implementing any land use/change rules

An independent science analyses be carried out to understand the implications of Phosphorus Vs Nitrogen limited lake and communicate to affected stakeholders

An independent review of the implications to the lake of significant land use change to pine trees having regard to N: P ratio.

Phosphorus loads to Lake Rotorua.

Phosphorus as a conservative element is easier to measure and monitor sources to the lake. The main forms of transport to the lake from the catchment is particulate P from soil erosion and dissolved P. Dissolved P is often in deep ground water having been dissolved from rocks and sources such as septic tanks and urban discharges. The sources of Phosphorus can be monitored and measured fairly accurately thus allowing quantifiable options to reduce P loss to the lake to be evaluated.

The latest information presented by Prof David Hamilton (April 2016) tabulated the sources of P to the lake.

- Geological sources 20.2 T
- Major streams 18.7 T

- Minor streams 8.5 T
- Atmospheric 1.4 T
- Internal loading 60.0 T

It has to be noted the biggest single source of P is the internal load. As there are cost effective and efficient methods available to reduce the internal loads of P and N it is important that they are investigated and reported to stakeholders openly and transparently.

Alum dosing of Lake

I must give credit to Council for the work done around Alum dosing and the monitoring of, has contributed to a “cleaner lake” and increased knowledge. ERI report No. 49 is a good summary. I recognise some people have a concern about Alum dosing. Having regard to this concern I asked Pro. David Hamilton at the public meeting in Rotorua to discuss the report “Could science detect any significant adverse effect from Alum dosing in the lake?” His response was that science could not detect Alum above the natural back ground levels naturally occurring in the lake. Subsequently I have discovered that there use to be Alum springs and a “Lady Alum lake” that flowed into lake Rotorua and contributed Natural Geological Alum into the Lake. This acted as a natural flocculent for the lake until lake side development “filled” in these natural water flows.

I fully support the continued monitored, regulated and strictly controlled dosing of Alum into the lake to control Phosphorus concentrations until such time as catchment loads can be reduced.

Relief sought: To carry out a full section 32 of RMA analysis of the effectiveness and efficiency of all the options to reduce Phosphorus Vs Nitrogen loading in the lake before implementing land use change rules.

Attenuation of Nitrogen

There are significant loses of N out of soil water. There are many different flow pathways and attenuations when looking at Nitrogen and its journey from land source to streams and lakes. Attenuation can vary from 29% up to 75% (As reported by Dr Ranvir Singh Massey University.)

Key findings of research so far. (Dairy Exporter March 2016)

- Nitrogen loads measured in rivers are significantly smaller than estimates by Overseer.
- The difference in those figures is likely because of the nitrogen reduction process that happens in the subsurface.
- The capacity of land for denitrification is variable

When the 435 Nitrogen load was first suggested and incorporated into BOPRC plans and the

proposed rules were first formulated it was stated that there was no Nitrogen Attenuation in lake Rotorua's catchment as the measured loads were the same as modelled outputs from farm land using overseer version 5.4.

Subsequent versions of overseer (Version 6.2) have indicated almost twice as much N leaving the farming area but loads to the lake are of the same magnitude therefore there is attenuation. What Massey university studies show is that different soils and catchments have significantly different attenuations. That there is scope to improve attenuation (denitrification) so the amount of N reaching receiving waters can be significantly reduced without having to change land use. This work also shows that different catchments will have different loadings to the lake from the same or similar land activities. Also some areas should be targeted before others to get the most effective and efficient reductions. The proposed rules treat all land in the catchment the same regardless of location, soil type, proximity to lake and ability to attenuate N.

If these rules are implemented there will be significant stress on the community for little or no gain in N loading to the lake. There is opportunity to harvest N and or enhance attenuation more efficiently and effectively than land use change.

Relief sought: That the implementation of the proposed rules be deferred until a review of all options to enhance catchment Nitrogen attenuation, what areas and sub-catchments are more responsive to such actions. (these results can feed into s32) Each sub catchment needs its own catchment action plan drawn up and managed by stakeholders within the catchment.

Economics.

The economic reports commissioned by BOPRC including the ones in the section 32 analysis on these rules did not include the effect of debt on individual families. The models worked at the Effective Farm Surplus (EFS) level. The Doole report included Nitrogen trading as a means of continuing to farm yet the rules forbid trading until after at least 2022.

The effect of only looking at EFS not including debt and personal wage into the economic models is to significantly reduce the perceived impact to our community. Any business has to have an EFS that covers debt, Tax and a wage for owners for the enterprise to survive.

My analysis of significantly reducing N losses on our pastoral systems is that there is not a straight line relationship between N loss and Profit but an ever increasing reduction in profit. Once the low hanging fruit have been picked (the easy options done) profit diminishes rapidly. BOPRC have employed a limited number of consultants to provide advice and support to farmers, primarily to develop farm plans that demonstrate how the farm will reduce N by the prescribed amount. Anything up to 50% reduction is required. Having a lifetime of budgeting and analysis of farm systems some of the claims in the draft farm plans are

boarding on incompetence. One case the farm profit was maintained by increasing the price silage was sold for. The rules will require several thousand Ha to have similar treatment. Grass Silage this year is worth less than the cost of making it. With rules requiring significant reductions in stock numbers the only option for farmers to maintain pasture quality is to sell silage. (cannot make good hay in wet climate)

Without maintaining control of pastures quality is lost (Metabolisable Energy is reduced) feeding poor quality pasture to livestock will reduce productivity and can even lead to animal welfare issues.

The synthetic farm models going into the Doole Parsons report and hence the ME report underestimate the real impact on individual farms.

It was noted in BOPRC, RDD workshop 2 December 2015 that “there will be significant economic cost and the impact on some individual farmers could be devastating”

This to me is acknowledgement that these rules will send some farmers broke.

Relief sought: That a true economic impact analysis of the proposed rules be carried out using real farmer’s data, farm systems, incorporating debt servicing and personal drawings. That the economic report analyses and explains the marginal changes to profit from each level of reduction in Nitrogen using real individual farm systems from the catchment. Not average models

Alternatives to land use change and Catchment mitigations.

The rules focus on N reduction with the focus on changing land use. As discussed this will inevitably lead to more pine plantations with reduced N but increased P loading to the lake.

There has been limited open and constructive dialogue about community or collective mitigation options. Ideas that need to be looked at constructively include (but not limited to) are;

- Nutrient harvesting (turning N & P into plant feed stock for industry)
- The range of methods to oxygenate bottom lake waters
- Siphon to take water outflow from lake water below thermocline during summer
- Detention bunds
- Enhanced wet lands

These suggestions reduce both N and P loads in the lake and are likely more efficient and effective than land use change at reducing nutrient loads and keeping N: P ratio correct.

Relief sought: That a full list of catchment mitigation options with a cost and efficiency analyses be published. That an independent review be undertaken of the effectiveness and efficiency of all mitigation options along the source-transport-sink pathway. These reports be fully disclosed to affected stakeholders to empower them to make the right decisions at each sub catchment level.

A different approach one that is inclusive, collaborative and progressive.

National and international experience shows that the closer the decisions are made to the resource managers and communities of interest, the faster and more effective is adoption of new ideas and transformation of resource use. I see sub catchment groups working in collaboration as the best way to move past the barriers being put up by PC10 rules. Farmers see the rules as compliance, BOPRC has budgeted for significant compliance monitoring. Let's shift the focus from rules and compliance to fixing things, managing change, achieving our shared goals and values.

Comment on sub catchment action groups and a truly integrated framework.

This idea is not new and there are many good examples throughout New Zealand.

I see these as a truly integrated framework with a key focus on priorities that will have immediate impact on the lake water quality; Secondly it will have tiers of responsibility; and thirdly it will be staged in the spirit of adaptive management that BOPRC espouse.

The evidence from farmers in the catchment is they are willing to implement good industry practices, adopt new technology and ideas that are reasonable, practical and affordable

Sub catchment action groups would be part of a **three Tiered** fully intergrated nutrient management framework:

- **At the Enterprises:**
 - urban responsibility for “best practicable option”
 - rural responsibility for “reasonable/practicable/affordable” best practices, focusing on mitigating “hot spots” from landuse.
 - **Industry** would lead good practice development/extension, one-on-one farm plan support, and reporting sector progress
 - Overseer nutrient budgets used as farm decision support tool and to assist monitoring the direction of change relative to industry benchmarks
 - farm plans used as a tool to identify and prioritise farm nutrient hotspots
 - farmers own their own farm plans and nutrient budgets; entering data and testing scenarios with their industry reps or farm management consultants
 - progress tracked against Overseer estimates
 - **Farmers implement**, best practice farm systems to reduce nutrient losses; while maintaining compliance with Rule 11, FDE rules etc
- **Sub-catchments:** focus on attenuating **legacy** loads along the **transport** pathways.
 - prioritise sub-catchments on rolling programme to develop sub-catchment action plans,
 - identify/prioritise sub-catchment nutrient hotspots, eg, N/gorse, P/RLTS
 - in sub-catchments dominated by nutrient rich legacy groundwater, prioritise options for attenuation, eg, springs/wetlands/riparian; continue alum dosing in selected streams

- in sub-catchments dominated by flood flow particulate nutrients, prioritise options for mitigating, eg, sediment bunds,
 - Use models to help prioritise; then groundtruth with science tools, eg, LIDAR; and with landowners, eg, the lay of the land and the opportunities
 - **Independent** coordination, eg, NZLCT; supported by science, eg, Richie McDowell/AgR/P hotspots, Chris Tanner/NIWA/constructed wetlands; plus council LMOs; plus sub-catchment committee of landowners/lifestylers/urban
 - **Incentives Fund pays** for best-bang-for-buck enduring solutions; either permanent landuse change or “green” infrastructure or to enable farm reconfigurations
 - Develop flexibility mechanisms, eg, TDRs, baseline-and-credit trading, offsets for new entrants/developments
- **At the Lake:** focus on mitigating **legacy** internal load, ie, the **sink**
 - prioritise interventions to improve ecological health and recreation/aesthetics
 - **Science** to the forefront, develop integrated modelling capability
 - Improve understanding of values, including competing values, eg, indigenous fish vis-à-vis trout
 - Improve understanding of nutrients/invasive plants/cyanobacteria dynamics
 - Develop longterm solutions for managing internal nutrient loads
 - Continue selective harvest of summertime lake edge weed to improve aesthetics
 - **BoPRC** in the lead, reporting to the Rotorua te Arawa Lakes Strategy Group

Relief sought. That BOPRC facilitate the establishment of Sub-catchment action groups to implement shared goals and would include farmers, lifestylers and urban communities alongside science expertise and land management support.

My specific concerns with Plan Change 10 Rules are:

Using ~~strike out~~ for deletions and underline for additions requested

PC 10 Introduction

Relief sort: amend to read: **Lake Rotorua Integrated Nutrient Management**

This plan change gives effect to the following ~~requirements~~ provisions in the Regional Policy Statement.

This plan change provides for a staged implementation of these ~~requirements~~ policies.

A future plan changes for the Rotorua Lakes WMA including Lake Rotorua is scheduled to commence in 2020 to give effect to the values/objectives/limit-setting requirements of the NPS-FW 2014.

Reason to give better clarity of intent and improve clarity

Provision: Preamble

Relief sought: amend for clarity, accuracy and completeness

The ~~need to achieve the sustainable~~ aspirational target lake load of 435 tonnes of nitrogen per annum and 37 tonnes of phosphorous per annum is based on the best science available in 1986. These targets were proposed in order to meet a TLI of 4.2, thought to represent water quality conditions in the post-war period before problems with invasive lake weeds became evident in the 1960s. Lake Rotorua has achieved the target TLI.

Adaptive management is a core element of the implementation of nutrient management for the Lake Rotorua groundwater catchment. This includes regular science and policy reviews and responding to the outcomes of these reviews, including review of the targets.

~~Achieving~~ Reviewing the lake load targets for nitrogen and phosphorous also forms part of the National Policy Statement for Freshwater Management (NPSFM 2014) implementation. Council may need to consider further changes to the Plan to address these and other NPSFM 2014 attributes of relevance ~~at some point in the future~~ consequent to the Science Review scheduled in 2017, or the Rotorua Lakes WMA values/objectives/limits process, currently scheduled to commence 2020.

The ~~nitrogen~~ nutrient load to Lake Rotorua from current and historic activities will be reduced through an integrated/tiered/staged programme of source/transport/sink interventions, including rules, ~~regulated~~ land use ~~nitrogen~~ nutrient reductions (~~Nitrogen Discharge Allowances~~), hard and soft engineering solutions, incentives and gorse conversion, and in lake management of nutrient release and nuisance algal growth.

Provision: preamble to Table LR 1

Amend of for reasons of improved accuracy and completeness

This One element of the package of interventions forms the Integrated is the Nitrogen Management Framework, summarised in Table LR 1 below.

Nitrogen entering the lake is above the target set in the RPS to achieve the RWLP TLI objective 4.2. The aim is to minimise unwanted algal blooms.

In 2011, the ROTAN model tested scenarios for reduction targets – recognising legacy loads - to achieve the target lake load by around 2080-2100:

- R-250 would approach the 435t target around 2090
- R-300 would approach the target around 2085
- R-350 would approach the target around 2080

The author proposed that the reduction target be set at around 320t N/pa. The RPS adopted a reduction target of 311t N/pa while noting that cost-benefit analysis had been undertaken only at a conceptual level. The Science Review in 2017 and/or the Rotorua Lakes WMA may revisit the target N load reduction, supported by iterative analysis of options, costs and achievability as required by the NPS-FW.

The Integrated Framework summarised in Table LR 1 below was developed through a “streamlined” consultation process with the Lake Rotorua Stakeholder Advisory Group process.

It was adopted by the Regional Council on 17 September 2013 as being the preferred approach to managing nitrogen losses from rural land use activities in the Lake Rotorua groundwater catchment at that time. It provides the basis for the proportional nitrogen reductions being implemented through these rules and for the allocation methodology.

The framework was developed prior to the Overseer version change from 5.4 to 6.2; prior to the lake meeting the TLI target; prior to research indicating the main driver of lake algal dynamics is the internal nutrient load; prior to the results of alum dosing indicating the lake may now be P limited; prior to results indicating potential significance of flood flow particulate nutrients; and prior to results dis-aggregating legacy groundwater baseflow

nutrients by sub-catchment.

ROTAN re-estimates of catchment loads in Overseer version 6.2 are expected mid-2016.

These revised estimates may necessitate a variation to the RPS load which was estimated in Overseer version 5.4.

PC10: OBJECTIVES

Provision: narrative after Objectives

Amend:

Reason: for completeness and accuracy.

Relief Sought: shift the RPS objective back to the earlier RPS section; and amend as follows:

~~No new objectives are required because the following objectives from the Operative Regional Policy Statement and Operative Regional Water and Land Plan already establish the~~
freshwater objectives for Lake Rotorua.

The objective requires that water quality be ‘maintained or improved’ to meet the TLI.

Lake Rotorua has met the TLI objective in recent years.

These objectives will be subject to review in the Rotorua Lakes WMA – currently scheduled 2020-2023 – which will review values, objectives, limits and methods, including for Lake Rotorua.

Regional Policy Statement

Objective 28: ~~Enhance the water quality in the lakes of the Rotorua District and other catchments at risk.~~

Regional Water and Land Plan

Objective 11: The water quality in the Rotorua lakes is maintained or improved to meet the Trophic Level Index of 4.2 for Lake Rotorua

Provision: *Policies LR P1 to LR P17*

Amend:

Reason: to give better effect to RPS and RWLP objectives and policies and for internal consistency.

Most of the policies currently read like rules, but need amendment to express higher intent.

The RPS and RWLP both set the expectation that landuses can be regulated to control increases in nutrient losses; or to require “best practicable option” or “reasonable, practicable and affordable” measures to reduce the effects of nutrient losses.

The RPS and RWLP both provide extensive policy direction on non-regulatory methods for meeting TLI and other objectives.

There are inconsistencies between Overseer 6.2 values in the policies and version 5.4 values used to develop allocation methods and the rules. Overseer 6.2 values should be deleted, and substituted with version 5.4 values for consistency.

Relief Sought: amend as follows

LR P1 To reduce nitrogen losses ~~from land~~ to Lake Rotorua to support achievement of the Lake TLI objective, achieve the 2032 sustainable lake load as required by the Regional Policy Statement and to monitor this target through science and policy reviews.

LR P2 To ~~manage~~ reduce phosphorus loss to Lake Rotorua to support achievement of the Lake TLI objective ~~through the implementation of management practices that will be detailed in Nitrogen-Management Plans prepared for individual properties/farming enterprises.~~ and to monitor this target through science and policy reviews.

LR P3 To ~~recognise the balance between certainty and~~ improve the use of best science and good environmental data in the management of ~~nitrogen~~ nutrients within the Lake Rotorua

groundwater catchment by ~~using~~ developing integrated catchment models which account for all contributing sources of both nitrogen and phosphorous including internal lake loads; and by improving the use of sub-catchment data to inform effective and efficient nutrient reduction strategies

- ~~(a) the 435 tonne sustainable annual nitrogen load for Lake Rotorua from the operative Regional Policy Statement Policy WL 3B(c);~~
- ~~(b) the 755 tonne load to Lake Rotorua estimated by the ROTAN model in 2011 as the position from which nitrogen loss reductions will be determined;~~
- ~~(c) OVERSEER[®] 6.2.0 for nitrogen discharge allowance allocation purposes; and~~
- ~~(d) the pastoral sector reductions within the Integrated Framework approach.~~

LR P4 To implement adaptive management in the management of ~~nitrogen~~ nutrients within the Lake Rotorua groundwater catchment through:

- (i) science reviews set out in Method LR M2 and subsequent consideration by Council of recommendations;
- (ii) regular reviews of the Regional Policy Statement and Regional Water and Land Plan objectives, policies, rules and methods under the Resource Management Act 1991;
- ~~(iii) five year individual on farm Nitrogen Management Plan review timeframes; and~~
- ~~(iv) the use of OVERSEER[®] reference files and proportional requirements to reduce the variability for individual property nitrogen targets.~~
- (v) Implementing the Rotorua Lakes WMA to give effect to the NPS-FW 2014

~~Nitrogen allocation~~ Managed Reduction Targets

LR P5 To ~~achieve the support achievement of Policy LR P1 the RWLP TLI objective sustainable load to Lake Rotorua by allocating nitrogen discharge allowances aspirational managed reduction targets across all contributing sectors; including to dairy and drystock activities within the Lake Rotorua groundwater catchment in accordance with (Table LR 4) subject to further work on dairy support; and to recognise standard OVERSEER[®] 5.4 loss rates for plantation forestry, bush/scrub and house blocks.~~

Table LR 4: Allocated nitrogen loss rates to sectors.

Overseer 5.4 values to be inserted

Sector	Average nitrogen loss by sector (kgN/ha/yr) (OVERSEER [®] 6.2.0 <u>5.4</u>)	Nitrogen loss range within each sector (kgN/ha/yr) (OVERSEER [®] 6.2.0 <u>5.4</u>)
Dairy	64.5	54.6 – 72.8
Drystock	25.6	18 – 54.6

No property/farming enterprise will be required to reduce its nitrogen loss below the bottom of the relevant sector nitrogen loss range.

LR P6 ~~To determine individual Nutrient Discharge Allowances that must be achieved by 2032 in accordance with Schedule LR One for all properties/farming enterprises that are not provided for as permitted activities by Rules LR R1 to LR R7-~~

LR P7 ~~To enable the authorised transfer of nitrogen loss entitlements between properties/farming enterprises from 1 July 2022~~ development of flexibility mechanisms to encourage efficient outcomes, eg, transferable development rights, offset mechanisms, baseline-and-credit trading schemes

LR P8 ~~To require encourage whole-of-community engagement by enabling sub-catchment property/farming enterprise specific Nitrogen-Nutrient Action Management Plans and require support the implementation of mitigation actions to achieve and maintain Managed Reduction Targets (five-yearly nitrogen loss reduction targets) and Nitrogen Discharge Allowances.~~

LR P9 To allow as a permitted activity:

- (a) All land uses until 30 June 2017 provided that the land uses do not increase their nitrogen loss.
- (b) The use of land for plantation forestry and bush/scrub and constructed wetlands and sediment detainment bunds
- (c) The use of land for farming activities on properties/farming enterprises 5 hectares or less in area from 1 July 2017 provided there is no intensive land use.
- (d) The use of land for farming activities on properties/farming enterprises greater than 5 hectares in area or between 5 hectares and 10 hectares or less in effective area from 1 July 2017 provided there is no intensive land use.
- (e) The use of land for farming activities on properties/farming enterprises between 10 and 40 hectares in effective area from 1 July 2017 to 31 June 2022 provided there is no increase in nitrogen loss and the information keeping and reporting conditions are met.
- (f) The use of land for farming activities on properties/farming enterprises in the Lake Rotorua groundwater catchment not previously managed by Rules 11 to 11F from 1 July 2017 to 31 June 2022 provided there is no increase in nitrogen loss and information keeping and reporting conditions are met.
- (g) The use of land for farming activities on properties/farming enterprises that can demonstrate low nitrogen loss.
- (h) The discharge of nutrients onto or into land provided the land use associated with the discharge is authorised under Rule LR R1 to LR R11.

LR P10 ~~To require resource consents for:~~ To allow as a permitted activity provided ~~properties do not exceed their 2001-2003 bench mark and farmers participate in sub-catchment nutrient action plans~~

- (a) The use of land for farming activities on properties/farming enterprises over 40 hectares in effective area from 1 July 2017
- (b) The use of land for farming activities on properties/farming enterprises between 10 and 40 hectares in effective area from 1 July 2022

- (c) The use of land for farming activities on properties/farming enterprises less than 5 hectares in area or that are between 5 hectares and less than 10 hectares in effective area that are not low intensity land use from 1 July 2022.
- (d) The use of land for farming activities on properties/farming enterprises in the Lake Rotorua groundwater catchment not previously managed by Rules 11 to 11F that are not low intensity land use from 1 July 2022.

LR P11 ~~To classify land use consent applications for farming activities that submit a Nitrogen Management Plan demonstrating the achievement of Managed Reduction Targets and Nitrogen Discharge Allowances by 2032 as controlled activities.~~

LR P12 ~~To classify as non-complying activities, farming activities that require a land use consent application to be made and that do not submit a Nitrogen Management Plan demonstrating managed reduction.~~

LR P13 To use OVERSEER[®] version ~~6.2.0~~ 5.4 ~~and subsequent versions~~ consistent with the catchment load estimates to determine the nitrogen loss from land. Any future version changes will need to retain consistency between catchment and farm estimates; and may necessitate a variation to the RPS

LR P14 To consider nitrogen budgets and alternative models for determining nitrogen loss if OVERSEER[®] cannot be readily used for a specific land use. Consideration of whether alternate nitrogen budgets may be used will take into account:

- (a) The ability to reliably estimate a property/farming enterprise's long-term nitrogen loss;
- ~~(b) The acceptability of information inputs, for example, verifiable leaching rates; and~~
- (c) The potential availability of suitably qualified and experienced persons to develop the nitrogen budgets.

Any alternative to OVERSEER[®] for nitrogen budgeting purposes must be authorised by the Regional Council

LR P15 To require information to be supplied for:

- (a) All farming activities on properties/farming enterprises between 5 hectares and 10 hectares in effective area that are not low intensity land use,
- (b) All permitted farming activities on properties/farming enterprises between 10 and 40 hectares; and
- (c) All permitted farming activities on properties/farming enterprises in the Lake Rotorua groundwater catchment not previously managed by Rules 11 to 11F that are not low intensity land use.

This information will be used to monitor compliance with permitted activity conditions.

LR P16 To grant controlled activity consents for a duration of not less than twenty years ~~and non-complying activity consents, where granted, for durations less than 20 years.~~ The duration of longer

consents will reflect the nature, scale and robustness of any on-farm mitigation options proposed to achieve the property/farming enterprise's 2032 Nitrogen Discharge Allowance Managed Reduction Target

LR P17 ~~To decline the re-consenting of activities that have failed to achieve the required reductions in nitrogen loss.~~

Provision: *new policy*

Add:

Reason: to give explicit effect to Treasury Principles for Best Practice Regulation.

Our understanding is that all Councils are expected to have regard to these principles.

Relief Sought: amend as follows

LR P 18 To develop rules consistent with Treasury Principles for Best Practice Regulation including by developing regulation which is:

- Flexible
 - the underlying approach is principles or effects based
 - entities have scope to adopt least-cost and innovative approaches
 - non-regulatory measures including self-regulation are used wherever possible
- Proportional
 - proposed rules have been tested against a risk-based, cost-benefit framework
 - the burden of rules and their enforcement is proportionate to benefits expected
 - changes proposed have been tested to assure the benefits outweigh the costs of disruption
- Certain
 - the regulatory system is predictable and provides certainty for plan users
- Growth supporting
 - economic objectives are given appropriate weighting
 - identifying and justifying trade-offs is explicit in the accompanying s32 reports
 - the need for businesses to take longterm investment decisions is taken into account, including by providing for maximum consent durations for major investments

Provision: LR M1

Oppose

Reason: intent not clear

Relief Sought: delete LR M1

~~LR M1 Regional Council will supply information to Rotorua District Council for inclusion on Land Information Memorandum that:~~

- ~~(a) clearly identifies rural properties/farming enterprises that lie within the Lake Rotorua groundwater catchment boundary and are subject to these nitrogen management rules; and~~
- ~~(b) advises landowners of rural properties/farming enterprises identified in Method LR M1(a) to contact the Bay of Plenty Regional Council for further information.~~

Provision: LR M2

Support with amendments

Reason: improved clarity and completeness

Footnote 68 needs to provide a more specific reference.

Relief Sought: amend as follows

LR M2 Regional Council will review and publish the science that determined the objectives and limits set in the RPS and the Regional Water and Land Plan for Lake Rotorua on a five yearly basis from 2017. These reviews may include:

- (a) Review of trends in Lake water quality attributes including nitrogen, phosphorus, Chlorophyll a, algal blooms, clarity, trophic level index¹ for in-lake, inflows, and outflow where relevant; review of the health of indigenous fauna and flora and review of interactions and impacts of introduced fauna and flora
- ~~(b) Review of progress towards achieving the RWLP TLI objective ~~RPS Policy WL 6B(c) 2022 catchment nitrogen load target~~~~
- (c) Review of the RPS Policy WL 3B(c) catchment nitrogen load , and a nominal phosphorus (external and internal) catchment load of 37 tP/yr², and any other nitrogen and phosphorus load combinations that catchment modelling shows would meet the Lake Rotorua Trophic Level Index of 4.2. This may necessitate:
 - (i) a review and rerun of the lake model (or any successor model), including its ability to replicate recent years data;
 - (ii) a review and rerun of ROTAN (or any successor model), including nitrogen and phosphorous loss rates, groundwater trends and attenuation rates by sub-catchment, including OVERSEER[®] or similar estimates;

¹ Trophic Level Index is defined in the Operative Regional Water and Land Plan.

² This nominal phosphorus load was first determined by Rutherford et al (1989) and confirmed in subsequent advice from the Water Quality Technical Advisory Group.

- (iii) an assessment of the efficacy and risks of alum dosing and an assessment of land-based or catchment-based phosphorus loss mitigation.
- (d) Review of relevant New Zealand and international lake water quality remediation science.
- (e) Recommendations to Council including for any necessary amendments to the RPS and the RWLP if the science supporting the targets or loads materially alters

Provision: LR M3

Support

Reason: important for this to be a public process

Relief Sought: retain

LR M3 Regional Council will respond to the recommendations that result from Method LR M2 science reviews through a formal and public decision making process. This may include initiation of a plan change and review of resource consent conditions.

Provision: LR M4

Amend:

Reason: for consistency with integrated intent. The reference to developing technologies is not clear.

Relief Sought: amend as follows, and clarify meaning of “developing technologies”

LR M4 Regional Council will monitor permitted activities and any developing technologies to ensure that any related risks of ~~nitrogen~~ nutrient loss to the catchment are understood and acted on if necessary.

Provision: LR M5

Amend:

Reason: consistent with recommended alternate Integrated Nutrient Management Framework

Relief Sought: amend as follows

LR M5 Regional Council will:

- (a) ~~develop and maintain a Rule Implementation Plan; support the establishment and resourcing of sub-catchment committees to develop sub-catchment Action Plans for the reduction of nutrient loads to the lake~~
- (b) report on the achievement of the ~~Rule Implementation Plan~~ sub-catchment Action Plans on a five-yearly basis through plan effectiveness reporting;
- (c) ~~develop and maintain a Nitrogen Discharge Allowance Register, that will monitor catchment-wide progress towards meeting the RPS Policy WL-3B(e) catchment nitrogen load RWLP TLI objective~~
- (d) provide land advisory services and incentives to support land use management change and land use change that reduces nitrogen and phosphorus loss in the catchment; and
- (e) encourage industry good practices to be implemented on rural properties/farming enterprises to reduce nitrogen and phosphorus loss in the catchment.

Provision: new method

Add:

Reason: to give effect to recommended alternate framework, consistent with TWLP Method 41

Relief Sought: add new method as follows or to similar effect

LR Method 41: Develop and implement Sub-Catchment Action Plans to maintain or improve lake water quality to meet the TLI set in Objective 11. Action Plans will be developed according to the following process.

Action Plan Stages

Stage 1 – Risk Assessment and Problem Evaluation

Stage 2 – Project Prioritisation

Stage 3 – Development of Action Plan for Lake Sub-Catchment

- (a) Where lake water quality exceeds the TLI
 - (i) Identify and quantify the lake water quality problem and any necessary research.
 - (ii) Identify and quantify the reduction of nitrogen and phosphorus required in the sub-catchment to achieve the TLI or MRT
 - (iii) Estimate the contributing sources of nitrogen and phosphorus in the sub-catchment, and the effects of existing land uses and activities in the catchment on the lake's nutrient load.
 - (iv) Estimate the lag between actual land use change and lake water quality effects.
 - (v) Establish a timeline for developing an Action Plan for the lake sub-catchment.
- (c) Develop and implement Stage 3 and 4 of the Action Plan in conjunction with an Action Plan Working Group comprising appropriate parties from the individual sub-catchment and an independent coordinator. The Action Plan Working Group will include, but is not limited to, Rotorua District Council, iwi, community groups, landowners, and relevant resource management agencies and industry representative groups. The main aims of Stage 3 of the

Action Plan are:

- (i) Identify factors that affect lake water quality and any necessary research.
- (ii) Include equitable and workable provisions to address effects on existing land uses where it is necessary to restrict land use to maintain or improve water quality. Such provisions include, but are not limited to, criteria for possible financial assistance and land acquisition.
- (iii) Identify efficient, cost-effective and equitable measures and options to reduce inputs of nitrogen and phosphorus from the lake catchment to maintain or improve lake water quality.
- (iv) Determine if the TLI and/or MRTs can be realistically achieved, and a practicable timeline for achieving the target TLI and/or MRTs

(d) Identify the costs and benefits of different nutrient management and reduction methods. Such methods include, but are not limited to:

- (i) Education on nutrient management;
- (ii) Riparian retirement;
- (iii) Constructed wetlands;
- (iv) Sewage reticulation;
- (v) Review of existing discharge consents in the catchment;
- (vi) Land use changes;
- (vii) Land purchase or lease;
- (viii) Engineering works;
- (ix) Nutrient trading systems.

(e) Take into account the macro-economic and micro-economic effects of lake water quality maintenance or improvement measures, including the value of land use and lake water quality to the catchment, district, region and wider community.

(h) Document a timetable for implementing nutrient management and reduction options.

4 Stage 4 – Implementation and Monitoring of Action Plans

- (a) Implement the lake water quality improvement measures identified and agreed to in Stage 3.
- (b) Evaluate and report progress towards achieving the TLI in Objective 11 and/or MRTs to all parties, and the community.

Provision: cross boundary issues

Amend:

Reason: I request reasons as to why this method is not open for submission?

Relief Sought: amend as follows

The Operative Regional Policy Statement outlines the following approach to address cross boundary issues specific to Waikato Regional Council.

Regional Policy Statement Method 10: Liaise on cross boundary issues specific to Waikato Regional Council

Liaise with Waikato Regional Council and South Waikato District Council to ensure:

- ~~Any regional plans for that any landowners or territorial authorities in that part of the Rotorua Lake Catchment within the Waikato region are encouraged to participate in the development of the relevant sub-catchment Action Plan, achieve the objectives set for the lake, particularly in relation to managing land use and nutrient discharge levels~~

~~This method is provided for informational purposes only and not part of the plan change. It is not open for submission.~~

Provision: Rules LR-R1 – R12

Amend:

Reason: the alternate rules recommended give better effect to RPS and RWLP objectives and policies; and to our integrated nutrient management framework

Relief Sought: delete Rules LR-R1 – R12, and replace with the following, and any consequential amendments.

Rule 1 - Permitted Activity

The use of land for farming activities/farming enterprises on properties which are less than 5 hectares in area are permitted provided the following condition is met:

- a) The farming activities/farming enterprises do not comprise of any of the following land use activities:
 - Commercial cropping; or
 - Commercial horticulture; or
 - Dairy farming.

Rule 2 - Permitted Activity

The use of land for farming activities/farming enterprises on properties which are greater than 5 ha in area but less than 10 hectares in area are permitted provided the following conditions are met:

- a) The stocking rate on the property does not exceed the stocking rates specified in Schedule XX at any point in time; and
- b) The farming activities/farming enterprises do not comprise of any of the following land use activities:

- Commercial cropping; or
- Commercial horticulture; or
- Dairy farming

Rule 3 – Permitted Activity

The use of land for farming activities/farming enterprises on properties which are greater than 10 hectares in area or do not meet the conditions of Rules 1 and 2 are permitted provided the following conditions are met:

- a) The use of land for farming activities/farming enterprises on properties which are less than 40 hectares in area:
 - The farming activities/farming enterprises will establish and will not exceed a nutrient benchmark in accordance with Schedule AA and provide that information to Council by 2017
 - b) The use of land for farming activities/farming enterprises on properties which are greater than 40 hectares in area:
 - The farming activities/farming enterprises have a lawfully established nutrient benchmark for the property and will not exceed it; or will establish a nutrient benchmark in accordance with Schedule AA and provide that information to Council by 2017, and will not exceed it
- ❖ For the purpose of Rule 3 nutrient benchmark means Council was provided with a register of the annual average export of nitrogen and phosphorus from the property for the agreed benchmarking period.

Rule 4 – Controlled Activity

The use of land for farming activities/farming enterprises on properties which do not meet Rule 3 is a controlled activity until 2022 provided the following conditions are met:

- a) The increase in the export of nitrogen or phosphorous from the proposed farming activity/farming enterprise will be fully offset by the use of nutrient management measures on land within the same lake catchment; and
- b) The nutrient management measures used to fully offset the effects of the proposed land use do not occur on land which is covered by indigenous forest cover or is on land located within an urban area or lakeside settlement area

Matters of control

- a) Measures to offset adverse effects on water quality, including surface water and groundwater.
- b) Measures to avoid, remedy or mitigate adverse effects on aquatic ecosystems in streams and rivers.
- c) Aspects of the land use activity that cause an increase in the export of nitrogen or phosphorus from the activity.
- d) Measures to fully offset the increase in the export of nitrogen or phosphorus from the activity within the same lake catchment.
- e) Contractual arrangements with third parties where the offset measures are not applied on the property.
- f) Where the offset is not applied on the property, the change to the nutrient benchmark for both properties. The nutrient benchmark for the property where the land use activity will take place will increase, and the property where offset measures will take place will decrease accordingly.
- g) Information and monitoring requirements.

Rule 5 – Restricted Discretionary Activity

The use of land for farming activities/farming enterprises on properties which do not meet Rule 4 is a Restricted Discretionary Activity until 2022.

Matters of Discretion

- a) Measures to offset adverse effects on water quality, including surface water and groundwater.
- b) Measures to avoid, remedy or mitigate adverse effects on aquatic ecosystems in streams and rivers.
- c) Aspects of the land use activity that cause an increase in the export of nitrogen or phosphorus from the activity.
- d) Measures to fully offset the increase in the export of nitrogen or phosphorus from the activity within the same lake catchment.
- e) Contractual arrangements with third parties where the offset measures are not applied on the property.
- f) Where the offset is not applied on the property, the change to the nutrient benchmark limit for both properties. The nutrient benchmark for the property where the land use activity will take place will increase, and the property where offset measures will take place will decrease accordingly.
- g) Information and monitoring requirements.

Rule 6 – Permitted Activity

The use of land for farming activities/farming enterprises on properties which are greater than 10 hectares in area or which do not meet the conditions of Rules 1 and 2 are permitted from 2022 provided the following conditions are met:

- a) Either The TLI for Lake Rotorua is at or below 4.2; or the sub-catchment action groups have active nutrient reduction plans and
- b) The farming activities/farming enterprises have and do not exceed a lawfully established nutrient benchmark for the property in accordance with Rules 3; or in accordance with Rules 4 or 5.

Rule 7 – Controlled Activity

The use of land for farming activities/farming enterprises on properties which do not meet the conditions (b) or (c) of Rules 6 are permitted from 2022 provided the following conditions are met:

- a) The TLI for Lake Rotorua is at or below 4.2; or the sub-catchment groups have active nutrient reduction plans and
- b) The increase in the export of nitrogen or phosphorous from the proposed farming activity/farming enterprise will be fully offset by the use of nutrient management measures on land within the same lake catchment; and
- c) The nutrient management measures used to fully offset the effects of the proposed land use do not occur on land which is covered by indigenous forest cover or is on land located within an urban area or lakeside settlement area, at the time of making the application.

Matters of control

- a) Measures to offset adverse effects on water quality, including surface water and groundwater.
- b) Measures to avoid, remedy or mitigate adverse effects on aquatic ecosystems in streams and rivers.
- c) Aspects of the land use activity that cause an increase in the export of nitrogen or phosphorus from the activity.
- d) Measures to fully offset the increase in the export of nitrogen or phosphorus from the activity within the same lake catchment.
- e) Contractual arrangements with third parties where the offset measures are not applied on the property.
- f) Where the offset is not applied on the property, the change to the nutrient benchmark limit for both properties. The nutrient benchmark for the property where the land use activity will take place will increase, and the property where offset measures will take place will decrease accordingly..
- g) Information and monitoring requirements.

Rule 8 – Restricted Discretionary Activity

The use of land for farming activities/farming enterprises on properties which do not meet Rule 7 is a Restricted Discretionary Activity from 1 January 2022 provided the following condition is met.

- a) The TLI for Lake Rotorua is at or below 4.2; and

Matters of Discretion

- a) Measures to offset adverse effects on water quality, including surface water and groundwater.
- b) Measures to avoid, remedy or mitigate adverse effects on aquatic ecosystems in streams and rivers.
- c) Aspects of the land use activity that cause an increase in the export of nitrogen or phosphorus from the activity.
- d) Measures to fully offset the increase in the export of nitrogen or phosphorus from the activity within the same lake catchment.
- e) Contractual arrangements with third parties where the offset measures are not applied on the property.
- f) Where the offset is not applied on the property, the change to the nutrient benchmark limit for both properties. The nutrient benchmark for the property where the land use activity will take place will increase, and the property where offset measures will take place will decrease accordingly.
- g) Information and monitoring requirements.

- ❖ For the purpose of rules 6 – 8 the TLI for Lake Rotorua is measured on a 3 year rolling average.

Provision: LR R13

Support

Reason: for clarity

Relief Sought: retain

LR R13 Permitted – Incidental nutrient discharges

The discharge of nutrients onto or into land in circumstances that may result in a contaminant entering water that would otherwise contravene section 15(1)(b) of the Resource Management Act is a permitted activity, provided the land use associated with the discharge is authorised under Rules LR R1 to LR R11.

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Provision: new schedule

Add:

Reason: to support administration of the rules

Relief Sought: add schedule as follows

Schedule AA - Nutrient Benchmark

Information required for Nutrient baseline

- 1) Land area;
- 2) Soils drainage class and soil characteristics;
- 3) Rainfall;
- 4) Slope/Topography;
- 5) Land cover and land uses on the property (including percentage of land area in different land uses);
- 6) Percentage of riparian area of rivers streams and lakeshore on the property that have been fenced, or in retirement plantings
- 7) Area of wetlands on the property.
- 8) Number of houses on the property.
- 9) Type of sewage treatment for the houses on the property.
- 10) Fertiliser application – type and amount of fertiliser, and percentage of amount applied in May, June and July.
- 11) Type of livestock on the property.
- 12) Peak number of livestock by stock type.
- 13) For beef properties, the percentage of female livestock.
- 14) Number of livestock taken off the property, or put onto a wintering pad/loafing pad/feedpad during winter.
- 15) Where a wintering pad/loafing pad/feedpad is used, the waste treatment and disposal system for the wintering pad/loafing pad/feedpad.
- 16) Crop type(s), and area in each crop. This includes forestry.
- 17) Volume of irrigation.
- 18) Supplementary stock feed purchased or sold off-farm.
- 19) Description of other land management practices relevant to nutrient management.
- 20) Annual exports from the property (e.g. crops, livestock, milk solids etc).

Provision: new schedule

Add:

Reason: to support administration of the rules

Relief Sought: add schedule as follows

Schedule BB Managed Nutrient Reduction Targets

This schedule has been left intentionally blank and will be filled in post 2017 Science review

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PC10 DEFINITIONS

Farming activities – includes all activities on any land located within the rural zone b

Property - Property means any contiguous area of land, including land separated by a road or river, held in single or multiple ownership (whether or not held in common ownership), that is utilised as a single operating unit, and may include one or more certificates of title.

Provision: Definitions

Amend:

Reason: for improved clarity and practical application

Relief Sought: amend definitions as below

Area: the property on which the farming activity/farming enterprise occurs and includes but is not limited to any land used for grazing, cultivation, cropping, horticulture, effluent disposal, plantation forestry or bush/scrub

Block: An area of land within a property/farming enterprise that has common physical and management attributes. OVERSEER[®] categorises blocks into types e.g. pastoral, fodder crop, trees and scrub, house. There may be multiple blocks of the same type within a property/farming enterprise reflecting the different physical or management characteristics of each of the blocks.

Bush/Scrub: Areas of native forest, bush, scrub, wetlands and exotic non-productive woody species (including gorse) ~~which are not grazed by stock.~~

Cropping: Includes a property/farming enterprise's effective area used for forage crops, fodder crops, maize and cultivation but does not include alternative pasture species.

Dairy: The ~~effective~~ area on which milking cows are grazed during the milking season and includes the animal effluent disposal area and fodder crop areas but excludes land used as dairy support, ~~plantation forestry and bush/scrub.~~

Dairy support: land used for heifer grazing or the wintering off of cows. *Note: dairy support's*

~~nitrogen loss allowance is included within the drystock allocation range. managed reduction target range requires further work~~

Drystock: The effective area used for non-dairy activity, including grazing of sheep, beef cattle, goats, horses, deer, cropping and dairy support ~~but excluding plantation forestry and bush/scrub.~~

~~**Effective area:** The part of the property/farming enterprise that is used for grazing, cultivation, cropping, horticulture and effluent disposal.~~

Farming Activity: dairy, dairy support and drystock activities, cropping and horticulture, ~~but not~~ including plantation forestry or bush/scrub

Grazed trees: Areas of trees, scrub or wetlands that under Rule 11 were also grazed by stock. These areas typically have low nitrogen discharges.

~~**House block:** The area around a house including gardens, driveways and sheds where these areas are not grazed by stock.~~

Horticulture: Includes a property/farming enterprise's effective area used for nurseries, orchards, vineyards or growing vegetables for human consumption.

Lake Rotorua groundwater catchment: All land within the groundwater catchment boundary identified in Map 1.

~~**Managed Reduction:** The planned progressive reduction of nitrogen nutrient losses from a property/farming enterprise over time to reach a Nutrient Discharge Allowance.~~

~~**Managed Reduction Target:** The maximum amount of nitrogen loss that is allowed to occur from a property/farming enterprise at a target date (1 July 2022 and 1 July 2027).~~

Managed Reduction Offset: Nitrogen loss capacity that is transferred from a source property/farming enterprise for addition to the managed reduction pathway of a destination property/farming enterprise to enable landuse change and meet a Managed Reduction Target.

Nitrogen: refers to elemental nitrogen as measured as Nitrogen Discharge Allowances (kgN/ha/yr) or as annual lake loads (tonnes N/yr). It is noted that the predominant form of leached nitrogen is the nitrate ion (NO₃⁻). In dissolved,

particulate or organic forms

Nitrogen budget: An estimate of the total nitrogen balance for a particular property/farming enterprise, taking into account all the nitrogen inputs and all the outputs.

~~**Nitrogen Discharge Allowance:** The maximum annual amount of nitrogen loss that is allowed to occur from a property/farming enterprise post 1 July 2032. Nitrogen Discharge Allowances are allocated on a block basis and these are summed to provide a property/farming enterprise total.~~

~~**Nitrogen loss entitlement:** A Nitrogen Discharge Allowance or Managed Reduction Offset.~~

~~**Nitrogen Nutrient Management Plan:** A plan prepared for a property or farming enterprise that identifies sources of nutrients associated with the farming activity and that records mitigation actions to reduce nitrogen nutrient losses to meet Managed Reduction Targets and the Nitrogen Discharge Allowance, and to manage phosphorus loss. The requirements of a Nitrogen Management Plan are specified in Schedule LR Six.~~

OVERSEER®: OVERSEER® Nutrient Budgets model (commonly referred to as OVERSEER®) is a software application that generates information about the flow of nutrients on and off a farm.

~~OVERSEER® calculations are based on a 01 July to 30 June period.~~

OVERSEER® File: An estimate of the total nitrogen nutrient balance for a particular property/farming enterprise using OVERSEER®, taking into account ~~nitrogen~~ inputs and outputs.

Plantation forestry: Areas of planting, maintenance and/or harvesting of tree species for commercial purposes ~~which are not grazed by stock.~~

Permanently retired: The permanent removal of plantation forestry and/or agricultural production to enable a natural reversion back to native forest cover (or a land use with the same nitrogen loss rate as bush/scrub) that is legally secured.

Phosphorous: refers to elemental phosphorus in dissolved, particulate and organic forms.

~~**Property/farming enterprise:** A single operating unit regardless of its ownership structure, size, arrangement and number of parcels and legal tenure.~~ means an aggregation of parcels of land held in single or multiple ownership (whether or not held in common ownership) that constitutes a single operating unit for the purpose of nutrient management

For the purposes of these provisions, property/farming enterprise only relates to rural land within the Lake Rotorua groundwater catchment.

Reference files: OVERSEER[®] files that provide a point of reference for the Lake Rotorua groundwater catchment and that represent the biophysical factors and farming systems found within the catchment.

Rural: In relation to land and properties/farming enterprises within the Lake Rotorua groundwater catchment means land identified on Map LR 1 excluding land outside BoPRC boundaries

Suitably qualified and experienced person: A person who:

- Implements OVERSEER[®] input best practice ~~and uses standard protocols recognised and approved by the Bay of Plenty Regional Council including those specific to the Lake Rotorua groundwater catchment;~~ and
- has completed both the “Intermediate” and the “Advanced” courses in “Sustainable Nutrient Management in New Zealand Agriculture” conducted by Massey University and has at least five years’ work experience in a land use/farm advisory role; or
- ~~is approved in writing by the Chief Executive (or delegate thereof) of the Bay of Plenty Regional Council.~~

●
Provision: Schedule LR One

Oppose

Reason: too many uncertainties currently associated with both the loads and the targets

Relief Sought: delete schedule LR One, develop straightforward methodology for determining benchmarks for properties that don't currently have them

~~Schedule LR One – Methodology to determine Start Points, Managed Reduction Targets and Nitrogen Discharge Allowances~~

~~Start Points, Managed Reduction Targets and Nitrogen Discharge Allowances must be calculated and authorised by the Regional Council.~~

~~Start Points, Managed Reduction Targets and Nitrogen Discharge Allowances are expressed as a percentage of the relevant reference file (see Schedule LR Five).~~

~~Start Points and Nitrogen Discharge Allowances~~

The Start Points from which the 2032 Nitrogen Discharge Allowances are calculated are set out in Table LR 5 below:

~~Table LR 5: Start Points and Nitrogen Discharge Allowances.~~

Rules category	Rule 11 status	2017 Nitrogen management start point	2032 NDA
40 ha or greater	Benchmarked	Actual Benchmark.	Actual Benchmark and land use applied to allocation methodology.
	Not benchmarked	Derived Benchmark. Function of 2002-03 land use and 2001-04 sector average unless evidence of substantial change.	Derived Benchmark and land use applied to allocation methodology.
Between 10-40 ha Consented	Benchmarked	Actual Benchmark.	Actual Benchmark and land use applied to allocation methodology.
	Not Benchmarked ²	Derived Benchmark. Function of 2002/03 land use and 2001-04 sector average unless evidence of substantial change.	Derived Benchmark and land use applied to allocation methodology.
Rules category	Rule 11 status	2022 Nitrogen management start point	2032 NDA
Less than 40 ha	Benchmarked	Actual Benchmark.	Actual Benchmark and land use applied to allocation methodology.

2017 Permitted 2022 Consented	Not Benchmarked	Derived Benchmark. Function of 2002/03 land use and 2001-04 sector average unless evidence of substantial change.	Derived Benchmark and land use applied to allocation methodology.
For properties/farming enterprises within the Lake Rotorua groundwater catchment that were not previously managed under Rule 11 to 11F (LR R5)	Not Benchmarked	Derived Benchmark This will be created through the application of OVERSEER® to the actual land use in place during the 36 month period ending on 01- January 2016.	Derived Benchmark and land use applied to allocation methodology

Nitrogen discharge allocation methodology

The following process will be used to calculate Nitrogen Discharge Allowances for all Dairy and Drystock blocks. For house blocks, plantation forestry and bush/scrub no reductions are required.

- (a) Take actual or Derived Benchmark from Table LR 5.
- (b) Apply the standard sector % reduction (from Table LR 6) for all blocks except:
 - (i) Those blocks where the benchmark is already below the relevant Nitrogen Discharge Allowance sector range; or
 - (ii) Those blocks where applying the standard sector % reduction would cause the Nitrogen Discharge Allowance to fall below the relevant Nitrogen Discharge Allowance sector range,
 where in both cases the Nitrogen Discharge Allowance shall be set at the bottom value of the relevant Nitrogen Discharge Allowance sector range.
- (c) Following the application of the standard sector % reduction (from Table LR 6), any block that is above the relevant Nitrogen Discharge Allowance sector range is assigned the upper value of that range.

A property's Nitrogen Discharge Allowance equals the sum of the allowable nitrogen losses for all of the blocks within the property (drystock, dairy, bush/scrub, plantation forestry and house block).

The combination of parameters and figures in Table LR 6 below supports the allocation methodology that achieves the required reductions and sector contributions within the Integrated Framework:

Table LR 6: Allocation parameters and figures.

	Dairy	Drystock
Standard sector % reduction	31.3%	20.0%
Nitrogen Discharge Allowance average	64.5	25.6
Lower Nitrogen Discharge Allowance range boundary	54.6	18.0
Upper Nitrogen Discharge Allowance range boundary	72.8	54.6
Sector contribution from Integrated Framework	35.3%	17.2%

Table notes: a) the Nitrogen Discharge Allowances are in kgN/ha/yr

b) the Nitrogen Discharge Allowance average shows the average for blocks within the range. The application of the methodology results in some blocks being given an increase in relative NDA meaning non-benchmarked blocks receive an average NDA of 24.7 kgN/ha/yr for drystock and 68.5 kgN/ha/yr for dairy.

Managed Reduction Targets

Managed Reduction Targets are the reductions required in each five-year timeframe which in total equal the difference between the Start Point and Nitrogen Discharge Allowance. They are calculated as a percentage of the total reduction required (as shown in Table LR 7) and will be expressed as percentages in relation to the relevant reference files (see Schedule LR Five).

Provision: Table LR 7

Oppose

Reason: too many uncertainties in the loads and targets

Relief Sought: delete Table LR 7

Table LR 7: Managed Reduction Targets.

Managed Reduction Target Date For 2017 Start	Integrated Framework reduction (tN/yr) to be achieved	% of total reduction required	Managed Reduction Targets as % of total reduction required
1 July 2022	44	31.4%	31.4%
1 July 2027	48	34.3%	65.7%
1 July 2032	48	34.3%	100.0%
	140	100.0%	

Managed Reduction Target Date For 2022 Start	% of total reduction required	Managed Reduction Targets as % of total reduction required
1 July 2022	N/A	N/A
1 July 2027	50%	50%
1 July 2032	50%	100%
	100.0%	

If there is a need to recalculate a Nitrogen Discharge Allowance due to a transfer of Nitrogen

~~Discharge Allowance the Managed Reduction Targets will be recalculated to maintain the same proportional rate of reduction.~~

Additional matters

- ~~Exceptional circumstances may exist that imply a need to assess amendments to the Nitrogen Discharge Allowance calculations on a case by case basis. This may include consideration of previous on farm nitrogen loss mitigations implemented on the property, lawfully established activities that result in nitrogen discharges and non-pasture low nitrogen discharge activities.~~
- ~~Areas of trees that were grazed and that were benchmarked as pastoral will be allocated the current benchmarked allocation unless after applying the Drystock reduction calculations the discharge is greater than the Permitted Activity level. If this occurs, the Drystock calculation applies.~~
- ~~Plantation Forestry and bush/scrub will be given a Nitrogen Discharge Allowance that equates the OVERSEER[®] discharge rate for these land uses within the Lake Rotorua groundwater catchment.~~
- ~~A house block is defined as the OVERSEER[®] discharge calculation for three people, 100-square metres of cultivated garden, plus the area of land.~~

Amendment of Nitrogen Discharge Allowances

- ~~Any amendment to Nitrogen Discharge Allowances that occurs due to subdivision, changes to property boundaries, addition of house blocks, contractual permanent removal of Nitrogen Discharge Allowance from the system or other circumstances must be authorised by the Regional Council.~~
- ~~The creation of new properties may lead to the requirement for resource consent.~~

Schedule LR Three – Information requirements for Permitted Rules LR-R5 and LR-R6

- (a) Contact details of landowner (and any leaseholder).
- (b) Legal description of the land and farm identifier as provided by the Regional Council.
- (c) A map or aerial photograph showing the boundaries or land areas of the property and land use cover including pasture, horticulture, crops, fodder crops and non-grazed areas (including forestry, riparian and tree areas).

And where applicable:

- (d) Stocking rate (numbers, classes and ages) including a breakdown by month.
- (e) Type, quantity and timing of effluent and fertiliser applications.
- (f) Type area and planting dates for crops.
- (g) Type and quantity of supplementary feed.

This information is to be collated for the period 1 July to 30 June each year and be provided to the Regional Council annually, or at greater intervals as demanded by the Regional Council, no later than 31 October each year. The Regional Council reserves the right to seek clarification from

information provided.

Provision: Schedule LR Five – Use of OVERSEER® and Reference Files

Oppose

Reason: completely undermines the value of Overseer

Relief Sought: delete schedule LR Five

Introduction

The OVERSEER® nutrient budget model is updated from time to time with new versions that reflect:

- Improvements to the model algorithms and the user interface.
- Additions of new farm systems, farm practices and mitigation options.
- Corrected software issues.

While each of these OVERSEER® version updates represents progressive improvements, they may result (to varying degrees) in different nitrogen leaching outputs, even though the same farm inputs are entered. Some version updates will impact some farms, and some farm practices, more than others.

It is therefore appropriate to adopt an OVERSEER® methodology that:

- Enables the latest version of OVERSEER® to be used for every assessment and so takes advantage of the best available science.
- Adjusts a property's Start Point, Managed Reduction Targets and 2032 Nitrogen Discharge Allowance in a way that enables a fair comparison with the property/farming enterprise's current nitrogen leaching rate, including when a new Nitrogen Management Plan is generated every five years.
- Maintains reasonable Nitrogen Discharge Allowance relativity between properties/farming enterprises i.e. maintains the overall integrity of the nitrogen loss allowance allocation method in Schedule LR One.
- Is understandable to landowners and managers.
- Enables effective compliance and reporting.

Annual OVERSEER® files submitted as part of consent or permitted activity conditions will be monitored on a three-year rolling basis but also may be assessed on an annual basis.

Use of Reference Files

Step 1: Create OVERSEER® reference files

OVERSEER® "reference files" have been established for a hypothetical dairy farm and a hypothetical drystock farm ("drystock reference file"), and to represent the permitted activity nitrogen discharge level. The OVERSEER® input parameters for these files and methodology are provided in Methodology for creation of NDA reference files and stocking rate table February 2016. In summary, each reference file is based on:

- A simplified and hypothetical 100 ha farm.
- Input parameters selected to give a nitrogen leaching loss approximately at the mid point of the two pastoral sector Nitrogen Discharge Allowance ranges. In OVERSEER® version 6.2.0 these are:

- — 25.6 kgN/ha/yr for drystock.
- — 64.5 kgN/ha/yr for dairy.

In addition to the two pastoral reference files, it is also necessary to define the standard reference nitrogen losses for plantation forestry (typically *pinus radiata*), bush/scrub, grazed trees and house blocks. Together, these land uses constitute the major land uses underpinning the Nitrogen Discharge Allowance method.

Step 2: Calculate property/farming enterprise's targets in relation to the reference files

Each property/farming enterprise's nitrogen targets (Start Point, Managed Reduction Targets for 2022 and 2027, and 2032 Nitrogen Discharge Allowance) will be calculated as set out in A, B and C below.

A. Setting nitrogen loss targets in OVERSEER[®] version 6.2.0 and as percentages of reference files

- 1 — The property's land use and 2017 start point are described in accordance with its 2001-2004 land uses and nitrogen losses, consistent with its 2001-2004 nutrient benchmark, being an actual Rule 11 benchmark value or a derived benchmark value in accordance with Schedule LR One.
- 2 — The 2032 Nitrogen Discharge Allowance is calculated in accordance with Schedule LR One using OVERSEER[®] version 6.2.0.
- 3 — The reduction increments for the five year periods (corresponding to managed reduction) are as described in Schedule LR One and show the total reduction required over the 15 year period from 2017 to 2032, unless otherwise prescribed in a Nitrogen Management Plan and resource consent conditions.
- 4 — The reference file nitrogen loss rates are calculated using OVERSEER[®] version 6.2.0, using the file input parameters in [Methodology for creation of NDA reference files and stocking rate table February 2016](#).
- 5 — The target Nitrogen loss rates (Start Point, Managed Reduction Targets for 2022 and 2027, and 2032 Nitrogen Discharge Allowance) are then expressed as a percentage of the relevant reference file Nitrogen loss rate.
- 6 — The relevant land uses and areas, and Nitrogen Discharge Allowance and Managed Reduction Targets as percentages of reference files will be included within consent conditions (LR R7(a), LR R8(a) LB R9 (b)), consistent with Table LR 8 below.

B. Using reference files with subsequent OVERSEER[®] versions

- 7 — The reference files for the major land uses are rerun upon each new OVERSEER[®] version release, using the file input parameters provided in [Methodology for creation of NDA reference files and stocking rate table February 2016](#) with the nitrogen loss results (in kgN/ha/yr) to provide an updated output. The nitrogen loss results (in kgN/ha/yr) will be made publicly available by the Regional Council. This will include a statement of any minor adjustments to the reference file input data necessary to maintain the detailed functionality of the reference files.
- 8 — As a result of version changes there may be a need for additional information or minor adjustments to the reference file input data to maintain the detailed functionality of the reference files. Any adjustments will be independently certified by agricultural advisors with experience of the Lake Rotorua groundwater catchment and will align with changes to published OVERSEER[®] user guides. No adjustments will be made that impact on the integrity of the reference files or that have more than a minor effect on the reference file farm systems.

C. Use of updated reference files

- 9 — A property's nitrogen targets are reassessed by applying the property's relevant reference percentage rates (from step 6 above) to the updated reference file nitrogen loss rates. This reassessment shall be carried out when any of the following occurs:
 - (a) — Upon updating the Nitrogen Management Plan at the standard five year renewal.

- (b) — When the Nitrogen Management Plan needs to be updated to reflect actual or proposed changes in the property's nitrogen management, including any transfer of Nitrogen Discharge Allowance or Managed Reduction Offset.
- (c) — Upon request for a reassessment.

OVERSEER[®] descriptions used to define sectors

OVERSEER[®] descriptions relate to definitions in the following ways³:

Drystock areas are OVERSEER[®] pastoral block types where the land use is not dairy, and cut and carry, crop and fruit crop.

Dairy areas are OVERSEER[®] pastoral blocks or fodder blocks that are primarily used for dairy.

Bush/Scrub areas are OVERSEER[®] native blocks

Plantation Forestry areas are OVERSEER[®] forestry blocks

Table LR 8: Example description of hypothetical property with multiple land uses – Nitrogen Discharge Allowance (NDA) and Managed Reduction Targets (MRT) expressed relative to reference file values

2001–2004 Land-use	OVERSEER [®] 6.2.0, kgN/ha/yr						Nitrogen targets expressed as a % of reference files			
	Start Point	2022-MRT	2027-MRT	2032-NDA	Total reduction	Ref. file	Start Point	2022-MRT	2027-MRT	2032-NDA
Drystock	40	37.5	34.7	32	8	25.6	156%	146%	136%	125%
Dairy	102	92	81	70	32	64.5	158%	143%	126%	109%
Bush/scrub	3	3	3	3	0	3	100%	100%	100%	100%
Plantation forestry	2.5	2.5	2.5	2.5	0	2.5	100%	100%	100%	100%

Table notes:

- All quantitative nitrogen loss rates are per annum values.
- The Start Point, Managed Reduction Targets and NDA follow the methodology provided under Schedule LR One. The total reduction in nitrogen losses is achieved across three five year periods (2017–2022, 2022–2027 and 2027–2032).

³ OVERSEER[®] Technical Manual: Technical Manual for the description of the OVERSEER[®] Nutrient Budgets engine, April 2015.

Provision: Schedule LR Six – Nitrogen Management Plan requirements

Oppose

Reason: this amounts to prescriptive input based management which is unacceptable for the reasons set out in the PC10 s32 report

Relief Sought: delete Schedule LR Six

~~The aim of the Nitrogen Management Plan is to manage nutrient reduction so the property/farming enterprise meets the Nitrogen Discharge Allowance by 2032.~~

~~A Nitrogen Management Plan shall be prepared in accordance with A or B below by a suitably qualified and experienced person.~~

~~The Nitrogen Management Plan shall take into account sources of nitrogen associated with the farming activity and identify all relevant nitrogen management practices and mitigation measures.~~

~~The plan requirements will apply to:~~

- ~~1— A plan prepared for an individual property or farm enterprise; or~~
- ~~2— A plan prepared for an individual property which is part of a farming enterprise or a collective of pastoral properties.~~

~~**A— Nitrogen Management Plans prepared for an individual property or a farming enterprise as part of an industry environment management programme approved by the Bay of Plenty Regional Council.**~~

~~**B— Nutrient Management Plans prepared for an individual property or a farming enterprise that are not derived from an industry environment management programme.**~~

~~Nitrogen Management Plans shall contain as a minimum:~~

- ~~1— Property details:
 - ~~(a)— Physical address.~~
 - ~~(b)— Name of a contact person.~~
 - ~~(c)— Description of ownership structure.~~
 - ~~(d)— Legal description of the land and farm identifier as provided by Regional Council.~~~~

- (e) ~~Name and contact details of the person responsible for managing the property/farming enterprise if different from above.~~
- 2 ~~A map(s) or aerial photograph at a scale that clearly shows:~~
 - (a) ~~The boundaries of the property.~~
 - (b) ~~A block map for the property/farming enterprise.~~
- 3 ~~The start point on which nitrogen loss allocation is based, relevant Managed Reduction Targets and the Nitrogen Discharge Allowance allocated to the property/farming enterprise that must be achieved by 2032.~~
- 4 ~~Any nitrogen benchmark under Rule 11 of the Regional Water and Land Plan.~~
- 5 ~~A description of how each of the following management objectives, where relevant, will be met.~~
 - (a) ~~*Nitrogen management:* To minimise nitrogen losses and achieve the Nitrogen Discharge Allowance allocated to the property/farming enterprise by 2032. The Nitrogen Management Plan must include:~~
 - (i) ~~A nitrogen budget for the property/farming enterprise that matches the current system or use of the system.~~
 - (ii) ~~A pathway, including a schedule of mitigation actions, that demonstrates managed reduction to achieve the Managed Reduction Targets and the 2032 Nitrogen Discharge Allowance in accordance with LR P8.~~
 - (iii) ~~The specific data and records that will be kept to measure compliance with specific targets and mitigation actions defined in 5(a)ii.~~
 - (iv) ~~A description of any specific risks related to nitrogen leaching and runoff risks and how these will be addressed.~~
 - (b) ~~*Phosphorus management:* To identify the environmental risks associated with phosphorus and sediment loss from the subject property, the significance of those risks and implementation of industry best practice management to avoid or reduce the risks.~~
 - (c) ~~*Effluent management:* To manage the risks associated with the operation of effluent systems to ensure effluent systems are compliant with consent conditions (including permitted activity standards) every day of the year.~~
 - (d) ~~*Gorse management:* To manage gorse to minimise nitrogen losses.~~
 - (e) ~~Water irrigation management: To operate water irrigation systems in a way that minimises nitrogen losses from the property.~~
 - (f) ~~*Fertiliser management:* To manage the risks associated with the application of fertiliser. Fertiliser must be applied in accordance with the Code of Practice for Nutrient Management 2013 or as updated; and either~~
 - (i) ~~the Spreadmark Code of Practice 2015 or as updated; or~~
 - (ii) ~~With spreading equipment that is maintained and self-calibrated to Spreadmark Code of Practice standards.~~
- 6 ~~Nitrogen budgets must be prepared using the OVERSEER[®] Nutrient Budget model (or an alternative model authorised by the Regional Council) in accordance with Policy LR P13 and LR P14.~~
- 7 ~~Nitrogen Management Plans shall be updated:~~
 - (i) ~~at no more than five yearly intervals from 1 June 2017; and~~

- ~~(ii) in response to a significant farm system change; or~~
- ~~(iii) in response to the addition or removal of leased land or land with contractual arrangements in support of a property/farming enterprise; or~~
- ~~(iv) on the transfer of Nitrogen Discharge Allowances; or~~
- ~~(v) on the transfer of Managed Reduction Offsets to meet a Managed Reduction Target; or~~
- ~~(vi) by agreement with the Chief Executive of the Regional Council.~~

~~All updated Nitrogen Management Plans must meet the intent of the original Nitrogen Management Plan and include an updated nitrogen budget.~~

~~The information requested by the Bay of Plenty Regional Council shall be provided in an electronic format compatible with Regional Council information systems and may include but shall not be limited to the following reports from OVERSEER[®] or their equivalent if an alternative model is used: Nutrient Budget, Nitrogen, Summary, and Nitrogen Overview.~~

Provision: Schedule LR Seven – Transfer of Nitrogen Discharge Allowance or Managed Reduction Offset

Amend:

Reason: too many uncertainties associated with targets/loads/NDAS.

Retain offsets to enable flexibility; more discussion needed on length of time.

Relief Sought: delete NDA transfers, retain managed reduction offsets

Transfer of Nitrogen Discharge Allowance

~~The transfer of Nitrogen Discharge Allowance between properties/farming enterprises can enable a destination property/farming enterprise to permanently increase its Nitrogen Discharge Allowance.~~

- ~~• Any proposed increase in nitrogen loss (consequently triggering the need for a new Nitrogen Discharge Allowance) associated with land must be offset by a corresponding and equivalent permanent decrease in nitrogen loss (also triggering the need for a new Nitrogen Discharge Allowance) on one or more other properties/farming enterprises in the Lake Rotorua groundwater catchment.~~
- ~~• Any Nitrogen Discharge Allowance that is transferred between properties/farming enterprises must be authorised by the Regional Council to confirm the new source (transferor) Nitrogen Discharge Allowance and new destination (transferee) Nitrogen Discharge Allowance.~~
- ~~• Evidence will be required of the legal basis for how the Nitrogen Discharge Allowance transfer is secured.~~
- ~~• New Nitrogen Management Plans will be required to recognise the new Nitrogen Discharge Allowances and any new Managed Reduction Targets for the source and destination land.~~
- ~~• Transfer does not include the contractual permanent removal of Nitrogen Discharge Allowances from the system by the Lake Rotorua Incentives Board or other organisation, including where required as a condition of consent under the District Plan.~~

Transfer of Managed Reduction Offset

The transfer of Managed Reduction Offset between properties/farming enterprises can enable a destination property/farming enterprise to meet a Managed Reduction Target.

- Any increase in Managed Reduction Offsets associated with a property/farming enterprise must be offset by a corresponding and equivalent decrease in one or more other properties/farming enterprises in the Lake Rotorua groundwater catchment.
- Managed Reduction Offsets must be measureable and able to be delivered through mitigation actions within Nitrogen Management Plans.
- Evidence will be required of the legal basis for how the Managed Reduction Offsets are secured for the relevant timeframe.
- New Nitrogen Management Plans will be required to recognise any Managed Reduction Offsets as part of the managed reduction for the source and destination land.

- Managed Reduction Offsets cannot be used to meet a Nitrogen Discharge Allowance target.
- The use of Managed Reduction Offsets by the destination property/farming enterprise is limited by the Managed Reduction Target timeframes for the source property/farming enterprise. Managed Reduction Offsets ~~only last for a maximum of 5 years.~~