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Proposed Waikato Regional Plan Variation 5 – Lake Taupo Catchment (Hearings Committee Recommendations Version)

Evaluation of alternatives, benefits and costs under section 32 of the RMA – Explanation of the approach taken in the Variation

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This Report sets out the evaluation of alternatives, benefits and costs under section 32 of the RMA undertaken by the Proposed Variation No. 5 – Lake Taupo Catchment Hearings Committee (acting under delegated authority from the Waikato Regional Council to hear/consider submissions on the Variation)

Dated this 23 day of February 2007

Commissioner P Skelton (Chairman)

Councillor DJM Peart

Councillor RA Neeley

Councillor AW Hinds

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1 Introduction

This document explains the background behind the approach taken by Waikato Regional Council in the Proposed Waikato Regional Plan Variation 5 – Lake Taupo Catchment (Decisions Version) (referred to herewith as the Variation). The document outlines the different approaches considered, along with their respective costs and benefits, and presents the Council's preferred approaches.

The content of the Variation reflects the culmination of almost six years of discussion and consultation with the project partners (Taupo District Council, Ngati Tuwharetoa, Ministry for the Environment) and stakeholders from the Taupo Catchment. The Variation also reflects both the constraints and opportunities afforded to Waikato Regional Council under the Resource Management Act (RMA).

This document explains the background behind each section of the Variation by:

- defining the resource management issues being addressed
- clarifying the objectives (how the objective addresses the issue and what the key alternatives are)
- detailing policy approaches (the range of policy approaches considered and their effectiveness; and costs and benefits of the preferred policy approaches)
- setting out the methods used to achieve the preferred policy approach (the range of methods and their effectiveness; and costs and benefits of the preferred methods).

2 Resource Management Issues

2.1 How the issues were defined

2.1.1 Identifying the problem

During 1999, as a result of ongoing monitoring, Waikato Regional Council became aware that the clarity of Lake Taupo's near-pristine water was decreasing, possibly as a result of land use changes in the Catchment. Around this same time, a MAF report[1] indicated considerable potential for dairy expansion in the Lake Taupo Catchment. This report was of concern to the Council because of the potential longer-term impacts of further land use intensification on the Lake's water quality.

Waikato Regional Council has statutory responsibility under the RMA to avoid, remedy or mitigate adverse effects on water quality in the Region. The proposed Waikato Regional Plan includes several objectives and policies supporting active protection of Lake Taupo, and three specific methods (Methods 3.9.4.6, 3.9.4.8 and 3.9.4.9), anticipating that Waikato Regional Council will investigate and undertake non-regulatory and regulatory action where waterbodies sensitive to adverse effects of non-point source discharges are being adversely impacted. In response to concern about changes in the Lake and the potential for future intensification, Waikato Regional Council commissioned technical investigations in mid-2000 to learn more about Lake water quality and the influence of Catchment land use. At the same time, the 2020 Taupo-nui-a-Tia Project[2] undertook a review of the scientific information available about key community values in the Catchment, including Lake and Catchment water quality.

These investigations[3], together with the 2020 Taupo-nui-a-Tia science review[4], indicated that Lake Taupo's excellent water quality is under threat from increased nutrients, particularly nitrogen, leaching from its Catchment. A NIWA review[5] of water quality data for Lake Taupo advises that there is certainty that continuing increases in nutrient loads will eventually lead to long-term water quality declines in the Lake that will be difficult to reverse.

Scientific measurement and modelling indicate that pastoral farm land contributes most (93 per cent) of the human-generated (and therefore manageable) nitrogen entering the Lake, with urban stormwater and wastewater being a localised nitrogen source (7

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[1] Ministry of Agriculture and Fisheries (1997): Impacts of Dairy Conversions in the Taupo District. MAF Technical Paper 97/9

[2] A three year project (2001-2004) funded by the Ministry for the Environment to develop a long-term plan for the sustainable development of the Lake Taupo catchment. The project was jointly run by Tuwharetoa Maori Trust Board and Environment Waikato and involved a range of key partners. The project addressed 14 different community values for the catchment, including a sub-set of values related to water quality. The implementation of the completed plan will be overseen by a joint management group that works with the range of agencies responsible for protection and management of the various values covered in the plan.

[3] Rae, R, Hawes, I, Chague-Goff, C and Gibbs, M (2000): Nuisance plant growths in the shallow littoral zone of Lake Taupo. *NIWA Client Report CHC00/75*. NIWA, Christchurch.

Spigel, R, (2001): A coupled hydrodynamic-ecosystem study of Lake Taupo – A preliminary model. *NIWA Client Report CHC01/52.* NIWA, Christchurch.

Elliot, AH and Stroud, MJ (2001): Prediction of nutrient loads entering Lake Taupo under various land use scenarios. *NIWA Client Report EVW01224.* NIWA, Hamilton.

Hall, JA, Payne, GW and White, E (2002): Nutrient bioassays on phytoplankton from Lake Taupo. *NIWA Client Report EVW01229.* NIWA, Hamilton.

Hawes, I (2003): Lake Taupo near-shore periphyton survey. *NIWA Client Report HAM2002-029.* NIWA, Hamilton.

Spigel, R, Howard-Williams, C, Hawes, I and James, M (2003): Predictions of water quality changes in Lake Taupo under different nitrogen loadings: Further refinements and application of a coupled hydrodynamic-ecosystem model. *NIWA Client Report CHC2002-042.* NIWA, Christchurch.

[4] Huser, B (2002) (ed.): A Review of Current Information on Taupo Community Values. Report compiled by Beat Huser, Science Co-ordinator, 2020 Taupo-nui-a-Tia Project.

[5] Gibbs, MM, Rutherford, JC and Hawes, I (2002): Lake Taupo Long-Term Monitoring Programme 2000-2001, with a review of accumulated data since 1994. *NIWA Client Report HAM2002-029*. NIWA, Hamilton.

Howard-Williams, C, Gibbs, MM, Viner, AB, James, MR and Schwarz, A-M (1994): Review and Report on the Accumulated Data on Lake Taupo to 1993. *Consultancy Report No. EVW003.* NIWA, Hamilton.

per cent)[6]. Nitrogen concentrations in streams draining pastoral sub-catchments have increased by between 50 per cent to 300 per cent in all measured streams since the 1970s[7].

A key aspect of the technical investigations was the measurement and modelling of the length of time taken for nitrogen discharged to land to leach through the soil profile, into groundwater and subsequently to enter and be entirely mixed in the Lake. Early results from groundwater sampling and dating in the Catchment indicated that only the leading edge of groundwater nitrogen contamination is currently reaching streams[8]. Nitrogen moves down into the soil and into groundwater, which in turn moves very slowly into streams and then into the Lake. This means that land use changes that occurred some decades ago will continue to increase nitrogen inputs into the Lake via groundwater, in addition to the effects of any future intensification.

Although domestic wastewater discharges represent a relatively small proportion of the nitrogen entering the Lake, several studies have shown that discharges from community wastewater treatment plants and concentrations of on-site wastewater systems near the lakeshore can have disproportionate effects in shallow near-shore waters[9]. Such discharges will increase the risk of weed and algae growth in shallow waters, as well as create a health risk from wastewater pathogens.

2.1.2 Deciding action was needed

Waikato Regional Council notified key stakeholders of threats to the water quality of Lake Taupo and its intention to take action in late May 2000. A letter and a short briefing paper from Waikato Regional Council's Chief Executive (document #619449) was sent to a wide range of people, including Government Ministers of Conservation, Tourism, SoE, Environment, and interest groups such as dairy companies and Federated Farmers, the local Lakes and Waterways Action Group, as well as Taupo District councillors. The main points of the briefing paper are summarised in the following quote from the document:

> "Environment Waikato strongly believes in the need to introduce a management plan to protect one of the country's most important natural features – Lake Taupo. It is possible that such a management plan will restrict further intensification of pastoral farming in the catchment area while encouraging alternative, low nitrogen producing land uses.
>
> At this stage we do not know what the final management proposal will be. However, we anticipate that we will need to define the existing high water quality of the Lake and its tributaries as an "environmental bottom line" and set targets for nitrogen losses from different types of land use, ie. an effects based approach. Resource consents and/or property management plans may be required to ensure property owners remain within sustainable limits. A whole catchment approach needs to be taken addressing all land use types, and incentives may be used to prevent or reduce nitrogen losses. A tradable nitrogen credit regime may also have a place."

Following the release of the briefing paper, Waikato Regional Council published and distributed a pamphlet to landowners and interested parties entitled '*Protecting Lake*

[6] Elliot, AH and Stroud, MJ (2001): Prediction of nutrient loads entering Lake Taupo under various land use scenarios. *NIWA Client Report EVW01224.* NIWA, Hamilton.
Updated by Environment Waikato in January 2004: see document # 885692.

[7] Vant, B (2002): Inflows to Lake Taupo: nutrients and water ages. Technical Report TR02/18. Environment Waikato, Hamilton.

[8] Hadfield, J, Nicole, D, Rosen, M, Wilson, C and Morgenstern, U (2001): Hydrogeology of Lake Taupo catchment – Phase 1. Environment Waikato Technical Report 2001/01.

[9] Hawes, I. (2003). Lake Taupo Near-shore Periphyton Survey. NIWA, Hamilton, May 2003;
Hawes, I. and Smith, R. (1993a). Effect of Localised Nutrient Enrichment on the Shallow Epilithic Periphyton of Oligotrophic Lake Taupo, New Zealand. New Zealand Journal of Marine and Freshwater Research 27:365-372;
Hawes, I. and Smith, R. (1993b). Influence of Environmental Factors on the Growth in Culture of a New Zealand Strain of the fast-spreading alga Hydrodictyon reticulatum (water net). Journal of Applied Phycology 5:437-445;
Rae, R., Hawes, I., Chague-Goff, C., and Gibbs, M. (2000). Nuisance Plant Growths in the Shallow Littoral Zone of Lake Taupo. NIWA, Christchurch, October 2000].

Taupo - A Plan by Environment Waikato'. The pamphlet focused on nitrogen as the source of the problem, actions that would limit nitrogen leaching, economic benefits of a clean Lake and the threat to water quality in the Lake of wide-scale conversion to dairying in the Catchment. The pamphlet noted that Waikato Regional Council intended to meet with landowners and interest groups to discuss options and nitrogen control methods over the following months.

Given the scientific information that levels of nitrogen in the Lake were increasing and were likely to affect Lake water quality into the future, Waikato Regional Council was faced with two key options in October 2000:

- Do nothing and accept the deterioration of Lake health into the future
- Take action to reduce nitrogen entering the Lake to protect water quality.

The paper '*Issues and Options for Managing Water Quality In Lake Taupo*'[10] was prepared and circulated amongst stakeholders and the general public, seeking feedback on four different options for Lake water quality:

1. Better water quality than now, with much less intensive land use in the Catchment.
2. Maintain current water quality by reducing nitrogen output from existing land uses and preventing further land use intensification.
3. Slightly lower water quality than now, with existing land use remaining the same but no further intensification.
4. Lower water quality. Do nothing to change land use in the Catchment.

Based on feedback received at earlier public meetings, Waikato Regional Council identified that Option 4 of doing nothing or Option 1 of trying to improve water quality substantially were not favoured by the community. For this reason, the options paper focused on Options 2 and 3.

At a Council workshop held on March 29 2001, Councillors agreed that Waikato Regional Council should pursue Option 2 – maintain current water quality in Lake Taupo by reducing nitrogen output from existing land uses and preventing further intensification. This was discussed at the April 11, 2001 Policy Committee (document #671476) and accepted at a Council Meeting on April 26, 2001 (document #672632). This decision was based on two factors:

- Community expectation for a clean Lake.
- A legislative responsibility under section 30 of the Resource Management Act to control land to protect water quality, reinforced by objectives and policies in the Waikato Regional Plan.

Community support for action

Community surveys undertaken since 2000 indicate that the community expectation for a clean Lake remains strong, supporting the Council's decision to pursue Option 2:

- A survey of Taupo people's attitudes and perceptions about Lake Taupo was undertaken in 2000[11]. Clean clear water was the most highly valued aspect about the Lake (96 per cent of respondents), followed by public access to the Lake, its natural character and cultural values. The survey identified a strong local ethic for environmental protection, with 90 per cent of respondents ranking protection over development. Some 87 per cent of respondents identified a collective responsibility for protecting the Lake.
- Waikato Regional Council's 2003 *Environmental Awareness, Attitudes and Actions Survey*[12] indicates the most common theme among aspects of the Waikato Region's physical environment that respondents value most is water, with Lake

[10] Environment Waikato (2000): Issues and Options for Managing Water Quality in Lake Taupo (document # 633814).

[11] Stewart, C, Johnston, D, Rosen, M, Boyce, W, (2000): Public involvement in environmental management of Lake Taupo; preliminary results of the 1999 survey. Institute of Geological and Nuclear Sciences Limited science report 2000/7.

[12] Gravitas Research and Strategy Limited (2004): Environmental Attitudes, Awareness and Actions, 2003: A survey of residents of the Waikato Region. Environment Waikato Technical Report 2004/01.

Taupo receiving specific mention. Some 8 per cent of Taupo residents surveyed said that pollution of Lake Taupo is the most important environmental issue facing the Waikato Region, with 24 per cent saying it was the biggest environmental issue for them personally.

- The 2020 Taupo-nui-a-Tia mail survey (October 2003)[13] of Taupo people shows that 'clear water' and 'safe drinking water' are the community values considered most important. The issues generating most concern among respondents were toxic algal blooms (88 per cent) and sewage pollution making the Lake unfit for swimming (87 per cent). Most people agreed that Lake Taupo is a national icon, that we all need to work together to protect it and that a clean Lake is vital for the district's well-being.

Cultural values supporting action

Taking action to maintain Lake water quality also helps to address the threats to cultural well-being from a deterioration in Lake health, particularly for Ngati Tuwharetoa, the iwi with mana whenua in the Catchment. Ngati Tuwharetoa are Treaty partners with the Crown and hold the legal title of the Lake bed and its tributaries. Ngati Tuwharetoa are kaitiaki of the Lake and the Lake is a tribal taonga. However, actions to protect the Lake will not be without challenge for Ngati Tuwharetoa, who collectively own 47 per cent of the pastoral land and 55 per cent of the forested land in the Catchment[14].

Economic value of a healthy Lake

In 1998, the Gross Domestic Product of Taupo District was $755 million, of which tourism contributed about $90 million (11.9 per cent), forestry $88 million (11.7 per cent) and agriculture $31 million (4.1 per cent)[15]. An economic analysis by McDermott Fairgray examined different development scenarios for the Catchment and indicated that forestry or tourism provide the greatest economic growth opportunities which create the lowest nitrogen losses to Lake Taupo.

Both current contributions and growth potential of tourism in the Catchment are likely to be threatened by degradation of the Lake, with adverse effects on employment and the economy of the Catchment in general. A physical environment conducive to attracting high tourism growth results in an economy that significantly outperforms potential gains in other sectors.

While the benefits of a clean Lake will be good for the economy as a whole, taking action to protect the Lake will incur costs on landowners[16]. Therefore, it is essential that the costs of alternative actions are considered, including the way costs could be allocated.

At a Lake Taupo workshop on 14 August 2002, Waikato Regional Councillors requested a cost-benefit analysis (CBA) to be undertaken of the Protecting Lake Taupo project. Such an appraisal determines whether the project is economically worthwhile undertaking. That is, to help justify (or not) the basis for Waikato Regional Council action on this issue.

The CBA utilised two modelling scenarios from work undertaken by McDermott Fairgray[17] to illustrate the costs and benefits of the 'do-nothing' (used as the baseline) and 'do-something' options:

[13] Stewart, C, Leonard, G, Johnston, D, Huser B (2004): Effectiveness of communication tools developed by the 2020 Taupo-nui-a-Tia environmental management project. Geological and Nuclear Sciences Limited science report.

[14] Lake Taupo Forest Trust (2004): Identification of Maori Land (Multiple Title) within the Lake Taupo Catchment. Report to Environment Waikato. (document # 926638).

[15] McDermott Fairgray (2001): The Impact of Alternative Land Uses in Taupo Catchment, report prepared for the Ministry for the Environment in association with Environment Waikato.

[16] Finlayson, J. and Thorrold, B. (2001): Estimating the costs of restrictions on nitrate emissions in the Taupo Catchment. Report to Environment Waikato.

[17] McDermott Fairgray (2001): The Impact of Alternative Land Uses in Taupo Catchment, report prepared for the Ministry for the Environment in association with Environment Waikato.

- 'Do-nothing': Extensive conversion to dairying in the Catchment (to 25,000 hectares in 2030[18]). No intervention by Waikato Regional Council or other agency. Continual tourism growth at the national average
- 'Do-something': Tourism/lifestyle scenario. No dairying in the Catchment by 2030. Tourism growth above the national average.

The value added by the additional tourist numbers provided the basis for the benefits of the 'do-something' option. The assumption was made that extensive conversion to dairying reduces the water quality of the Lake and thus reduces growth potential of tourism and the associated economic benefits.

The CBA took a very conservative view of costs and benefits – for example, the only monetary benefit considered was that derived from the additional value added from tourism growth. It also assumed that any land purchased to reduce nitrogen was not on-sold or put to productive use.

The CBA resulted benefits greater than costs (at their present value) by a ratio of 3.39:1. In other words, benefits outweigh costs by a factor of 3 to 1. The present value of benefits was $395 million, and costs $116 million[19]. The results show that taking action to protect the Lake is justified while only examining the change in value between 'dairy' and 'tourism' land uses.

The CBA was not intended to be the definitive economic appraisal of taking action to protect Lake Taupo, rather a guide to the relative costs and benefits of undertaking such a project. As such, it was noted at the time that there were a number of assumptions and gaps in the analysis that will require further examination if it is decided that a more detailed formal CBA is required. For instance, no attempt was made to value the more 'intangible' non-market values associated with a clean Lake (such as environmental and cultural values).

In summary, the result of the 2002 broad scale cost benefit analysis[20] that utilised two modelling scenarios from previous economic scenario work (McDermott Fairgray 2001)[21] gave Waikato Regional Council certainty that the benefits of restricting nitrogen inputs to Lake Taupo exceeded the costs associated with Lake deterioration.

The analysis assumed that intensification of farm land would reduce the potential for tourism and the associated economic benefits. This means that protecting water quality is economically efficient, providing long-term and sustainable benefits for both the Catchment and the Region.

2.1.3 Costs of action

Further analyses of the costs of action required at an individual property level to protect Lake water quality show that the social and economic costs are significant. Farmers in particular, would face a reduction in income to the point where many farms may be no longer profitable or viable operations. Both farmers and foresters could face significant opportunity costs of future income foregone as a result of protecting Lake water quality. The implications of such costs are not only felt by individuals – flow-on effects would mean the wider community, businesses and the local economy will also be adversely affected. This is discussed in more detail under the reasons for choosing Objective 4.

2.1.4 Other environmental effects as a result of intervention

Managing nitrogen emissions for the benefit of Lake Taupo water quality means particular land uses are preferred over others. This preference may result in additional

[18] Although new dairy conversions for 2002/3 were expected to be lower than recent years, it is assumed that the 'do-nothing' option would have seen increasing dairying in the catchment over time.
[19] Values are modelled over 32 years (as per McDermott Fairgray) and a discount rate of 7.5% has been used. Value added modelling is given at a Regional level.
[20] Environment Waikato unpublished data (2002).
[21] McDermott Fairgray (2001): The Economic Impact of Alternative Land Uses in Taupo Catchment, report prepared for the Ministry for the Environment in association with Environment Waikato.

pressure for residential or rural residential growth and development throughout the Catchment. Without careful management by Taupo District Council, which has statutory responsibility for managing subdivision, development might occur at the expense of other environmental values such as landscape, amenity and biodiversity. Consultation with Taupo District Council staff has indicated that additional pressures for residential and rural lifestyle development are already occurring in some places in the Catchment.

This means that the effects of unmanaged growth and development are an issue that requires specific management.

2.2 Issues listed in Variation

Issue 1 Lake Taupo water quality decline – Effect on environmental values

Increases in nutrient discharges primarily from farming land uses but also wastewater disposal in the Lake Taupo Catchment have threatened the Lake's water quality, resulting in:

a) Increases in nitrogen in the surface waters of the Lake
b) Increases in nitrate nitrogen in the bottom waters of the Lake
c) More microscopic particles of nutrient dependent algae
d) Increases in blue-green algae blooms
e) Increases of algal slimes and other diatoms in shallow water
f) Blooms of filamentous green algae along the Lake edge.

Expansion of settlements and associated sewage treatment facilities, and the resulting leaching of contaminants near the lakeshore, has had localised adverse effects on the shallow near-shore water environment including:

a) Filamentous algae that coats rocks with a slippery surface
b) Some nutrient dependent macrophytes, taking up clear swimming space close to the shore
c) Periphyton that washes up on the shore, causing unpleasant odours
d) Increased risk of adverse health effects when near-shore waters are used for recreation.

If nutrient discharges continue at the same level or increase, then the adverse effects will worsen and will result in a further decline in lake water quality.

Issue 2 Lake Taupo water quality decline – Effect on community values

The changes outlined in Issue 1 will be difficult to reverse, with the potential to significantly affect:

a) Icon status of Lake Taupo and associated social and cultural value to local, regional and national communities
b) Mana of Ngati Tuwharetoa as kaitiaki of the Lake
c) Economic benefits to the local community from recreation and tourism activities
d) Amenity and landscape values associated with the Lake
e) Human health
f) Natural character of the Lake
g) The Lake's trout fishery
h) The Lake's ecological health.

Issue 3 Social, cultural and economic effects associated with nitrogen management

Managing the discharges referred to in Issue 1 will have adverse social, cultural and economic effects on individuals and communities in the Lake Taupo Catchment, such as:

a) Increased cost of compliance through new regulation and monitoring
b) Nitrogen limits will reduce the range and types of land use options undertaken, particularly for pastoral, shrub land and forestry landowners
c) Reduction in land values for some pastoral, forest and undeveloped land.
d) Reduction in farm income, to the point that farms may become unprofitable or not viable
e) Preventing the opportunity to develop new or existing land uses where that development will result in a net increase of nitrogen to the lake
f) Effects on the wider community and social and cultural structures such as declines in school rolls, rural services, and local businesses
g) Limits on traditional Maori settlements of Papakainga or Marae buildings.

Issue 4 Adverse effects on other environmental values from land use change to low nitrogen activities

Managing the discharges referred to in Issue 1 means that in addition to changes in farming practice, lower nitrogen leaching activities are encouraged such as forestry, rural residential subdivision, and urban style development. While benefiting lake water quality, this type of land use change may adversely affect other parts of the environment, such as: biodiversity; landscape and amenity values; natural and cultural heritage, and soil conservation. Most of these values are managed by the Taupo District Council.

3 Objectives

3.1 Objective 1

Objective 1 is:

Objective 1 Maintenance of the current water quality of Lake Taupo

2001 water quality levels in Lake Taupo maintained by 2080 as indicated by:

Water Quality Characteristic	Mean	Standard Deviation
Total nitrogen (mg/m^3)	70.3	19.1
Total phosphorus (mg/m^3)	5.57	1.4
Chlorophyll *a* (mg/m^3)	1.18	0.6
Secchi depth (m)	14.6	2.7

Note: Statistics based on Lake Taupo data set, January 1999 to December 2003 inclusive

This objective sets a long-term goal for nitrogen loads in the Lake. The objective will address the issue because it sets a finite limit for nitrogen in the Catchment.

The key alternative to setting a limit on the total load of nitrogen is for the objective to refer generally to Lake protection, without setting a numerical standard. However, this is not appropriate because of the difficulty of measuring whether the environmental outcomes are being achieved.

3.1.1 Total annual nitrogen load in Objective 1

Table 1 lists the loads of nitrogen estimated to be currently entering Lake Taupo in an "average year" under existing land uses. The loads were initially estimated at a total of 1145 tonnes per year by NIWA using a complex Catchment model.[22] These loads were revised by Waikato Regional Council in 2003 to account for:

- a slightly higher specific yield from undeveloped areas and areas in pine, allowing for flood loads
- a downward revision in the areas of pasture, pine and shrub in the Catchment using more recent land cover data from a January 2002 Landsat satellite image.

The values in Table 1 are rounded and are a best estimate of loads in an average year over the past decade. The total load of 1198 has also been rounded in Objective 1 to provide the estimated current Lake nitrogen load of 1200 tonnes per year.

Table 1: Current nitrogen loads to Lake Taupo

Source	Load (tonnes/yr)		Effective yield (kg/ha/yr)
Rainfall	230	(19%)	3.7
Undeveloped	313	(26%)	2
Pine	132	(11%)	2
Non-dairy pasture	377	(31%)	7.3
Dairy pasture	58	(5%)	25
Urban runoff	16	(1%)	8
Sewage	17	(1%)	
Tongariro Power Development	80	(7%)	
Total	**1220**		

[22] Elliott, A.H.; Stroud, M.J. 2001: Prediction of nutrient loads entering Lake Taupo under various land use scenarios. *NIWA Client Report EVW01224*. NIWA, Hamilton.
See also: Elliott, S.; Stroud, M.; Cooper, B.; Shankar, U.; Tian, Y. 1999: Catchment model for assessment of nutrient loads entering Lake Taupo. *NIWA Client Report ELE90233*. NIWA, Hamilton.

It is important to note that the manageable load of nitrogen to the Lake includes only those sources that can be reduced by management – that is, nitrogen from pastoral and urban (run-off and wastewater) land uses. This is a subset of the total load to the Lake shown in Table 1 above.

3.1.2 Water quality characteristics in Objective 1

Waikato Regional Council measures Secchi disc depth at an open water sampling site to monitor Lake Taupo's water clarity over time. Other water quality characteristics are monitored from samples collected at this site in the top ten metres of the Lake.

In determining the water quality characteristics used in the objective, and the benchmark date for assessing whether the objective is achieved, consideration was given to three aspects:

- The range of data that could be used to characterise the average water quality of Lake Taupo and characteristics that would accurately describe effects on water quality from nitrogen load in the Lake.
- An acceptable number of years over which data could be averaged.
- The most appropriate five year period around the 2001 benchmark that could be averaged.

The number of years over which data are averaged needs to be long enough to give a snapshot of water quality that is not skewed by individual yearly fluctuations or unusual events such as eruptions, and short enough to be able to respond to community expectations of responsive policy intervention, if changes in expected trends in the Lake are detected.

A period of five years smoothes out seasonal and inter-annual variability in the water quality of the Lake and is a reasonable timeframe over which to average monitoring results. There are two possible approaches to defining the appropriate averaging period, as follows:

- The five years before 30 June 2001 (i.e. July 1996 to June 2001); and
- The five years centred on 30 June 2001 (that is, January 1999 to December 2003).

Technical advice to Waikato Regional Council was that four variables (total nitrogen, total phosphorus, chlorophyll *a* and Secchi disc depth) that have a direct relationship with nutrient loads to the Lake should be listed in the objective. Dissolved oxygen was not listed, although it is regularly monitored in the Lake and used by Waikato Regional Council as an indicator of Lake condition. The fact that there are far fewer data for dissolved oxygen depletion rate and that these data are highly variable meant that this characteristic was not a suitable measure for the objective.

Table 2 below lists the mean and standard deviation ("Stdev") for five relevant water quality characteristics as measured at Waikato Regional Council's deep water monitoring site on the Lake ("Site A").[23,24] There is one value of the dissolved oxygen depletion rate for each year , while the other variables are measured at intervals of approximately 3–4 weeks. The units for total nitrogen, total phosphorus and chlorophyll *a* are milligrams per cubic metre, the units for Secchi disc depth are metres and the units for the volumetric hypolimnetic oxygen depletion rate are milligrams per cubic metre per day. *n* = number of measurements used to calculate the mean and standard deviation.

[23] The mean (or average) is a measure of the central tendency of the data; the standard deviation is a measure of the variability of the data around the mean. A relatively small standard deviation (e.g. <5% of the mean) indicates that the data does not vary much, while datasets that are highly variable have relatively large standard deviations (e.g. >50% of the mean). The greater the variability, the less likely it is that two datasets will be significantly different.

[24] The dissolved oxygen depletion rate is calculated from the dissolved oxygen measurements that are made at depths between 70 metres and 150 metres at 3–4 weekly intervals during spring-to-autumn. Secchi disc depth is measured vertically downwards from the Lake surface. Total nitrogen, total phosphorus and chlorophyll *a* are measured in a "composite" sample collected from the 0 to 10 metre layer (using an integrating tube).

Table 2: Mean and standard deviation for five water quality variables measured at Lake Taupo deep water monitoring site

	Five years before 30/6/01			Five years centred on 30/6/01			Are means statistically significantly different (*t*-test)?
	n	**Mean**	**Stdev**	***n***	**Mean**	**Stdev**	
Total nitrogen	62	73.2	13.4	76	70.3	19.1	No
Total phosphorus	57	5.22	1.61	73	5.57	1.40	No
Chlorophyll *a*	70	0.94	0.47	76	1.18	0.60	**Yes (*p* <1%)**
Secchi depth	69	14.1	2.0	78	14.6	2.7	No
Oxygen depletion	5	5.1	2.6	5	8.0	4.3	No

Comments on Table 2

- There are several missing values for total nitrogen and total phosphorus in the "five years before" dataset.
- Average chlorophyll *a* in the "five years centred" dataset is about 25 per cent higher than that in the "five years before" dataset (that is, there has been a deterioration in water quality), and the difference is statistically significant (despite the relatively high variability in the datasets).
- In contrast, average Secchi depth in the "five years centred" dataset is 3–4 per cent higher than that in the "five years before" dataset (that is, there has been an improvement in water quality), but the difference is not statistically significant.
- The dissolved oxygen depletion rate has varied markedly, from 2.6 mg/m3/d (1998/99) to 13.8 mg/m3/d (2002/03) and may have been affected by non-Catchment factors (for example, volcanic eruptions, varying algal assemblage, unusual weather).

It was considered that the five year period centred around 30 June 2001 provides a satisfactory basis for identifying "before Taupo Variation" conditions in the Lake. Although chlorophyll *a* levels in this period were somewhat higher than those earlier, the datasets are comprehensive, with few missing values.

3.2 Objective 2

Objective 2 is:

Objective 2 Effect on Lake Taupo water quality from farming activities

Farming activities which result in nitrogen leaching are managed to maintain the 2001 water quality characteristics of Lake Taupo.

Objective 2 recognises that in order to achieve the long term water quality goal in Objective 1, farming activities which result in nitrogen leaching need to be managed. This is in recognition of the large proportion of manageable nitrogen in the Lake Taupo Catchment which results from such farming activities. This objective recognises that if the water quality objective is to be achieved, farming activities that result in nitrogen leaching in the Catchment must be controlled.

3.2.1 Farming and nitrogen leaching

The following is a simplified summary of nitrogen leaching and farming.

Two things must occur for nitrogen to leach from the soil. Firstly, there must be a source of nitrogen in a suitable form that is mobile and for the most part that form of nitrogen is nitrate. Secondly, there must be water draining through the soil profile to

carry the nitrate from the soil. That is, for nitrogen to leach there must be both a source of nitrogen, and a transport mechanism.

The transport mechanism of drainage is largely controlled by rainfall, evaporation, and soil physical properties. These factors are effectively beyond control of the land user. Short of placing a roof over the whole farm, nitrogen leaching can therefore only practically be controlled by controlling the amount of leachable nitrogen in the soil.

As the total inputs of nitrogen to a soil system increase, the pool of available nitrogen in the soil also increases, and nitrate is more likely to leach. Research has identified a number of sources of nitrogen leached from pasture systems, with the major contributor being animal urine and other minor contributors being animal dung, effluent from dairy farms and direct leaching of fertiliser nitrogen.

Animals effectively “concentrate” the nitrogen by grazing grass from a large area of the paddock, excreting much of the ingested nitrogen back onto the soil in a concentrated urine spot. This concentrated spot of urine contains far more nitrogen than the grass can take up and soil bacteria over a number of weeks convert the excreted urea into ammonia and then into nitrate. Once nitrate is formed, rainfall events that wet the soil enough to cause drainage are likely to cause nitrogen to leach below the depth of grass roots, and nitrate remediation becomes less likely.

The amount of nitrogen leached by animal grazing is related to how much nitrogen an animal ingests, as the more of a given feed the animal eats, the more nitrogen is excreted onto the land in urine and faeces. The issue of increasing nitrogen leaching from the intensification of pastoral agriculture is caused largely from the practise that to get greater production (necessary to stay competitive), it is necessary to either get more production from each animal, or more animals on the land, or ideally a combination of both. Either way, both practises result in more feed being consumed, and therefore more urine spots, leading to greater nitrogen leaching. Put simply, more nitrogen in equals more nitrogen out, all other things being equal.

At the simplest level, controlling nitrogen leaching is simply a matter of controlling how many animals graze a property. However, given that production (and therefore nitrogen leaching) can be increased by feeding the same number of animals more food, the amount of feed an animal receives also needs to be controlled if overall nitrogen leaching is to be maintained. The two simplest mechanisms to increase feed are to use nitrogenous fertilisers to promote extra grass growth, or the purchase of supplementary feed.

While the matters outlined previously broadly control nitrogen inputs to the system, and therefore nitrogen loss, in reality, it is far more complex with multiple feedback loops and interactions between variables. There are a wide range of management practices that affect how much nitrogen leaching will occur. For example, animal type is important as sheep leach less nitrogen per stock unit than bulls, which leach less than cows. This is related to the volume and nitrogen concentration of the animal’s urine at each urination event.

The timing of fertiliser application is important. Nitrogen fertiliser applied in winter (when drainage is usually highest) is more likely to lead to leaching than if that fertiliser is applied in summer (when drainage is usually lower).

Some other management practices are either more capital intensive, or more ‘high-tech’. Winter housing for animals prevents the deposition of the urine spots during the peak autumn and winter leaching season of April to July and allows captured urine and dung to be spread in a spatially more even way back onto the soil avoiding urine spot concentration. Research into even more ‘high tech’ solutions is also underway, for example research on niitrification inhibitors that inhibit the activity of soil bacteria responsible for converting immobile nitrogen into mobile nitrate.

There has been considerable research over many decades into the factors affecting nitrogen cycling and therefore nitrogen leaching in soils. Conveniently, New Zealand has the outcomes of much of that research bundled into the nutrient model Overseer™. Overseer™ is a tool to examine the impact of nutrient use and flows within a farm (as fertiliser, effluent, supplements or transfer by animals) on nutrient use efficiency and possible environmental impacts. The model also provides a means to investigate mitigation options to reduce the environmental impact of nutrients within a land use.

Satisfying Objective 2 will mean that over time pastoral farming activities are being managed in a way that maintains the 2001 water quality characteristics of Lake Taupo.

An alternative to Objective 2 would be to not have such an objective and instead remain silent on the issue of managing nitrogen leaching from farming activities. Objective 1 also seeks to achieve the maintenance of water quality to the 2001 water quality characteristics. Given that Objective 1 can only be achieved through managing leaching from farming activities it could be sufficient to just have Objective 1 and not Objective 2. This is rejected as an alternative however as it doesn't make clear that controlling nitrogen leaching from pastoral farming (as opposed to other land uses/discharges such as wastewater discharges or forestry activities) is central to the Variation.

3.3 Objective 3

Objective 3 is:

Objective 3 Avoidance of near-shore effects from wastewater

No greater concentrations of domestic wastewater nitrogen or pathogens in shallow near-shore waters of Lake Taupo in the vicinity of wastewater treatment and disposal systems.

This Objective will address the issues identified concerning wastewater discharges near the Lake Taupo shore, where these discharges result in localised increases in nitrogen and wastewater pathogen concentrations in the water column and where there are increased risk of nuisance effects and health effects. The objective is to ensure wastewater disposal near the lakeshore does not increase the risk of plant and algae growth or cause health effects due to wastewater bacteria, viruses and other contaminants in shallow lakeshore waters.

The most suitable measure of wastewater nitrogen is Total Nitrogen, as this represents all nitrogen forms that may eventually become available as nutrient for plant growth. With respect to wastewater pathogens, suitable indicators would include those used in Ministry for the Environment or Ministry of Health guidelines for microbiological water quality.

Where there are greater than normal concentrations of nitrogen and wastewater pathogens, nuisance risks and health risks are considered to be above 'normal'. If the greater concentrations are found near a discharge from a community wastewater treatment plant, or near a number of on-site wastewater systems, it is highly likely that these risks are being caused by the wastewater systems. Satisfying Objective 3 will therefore ensure that wastewater discharges do not increase nuisance risks or health risks.

The objective has been worded in a way that allows progress towards its achievement to be monitored. Regular monitoring of nitrogen and indicators of disease-causing micro-organisms near wastewater discharges will show whether the objective is being met. It is important to note that background nitrogen levels in the Lake are expected to worsen before they improve and return back to current levels. Therefore, although the

objective ties required wastewater quality to background Lake water quality, a significant improvement in Lake water quality is not expected as a result of this objective. It is also acknowledged in setting this objective, that to assess whether a near-shore wastewater discharge is affecting localised Lake water quality, other nearby non-wastewater nitrogen sources will need to be accounted for.

Currently, there are several communities near the lakeshore that are serviced by standard septic tank wastewater systems. Standard septic tanks do not remove nitrogen from wastewater and only partially remove micro-organisms. There is considerable potential for such communities to increase nitrogen and micro-organism concentrations in near-shore shallow waters. Taupo District Council has indicated in its Long-Term Council Community Plan that it intends to reticulate and centrally treat wastewater from the main communities where this is an issue. The new centralised plants will be subject to wastewater discharge consents. The consent process therefore will need to ensure that treated wastewater discharges from the new community wastewater systems satisfy the objective.

It is likely that some existing community wastewater treatment plants near the lakeshore would not currently meet this objective, particularly with respect to nitrogen. For example, Barkle and Wang (2003)[25] modelled the movement of wastewater nitrogen and predict that wastewater nitrogen would need to move 700 metres from the Acacia Bay wastewater treatment plant before it dilutes to background levels. The discharge to the Lake from this plant is well within this distance. It is acknowledged that Taupo District Council will need time to upgrade such plants to comply with this objective. However, recent Taupo District Council experience with Sequential Batch Reactor wastewater treatment plants and trials of bark bed disposal at Kinloch, have shown that treatment plant upgrades to achieve the objective are practicable.

Isolated individual septic tanks near the lakeshore are unlikely to contribute significantly to greater risks of nuisance plant growth. However, they could cause localised health risks, particularly if the disposal field is often saturated by high groundwater. Individual on-site systems near the lakeshore will need to be managed in a way that allows such situations to be identified and remedied.

3.3.1 Near-shore effects from wastewater nitrogen

Studies have reported that wastewater nitrogen increases the risk of nuisance plant growths near the lakeshore. These studies are summarised in a recent draft paper by Waikato Regional Council[26]. Near-shore plant growth depends on several factors such as type of substrate, wave action, water depth, light conditions, temperature conditions, source plant stock and nutrient requirements of plants. Near-shore plants will not establish evenly around the lakeshore and there will be seasonal and annual differences in growth and distribution due to climate variations.

There are two main types of aquatic weeds found in Lake Taupo: nuisance macrophytes (large plants) and nuisance algae. Nuisance algae include the periphyton slimes and furry growths that establish on rocks and plant material, filamentous algae (looks like green cotton-wool and washes up on the shore) and phytoplankton (microscopic free-floating algae). In general, localised wastewater nitrogen sources are more likely to affect algae growth than macrophyte growth, because macrophytes generally take their nutrient needs from sediments. Reducing near-shore wastewater nitrogen will therefore reduce the risk of near-shore algae growth (including summer toxic algae blooms). However, in most cases, it will not result in a reduction in established macrophyte beds.

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[25] Barkle, G.; Wang, F. 2003: The Simulated Fate of Treated Domestic Effluent Discharged into the Vadose Zone within the Taupo Catchment. *Lincoln Environmental Report No 4949*, June 2003.

[26] Environment Waikato (draft): Lake Taupo Weeds Position Paper. Environment Waikato, Hamilton.

Wastewater from near-shore wastewater systems can also increase the risk of health effects from recreational activities in the shallow lakeshore waters. In general, where there is at least a 600 millimetre unsaturated zone beneath the wastewater disposal field, bacteria will die off before the wastewater reaches groundwater and the Lake[27]. However, Pang et al.[28], in their discussion of setback distances for on-site systems near the Rotorua Lakes (where soil conditions are similar to those around Lake Taupo), have stated that to protect swimmers from the risk of viral infection, on-site systems should be set back at least 48 metres from the shore.

For these reasons, it is important that near-shore wastewater discharges are managed such that the risks of nuisance plant growths and health effects are minimised, and that future development around the lakeshore does not increase the risk of these effects. To ensure this is the case, methods will need to identify an appropriate buffer zone within which special requirements for wastewater management are required.

3.4 Objective 4

Objective 4 is:

Objective 4 Economic costs minimised and social and cultural effects mitigated

Economic costs of managing land use activities to achieve Objective 1 are minimised, and spread across local, regional and national communities. Social and Cultural effects of managing land use activities to achieve Objective 1 are mitigated.

The objective will address the issue of social, cultural and economic effects listed in Issue 3 by spreading the economic cost across local, Regional and national communities and mitigating social and cultural costs. It is appropriate for the Variation to contain an objective making specific reference to social, cultural and economic well-being, as it is a matter listed in the purpose and principles of the RMA and significant social, cultural and economic costs have been identified that will adversely affect social. economic and cultural well-being.

There are two key alternatives to this objective. The first alternative is for the Variation to be silent on this matter and instead, rely on provisions of the Local Government Act and Waikato Regional Council's 2006-2016 Long-Term Council Community Plan. The second alternative is for the objective to be silent about how financial costs will be spread, or state that costs will lie where they fall. These alternatives have been rejected for the reasons given below.

3.4.1 Enabling people and communities to provide for their social, economic and cultural well-being

The rationale for this objective can be summarised as follows:

- The land use changes required to achieve Objective 1 are likely to have significant negative economic impacts for some landowners in the Lake Taupo Catchment.
- Future land use options, such as farming intensification and conversions to farming that increase nitrogen, will be constrained, reducing the number of options for landowners.
- All landowners who have been carrying out nitrogen leaching activities believe they have been acting lawfully to date.
- There is no statutory obligation on Environment Waikato or any other government agency to recompense or otherwise assist landowners for any financial losses

[27] Ian Gunn (1987): Letter to Hauraki Catchment Board re Clearances to groundwater and renovation of septic tank effluent. 11 February. School of Engineering, University of Auckland, Auckland.
US Environmental Protection Agency (1980): Design Manual – Onsite Wastewater Treatment and Disposal Systems. Office of Water Program Operations and Office of Research and Development Municipal Environmental Research Laboratory.

[28] Pang, L, Close, M, Goltz, M, Sinton, L, Davies, H, Hall, C and Stanton, G (2003): Estimation of septic tank setback distances based on transport of *E.coli* and F-RNA phages. Environment International 1062 (2003):1-15.

incurred but it is appropriate to identify costs and, where there is a significant negative impact, to look at ways of sharing costs.

- The statutory basis for Objective 4 is the definition of "sustainable management" in section 5 of the RMA; enabling "people and communities to provide for their social, economic, and cultural well-being".

Case law requires decision makers to take an "overall broad judgement" approach to section 5 of the RMA and promoting the sustainable management of natural and physical resources. The leading case on this matter is NZ Rail vs Marlborough District Council [1994] NZRMA 70, a decision of the High Court. In that decision the Court stated:

> Part II of the Act expresses in ordinary words of wide meaning the overall purpose and principles of the Act. It is not a part of the Act which should be subjected to strict rules and principles of statutory construction which aim to extract a precise and unique meaning from the words used. There is a deliberate openness about the language, its meaning and its connotations, which is intended to allow the application of policy in a general and broad way.

However, the Environment Court's decision in North Shore City Council vs Auckland Regional Council (Okura) [1997] NZRMA 59 probably describes the concept most appropriately. In that decision the Court stated:

> The method of applying section 5 of the Act then involves an overall broad judgement of whether a proposal would promote the sustainable management of natural and physical resources. That recognises that the Act has a single purpose. Such a judgement allows for comparison of conflicting considerations in the scale or degree of them, and their relative significance or proportion in the final outcome.

The broad overall judgement approach allows decision makers to weigh the need to protect the water quality of Lake Taupo with the need to enable people and communities, in this case the landowners affected by the rules controlling nitrogen leaching, to provide for their economic well-being. Consequently, to facilitate that weighing up process, a balanced suite of objectives is required.

3.4.2 Spreading the financial cost

Waikato Regional Council signalled in the Lake Taupo Strategic Partnership document in 2003 that it did not wish to introduce nitrogen reduction rules that could significantly affect the long-term economic well-being of farmers. It was acknowledged that the imposition of a Catchment-wide nitrogen cap meant that forestry and farming landowners would forgo future opportunities. Including Objective 4 is a way of facilitating an overall broad judgement on the environmental and economic issues related to Lake water quality. In so doing, Objective 4 conveys to affected landowners and the wider community that their economic well-being will not be unduly compromised as a result of regulatory measures introduced by the Council.

At a macro economic scale there are significant economic, social, cultural and environmental benefits from protecting the Lake (the benefit to cost ratio is greater than three), but the burden of change falls unevenly on the rural community to the extent that, for some, economic viability is threatened.

Estimating the cost of intervention to landowners

Reduced land values due to restrictions on nitrogen leached from future land use are one likely result of any policy intervention by Waikato Regional Council. This reduction in property values will not be even across the Catchment as lakeside land has other high value opportunities. Also the reduction in land values could have cost consequences for some landowners in the immediate future, but for others nothing will change immediately except that the option of further development is constrained.

Issue 3 identifies that nitrogen limits will reduce land use options for all land use types and in particular for pastoral, shrub land or undeveloped land and forestry landowners. The issue also identifies that the Variation does not provide any opportunity to develop existing or new businesses where that will increase nitrogen outputs. A reduction in land values will be across all land uses including forestry and undeveloped land.

A report undertaken for Waikato Regional Council in 2001[29] indicated that the costs to pastoral landowners of reducing nitrogen outputs from their farms would be significant. This report did not specifically assess the costs to farmers of managing their business under a nitrogen cap (regulation and compliance costs) but it did indicate that farms would lose value due to the potential decrease in profitability as a result of a cap.

The key issue of concern to Waikato Regional Council was the loss of income if regulation was introduced where all farming properties had to reduce nitrogen leaching by 20 per cent.

The cost of the uptake of new technology and changes to farm management practices will vary between farms, possibly to the extent that some farms will be able to achieve the 20 per cent reduction and others only part or none of it.

Costs would also vary based on the extent of flexibility built into the regulatory regime regarding individual circumstances. This was illustrated in the consultation with farmers about a possible 'across the board nitrogen reduction' where all properties reduce nitrogen by the same percentage, regardless of their existing nitrogen leaching. The cost of achieving this would vary from farm to farm. For instance, landowners with high debt servicing requirements or lower existing economic farm surplus have less ability to buffer the drop in income that would result from land use changes to meet nitrogen reductions. This means that some farmers may have the ability to reduce nitrogen leaching and maintain a viable farming business, whereas others may not.

The report[30] estimating the costs to farms of restrictions on nitrate emissions in the Taupo Catchment concluded the following relevant points:

- Intensification (for instance, increasing the amount of stock grazed per hectare) is profitable to farmers. Any restriction on this may reduce profitability and capital value.
- A cap based on existing use, where no increase in nitrogen emissions is allowed, may result in a 25 per cent reduction in land values - a total cost of $38 million, or on average, $380,000 per farm.
- One way that farmers could achieve a 20 per cent nitrogen reduction is through reducing the amount of animals on the property. A reduction in nitrogen through reduced stocking rates may result in a total cost of $54 million or on average $540,000 per farm (this is calculated based on approximately 100 large farms in the Catchment).
- Depending on the timeframe over which the new nitrogen restriction regime was enforced, farmers may be able to extract capital to reduce costs. For example, a pastoral landowner could stop maintenance and upgrading of fencing or soil fertility for a number of years before the land is converted to a lower nitrogen leaching land use. If capital extraction is possible, the effect of this is $9 million, which equates to $9,000 per farm.
- Levels of capital investment and therefore ability for capital extraction associated with farm conversions vary throughout the Catchment. Such levels influence costs and patterns of land use.

[29] Finlayson, J. and Thorrold, B. (2001): Estimating the costs of restrictions on nitrate emissions in the Taupo Catchment. Report to Environment Waikato.
[30] Finlayson, J. and Thorrold, B. (2001): Estimating the costs of restrictions on nitrate emissions in the Taupo catchment. Report to Environment Waikato.

A subsequent refinement to this report in 2001,[31] described the on-farm economic impacts of nitrogen management in the Lake Taupo Catchment. It examined the effects of stocking density and farm management systems on farm cash surplus, farm capital value and nitrogen leaching from farm land based using a case study of a typical sheep and beef farm in the Catchment. The study showed that intensification of land use is a profitable option for farmers and that any restriction on land use will have large effects on profitability and value of existing farm businesses. The study also examined several farm systems that reduced nitrogen leaching but all options resulted in a decrease in farm cash surpluses.

Figure 1 below, shows the effect of land use change on farm capital value and cash surplus for a representative 12 stock units per hectare (su/ha) sheep and beef farm. The management scenarios shown include:

Current - the farm situation before May 2000
Option 1 - conversion to forestry
Option 2 - restricted low intensity sheep and beef system (8su/ha) that represents a 25 per cent reduction in nitrogen leaching
Option 3 - restriction to current intensity

For comparison purposes, two realistic development options under an unrestrained regulatory environment were assessed:

Option 4S – conversion to intensive sheep and beef farming (16 su/ha),
Option 4D - conversion to a dairy farm.

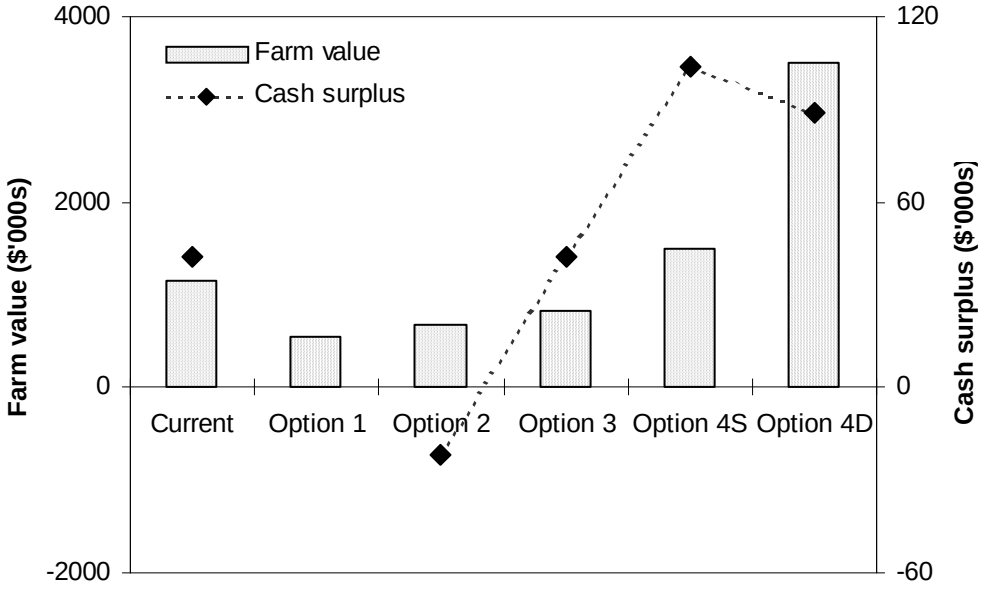

Figure 1: Effect of land use change on farm capital value and cash surplus under different management scenarios

Option 2, requiring a 25 per cent reduction of nitrogen leaching, resulted in lowered capital value and more importantly, a reduction of farm income leading to an annual cash deficit (that is, an annual cash loss). In reaching this conclusion, Waikato Regional Council believed that a rule requirement to reduce nitrogen would cause significant financial losses, and therefore did not take into account the social and economic well-being of the pastoral based community.

[31] Thorrold, B., Finlayson, J., Lambert, G., Ledgard, S., Smyth, D., Tarbotton, I., Smeaton, D., and Webby, R. 2001. Proceedings of the New Zealand Grasslands Association 2001. Vol.63:page 69-72.

Having considered this information Waikato Regional Council concluded that Option 3, which maintains farm cash surplus but reduced relative capital value, combined with the imposition of an ongoing regulatory regime to cap nitrogen from all properties and associated costs for establishment of consents and monitoring, represented a fair burden of change for the rural community.

It is Council policy that regulatory and compliance costs are applied on a 'user pays' basis. Landowners therefore expect to incur ongoing compliance costs with regulatory intervention.

Throughout 2001, the consulting committee of Taupo Lake Care (TLC) farmer representatives strongly advocated the position that farmers should receive payment for income forgone under a nitrogen capping regime. This was not accepted by Waikato Regional Council.[32] A report was commissioned by the Taupo Lake Care farmer group in 2002[33] to estimate financial losses to Catchment farmers of nitrogen restrictions. The report estimated both a Catchment-wide cost if all landowners were forced to limit their business to current activities under a nitrogen cap, and also estimated the overall cost to pastoral landowners of having to reduce nitrogen by 20 per cent. The report concluded the total of these two aspects to be upwards of $96 million. Waikato Regional Council noted that this report appeared to assume a 'worst case' scenario of an inflexible regime with no trading and no uptake of nitrogen reducing on-farm practices.

The Council accepted the Taupo Lake Care farmer representative position that both capping and nitrogen reduction will place significant costs on landowners. However, the Council has not verified the assumptions and accuracies of the report estimate.

Waikato Regional Council did not commission any assessment of cost to forestry interests of a Catchment-wide nitrogen cap, despite requests from private forestry company representatives. The portion of the nitrogen capping cost due to opportunities forgone is a cost to all rural landowners in the Catchment. Waikato Regional Council made a policy decision that rural landowners would not be compensated for lost opportunities as a result of a nitrogen cap on nitrogen leaching in the Lake Taupo Catchment.

Overall judgement on addressing financial cost to landowners

Waikato Regional Council considered that, in view of the significant costs to the rural community and the history of government-subsidised land development in the Catchment, it would be prudent to investigate options for a government partnership to help support the community through the required change process.

On 15 August 2001, the Waikato Regional Council Policy Committee agreed to liaise with Taupo District Council and Central Government on implementing land use change, including investigating funding options to help share the costs of change. This was accepted at a Council meeting on 30 August 2001.

At a meeting with Regional and District Councillors, farmer representatives and Tuwharetoa Maori Trust Board representatives in mid July 2001, Minister for the Environment, Marion Hobbs, agreed to enlist Governmental support for the project with the view of developing a "whole of government" approach.

Since 2001, Waikato Regional Council has been working in partnership with Taupo District Council and Central Government to establish how best to share the costs of

[32] TLC/EW meeting notes 26 March and 2 July 2002 referred to TLC ideas of 'service payments' for farmers under a nitrogen capping regime. The Nimmo Bell report was presented to EW staff and several Councillors in late 2002. Subsequent EW/TLC meeting notes referred to the EW position of there being 'no compensation for income forgone', on 29 April 2003.

[33] Thomas, A, Bell, B and McRae, A (2002): Assessing the loss to farmers associated with nitrogen restriction outputs in the Lake Taupo catchment. Nimmo-Bell and Company Limited, Wellington.

change. The outcomes of this work are reflected in the preferred policy approaches outlined in section 4 of this report.

Effects on papakainga and Marae

During the hearing, some submitters raised the issue that the wastewater rules would effectively prevent expansion of papakainga and Marae wastewater services in some cases. This was considered to be unacceptable to the Committee in terms of the Resource Management Act requirements in s5(2) ('enabling people and communities to provide for their . . . cultural wellbeing'), s6(e) and s8. This matter also needs to be addressed in terms of Objective 4.

3.5 Objective 5

Objective 5 is:

Objective 5 Avoidance of adverse effects from land use change

Significant adverse effects on the environment from land use changes as a result of managing land uses to achieve Objective 1 are avoided.

This objective will address Issue 4 regarding subsequent and consequential effects that may arise with intervention to manage diffuse nitrogen discharges and land use change. There are existing pressures in the Taupo Catchment for land uses, particularly lifestyle subdivision, which may affect landscape, amenity, biodiversity, natural and cultural heritage and soil conservation. These matters, in the main, fall under the jurisdiction of territorial authorities – in this case, Taupo District Council.

In preferring some land uses over others because of their nitrogen discharges and effect on Lake water quality, the Waikato Regional Council is signalling a need for land use change. However, low nitrogen land uses, while good for Lake water quality, may give rise to significant adverse effects on other values, if not managed appropriately. Part of ensuring these other significant adverse effects are avoided is to anticipate them in Regional and district planning documents. Because plans are driven by effects-based issues, these particular issues are not a current concern and, as such, plans are not geared to address them. The objective aims to create a planning environment that anticipates these issues and ensures the appropriate guidance is given at Regional and district levels.

A key alternative to this objective is to remain silent and leave such issues to be dealt with solely by Taupo District Council when and if they arise. This is a narrow and reactive approach and will not promote integrated management.

3.5.1 Growth management

Taupo District Council has adopted a growth management strategy for the district - 'Taupo 2050'. This growth strategy identifies that the district is under pressure from population growth, tourism and visitors, and that growth and development does require management. The strategy outlines where Taupo District Council prefers future growth to occur and the nature and scale of such growth. Due to additional pressures as a result of Regional policy, it is appropriate that the Waikato Regional Council works together with the Taupo District Council to develop joint policies on land use change, growth and development.

3.5.2 Other values

Extensive land use change may give rise to adverse effects on other values such as landscape, biodiversity and amenity. While these matters are managed predominantly through territorial planning documents, it is appropriate that the Waikato Regional Council gives guidance to ensure integrated management. Conflicts between Lake

objectives and other resource management objectives could create unnecessary pressures and the potential for mixed messages to landowners and developers. It is important that water quality is not given a significance that overrides all else in all circumstances. Raising the issue and providing an objective that aims to avoid wider significant adverse effects on the environment means the wider implications of managing nitrogen are taken into account.

3.6 Summary

Issue 1 lists the effect on environmental values from manageable nitrogen discharges. Issue 1 highlights nitrogen leaching from farming activities as the predominant cause of threat to Lake Taupo water quality. Issue 2 is concerned with effects on community values. Issue 3 sets out fully and objectively, effects on individuals and communities of any management of nitrogen discharges that threaten water quality of the Lake. Issue 4 refers to possible adverse effects of any management of nitrogen discharges that threaten water quality of the Lake.

Objective 1 is a water quality objective for the Lake. Objective 2 recognises that nitrogen leaching from farming activities is the predominant cause of the threat to Lake Taupo water quality. The objective therefore indicates that nitrogen leaching from farm activities must be managed in order to achieve the water quality objective. Objective 2 is also the lead in to policies and methods in the Variation that actively seek to manage farming activities.

Wastewater also can affect Lake water quality, particularly in shallow waters near large or concentrated wastewater discharges. Wastewater therefore must also be managed so that such localised increases in wastewater nitrogen or pathogens do not occur, as stated by Objective 3.

Objective 4 aligns with the purpose of the Act, as it gives a desired end state for the social and cultural effects and the economic costs, of managing nitrogen leaching listed in Issue 3. Objective 5 completes the suite of objectives.

These objectives seek to achieve protection of Lake Taupo water quality while ensuring the potential adverse effects of that protection are appropriately managed. In doing so they represent a balanced suite of objectives which address the range of matters relating to sustainable management as defined by s5(2) of the RMA.

4 Possible Policy Approaches to Achieve Objective 1 and 2

There are a number of possible policy approaches that could be adopted to achieve the Lake water quality target and control nitrogen leaching from farming activities. Waikato Regional Council has considered a range of these possible policy approaches. As noted earlier in this report, these alternatives have also been evaluated in the light of feedback from project partners and stakeholders in the Catchment.

In achieving the long-term Lake target in Objective 1 and the controlling of nitrogen leaching from farming activities, it is considered that there are two cornerstone aspects:

- Preventing nitrogen increases by setting a Catchment-wide cap on nitrogen emissions
- Managing land use so that nitrogen is permanently removed from sources that can be managed downwards (nitrogen from primarily pastoral land and also wastewater) in the Catchment. Permanent removal of nitrogen from existing land use activities would balance the amount of nitrogen that is 'in transit', that is, nitrogen that has already been discharged but has not yet reached the Lake via groundwater.

The following sections divide the potential policy approaches into:

- Value recognition.
- Nitrogen capping.
- Nitrogen reduction.

In the following sections, there is a further division into policy approaches for both wastewater and land use. Addressing diffuse nitrogen discharges from land use is a very different matter from approaches to address treatment and discharge of wastewater. Thus, in addition to setting out nitrogen capping and reduction policy approaches, each is further divided into whether the cap or the reduction is to address wastewater or land use activities.

4.1 Value recognition

Extensive research and consultation over the last few years has shown that Lake Taupo is valued very highly by local, Regional and national communities and particularly Ngati Tuwharetoa.

The 2020 Taupo-nui-a-Tia Project arose from the community and tangata whenua identifying what they considered to be the critical values associated with the Lake. Values of significance to Ngati Tuwharetoa were a critical part of the value identification, as an integral strand of the project. Other values included:

- Clear water.
- High quality inflowing water.
- Diverse plants and animals.
- Good trout fishing.
- Recreational opportunities.
- Foreshore reserves.
- Safe drinking water.
- Safe swimming.
- Weed-free Lake.
- Wilderness areas.
- Outstanding scenery.
- Geological features.

It is the recognition and importance of these values, particularly in a Resource Management Act context, that has driven the action to protect the Lake.

In addition to the policy approaches describing the different actions to be taken to achieve Lake protection, a number of policy approaches that recognise its value have also been considered. These are:

- Identification of Lake Taupo as an outstanding waterbody.
- Recognition of Ngati Tuwharetoa as kaitiaki of the Lake.
- Adoption and implementation of the Ngati Tuwharetoa Iwi Management Plan.

4.1.1 Lake Taupo as an outstanding waterbody

Description

This policy approach recognises Lake Taupo as an outstanding waterbody and can be described as a statement about the significant characteristics that make Lake Taupo an outstanding waterbody, and the need to ensure that activities do not adversely affect these characteristics.

Implications

By identifying the waterbody of Lake Taupo as an outstanding natural feature in the region it gains recognition under section 6 b) of the RMA as a matter of national importance. Identifying Lake Taupo as an outstanding waterbody elevates its statutory importance commensurate with the value placed on it by Ngati Tuwharetoa, local, regional and national communities.

Effectiveness

The identification of Lake Taupo as an outstanding waterbody complements and reinforces the value placed on it and the intervention proposed to protect it. This policy will be effective in ensuring that all those landowners and agencies working in the Catchment recognise and provide for the Lake's protection.

This policy approach is supported. The policy is written as Policy 1 in the Variation, and listed in section 8 of this report.

4.1.2 Tangata whenua values

Description

This policy recognises Ngati Tuwharetoa as kaitiaki of the Lake and the need for them to be involved in decisions about the Lake.

Implications

This policy approach formalises Ngati Tuwharetoa's position as kaitiaki of the Lake and commits the Waikato Regional Council to being proactive in involving Ngati Tuwharetoa in decision-making processes. This means that relationship building and communication are essential factors necessary to achieve the policy.

Effectiveness

The Waikato Regional Council and Ngati Tuwharetoa have a memorandum of understanding that formalises the relationship between the two parties. Building on this and continuing lines of communication should therefore be straightforward. For the policy to be effective, it needs to be supported by implementation methods that ensure tangata whenua values are incorporated into decision-making.

This policy is supported. The policy is written as Policy 2 in the Variation, and listed in section 8 of this report.

4.1.3 Ngati Tuwharetoa Iwi Management Plan

Description

This policy approach would formally adopt and implement Ngati Tuwharetoa's Iwi Management Plan.

Implications

Through the 2020 Taupo-nui-a-Tia Project, Ngati Tuwharetoa were able to articulate their resource management aspirations into the Ngati Tuwharetoa Environmental Iwi Management Plan. The Environmental Iwi Management Plan is underpinned by Ngati Tuwharetoa tikanga and kawa, and has identified the key environmental values and policies for the tribe. To progress the Environmental Iwi Management Plan further, a Ngati Tuwharetoa Comparative Risk Assessment was completed to ensure an organised approach was taken to achieving and protecting the values identified. During the life of the development of the action plan, a strong relationship between Ngati Tuwharetoa values and wider community values emerged. However, the methods used to achieve protection of these values for both Ngati Tuwharetoa and the community are different. The Environmental Iwi Management Plan sets a strong basis for Ngati Tuwharetoa to build its environmental management capacity.

Effectiveness

Because Ngati Tuwharetoa's iwi management plan is focussed on how to build its own capacity for undertaking environmental management, it would not be effective in providing a framework for recognising the Lake values. However, due to the incorporation of Ngati Tuwharetoa's values into the 2020 Action Plan it would be more directly effective in achieving Objective 1, to use the Action Plan as a means of recognising how Ngati Tuwharetoa value the Lake. The 2020 Action Plan has been completed and is now at an implementation stage. It is discussed later in this report as a possible implementation method.

This policy approach is not supported.

4.2 Nitrogen cap to prevent increases in emissions from land use

Waikato Regional Council considered three broad approaches to prevent further increases in nitrogen from land use within the Catchment:

- Regulation to cap nitrogen.
- Regulation to cap nitrogen supported with direct financial assistance from a public fund.
- No regulation by Waikato Regional Council – other measures ensure nitrogen cap is met.

Other approaches considered that support the cap include:

- Reviewing effectiveness of intervention measures.
- Monitoring phosphorus levels in the Lake.

4.2.1 Nitrogen cap using regulation – without direct financial assistance

Description

Nitrogen outputs from rural land are capped at current levels using rules in the Waikato Regional Plan, to prevent nitrogen discharges from increasing into the future. Rural landowners pay the full cost associated with complying with these rules, including medium-term costs of changing land use or management to continue operating their business under the cap, income forgone, and any reductions in capital value.

Implications

Rural landowners do not face an upfront cost to continue their farming or forestry businesses. However pastoral and cropping farmers and foresters face medium-term costs to maintain profitability under the new regime that caps nitrogen outputs.

Although it is possible for Waikato Regional Council to write rules that restrict land use and associated discharges, implementation of these rules is challenging because the regime is both unprecedented and unfamiliar, and monitoring and enforcement will be complex. Challenges include:

- Reliance on nutrient modelling as the means of measuring nitrogen leached, where nitrogen is invisible and diffuse.
- Requirement for farmers to self report farm inputs when developing farm plans.
- Requirement for detailed farm records as part of an on-farm audit, but small ongoing under-reporting of stock numbers, and feed and fertiliser supplements will be time-consuming and expensive for Waikato Regional Council to identify.

Since June 2000, Waikato Regional Council has undertaken detailed consultation with landowner representatives Taupo Lake Care, and less frequent and more general consultation with pastoral and forestry economic authorities of Ngati Tuwharetoa, and with representatives of other forestry interests in the Catchment. From this consultation, Waikato Regional Council has concluded that landowner acceptance of compliance with a nitrogen capping regime is more likely than acceptance of regulation to reduce nitrogen from pastoral land and capping of all nitrogen leaching land in the Catchment.

The cost of restricting nitrogen outputs to current levels from pastoral farms and forestry can be divided into:

- Medium-term costs of changing land use or management to continue business under permanent nitrogen cap.
- Future income forgone, due to restricting nitrogen leaching by removing traditional development pathways. These include conversion of forestry land to pastoral land, increasing stock units on existing farms, change to stock with higher nitrogen leaching potential and introducing nitrogen from outside the property in the form of nitrogen fertiliser or additional feed for animal farmers.
- Reduction in capital value of land as a result of restrictive regulatory controls being placed on that land. This may make a nitrogen restricted property less attractive to potential purchasers, with the potential to decrease the achievable purchase price.

The capital value cost to individual farming businesses of capping nitrogen on pastoral land were estimated in Thorrold and Finlayson (2001). The cost of income forgone for owners of undeveloped land, forestry land and pastoral land was estimated in the report commissioned by Taupo Lake Care (Nimmo Bell 2002). These two sets of costs are discussed previously in section 3.4.2 of this report.

The 2003 capital value cost of forestry land was estimated in a report to Waikato Regional Council (Curnow Tizard, 2003)[34]. Forest investors acquiring land either for planting or when purchasing an existing forest will measure or assess the productivity of the land as part of their evaluation. In the Curnow Tizard report, the current land market and an analysis of recent forestry sales was analysed to give a 'snapshot' of current land prices. The report also made some comment on the external influences taken into account in setting the price of forestry land, such as Local Authority regulation and the locations' land use infrastructure. However, no attempt was made to assess the future value of the land under development scenarios such as conversion to pastoral land. As stated earlier, Waikato Regional Council did not commission any work on the cost to forestry of opportunities forgone under a nitrogen cap.

[34] Smyth, D.R. (2003): Valuations – Lake Taupo catchment. Report to Environment Waikato from Curnow Tizard, July 2003.

Effectiveness

A regulatory approach where landowners are prevented from increasing nitrogen but are not required to reduce nitrogen to meet the Lake target, has the most potential to meet the objective, compared with voluntary approaches or nitrogen reduction rules.

This "no direct financial assistance for capping" option places the burden of costs on those landowners who must comply with regulation to cap nitrogen from their property. Waikato Regional Council has made a judgement that the "cost" of capping is largely one of future income potential, and that the wider community should not be responsible for compensating for opportunities forgone or a reduction in capital value of the land.

This policy approach is supported. The policy is written as Policy 3 in the Variation, and listed in section 8 of this report.

4.2.2 Nitrogen cap using regulation – with direct financial assistance

Description

Under this option, all landowners who are restricted in the allowable amount of nitrogen leached from their property, receive payment for the development opportunity that they may otherwise have enjoyed if regulation had not been put in place. For example, before Waikato Regional Council released its intention to regulate nitrogen discharges, some forestry landowners and pastoral farmers had plans to convert to other land uses such as higher leaching pastoral farming or subdivision and development.

Implications

The overall cost of the project is much larger if direct financial assistance for opportunities forgone is provided.

There are issues around the willingness and ability of the regional and district communities to fund this larger cost. It is also difficult to accurately estimate the cost of income forgone – current estimates are based on the traditional development pathway for pastoral farming, which may not be an accurate reflection of the future.

The Government has stated that compensation for forgone profits is unacceptable[35]. Any direct financial transfer to landowners must be for the purpose of cost-effective nitrogen mitigation.

Central Government Cabinet Ministers considered two separate papers – July 2003 and December 2003. Both papers, and the resulting Cabinet minute that recorded the decision of the Cabinet, made it clear that no compensation for future earning forgone would be agreed to by Central Government. This was clearly stated in a meeting between Taupo Lake Care representatives and Hon. Marian Hobbs and Hon. Jim Sutton (Ministers of Environment and Agriculture) on 23 September 2003. At a separate meeting on the same day, the Ministers advised forestry representatives that no compensation for future earning forgone would be agreed to by Central Government.

Landowner representatives have also requested limited financial assistance for landowners to live under a nitrogen restriction regime in their negotiations with Central Government Ministers. These include one-off payments for infrastructure development and financial incentives for land management and land use changes under a nitrogen cap, in order to maintain business viability in medium- to long-term. For example, payments for putting in winter standoff areas, business planning advice and cost of tree planting.

[35] Paper to Cabinet Policy Committee by Hon Marian L Hobbs, Minister for the Environment – 10 December 2003.

The response from Central Government, noted in the Cabinet paper, was:

> Taupo Lake Care also talked of "assistance" or "incentivising the nitrogen cap". There will be a range of advisory services but any direct financial transfer to landowners MUST be for the purpose of cost-effective nitrogen mitigation. We can still be creative in considering a matrix of land use changes that achieves net nitrogen mitigation, and fund accordingly. However, we should not blur this with compensations for foregone profits which is unacceptable.

In making its own judgement on whether landowners should receive payment for under a nitrogen cap, Waikato Regional Council considered several factors. Ratepayers contribute to the public fund for nitrogen reduction and research and development, and rates also contribute toward existing work to protect values in the Lake Taupo Catchment. Costs of Catchment protection are at the limit of affordability for Regional and district ratepayers. This was tested through a survey published in local papers and sent to all Taupo Catchment ratepayers in November 2003, and then assessed in the public submissions and Hearings on the Draft Long-Term Council Community Plan March – May 2004.

Effectiveness

In summary, this approach of compensation for potential income forgone associated with permanent nitrogen limits in the Catchment will not achieve the objective because:

- ratepayers and taxpayers are already subsidising the transition to sustainable land use by paying for the nitrogen reductions needed
- Central Government has made it clear that no funding for cost sharing to meet the cost of income forgone is forthcoming
- it is expensive for ratepayers to subsidise land use change to such an extent, when the majority of the benefit of subsidy falls to the local landowners concerned.

This policy approach is not supported.

4.2.3 Non-regulatory approach to achieving nitrogen cap

Waikato Regional Council considered three voluntary approaches to ensuring nitrogen emissions were capped in the Catchment:

- Research and development of new low nitrogen land uses and management practices.
- Provision of advice and information to landowners to support their transition to low nitrogen land uses and management practices.
- Code of practice supported by a Catchment management body.

Each of these voluntary approaches are considered for their ability to achieve the nitrogen cap without a regulatory 'backstop'.

Research and development

Description

This approach involves public funding of applied research and farm trials, with the overall goal of ensuring that profitability is maintained when nitrogen outputs from pastoral farm systems are restricted. It includes research on refining existing farm management practices, and investigation of alternative land uses and crop types in the Catchment. Examples include greater use of silage or wintering stock outside the Catchment, and development of horticultural crops such as blueberries.

Implications

This approach would provide increased certainty for landowners that they are able to adjust their current businesses and remain profitable in the Catchment. Research and

development may provide possible low nitrogen development pathways, helping to future-proof rural businesses.

Effectiveness

Research and development alone may not be effective at achieving sufficient change on the ground. This approach would need to be supported with the provision of extension and education services to help landowners apply research outcomes to their individual properties. Uptake of new land uses and practices is likely to be variable and would not provide high certainty of achieving the nitrogen reduction target.

There is also no guarantee that research and development will be able to provide sufficient gains to meet the 20 per cent reduction required across the Catchment, making the certainty of this approach very limited unless it is linked with other policy approaches.

Advice and information to landowners

Description

This approach involves the provision of farm advisory services and information about alternative low nitrogen land uses, management practices and business planning. It also involves voluntary implementation of land use and management change, including improved maintenance of existing urban septic tank systems and good practice with respect to boat washing to prevent the spread of exotic weeds in near-shore areas.

Implications

There are costs associated with the provision of this service. It is unlikely that there would be a viable private business and landowner transaction for this information. Therefore, this approach requires the public funding of an advisory service, supported by effective research and development.

Effectiveness

A purely voluntary approach of advice and information provision, will not achieve the objective because:

- Although there is widespread support for measures to protect Lake Taupo, there are costs to all landowners of achieving the Lake target.
- For existing and future urban landowners, these range from costs of checking and pump-out of septic tanks, through to installation of high performance individual on-site systems.
- The scale of the on-farm changes required and impacts on farm businesses is so large that it would be contrary to any individual's business viability to reduce nitrogen in the timeframe required unless equivalent or greater financial incentives were offered.
- An action that results in no easily identifiable individual benefits to the landowner is likely to invoke a "free-rider" mentality where landowners hope that others will act so that they will not have to themselves.

Code of practice supported by Catchment Management Body

Description

Taupo Lake Care suggested several options that could achieve the Lake target:

Option A – A two-tiered system whereby a 'Catchment management body' is formed consisting of landowners who want to comply and where the Catchment body obtains one resource consent for all properties that are part of the Catchment body. The Catchment body is then responsible for ensuring nitrogen restrictions for all landowners. Farm plans are developed using a general Taupo code of practice for each sector. Those landowners that stay within their nitrogen target are rewarded for good practice. Landowners that cannot fit with the code of practice or are in non-

compliance must obtain an individual resource consent from Waikato Regional Council and are no longer part of the Catchment management body.

Option B – Approved Operator accreditation system where operators meeting a set of environmental standards do not need to obtain consents. Accreditation can be revoked if the operator demonstrates poor environmental performance. Those landowners that are not approved operators must obtain controlled activity consents.

Implications

The idea of a Catchment body holding consents for numerous landowners creates jurisdictional issues regarding compliance. The Waikato Regional Council would have to rely on the Catchment body monitoring all farms and ensuring compliance. Liability issues then become complex in terms of whether individuals or the Catchment body are responsible for compliance. This option could be described as a 'global' consent to cap nitrogen, as it would allow a collective of landowners to obtain a single authorisation for their activities.

There are significant legal and practical difficulties with this method, as discussed below.

A single consent could not cover farms generally within the Catchment but would have to be specific to the land farmed by the members of the collective. Otherwise, it would be difficult to establish the modelled total discharge that would apply to the collective, and would make it impossible for Waikato Regional Council to estimate the amount of nitrogen leaching into the Lake from the collective.

If the membership of the Catchment management body changes over the course of the consent, this raises issues about how to deal with parties who may wish to leave or join the Catchment body while the consent is in force. If the consent set a quantitative maximum calculated by reference to the land farmed by the members of the collective, that number would need to be adjusted each time the membership of the collective changed.

Even if there was no quantitative maximum, Waikato Regional Council would still need to know which farms were in the collective and which had left in order to be able to know whether farms were operating under the collective consent or not and to be able to estimate the total amount of nitrogen being discharged by the collective.

More generally, there would be problems in monitoring and enforcement. The collective, as the consent holder, would have the obligation to comply with the consent conditions, including conditions requiring the provision of reports of the inputs to each farm and the modelled emissions. However, if one of the collective's members failed to provide the report or otherwise failed to comply with the consent conditions, difficult issues would arise as to whether Waikato Regional Council could take action against the individual member of the collective or whether it would have to take action against the collective itself and rely on the collective to require compliance with consent conditions.

In summary, if Waikato Regional Council granted a consent to a collective, then that entity would be liable for monitoring whether the individuals belonging to the collective were meeting their individual responsibilities, but would not have recourse itself to enforcement procedures under the RMA. The issues listed above would need to be addressed if an application was made for a globalised consent. It may be that there are ways of resolving these questions but much would depend on the nature of the proposal. It appears that it would be no less onerous for Waikato Regional Council to administer a globalised consent than it would be to administer a series of individual consents.

Accreditation regimes rely on best practice being defined. Currently, this has not been done in a comprehensive way for the Lake Taupo Catchment and, as such, cannot form part of an accreditation system. This implication also affects the ability to base farm plans on a code of practice.

Neither of the two approaches discussed above will achieve the objective, because of the legal and practical reasons stated.

This method is not supported.

Effectiveness

The options described above require levels of Catchment management sophistication that are not yet available. To try to implement such regimes would be problematic and create high levels of uncertainty.

Best practice, as a principle, may be defined in a variety of ways. However, nitrogen leaching best practice in a farm context can be described as practices that are both economically viable and environmentally beneficial (low nitrogen). The practicalities of implementing best management practices vary from farm to farm and change depending on market variables, such as price. Certain practices may be technically feasible but the costs associated with them may be significant, reducing the likelihood of voluntary adoption. Voluntary reductions in nitrogen leaching may be achieved by adoption of best management practices that profitably reduce nitrogen leaching. More research and development into best practice is required over the next few years before any effective regime could be determined.

The effectiveness of these policy approaches on their own are considered low and are not supported.

4.2.4 Review of intervention

Description

This policy approach would be a specific policy containing a date at which the intervention to achieve Objective 1 is reviewed, as well as the likely outcome of that review, if it was found that Waikato Regional Council was not likely to achieve the objective.

Implications

Specifying that intervention will be reviewed in a certain timeframe gives the community certainty that progress towards the Lake target is being monitored closely. It also signals that if more accurate information and data reveals the specific intervention is not adequate, different approaches may need to be proposed. The policy would recognise that the research and science involved in determining the rate and extent of water quality decline, does not provide absolute certainty.

Waikato Regional Council has the ability to undertake a wide range of policy options, including new regulation. It is not appropriate or effective to try and ‘second guess’ what type of further intervention will be required, if any.

Effectiveness

An explicit review policy is superfluous, as the RMA already contains a requirement to review Regional Plans every ten years. Signalling that in the future management options for the Lake may change is therefore not necessary.

This policy approach is not supported.

4.2.5 Monitoring phosphorus

Description

The policy highlights the need to ensure that phosphorus, as the other key nutrient that affects water quality in the Lake, does not increase to levels that will threaten water quality.

Implications

Phosphorus is not currently having an adverse effect on water quality in Lake Taupo. Past Catchment management by landowners and agencies to protect riparian areas and control soil erosion, as well as existing Waikato Regional Plan controls on soil disturbance, has reduced immediate risk of increased amounts of phosphorus entering the Lake. However, the strong interrelationship between nitrogen and phosphorus means that an increase in phosphorus could threaten Lake water quality. Waikato Regional Council regularly monitors total phosphorus as an important water quality characteristic. In this way a 'watching brief' is kept on the nutrient.

Effectiveness

This policy approach will be effective in ensuring that a 'watching brief' is maintained on phosphorus levels in order to ensure the Lake target is met.

This policy approach is supported. The policy is written as Policy 5 in the Variation, and listed in section 8 of this report.

4.3 Nitrogen cap to prevent increases in emissions from wastewater

Waikato Regional Council considered the following approaches to capping nitrogen from wastewater sources:

- Regulation to prevent further development, preventing subdivision development and additional wastewater discharges in the Catchment.
- Regulation to manage new or increased wastewater discharges so that land use change does not cause additional nitrogen leaching from new wastewater discharges.

Policy approaches for reducing wastewater nitrogen are set out in section 4.6.

4.3.1 Cap nitrogen by preventing further development

Description

Prevent further subdivision development and additional wastewater discharges in the Catchment, in order to cap the amount of nitrogen coming from wastewater sources. New on-site wastewater discharges or new subdivision that increase wastewater discharges from community plants would be prohibited.

Implications

Prohibiting new wastewater discharges in the Lake Taupo Catchment would effectively prevent further subdivision and residential development in the Catchment.

This policy would result in considerable social and economic costs to the local community. It would halt economic growth in the district and result in a loss of residential choice for existing and new residents. It would also restrict options for future land uses. The policy would not be consistent with the purpose of the RMA, in that it would not enable people and communities to provide for their social, economic, and cultural well-being.

Effectiveness

Although this policy may effectively cap nitrogen discharges from wastewater sources, the social and economic costs would not be acceptable and the policy is therefore not supported.

This policy approach is not supported.

4.3.2 Cap nitrogen with higher wastewater standards and offsetting

Description

Nitrogen outputs from wastewater sources are managed, so that there are no increases in nitrogen entering the Lake as a result of domestic wastewater.

Implications

This policy approach allows increased wastewater discharges from existing wastewater plants (such as by expanding existing community plants) and additional wastewater discharges from new on-site or community wastewater plants. To expand existing wastewater plants, or to allow new plants, methods will be needed to reduce nitrogen leaching by improved wastewater treatment or by offsetting nitrogen increases by corresponding decreases from other sources.

Much of the land in the Taupo Catchment where there is most pressure for subdivision is currently being farmed. An average of 14 kilograms of nitrogen per hectare per year is leached by sheep and beef farming operations. Advanced nitrogen-removing on-site wastewater systems are considered to leach approximately 3.4 kilograms of nitrogen per year from an average household, and 9.7 kilograms for conventional systems. Where farm land is subdivided at an appropriate density and animal inputs kept to a low minimum, it is therefore possible, even with new on-site wastewater discharges, to reduce the net leaching of nitrogen.

Community wastewater treatment plants can potentially remove significantly more nitrogen from domestic wastewater than on-site systems. There is therefore further potential to obtain a net reduction in nitrogen from subdivided land serviced by community wastewater systems.

To subdivide land that already has a low nitrogen leaching rate, there would need to be a reduction in nitrogen leaching on other land to compensate for the additional nitrogen from new wastewater discharges.

Effectiveness

This policy could be a very effective way of capping wastewater nitrogen. The policy also provides considerable social benefit, as it would achieve the objective without limiting choice in property options for both buyers and sellers. It gives economic flexibility to landowners by allowing the option of subdivision of land, providing nitrogen targets are met.

This policy is supported. The policy is written as Policy 7 in the Variation, and listed in section 8 of this report.

4.4 The need to reduce nitrogen - background

Capping nitrogen in the Catchment would prevent further increases of nitrogen to the Lake. Investigations were undertaken to determine whether, in addition to capping, nitrogen reductions would be necessary to maintain the water quality of Lake Taupo.

A possible nitrogen reduction target for Lake Taupo was first discussed at a meeting of science advisors from the National Institute of Water and Atmosphere (NIWA), Waikato Regional Council, AgResearch and Institute of Geological and Nuclear Sciences (GNS) on 28 May 2001. The purpose was to share information and develop a common understanding of the processes linking land use activities and Lake Taupo's water quality.

Early results from groundwater sampling and dating in the Catchment indicated that only a part of the groundwater nitrogen contamination from pastoral development was currently reaching streams[36]. Groundwater moves very slowly through the soil carrying nitrogen from the land through the soil, into streams and then into the Lake. This means that land use changes that occurred some decades ago, will continue to increase nitrogen inputs into the Lake via groundwater[37].

By reducing current levels of nitrogen discharged to land, the increasing nitrogen load still to come via groundwater, can be offset in the future.

4.4.1 Scientific evidence for nitrogen reduction – 2001 to 2005

Hadfield *et al.* (2001)[38] reported evidence that land use was affecting groundwater nitrate concentrations, and that groundwater nitrate concentrations were substantially higher than surface water nitrate concentrations within the Catchment and the Lake itself. They reported that dating of groundwater indicated that much of the groundwater recharged was greater than 35 years old and therefore groundwater in the Catchment probably does not yet show the full impact of land use conversions to agriculture. Further, as nitrate concentrations tended to be higher as the amount of young water in the groundwater increased, it was suggested that groundwater nitrate concentrations may be expected to continue to increase in future. This indicated there was likelihood for further increases in nitrogen loads to the Lake from both current and past land uses.

Vant (2001)[39] undertook a desktop study to estimate amounts of nitrogen yet to come based on current nitrogen leaching estimates provided by AgResearch for dairy, beef and sheep farms in the Catchment, as well as past and recent stream nitrogen loads. Using that method, he estimated that there may be between 10 to 40 per cent of nitrogen yet to enter the Lake under current land uses.

Elliott (2001)[40] also estimated amounts of nitrogen yet to come based on recent and historic nitrogen loads in streams, soil fertility and groundwater lags, in-stream processing, climate effects, land use changes that have occurred, and atmospheric deposition. He estimated that between 10 to 25 per cent of nitrogen is yet to come. However, if expected climate changes occur, then the amount of nitrogen yet to come could increase to between 20 to 40 per cent.

In a further meeting of science advisors in October 2002[41], scientists agreed there was definitely more nitrogen yet to come and that adverse effects on aspects of Lake water quality would result, although it was difficult to be precise about how much.

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[36] Hadfield, J, Nicole, D, Rosen, M, Wilson, C and Morgenstern, U (2001): Hydrogeology of Lake Taupo catchment – Phase 1. Environment Waikato Technical Report 2001/01.

[37] Groundwater flow and contaminant transport models are being used to further investigate the extent and lag of nitrogen contamination . To date, this modelling work predicts that nitrate concentrations from current land use intensity continue to increase and propagate through the aquifers for a long period of time (> 100 years). It is the slow replacement rate of old pristine groundwater with nitrogen-enriched water from land use that is the primary reason for the substantial time delay.

[38] Hadfield, J.; Nicole, D.; Rosen, M.; Wilson, C.; Morgenstern, U. 2001: Hydrogeology of Lake Taupo catchment—Phase 1. Environment Waikato technical report 2001/01.

[39] Vant, B. 2001: A method for estimating the load of N still to come from the current extent and intensity of pastoral land use in the catchment of Lake Taupo. Environment Waikato – document #699155.

[40] Elliott, A.H.; Stroud, M.J. 2001: Prediction of nutrient loads entering Lake Taupo under various land use scenarios. *NIWA Client Report EVW01224*. NIWA, Hamilton.

[41] Science Providers Meeting 2002: Notes from Taupo Science Meeting 11 October 2002. Environment Waikato – document # 783967.

Vant and Smith (2004)[42] later provided estimates of nitrogen loads yet to come based on aging studies of stream waters entering the Lake, and historic and current stream nitrogen concentrations. They reported that from studies representing half the pastoral Catchment area, between 20 and 80 per cent of the current amount of nitrogen may be yet to come before equilibrium is reached with current land use. Vant notes that the estimates are dependent on the timing of pastoral development in each of the Catchments examined.

Historically, the 2800 km^2 Catchment of Lake Taupo was mostly covered in native forest and tussock grassland[43]. Cobalt deficiency of the volcanic soils and the nature of land tenure meant that prior to the 1950s this part of the North Island was largely undeveloped[44]. By 1955, about 160 km^2 of land at the southern end of the Lake had been developed for farming[45]. In 1970, the Crown- and Maori-owned land in the Catchment was largely covered in low-growing indigenous vegetation, comprising cut over forest and scrub[46]. However, from 1970 onwards, increasing areas of land – mainly in the north and west – were developed under major development schemes, so that by 1973 an area of about 470 km^2 was in pasture[47]. A high-resolution satellite image of the Catchment taken in January 2002 showed a total area 524 km^2 in pasture (or about 19 per cent of the Catchment area).[48] These figures are summarised in Table 3 below as well as estimates of pastoral development occurring both 35 and 45 years prior to the date of the Vant and Smith study[49]. The estimated areas assumes a range starting at zero pastoral development between the times of documented development (that is, 1955 and 1970), through to continued and steady development between the times of known development.

Table 3: Areas of land in pasture in the Catchment of Lake Taupo at particular times.

	Area (km^2)	Per cent of 2002 value
Measured areas		
1955	160	30
1973	470	90
2002	524	100
Estimated areas		
1957 (45 years prior to 2002)	160-to-200	30-to-38
1967 (35 years prior to 2002)	160-to-370	30-to-70

The above studies all strongly suggest that there is more nitrogen yet to reach the Lake, given that land use conversions to agriculture have occurred. Estimates of the nitrogen load to come have ranged from 10 to 80 per cent of current levels. Studies by Hadfield (2001) and Vant and Smith (2004) found relatively old water in the Catchment,

[42] Vant, B and Smith P. 2004: Inflows to Lake Taupo – nutrients and water ages (Revised). Environment Waikato Technical Report 2002/18R.
[43] Leathwick, J.; Clarkson, B.; Whaley, P. 1995: Vegetation of the Waikato region: current and historic perspectives. *Contract Report LC9596/022*. Landcare Research, Hamilton.
[44] Environment Waikato 1998: Asset management plan: Lake Taupo Catchment Control Scheme. *Environment Waikato policy series 97/09*. EW, Hamilton.
[45] Ward, R.G. 1955: Land development in the Taupo Country. Master of Arts thesis, University of New Zealand, Auckland. See also a 1956 article with the same title by this author in *New Zealand geographer 12*: 115–132.
[46] Environment Waikato 1998: Asset management plan: Lake Taupo Catchment Control Scheme. *Environment Waikato policy series 97/09*. EW, Hamilton
[47] Waikato Valley Authority 1973: Lake Taupo Catchment Control Scheme. WVA, Hamilton.
[48] EW Enhanced Land Cover Database: EW DOCS #813824 and #813012.
[49] Vant, B and Smith P. 2004: Inflows to Lake Taupo – nutrients and water ages (Revised). Environment Waikato Technical Report 2002/18R.

with ages measured in decades rather than months or years. It is therefore clear that it could be several decades before nitrogen levels peak in the Lake.

At the request of Ngati Tuwharetoa, the Ministry for the Environment contracted Professor David Hamilton (Centre for Biodiversity and Ecology Research, University of Waikato) to undertake an independent review of the 20 per cent target. The review was completed in June 2004.[50] As a result of this review, Hamilton concluded that nitrogen levels draining pastoral Catchments have not yet equilibrated to pastoral land use in the Catchment and that at equilibrium, nitrogen yields from pastoral streams to the Lake may be around 20 per cent, possibly even up to 80 per cent, higher than current yields. To maintain the Lake's current water quality (no increase in nitrogen levels beyond current), Hamilton asserts that the 20 per cent reduction estimate may be conservative.

4.4.2 Scientific evidence for nitrogen reduction –Variation 5 (Lake Taupo Water Quality) Hearings 2006

In the Hearings of the Lake Taupo variation evidence on the Nitrogen Reduction target was presented by Professor Warwick Silvester and Mr Paul White on behalf of Tuwharetoa Maori Trust Board. This evidence is summarised in the Committee Decision report under Recommendation 3. Professor Silvester and Mr White concluded in their evidence that a likely estimate of load to come is between 30-60 per cent of current levels.

4.5 Policy options for nitrogen reduction

Waikato Regional Council considered four broad approaches to reducing nitrogen leaching from land:

- Reduction solely using regulation (blanket reduction).
- Reduction by purchasing nitrogen using a public fund.
- Voluntary reductions.
- Reduction by environmental charges.

4.5.1 No requirement to reduce manageable nitrogen from pastoral farming

Description

This approach would involve a cap on manageable nitrogen loads to the Lake but no associated reduction.

Implications

Maintaining water quality in Lake Taupo relies on a reduction in nitrogen leaching from land use activities. If there is no reduction in nitrogen leaching, water quality will decline.

Effectiveness

If there are no policies requiring reduction, maintaining water quality would rely on voluntary action to reduce nitrogen leaching. This is dependent on landowners' willingness to change. Because the change required is significant in terms of cost, it is unlikely that people will be willing and committed to voluntary change. As a result, this option will not be effective in achieving the outcomes sought and it is therefore rejected.

[50] Hamilton. David and Wilkins, Kate (2004): Review of science underpinning the 20 percent nitrogen target for Lake Taupo. Contract report for the Ministry for the Environment. Centre for Biodiversity and Ecology Research, University of Waikato. Hamilton.

4.5.2 Requirement to reduce current pastoral nitrogen by 20 per cent

Description

This policy option would require a 20 per cent reduction in pastoral nitrogen leaching to the Lake. This is in addition to ensuring that new or increased pastoral discharges do not increase pastoral nitrogen leaching to the Lake. The 20 per cent reduction may be achieved by such means as retiring farmland to forest, or changing farmland to other low nitrogen leaching land uses and then permanently securing that nitrogen reduction. Options for funding the 20 per cent reduction include using a public fund (with contributions from district and Regional rates and taxes) to purchase reductions or regulating for blanket nitrogen reductions from landowners.

Implications

The scientific basis for a reduction is outlined in sections 4.4.1-4.4.2 of this report. 20 per cent is near the lower end of predictions of possible reductions and is described as being a conservative amount. Estimates of current loads of manageable nitrogen to the Lake suggest that a 20 per cent reduction in nitrogen from the Catchment would be equal to approximately 95 tonnes of attenuated nitrogen (20 per cent of 468 tonnes of manageable nitrogen as described in Table 1, section 3.1.1 of this report).

Blanket Reduction by Regulation

One policy approach to achieve a 20 per cent reduction would be to require a blanket nitrogen reduction from landowners. The cost to individual farming businesses of reducing manageable sources of nitrogen by 20 per cent on pastoral and cropping land has been estimated.[51]

This cost can be divided into:

- Upfront costs of reducing nitrogen per property by 20 per cent, which could vary depending on the phase-in period allowed for compliance with regulation. These costs include reduced economic farm surplus and therefore long-term business viability.
- The additional medium-term costs of changing land use or management to continue business under the permanent nitrogen cap.
- Future income forgone and reduction in capital value of land, due to the restriction of nitrogen leaching by removing traditional development pathways. These pathways include increasing stock units, changing to stock with higher nitrogen leaching potential and introducing nitrogen from outside the farm in the form of nitrogen fertiliser or additional feed.
- Ongoing compliance costs to meet a regulatory regime, such as resource consent processing costs and monitoring costs.

A solely regulatory approach to nitrogen reduction on pastoral and cropping land involves several aspects, which, taken together, could result in non-compliance. These aspects include:

- In proposing nitrogen reduction rules, Waikato Regional Council must be able to satisfy the Environment Court that a rule that immediately curtails existing farm operations and may make some farms uneconomic can satisfy the key tests in section 32 of the RMA, namely that the objectives of the Variation are the most appropriate way of achieving the sustainable management purpose of the RMA, and that the proposed rules are the most appropriate way of achieving those objectives.

[51] Finlayson, J. and Thorrold, B. (2001): Estimating the costs of restrictions on nitrate emissions in the Taupo Catchment. Report to Environment Waikato.

- Cost to pastoral landowners is difficult to quantify, but has been estimated as significant in an analysis of different farm scale scenarios – Finlayson and Thorrold (2001) found that a uniform reduction in stocking rate would be a "costly" option, estimated at approximately $45-54 million. Landowners see the cost of a regulatory nitrogen reduction regime as an immediate and severe constraint on their business viability. Evidence presented during the hearing of submissions by farmers in the Catchment including the Lake Taupo Farming Group (see Committee Recommendation report, Recommendation 1) have demonstrated that the costs of capping nitrogen emissions alone are significant and threaten farm viability. A required blanket reduction would exacerbate that threat.
- Landowner acceptance of a nutrient model to determine the extent of the reduction in nitrogen leaching is required. Challenges in the first schedule process and in particular, in the Environment Court, will be more costly and difficult for Waikato Regional Council to resolve.
- Widespread non-compliance is likely under this option (based on community consultation results), as there will be strong resistance from landowners to a nitrogen reduction rule. The implications of this are increased costs to the Regional community from enforcement proceedings and prosecutions.
- Majority landowner acceptance that the overall approach is a reasonable response to the risk to the Lake was judged by Waikato Regional Council to be fundamental to the successful implementation of the rules.
- Requiring every landowner to reduce their nitrogen by an equal amount does not acknowledge the differences in their ability to reduce, and their costs of reduction. Mandatory reductions therefore do not take advantage of the cost efficiencies of this diversity.
- It is likely that the cost of nitrogen reduction will decrease over time due to technology and management changes. If this is the case, landowners may be able to retain profitability with reduced total nitrogen emissions, although farmers will still need to meet increasing expenses of farming (as do other farmers outside the Catchment as well). This approach is likely to fail if technology and management gains that enable farmers to maintain or increase profitability under required nitrogen reductions are not realised, as the 20 per cent required reduction will force farmers out of business.

This policy approach is not equitable for current farming landowners because of the history of land development in the Catchment. In its analysis under the Local Government Act to justify the changes to the revenue and financing policy for Lake Taupo Catchment in the 2004 Long-Term Council Community Plan, Waikato Regional Council took into account the active role played by various Central Government agencies from 1940 – 1970s in promoting and financing pastoral development of the Western Bays shrubland. This included the balloting out of farms that had been already developed by the Department of Lands and Survey and the Department of Maori Affairs.

Although there had been concern from local councils and Ngati Tuwharetoa about sediment and fertiliser entering the Lake since the 1960s, the link between stock urine and nitrogen leaching under pasture was not widely realised until the 1980s. Intervention to restrict nitrogen leaching was not discussed with the local farming community until after Waikato Regional Council publicly released a pamphlet about the issue in May 2000. While there was some agency recognition of potential environmental consequences during land development, the action taken did not address non-point sources of nitrogen leaching. Instead, action on Lake protection was focused on community wastewater upgrades and improving land and soil stability through extensive land retirement in a Catchment control scheme. It was not until 2000 that there was clear evidence that pastoral derived nitrogen was a threat to water quality in the Lake. At this point Waikato Regional Council developed policy on the issue and took the view that the cost of the pastoral nitrogen reduction should be shared between landowners, the rest of the local community and Regional and national communities.

The policy approach requiring unassisted 20 per cent reduction in nitrogen leaching from landowners is not supported.

Public Fund
Under this option, the 20 per cent nitrogen reduction is achieved solely by financial assistance by:

- purchasing pastoral and cropping land in the Catchment from willing landowners and converting it permanently to covenanted low nitrogen land uses, or
- purchasing nitrogen allowances (where land cannot be sold – for example, Ngati Tuwharetoa land) from willing landowners and permanently removing that nitrogen from the Catchment.

Waikato Regional Council, Taupo District Council and Central Government have agreed to share the costs of the 20 per cent nitrogen reduction, along with research and advisory services. It is planned that a joint public fund will be established for this purpose (see sections 6.3, 9.3.1 and 9.4.2 of this report).

The new expenditure required to achieve the reduction was estimated by determining the amount of average pasture land required to convert to forestry in order to achieve that reduction; and the cost (purchase/conversion/retirement/ resale of land) required to do so. It was estimated that 13,500 hectare of average pasture (assuming average pasture leaching 13.75 kilogrammes of nitrogen per hectare per year) or 26 per cent of the pasture land in the Catchment (13500/52500), would be required to be converted at a cost of $5000 per hectare.

The estimated costs and the way in which the total cost will be shared between Crown and local government are summarised in Table 4 below. Further detail is available in the document Protecting Lake Taupo – Revenue and Funding Policy (Environment Waikato 2004).

Table 4: Estimated cost of nitrogen reduction and assistance (over 15 years)

	Net Cost ($1000)
Committed expenditure	
Upgrade of wastewater systems (Taupo District Council)	23,830[52]
Crown Expenditure	20,000
Project Watershed (Waikato Regional Council)	6,750
Environmental monitoring costs (Waikato Regional Council)	11,250
Subtotal	38,000
New expenditure	
Purchase/conversion/retirement/ resale of land	67,450
Research and development – pastoral land use	2,000
Research and development – non pastoral land use	3,000
Project monitoring	5,000
Transaction costs (trust set up costs and administration)	4,000

[52] More recent estimates from Taupo District Council suggest possible cost increases to approximately $30 million.

Subtotal	81,450
Total project costs	143,280

Effectiveness

In terms of Objective 1, setting the nitrogen reduction figure near the lower end of scientific estimates of the nitrogen load yet to come may delay achievement of the water quality targets in the objective, if in fact nitrogen loads to come are more like 30 per cent or greater. Notwithstanding this and as concluded in the analysis below of the option to reduce by 30 per cent, the difference between a 20 and 30 per cent reduction equals 4 per cent of the total load. In addition, the scientific uncertainty surrounding estimates of nitrogen load to come and the Lake's buffering capacity with respect to those additional nitrogen loads suggest the difference of effect between a 20 per cent and 30 per cent reduction is not likely to be significant in terms of overall water quality.

As well as ongoing Lake water quality monitoring, there are two groundwater ageing tests scheduled to be undertaken in the next 10 years. These further tests should help provide greater certainty in estimating the load of nitrogen still to come and will therefore better enable decisions to be made on any review of the reduction target.

The level of the nitrogen reduction target will affect achievement of Objective 4 which seeks to spread the social and economic costs of intervention required to achieve Objective 1. The social and economic costs of intervention will vary depending on the level set. The greater the reduction target the greater the current costs of intervention. It is noted that further intervention costs will be incurred in the future if a greater reduction is determined to be required. Deferring these costs until that time will achieve a further spreading of these costs (for example to future ratepayers/tax payers or landholders).

Given the scientific uncertainties and the social and economic effects of intervention, it would seem that an approach where policy responses can change via future Regional Plan reviews (as more becomes known about the response of the Lake to Catchment land use changes) would be an appropriate way forward. This approach does rely on being able to secure a greater nitrogen reduction in the future (when the plan is reviewed) if ongoing monitoring determines that this is required. Any policy review resulting in a plan change will be subject to the Schedule 1 process under the RMA, that is, any change to the reduction target would be notified and open to submissions.

Using the public fund to achieve a 20 per cent reduction has the most potential to achieve the objective compared with landowners bearing full costs, or cost sharing for nitrogen reduction and nitrogen capping. The reasons for this include:

- Taking into account ability to pay results in a pragmatic redistribution of the costs of achieving the Lake target.
- The immediate upfront cost of nitrogen reduction to farmers is removed, therefore decreasing the risk of widespread non-compliance with the nitrogen restriction rules and a lower risk of farms becoming uneconomic.
- The total cost of nitrogen reductions needed from pastoral and cropping land is beyond the capability of regional ratepayers to fund. Therefore, financial incentives funded by local, regional and national communities are most likely to achieve the objective. A shared contribution also aligns with a shared responsibility for contributions to the need for the policy and receiving of benefits from the policy.
- Community social change is minimised by spreading the cost of the nitrogen reductions needed amongst the whole of New Zealand.
- It reflects the history of land development in the Catchment.

- The total cost of nitrogen reduction is minimised as the fund is used to purchase land or nitrogen allocation where nitrogen reductions can be achieved most cost effectively.

Conclusion
The 20 per cent reduction target using the public fund is supported for the following reasons:

- Future monitoring should provide greater certainty in the target.
- The target can if necessary, be altered via future plan reviews.
- The target is more likely to achieve Objective 4 than a higher initial reduction figure given the lower costs of initial intervention.
- A 20 per cent reduction involves a measured approach allowing time for adaptation to new low nitrogen leaching land uses and community change.

These policies are written in the Variation as Policies 4 and 10, and listed in section 8 of this report.

4.5.3 Requirement to reduce current pastoral nitrogen by 30 per cent

Description

This policy option would require a 30 per cent reduction in pastoral nitrogen leaching to the Lake. This is in addition to ensuring that new or increased pastoral discharges do not increase pastoral nitrogen leaching to the Lake. As per the 20 per cent reduction, a 30 per cent reduction may be achieved by such means as retiring farmland to forest, or changing farmland to other low nitrogen leaching land uses and then permanently securing that nitrogen reduction. Options for funding the 30 per cent reduction include using a public fund (with contributions from district and Regional rates and taxes) to purchase reductions or requiring blanket nitrogen reductions from landowners or a combination of the two.

Implications

The scientific basis for a reduction is outlined in sections 4.4.1-4.4.2. 30 per cent is the minimum reduction assumed in the evidence of Professor White and Silvester and is a more precautionary figure on the basis of estimates of the loads to come estimated by Vant et al. Estimates of current loads of nitrogen to the Lake suggest that a 30 per cent reduction in nitrogen from the Catchment would be equal to approximately 140 tonnes of attenuated nitrogen (30 per cent of 468 tonnes of manageable nitrogen as detailed in Table 1, section 3.1.1 of this report)

The discussion below demonstrates that the efficiency and effectiveness of the 30 per cent reduction is highly reliant on how the reduction is to be achieved. If the costs are spread wider (that is, through funding via rates and taxes or a public fund) the costs to landowners in the Lake Taupo Catchment is much less than if they have to bear the full or a significant portion of the costs, themselves.

Blanket Reduction by Regulation
As with the 20 per cent reduction achieving the reduction through requiring blanket nitrogen reductions from landowners depends on the ability of landowners to reduce nitrogen and still remain economically viable. 30 per cent reduction from landowners without financial assistance would have a proportionally greater effect on incomes and farming viability than a required 20 per cent reduction.

Public Fund
As stated above Waikato Regional Council, Taupo District Council and Central Government have agreed to share the costs of the 20 per cent nitrogen reduction, along with research and advisory services.

Through negotiation with both Taupo District Council and Government and through an increased district and regional rate or an extended time period for collecting the special rate (subject to the provisions of the LGA) it is possible that additional capital could be raised to achieve a full purchase of the 30 per cent reduction.

Assuming static land values since the cost of achieving the 20 per cent reduction was undertaken, and following the same process for calculating the cost of potential reductions, the estimated costs for a 30 per cent reduction are as follows. Analysis undertaken by Waikato Regional Council suggests that the 30 per cent reduction could be achieved by converting approximately 20,000 hectares of average pasture to forest or 38 per cent of the pasture land in the Catchment (20,000/52500). As detailed above calculations undertaken to ascertain the cost of the 20 per cent reduction were based on a net cost of conversion to forestry of $5000 per hectare. Based on this assumption, the estimated cost for the conversion of 20,000 hectares to forestry is $100 million, or an additional $32.5 million to that required to reduce by 20 per cent. Administration costs are around 6 per cent of the costs associated with the purchase/conversion/retirement/ resale of land and therefore would increase to $6 million. Assuming all other costs outlined in Table 4 remain static (research and development costs etc.), the total value of the public fund would be $116 million ($34.5 million more than under a 20 per cent reduction scenario).

Assuming the new expenditure for nitrogen reduction and support ($116 million) costs would be shared as currently proposed, that is 45 per cent by Government, 33 per cent by the Regional community and 22 per cent by the district community, each entity would be required to contribute the following:
Waikato Regional Council: 38.28 million (as opposed to 27 million under 20 per cent scenario).
Taupo District Council: 25.52 million (as opposed to 18 million under 20 per cent scenario).
Crown: 52.20 million (as opposed to 36.65million under 20 per cent scenario).

Blanket Reduction and Public fund
Should the public fund not be able to be extended beyond its current capacity to reduce by 20 per cent there is a possibility of requiring the balance of the required reduction (that is, a 10 per cent reduction) from pastoral landowners.

Effectiveness

The adoption of the 30 per cent reduction figure is likely to result in better water quality than that achieved under the 20 per cent reduction, although just how much better is uncertain as there is not sufficient information about the response of the Lake to Catchment land use changes.

Using existing estimates of current nitrogen loads to the Lake, the difference between a 30 per cent reduction and a 20 per cent reduction is a load of approximately 45 tonnes. The current total load to the Lake is estimated at 1220 attenuated tonnes (manageable plus unmanageable load (page 10 s32 report (2005)) therefore the difference in tonnes between the 20 and 30 per cent reduction, is 4 per cent of the total load. Furthermore, the scientific uncertainty surrounding estimates of nitrogen load to come and the Lake's buffering capacity with respect to those additional nitrogen loads, suggests the difference of effect between a 20 and 30 per cent reduction is not likely to be significant in terms of overall water quality.

The improvement in water quality (through a 30 per cent reduction) will come at an additional cost to the community and/or landowners, depending on how the reduction is achieved.

There is still the possibility that additional reductions (beyond 30 per cent) will be required in the future.

Public Fund
The effectiveness of this approach relies on extending the public fund. This process is not within the bounds of the RMA and will require negotiation with both Taupo District Council and the Crown and a public process under the Local Government Act. Any proposed rate increase could be notified in Environment Waikato's 2007 Annual plan and be subject to submissions etc.

Blanket Reduction (10 per cent) and Public fund (20 per cent)
If the increased public expenditure is not able to be achieved, a 10 per cent blanket reduction for landowners will be required. The cost of this approach again will vary between farmers. As stated above, through the hearing of submissions farmers in the Catchment have demonstrated that the costs of capping nitrogen emissions alone are significant and threaten farm viability. A blanket reduction is likely to exacerbate these costs. This approach is likely to fail if technology and management gains that enable farmers to maintain or increase profitability under required nitrogen reductions are not realised, as the 10 per cent reduction will force farmers out of business.

Conclusion
The key risks of setting a 30 per cent nitrogen reduction target are therefore that the social and economic costs to the district are increased unacceptably, or that the process of renegotiating an increased public fund may fail. Furthermore the effect on the Lake of increasing the target from 20-30 per cent is not considered to be significant given the increased reduction is only 4 per cent of the total nitrogen load to the Lake and there is uncertainty about the Lake's buffering capacity. There is also scientific uncertainty about the target itself, that is, a 30 per cent target may in future prove to be unnecessary or it may prove to be insufficient. For these reasons and as discussed in section (4.5.3), a 20 per cent target is preferred along with an approach that allows for future changes to land use management in the Catchment if further monitoring and water ageing demonstrates that this is necessary.

4.5.4 Voluntary approaches to reduce nitrogen leaching

Waikato Regional Council considered two voluntary approaches to nitrogen reduction in the Catchment:

- Research and development of new low nitrogen land uses and management practices.
- Provision of advice and information to landowners to support their transition to low nitrogen land uses and management practices.

Research and development

Description

This approach involves public funding of applied research and farm trials, with the overall goal of ensuring that profitability is maintained when nitrogen outputs from pastoral farm systems are restricted. It includes research on refining existing farm management practices, and investigation of alternative land uses and crop types in the Catchment. Examples could include greater use of silage or wintering stock outside the Catchment.

Implications

This approach would provide increased certainty for landowners that they are able to adjust their current businesses and remain profitable in the Catchment. Research and development may provide possible low nitrogen development pathways, helping to future-proof rural businesses.

Effectiveness

Research and development alone will not be effective at achieving change on the ground. This approach would need to be supported with the provision of extensive farm advisory services to help landowners apply research outcomes to their individual properties. Uptake of new land uses and practices is likely to be variable and would not provide high certainty of achieving the nitrogen reduction target. There is also no guarantee that research and development will be able to provide sufficient gains to meet the reduction required across the Catchment, making the certainty of this approach very limited unless it is linked with other policy approaches.

The sole use of this policy approach to achieve nitrogen reduction is not supported.

Advice and information to landowners

Description

This approach involves the provision of farm advisory services and information about alternative low nitrogen land uses, management practices and business planning. It also involves voluntary implementation of land use and management change, including improved maintenance of existing urban septic tank systems and good practice with respect to boat washing to prevent the spread of exotic weeds in near-shore areas.

Implications

There are costs associated with the provision of this service. It is unlikely that there would be a viable private business and landowner transaction for this information. Therefore, this approach requires the public funding of an advisory service, supported by effective research and development.

Effectiveness

A purely voluntary approach will not achieve the objective because:

- Although there is widespread support for measures to protect Lake Taupo, there are costs to all landowners of achieving the Lake target.
- For existing and future urban landowners, these range from costs of checking and pump out of septic tanks, through to installation of high performance individual on-site systems.
- The scale of the on-farm changes required and impacts on farm businesses is so large that it would be contrary to any individual's business viability to reduce nitrogen in the timeframe required unless equivalent or greater financial incentives were offered.
- An action that results in no easily identifiable individual benefits to the landowner is likely to invoke a 'free-rider' mentality where landowners hope that others will act so that they will not have to themselves.

The sole use of this policy approach to achieve nitrogen reduction is not supported.

4.5.5 Nitrogen reduction from environmental charges

Description

This approach involves implementing an environmental charge or tax to reduce nitrogen leaching. An environmental tax can be attached to either an input or an output, and these can either be direct (such as nitrogen leached) or indirect (for example, something that bears some relationship with nitrogen leached). Charges or taxes work to impose an additional cost such that it acts as a disincentive.

Implications

Attaching an environmental charge to either inputs or outputs affects the price signals that a landowner faces. A charge is therefore intended to either shift decisions in such a way to reduce environmental damage, or generate funds to remedy environmental damage. In Taupo the charge would be intended to reduce nitrogen leaching.

Therefore, the charge would have to be continuously adjusted as the relative prices of other things such as commodity prices changed, altering the marginal value to a landowner of nitrogen leached.

Effectiveness

Although an environmental charge would appear to meet the principles of making those landowners who contribute the most nitrogen to the Lake, pay the highest charges, it is unlikely to be a successful mechanism for meeting the objectives of reducing nitrogen to the Lake, at least cost.

Attaching a charge to an input for Taupo is problematic because direct application of nitrogen to land is only a small contributor to nitrogen leaching, and there is not an indirect input that would adequately account for the amount of nitrogen from that land. For instance, taxing nitrogen fertiliser would be ineffective, as farmers would increase production (and thus increase nitrogen leaching) through other means such as non nitrogen fertiliser and bought in feed.

It is the combination of many land management practices that contribute to actual nitrogen leaching. Similarly, it is difficult to attach a charge to nitrogen output because it would require complex measurement on each property.

Because the charge would only be applied in the Taupo Catchment and obtaining accurate information is difficult, people would be able to successfully 'cheat' the tax and compliance would be difficult to monitor.

A charge that is applied to an indirect input or output can be inefficient and inequitable because it doesn't recognise the diversity in individual property requirements.

This policy approach is not supported.

4.6 Reducing nitrogen from wastewater

Waikato Regional Council considered whether policy should require that wastewater nitrogen is reduced by 20 per cent. This section discusses the following two policy approaches:

- Requirement to reduce current wastewater nitrogen.
- No requirement to reduce current wastewater nitrogen.

Before discussing these approaches, the extent of nitrogen from domestic on-site wastewater systems and community wastewater treatment plants in the Catchment is described.

4.6.1 The extent of wastewater nitrogen in the Catchment

Within the Lake Taupo Catchment, there are approximately 1350 on-site wastewater systems. Based on information from Taupo District Council wastewater managers, there are about 470 on-site systems in the lakeside urban areas of Hatepe, Motutere/Jellicoe Point, Waitetoko/Te Rangiita, Oruatua/Tauranga-Taupo and Waihi. Approximately 270 are in rural-residential blocks or other small urban areas near Lake Taupo, but not adjacent to the lakeshore. Waikato Regional Council staff have estimated that there are 111 farms over 100 hectares in the Catchment, most of which will have at least two on-site systems, and that there are 413 'small farms' between 4 and 100 hectares, some of which may not in fact have houses and wastewater systems. Based on these figures, Waikato Regional Council estimates there are approximately 610 on-site wastewater systems on farms.

The majority of these on-site wastewater systems are standard septic tank systems. These systems are not expected to remove nitrogen from wastewater, although approximately 15 per cent of nitrogen is likely to be removed by soil processes in and

around disposal trenches in coarse soils (such as those found in the Taupo Catchment)[53]. Assuming that the average household size in Taupo is 2.6 people[54] and the nitrogen discharge to the wastewater system is 12 grams per capita per day[55], the nitrogen leaching below the soil per system would be 26.5 grams per day or 9.67 kilograms per year. For 1350 systems, this would equate to approximately 13 tonnes per year. Approximately 1200 tonnes of nitrogen enters the Lake per year[56]. If all 13 tonnes of nitrogen from on-site systems enters the Lake (a worst case scenario), this would represent approximately 1.1 per cent of the total nitrogen load to the Lake (excluding nitrogen from community wastewater systems).

The Taupo District Council operates eight community wastewater plants within the Lake Taupo Catchment (Acacia Bay, Kinloch, Turangi, Waitahanui, Motuoapa, Omori, Motutere and Whareroa). The total load of nitrogen entering the ground (and potentially the Lake) from these systems is approximately 21 kilograms per day or 7660 kilograms per year[57]. If the entire total nitrogen load from community wastewater plants reached the Lake, it could represent 0.6 per cent of the total nitrogen load to the Lake.

These calculations indicate that total wastewater nitrogen load to the Lake from on-site and community wastewater treatment plants is approximately 20.66 tonnes per year. Using the estimated 1200 tonnes of nitrogen entering the Lake per year in total, wastewater would represent approximately 1.7 per cent of the total load, or about 4.4 per cent of the manageable load (nitrogen from nitrogen from pasture, urban run-off and sewage as estimated in Table 1 (section 3.1.1). Note that the wastewater nitrogen figure of 20.66 tonnes per year is slightly different to the 'sewage' figure in Table 1 due to different estimation models used. For example, the sewage figure used in Table 1 is 'urban sewage'. 'Rural sewage' is included in the pastoral figures.

4.6.2 Requirement to reduce current wastewater nitrogen by 20 per cent

Description

This policy option would require a 20 per cent reduction in wastewater nitrogen leaching to the Lake. This is in addition to ensuring that new or increased wastewater discharges do not increase wastewater nitrogen leaching to the Lake. The most likely way of reducing wastewater nitrogen would be to reticulate communities in the Lake Catchment which are currently serviced by on-site wastewater systems that do not effectively reduce nitrogen, and servicing these communities with new nitrogen removing community wastewater plants. There could also be some reductions in nitrogen leaching by upgrading existing wastewater plants. It is important to note in considering this policy option that it is the district Council's role to manage community wastewater treatment plants, which includes making decisions about reticulation and community plant upgrades. However the Regional Council can influence decisions through resource consent processes and Regional Plan policies.

Implications

The options for reducing wastewater nitrogen by 20 per cent are discussed in more detail in section 9.3 – Wastewater Management Policies - Possible Types of Methods to Implement. All options considered carry substantial costs for the community. For example, currently the Taupo District Council 2006-2016 Long-Term Council Community Plan has indicated a budget of $5.7m for new community wastewater

[53] Gunn, I. (2003). Overview of Issues Related to Nutrient Management of Lake Taupo Wastewater Treatment and Disposal. Auckland UniServices Ltd, Auckland, March 2003.
[54] Taupo District Council, Best Guesses 2003-2013, August 2003.
[55] Gunn, I. (2003). Overview of Issues Related to Nutrient Management of Lake Taupo Wastewater Treatment and Disposal. Auckland UniServices Ltd, Auckland, March 2003.
[56] Based on Elliot, AH and Stroud, MJ (2001): Prediction of nutrient loads entering Lake Taupo under various land use scenarios. *NIWA Client Report EVW01224.* NIWA, Hamilton.
[57] Environment Waikato (2004): Management of Nutrient Inputs from Wastewater Systems to Lake Taupo – A Discussion Paper. Environment Waikato, Hamilton.

treatment plants to service communities on the Lakeshore which are currently serviced by conventional on-site wastewater systems (Hatepe and Waitetoko).

There would be a number of reasons for the Taupo District Council undertaking to build new wastewater treatment plants and upgrade existing plants as it has in the Long-Term Council Community Plan. The district council has for many years put significant effort and expenditure into ensuring that community wastewater plants in the Lake Catchment have the least possible effect on the Lake. There are certainly a number of benefits of reticulating those communities still being serviced by septic tanks, and of continuing to upgrade existing community systems, including:

- Reducing wastewater load of nitrogen to the Lake.
- Reducing the risk of near-shore effects caused by greater concentrations of nitrogen and wastewater pathogens in shallow waters near these communities (effects may nuisance effects such as weeds in swimming areas, amenity effects such as slimes on Lake bed rocks, health risks to recreational Lake users from algal blooms and wastewater pathogens, and so on).
- Reducing health risks to residents from failing septic tank disposal fields.
- Improving the cultural acceptability of wastewater discharges in the vicinity of the Lake.
- Allowing further growth of Lakeshore communities.

Effectiveness

As stated earlier, wastewater nitrogen represents approximately 4.4 per cent of the manageable load of nitrogen leaching to the Lake. Removing 20 per cent of wastewater nitrogen would therefore represent only a small gain in terms of reducing nitrogen loads leaching to the Lake. Given the high cost of providing new or upgraded community wastewater treatment plants this is probably not a very efficient way of reducing nitrogen loads in the Lake. However the policy approach is supported for the following reasons:

- If this approach was not taken, there would need to be further reductions in nitrogen from farming activities to ensure the required 20 per cent reduction of total nitrogen leaching to the Lake is achieved.
- Wastewater nitrogen is a manageable load which can be reduced and therefore the approach does support the achievement of the objectives, albeit in a small way.
- The means of achieving this policy approach are likely to be undertaken in any case, given that the Taupo District Council Long-Term Council Community Plan has already signalled that reticulation and upgrades will occur, and that these are also required to support Objective 3 (reducing risks of near-shore effects). On its own therefore, the additional cost of this policy approach is therefore not large.
- There would be many secondary benefits of supporting this approach as described above.

The policy approach is supported. The policy is written as Policy 4 in the Variation, and listed in section 8 of this report.

4.6.3 No requirement to reduce current wastewater nitrogen by 20 per cent

Description

The main alternative policy to that described above is to not require a 20 per cent reduction in wastewater nitrogen.

Implications

As discussed in the previous section, there are many benefits to be gained from reticulating communities currently serviced by conventional on-site wastewater systems and of continuing to upgrade existing community wastewater treatment systems. If there was no policy approach of requiring a 20 per cent reduction in wastewater

nitrogen, it does not necessarily mean that reticulation and upgrades will not occur. As described earlier, the Taupo District Council has already made commitments to certain reticulation and plant upgrade works. Also, these works may be supported because they would reduce the risk of near-shore effects from wastewater, and therefore would support Objective 3. The absence of a policy which seeks to ensure a 20 per cent reduction in wastewater nitrogen would however take away one of the reasons for such works, which could effectively move them down the priority list for Council spending.

Effectiveness

Scientific advice requires that total manageable nitrogen loads leaching to the Lake must be reduced by at least 20 per cent. Wastewater nitrogen only represents 4.4 per cent of the total manageable wastewater load leaching to the Lake. Therefore, if wastewater nitrogen was exempt from the requirement for a 20 per cent nitrogen reduction, it would make the total target harder to achieve. In other words there would need to be a slightly greater reduction in nitrogen from farming sources. However, as stated in the previous section, there are many reasons for supporting the 20 per cent reduction from wastewater sources. The converse of these reasons therefore would mean that capping of wastewater nitrogen without a 20 per cent reduction from wastewater sources should not be supported.

5 Possible Policy Approaches to Achieve Objective 3

Waikato Regional Council considered the following approaches to ensure wastewater does not cause near-shore effects:

- Promote reticulation of lakeshore communities and upgrading of community wastewater plants discharging in the near-shore area.
- Upgrade existing lakeshore septic tanks to advanced nitrogen reducing systems
- Prohibit new wastewater discharges near the lakeshore.
- Allow new wastewater discharges near the lakeshore providing near-shore effects are avoided.
- Promote Best Management Practices in non-domestic point source wastewater discharges such as stormwater and industrial discharges.

5.1 Reticulation of lakeshore communities and upgrading of community wastewater plants

Description

Communities near the lakeshore currently serviced by on-site wastewater systems will need to be reticulated and serviced by centralised community wastewater treatment plants, due to their potential for near-shore effects.

Implications

The risk of near-shore effects, such as health risks and nuisance plant growths, is likely to be highest where there are a large number of septic tank on-site wastewater systems at high density near the lakeshore, or where there is a large community wastewater treatment plant discharge near the lakeshore. There are approximately 470 on-site wastewater systems in the lakeside urban areas of Hatepe, Motutere/Jellicoe Point, Waitetoko/Te Rangiita, Oruatua/Tauranga-Taupo and Waihi/Braxmere. There would therefore be a significant risk of near-shore effects near these communities. Some large community discharges close to the Lake edge also have potential to increase the risk of near-shore effects. By reticulating on-site systems and upgrading near-shore community discharges, the risk of such effects can be minimised.

Effectiveness

The Taupo District Council has shown that community wastewater treatment plants can be very effective at removing nutrients and other contaminants that can cause near-shore effects. The district council has already made provision in its Long-Term Council Community Plan for new wastewater reticulation and community plant upgrades that will ensure those communities where there is most potential for near-shore effects have effective community wastewater treatment and disposal systems.

This policy approach is supported. The policy is written in the Variation as Policy 8, and is listed in section 8 of this report.

5.2 Upgrade existing lakeshore septic tanks to advanced nitrogen reducing systems

Description

Ensure that existing septic tank on-site wastewater systems are upgraded to advanced nitrogen reducing systems

Implications

This would be an alternative approach to encouraging reticulation and centralised treatment of properties currently serviced by on-site wastewater systems. There are a number of disadvantages with on-site systems compared with centralised systems, making centralised systems preferable where they are practicable. Advanced on-site systems that are reasonably affordable would generally not achieve the nitrogen removal rates that are achievable with centralised systems. Even the more cost effective on-site systems are generally more expensive to install and operate, on a per household basis, than centralised systems because of economies of scale. Advanced on-site systems need to be regularly maintained and well managed to achieve consistently high nitrogen removal rates. It is much easier to ensure that a small number of centralised plants consistently achieve high performance standards than it is with a large number of on-site systems.

Effectiveness

There are advanced on-site systems available that could be installed near the Lake and would not result in localised increases of nitrogen or wastewater pathogens in the Lake's water. However, due to the advantages of centralised plants over on-site systems, it is considered that this policy approach would not be as effective in terms of achieving the objective, compared to encouraging reticulation and centralised treatment of wastewater from near-shore communities.

This policy approach is not supported.

5.3 Prohibit new wastewater discharges near the lakeshore

Description

Prevent further potential for localised increases in nitrogen and wastewater pathogens near the lakeshore by prohibiting further wastewater discharges near the lakeshore.

Implications

There is likely to be continued pressure for development of lakeshore property. Prohibiting new wastewater discharges near the lakeshore would mean that any new developments have to be serviced by a centralised wastewater treatment plant discharging away from the Lake. This would mean it would only be economical to have intensive lakeshore development serviced by wastewater reticulation. It would not be possible to have new large properties (over one hectare in area) serviced by on-site systems, severely limiting development options.

Effectiveness

Preventing new wastewater discharges near the lakeshore would prevent near-shore wastewater effects from new developments around the Lake. However, this approach is likely to significantly limit development options particularly since alternative more flexible responses are available.

This policy approach is not supported.

5.4 Allow new wastewater discharges near the lakeshore providing near-shore effects are avoided

Description

Allow new wastewater discharges near the lakeshore if it can be shown that they will not cause localised increases in nitrogen or wastewater pathogens in the Lake.

Implications

This is an alternative policy approach to that explained in the previous section. As stated earlier, there are advanced on-site wastewater systems available, which if appropriately managed, can be sited near the lakeshore while avoiding localised increases in nitrogen or wastewater pathogens in the Lake. Such a policy approach will not limit development options by preventing on-site systems near the lakeshore. New discharges of treated wastewater near the lakeshore from centralised plants would find it difficult to meet these criteria, although not impossible.

Effectiveness

This policy option would ensure that the objective is met, while not limiting property development options. It is therefore considered an effective policy option.

This policy approach is supported. The policy is written in the Variation as Policy 8, and is listed in section 8 of this report.

5.5 Promote Best Management Practices for non-domestic wastewater

Description

Promote Best Management Practices that prevent near-shore water quality effects from contaminants in non-domestic point source wastewater discharges such as stormwater and industrial discharges.

Implications

Most large point source discharges are managed by Waikato Regional Council discharge consents. Taupo District Council has applied for Comprehensive Stormwater Consents from the Waikato Regional Council. The effects of urban stormwater discharges to Lake Taupo will be dealt with during this consent process. However, there will be a number of other forums where Best Management Practices for stormwater and other point source discharges can be promoted. This would include visits to key commercial/industrial sites, discussions with subdivision developers and Taupo District managers of stormwater, provision of guidelines about best practice and so on. Some of these approaches are already occurring and it is not considered that the option will have significant financial implications.

Effectiveness

There are many existing opportunities for promoting Best Management Practices with respect to non-domestic point source wastewater discharges. Making use of these opportunities will help to ensure that these discharges do not negate improvements made with respect to domestic wastewater discharges.

6 Possible Policy Approaches to Achieve Objective 4

There are a number of possible policy approaches that could be adopted to achieve the Lake water quality target, while mitigating social and cultural effects and sharing financial costs in varying degrees. The Waikato Regional Council considered a range of alternatives within its Resource Management Act mandate. These alternatives take in aspects of social, cultural and economic well-being and environmental sustainability, as well as funding decisions and acceptability to Regional and district ratepayers. As noted earlier in this report, these alternative policy approaches have also been evaluated in the light of feedback from project partners and stakeholders in the Catchment.

Social effects of managing land uses to achieve the Lake water quality target includes rapid or large scale changes to individuals or parts of the community that might result from:

- effects on individual businesses – for example, negative cash flow and inability to service debt levels requiring businesses or assets to be sold or changed within very short timeframes at high cost
- effects on social fabric – families leaving local communities, affecting schools and rural services.

Policy options considered that mitigate the social effects of managing land uses to achieve the Lake water quality target include:

- The approach used to allocate rights for nitrogen discharge under a capping regime. In the rules in the Variation, management of nitrogen discharges is referred to nitrogen discharge allowances.
- The development of a tradable market in nitrogen.

Policy options considered that share the financial costs of managing land uses to achieve the Lake water quality target include:

- reducing nitrogen using a public fund
- reducing nitrogen using gradual steps over a long time period
- having a public fund paying for income forgone under a nitrogen cap
- altering Waikato Regional Council policy for full cost recovery for:
  - pre-consent information such as collation of information and nutrient modelling to achieve a benchmark and development of Nitrogen Management Plans
  - resource consents
  - annual charges for consents
  - compliance costs.

During the hearing, some submitters were concerned that the proposed rules would prevent further expansion of papakainga and Marae due to restrictions in the wastewater rules. The main policy option considered to address this is to make provision for a limited increase in wastewater nitrogen to allow some expansion of papakainga and Marae.

6.1 Allocation approach that minimises social disruption

The establishing of limits on nitrogen to achieve water quality standards implies that the existing structure of rights and obligations is unacceptable to some of society. Rights and obligations need to be structured such that they allow the establishment and enforcement of water quality standards. The structure chosen will impact on how wealth is redistributed, and therefore, the extent of social disruption.

To date, discharging nitrogen has not been constrained, so landowners have effectively been exercising a perceived privilege to discharge. This was not seen to infringe on the rights of others. The right of society to high water quality is now found to be in conflict with the privilege to discharge nitrogen.

Establishing a market for nitrogen emissions requires the establishment of rights to discharge. This requires all current privileges to be surrendered, and the rights to nitrogen emissions to be allocated. The sections below discuss the different approaches that could be used to allocate nitrogen discharge rights.

6.1.1 Allocation based on grandparenting

Description

Rules to cap nitrogen for individuals are based on an initial allocation of nitrogen that is grandparented – that is, based on current existing (or historical) nitrogen leaching output. Landowners are required to obtain resource consent that is based on existing nitrogen leached from their individual property. Resource consents are given a common expiry date no sooner than July 2022 to give certainty for consent holders so that they can realise the value of capital investments, and to give certainty to Waikato Regional Council that any significant changes in the future management of the Lake's water quality can be realised out into the future.

In essence, this grants all the manageable, and potentially tradable, nitrogen to the existing pastoral farmers and urban sources. This means that all landowners would start with their existing land use allocations.

The policy approach makes the allocation of nitrogen explicit, and sets up the way that nitrogen from land will be managed in the regulatory methods.

Implications

Grandparenting limits all land owners to their historic nitrogen leaching rates. In this sense, land use intensification is equally limited for all land owners. No land owner may change their land use activity in a way that increases nitrogen leaching in the catchment. After the grandparented allocation, land owners may increase nitrogen leaching on one area of land provided that increase is offset by a corresponding decrease elsewhere in the catchment.

Forestry activities will be able to continue. However, those who own undeveloped land or forestry will not have sufficient nitrogen to change to higher nitrogen leaching land uses such as pastoral farming. Owners of forest land will not have a surplus of nitrogen which can be sold or used to offset a nitrogen increase elsewhere.

Farmers will be able to continue to farm at benchmarked levels. This will now occur within a regulatory framework. Farmers will not be able to increase nitrogen leaching, unless the increase can be offset by a decrease elsewhere in the catchment. This effectively places a significant restriction on land use intensification. Intensification has traditionally been the primary means by which farmers have stayed profitable in the face of increasing costs of farming. Grandparenting therefore creates a risk in terms of the future viability of farming.

Effectiveness

Grandparenting means that land owners can continue their existing land use without the need to obtain additional nitrogen leaching rights. There are therefore no immediate up-front costs.

To satisfy Objective 4, the nitrogen allocation mechanism needs to ensure that as far as practicable the viability of existing land uses is not significantly compromised. Objectives 1 and 2 should be achieved without preventing people and communities from providing for their social, economic and cultural wellbeing. Grandparenting is the

most likely allocation option to achieve this. Other allocation options will increase the likelihood that farmers will not have sufficient nitrogen to continue farming.

Grandparenting will also limit development potential for foresters. However they are able to continue their existing land use. This does restrict foresters to a land use which is currently producing low returns. However this is a factor of the market rather than the Variation. All land owners are subject to such market fluctuations.

On balance, in order to attain the objectives and so achieve sustainable management, the grandparenting regime should be adopted.

This policy approach is supported. The policy is written in the Variation as Policy 3, and is listed in section 8 of this report.

6.1.2 Allocation based on averaging

Description

Rules to cap nitrogen are based on an initial allocation of nitrogen that is an average across some or all land uses in the Catchment. Farmers are required to obtain resource consent that is based on a limit of nitrogen set in the policies and rules, which is certain and measurable.

Implications

The main implication of this approach is that forestry and owners of undeveloped land gain a surplus of nitrogen allocation, and pastoral landowners will be in deficit, the size of which is determined by how much nitrogen they are currently emitting. For example, the five dairy farms would receive an allocation approximately 70 per cent below their current level, and would have to purchase nitrogen credits from foresters or owners of undeveloped land in order to continue. Pastoral farmers would have to immediately reduce nitrogen to meet the rule or purchase nitrogen allocation from foresters or owners of undeveloped land in order to continue their current operations. This is viewed as inequitable by farmers because of the windfall gain that non-pastoral landowners would receive, and the windfall loss that pastoral landowners would endure.

Effectiveness

Future opportunities are widened for foresters and owners of undeveloped land if nitrogen allocations are pooled. However, there are immediate large upfront costs for pastoral farmers, which is inconsistent with Objective 4 and the policy approach to restrict farmer costs to future opportunities forgone and losses in capital value. This is a windfall cost to pastoral farmers and a windfall gain to owners of undeveloped land and forestry. Higher enforcement costs are likely because of poor co-operation from pastoral farmers.

If this allocation method was adopted in conjunction with policies that did not allow trading of nitrogen allocation, or if those holders of a nitrogen allocation surplus refused to sell their surplus, the immediate shut-down of all pastoral land use in the Catchment would be a large social cost.

This policy approach is not supported.

6.1.3 Allocation based on industry averaging

Description

This scenario combines the grandparenting and averaging scenarios presented above. Each industry sector (for example, forestry, dairy farming) gets a grandparented allocation based on the historical emissions of the sector as a whole. Within each sector, this allocation is then averaged across all landowners, so that each receives the same allocation.

Implications

This approach would not differ from the grandparenting approach in its effect on foresters and owners of undeveloped land. That is, they will be unable to develop their land beyond forestry without purchasing nitrogen allocation from pastoral landowners.

Pastoral landowners will be made either better or worse off depending on what their historical emissions were compared to their industry counterparts. Some will have a nitrogen allocation surplus, while others will have a deficit. While this is similar in effect to averaging, the surpluses and deficits would be much smaller.

Effectiveness

Owners of undeveloped land and forests (largely Ngati Tuwharetoa) will be constrained to forestry or an equivalent low nitrogen land use. Owners of pastoral land who are currently emitting less than industry average nitrogen will be able to intensify their land use or sell their surplus allocation (assuming trading is allowed). Owners of pastoral land who are currently emitting more than the industry average will have to either immediately reduce their nitrogen emissions or purchase nitrogen allocation from other landowners.

While this option has a lower social cost than averaging, it would create greater social costs than those achievable under grandparenting. Because every farm is different, it is impractical to say that every hectare of land under a certain industry type should emit the same nitrogen. Due to many factors, such as topography, some farmers are able to reduce nitrogen emissions at a much lower cost and more effectively than others. Typically, the costs of adjustment within the agricultural sector are high, and adjustments are irreversible in the short term. Using such a blanket approach does not take into account these efficiencies.

This policy approach is not supported.

6.1.4 Allocation based on averaging with adjustments

Description

Allocation could be based on averaging and then adjusted to favour one or more parties. There are many possible adjustment scenarios. One example would be to exclude tussock, bare ground, and indigenous forestry from the averaging calculation. These landowners would only receive their current output. All other land uses would have their nitrogen emissions summed and averaged, which becomes the initial allocation for every other hectare of land.

The main purpose behind this approach is an attempt to allow owners of planted and native vegetation land some more flexibility in their future development aspirations. This approach would also avoid immediate windfall losses to all pastoral landowners, because the allocation they receive would be higher than if tussock, bare ground and indigenous forestry were included in the averaging calculation.

Implications

Any combination of adjustment to initial allocation can be set, and each will have different implications for different landowners. For example, an adjusted average could include the per hectare nitrogen leached from privately owned scrub and pasture and urban sources. Privately owned indigenous forest and Department of Conservation (DOC) land would not get any additional nitrogen. This ‘adjustment’ means that foresters and owners of undeveloped land would end up with more nitrogen than currently, which would provide a valuable asset. Pastoral would have a deficit, but as large as under a pure averaging scenario. Pastoral farmers would have to either immediately reduce nitrogen by at least 25-30 per cent, or purchase nitrogen allocation from foresters.

Effectiveness

As with averaging, future opportunities are widened for owners of undeveloped land and forests if nitrogen allocations are pooled. Immediate upfront costs for pastoral farmers are not as high as with the averaging option but it is still inconsistent with the intention to restrict landowner costs to future opportunities forgone and losses in capital value. The actual cost to pastoral farmers depends on price of nitrogen or their ability to reduce nitrogen by the required 25-30 per cent. Analyses show that a reduction of this magnitude would place significant costs on farmers. The effectiveness of this approach may therefore be undermined due to the inability and lack of motivation to comply.

This policy approach is not supported.

6.1.5 Allocation based on grandparenting with adjustments (flexibility allowance)

Description

Allocation could be based on grandparenting and then adjusted to favour one or more parties. There are many possible adjustment scenarios. One example would be to cap at a 'best practice' level, such that each landowner receives an allocation equivalent to what 'best practice' management would determine for their land use. However, it would be impractical to determine best practice for every landowner's allocation.

Another option is where allocations start with existing nitrogen outputs but are then adjusted by a transfer from pasture and urban sources to planted forests and undeveloped land.

Implications

Pastoral farmers must reduce their discharges by improved farm management systems, conversion to low nitrogen land uses, or purchasing nitrogen credits from foresters. Owners of undeveloped land and forests have more allocation than required for their current land use. This can be seen as providing compensation, to some degree, to those landholders for foregone opportunities.

Effectiveness

As with averaging, future opportunities are widened for owners of undeveloped land and forests if nitrogen allocations are adjusted in their favour. They have the ability to intensify their land use or to sell their surplus allocation to those with a deficit (pastoral landowners). Immediate upfront costs for pastoral farmers depend on how much the allocation is 'adjusted'. The actual cost to farmers will depend on the price of nitrogen or their ability to reduce nitrogen by the adjustment amount. As already outlined, the cost to farmers of reducing nitrogen is significant, which may lead to an inability to comply with the reduction target.

If compensation to owners of forests and undeveloped land is desired, then this should occur outside of the allocation mechanism, via for example, a direct payment. Using an adjusted allocation to provide compensation is inequitable, inefficient and possibly impractical[58].

This policy approach is not supported.

[58] Kaine, G. and M. Higson (2004): A Tradable Permit Program for Nitrogen Emissions to Lake Taupo. Social Research Working Paper, AgResearch Ltd.

6.1.6 Traditional regulation including allocation based on delayed averaging

Description

A non-allocative or traditional regulatory approach was proposed at the Hearings. This approach would involve permitting or controlling all land uses subject to best practice performance standards. There would be no restriction on conversion from low leaching activities to high leaching activities provided best management practice was incorporated into farm plans. It was suggested that this could be undertaken in combination with a delayed allocation (delaying allocation for say 10 years), with the proviso that future allocation should not be based on grandparenting.

Implications

Pastoral farmers must apply best practices to existing farm practices. Foresters and undeveloped landowners could effect conversions to farming provided that best practice was followed. There would be no cap on nitrogen leaching for the 10 years before nitrogen was allocated.

As previously stated best practice, as a principle, may be defined in a variety of ways. However, nitrogen leaching best practice in a farm context can be described as practices that are both economically viable and environmentally beneficial (low nitrogen). The practicalities of implementing best management practices vary from farm to farm and change depending on market variables, such as price. Certain practices may be technically feasible but the costs associated with them may be significant.

Effectiveness

The major problem with the regulatory option is that it would put the cap in jeopardy because it is intended to enable current non-farming land to be converted to that activity with only the need to obtain a controlled activity consent for the purposes of fixing the performance standards, but with no limit on the discharge of nitrogen.

Any allocation of nitrogen after the 10 year period would still have social and economic effects. These effects will depend on the allocation method, however as signalled this approach would not follow the grandparented allocation method.

This policy approach is not supported.

6.2 Nitrogen offsetting

Description

Within the nitrogen cap, offsetting nitrogen between properties is enabled. Enabling offsetting introduces flexibility into the overall environmental management system allowing landowners to determine the ‘best’ way to achieve environmental objectives while maintaining a viable business.

Offsetting could be undertaken in a number of ways, for example internal offsetting within a property or within properties owned by the same person. Offsetting could also occur through a nitrogen trading system.

Implications

In general terms, nitrogen offsetting has a number of advantages. An effective system would:

- encourage greater nitrogen efficiency among landowners, as there is a continual positive incentive to reduce nitrogen input to those who can achieve change most cheaply
- work best when there are multiple ways of solving problems and significant differences in the cost of the solutions
- lead to the most cost-effective solution, as the least cost solutions would be implemented first, and nitrogen goes to its economically most valued use
- reduce compliance costs by encouraging greater change by those who change is relatively cheap, rather than asking everyone to make the same level of change
- promote innovative means of reducing nitrogen leaching, due to the asset created and the value it holds
- create incentives for the adoption of best practice
- allow transfers between uses without continual decision-making by the regulatory authority, thereby reducing both costs (including litigation) and the burden of allocation decisions on the Waikato Regional Council
- leave the management decision-making and enterprise selection decisions in the hands of those best suited to making them
- lead to changes in land use based on price, reflecting the economic value of the resource, rather than political judgements
- within the nitrogen limitations, not constrain the range of land use options available to landowners
- provide a form of compensation for those who exit or change land use
- be better able to accommodate new entrants to the system
- create a community of interest among asset holders in ensuring compliance.

A component of offsetting, nitrogen trading, has a number of challenges to overcome, including:

- Working within the auspices of the RMA, and the resulting constraints on the fluidity of the market.
- Administration and transactions management and costs.
- A philosophical shift in resource management thinking for landowners and resource managers in New Zealand, including the relinquishing of control by resource managers over land use decisions.

Effectiveness

This method will achieve the objective, as:

- it is legally possible under the RMA for Waikato Regional Council to carry out a form of trading or offsetting through adjusting resource consents. This means that while leaching on one property may go up, there is a subsequent decline on another property
- it allows nitrogen allocation to move to its highest valued use, as trading/offsetting occurs and those individuals that obtain nitrogen allocations are able to develop businesses within environmental constraints
- providing flexibility for those operating under a cap is the most effective way to minimise social and economic disruption.

This policy approach is supported. The policy is written in the Variation as Policy 12, and is listed in section 8 of this report.

6.3 Nitrogen reduction using public fund

Description

This approach shares the costs of reducing manageable sources of nitrogen by 20 per cent, through a public fund contributed to by Central Government, Taupo District Council and Waikato Regional Council. It is supported by a policy that reviews the effectiveness of the fund.

Implications

As stated in section 4.5.2 Waikato Regional Council, Taupo District Council and Central Government have agreed to share the costs of the 20 per cent nitrogen reduction, along with research and advisory services. It is planned that a joint public fund will be established for this purpose. The estimated costs and the way in which the total cost will be shared are summarised in section 4.5.2. Further detail is available in the document '*Protecting Lake Taupo – Revenue and Funding Policy*'[59].

Effectiveness

Central Government, Waikato Regional Council and Taupo District Council have considered the different contributors and beneficiaries of Lake protection. Collectively, they have agreed that the new expenditure of nitrogen reduction and support ($81.5 million) should be shared 45 per cent by Government, 33 per cent by the Regional community and 22 per cent by the District community, reflecting a balance between the factors considered.

Waikato Regional Council and Taupo District Council's share of the public fund have been discussed with the Regional and district communities during the preparation of their respective 2004-2014 Long-Term Council Community Plans, which were formally adopted in June 2004.

Because a financial commitment has been made by all levels of government and supported through a community process, considerable effort will be made in ensuring that the fund is effective in achieving nitrogen reductions. The public fund allows the most efficient and effective ways of permanently removing nitrogen to be pursued. This can be compared to requiring and subsiding reductions across the board, which would be more expensive. However, checks and balances are necessary to be put in place to monitor the fund's effectiveness – hence the need to include a complementary policy on monitoring.

This policy approach is supported. These policies are written in the Variation as Policies 10 and 11, and are listed in section 8 of this report.

6.4 Nitrogen reduction phased in

Description

The 20 per cent nitrogen reduction target is achieved by requiring incremental nitrogen reductions from landowners. The policy sets out the amount of nitrogen reduction required and the period of time for achieving it. Defining an acceptable period of time to achieve the 20 per cent reduction is the first policy decision, followed by the size and frequency of the incremental reductions. There may be many combinations and each will have different implications for practical implementation of the rules, affecting landowners in different ways.

In order to assess the implications of this approach, one option comprising 3 components which could be considered is:

- landowners are benchmarked and capped in years 1 to 5
- a 10 per cent reduction is required in years 5 to 10
- a further 10 per cent reduction is required in years 10 to 15.

This approach could be supported by financial assistance for landowners to meet reduction targets, such as initial assistance payments for meeting first reduction target. For example, payment of capital costs for implementing new practices (feed pads, herd homes etc.), payment for kilograms of nitrogen permanently reduced, subsidies for use of nitrogen leaching inhibitors, joint ventures with forestry conversion.

[59] Environment Waikato, 2004, *Protecting Lake Taupo – Revenue and Funding Policy*, Environment Waikato, Hamilton.

Implications

This approach depends on the ability of landowners to reduce nitrogen and still remain economically viable. Assistance and financial incentives assume that the cost of nitrogen reduction will decrease over time due to technology and management changes. If this is the case, landowners will be able to retain profitability with reduced total nitrogen emissions. The blanket reduction approach will fail if technology and management gains are not realised.

The cost of the uptake of new technology and changes to farm management practices will vary between farms, possibly to the extent that some farms will be able to achieve the 20 per cent reduction and others only part or none of it. Financial assistance therefore needs to take into account these variances. Although there have been some trials in the Catchment modelling profitability and nitrogen leaching for a range of farm systems, they are still in an early phase. It is not currently possible to identify the appropriate levels of financial assistance to address the uneven distribution of costs resulting from this policy approach.

Effectiveness

Given the lack of definitive information, the provision of financial assistance may not be effective initially. Effective assistance could potentially be developed in the first five year period but this creates a high level of uncertainty for landowners. Uncertainty is likely to affect landowners' plans for their properties and farm businesses, both in the first period and as the reduction targets approach, potentially resulting in high levels of non-compliance. Given that reductions are expected across the Catchment by all landowners, and financial assistance does not cover the full 20 per cent reduction, levels of compliance may be further reduced.

Blanket reduction targets together with the differences within the rural sector means unreasonable expectations will be placed on those that are least able to reduce. This will affect the implementation of this policy approach and may undermine its effectiveness.

This policy approach is not supported.

6.5 Public fund pays for income forgone

Description

This approach shares the future costs of living under a cap. Because the cap involves not being able to intensify and increase profit in a traditional sense, future income is foregone. Compensation for this loss of future possibilities could be paid through a public fund, either as a one-off payment or an annuity.

Implications

Compensating for future income that can no longer be realised due to the cap is problematic because future incomes are not known. Estimates of future income, such that payments are equitable, would be subject to appeal. A one-off payment would require future income to be calculated at its present value, incurring a very large cost on the current community. Annuity payments (potentially in perpetuity) would be an ongoing cost to the community.

Compensation in this form sends a clear message that landowner rights are paramount, and sets a precedent for compensation for any restrictions to land use.

Effectiveness

This policy would not be effective at minimising social and economic costs because the costs are simply shifted to the wider community and could even be overestimated. There would be less incentive to innovate and adopt new technologies because it would not be economically necessary.

This policy approach is not supported.

6.6 New wastewater for papakainga and Marae

Description

This approach is to allow for the development of new on-site wastewater servicing for papakainga housing and associated Marae buildings, provided that:

- additional wastewater nitrogen is offset where practicable and minimised where it cannot be offset;
- the cumulative effect of additional nitrogen leaching as a result of this policy is inconsequential in terms of Objective 1;
- near-shore effects are avoided.

This provision is intended to be implemented by a restricted discretionary rule.

Implications

This approach will ensure that expansion of on-site wastewater servicing for papakainga and Marae is not prevented. By implementing the provision through a restricted discretionary rule, it can be effectively managed so that the expansion of services does not risk meeting the other objectives of the Variation.

In many cases, iwi groups would have the ability of offset additional wastewater nitrogen with a reduction of nitrogen from other sources (such as from farm animals). This would often allow new on-site wastewater servicing through existing permitted activity rules. However, there are cases where such an offset would not be possible, such as where land associated with a Marae is not farmed, and in some cases where lack of access and electricity would not allow the installation of advanced nitrogen reducing wastewater services.

Ensuring that the Variation does not prohibit new papakainga and Marae wastewater servicing will help to allow Marae members to provide for their social and cultural wellbeing, and will allow appropriate provision in terms of s6 and 8 of the RMA.

Effectiveness

This policy approach will allow the establishment of new papakainga and the expansion of Marae facilities. There will be additional costs to iwi of this provision, as it will be implemented through a consent process. As noted above however, there will be many cases where new wastewater servicing for such facilities can be permitted. It is not expected that this provision will need to be used frequently in the Catchment. The benefits of the provision are considered to be significant in comparison to the costs, as the provision ensures the traditional ability for iwi to expand papakainga and Marae facilities on their land is maintained, while not risking Lake water quality objectives. The provision is therefore considered to be an effective approach.

This policy approach is supported. This policy is written in the Variation as Policy 9, and is listed in section 8 of this report.

7 Possible Policy Approaches to Achieve Objective 5

Waikato Regional Council considered the following approaches to managing significant adverse effects resulting from land use change:

- Joint planning projects.
- Provision of guidance on matters to consider when land use changes.

7.1 Joint planning projects

Description

This approach is direct integrated management, whereby Waikato Regional Council and Taupo District Council work together on planning and resource management issues within the Taupo Catchment. Management of growth and landscape would be of particular relevance.

Implications

Integrated management of natural and physical resources is a responsibility of Waikato Regional Council. This role is particularly relevant to the Taupo Catchment as a result of the need for intervention to reduce nitrogen emissions, as outlined in the issue. Integrated management requires commitment and capacity from both councils.

Effectiveness

High priority has been given to managing nitrogen emissions directly through a wide range of approaches, many of which involve integration with Taupo District Council. Taupo District Council has initiated a growth management study and plans to deal with other issues such as landscape and natural features in the near future. Commitment to joint planning at this point in time is limited because of the scale of the task and resourcing required to achieve Lake protection. The Waikato Regional Council could not be an effective participant in joint planning studies over the next few years.

This policy approach is not supported.

7.2 Consequences of land use change

Description

This approach places emphasis on integrated management to ensure potential issues arising out of land use change or changes in management practices are taken into account at the Regional and district levels. It provides a range of matters that should be considered.

Implications

This approach outlines particular issues that should be recognised by Waikato Regional Council and Taupo District Council when considering land use change. It enables integrated management but is not overly-directive. It will be up to both councils to use this guidance when relevant and to work together on a case-by-case basis.

Effectiveness

This approach is effective in giving guidance to both councils and highlighting the issues associated with land use change. It is recognised that this issue requires monitoring as land use change occurs in the Catchment over time, with a view to greater intervention in the future if required.

This policy approach is supported. The policy is written as Policy 13 in the Variation, and is listed in section 8 of this report.

8 Preferred Mix of Policy Approaches

Following evaluation of the above range of policy approaches with respect to Waikato Regional Council's roles and responsibilities under the RMA Act and the Local Government Act and feedback received during ongoing consultation with partners and stakeholders, the following policies have been written in the Variation:

To achieve Objectives 1, 2, 3, 4 and 5

Policy 1: Tangata whenua values
Recognise the role of Ngati Tuwharetoa as kaitiaki of the Lake and owners of the Lake Bed, and enable groups and individuals within Ngati Tuwharetoa to participate in decision making processes related to adverse effects on the environment which impinge on tangata whenua values.

To achieve Objectives 1, 2 and 3

Policy 2: Identification of Lake Taupo as an Outstanding Waterbody in the Waikato Region
Ensure that activities do not adversely affect the significant characteristics of Lake Taupo that make it an outstanding water body in the Waikato region:

a) New Zealand's largest clear blue lake resulting from exceptional water quality (as defined by water quality characteristics) in that it, in most locations and most times, surpasses the New Zealand drinking water standards and is of higher quality than all Waikato Regional Council's ecological health and recreation standards
b) High level of natural character of the margins of the Lake and inflowing streams due to the extent of wilderness, surrounding landscape and geological features and lack of built environment around much of the Lake
c) Status as tribal taonga for Ngati Tuwharetoa
d) Internationally renowned trout fishery
e) Ability to support a wide range of indigenous fauna and flora
f) Commercial opportunities based on the Lake's natural features and values, which provides local and national economic benefit.

To achieve Objectives 1, 2, 3 and 4

Policy 3: Cap nitrogen outputs from land in the catchment
Avoid catchment-wide increases of nitrogen leaching from land by placing limits on the annual average amount of nitrogen leached by:

a) Enabling low nitrogen leaching activities, within specified nitrogen limits
b) Managing other nitrogen leaching activities using the Overseer^{TM} model to determine nitrogen discharge allowances for each individual property, based on the average of nitrogen leached between July 2001 and June 2005, and on an ongoing basis, manage the annual average of nitrogen leached through Nitrogen Management Plans.
c) All consents granted which determine a Nitrogen Discharge Allowance for an individual property, shall have a common expiry date of no sooner than July 2022.

To achieve Objectives 1, 2, 3

Policy 4: Reduce nitrogen outputs from farming land use activities and wastewater

Permanently remove 20 percent of total annual manageable load of nitrogen leached from farming land use activities and wastewater, from the Lake Taupo catchment by 2020.

Policy 5: Phosphorus and water quality
Ensure phosphorus discharges from land do not get to levels where they could adversely affect water quality in Lake Taupo and inflowing tributaries, and ensure management practices are sufficient to continue to avoid adverse effects.

Policy 6: Landowner involvement in catchment management
Promote sound working relationships between landowners in the catchment and Waikato Regional Council, that:

a) Ensure compliance with regulation
b) Confirm that the regulatory auditing process is fair and transparent
c) Ensure landowners have access to relevant information about current research and development initiatives, nitrogen management practices and overall progress in achieving the Lake target
d) Assist landowners to identify, define and implement nitrogen management practices and new technology that is relevant to their business and their property nitrogen limit
e) Assist the process of mutual understanding between the parties, and the joint development of solutions.

Policy 7: Cap nitrogen outputs from wastewater sources
Ensure new or existing domestic on-site and community wastewater systems do not cause an increase in leaching of wastewater nitrogen to the Lake.

To achieve Objective 3

Policy 8: Domestic wastewater management in Near-shore Zone*
Ensure new on-site and community domestic wastewater systems within the Lake Taupo Near-shore Zone achieve a high standard of nitrogen and pathogen removal, and that existing domestic wastewater systems within the Near-shore Zone are reticulated if practicable, or upgraded if they are likely to cause increased concentrations of nitrogen or wastewater pathogens in shallow near-shore waters.

To achieve Objective 4

Policy 9: Papakainga and Marae Wastewater Discharges
Notwithstanding Policies 7 and 8, provide for the development of new on-site wastewater servicing for papakainga housing or Marae buildings provided that:
a) Additional wastewater nitrogen is offset where practicable and minimised where it cannot be offset;
b) The cumulative effect of additional nitrogen leaching as a result of this policy is inconsequential in terms of Objective 1;
c) Near shore effects are avoided.

Policy 10: Public Fund to share costs of reducing nitrogen from rural land in the Lake Taupo catchment
Ensure a public fund assists research and development of low nitrogen leaching land uses and management alternatives, and contributes to a permanent reduction in nitrogen outputs from farming land use activities. The administration of a public fund that is contributed to by local, regional and national communities, shall follow the guiding principles of:

a) Cost effectiveness
b) Certainty of permanent nitrogen removal
c) No adverse environmental consequences
d) Maximum nitrogen removal in minimum timeframe
e) Open and transparent process.

Policy 11: Effectiveness of the Public Fund
Review progress of the public fund after 2010 and initiate changes to the mechanism for achieving Objective 4 if substantial progress has not been made on Policies 4 and 10 by that time. The following factors will be considered during the review:

a) The extent to which agreements in process have achieved the 20 percent nitrogen reduction target
b) The extent to which the fund has been efficient and effective in achieving permanent nitrogen removal and whether modifications to the criteria are necessary
c) The extent to which the administration of the fund has been efficient and effective and whether modification to the representation, structure or reporting are necessary.

Policy 12: Nitrogen Offsetting
Permit the transfer of Nitrogen Discharge Allowances around the catchment of Lake Taupo, by ensuring any increases in nitrogen leaching are offset by corresponding and equivalent reductions in nitrogen leaching within the Lake Taupo catchment.

To achieve Objective 5

Policy 13: Consequences of land use change
Ensure integrated management of natural and physical resources is achieved when considering proposed land use changes and changes in management practices including the consideration of the following matters where relevant:

a) Biodiversity and ecological values of indigenous vegetation and habitats of indigenous fauna, including restoration and the creation of ecological corridors
b) Public access to Lake Taupo and waterways in the catchment of Lake Taupo
c) Low impact stormwater management in subdivisions
d) Land stability and soil conservation practices
e) Natural and cultural heritage resources
f) Landscape and amenity values.

For the next level of analysis, the policies have been put into six main groups, according to common themes. Each one of these themes will be assessed in terms of the possible methods that could achieve the policy. The grouping are listed in the shaded box below.

Preferred Policy Approaches – main groupings for policies in Variation

1. **Recognition of values:** Policies to recognise tangata whenua values and to recognise Lake Taupo as an outstanding waterbody.
2. **Cap nitrogen outputs and reduce manageable sources by 20 per cent:** Policies to require capping of nitrogen from rural land and wastewater, and to set up the nitrogen reduction target and means for achieving it. Policies to set out expectations of changes in behaviour from existing and future landowners and how this will be supported by research and development, and information and advice to landowners.
3. **Wastewater management:** Policies to recognise higher risks in discharges closest to the Lake and to set out how existing and new wastewater discharges will be managed.
4. **Providing for social, cultural and economic well-being:** Policies to set out how this will be provided for using nitrogen offsetting to introduce flexibility under the nitrogen cap, set up of a public fund to share financial costs of the nitrogen cap and reduce policies and increase landowner involvement in Catchment management.
5. **Consequences of land use change:** Policy to guide resource consent decisions on consequential land use changes.

9 Possible Methods to Implement Preferred Policy Approaches

There are a wide range of methods that could be adopted to implement the mix of policy approaches adopted. The methods listed in this section are the possible methods that could achieve the preferred policy approaches presented in section 8 of this document. For each policy grouping in the shaded box in section 8 above, a number of possible methods have been listed. The implications and effectiveness of each possible method are briefly assessed.

9.1 Recognition of values policies – possible methods to implement

Preferred policies that recognise Lake and Catchment values are policies 1, 2 and 6, listed in section 7 of this report. Possible methods to implement these policies include:

- Support for 2020 Taupo nui-a-Tia Action Plan.
- Alternative Lake protection mechanism such as a water conservation order.
- Actively investigating and supporting Ngati Tuwharetoa values.
- Promotion and education of sustainable land management values.

9.1.1 2020 Action Plan

Description

This method commits Waikato Regional Council to continuing to take an active role in the non-statutory 2020 Taupo nui-a-Tia Action Plan to implement actions to protect all the community chosen values for the Lake and the Catchment.

Implications

This method requires active participation, and commitment of funding and resources. The method has implications for other Council plans and policies such as the Long-Term Council Community Plan, annual plan and other initiatives, in order for it to be effective. This means that Waikato Regional Council staff need to integrate the Action Plan into activities undertaken across the organisation.

Effectiveness

This method implements all of the Lake Taupo policies because 2020 Taupo-nui-a-Tia is an integrated sustainable development strategy for the Lake Taupo Catchment. It has been developed jointly by tangata whenua, the community and Local and Central Government agencies, and identifies threats to community values that require action. The water quality of Lake Taupo is a key community value. Its implementation will therefore provide a significant contribution to ensuring Lake water quality will not degrade long-term. However, this method requires significant Waikato Regional Council commitment to ensure it is capable of helping achieve the Lake target.

This method is supported. It is written as Method 1 of the Variation and listed in section 9.6 of this report.

9.1.2 Actively investigating and supporting Ngati Tuwharetoa Lake values

Description

This method can be described as a commitment from Waikato Regional Council to work with Ngati Tuwharetoa towards actions and processes that sustain the cultural and environmental capacity of the Lake.

Implications

Working toward processes and actions that sustain these values requires Council commitment and capacity to implement the method.

Effectiveness

Given Waikato Regional Council commitment and capacity, the method can be effective in contributing to a deeper understanding of the similarities and differences in values and methods chosen to protect those values in the long-term.

This method is supported. It is written as Method 4 of the Variation and listed in section 9.6 of this report.

9.1.3 Promotion and education of sustainable land management values

Description

This method can be described as a commitment from Waikato Regional Council to work with other relevant agencies to raise awareness and promote rural land use that sustains the community and the environmental capacity of the Lake.

Implications

Promotion and education of values requires Council commitment and capacity to implement the method. It also requires community buy-in and involvement.

Effectiveness

Given Waikato Regional Council commitment and capacity, the method can be effective in contributing to long-term behavioural change. Voluntary action is considered a better sustainable outcome than forced change.

This method is supported. It is written as Method 10 of the Variation and listed in section 9.6 of this report.

9.1.4 Water conservation order

Description

This method would pursue the application of a water conservation order that would protect the outstanding amenity or intrinsic values of Lake Taupo, including:

- Habitat for terrestrial or aquatic organisms.
- Fishery.
- Wild, scenic or other natural characteristics.
- Scientific and ecological values.
- Recreational, historical, spiritual or cultural purposes.
- Characteristics of outstanding significance in accordance with Tikanga Maori.

Any person may apply to the Minister for the Environment for the making of a water conservation order, which then has to be assessed by a special tribunal including a public submission and Hearings process. The Governor General makes the final decision based on a recommendation from the Minister.

A water conservation order could place restrictions on the exercise of Waikato Regional Council's powers, particularly in regard to the following aspects:

- The quantity, quality, rate of flow or level.
- The maximum and minimum levels of flows and their rate of change.
- The maximum allocation for abstraction.
- The minimum contaminant loading.
- The ranges of temperatures and pressure.

Implications

Consent authorities may not grant resource consents that would be contrary to the water conservation order (however, consents granted before the order is made are unaffected). In addition, Regional policy statements, Regional plans and district plans may not be inconsistent with any water conservation order. The process of granting water conservation orders tends to be very lengthy – for example, the application for the recently granted (August 2004) water conservation order on the Motueka River was lodged in 1991.

Effectiveness

A water conservation order recommended by the Minister of Conservation, as set out in RMA sections 199–217 (scope and process for making a water conservation order) will not achieve the policies because:

- the timeframe involved would delay regulatory control over discharges of nitrogen in the Catchment of the Lake by several years
- it is likely that Waikato Regional Council would still need to go through a first schedule RMA process, in order to clarify the sorts of behavioural and business changes required to meet a water quality target in the Lake. This process is in addition to the water conservation order, adding to the time delay and cost
- Waikato Regional Council's statutory documents signal that Waikato Regional Council will take action to protect high value water resources in the Region. In particular, the proposed Waikato Regional Plan includes several objectives and policies supporting active protection of Lake Taupo, and three specific methods (methods 3.9.4.6, 3.9.4.8 and 3.9.4.9), anticipating that Waikato Regional Council will investigate and undertake non-regulatory and regulatory action where waterbodies sensitive to adverse effects of non-point source discharges are being adversely impacted
- the Waikato Regional Council Strategic Plan *'The Way Forward 2001-2011',* states that "Currently the proposed Waikato Regional Plan contains only voluntary provisions to manage nitrogen, and incentives for landowners to develop and improve riparian zones to intercept and treat some of the flow. These are not enough for Lake Taupo's soils, so we will develop ways of controlling nitrogen and propose these as a change to the Plan during 2001/02. It is likely to take a further three years to reach agreement with the community on these changes."

This method is not supported.

9.2 Cap and reduce policies– possible methods to implement

Preferred policies to cap and reduce nitrogen are policies 3 and 6, listed in section 8 of this report.

Possible methods that will achieve the policy approaches are:

- Regulation (capping– max limits – reduction).
- Education, advice and extension.
- Voluntary methods such as education and landowner Catchment body.
- Transfers of power.
- Monitoring of Lake Taupo water quality.
- Promotion of low nitrogen land use, research and development.

The option of having no methods is discussed first.

9.2.1 Do nothing

Description

No methods are identified.

Implications

Maintaining water quality in Lake Taupo relies on a reduction in nitrogen leaching from land use activities. If there is no reduction in nitrogen leaching, water quality will decline.

Effectiveness

If there are no methods, maintaining water quality would rely on voluntary action to reduce nitrogen leaching. This is dependent on landowners' willingness to change. Because the change required is significant in terms of cost, it is unlikely that people will be willing and committed to voluntary change. As a result, this option will not be effective in achieving the outcomes sought.

9.2.2 Regional Plan rules

Rules may be written in various ways to achieve the policies. Three options are discussed below:

Benchmarking and capping rules

Description

Benchmarking and capping rules determine each property's individual existing level of nitrogen leaching and ensure those levels are capped.

Implications

These rules are site specific and allow for landowner variation. They set up a process for determining existing landowner nitrogen leaching levels, which then become the allocation and maximum limit that the landowner must work within. This process can be carried out using permitted, controlled or discretionary rules. Because these rules implement a grandparenting policy approach, historical nitrogen leaching levels need to be identified. Benchmarking must be undertaken for a defined period of time in order to determine landowners' allocations. The time period of 2001-2005 is considered appropriate for assessing nitrogen leaching levels.

A consistent and robust methodology is required to carry out the benchmarking. There are several Nutrient Management tools available. A comparison between some of these models including Overseer™, SPASMO and NPLAS, was undertaken by AgResearch in 2005. The following analysis has been adapted from this comparison.

Overseer™

Overseer™ is a decision support tool for nutrient management. It includes consideration of nitrogen, phosphorus, potassium, sulphur, calcium, magnesium, sodium, and acidity and greenhouse gas and energy accounting. Overseer™ can account for pastoral, cropping, and horticulture land uses but there is greater development on the pastoral land use modules of the model. Overseer™ calculates nutrient use and flows from fertiliser, effluent, supplements, transfer by animals, and removal in products. Overseer™ can be used to investigate mitigation options. Overseer™ is designed to be used by farmers, consultants and scientists.
AgResearch is currently in the process of publishing the scientific basis of Overseer™ in peer reviewed journals.

Assumptions, Limitations, Features

- Overseer™ estimates long-term annual averages; it is not designed to predict the outcomes within a particular year or resulting from extreme events within a year.

- The model relies on the user supplying actual and reasonable inputs. Because Overseer™ is designed to be run by farmers and there is little restriction on how inputs can be entered, quality-control of the inputs is an important issue. In implementing the Variation, Overseer™ will be run by Certified Consultants or Contracted Waikato Regional Council staff to ensure consistency and quality control.
- Overseer™ is an empirical model that has been extensively calibrated for a wide range of climates and soil types. The quality of the calibration is dependent on the data available so has its greatest reliability and accuracy in determining nutrient flows from conventional farming systems.
- Overseer™ can not be used as a management tool for within season decisions, for example, Overseer™ can be used to estimate average nitrogen required for a crop but cannot be used to make decisions about nitrogen required for a particular year.

Applications
- Overseer™ is used by the three major fertiliser companies as part of the nutrient budgeting for their clients. It is the most widely used nutrient management tool in New Zealand.
- Available free of charge from MAF or the website.

Future Developments
- Overseer™ is under continual update/upgrade in response to users needs. It is intended to make improvements to some of the calibrations for some of the components of the model that are thought to be weaker and add mitigation options to the model as they become available and understood/tested. As detailed above, AgResearch has a multi year Foundation for Research Science and Technology (FRST) funded programme on low nitrogen emitting farming systems and nitrogen leaching trials so that Overseer™ can be refined for the Taupo Catchment.

SPASMO

SPASMO is a simulation model which requires daily information so that it can run on a daily time step that allows the investigation of timing-weather interactions. The SPASMO model looks at the processes of water, plant growth, and nitrogen. The model setup is very flexible so it can be used to address a very wide range of questions. SPASMO is primarily applied to horticultural systems but can also be applied to cropping and pastoral systems. SPASMO is designed to be run by HortResearch scientists but can be set up in various ways to make it more generally available for public use.

Assumptions, Limitations, Features
- Short-term and long-term variability is evident in results from the model.
- The model inputs are set by HortResearch scientists and therefore automatically come with a quality-control on use and inputs. The 'cost' of this is that the model is not available to individual users.
- SPASMO could be used as a management tool for within-season decisions however in practice this would be too slow because of the need to engage a scientist to run each simulation.

Possible Future Developments
- SPASMO developments are driven by demand from users. It is anticipated that the model will be developed to include more crops, more soils, and different land practices.

NPLAS

NPLAS has been designed to test if proposed land use changes around the Rotorua Lakes comply with the Regional Plan regulation which requires a cap in nitrogen or phosphorus leaving the property. NPLAS calculates the long-term annual average load of nitrogen and phosphorus entering the streams on a property or leaving the property in groundwater. NPLAS is a web-based programme and has been designed to be run

easily by any user without specific training. The NPLAS model is specific to the Rotorua Lakes district but is an example of what could be developed for other locations.

Assumptions, Limitations, Features

- The NPLAS model can assess pastoral nitrogen leaching estimates from a basic version of Overseer™, pastoral phosphorus loss and overland flow loss from GLEAMS simulations, direct animal deposition to waterways, nitrogen and phosphorus loads from houses/wastewater. NPLAS includes a consideration of the effects of fertiliser, rain, soil drainage, slope, and wintering-off.
- NPLAS can account for on-site mitigation through ponds, riparian strips, and wetlands.
- All these predictions are specific to the Rotorua Lakes environment.

Future Developments

- Developments of the NPLAS model in the immediate future will be centred on refinement and testing of the model. There is also a possibility for extending the system to other regions.

Preferred Model

Overseer™ is the preferred model for managing Nutrients under the regulation of the Variation, because it is the most detailed and accurate farm systems model and the inputs for the model are known by or readily accessible to farmers. Waikato Regional Council sought to ensure farmers had a tool that best met their on farm management needs because it was the farm management systems that were to be modified. In addition it is recognised that Overseer™ does have the capability to include mitigation measures including attenuation of nitrogen through wetlands and AgResearch are looking to include this information in the model in the near future.

It is noted that a comparison of modelling outputs from Overseer™ and SPASMO in the Taupo Catchment was commissioned by Waikato Regional Council and Hort Research. The result of this comparison concluded that there is a reasonable agreement between the predictions from the two models.

Effectiveness

These rules ensure landowners are constrained to historical levels of nitrogen leaching. This means they cannot increase nitrogen levels through intensification into the future. While this is a constraint on landowners, it is likely to be effective because it is achievable for landowners, albeit at some cost. With high levels of compliance, the cap achieves a significant component of the Lake target.

However, compliance is influenced by the activity status of the rules. If the rules are written as part of a permitted activity regime, their effectiveness relies heavily on landowners to determine their allocations and operate within a cap. It is then up to the Waikato Regional Council to monitor and enforce the rules very rigidly to ensure all landowners are complying. A permitted activity rule is likely to be ineffective in the short- to medium-term.

A controlled activity rule regime ensures all benchmarking is regulated in a consistent and transparent way through a resource consent process. It gives landowners certainty and ensures the cap is in place within a relatively short period of time. It is likely that a controlled activity rule will be more effective than a permitted rule. Further discussion on rule categories is found in section 11.1.3 of this report.

This method is supported. The method is written in the Variation as a series of land use rules in section 11.1 of this report.

Benchmarking and capping with maximum limits

Description

Rules could set different maximum nitrogen leaching limits for different land use types and different sectors within a land use type. For example, there would be separate maximum nitrogen leaching rates set for forestry, sheep and beef, deer and dairy farms.

Implications

These rules are the same as above but include maximum nitrogen leaching standards for different land use types, or sectors. For example, sheep and beef farms would have a lower maximum nitrogen leaching rate than dairying. Within the maximum limit for each sector, it is likely that some properties would have higher existing nitrogen leaching.

This approach has been considered in response to the concern that some properties may be using excessive amounts of nitrogen fertiliser. Traditional farm management has a focus on increasing soil fertility, improving grass or crop production and therefore supporting higher densities of stock or higher crop yields. Depending on ongoing management, this has the effect of a continual increase in nitrogen leaching.

Farming and horticultural activities need to be categorised so that appropriate nitrogen limits can be identified to ensure excessive leaching is avoided. This requires analyses to determine appropriate maximum limits for different land use types. While this analysis could be undertaken, it involves an element of arbitrariness, based on an arbitrary definition of efficiency or best practice. There would also be a need to develop detailed descriptions of different land use categories. For example, inherent differences in nitrogen leached per kilogram of dry matter eaten between sheep and cattle, mean that the sheep to cattle ratio on a farm would need to be considered along with fertiliser and cropping issues. This is likely to lead to a plethora of land use categories.

These rules implement a grandparenting policy approach.

Effectiveness

These rules will be effective in a similar way to the straight benchmarking and capping rule. However, if the categorisation of land use types is too complex, the effectiveness of the rules may be undermined. If landowners can't easily determine their category types, there is more potential for debate, and the certainty of the rule decreases. In addition, there is likely to be debate over the maximum levels set for each land use type.

An alternative approach would be to set a limit on nitrogen leached per stock unit or kilogram of dry matter consumed, across all farms. Further consultation with stakeholders is required to determine the effectiveness of this approach.

For these reasons this method is not supported

Nitrogen reduction rules

Description

Rules could require a reduction in nitrogen leaching, either immediately, or phased in over time.

Implications

These rules set reduction targets to be achieved over a period of time. For example, benchmarking (as above) is carried out in first five years followed by regular 5 per cent or 10 per cent reductions every five years.

These rules implement a phased nitrogen reduction policy approach.

Effectiveness

These rules require landowners to reduce their nitrogen leaching over a period of time at some considerable cost. Because a significant cost is associated with meeting these rules, some landowners will not be able to comply. This lessens the effectiveness of the rules considerably. It will be difficult for landowners to determine and foresee how to comply with the reduction targets at the end of each five year cycle. This will create additional uncertainty that is likely to affect compliance and the effectiveness of the rule.

For these reasons this method is not supported.

9.2.3 Education, advice and extension

Description

This method can be described as formalising an existing relationship between Waikato Regional Council and rural landowners to work through detailed implementation of sustainable rural land use regulatory and non-regulatory methods.

Implications

This method is intended to support the regulated capping regime by providing advice on how to live under a cap and by encouraging landowners to reduce where possible. It is acknowledged that implementing a capping regime requires behavioural change and this is not easily achieved solely through regulation. The method requires the Waikato Regional Council to be proactive and take a leadership role in facilitating behavioural change.

Effectiveness

This method is likely to be effective in providing support for the capping regime. However, effectiveness will depend on the extent of the Waikato Regional Council's commitment and the amount of funding available.

This method is supported. The method is written in the Variation as Method 10 and listed in section 9.6 of this report.

9.2.4 Education for rural land use activities on phosphorus management

Description

This method ensures that appropriate management of phosphorus is fostered through education programmes with rural landowners.

Implications

This method is intended to ensure management practices are sufficient to continue to avoid adverse effects on the Lake from phosphorus by educating farmers on agronomic optimums for soil phosphorus levels. The method requires the Waikato Regional Council to engage with rural landowners regarding phosphorus management through either new or existing education programmes.

Effectiveness

This method is likely to be effective in avoiding adverse effects on water quality from the use of phosphorus fertiliser on rural land. However, effectiveness will depend on the extent of the Waikato Regional Council's commitment and the amount of funding available.

This method is supported. The method is written in the Variation as Method 13 and listed in section 9.6 of this report.

9.2.5 Voluntary landowner Catchment management

Description

This method follows from Method 10 in the Variation, as it is intended to work through detailed implementation of sustainable rural land use regulatory and non regulatory methods. The method provides a commitment to formalise an existing relationship between Waikato Regional Council and rural landowners.

Implications

Under this option, Waikato Regional Council retains its full functions under the RMA, including responsibility for ensuring the objectives in the Variation are achieved through monitoring and enforcement of rules. The idea of a formal structure that involves representatives of Waikato Regional Council, other relevant agencies and landowners was suggested by farmer representatives Taupo Lake Care and has been the subject of research and consultation. A MAF funded project under its Sustainable Farming Fund, undertaken by Taupo Lake Care and supported by Waikato Regional Council, was completed in 2004. The following issues have been raised as a result:

- Any structure is likely to need to contain representatives from pastoral landowners, Waikato Regional Council, Taupo District Council, Ngati Tuwharetoa and forestry.
- A structure needs to be flexible and transparent and allow for change.
- There will be additional administration costs to Regional ratepayers, as a result of running a separate management structure.
- Possible duplication of existing management structures, such as the Lake Taupo Liaison subcommittee set up under Project Watershed (main objectives are land use changes, soil erosion and river structures and links to water quality, all of which overlap with the aims of the Variation).
- Raising expectations of landowners in the Catchment that they will have a wide ranging decision-making role in nutrient controls and funding for land use changes.
- Possible conflict of interest for landowner representative members between individual business decisions and their Lake overview role as part of the management body.

Effectiveness

This method looks at progressing behavioural change through a Catchment body rather than being facilitated solely by the Waikato Regional Council. It has the potential to develop into a Catchment management body with formal roles and responsibilities that integrate with those of the Waikato Regional Council. However, further research is required to investigate many of the issues raised above. The method is written to focus on the overall purpose of the Catchment body, whilst not ignoring the need for further investigation and support from the regulatory agency and affected landowners. If the issues above are worked through, the method is an appropriate way of promoting sustainable rural land uses.

This method is supported. The method is written in the Variation as Method 11 and listed in section 9.6 of this report.

9.2.6 Transfer of power

Description

Under this method, Waikato Regional Council passes some or all of its function onto an existing or new governance body, using section 33 transfer of power provisions in the RMA.

Implications

Waikato Regional Council effectively transfers control of day to day management toward achieving objectives in the Variation. This affects its certainty and thus public confidence. The unfamiliarity of the new regulatory controls means that in passing over some or all of its functions for a particular aspect of the nitrogen leaching restrictions for land in the Catchment, Waikato Regional Council has an additional uncertainty.

Effectiveness

This method will not achieve the objective, as the complexity and novelty of the new regulations for managing nutrient discharges mean that Waikato Regional Council is the only body that has experience in monitoring whether people are in compliance with their resource consent conditions or conditions in permitted activity rules. There is also a possible conflict of interest for landowner members of the new governance body between individual business decisions and their Lake overview role.

This method is not supported.

9.2.7 Review of Lake Taupo water quality

Description

This method is a description of the sort of routine and periodic monitoring and measuring that Waikato Regional Council will carry out on an ongoing basis. The characteristics to be measured are identified in the Lake target objective and include near-shore water quality, although a wider range of water quality characteristics will be measured as part of Waikato Regional Council standard practice monitoring programme.

Clause c) of the method notes that this information will be periodically assessed and some judgements made about whether the technical evidence collated at the time of review, gives Waikato Regional Council sufficient certainty that it will meet long-term water quality in the Lake. The use of expert technical advice to assess water quality trends is mentioned in the method, and while not specified, is intended to refer to the various science specialists from Crown Research institutes and universities that have been called on by Waikato Regional Council in the past.

Clause d) identifies that 2015 is a reasonable timeframe for analysing need for policy intervention given the water ageing assessments set out in Clause b) will occur in approximately 2008 and 2013 and s79 of the RMA 1991 requires that a review of the Plan shall be commenced no later than 10 years of it becoming Operative.

Clause e) and f) set out particular monitoring requirements to determine the effects of septic tanks and new papakainga and Marae wastewater discharges, on Lake water quality.

Implications

This method stipulates particular monitoring and assessment requirements. This means that funding will need to be committed to monitoring and assessment and the necessary technical input organised to undertake it.

Effectiveness

Scientific evidence and modelling indicates that the target of 20 per cent reduction of nitrogen leaching is sufficient to maintain current water quality in Lake Taupo. However, continued monitoring is required over time to input more data into the models so that the target can be refined. This method will be very effective in ensuring that the necessary monitoring and assessment is undertaken.

The method is supported. The method is written in the Variation as Method 3 and listed in section 9.6 of this report.

9.3 Wastewater management policies – possible types of methods to implement

The following types of methods have been selected for discussion:

- Do nothing.
- Regional Plan rules.
- Develop a management system for on-site wastewater .
- Integrated management of wastewater.
- Advocating for reticulation and centralised servicing of communities and upgrading existing community wastewater systems.
- Reducing wastewater nitrogen through upgrades of existing on-site wastewater systems to nitrogen.
- Review consents in the Taupo Catchment for community systems with a view to upgrading.
- Monitor performance of existing on-site systems.
- Encourage high quality on-site systems via financial mechanisms.

9.3.1 Do nothing

Description

No methods are developed for policy implementation.

Implications

Wastewater discharges in the vicinity of Lake Taupo add to the water quality issues in Lake Taupo. If these discharges are not managed, they are likely to continue to pose a risk to water quality, particularly in localised areas where wastewater discharges are most concentrated.

Effectiveness

Doing nothing would not address the issues and would not achieve the objectives or policies. Current effects on the Lake from current wastewater sources would continue, and would escalate due to the increasing demand for new subdivisions and wastewater services.

This method is not supported.

9.3.2 Regional Plan rules

Description

Adopt Regional Plan rules, including rules for permitted activities, to manage wastewater discharges in the Taupo Catchment.

Implications

Regional Plan rules are an accepted way of restricting and managing activities such as wastewater treatment and disposal. Waikato Regional Council currently has one set of Regional Plan rules for wastewater. However, these have not been effective in managing the particular wastewater issue in the Taupo Catchment. Creating new

wastewater rules for the Taupo Catchment will add another level of complexity to wastewater rules in the Waikato Region and this will need to be managed to avoid confusion for those who use the rules.

Effectiveness

Regional Plan rules can effectively provide for activities to occur, while providing limitations that ensure the adverse effects of such activities do not eventuate. They can provide certainty to resource users in terms of what they are allowed to do with a property. Rules can provide a hierarchy of activities that allow benign activities to occur through permitted activities (without the need for bureaucratic processes), while ensuring higher risk activities are properly assessed through consent processes. They also provide a legal mechanism via enforcement provisions of the RMA, so that individual activities causing adverse effects can be dealt with. For these reasons, Regional Plan rules are considered an effective method.

Regional Plan rules are also considered a cost effective method of managing resource use activities. Minor activities can occur without incurring additional costs of seeking authorisation. Higher risk activities will be required to pay for consent processes, and the cost is generally relative to the size of the risk (higher risk activities require more rigorous assessment processes and therefore the costs of consent are likely to be greater than for lower risk activities). In general, the benefits of rules in terms of environmental protection and improvement far exceed the costs involved.

This method is supported. The method is written in the Variation as a series of wastewater management rules in section 11.2 of this report.

9.3.3 Develop a management system for on-site wastewater

Description

Develop and implement a management system for on-site wastewater in the Taupo Catchment that ensures wastewater systems are well managed, and new systems appropriately installed. Such a management system would be jointly organised with Taupo District Council and may ensure, for example, that all on-site systems are recorded on a database, that they are regularly inspected, that new systems will meet certain effluent treatment standards.

Implications

The development of a management system for on-site wastewater will require staff resources and will create costs that are passed onto the ratepayer. It will require the Waikato Regional Council to work closely with Taupo District Council, alongside wastewater industry groups, developers, homeowners and other affected groups.

Effectiveness

Standard septic tank type on-site wastewater systems generally do not require a high degree of management to ensure they perform appropriately. They do need to be regularly pumped out (perhaps at three to five yearly intervals). They also do not effectively reduce nitrogen (apart from perhaps a 15 per cent reduction through the soil profile in the disposal area). However, good management of these systems will ensure that health and environmental risks are minimised, within the ability of the system.

However, advanced secondary on-site wastewater plants configured for nitrogen removal require a high level of management to ensure that they achieve consistently high nitrogen removal efficiency. It is likely that if future subdivisions in the Taupo Catchment are not serviced by community wastewater treatment systems, they will need to be serviced by advanced on-site plants. If there is to be any certainty in terms of meeting the wastewater objectives, management systems need to be put in place to ensure appropriate management of advanced wastewater plants.

Based on discussions with manufacturers and Taupo District Council wastewater managers, it appears that, on a per property basis, the cost of running a management system to oversee on-site wastewater plants is likely to be similar to the cost of running a community treatment plant. The annual cost per property is likely to be in the order of $300 per year, including the cost of a manufacturer's maintenance contract and council management. As the cost of the management system would be similar, on a per property basis, to current per property community wastewater costs, such a system is considered to be an efficient way of achieving the objectives.

This method is supported. The method is written in the Variation as Method 6 and listed in section 9.6 of this report.

9.3.4 Integrated management of wastewater

Description

Work with Taupo District Council and others involved with wastewater management, including the wastewater industry, developers, homeowners and other councils, to ensure wastewater is managed in an integrated way. This would involve having input into district plans, long-term council community plans, structure plans, development proposals, other Regional council wastewater initiatives and so on. It would also involve communication and information sharing with the wastewater industry, developers and homeowners.

Implications

The Taupo District Council has a range of mechanisms available for managing development, and these could effectively support wastewater policy. For example, the district plan provides rules for subdivision, which would also be effective at reducing nitrogen discharges to the Lake, such as by managing density of development in particular areas, or ensuring proper consideration of centralised wastewater treatment options for new subdivisions. Strategic plans such as the long-term council community plan can provide for works to improve community wastewater treatment plants and extend reticulation services. Structure plans can be used to guide development and ensure that wastewater reticulation is provided where needed.

The Australia/New Zealand Standard "On-site Domestic Wastewater Management" (AS/NZS 1547:2000) makes it clear that all sectors involved in wastewater services are collectively responsible for managing potential effects of wastewater systems. Working with these sectors, particularly developers and the wastewater industry (including manufacturers, designers and installers of wastewater systems), can help Waikato Regional Council to achieve wastewater solutions that maximise environmental benefits.

Providing information and advice to householders about wastewater management can help to ensure they are aware of the potential effect of wastewater on the Lake, and of how to effectively manage their wastewater system. Public education can increase 'buy in' with respect to new wastewater requirements.

There are a range of other discharges in the Lake Taupo Catchment which can also affect Lake water quality such as stormwater discharges and industrial discharges. It would be beneficial with respect to the Lake Taupo objectives to integrate management of domestic wastewater with management of these other discharges.

Other councils are also working on ways to manage wastewater issues. For example, the Bay of Plenty Regional Council is also developing new wastewater rules to deal with water quality issues in the Rotorua Lakes. It is therefore important that the Waikato Regional Council works with these other Councils for mutual benefit.

Effectiveness

As outlined above, there are many benefits of working with other groups involved with wastewater management. The cost of working with these groups would not be considerable as it would mostly just involve staff time and many such interactions are already commonly occurring. This type of method is therefore considered an effective way of supporting the wastewater policies.

This method is supported. The method is written in the Variation as Method 7 and listed in section 9.6 of this report.

9.3.5 Advocating for reticulation and centralised servicing of communities and upgrading existing community wastewater systems

Description

Advocating to the Taupo District Council through the Long-Term Council Community Plan process for reticulation and centralised wastewater servicing of communities currently serviced by on-site wastewater systems, and upgrading existing community wastewater plants.

Implications

There are approximately 470 on-site wastewater systems in urban areas around the shores of Lake Taupo. For most of these systems, the numbers and density of systems would allow them to be reticulated and centrally treated. Taupo District Council has made allowance in the 2006-2016 Long-Term Council Community Plan for reticulation and new community wastewater treatment plants to service Hatepe and the Waitetoko/Tauranga Taupo area by 2012/13.

In addition, Taupo District Council's Long-Term Council Community Plan allocates funds for upgrading particular community wastewater treatment plants. The method of advocacy is therefore largely to support existing undertakings by the district council. The cost of advocacy itself is not expected to be significant although it is accepted that there is a significant cost to the community of undertaking the works.

Effectiveness

The planned wastewater reticulation and new wastewater treatment plants mean that by 2012/13 approximately 432 on-site wastewater systems in these near-shore communities would be reticulated and centrally treated. Currently wastewater accounts for about 20,660 kilograms per year of nitrogen leaching to the Lake. The 432 lakeshore households, assuming 2.6 people per household and 12 grams of nitrogen per capita per day, represent a nitrogen load of 4920 kilograms per year. Modern centralised treatment plants configured for nitrogen reduction could conservatively be expected to remove 85 per cent of nitrogen. An 85 per cent reduction from 4920 kilograms is 4182 kilograms. If this amount of nitrogen is removed by the planned reticulation of these lakeshore communities, it would equate to removal of about 20 per cent of the current wastewater nitrogen potentially leaching to the Lake. Further nitrogen reductions can be achieved by upgrading some existing community plants. Existing proposals in the 2006 LTCCP to upgrade existing treatment plants and disposal systems would be beneficial in this respect. This approach is therefore a very effective way of achieving a 20 per cent reduction in wastewater nitrogen and therefore of helping to achieve Objective 1.

These lakeshore communities currently create a risk of near-shore effects such as weed and algae growth and increased wastewater pathogens in shallow Lake waters. Replacing the septic tanks with reticulated community wastewater systems would greatly reduce this risk and therefore would be effective with respect to achieving Objective 3.

This method is supported. The method is written in the Variation as Method 2 and listed in section 9.6 of this report.

9.3.6 Reducing wastewater nitrogen through upgrades of existing on-site wastewater systems to nitrogen reducing on-site systems

Description

Individual households would pay to upgrade their existing on-site wastewater systems to advanced on-site wastewater systems configured for nitrogen removal.

Implications

The technology for on-site wastewater systems is constantly changing. Currently there are a number of systems available that can effectively remove significant percentages of nitrogen from effluent. The cost of installing an advanced nitrogen-removing on-site wastewater system is approximately $12,000 (based on various discussions with wastewater experts). Advanced wastewater systems need to be subject to maintenance contracts to ensure good performance. Such contracts would cost the householder approximately $170 per year. The annual electricity costs are approximately $60 for sand filter type systems and $240 for aerated systems (based on advice from wastewater industry representative). Averaging these figures gives an annual cost for running an advanced on-site wastewater system of approximately $320, excluding any repair costs. The estimated installation and running costs of advanced systems would be very difficult for many existing property owners in the Catchment to meet.

Effectiveness

Once the Taupo District Council has completed its programmed works to reticulate lakeside communities, there will be around 900 individual on-site wastewater discharges still occurring within the Lake Catchment. Collectively these could potentially add 8700 kilograms of nitrogen to the Lake per year, which is 0.7 per cent of the total nitrogen load to the Lake and 2.0 per cent of the manageable load.

Gunn (2003) considers that an advanced secondary on-site wastewater treatment system configured for nitrogen removal wastewater systems could remove 65 per cent of the wastewater nitrogen in the treatment plant and a further 15 per cent through the soil. For an average family of 2.6 people, producing 12 grams of nitrogen each per day, this would represent a nitrogen discharge of 9.3 grams per system per day, compared to a nitrogen discharge from a standard on-site wastewater system of 26.5 grams per day. Upgrading a standard on-site wastewater system to an advanced nitrogen-removing system could therefore result in the removal of 17.2 grams of nitrogen per day from the Catchment per system, which would equate to 5650 kilograms per year for 900 systems. This would represent a reduction of approximately 27 per cent of the wastewater nitrogen load currently discharging to the Lake. On this basis, upgrading existing systems would be a very effective way of meeting the objective.

The Taupo District Council has indicated that it will reticulate, over the next few years, the main Lakeshore communities currently serviced by on-site septic tank systems. The remaining 900 septic tanks will therefore be the more remote systems from the Lake. They are unlikely to cause near-shore effects. Therefore, although replacing these systems with advanced nitrogen removing on-site systems would be an effective way to achieve a 20 per cent reduction of wastewater nitrogen, it does not have the added advantages that achieving this 20 per cent reduction by reticulating Lakeshore communities has. It also puts a considerable cost on individuals with septic tanks. This cost cannot be spread over time and over the community as district council schemes can be.

This method is not supported.

9.3.7 Review consents in the Taupo Catchment for community systems with a view to upgrading

Description

Review community wastewater discharge consents in the Taupo Catchment with a view to increasing treatment and disposal standards.

Implications

The Taupo District Council has for many years been improving its wastewater systems, to ensure nutrient discharges to the Lake is minimised. The annual operating cost of Taupo District wastewater treatment and land application is over $5 million and annual capital wastewater costs are greater than this (2006/16 LTCCP). In 1974, 12,500 Taupo township residents using on-site systems were discharging over 46 tonnes of nitrogen annually into the Lake. Today, with a population of over 20,900, the town discharges only 1.8 tonnes of nitrogen, and that is discharged outside the Lake Catchment.

The Acacia Bay and Kinloch treatment plants both remove over 90 per cent of wastewater nitrogen. The Turangi wastewater plant has recently been upgraded to a membrane filtration system, which is the most advanced wastewater treatment technology currently used in the New Zealand. A recent Taupo District Council initiative involves trialling a new carbon bed disposal system, which early results show is very effective at removing nitrogen.

The Taupo District Council has been putting considerable effort and resources into minimising the effect of community wastewater treatment plants on the Lake. This is partly a result of past consent processes requiring progressive improvements to treatment plants and disposal systems. It could be seen as unfair to now review all consents with the view to further improvements, given the significant effort already made by Taupo District Council.

Effectiveness

There is no doubt that at least some of the Catchment's wastewater plants could be improved, either in terms of treatment or disposal. Reviewing all consents for these plants could therefore result in improvements to nitrogen removal effectiveness.

The cost of formal RMA consent reviews could potentially be very high, as the review process is similar to a consent process. To review all consents at one time, or even a selection of them, would be a large cost to a community that already has committed considerable resources into maximising nitrogen removal from wastewater plants. Some wastewater consents are currently going through, or have recently been through, a consent process. Others will go through the process over the next 10 years. For these reasons, consent reviews are not considered to be an efficient way of meeting the objectives and implementing the policies.

This method is not supported.

9.3.8 Monitor performance of existing on-site systems

Description

Set up a process for checking nitrogen reduction performance of existing on-site wastewater systems.

Implications

Given the relatively low numbers of on-site wastewater systems in the Catchment, it would not be logistically difficult to monitor the performance of all systems.

Effectiveness

The majority of the on-site systems are standard septic tanks and, as such, are not expected to reduce nitrogen (other than some removal in the disposal field). Monitoring effluent from septic tanks would therefore not provide much new information. New advanced on-site systems can remove significant quantities of nitrogen but they need regular maintenance to maintain performance. Monitoring these systems will show which ones are performing poorly, and could therefore result in improvements being made. However, there are currently relatively few of these advanced systems in the Catchment. Setting up a monitoring system for these few systems would not significantly help to meet the objectives.

This method is not supported.

9.3.9 Encourage high quality on-site systems via financial mechanisms

Description

To encourage upgrading of existing on-site wastewater systems and the installation of new systems capable of a high degree of nitrogen removal, through financial mechanisms such as inducements and charges.

Implications

Using financial mechanisms to significantly change people's behaviour is not common practice for regional and local government. The implications of this approach are therefore uncertain and would vary, depending on the type of mechanism adopted.

Effectiveness

Given the high cost of new nitrogen removing on-site wastewater systems, financial inducements and charges would need to be significant if they are to effectively encourage people to use expensive advanced on-site wastewater systems.

This method is not supported.

9.4 Providing for social, cultural and economic well-being policies – possible methods to implement

Preferred policies are Policies 9, 10, 11 and 12. These policies refer to the set-up and effectiveness of the public fund to share costs of reducing manageable nitrogen in the Lake Taupo Catchment, and permitting transfers of nitrogen allowances, as long as there is no overall increase in nitrogen leached in the Catchment.

Possible methods that will achieve these policy approaches are:

- Public fund organisation.
- Public fund monitoring and review.
- Nitrogen trading.

9.4.1 Public fund

Description

In accordance with section 56 of the Local Government Act 2002, both Environment Waikato and Taupo District Council undertook consultation with the community pursuant to s88 of the Act, on the establishment of a Council Controlled Organisation (CCO) to administer a public fund to protect Lake Taupo. The public fund will be used to purchase the 20 per cent nitrogen reduction from rural land, support land use change by funding research and development, and cover the initial start-up costs of benchmarking.

At their meetings of 30 June 2005 and 29 June 2005, Waikato Regional Council and Taupo District Council respectively resolved to:

a) establish and/or become a shareholder in a Council Controlled Organisation for the administering of a public fund for protecting Lake Taupo (the Lake Taupo Protection Trust)
b) establish a Council Controlled Organisation implemented by a stand-alone organisation appointed by a joint committee of the partners (Environment Waikato, Taupo District Council and the Crown)
c) adopt a draft Project Agreement which provides for the establishment of a Council Controlled Organisation known as the Lake Taupo Protection Trust (charitable trust) whose purpose is maintenance of water quality in Lake Taupo through reducing nitrogen levels in the Lake Taupo Catchment area and draft Trust Deed.

The Project Agreement provides for the establishment of a Joint Committee to oversee the work of the Trust. The Joint Committee shall be made up of representatives from Environment Waikato, Taupo District Council and the Crown (two from each) and two representatives from Tuwharetoa Maori Trust Board (as holder of the title and kaitiaki of Lake Taupo for Ngati Tuwharetoa and its hapu). The Joint Committee appoints trustees and monitors the work of the Trust.

The Project Agreement was signed by Taupo District Council, Waikato regional Council and the Minister for the Environment on 9 February 2007. The Lake Taupo Protection Trust was also constituted on 9 February 2007.

Implications

The addition of a method to implement the policy approach makes an explicit Waikato Regional Council commitment to the mechanism of a Council Controlled Organisation to manage the public fund.

Effectiveness

The structure and criteria for the public fund will be developed to maximise the cost-effectiveness of nitrogen reduction, while ensuring that secondary social and economic goals are maximised where possible and any negative impacts are avoided. Because the fund approach is flexible, there is the ability to gain permanent nitrogen reductions in the most effective and efficient ways.

The method is supported. The method is written in the Variation as Method 8 and listed in section 9.6 of this report.

9.4.2 Public fund monitoring and review

Description

This method is a description of the process Waikato Regional Council will follow, as one of the funding partners in the Council Controlled Organisation, to show that it is carefully tracking the efficient and effective use of public money.

Implications

This method relies on the public fund achieving the 20 per cent reduction by 2020. If progress has not been made by 2010, there may be a need for new and additional methods to help achieve Objective 4. The success of the fund is dependent on nitrogen or land becoming available for purchase.

Effectiveness

This method should be effective in ensuring the public fund organisation achieves the 20 per cent target. Because a number of agencies are in control of the fund, there may be implementation and administration issues that could delay action. In addition, if no land or nitrogen becomes available then permanent reduction may not be possible

through the fund itself. For this reason, this method will be effective in determining these matters earlier rather than later.

This method is supported. The method is written in the Variation as Method 9 and listed in section 9.6 of this report.

9.4.3 Nitrogen offsetting

Description

This method is regulatory and enables the offsetting of nitrogen through consents. Rules 3.10.5.3 and 3.10.5.4 allow for nitrogen offsets. The method also has a non-regulatory aspect, which refers to investigation of streamlining implementation of nitrogen offsets under the current RMA constraints.

Implications

Providing for increases in nitrogen to be offset by decreases elsewhere in the Catchment means the rules need to cover a number of situations to ensure no net increase in nitrogen leaching occurs. The rules need to be written in a way that anticipate a number of different scenarios, as some landowners will have consents managing their nitrogen outputs and others not. Inevitably, this results in a number of rules and conditions. Keeping track of offsets is necessary and will be complex. A database or tracking system will most likely be required.

The non-regulatory method provides for working through practical issues such as the type of information plan users might want, as well as developing effective and efficient tracking systems and databases.

Effectiveness

The aim of allowing nitrogen to be moved around the Catchment is to give landowners flexibility and promote efficient use of nitrogen. With the right implementation support, this method has the potential to be very effective. However, because it is a new provision and has not been tested, its effectiveness is difficult to foresee. Monitoring the effectiveness of this method will be particularly important.

The method is supported. The method is written in the Variation as Method 5 and listed in section 9.6 of this report.

9.5 Consequences of land use change policies

The preferred policy is Policy 13, which refers to the need for the district and Regional councils to work together under the RMA to consider and recognise subsequent effects of land use change.

The possible methods for implementing this policy are:

- Practice notes.
- Advocacy and Joint Approaches.

9.5.1 Practice notes

Description

This method would require the Waikato Regional Council to prepare practice notes dealing with land use change. Practice notes are non-statutory guidance documents that Council resource officers refer to when processing consents. The purpose of guidance notes is to assist in providing consistency in consent decisions when a number of different individuals are processing similar consents, particularly when there are complex and sometimes conflicting values that must be considered in the RMA assessment.

Implications

Many of the land use change effects are managed under the jurisdiction of the Taupo District Council. Therefore, practice notes would need to be developed in consultation with the district council. The practice notes would be given effect to, across Regional and district council processes.

Effectiveness

For this method to be effective, both councils need to be aware of land use change effects and have appropriate policies or strategies for dealing with them. Currently, both councils are at different stages of development regarding many of the issues relevant to this matter, such as subdivision, growth and development and landscape management. Given the lack of policy direction, particularly from the Waikato Regional Council, the development of practice notes is likely to be difficult. For instance, Waikato Regional Council currently does not have any Council policy on public access to waterways. The method is likely to be ineffective in achieving the objective and implementing policies.

This method is not supported.

9.5.2 Advocacy and Joint Approaches

Description

This method can be described as signalling an intent that the two RMA agencies with a role in managing land use in the Catchment of Lake Taupo, work closely together on developing policy direction as issues arise. The method recognises that there may be occasions when the most appropriate course of action is for the two councils to prepare and notify a joint plan, instead of two separate plans which cover the same issue.

Implications

This method calls for the Waikato Regional Council to raise awareness of consequential adverse effects through advocacy and then achieve integrated management through subsequent actions. The method can ensure the issue is considered without prescribing a particular outcome. This method requires good communication between the Regional and district councils.

Effectiveness

The method can be effective if Regional Council staff are aware of the forums where advocacy is required – that is, policy and resource consent arenas. Effectiveness will also depend on the District and Regional Councils working together to identify pressure areas and priorities for policy development if necessary.

This method is supported. The method is written in the Variation as Method 12 and listed in section 9.6 of this report.

9.6 Preferred mix of methods

Following evaluation of the above range of methods with respect to Waikato Regional Council's roles and responsibilities under the RMA, and feedback from ongoing consultation with project partners and stakeholders, a set of methods has been chosen as the preferred mix of methods. Two groupings of regulatory methods make up the preferred rules (land use rules to benchmark and cap nitrogen, and wastewater rules).

The following non- regulatory methods are the preferred methods and are written in the Variation.

3.10.4.1 Method 1 to achieve Policies 1 to 8 and 13

2020 Taupo-nui-a-Tia Action Plan

Waikato Regional Council will support the implementation of the 2020 Taupo-nui-a-Tia Action Plan through:

a) Working with the 2020 Taupo-nui-a-Tia Joint Management Group to discuss and co-ordinate work priorities, budgets and opportunities for working together
b) Developing effective relationships between the diverse agencies and groups in the Lake Taupo catchment
c) Funding implementation of the Action Plan through the Long-Term Council Community Plan
d) Yearly review of Waikato Regional Council actions, to ensure that existing actions are effective and monitored, and further actions are included as appropriate.

3.10.4.2 Method 2 to achieve Policies 4, 7 and 8

Taupo District Council Long-Term Council Community Plan

Waikato Regional Council will advocate for provision for community wastewater upgrades and reticulation in the Taupo District Council Long Term Council Community Plan, particularly the reticulation and centralised treatment of sewage from lakeshore settlements including:

- Hatepe
- Waitetoko
- Oruatua/Tauranga Taupo
- Te Rangiita
- Waihi Village.

3.10.4.3 Method 3 to achieve Policies 3, 4, 5, 7, 8 and 9

Monitoring and Review of Lake Taupo Water Quality

As part of the Waikato Regional Council's monitoring responsibilities Council will:

a) Ensure regular and on-going monitoring of water quality characteristics in Lake Taupo, inflowing tributaries and groundwater, and periodically analyse data and assess water quality trends
b) Carry out five-yearly water aging of groundwater and surface water tributaries in 2008 and 2013
c) Ongoing use of expert technical advice to assess the information in light of whether the long-term water quality goal will be achieved
d) In 2015 carry out analysis of need for further plan intervention as a result of monitoring and assessment carried out in a-c
e) Periodically assess effects of community septic tank discharges on near shore water quality
f) Periodically assess the cumulative effect of new papakainga and Marae wastewater discharges established under rule 3.10.6.6 on Lake water quality.

3.10.4.4 Method 4 to achieve Policy 2

Tangata Whenua Partnership

Waikato Regional Council will continue to work with Ngati Tuwharetoa in the spirit of partnership and in accordance with the memorandum of understanding established by the two parties, and through the memorandum establish processes to enable individuals and groups within Ngati Tuwharetoa to participate in decision making processes.

3.10.4.5 Method 5 to achieve Policy 12

Research into Development and Implementation of Markets for Nitrogen Offsetting

Waikato Regional Council will, with Central Government and affected landowners, support and facilitate research into the practical implementation of markets for nitrogen offsetting between properties in the Lake Taupo catchment.

Waikato Regional Council will provide a central notice board to advertise nitrogen for sale/wanted.

3.10.4.6 Method 6 to achieve Policies 4, 7 and 8

Wastewater Management

Develop and implement in conjunction with Taupo District Council a management system for on-site wastewater in the Taupo Catchment that is consistent with Australia/New Zealand Standard 1547:2000.

3.10.4.7 Method 7 to achieve Policies 4, 7 and 8

Integrated Management of Wastewater

Work with Taupo District Council and other stakeholders to:

a) Ensure integrated management of on-site wastewater
b) Ensure domestic wastewater systems chosen for new subdivisions and individual properties represent the Best Practicable Option, and include provision for nitrogen reduction
c) Advocate for centralised wastewater servicing of new subdivisions where such servicing is practicable
d) Ensure major stakeholders, including designers, manufacturers, installers and users of on-site wastewater systems, are provided with information, advice and discussion forums that help them carry out their wastewater management responsibilities appropriately and in line with Australia/New Zealand Standard 1547:2000
e) Promote practices to ensure non-domestic point source discharges such as stormwater and industrial discharges do not adversely affect Lake water quality
f) Support joint initiatives with the Bay of Plenty Regional Council and Rotorua District Council for testing treatment efficiencies of advanced wastewater treatment systems.

3.10.4.8 Method 8 to achieve Policies 4 and 10

Public Fund

Waikato Regional Council will, in conjunction with Ngati Tuwharetoa and funding partners Taupo District Council and Central Government, continue to be a member of a Joint Committee of a charitable trust called the Lake Taupo Protection Trust, which is a Council Controlled Organisation that:

a) Comprises a board of technical people as Trustees appointed by the Joint Committee
b) Implements strategies to permanently reduce nitrogen from rural land use activities by 20 percent
c) Contracts appropriately skilled persons to provide advice and nutrient modelling support and education in the nitrogen benchmarking process, as the first phase of achieving a nitrogen cap for farming land uses.

3.10.4.9 Method 9 to achieve Policy 11

Review of Effectiveness of Public Fund

Waikato Regional Council will, in conjunction with the other members of the Joint Committee, Ngati Tuwharetoa, Taupo District Council and Central Government, initiate a review after 2010 of the Council Controlled Organisation's effectiveness toward achieving the nitrogen reduction target using public funding.

3.10.4.10 Method 10 to achieve Policies 3 and 6

Education, Advice and Extension for Rural Land Use Activities Under a Nitrogen Cap

Waikato Regional Council will, in conjunction with any existing or new body with an interest in sustainable catchment management, investigate and develop land management activities and land uses that will maintain or reduce nitrogen leached from land in Lake Taupo catchment, including:

a) Providing advice through identification of Certified Nutrient Management advisors who are appropriately qualified in sustainable nutrient management in New Zealand agroecosystems to assist landowners to make changes to farm management practices or change land use under a nitrogen capping regime
b) As part of implementation develop templates that link land management practices with expected nitrogen leached
c) Co-ordinating development and updating of codes of practice and best management practices for existing land uses in the catchment
d) Supporting and facilitating research and development into profitable and viable rural land uses that prevent catchment-wide increases in nitrogen outputs.
e) Advocate that managers of Government farm land in the Lake Taupo Catchment take on a leadership role in the investigation and implementation of low nitrogen leaching farming activities.

3.10.4.11 Method 11 to achieve Policies 3 and 6

Landowner Involvement in Catchment Management

Establish a catchment management body that is supported and represented by regulatory authorities, Ngati Tuwharetoa and private owners of pastoral, forestry and undeveloped rural land, that has a formal reporting and advisory role to Waikato Regional Council on matters related to the transition to sustainable rural land uses in the Lake Taupo Catchment, including:

a) Research needs
b) Extension and advice
c) Monitoring and auditing processes for rural land use consents.

3.10.4.12 Method 12 to achieve Policy 13

Advocacy and Joint Approaches

Waikato Regional Council will, through advocacy and joint approaches with Taupo District Council, proactively seek to prevent adverse effects on the environment and the wider economic, social and cultural values and address resource management issues that arise as a consequence of land use changes.

3.10.4.13 Method 13 to achieve Policy 5

Education for Rural Land Use Activities on Phosphorus Management

Develop, implement and regularly review an environmental education strategy that educates farmers on agronomic optimums for soil phosphorus levels.

10 Detailed Assessment of Selected Methods

This section assesses the preferred methods. Each method is first described in sufficient detail to allow analysis. The environmental, social and economic benefits and costs are identified for the method. The efficiency of the method is then established by comparing benefits with costs, considering environmental, social, cultural and economic aspects of these benefits and costs. The risks of acting or not acting are then briefly discussed. Finally, for each method, a summary is provided of why the method is considered appropriate.

10.1 Non-regulatory methods

10.1.1 Method 1: 2020 Taupo-nui-a-Tia Action Plan

Description

This method is as follows:

2020 Taupo-nui-a-Tia Action Plan

Waikato Regional Council will support the implementation of the 2020 Taupo-nui-a-Tia Action Plan through:

a) Working with the 2020 Taupo-nui-a-Tia Joint Management Group to discuss and co-ordinate work priorities, budgets and opportunities for working together
b) Developing effective relationships between the diverse agencies and groups in the Lake Taupo catchment
c) Funding implementation of the Action Plan through the Long-Term Council Community Plan
d) Yearly review of Waikato Regional Council actions, to ensure that existing actions are effective and monitored, and further actions are included as appropriate.

This method implements all of the Lake Taupo policies because 2020 Taupo-nui-a-Tia is an integrated sustainable development strategy for the Lake Taupo Catchment. It has been developed jointly by tangata whenua, the community and Local and Central Government agencies and identifies threats to community values that require action. The health of Lake Taupo is a key community value. Implementation of the Action Plan will therefore provide a significant contribution to ensuring Lake water quality will not degrade long-term.

Ngati Tuwharetoa and the Lake Taupo community were aware of the need to develop in a sustainable way to protect the future of the Lake. It was perceived by the community that over the past decade there had been a range of ad hoc actions and agencies involved in managing the Lake and its Catchment.

The 2020 Taupo-nui-a-Tia project, initiated by the Lakes and Waterways Action Group, was focused on ensuring the community and tangata whenua values that had been identified for Lake Taupo were protected sustainably into the future. The project had three main strands – science, community and economy. It was managed by a Project team of five part-time people, and overseen by a Joint Management Group, consisting of political and community representatives.

Funding for this project came from a joint bid by Tuwharetoa Maori Trust Board and Environment Waikato, to the Ministry for the Environment's Sustainable Management Fund.

During the life of the project, a wide range of reports and additional research was undertaken. In addition, there was significant involvement of the community and Ngati Tuwharetoa as the project progressed. The final outcome was the development of an Action Plan, which was launched by the Ministers for the Environment and Maori Affairs on 30 July 2004.

The 2020 Taupo-nui-a-Tia Action Plan is a non-statutory resource management plan, focused on sustainable development – on environmental, social, cultural and economic issues related to Lake Taupo. The plan is notable for its partnership with Ngati Tuwharetoa and the collaborative opportunities that exist to build Ngati Tuwharetoa management capacity, in terms of the tribal directives for the Lake Taupo area.

It is also closely aligned with the philosophy of the Local Government Act 2002, in that it requires the key management agencies with statutory responsibilities for the management of Lake Taupo to work together for the Vision that the community identified. These key agencies include: Tuwharetoa Maori Trust Board, Environment Waikato, Taupo District Council, Department of Conservation and Department of Internal Affairs.

Benefits and costs

The development of the Action Plan was funded by Central Government's Sustainable Management Fund. Direct cost to ratepayers to date has been in the form of Waikato Regional Council contributing staff and Councillor time to the development of the Action Plan. Implementation of the Action Plan will be a financial cost to the Waikato Regional Council as a contributor with other key agencies Taupo District Council, Department of Conservation, Department of Internal Affairs and Ngati Tuwharetoa. The two councils have the most direct ongoing cost, as they agreed in 2003 to jointly fund the management group and a part-time 2020 Action Plan co-ordinator who will provide an ongoing link between the management group, the community and the agencies involved.

The five key agencies have already agreed to report on how their specific actions will assist in implementing the 2020 Action Plan. Lake Taupo is a jurisdictionally complex area to manage. There are a large number of agencies and community groups involved in different aspects of managing the Lake. One of the earlier steps of the 2020 project was to identify the range of agencies involved and to indicate where there were links between the agencies, in relation to managing the values. The project therefore involved joint agency discussions from an early stage. These discussions provided the opportunity to identify those potential actions from the Action Plan that did not have a clear 'home' for future management purposes. In such instances, a lead agency was identified to have responsibility to work with a cross-agency team (as appropriate) to resolve or undertake the action. This ongoing level of discussion and liaison built a strong basis for developing the subsequent Action Plan. It will also provide a strong basis for undertaking the implementation of the Plan, as there is peer support and willingness for agencies to jointly participate.

The environmental and social benefits associated with its implementation are significant. The integrated nature of the Strategy, coupled with the community buy-in and commitment, make it a powerful mechanism for achieving behavioural change and action in the Lake Taupo Catchment.

A significant benefit of including this method in the Variation is that it supports the 2020 Taupo nui-aTia Action Plan. By demonstrating that Waikato Regional Council is involved with its implementation there will be overall benefit to the Waikato Regional Council in achieving the plan policies.

Efficiency of method

Waikato Regional Councils Long Term Council Community Plan 2006-2016 identifies the continued implementation of the 2020 Taupo-nui-a-Tia Action Plan as a

performance measure and target for the 2006/07, 2007/08 and 2008/09 years but it is important that Method 1 in the Variation outlines Waikato Regional Councils commitment to actively supporting the 2020 Taupo-nui-a-Tia Action Plan. The inclusion of the method sends a signal of Waikato Regional Council's commitment to those people who have an ongoing interest in the wider values associated with the Lake and the Catchment. If the method is not included, there is a risk that Waikato Regional Council may be perceived to be less than committed to implementing the 2020 Action Plan. If there is a perception that one of the core agencies does not actively support the Action Plan, this could lead to a loss in confidence about the necessary capacity building over all agencies, as well as financial assistance for implementation. This is not efficient in terms of the previous work and community participation.

Because of the potential benefits involved with the implementation of the Action Plan, and the momentum gained from the considerable work and multi-party involvement to date, combined with Waikato Regional Council only bearing a share of the costs, the method will be efficient in achieving the policies.

Risks of acting or not acting

Waikato Regional Council is a major stakeholder and regulator in the Lake Taupo Catchment. If the Council is not involved in the implementation of the 2020 Action Plan, it risks losing community support for its objectives.

Appropriateness of method

The following table summarises the costs and benefits of this method:

Benefits	Costs
• Provides a public commitment to active support of the 2020 Action Plan. • Sets out a summary of the process expected in implementation, and the Waikato Regional Council role. • Enables people to see the linkages between the overarching sustainable development initiative of 2020 and the specific actions to protect a subset of the values of the Lake and Catchment in the Variation.	• Implementation is an ongoing cost to Waikato Regional Council in terms of administrative support for staff and political representatives.

10.1.2 Method 2: Taupo District Council Long-Term Council Community Plan

Description

This method is as follows:

Taupo District Council Long-Term Council Community Plan

Waikato Regional Council will advocate for provision for community wastewater upgrades and reticulation in the Taupo District Council Long Term Council Community Plan, particularly the reticulation and centralised treatment of sewage from lakeshore settlements including:

- Hatepe
- Waitetoko
- Oruatua/Tauranga Taupo
- Te Rangiita
- Waihi Village.

Method 2 is to support Policies 4, 7 and 8. Reticulation of septic tanks and replacing them with community wastewater treatment plants, which can remove a high proportion of the nitrogen, will help to achieve the 20 per cent reduction in wastewater nitrogen (Policy 4). The method will support Policy 7 by improving the nitrogen removal efficiency of existing community plants, which could allow increased wastewater discharges (servicing greater numbers of people) without causing corresponding increases in nitrogen leaching to the Lake, and therefore help to cap wastewater nitrogen levels. The reticulation of Lakeshore communities will have significant benefits in terms of reducing the risk of near-shore effects, and therefore also supports Policy 8.

Benefits and costs

Currently, the Taupo District Council has made commitments in the 2006-2016 Long-Term Council Community Plan for reticulation of some lakeshore communities and upgrading certain existing community wastewater treatment plants. Waikato Regional Council can provide support to these initiatives in future funding rounds to encourage early upgrades where they will be of most benefit to the Lake.

This method in itself will not have any environmental or social costs. Additional economic costs to the community of the method will be minimal, given that it is common practice for the Regional Council to be involved in district council long-term council community plan processes. It is recognised that there will be substantial costs for the local community to provide the reticulation and to upgrade or build new wastewater plants. As stated earlier, the annual operating cost of Taupo District wastewater treatment and land application is over $5 million and annual capital wastewater costs are greater than this (2006/16 LTCCP). However, these costs have been provided for outside the Regional Plan process and should not be considered direct costs of this method.

Efficiency of method

The net environmental benefits of this method are likely to be significant, and given the lack of significant additional social and economic costs, this method is considered an efficient way of achieving the policy.

Risks of acting or not acting

Although it is acknowledged that the Taupo District Council is committed to upgrades to wastewater treatment systems for Lake protection purposes, it is also acknowledged that there are many demands on the district council ratepayer, and there will be parties advocating for spending in other areas. If the Waikato Regional Council does not provide support for these Lake initiatives through long-term council community plan processes, there is a risk that upgrades will be delayed due to advocacy from other groups with other priorities.

Appropriateness of method

The following table summarises the costs and benefits of this method:

Benefits	Costs
• Supports planned Taupo District Council initiatives to upgrade wastewater systems. • Ensures appropriate upgrades are undertaken as soon as practicable.	• Minor additional costs given that the Waikato Regional Council already has input into such planning processes.

This method is appropriate as it will ensure the policy is achieved with minimal additional cost.

10.1.3 Method 3: Monitoring and review of Lake Taupo water quality

Description

The method is as follows:

Monitoring and Review of Lake Taupo Water Quality

As part of the Waikato Regional Council's monitoring responsibilities Council will:

a) Ensure regular and on-going monitoring of water quality characteristics in Lake Taupo, inflowing tributaries and groundwater, and periodically analyse data and assess water quality trends
b) Carry out five-yearly water aging of groundwater and surface water tributaries in 2008 and 2013
c) Ongoing use of expert technical advice to assess the information in light of whether the long-term water quality goal will be achieved
d) In 2015 carry out analysis of need for further plan intervention as a result of monitoring and assessment carried out in a-c
e) Periodically assess effects of community septic tank discharges on near shore water quality
f) Periodically assess the cumulative effect of new papakainga and Marae wastewater discharges established under rule 3.10.6.6 on Lake water quality.

The method clarifies that Waikato Regional Council has ongoing responsibility for monitoring and assessing technical and scientific data. It sets out the process and steps that Waikato Regional Council will follow in gathering and assessing information.

The scientific and technical justification for the regulatory and non-regulatory methods in the Variation has been the subject of considerable public scrutiny throughout consultation and policy development. For this reason, the purpose of the method is to send a clear signal that Waikato Regional Council will follow a robust and objective process in assessing whether Catchment management has been successful.

Clause a) is a simple statement about Waikato Regional Council monitoring responsibilities.

Clause b) focuses on a key aspect that will assist in checking water quality achievement. It sets out the frequency at which water aging will be undertaken. A key aspect of the technical investigations is the measurement and modelling of the length of time taken for nitrogen discharged to land to leach through the soil profile, into groundwater and subsequently enter and be entirely mixed in the Lake. Nitrogen moves down into the soil and into groundwater, which in turn moves very slowly into streams and then into the Lake. This means that land use changes that occurred some decades ago will continue to increase nitrogen inputs into the Lake via groundwater, in addition to the effects of any future intensification.

Clause c) ties the two earlier 'descriptive' clauses together by setting out that technical expertise will assist in an overall assessment of whether the long-term water quality goal is being achieved.

Clause d) identifies that monitoring will feed into any future assessment of the need for further plan intervention. This may include changes to the nitrogen reduction target if monitoring and water ageing suggests this is necessary to achieve the Lake target. The timing of the review aligns with the requirement to review plans in accordance with s79 of the RMA. Any Variations to the plan (including the nitrogen reduction target) will be subject to RMA schedule one processes.

Clause e) is to ensure data is collected which will indicate the extent to which Objective 3 is being satisfied.

Clause f) is in recognition that Papakainga Wastewater Rule 3.10.6.6 has potential to allow a more than inconsequential increase in nitrogen leaching to the Lake. It is very important that the Regional Council keeps a check on additional nitrogen from new papakainga wastewater discharges, to help inform consent decisions under this rule.

Benefits and costs

The benefits of this method are that it sends a clear signal that Waikato Regional Council will continue to assess scientific evidence, and that a robust and objective process will be followed.

There will be some additional costs associated with this method, although some of the actions listed would have been carried out regardless of the Variation as part of the Waikato Regional Council's Section 35 Resource Management Act responsibilities. The costs involved are budgeted for in the Waikato Regional Council Long-Term Council Community Plan, and paid for under the general Regional rate, contributed to by all ratepayers throughout the Waikato Region. Costs include taking of water samples and subsequent analysis and recording results. Groundwater ageing must be done by expert agencies outside Waikato Regional Council and this is costly and time consuming. The frequency of water ageing is set at five yearly intervals. This is the minimum period of time over which changes are expected to be seen, as the biophysical processes involving subsurface and groundwater flows are extremely slow.

Efficiency of the method

Waikato Regional Council is the most appropriate agency to assess the range of technical and scientific information about Lake water quality given that it routinely undertakes such monitoring in any case. Clause c) refers to using expert technical advice. During policy development, this advice came from a range of sources, including most of the recognised experts in their field from the major Crown Research Institutes. In addition, Waikato Regional Council supported an independent scientific review[60] of the technical information. Although this method does not set out the detail of an identical process in the future, Waikato Regional Council has set a precedent for the independence and rigour of its scientific information. As the regulatory agency charged with managing land for the purposes of water quality protection, it is also the most appropriate agency to review the information to assess whether the Lake target is met.

Risks of acting or not acting

If Waikato Regional Council does not continue to use the most up to date techniques in monitoring and measuring water quality, it risks gaps in the water quality record for the Lake. Given the scale of the intervention that is proposed, it is important to continue checking and assessing the technical evidence, to give early warning of any changes in expected results.

Appropriateness of the method

The method does not attempt to set out the judgment Waikato Regional Council will make after assessing the information gathered. The main reason for this is that the Council cannot know now what the results of the monitoring will show. It is not necessary for a method in a plan to set out the result of a review, as the RMA envisages that Regional Plans will be reviewed every ten years. The method goes as far as is appropriate in setting out the actions to be taken in the future.

[60] Hamilton, David and Wilkins, Kate (2004): Review of science underpinning the 20 percent nitrogen target for Lake Taupo – Draft. Contract report for the Ministry for the Environment. Centre for Biodiversity and Ecology Research, University of Waikato. Hamilton.

Benefits	Costs
• Public statement of rigorous and objective process to be followed in ongoing monitoring of Lake water quality target. • Certainty that there will be an ongoing and complete record of Lake water quality. • Refinement of detailed Lake modelling and increase in scientific understanding for the benefit of the whole of New Zealand.	• Ongoing costs to Regional ratepayers of standard monitoring procedures.

10.1.4 Method 4: Tangata whenua partnership

Description

The method is as follows:

Tangata whenua partnership

Waikato Regional Council will continue to work with Ngati Tuwharetoa in the spirit of partnership and in accordance with the memorandum of understanding established by the two parties, and through the memorandum establish processes to enable individuals and groups within Ngati Tuwharetoa to participate in decision making processes.

The method will achieve policy 2. It sets out Waikato Regional Council's desire to work with Ngati Tuwharetoa, with a general statement about an existing relationship, as well as an aspiration about the development of a partnership relationship in the future.

Benefits and costs

This method will not create additional economic costs to the regional community, as Waikato Regional Council has set aside existing funding to work with Ngati Tuwharetoa under the memorandum of understanding.

There are many benefits in working together with Ngati Tuwharetoa. Ngati Tuwharetoa are tangata whenua that hold mana whenua in the Catchment of the Lake, and are kaitiaki of Taupo-nui-a-Tia. They are a significant manager of the Lake and already have various agreements with the Crown. Of the landowners in the Catchment, collectively Ngati Tuwharetoa are the largest private owner of land. Ngati Tuwharetoa have made it clear in the consultation for the Variation that they do not wish to sell any part of their land holdings. The combination of these factors make Ngati Tuwharetoa the most affected landowner in the Catchment.

Efficiency of method

Ngati Tuwharetoa and Waikato Regional Council have an existing memorandum of understanding. This is implemented through regular meetings and liaison on a range of matters between the paramount chief of Ngati Tuwharetoa and senior Trust Board members and Waikato Regional Council Chairman and Deputy Chairman and senior staff. This method recognises the importance of that memorandum and the existing relationship developed, and takes that as a starting point.

In 2002, Ngati Tuwharetoa articulated their resource management aspirations in the Ngati Tuwharetoa Environmental Iwi Management Plan. The Environmental Iwi Management Plan is underpinned by Ngati Tuwharetoa Tikanga and Kawa, and has identified the key environmental values and policies for the tribe. The development of this plan was stimulated by Ngati Tuwharetoa involvement in the 2020 Taupo nui-a-Tia project, described in an earlier section. To progress the Environmental Iwi Management Plan, a Ngati Tuwharetoa Comparative Risk Assessment was completed to ensure an organised approach was taken to achieving and protecting the values identified. The resulting 2020 Action Plan contains some specific actions that must be

addressed by Waikato Regional Council and Ngati Tuwharetoa. Many of the 2020 actions are concerned with developing good relationships, understanding of respective aspirations and values, and specific processes to address gaps.

Risks of acting or not acting

The strong relationship between Ngati Tuwharetoa values and the wider community values was recognised during the three years of the 2020 Taupo nui-a-Tia project. If the method is not implemented, the critical differences between Ngati Tuwharetoa and the rest of the community in terms of methods used to achieve a sustainable, clean Lake and environment for future generations are not recognised or acted upon. This is a significant loss in terms of Lake protection. It also puts at risk the Environmental Iwi Management Plan, which sets a strong basis for Ngati Tuwharetoa to build its environmental management capacity.

Appropriateness of method

The table below summarises the benefits and costs of the method:

Benefits	Costs
• The method will assist in developing closer working relationships between the two parties. Understanding and goodwill from Ngati Tuwharetoa as the owner of the majority of the private land in the Catchment will be more likely to result in successful implementation of the Variation.	• May be additional costs in terms of staff resources, as a consequence of Ngati Tuwharetoa and Waikato Regional Council developing further actions to progress a deeper understanding and closer working relationship.

Overall, the Method is an appropriate way to recognise that specific effort needs to be made for Waikato Regional Council to work more closely with Ngati Tuwharetoa, as the most significant and permanent landowner in the Catchment.

10.1.5 Method 5: Research into development and implementation of markets for offsetting nitrogen

Description

The method is as follows:

Research into Development and Implementation of Markets for Nitrogen Offsetting

Research into Development and Implementation of Markets for Nitrogen Offsetting
Waikato Regional Council will, with Central Government and affected landowners, support and facilitate research into the practical implementation of markets for nitrogen offsetting between properties in the Lake Taupo catchment.

Waikato Regional Council will provide a central notice board to advertise nitrogen for sale/wanted.

Method 5 will implement Policy 12. As noted earlier there is also a regulatory aspect to implementing Policy 12. The ability to use nitrogen offsets is set out in standards and terms in rules 3.10.5.3 and 3.10.5.4.

The concept of nitrogen offsets is supported by the policy approach and the necessity is demonstrated by the ability for nitrogen offsetting in the rules. At the same time, there is the recognition that nitrogen offsetting is a new concept and is unfamiliar to both potential players in a nitrogen market and the regulator. The rules in the Variation allow nitrogen offsets between two parties, through the use of a dual consent process under section 127 of the RMA. There are transaction costs in using a resource consent process which are discussed under rule 3.10.5.3. However, the Variation cannot allow a less onerous method of offsetting nitrogen allowances as this is the only way certainty that the cap will not be exceeded, can be achieved. For this reason, the

method recognises the need for ongoing refinement and investigation into potential barriers for individuals in using the nitrogen offsetting ability in the rules.

Benefits and costs

The benefits of this method are that it allows practical issues with implementation to be considered. The assumption behind this is that the nitrogen offsetting system as set out in the Variation is unprecedented. During consultation of the policy approach of nitrogen offsetting, many of the landowners who are eligible to enter into a nitrogen offset, wanted more information about how the systems could work. In particular, they wanted to discuss the possibilities and implications for their businesses if they entered into a nitrogen offset. By taking a theoretical construct and 'translating' it into terms that potential players can understand and relate to their particular circumstances, a greater uptake of the option is likely.

Efficiency of the method

The method states that Central Government will be involved in practical implementation. There are already strong signals that Central Government intends to put resources into working with Local Government on these matters. The method builds on existing documentation to this effect. In December 2004, Ministry for the Environment published a discussion document entitled "*Freshwater for a Sustainable Future: Issues and Options*". This was part of the Government's Sustainable Programme of Action. Actions in the document related to market mechanisms, highlighted the need for practical implementation and trials and stakeholder involvement.

In the long-term, changes to the Resource Management Act will streamline trading of point and non-point discharges to water.

In its submission to Ministry for the Environment's (MfE) Issues and Options document, Waikato Regional Council noted that regional councils will take a cautious approach to transfer of resources, which may have unforeseen consequences. Development of pilot systems that look at technology, software and infrastructure were supported, as was bringing together the diverse experience currently being developed in regional councils and some government departments and Crown Research institutes.

Risks of acting or not acting

If Waikato Regional Council took the view that people would work out a mechanism as unprecedented as trading nitrogen allowances, without any further investigation into practical measures, there is a risk that the mechanism would not be well understood or supported.

Appropriateness of method

The method is appropriate, as it is not until theory is translated into practice, that the practical implementation issues can be worked through and taken back to improve policy. The table below summarises the benefits and costs of the method:

Benefits	Costs
• Assists local landowners to understand and test scenarios without committing themselves to entering into offsets. • Potential users of a nitrogen offsetting and trading market are able to work through practical issues and provide valuable feed back for future policy refinements. • Provides a focus for considerable existing national interest in developing workable markets for diffuse discharges.	• May raise expectations of an 'ideal' situation that is not possible under the present legal and technical constraints. • Financial costs of investigation to Regional community.

10.1.6 Method 6: Wastewater management

Description

The method is as follows:

Wastewater Management

Develop and implement in conjunction with Taupo District Council a management system for on-site wastewater in the Taupo Catchment that is consistent with Australia/New Zealand Standard 1547:2000.

Method 6 is to support Policies 4, 7 and 8.

The Wastewater Management Standard AS/NZS 1547:2000 clearly makes the point that historically, the management of on-site wastewater has been very poor. The result has been many substandard septic systems that result in unacceptable health and environmental risks. The main reason given for this situation is that the management of on-site wastewater systems is left to householders, who are generally poorly informed about the systems (in fact, often householders are unaware of their system unless it fails in some way). The standard therefore strongly recommends that agencies such as regional and district councils take on a much greater role in management of on-site wastewater systems.

An appropriate management system would need to ensure that on-site wastewater systems are inspected and maintained at suitable intervals. For this to occur there needs to be a database that stores details (for example, location, owner, type of system, inspection requirements) of each on-site system. Inspectors will need to be trained and properly managed. New wastewater systems need to be designed, sited and installed appropriate to the site conditions and such that the requirements of the wastewater rules will be satisfied. There will therefore need to be appropriate oversight of the installation of new wastewater systems. Owners of systems need to be educated about management of their systems. Part of wastewater management will also be checking on issues such as ongoing compliance with rules and actual environmental effects of wastewater installations. It is appropriate that both the Waikato Regional Council and the Taupo District Council are involved in ongoing management of on-site wastewater systems in the Lake Catchment. The method ensures that the two councils work together to develop a suitable wastewater management system for the Catchment.

Benefits and costs

Conventional septic tank on-site wastewater systems generally do not require a high degree of management to ensure they perform appropriately, although they require regular pumping out. However, good management of these systems will ensure that health and environmental risks are minimised, within the ability of the system. The most common fault with standard septic tanks is failure of the disposal field. If this occurs near drains or waterbodies, effluent can significantly affect water quality, leading to increased health risk and ecological damage. The on-site wastewater management system will need to ensure existing and conventional on-site systems are regularly inspected to ensure that disposal fields are operating properly and that the tanks are pumped out at appropriate intervals.

Advanced secondary on-site wastewater plants configured for nitrogen removal require a high level of management to ensure that they achieve consistently high nitrogen removal efficiency. It is likely that many such systems will be installed in the Catchment in coming years. Ensuring these plants are well managed will greatly increase the likelihood that new on-site systems do not cause additional nitrogen discharges to the Lake and that therefore the Regional Plan objectives with respect to Lake Taupo are achieved. For these reasons, the environmental benefit of this method could be substantial.

There will be a number of costs of managing on-site wastewater in the Catchment. This includes initial costs in the development of management systems, training programmes and educational material. After this initial period, there will be ongoing management costs that could be passed on to owners of on-site systems.

Inspectors will need to be trained, particularly in terms of understanding the requirements of the Standard AS/NZS 1547:2000 and Auckland Regional Council's Technical Publication 58, both of which are referred to in the advice notes to the rules for new on-site systems. Auckland Regional Council is currently developing its own training programme that would largely suit this purpose. The additional cost of such training is therefore not likely to be large.

The Waikato Regional Council and Taupo District Council are, at the time of writing this report, investigating the establishment of a database through which to manage on-site wastewater systems in the catchment. There will be costs of developing and maintaining this database. The database will be used to record all existing on-site systems in the Near-shore Zone (approximately 470 systems) so that monitoring of these systems can be tracked. New systems will also be recorded on the database.

There will need to be additional management and administrative staff to run the wastewater management system. It is possible that ongoing management of permitted activity on-site wastewater in the Catchment (managing Site Assessment and Design Reports, carrying out Post-installation Inspections, managing and auditing inspectors of existing systems, responding to enquiries and dealing with complaints) will require perhaps 20 hours per week (based on discussions with Environment Bay of Plenty wastewater management staff and consideration of numbers of new systems in the Taupo Catchment per year). In addition there will be initial costs of database set-up and data input.

Currently Taupo District Council officers oversee the installation of new on-site wastewater systems from a Building Act and Health Act perspective. Such officers could be trained to also oversee installation from an RMA perspective, although this would increase their workload at an additional cost to the district council. In terms of ongoing inspections, new secondary treatment plants will be required to have a manufacturer's maintenance contract. Ongoing inspections would therefore be the responsibility of the manufacturer's agents. Regional or district council involvement would be largely limited to tracking and auditing inspections. There will also be a need for inspections of conventional septic tank type systems in the Near-shore Zone. It should be noted that the Taupo District Council already has an inspection and maintenance regime in place for septic tanks which are part of district council STEP wastewater systems. Environment Bay of Plenty has found that pump out operators can effectively undertake the task of tank inspections.

Management costs for secondary treatment plants are likely to be in the order of $325 per year per on-site system. This would include the cost of the six monthly inspections required by the proposed rules, which will be carried out by agents of the manufacturer (approximately $250 per year), and allows a further $75 per system per year for Council administration (based on discussions with Environment Bay of Plenty and comparisons with Environment Waikato's consent administration costs). For conventional septic tank systems, the management costs are unlikely to be greater than $50 per year per system. The main management tasks will be auditing inspectors, updating the database after inspections/pump-outs (which are to occur every 3-5 years), and responding to enquiries and complaints. These management costs would need to be recovered from owners of wastewater systems.

This method will not result in environmental costs. There may be some additional minor social cost to householders as a result of increased financial costs for managing existing on-site wastewater system.

Efficiency of method

Based on discussions with Taupo District Council Asset Managers, ongoing management costs for on-site secondary treatment plants per household are not dissimilar to management costs for community wastewater treatment plants. Ratepayers serviced by community systems are therefore already paying charges that are comparable to the new ongoing costs for management of on-site wastewater systems (which could be passed on to owners of these systems). Given the environmental benefits that would accrue from good management of on-site wastewater systems and the lack of social and environmental costs from this method, it is seen as an efficient way of satisfying the policies and meeting the objectives.

Risks of acting or not acting

Based on the proposed rules, most on-site wastewater systems will be (as they are now) permitted activities. If an appropriate on-site wastewater management system is not developed for the Lake Catchment, there will be little control over the types of wastewater plant being installed and little control over ongoing treatment efficiency of these plants. Although most manufacturers require advanced systems to be managed via a maintenance contract, this generally only applies to the initial guarantee period (commonly up to five years). However, it is important that this level of management continues for the life of the plant, if there is to be any guarantee that these systems are meeting the required effluent treatment standards. The risk of not providing a suitable management system for these advanced wastewater plants is that there will increasingly be associate near-shore effects, and much less likelihood that the nitrogen discharge from the property will remain within the nitrogen cap.

Conventional septic tank wastewater systems can create significant environmental and health risks if they are located at high density, and particularly if they are near waterbodies or in areas of high groundwater. If there is no management system for managing such systems, there is increased risk of adverse effects. The need for a management system is less important for systems in remote areas, where risks are more localised although sometimes still significant to those in the immediate vicinity.

Appropriateness of method

The following table summarises the costs and benefits of this method:

Benefits	Costs
• Reduced health and environmental risks from new and existing wastewater systems. • Higher standard of new on-site system installed. • Greater confidence that systems are achieving required effluent treatment efficiency. • Better knowledge of where systems are located. • Reduced likelihood of disposal field failure.	• Initial costs of developing management systems, and training and organising inspectors. • Initial cost of database set up and data input. • Costs of Site Assessment and Design Report and Post-installation Inspection. • Ongoing costs of management approximately $325 per household per year for advanced wastewater plants and $50 for conventional plants.

The method is considered to be appropriate as it supports the achievement of policy and objectives in a way that is both effective and efficient.

10.1.7 Method 7: Integrated management of wastewater

Description

The method is as follows:

Integrated Management of Wastewater

Work with Taupo District Council and other stakeholders to:

a) Ensure integrated management of on-site wastewater
b) Ensure domestic wastewater systems chosen for new subdivisions and individual properties represent the Best Practicable Option, and include provision for nitrogen reduction
c) Advocate for centralised wastewater servicing of new subdivisions where such servicing is practicable
d) Ensure major stakeholders, including designers, manufacturers, installers and users of on-site wastewater systems, are provided with information, advice and discussion forums that help them carry out their wastewater management responsibilities appropriately and in line with Australia/New Zealand Standard 1547:2000
e) Promote practices to ensure non-domestic point source wastewater discharges such as stormwater and industrial discharges do not adversely affect Lake water quality
f) Support joint initiatives with the Bay of Plenty Regional Council and Rotorua District Council for testing treatment efficiencies of advanced wastewater treatment systems.

Method 7 is to support Policies 4, 7 and 8.

There are many agencies and parties who are involved in the management of on-site wastewater. These include the Waikato Regional Council, Taupo District Council, health and environmental agencies, property developers, wastewater plant designers, manufacturers and installers, homeowners and even real estate agents. It is likely that on-site wastewater management efficiency and effectiveness will be improved if all parties work in an integrated way to achieve the objectives. The main means for achieving this will be to provide relevant information and advice, being involved in planning activities such as district council structure plans and developer proposals, and ensuring there are regular forums for discussion between parties.

Management of domestic wastewater should be integrated with wider wastewater management initiatives that also encompass non-domestic discharges such as stormwater and industrial discharges. Such non-domestic wastewater discharges can also impact on the ability to achieve the objectives for Lake Taupo.

Benefits and costs

There are many benefits in working with the Taupo District Council to manage on-site wastewater. District Council officers have much better local knowledge of on-site systems and their owners. They have more regular contact with their ratepayers, which can be an important avenue of communication about on-site wastewater issues. They are also directly involved with management of land use change (such as granting land use consents), as well as the installation of permitted activity on-site wastewater systems (through their Building Act and Health Act responsibilities). The district council can ensure, for example, that high density developments are only able to occur where there is a community wastewater treatment plant able to serve the new development.

Wastewater servicing options can be greatly influenced by design of subdivision developments. Some land is unsuitable (for example, due to unstable land, nearby waterbodies or high groundwater levels) for on-site wastewater systems. In such cases, there may need to be allowance in subdivision design for appropriate wastewater servicing. This may include setting aside land for a community wastewater treatment plant, or a package plant to service at least some of the properties. In other cases, some land should not be developed due to restrictions for on-site wastewater. For these reasons, better wastewater solutions can be adopted if the Regional Council is able to work closely with property developers.

Centralised wastewater systems generally achieve higher rates of nitrogen removal than on-site systems, are generally more reliably and professionally managed, and are generally subject to site specific management through a discharge consent such that more comprehensive management and monitoring occurs. For these reasons encouraging those making decisions about wastewater treatment to adopt centralised wastewater solutions will be beneficial in terms of the Lake water quality.

Working in an integrated way with on-site wastewater designers, manufacturers and installers can also ensure that appropriate wastewater solutions are implemented in the Taupo District. The Regional Council can pass on information about new technology, reliability of various wastewater systems, potential environmental effects and management requirements to the wastewater industry, which will help to ensure improved wastewater system design and management. This will help to ensure systems that are installed are able to meet requirements of the wastewater permitted activity rules and policy.

Householders are also an integral part of wastewater management. Working with householders will ensure that they are informed about wastewater servicing options and management requirements for wastewater systems.

In general, if all relevant parties are actively involved in wastewater management, there is likely to be better understanding of wastewater issues in the Catchment, and as a result, greater general support for required standards and management initiatives.

There will be opportunities, when working with Taupo District Council, developers, the wastewater industry and others, to promote Best Management Practices for other point source discharges such stormwater and industrial discharges. Such discharges can sometimes increase the risk of adverse effects on near-shore Lake water quality. Ensuring that these discharges are properly managed will help to achieve the objectives for Lake Taupo.

Waikato Regional Council, Bay of Plenty Regional Council and Rotorua District Council have recently developed a testing station for advanced secondary treatment on-site wastewater systems. A number of systems have now been tested and a second batch of systems is now being tested. The testing provides results that indicate treatment efficiency of wastewater systems that may be used in the vicinity of Lake Taupo and the Rotorua Lakes. This provides much needed information about which systems are able to meet wastewater requirements of the respective Councils. There are significant benefits in continuing to work with the Bay of Plenty Regional Council and the Rotorua District Council in this way.

There will be additional costs of this method, although much of the work is already being carried out. The Waikato Regional Council already has significant input into district council planning mechanisms such as district plans, long-term council community plans, subdivision consent processes and structure plans. There will need to be additional educational material provided to householders about on-site wastewater, although there are already very good brochures available from other organisations about care of on-site wastewater systems that can be distributed at minimal cost. The Regional Council also already works with major land developers with respect to their development plans but will need to provide additional forums for information exchange with the wastewater industry. There will be additional costs with respect to the wastewater treatment plant trials.

There will not be environmental costs or social costs associated with this method.

Efficiency of method

The costs are not expected to be major in relation to the potential benefits. The method is expected to significantly improve wastewater management in the Lake Catchment. For these reasons, it is considered to be an efficient method to adopt.

Risks of acting or not acting

If this method is not adopted, there is a risk that wastewater management will be uncoordinated and ill-informed. This could mean that inappropriate and poorly performing wastewater systems are installed and that they are not well maintained. In some cases, insufficient attention may be given to ensuring appropriate wastewater solutions are implemented if this method is not adopted. This will reduce the likelihood of achieving the objectives for Lake Taupo.

Appropriateness of method

The following table summarises the costs and benefits of this method:

Benefits	Costs
• Improved coordination of wastewater management. • Better wastewater treatment and disposal solutions adopted for new developments. • Better wastewater management with fewer treatment and disposal 'failures'. • Greater 'buy in' by involved agencies.	• Minor additional costs for provision of information to householders and other parties. • Minor additional costs involved in working with the wastewater industry. • Costs associated with the joint wastewater testing station.

The method is considered to be appropriate as it supports the achievement of policy and objectives in a way that is both effective and efficient.

10.1.8 Method 8: Public fund

Description

The method is as follows:

Public Fund

Waikato Regional Council will, in conjunction with Ngati Tuwharetoa and funding partners Taupo District Council and Central Government, continue to be a member of a Joint Committee of a charitable trust called the Lake Taupo Protection Trust, which is a Council Controlled Organisation that:

a) Comprises a board of technical people as Trustees appointed by the Joint Committee
b) Implements strategies to permanently reduce nitrogen from rural land use activities by 20 percent
c) Contracts appropriately skilled persons to provide advice and nutrient modelling support and education in the nitrogen benchmarking process, as the first phase of achieving a nitrogen cap for farming land uses.

The method sets out specific reference to the set up of a Joint Committee of the funding partners that oversees a Council Controlled Organisation, (CCO). It follows from the policy approach in Policy 10, to set out the guiding principles of a public fund. The method is intended to provide more detail about how the fund will be set up and the process it will follow to achieve its overall aim.

Benefits and costs

The benefit of including specific reference to the set up of a Joint Committee of the funding partners, that oversees a Council Controlled Organisation, is that it is a public statement of the process that Waikato Regional Council will follow in terms of implementing the objectives in the Variation.

The public fund allows the most efficient and effective ways of permanently removing nitrogen to be pursued. Because the fund approach is flexible, there is the ability to gain permanent nitrogen reductions in the most effective and efficient ways.

Efficiency of method

Both Taupo District Council and Waikato Regional Council put a statement of proposal for a Lake Taupo Protection Trust in their respective 2005/2006 draft annual plans. The annual plan process is covered under the Local Government Act and a decision on the proposal will be made under that Act. However, the existence of a public fund is a fundamental part of effectively meeting the objectives and policies in the Variation, and the method sets out the detail of the process. If the method was not in the Variation, some reference would need to be made to the two councils' respective annual plan and long-term council community plans (LTCCP's).

Risks of acting or not acting

If the method was not included in the Variation, the CCO would still exist and go through due public process under the Local Government Act in the councils' respective annual plans and LTCCP's. However, there would be less clarity in the Variation about the connection between Objective 4 (minimise social and economic costs by spreading costs of intervention to achieve the Lake water quality target) and the action taken by Waikato Regional Council and other funders.

Appropriateness of method

The benefits and costs of the method are summarised in the table below:

Benefits	Costs
• Provides guidance on the process and set-up of the use of the public money gathered using the special rating processes that began in 2004. • Existence of a public trust provides transparency in the use of public monies.	• Additional administration costs of managing ongoing meeting costs for trustees of a CCO.

Overall, the method is an appropriate one to include in the Variation. It provides useful guidance and transparency in the use of public money to achieve objectives in the Variation.

10.1.9 Method 9: Review of effectiveness of public fund

Description

The method is as follows:

Review of Effectiveness of Public Fund

Waikato Regional Council will, in conjunction with the other members of the Joint Committee, Ngati Tuwharetoa, Taupo District Council and Central Government, initiate a review after 2010 of the Council Controlled Organisation's effectiveness toward achieving the nitrogen reduction target using public funding.

The method essentially restates Policy 11, identifying that a period of at least five years is necessary for the administrative body that is managing the public fund (the Lake Taupo Protection Trust) to bed down its operation, before a review can take place. The method notes that Waikato Regional Council will do this in conjunction with the other funding partners Taupo District Council and Central Government.

Benefits and costs

The main benefit of the method is to note the commitment Waikato Regional Council has made, to structure and criteria for the public fund to maximise cost-effective nitrogen reduction, while ensuring that secondary social and economic goals are

maximised where possible and any negative impacts are avoided. The method provides a clear expression of the necessity of checks and balances. There will be costs associated with a review of the effectiveness of the fund, including the cost of an independent agency or individual to assess progress towards the stated goals.

Efficiency of method

It is not essential to specify the exact year the Public Fund will be reviewed however signalling that a review will occur sometime after 2010 provides enough time for the fund to have achieved significant gains, while being short enough to be able to reframe or reassess the use of the fund, if there have been unforeseen difficulties in achieving the objectives and policies in the Variation.

Risks of acting or not acting

Method 9 provides a firm commitment to reviewing the public fund in the same RMA plan that has set up the need for the public fund. If the method was not inserted into the Variation, there would still be the ability to review the use of the fund, as the structure of any public trust includes some form of checks and balances. The risk would be more in terms of public perception that funds were not been used in the most effective way.

Appropriateness of method

The table below summarises the benefits and costs of the method.

Benefits	Costs
• Provides a clear link between the use of the public money and the achievement of Objective 4 to minimise social and economic costs. • Provides guidance on the date and process of reviewing the use of public money.	• Additional administration costs of managing an external review of the effectiveness of the CCO.

Because a financial commitment has been made by all levels of government and supported through a community process, it is important that the fund is effective in achieving reductions. Overall, the method is an appropriate one to include in the Variation. As with Method 8, this method provides useful guidance and transparency in the use of public money to achieve objectives in the Variation.

10.1.10 Method 10: Education, advice and extension for rural land use activities under a nitrogen cap

Description

The method is as follows:

Education, Advice and Extension for Rural Land Use Activities Under a Nitrogen Cap

Waikato Regional Council will, in conjunction with any existing or new body with an interest in sustainable catchment management, investigate and develop land management activities and land uses that will maintain or reduce nitrogen leached from land in Lake Taupo catchment, including:

a) Providing advice through identification of Certified Nutrient Management advisors who are appropriately qualified in sustainable nutrient management in New Zealand agroecosystems to assist landowners to make changes to farm management practices or change land use under a nitrogen capping regime
b) As part of implementation develop templates that link land management practices with expected nitrogen leached

c) Co-ordinating development and updating of codes of practice and best management practices for existing land uses in the catchment
d) Supporting and facilitating research and development into profitable and viable rural land uses that prevent catchment-wide increases in nitrogen outputs.
e) Advocate that managers of government farm land in the Lake Taupo catchment take on a leadership role in the investigation and implementation of low nitrogen leaching farming activities.

The method is intended to support Policies 3 and 6. It recognises that all rural landowners will need information and advice that will help them to make changes to their land practices or land use under the provisions of the Variation. Rural landowners will need to understand how their land use and associated practices influence the quantity of nitrogen leaching from their land so that they are able to maximise production while remaining within their nitrogen cap. The method is intended to assist research and development into viable low nitrogen land uses. This is a key component of the Lake Taupo policy framework and, as such, requires a proactive stance from Waikato Regional Council. This method is specific in establishing a commitment by Waikato Regional Council to be actively involved with relevant agencies and organisations and facilitate appropriate research and development.

Benefits and costs

This method requires a commitment from the Waikato Regional Council to take a lead role in research, development and promotion with respect to low nitrogen land uses. There are many research activities and trials looking at how nitrogen leaching can be reduced while maintaining profitability. As such, it will require considerable co-ordination and integration between agencies to keep abreast of latest findings and subsequently promote appropriate activities. It also provides, through a certification process, for the recognition of people outside of Waikato Regional Council who have the skills to assist landowners making farm business management or land use change decisions under a nitrogen capping regime.

Research into and promotion of viable low nitrogen land uses are key components of the Lake Taupo policy framework. If this method is listed in the Variation, there is a risk that there will be considerable overlap between Waikato Regional Council and the Council Controlled Organisation, and possible confusion about who is the lead agency for implementing the method. Waikato Regional Council has been instrumental in co-ordinating much of the Catchment based research to date, either by support in kind (staff time and administration resources) or contributing financially. A proactive stance from the Waikato Regional Council would ensure that this method is effective in progressing research and development in this area. However, this may come at the expense of the Council Controlled Organisation taking responsibility for decisions about the portion of the public funding allocated to research and development referred to in Policy 10.

Efficiency of method

This method has the potential to be inefficient, due to the possible overlap of roles between the Regional Council and the new administrative body that is managing the portion of money in the public fund that is understood to be set aside for research and development. The undertakings in the method are however appropriate and necessary. The new requirements represent a significant departure from how the Waikato Regional Council has managed land use in the past. These requirements mean that farmers will need to look quite differently at how they manage their land and farming operations into the future. To ensure the success of the Variation Waikato Regional Council needs to make sure that the requirements are fully understood and that landowners or their agents have the support they will need to help them make good decisions under this new more restrictive land management regime.

Risks of acting or not acting

If this method is not included in the Variation, there is a risk that insufficient resources are diverted toward developing land use of benefit to the Lake in the long term.

Appropriateness of method

The table below summarises the benefits and costs of the method. Overall, the method is an appropriate one to include in the Variation, as it is still uncertain how the Council Controlled Organisation will choose to operate. If the Council Controlled Organisation decides to engage Waikato Regional Council to continue to be involved in coordinating research and development, this method will be a useful addition to the Variation. The method signals the intent and Waikato Regional Council commitment to continue to investigate alternative ways of using and developing land that sustain the local community and the wider environment, including the water quality of the Lake and the Regional community, through efficient use of ratepayer funds.

The table below summarises the benefits and costs of the method:

Benefits	Costs
• Waikato Regional Council keeps closely in touch and retains influence over projects with direct relevance to promoting sustainable land management in the Lake Taupo Catchment.	• Additional cost to Regional ratepayer of staff resources to co-ordinate research projects, • Possible duplication of effort between Waikato Regional Council and Council Controlled Organisation,

10.1.11 Method 11: Landowner involvement in Catchment management

Description

The method is as follows:

Landowner Involvement in Catchment Management

Establish a catchment management body that is supported and represented by regulatory authorities, Ngati Tuwharetoa and private owners of pastoral, forestry and undeveloped rural land, that has a formal reporting and advisory role to Waikato Regional Council on matters related to the transition to sustainable rural land uses in the Lake Taupo Catchment, including:

a) Research needs
b) Extension and advice
c) Monitoring and auditing processes for rural land use consents.

Method 11 implements Policies 3 and 6. The method sets out to establish a Catchment body that provides effective liaison and more formal landowner involvement in decision making processes. Under this option, Waikato Regional Council retains its full functions under the RMA, including responsibility for ensuring the objectives in the Variation are achieved through monitoring and enforcement of rules. The structure is likely to need to contain representatives from pastoral landowners, Waikato Regional Council, Taupo District Council, Ngati Tuwharetoa and forestry.

The idea of a formal structure that involves representatives of Waikato Regional Council, other relevant agencies and landowners was suggested by farmer representatives Taupo Lake Care and has been the subject of research and consultation. A MAF funded project under its Sustainable Farming Fund, undertaken by Taupo Lake Care and supported by Waikato Regional Council, was completed in 2004.

Benefits and costs

This method follows from Method 10 in the Variation, as it is intended to work through detailed implementation of sustainable rural land use regulatory and non regulatory methods. The method provides a commitment to formalise an existing relationship between Waikato Regional Council and rural landowners.

Costs of the method include:

- There will be additional administration costs to regional ratepayers, as a result of running a separate management structure.
- Raising expectations of landowners in the Catchment that they will have a wide ranging decision-making role in nutrient controls and funding for land use changes.
- Possible conflict of interest for landowner representative members between individual business decisions and Lake overview role of management body.

Efficiency of method

The method has the potential to be efficient, as it provides a focus for representation and discussion of a range of topics that might otherwise be raised in a number of forums. If the structure is flexible and transparent and allows for change, and avoids duplication of existing management structures, it has a high chance of being a valuable implementation focus point for both Waikato Regional Council and affected landowners.

Risks of acting or not acting

If the method were not in the variation, there is a risk that the relationship developed through the extensive consultation with affected landowners, is not progressed. This is particularly of concern in the next phase of implementing an unprecedented regulatory framework, with all the learning and experimentation that needs to be done to get a system that is practical and streamlined.

Appropriateness of method

The following table summarises the benefits and costs of this option:

Benefits	Costs
• Provides a structure and focus for landowners and regulatory agency to work together. • Builds on the existing relationship and ability of farmers and Waikato Regional Council staff to engage in robust debate that results in practical solutions.	• Costs are not known until full analysis has been done of the formal or semi-formal structure, but is likely to be an additional cost to the Regional community through the administrative costs of meetings and staff resources.

This method looks at progressing behavioural change through a Catchment body rather than being facilitated solely by the Waikato Regional Council. It has the potential to develop into a Catchment management body with formal roles and responsibilities that integrate with those of the Waikato Regional Council. However, further research is required to investigate many of the issues raised above. The method is written to focus on the overall purpose of the Catchment body, whilst not ignoring the need for further investigation and support from the regulatory agency and affected landowners. If the issues above are worked through, the method is an appropriate way of promoting sustainable rural land uses.

10.1.12 Method 12: Advocacy and joint approaches

Description

The method is as follows:

Advocacy and Joint Approaches

Waikato Regional Council will through advocacy and joint approaches with Taupo District Council, proactively seek to prevent adverse effects on the environment and the wider economic, social and cultural values and address resource management issues that arise as a consequence of land use changes.

Method 12 implements Policy 13, which recognises there may be consequential effects arising from land use change as a result of nitrogen intervention. This method calls for the Waikato Regional Council to raise awareness of consequential adverse effects through advocacy, and then achieve integrated management through subsequent actions.

Waikato Regional Council will be proactive in advocating an holistic approach to land use change that takes account of district and Regional concerns. It is acknowledged that land use change may be inappropriate in certain circumstances and nitrogen intervention should not be used as a reason to override other environmental values. Waikato Regional Council will, through statutory processes, advocate that other environmental values should not be undermined.

Benefits and costs

If there is extensive land use change in the Catchment as a result of nitrogen capping and reduction, both Taupo District and Waikato Regional Council need to be ready to manage any consequential effects on the environment. The main benefit of this method is that it establishes a closer working relationship between the two councils and signals the need for possible joint approaches on issues.

This method can be described as signalling an intent that the two RMA agencies with a role in managing land use in the Catchment of Lake Taupo, work closely together on developing policy direction as issues arise. The method recognises that there may be occasions when the most appropriate course of action is for the two Councils to prepare and notify a joint plan, instead of two separate plans that cover the same issue.

For the method to succeed, district and Regional councils both need to put sufficient resources into working together to identify pressure areas and priorities for policy development.

Efficiency of method

Currently, both councils are at different stages of development regarding many of the issues relevant to this matter, such as subdivision, growth and development and landscape management. Closer ties between the two councils will assist in bringing common issues to council agendas, and faster resolution of issues of concern to both.

Risks of acting or not acting

If the method was not in the Variation, there is no action described for situations where conflicting values must be considered across different RMA jurisdictions. Although good RMA practice does not rely on the existence of the method, it gives a valuable public signal that both councils intend to work closely together to ensure adverse effects listed in issue 4 are avoided.

Appropriateness of method

The following table summarises the benefits and costs of the method.

Benefits	Costs
• Ensures that Waikato Regional Council and Taupo District Council are communicating effectively so that there are no unintended consequences of new nitrogen regulation on the wider	• Additional staff resources may be needed, especially in the policy development phase.

environment. • Leaves room for developing appropriate solutions without prescribing a particular outcome.	

The method is appropriate as it can ensure issues of concern to both councils are considered without prescribing a particular outcome. This method will also result in closer communication and potential overall environmental benefit and administrative cost savings between the Regional and district councils as it is implemented.

10.1.13 Method 13: Education for rural land use on Phosphorus management

Description

The method is as follows:

Education for Rural Land Use Activities on Phosphorus Management

Develop, implement and regularly review an environmental education strategy that educates farmers on agronomic optimums for soil phosphorus levels.

The method is intended to support Policy 5. It recognises that while there is currently no need to regulate phosphorus leaching/discharges in the same way that nitrogen leaching is being regulated under the Variation, farmers need information and advice regarding management of phosphorus, in particular through fertilisers, to avoid the need to regulate phosphorus leaching/discharge in the future.

Benefits and costs

This method requires Waikato Regional Council to prepare and implement an education strategy. Waikato Regional Council has an existing education programme for farming in the Waikato Region. Education on phosphorus management is likely to fit within this existing programme at little or no additional cost.

A proactive stance from the Waikato Regional Council could avoid the need for regulation of phosphorus leaching/discharge in the future.

Efficiency of method

This method has the potential to be efficient as the education strategy is likely to fit within existing education programmes and could avoid costly regulation in the future.

Risks of acting or not acting

If this method is not included in the Variation, there is a risk that insufficient resources are diverted toward educating farmers on phosphorus management, and consequently phosphorus discharges could increase to the extent that they could adversely affect Lake Taupo Water quality.

Appropriateness of method

The table below summarises the benefits and costs of the method. Overall, the method is an appropriate one to include in the Variation.

The table below summarises the benefits and costs of the method:

Benefits	Costs
• Need to regulate for non point source phosphorus discharges is avoided.	• Possible small additional cost to Regional ratepayer of staff resources to co-ordinate education programmes

11 Rules

11.1 Land use rules

11.1.1 Permitted Activity Rule 3.10.5.1 – Low Nitrogen Leaching Farming Activities

Description

The Permitted Activity Rule 3.10.5.1 will manage the effect of nitrogen entering Lake Taupo by capping nitrogen loss from properties covered by this rule. The rule contributes towards the implementation of Policy 3.

The title of the rule refers to 'farming activities', which is defined in the glossary as "The grazing of animals or the growing of produce, including crops, market gardens and orchard produce but not including planted production forest and ancillary grazing of animals or cropping". The Controlled Activity Rule 3.10.5.3 also refers to farming activities, but the intent of that rule is to cover farming situations that leach moderate to high levels of nitrogen, relative to the low nitrogen leaching limits in this rule 3.10.5.1.

The rule permits low nitrogen leaching activities and sets a maximum limit on the amount of nitrogen leached as a result of animal grazing or fertiliser application. The intention of this rule is to allow low nitrogen leaching farming activities where farming activities were existing as at the date of notification of the rule and where either a consent pursuant to Rule 3.10.5.3 and 3.10.5.4 has not been obtained, or where a consent has been obtained there is sufficient nitrogen to allow for at least 8 kilograms of nitrogen per hectare per year for farming plus any nitrogen leached from wastewater systems, or where land was not being farmed but any increase in nitrogen leaching has been authorised by consent. Allowable animal numbers where chosen so that nitrogen leaching from land farmed at these limits, including background leaching, would equate to about 8 kilograms nitrogen per hectare per year. The animal rate is considered sufficient to manage grass growth in the Catchment while being at the lower end of existing farm leaching. Therefore in the large majority of cases leaching will not increase for previously farmed land.

The conditions of the rule aim to limit nitrogen leaching from animal grazing or fertiliser use to 8 kilograms per hectare per year. This limit has also been chosen taking into account the following factors:

- The overall nitrogen loss from the properties authorised under this rule, including background losses, on-site sewage losses, and grazing/fertiliser losses will be less than the lowest expected nitrogen loss occurring on commercial farming properties.
- Approximately 1100 properties currently exist that are less than 4 hectares in size. The total area in pasture is small, with lifestyle blocks making up approximately 2 per cent of the existing pasture land in the Catchment. The majority of these properties are outside urban areas serviced by reticulated sewerage, and are expected to have individual on-site domestic wastewater treatment and disposal systems.
- Nitrogen leaching for these activities was estimated. This estimate was based on expert assessment and known average nitrogen leaching from different animals and types of activities. From this, some general assumptions were made about the amount of nitrogen leached from existing rural residential and lifestyle blocks.
- Taupo District Council has noted that future trends for urban and rural residential growth are that demand for small properties (one hectare or less), will continue. Areas where growth is concentrated are lakeshore areas near Taupo and Kinloch township, although district council staff note an increasing number of proposals for subdivision and development scattered around the entire Lake.

The types of properties that will be captured by this rule are those that have animals grazing at a low intensity or those with small scale crops or plantings (for example, rural residential lifestyle blocks). The land uses are expected to be of a scale that is non-commercial, and the use is unlikely to contribute significantly to the owner or occupiers total income. These properties may also have permanent or holiday residences, with domestic on-site wastewater treatment and disposal systems.

The stocking limits and fertiliser use are set at a level such that most existing lifestyle farming related activities within the Catchment are expected to be able to continue without being required to apply for a resource consent. The rule reflects that fact that many small lifestyle property owners want to keep some animals, for uses such as personal consumption, aesthetic pleasure, or controlling grass growth on their property. The rule also acknowledges that some lifestyle property owners may wish to use their land for crop production (such as tree crops like nuts or olives) where small applications of nitrogen fertiliser may be appropriate and are not likely to contribute significantly to nitrogen leaching from the property. The rule does not duplicate or introduce new limits in respect of individual on-site wastewater treatment and disposal systems. Instead, the advisory note refers users to the specific wastewater rules in Section 3.10.6.

The rule listed in the Variation is:

3.10.5.1 Permitted Activity Rule – Low Nitrogen Leaching Farming Activities

The use of land in the Lake Taupo catchment that may result in nitrogen leaching from the land and entering water:

1. where farming activities were existing as at the date of notification of this Rule (9 July 2005) and
   i) the land has not been subject to a consent pursuant to Rule 3.10.5.3 or 3.10.5.4; or
   ii) where the land has been subject to a consent pursuant to Rule 3.10.5.3 or 3.10.5.4 and has a Nitrogen Discharge Allowance sufficient to allow for at least 8 kilograms of nitrogen per hectare per year for farming plus 3.5 kilograms of nitrogen per year for any advanced wastewater system in accordance with Rule 3.10.6.3 or 10 kilograms of nitrogen per year for any conventional wastewater system in accordance with Rule 3.10.6.4.
2. where land was not used for farming activities at the date of notification of this Rule and where any nitrogen increase has been authorised by a resource consent granted under Rules 3.10.5.3 or 3.10.5.4

is a **permitted activity** if the following conditions are met:

a) Where the land is not used to graze stock, no more than 75 kilograms of nitrogen per hectare per year shall be applied to the land. Where the land is used to graze stock, the maximum number of animals shall be equivalent to any one row of Table 3.10.5.1 below:

Table 3.10.5.1- Stock Limits

Animal type	Maximum number of animals permitted per hectare	Maximum number of animals permitted per 10 hectares
Dairy Cow	0.55	5.5
Beef cattle	0.8	8
Calf	3.3	33
Horse	0.8	8
Sheep	7.7	77
Deer	3.3	33
Goat	10	100

Alpaca or Llama	3.3	33
Pig (free range)	2.5	25

b) Progeny of animals grazed under condition a) (such as lambs and calves) are permitted provided that no additional feed is brought on to the property except feed that is supplied as per standard industry practice to meet animal welfare requirements during the period of weaning and stocking rates return to the stock limits outlined in condition a) between 1 April and 31 July each year.

c) Non-grazing domestic animals including cats, dogs, chickens and ducks that are kept for domestic purposes are permitted and are not to be taken into account for the purposes of this rule.

AND PROVIDED ALSO THAT:
Where land use is authorised by this rule, the subject land shall not be used to offset any nitrogen leaching increase elsewhere in the catchment.

Advisory Notes:

- The area of land used to calculate animal density excludes any area of land used for buildings, lawns or gardens.
- Wastewater systems must be authorised by the wastewater rules in section 3.10.6.
- The application of 75 kilograms of nitrogen per hectare per year in a non-grazing situation, or grazing at the limits in table 3.10.5.1 is equivalent to 8 kilograms per hectare per year nitrogen leaching rate

Condition a) sets a limit on the nitrogen applied to land from both fertiliser and animal sources. The limit is expressed as a simple fertiliser rate of 75 kilograms of nitrogen per hectare per year where there are no animals kept. Where animals are kept, the nitrogen input is managed by a simple limit on stocking rates.

An input-output nutrient model such as Overseer^{TM} could translate each individual property's nitrogen discharge to land into the output expected. However, to remove the need to use such a model as a condition of the permitted activity rule, a table is included that prescribes stock limits. This table makes it clear how the landowner will ascertain whether they are inside or outside the condition of the rule, without reference to a nutrient model. Each row in the table lists the maximum number of animals permitted to be grazed per hectare or 10 hectares. A plan user can calculate the amount and types of animals that can be kept without breaching the permitted activity rule. The landowner will look up the table, knowing the existing land area that they have available on their property for grazing, and check that the amount and type of stock they have on the property is within the allowable level.

Condition b) is inserted to allow for reproduction and replacement of existing animals. Overseer^{TM} uses average annual stocking rates to determine long-term average nitrogen leaching rates. For the purposes of this rule the target nitrogen leaching rate was chosen to be 8 kilograms per hectare per year. While the number of animals able to be grazed on a farm is usually restricted by feed supply, the very low animal grazing limits in this rule are unlikely to allow all available feed to be used, even at the slowest growing periods of the year. Consequently the number of progeny to be produced will depend primarily on the number and quality of parent animals grazed, and the ability of the property to supply sufficient feed for the animals and their progeny. The ability to import feed to support progeny is restricted in order to prevent increasing the pool of nitrogen inputs to the property, which in turn will increase the amount of leaching above that intended. However, supplements such as grains and meal are sometimes fed to young animals as they weaned to provide a transition from a milk feed diet to a grass feed diet. This is unlikely to significantly increase the pool of nitrogen on the property and therefore supplements to meet animal welfare requirements during the period of weaning are permitted by this rule. It is important that animal numbers return to the limits specified in Table 3.10.5.1 by 1 April, as the highest risk period for nitrogen leaching occurs in winter, during the months April through to July.

Condition c) is inserted for clarity, so that plan users are not unnecessarily put into the next category of rule because they have animals on their property that are not listed in Table 3.10.5.1. The animals listed in Condition c) have negligible nitrogen leaching potential because they are not kept in sufficient numbers, and thus have been excluded from the nitrogen leaching standard calculation. If a commercial chicken farm existed on a property or was proposed, it would not be covered by this permitted activity rule. Instead, the scale and type of operation would require a resource consent under the Proposed Waikato Regional Plan, for effluent and air discharges.

The final provision in the rule prevents landowners who operate under this permitted activity rule, from reducing their nitrogen leaching and entering into arrangements with other landowners to offset and trade nitrogen. This is not provided for in the rules and as such would be a non-complying activity. There are several reasons why owners of lifestyle blocks are prevented from decreasing nitrogen in order to offset increases elsewhere. Amounts of nitrogen that may be released are very small. The benefit of being able to trade such small amounts would be outweighed by the transaction costs associated with resource consents. As explained later under Rule 3.10.5.4, offsetting needs to be tracked through resource consents to secure changes in nitrogen allowances.

The first advisory note to Rule 3.10.5.1 clarifies that a calculation of animal density under Condition a), has to be based on grazeable land, rather than the total property size. The second advisory note cross-references to the wastewater rules, as there are some important conditions for existing properties that must be met, which will vary depending on lot size and how close the property is to the shores of the Lake.

The rule recognises that there are a large number of rural property owners with a low potential for nitrogen leaching to the Lake as a result of their land use activities. It also recognises that many properties are primarily used for residential (or perhaps recreational) purposes, as opposed to productive purposes. Importantly, it gives these landowners a choice to operate within prescribed standards or obtain a resource consent. Individually consenting each of these property owners for their land use is inappropriate as it would greatly increase the bureaucratic or administrative burden for the Waikato Regional Council and property owners, increase regulatory costs, and result in a large number of very similar consents, all for little additional benefit to the Lake. The use of a permitted activity therefore will keep bureaucratic processes much simpler, while still affording a satisfactory level of protection for the Lake from such properties. The same comments apply to the large number of small block or lifestyle properties that potentially will occur in the future in the Lake Catchment.

Options considered for rule category and determining threshold of permitted activity

The decision made on whether a permitted activity was chosen as the preferred rule category, is one which weighs up the risk of not achieving the Lake target in Objective One, against the administrative efficiency, and lower individual cost burden of allowing existing land uses to continue without the need for a resource consent.

When determining the appropriate rule category and the thresholds for nitrogen leaching activities, a number of options were considered, including:

- No threshold - all properties have to obtain resource consent, regardless of their size or the amount of nitrogen leached.
- Threshold based on the size of the property – smaller properties could have less onerous reporting or consenting requirements.
- Threshold based on nitrogen leached – properties with low nitrogen leached could have less onerous reporting or consenting requirements.

The guidance in Policy 3 for all of the rules was that nitrogen allocation is based on nitrogen leached from existing land use. This meant that firstly, if thresholds are to be

set, they should be based on what is currently occurring on most properties, so that existing low nitrogen leaching land uses are able to continue without resource consent. The other consideration is that the limit should not be set above existing levels, because this would give landowners the incentive to 'pollute-up' to the limit, thus risking not achieving the Lake water quality goal in Objective One.

An option considered was that all properties in the Catchment that contain stock or apply nitrogen to the land, should have to undertake a resource consent process in order to ensure nitrogen leaching is not increased. A controlled activity rule would achieve this. However, this option was rejected because there is the ability to set certain and effective nitrogen leaching limits for a typical lifestyle block property. This means the process of obtaining consent and the costs to the individual and the regional community are avoided.

Waikato Regional Council considered setting a limit based on the size of the property, rather than the amount of nitrogen leached. For instance, the rule could state that all properties below 10 hectares (or any other size limit) are a permitted activity with no conditions on nitrogen leached. A rule such as this has the major advantage of being very simple, both for the affected landowner and the regulator. Affected landowners would know immediately whether their property fell within the rule. Using existing property databases and geographical information systems, Waikato Regional Council would keep a record of where the permitted activity properties were, and work with Taupo District Council to update this information as properties were either subdivided or titles amalgamated.

In essence, a rule such as this would have very low financial cost, as it would remove the need for fieldwork to undertake compliance monitoring, and landowners would not incur any additional cost of providing information or counting and measuring anything on their property to ensure they are still within the permitted activity rule.

The key premise of a permitted activity rule that relies solely on an area threshold is that people will continue to use their small blocks of land in the same manner. In terms of preventing Catchment-wide nitrogen increases, the concern is that these blocks could increase in nitrogen leaching, whilst the size of the block remains within the allowable limit. If the land is currently being used for horticulture or cropping, for instance, a small land use change such as doubling fertiliser application, could result in much higher nitrogen leaching. This means that an area threshold rule is not effects based. As such, there is considerable risk of not achieving the Lake target if this approach was followed.

The option of a permitted activity using an area threshold has been dismissed as not effective in achieving the objectives and policies of the Variation. Instead, a threshold based on the amount of nitrogen leached has been chosen. This is discussed under the heading 'benefits and costs'.

Option of allowing nitrogen offsetting

The final provision of Rule 3.10.5.1 prevents landowners who make use of this permitted activity rule, from entering into arrangements with other landowners to offset nitrogen.

For instance, a person whose existing land use is a house and some grazed paddocks, and is covered by Rule 3.10.5.1, may choose to change land use to convert the grazed area to forestry. This land use change would reduce the Total Nitrogen leached from the property, as forestry has lower nitrogen leaching than grazed pasture. In theory, under a nitrogen offsetting regime, this landowner could sell or lease this to another landowner.

The mechanism used by Waikato Regional Council in the Variation, is to provide for nitrogen offsets primarily through dual resource consent processes, including changes

under section 127 of the RMA. In this way, when trades occur between two landowners, Waikato Regional Council can easily track the offset and enforce the new nitrogen allowance for each landowner. When trades occur between two landowners that hold consents for nitrogen allowances they may alter their allowances, accordingly through changes to their consent. This is described more fully under Rule 3.10.5.3.

The consent provides a good basis for keeping track of the nitrogen offsets arranged between landowner A and B, and ensures there is no net increase in nitrogen leached as a result of the arrangement. This issue is discussed further under Rule 3.10.5.4. If a land use that didn't require a resource consent (allowed as of right), was able to offer an amount of nitrogen to the market, it would require a consent to secure the nitrogen decrease. Because these activities already leach low amounts of nitrogen, the options for further reduction are very limited. The only realistic options are to convert to forestry or remove stock. This land use change releases a small amount of nitrogen. The costs to trade this amount would outweigh its worth. In addition, it would challenge the nitrogen accounting process which is calculated using the Overseer^{TM} model. Offsetting is more efficiently achieved with moderate to high amounts of nitrogen.

Benefits and Costs

The basis for rule drafting was policy guidance in the Variation that nitrogen allocation is based on historical emissions (grandparenting). Implementing this policy decision means that most existing lifestyle blocks will be permitted and continue to leach the same amount of nitrogen into the future. Each individual property will have a slightly different nitrogen leaching rate in kilograms of nitrogen per hectare per year, depending on their current management. However, Rule 3.10.5.1 sets a 'flat rate' for nitrogen leaching limits thus placing the same limit on all lifestyle blocks.

There are some social and economic costs associated with Rule 3.10.5.1, as landowners who do not operate within the 'flat rate', will have to make immediate changes on their property if they want to be permitted, or apply for a resource consent under Rule 3.10.5.3 (existing farming operations which must go through a process of estimating current leaching amounts and plan for future management using a nutrient model). However, this is their choice if they want to continue leaching a higher amount based on their historical levels. An example of the economic cost of the Permitted Activity Rule 3.10.5.1 is that some landowners may have to sell some of their sheep flock if they graze more animals than the limits applied in Table 3.10.5.1. This could also have the effect of disrupting and upsetting landowners who have kept the same amounts of animals for a number of years, or be building up a breeding flock. However, the overall economic and social costs are assumed to be low, as they will only affect a very limited amount of landowners. Individual property owners who wish to keep greater numbers of animals on small blocks will still be able to do so if they apply for a resource consent under Rule 3.10.5.3.

The main benefit of the rule is that it provides certainty for achieving the Lake target and at the same time enables the continuation of a large number of existing low nitrogen leaching activities that may have different combinations of stock and fertiliser inputs, without the need for a resource consent. Setting a 'flat rate' of allowable nitrogen leaching for these properties, rather than trying to track each individual property's nitrogen leaching though a consent, has the benefit of retaining the permitted activity status, and setting up one simple rule for all existing lifestyle blocks. The development of conditions that can be easily understood without the need to apply a nutrient model has been discussed above. This has the benefit of avoiding unnecessary cost and social disruption.

Costs associated with this method have been described above. Additional monitoring costs are needed to ensure that existing lifestyle block owners who are either above the permitted level or increase stocking levels or fertiliser above the limits, apply for a consent.

Efficiency of the method

Rule 3.10.5.1 is an efficient way of allowing existing farming activities to continue that emit low levels of nitrogen. The alternative option described above, of allowing landowners to reduce nitrogen for the purposes of offsetting has been rejected as inefficient.

One of the most important factors in considering the drafting of the rule to control nitrogen from existing properties, is whether a permitted activity is sufficiently certain to ensure that the Catchment average nitrogen does not increase. Permitted activities must be able to be carried out as of right and without reference to the Council. Although permitted activities can be monitored and enforced, there is a less direct relationship between the person undertaking the activity and the Waikato Regional Council.

The permitted activity rule must be capable of being understood and applied without reference to any authorisation from Waikato Regional Council. It is also preferable that it be capable of being understood and applied by ordinary citizens without the need to get technical input.

With this latter consideration in mind, Waikato Regional Council preferred to specify the activities covered by the rule rather than to specify a nitrogen leaching limit. That way, people can work out whether they come within the rule or not without having to get technical advice on whether the activity they wish to undertake comes within the prescribed leaching limit.

Table 3.10.5.1 - Stock limits

Waikato Regional Council noted that different species of animals have different nitrogen leaching rates, therefore the conditions in the rule relating to nitrogen leaching need to recognise this.

The quantity of urine discharged at any one urination event will be a significant factor in how much nitrogen is leached past the root zone and into groundwater. Amount of nitrogen leached is related to the amount of nitrate available at the plant root level, and the rate at which plants can take up nutrient. If grass plants are flooded with large amounts of nitrogen from urine, they are not able to take up and use available nutrient before it is washed through the soil profile beyond the reach of the roots. In general terms, the size of the animal is relevant to its nitrogen leaching potential. For instance, a cattle beast discharges larger amounts of urine at any one time than a sheep. These factors have been quantified by AgResearch and make up part of the base information in the Overseer™ model.

In order to avoid potential difficulties with complex reporting and checking in the permitted activity rule, a simple table was required, listing activities that would not breach the effects based condition of 8 kilograms of nitrogen per hectare per year of nitrogen leached. If this table is sufficiently certain, covers the range of activities anticipated, and is able to be interpreted by a layperson with no agricultural expertise, then the permitted activity is an efficient way of meeting the policy approach.

For ease of understanding the table lists maximum number of animals per hectare and per 10 hectares. A Plan user with more or less than 10 hectares of land can still take the existing land area that they have available on their property for grazing, and calculate with ease the amount and types of animals that can be kept without breaching the permitted activity rule.

An alternative considered (and used in the Variation as notified) was to list the minimum land area required per animal. This uses exactly the same base information as the chosen option. However, during the course of the hearing for the Variation it was clear that when listed as minimum land area per animal, the table was confusing for submitters who were used to considering stock numbers in terms of density.

In order for the rule to be based on the effect of the activities, rather than imposing unnecessary restrictions, the rule should provide for a range of different animals to kept on rural residential and lifestyle properties. Nitrogen leaching limits had to be assessed for each species. In addition, the table had to account for any differences in nitrogen leached that occur at different times of the life cycle of the animal, between sexes or in different management systems.

Appropriateness of the method

The Permitted Activity Rule 3.10.5.1 contains conditions that are clearly expressed, so that they can be easily understood by a layperson with no knowledge of soil processes or nutrient cycles and no access to computer models or measuring equipment.

Most existing lifestyle or rural residential blocks will be able to comply with permitted activity conditions and will not need to seek resource consent to continue at their existing nitrogen leaching rates. For the reason listed above, the permitted activity rule is an efficient and effective method to achieve the policy approach.

In summary, Waikato Regional Council considers that the benefits of having a permitted activity rule that allows existing low nitrogen activities to continue within certain conditions, outweighs the costs of requiring more than 1000 landowners to apply for a resource consent

Benefits	Costs
• Rule threshold is effects based, so those landowners with low nitrogen leaching activities do not incur consenting or ongoing compliance monitoring costs. • Setting a threshold based on nitrogen leaching gives certainty that changes in land use that increase nitrogen leaching will be adequately controlled, and the Lake target achieved. • Conditions are able to be easily understood by laypeople with no agricultural or technical background. • Rule explicitly permits lifestyle blocks created as a result of nitrogen offsets. • The rule minimises bureaucratic requirements. • Nitrogen offsetting processes kept simple, measurable and manageable.	• The compliance monitoring methodology and timing will have to be transparent and well publicised because of the potential for confusion and uncertainty about animal threshold numbers due to natural increases (for instance during lambing season). • Some landowners whose activities put them just over the maximum nitrogen leaching threshold and who believe they have been acting in an environmentally responsible manner, will incur costs from having to reduce their animal or fertiliser inputs or apply for a resource consent. • Potential non compliance with rule conditions due to landowners being unaware of the permitted activity rule. • Landowners who comply with this rule are prevented from entering into arrangements to sell nitrogen if they intend to change land use and achieve nitrogen reductions.

11.1.2 Permitted Activity Rule 3.10.5.2 – Nitrogen Leaching Non-farming Activities

Description

The Permitted Activity Rule 3.10.5.2 permits non farming activities that either exist at the time of notification of the Variation, or are new low nitrogen leaching activities that involve no animal grazing and very little fertiliser application. The majority of the land uses that will fall within the ambit of this rule are forestry or regenerating indigenous forest and shrubland.

The rule is intended to implement the grandparenting allocation policy in the Variation, that is, where nitrogen leaching limits from each property are based on historical levels. Farming activities have been defined in the Variation as including animal grazing or growing produce, and specifically exclude plantation forestry. Therefore, the rule takes account of all other non-farming existing land use activities that leach nitrogen, not all of which fall into the category of forestry or indigenous vegetation. Examples of such activities include; parks, reserves areas, residential, commercial or industrial areas and golf courses (where no nitrogen fertiliser is applied).

The rule is as follows:

3.10.5.2 Permitted Activity Rule – Nitrogen leaching Non-Farming Activities

The use of land in the Lake Taupo catchment:

1. That is not for farming activities existing as at the date of notification of this Rule (9 July 2005); or
2. That is established after the date of notification of this Rule(9 July 2005), that is not for farming activities and that involves no:
   i) nitrogen fertiliser applied to land (except that authorised in condition a) or b) or c) of this rule); or
   ii) animal grazing (excluding grazing of animals and cropping ancillary to planted production forestry)

   that may result in nitrogen leaching from the land and entering water

is a **permitted activity** if the following conditions are met:

a) Where the use of land is for planted production forestry:
   i) Spot application of nitrogen fertiliser in conjunction with planting shall not exceed 30 grams of nitrogen per tree.
   ii) Broadcast application of nitrogen fertiliser at any time shall not exceed 200kg/ha of nitrogen per application.
   iii) Application of nitrogen fertiliser shall not occur between 1 June and 31 August or following wet periods.
   iv) A nutrient analysis of foliage must be used to plan fertiliser application and must be made available to the Waikato Regional Council upon request.
   v) Except where plantations are severely deficient (where visual symptoms of nitrogen deficiency are evident), broadcast application shall be made in conjunction with thinning and pruning operations.
   vi) The application of nitrogen fertiliser shall not result in any avoidable direct application of fertiliser to any water body.
   vii) All exposed areas of soil resulting from vegetation clearance of planted production forestry shall be stabilised by vegetative cover (including grass or scrub) as soon as practical following completion of the activity and no later than six months from the date of disturbance to avoid the adverse effects of nutrients on water bodies.
b) Where the use of land is for erosion rehabilitation, nitrogen fertiliser used during erosion area rehabilitation, may be applied.
c) Where the use of land is for domestic gardening (meaning gardening not undertaken for commercial purposes) nitrogen fertiliser may be applied to land at a rate no greater than the manufacturers' recommendation.

AND PROVIDED ALSO THAT:
Where land use is authorised by this rule, the subject land shall not be used to offset any nitrogen leaching increase elsewhere in the catchment.

Benefits and Costs

The main benefit of the rule is that it provides certainty for achieving the Lake target through capping existing land uses and at the same time enables low nitrogen leaching activities without the need for a resource consent. The benefit of a permitted activity

status, and setting up one simple rule for all non-farming nitrogen leaching activities avoids unnecessary cost and social disruption.

Forestry activities and associated nitrogen leaching has been measured in a number of studies. The most recent work has been done by NIWA in 2003, who confirmed information given to Waikato Regional Council from science advisors, that forestry leach very low amounts of nitrogen over an entire rotation.

In drafting the permitted activity rule, Waikato Regional Council recognised that as part of regular forestry operations fertiliser is applied to the land periodically. Therefore, the maximum amount of nitrogen fertiliser applied over a period of time needed to be specified for forestry operations to prevent ongoing nitrogen increases to surface or groundwater resources in the Lake Taupo Catchment.

Waikato Regional Council commissioned Ensis (formerly the Forest Research Institute) to provide some base information for the Lake Taupo Catchment. The Ensis report[61] provided back ground information on fertiliser use and nutrient leaching for forests in the Catchment. The report acknowledged that information on nitrogen leaching after fertiliser application to pumice soils in the Taupo Catchment is limited. However conservative guidelines to minimise nitrogen losses from forestry were recommended. These guidelines are as follows:

- Broadcast application of nitrogen at any time should not exceed 200 kilograms per hectare.
- Spot application after planting should not exceed 30 grams of nitrogen per tree.
- Applications during winter or other wet periods when soil water drainage is likely should be avoided.
- Except where plantations are severely deficient broadcast application should be made in conjunction with thinning and pruning operations when nitrogen demand is high.
- Application decisions should be based on results of nutrient analysis of foliage.
- Mechanisms to prevent the direct discharge of fertiliser into surface water should be in place.
- Rapid revegetation of clear felled areas should be promoted to minimise losses after harvest.

These guidelines served as a basis for the permitted activity conditions for forestry fertiliser use under Rule 3.10.5.2.

Given the negligible scale and effect of fertiliser use for erosion control projects or for domestic garden use, it is not the intention of the Variation to require fertiliser use on small scale erosion control practices or in domestic gardens be a non-complying activity under Rule 3.10.5.5. Use of fertiliser for erosion control projects and domestic gardening is therefore also permitted under this rule.

Appropriateness of method

The method is appropriate as it follows the grandparenting policy approach in the variation for non-farming activities and enables low nitrogen land uses with minimum compliance costs.

[61] Davis M. 2005. Nutrient losses from forestry in the Lake Taupo catchment. Environment Waikato Technical Report TR2005/37

Benefits	Costs
• Provides absolute certainty that non-farming activities may operate within fertiliser limits.	• Increased cost to regional community from monitoring permitted activity conditions. • Minimal additional cost of monitoring Condition a) of the permitted activity rule, with respect to nitrogen applied as fertiliser, to ensure the condition is not being breached.

Note that benefits and costs in respect of the prevention of nitrogen reductions for the purposes of offsetting are discussed under Rule 3.10.5.1 (the same reasoning applies).

11.1.3 Controlled Activity Rule 3.10.5.3 – Existing Nitrogen Leaching Farming Activities

Description

The purpose of the Controlled Activity Rule 3.10.5.3 is to allow active management, via the consent process, of farming land use activities that leach more than a low level of nitrogen to the Lake.

This rule contributes towards the implementation of Policy 3. It sets up the way in which the nitrogen cap for properties being used for productive activities in the Catchment is achieved, and the process by which offsets of nitrogen between properties are allowed.

This rule makes the use of land for existing farming that does not meet the permitted activity conditions, a controlled activity. Resource consent applications are required which will be granted by Waikato Regional Council subject to the listed standards and terms being met.

The rule also provides for situations where landowners are increasing nitrogen outputs but can offset those increases by showing there has been a corresponding decrease elsewhere in the Lake Taupo Catchment.

The rule will manage nitrogen leached below the root zone over a whole property, by controlling what occurs on the land. A key part of the rule is the use of a computer model called Overseer™. Overseer™ is an empirical model developed by the Crown Research Institute AgResearch, which estimates nutrient losses from pastoral land based on a range of input, management and geophysical parameters associated with the farm. The model is widely accepted as the most advanced tool available for predicting long-term average nutrient losses associated with pastoral land use in New Zealand. The model synthesises a wide range of research undertaken in New Zealand, into a predictive tool for assessing the nutrient losses of various types of farming systems.

By July 2007 existing farmers will be expected to apply for a Nitrogen Discharge Allowance as part of their consent application. The Nitrogen Discharge Allowance is based on nitrogen leaching that occurred during a benchmarking period. This nitrogen leaching will be calculated using the Overseer™ model, using the farm management of each year of the benchmarking period as input data.

The Nitrogen Discharge Allowance will be equivalent to the average of the leaching that occurred from a property in each of the four benchmarking years July 2001- June 2005. The farm management analysed through this process will need to be supported by auditable records proving the claimed management practices, such as, kill sheets and fertiliser invoices.

A resource consent will be issued with a specified Nitrogen Discharge Allowance for that property. The farmer will be required to develop a Nitrogen Management Plan on

an on-going basis to show how they are complying with their Nitrogen Discharge Allowance. These plans will set out what the expected farm practice will be for an up-coming year. The farm management data will be run through Overseer™ to show that the predicted nitrogen losses do not exceed the nitrogen discharge allowance for the property. The farmer is free to adjust various management regimes to respond to market and business drivers, as long as the Nitrogen Discharge Allowance is not exceeded and an updated Nitrogen Management Plan is submitted to Council. Farmers may run various scenarios through the Overseer™ model to aid them with their nutrient management decisions.

The only way in which a farmer can increase the nitrogen leaching from a property is to offset Nitrogen Discharge Allowances, with other consent holders. This is provided for in the controlled activity rule. The farmer must gain sufficient Nitrogen Discharge Allowances to offset the increase in nitrogen leaching on their property.

The alternative route for those farmers whose changes in productivity and intensity will increase the nitrogen leached and exceed their nitrogen allowance, and who do not wish to trade with another consent holder, is to apply for a non-complying resource consent. However, if a farmer can increase the efficiency of nitrogen use within the farm system, so that productivity gains are made without also increasing the nitrogen leached from the property, then they remain within the ambit of their resource consent.

The rule is set out below:

3.10.5.3 Controlled Activity Rule –Nitrogen Leaching Farming Activities

The use of land in the Lake Taupo catchment for any farming activity existing as at the date of notification of this Rule (9 July 2005) that does not meet the conditions for permitted activities under Rule 3.10.5.1 and which may result in nitrogen leaching from the land and entering water is **a permitted activity until July 1 2007, after which it will be a controlled activity,** subject to the following conditions, standards and terms

Benchmarking in order to determine Nitrogen Discharge Allowance

a) The average amount of nitrogen leached from farming activities on land between July 2001 and June 2005, shall be calculated using the Overseer™ Model and benchmark data. The average amount of nitrogen leached over that period shall be the Nitrogen Discharge Allowance for the land to which the controlled activity consent applies. The benchmark data shall be submitted to Waikato Regional Council as part of any application for consent under this rule**.** Where any part of the land subject to the controlled activity consent is subsequently sold or otherwise disposed of, the land so disposed of shall be allocated from the Nitrogen Discharge Allowance sufficient nitrogen by way of a new allowance calculated in accordance with condition i) of this rule to allow for the intended use of that land and to ensure that there is no net increase of nitrogen leaching in the Lake Taupo catchment.

Nitrogen Management Plan

b) A Nitrogen Management plan shall be prepared to demonstrate that the nitrogen leached from any proposed farming activities complies with the Nitrogen Discharge Allowance for the land to which the controlled activity consent applies. The Overseer™ Model shall be used to calculate whether the nitrogen leached from any proposed farming activities under the Nitrogen Management Plan complies with the Nitrogen Discharge Allowance for the land to which the controlled activity consent applies. The Nitrogen Management Plan shall be submitted to Waikato Regional Council as part of any application for consent under this Rule.

Changes to the Nitrogen Management Plan

c) A resource consent holder may change the farming activities described in any Nitrogen Management Plan, provided that:

i) the nitrogen leached by the proposed farming activities does not exceed the Nitrogen Discharge Allowance for the land to which the controlled activity consent applies, as calculated using the latest version of the Overseer™ Model;
ii) the proposed changes to the farming activities are set out in a new Nitrogen Management Plan;
iii) the new Nitrogen Management Plan is registered with Waikato Regional Council within 10 calendar days of the farming activities changing.

d) If the Nitrogen Management Plan is to be changed and the version of the Overseer™ Model has changed since the last time the Nitrogen Management Plan was created or changed, the Nitrogen Discharge Allowance shall be recalculated using the benchmark data and the latest version of the Overseer™ Model. The Nitrogen Discharge Allowance calculated under this condition shall be the new Nitrogen Discharge Allowance for the land to which the controlled activity consent applies**.**

e) If under condition d) the Nitrogen Discharge Allowance for the land to which the controlled activity consent applies is changed, the consent holder will need to apply for a change to the consented Nitrogen Discharge Allowance pursuant to s127 of the RMA.

Offsetting Nitrogen

f) Once a Nitrogen Discharge Allowance has been determined in accordance with this Rule, or by Rule 3.10.5.4, any further increase in nitrogen leaching shall be offset by a corresponding and equivalent decrease in nitrogen on one or more other properties in the Lake Taupo catchment. The increase shall be secured by way of a change to the Nitrogen Discharge Allowance.

g) Information shall be provided that shows that the corresponding and equivalent decrease in nitrogen leaching is secured by way of resource consent. This may be achieved by dual resource consent processes, including changes under s127 of the Resource Management Act 1991**.**

h) Once a Nitrogen Discharge Allowance has been determined in accordance with this Rule, or by Rule 3.10.5.4, any further decrease in nitrogen leaching**,** shall be secured by way of a change to the Nitrogen Discharge Allowance.

i) For the purposes of determining nitrogen leaching amounts under condition a) or for offsetting to comply with the conditions f) and h) of this rule, the following leaching rates shall be applied where relevant:
i) Use of land described under Rule 3.10.5.1 has a leaching rate of 8 kilograms per hectare per year
ii) Use of land described under Rule 3.10.5.2 has a leaching rate of 2 kilograms of nitrogen per hectare per year
iii) Use of land for farming activities except under Rule 3.10.5.1, that may result in nitrogen leaching from the land and entering water, has a nitrogen leaching rate of an amount calculated using Overseer™ Model
iv) An advanced wastewater system in accordance with Rule 3.10.6.3 has a leaching rate of 3.5 kilograms of nitrogen per year
v) A conventional wastewater system in accordance with Rule 3.10.6.4 has a leaching rate of 10.0 kilograms of nitrogen per year.

Waikato Regional Council reserves control over the following matters:
i. The applicable version of the Overseer™ model;
ii. The parameters or information to be used in the applicable version of the Overseer™ model;
iii. Any other information required to ensure compliance with conditions a) to i) of this Rule;

iv. The monitoring requirements for each resource consent holder's performance under the conditions of their consent including the Nitrogen Management Plan;
v. The circumstances under which the consent conditions may be reviewed;
vi. The duration of the resource consent;
vii. The circumstances under which consents can be surrendered either in whole or part pursuant to s138 of the RMA; and
viii. The allocation of nitrogen from the Nitrogen Discharge Allowance to land areas when any part of the land to which the consent relates is sold or disposed of as described in condition a) of this Rule.

Notification:
Pursuant to s94D(3) of the Resource Management Act 1991, notice of controlled activity applications received in accordance with this Rule, does not need to be served.

Table 3.10.5.3 –Guidance for Nitrogen Management Plans

Parameter	Information to be provided in Farm Plan

Nitrogen fertiliser	• Total annual nitrogen application rate
	  • Total application rate between 1 May to 31 July
	  • Maximum rate per application

Stocking rate	• Annual stocking rate • Stocking rate including a breakdown by stock class for each month during the period 1 April to 31 July
Cultivation	• Area cultivated per year • A description of cultivation methods (e.g. direct drilling or ploughing) • A description of the season in which the crop is to be fed
Supplementary feed	• Quantity and type of brought in feed • Nitrogen content of feed
New technologies	• Wintering systems • Leaching inhibition substances (e.g. Nitrification Inhibitors etc)
Effluent management (Dairy farms, feedpads, off pasture housing)	• Area of land used for irrigation • Annual nitrogen loading rate and nitrogen load rate per application • Instantaneous application rate • Available storage, and management of storage pond leakage • Fertiliser management on the effluent block

Nitrogen Discharge Allowance

- Nitrogen Discharge Allowance means the maximum amount of nitrogen allowed to leach from land, as determined in accordance with Rule 3.10.5.3 or Rule 3.10.5.4. A Nitrogen Discharge Allowance will be specified as a condition of any consent granted under this rule and will be described as the total kilograms (or tonnage) of nitrogen permitted to be leached from the land to which the consent relates, each year.

Benchmark data

- Benchmark data means the parameters and information for farming activities during the benchmarking period under Rule 3.10.5.3 a), unless nitrogen offsetting has occurred, in which case benchmark data shall be the parameters and information for farming activities described in the first Nitrogen Management Plan registered with Waikato Regional Council following nitrogen offsetting under conditions f) or h) of Rule 3.10.5.3 or Rule 3.10.5.4.

Overseer^{TM} Model

- The Overseer^{TM} Model is a nutrient management computer model produced by AgResearch, FertResearch and the Ministry of Agriculture and Forestry, which provides estimates of the annual fate of nitrogen, phosphorus, potassium and other nutrients in kilograms per hectare per year.

Nitrogen Management Plan

- The Nitrogen Management Plan means a plan that must be prepared showing how farming activities will be managed in order to comply with the farm's Nitrogen Discharge Allowance.

Changing Farming Activities

- A farm's Nitrogen Management Plan remains valid until such time as the consent holder proposes a change to farming activities.

Monitoring and Compliance

- Adherence to the Nitrogen Management Plans will be monitored to ensure that the Nitrogen Discharge Allowance for the land to which the controlled activity consent applies, has not been exceeded.

The Latest Version of the Overseer^{TM} Model

- The Waikato Regional Council shall ensure that notice is provided of any changes to the applicable version of the Overseer^{TM} Model, and that electronic copies are made available on the internet or by way of order.
- Changes in the applicable version of the Overseer^{TM} Model will apply when a consent holder proposes changes to the farm's Nitrogen Management Plan.
- Resource consent holders are required to calculate the affect of any proposed changes to the Farms' Nitrogen Management Plan by using the latest version of the Overseer^{TM} Model.

Changing Conditions of Consent

- Consent change processes under s127 of the Resource Management Act can be used by the consent holder to authorise changes to the Nitrogen Discharge Allowance under this rule.

The rule specifies a date at which farming will become a controlled activity. The July 2007 date is specified in order to provide the time necessary for Waikato Regional Council to issue consents under the Variation to all farmers in the Catchment.

The new regulatory regime for farming activities will be a two step process. The first step is benchmarking, where the existing amount of nitrogen leached from each property must be assessed. This is likely to be a lengthy process, even with the intended expert advice and support for farmers. The second step is to develop a Nitrogen Management Plan, which is important for monitoring and compliance into the future. These two steps will form the basis of the Resource Consent Application.

Condition a) sets out the benchmarking parameters for assessing the initial Nitrogen Discharge Allowance. The condition sets out the time period over which nitrogen will be measured. It notes that this must be submitted with the application for resource consent for the property. In order to prevent any net increase in nitrogen leaching from a property which is the subject of a consent under this rule when land is subdivided and subsequently sold, the condition also requires that when land is disposed of, nitrogen from the Nitrogen Discharge Allowance needs to be allocated to that land in such a way that there is sufficient allowance for the intended use and the nitrogen cap for that property is not exceeded.

Condition b) gives a requirement for the landowner to develop a Nitrogen Management Plan using Overseer^{TM} to confirm that the activities set out in the plan do not exceed the Nitrogen Discharge Allowance for the property. It also notes that this must be submitted with the application for resource consent for the property.

Condition c) sets out how a Nitrogen Management Plan can be changed during the course of the consent. Allowing 10 days between a change to a practice and submission of the amended Nitrogen Management Plan to Council gives farmers the ability to make necessary on the spot decisions about farm management without breaching the requirements of the controlled activity rule. Whilst the rules require that at all times a farmer must undertaken practices which do not exceed the Nitrogen Discharge Allowance for the property, amended management plans must be submitted to Council to ensure that at all times Council hold a plan against which a farm's practice can be monitored.

Conditions d) and e) set out additional conditions for changing Nitrogen Management Plans if the version of Overseer^{TM} has changed since the last time the management plan was created or changed. Condition d) expressly allows increases and decreases

in Nitrogen Discharge Allowances from that given in the benchmarking step, if when the benchmark data is recalculated through the new version of the model, the Nitrogen Discharge Allowance changes. The rule states this will need a change to the consent pursuant to s127 of the RMA. Versions of Overseer™ are discussed in more detail below.

Conditions f), g), h) expressly allow increases and decreases in Nitrogen Discharge Allowances from that given in the benchmarking, if landowners have entered into arrangements with each other to offset increases to Nitrogen Discharge Allowances. The rule notes this may require a change to the consent pursuant to s127 of the RMA.

When an offset occurs between two landowners who each already hold a resource consent that specifies a particular Nitrogen Discharge Allowance for their property, the process is as follows:

- Landowner A proposes to make a land use change that, from calculation, will result in an increase in nitrogen leaching.
- If Landowner A wishes to continue with the change, they will need to find another landowner who is willing to make or has made a change in land use such that a decrease in nitrogen leaching will occur or has occurred on their property.
- Landowners A and B agree on the amount of nitrogen discharge allowance to be traded that ensures the nitrogen leaching increase is fully offset.
- Both landowners apply to change their Nitrogen Discharge Allowances in their respective resource consents through a dual section 127 process.
- Waikato Regional Council then processes these applications and secures the new Nitrogen Discharge Allowances by issuing new consents.
- The new consents may mean that Nitrogen Management Plans need to be altered accordingly to reflect the new allowance.

Condition h) expressly allows decreases in Nitrogen Discharge Allowances without any corresponding increase. The Lake Taupo Protection Trust could choose to effect nitrogen reductions from a farming property by securing a decrease in the Nitrogen Discharge Allowance for the property in accordance with Condition h).

Condition i) relates to the disposal of land subject to a consent or the offsetting process, and sets out standard leaching rates or the process by which leaching rates will be calculated. This is particularly important for low nitrogen land uses that occur under the permitted activity rules and discharges from wastewater systems which do not use a nutrient model, as the specific method of calculating nitrogen leaching. For instance, if one of the landowners in the offsetting arrangement agrees to reduce their nitrogen allowance by planting some of their farm in trees, they need to look at Condition i) ii), where they will conclude that each hectare of forestry will leach two kilograms of nitrogen per hectare per year.

The Rule sets out the matters over which Council reserve their control. The matters enable Council to control the applicable version of the Overseer™ model and among other things, the duration of the resource consent (this will be advised as a condition of any consent granted), the circumstances under which consents can be surrendered, and nitrogen allocated from the Nitrogen Discharge Allowance when land subject to a consent is disposed of.

The rule also states that notice of applications received in accordance with this rule, does not need to be served. In the case of consents under these rules, other parties are not expected to have any interest in the farm based information. Checks and balances in terms of certainty and the ability to be audited regarding the information supplied are provided in the consent process undertaken by Waikato Regional Council. Not serving notice of the application on affected parties would not affect the robustness of the consent process for this rule.

Options considered

Waikato Regional Council considered a number of alternative rule drafting options. The main alternatives that were considered are set out below, as they assist in the discussion on costs and benefits of the chosen rule. The alternatives have been divided into main topics as follows:

- Section of the RMA relied on in drafting the rule - discharge consent or land use consent.
- Rule category for existing farming activities – permitted or controlled activity.

In addition, a number of other technical and practical aspects on the rule threshold and measures of compliance were considered in the drafting of the controlled activity rule, and these are also discussed below.

In determining the appropriate rule structure under which nitrogen from existing farming activities is managed, Waikato Regional Council considered the following criteria which included:

- Simple – the scope of the rule and the activities covered can be understood by a layperson, with reporting and auditing kept to a minimum.
- Certain – implementation of the rule will ensure that there is no Catchment increase in nitrogen leached.
- Cost effective – additional costs of new regulation for individuals and the regional community are kept to a minimum, and are reasonable in relation to the size of the environmental risk being managed.
- Flexible – the rule allows for innovation and changes in farm management, where the plan user can make business decisions within their individual nitrogen limit.

Information that was relevant to the consideration of options included:

- Pastoral land makes up approximately 54,000 hectares of the Lake Taupo Catchment.
- The majority of the pastoral land (approximately 52,000 hectares) is used for sheep and/or beef farming, while the remaining 2,300 hectares is used for dairying.
- There are a total of approximately 110 farm properties with an area of greater than 100 hectares.
- There are approximately 180 properties between 4 hectares and 100 hectares in size.
- Waikato Regional Council decided in 2001 that it was unreasonable to put in place complex regulation without allowing sufficient time to allow those being regulated to come to terms with the implications of those regulations.
- There have been at least 35 meetings between farmer representatives, expert agricultural advisors and Waikato Regional Council staff to work through options for controlling nitrogen from farms in the Lake Taupo Catchment.

Farmer input and general agreement with the intent and workability of the rule was an important factor in policy development, and will be critical for effective implementation of the rule. One of the goals in managing non-point source discharges is a change in farmer and regulator culture and norms from telling farmers they must undertake or cease some particular activity, to developing an understanding of the complexity and drivers of nitrogen leaching in the Taupo Catchment. To accomplish the necessary change requires a strategic and co-ordinated approach that encompasses consultation, education, policy development, regulation and enforcement. In order to maximise the effectiveness and efficiency of implementing regulation, the majority of compliance needs to be achieved voluntarily. Because the regulation of non-point source discharges is likely to be complex, and not intuitive, levels of voluntary compliance can be increased by improving farmer understanding of the rules.

The following sections set out the key options and alternatives considered in the drafting of the Controlled Activity Rule 3.10.5.3.

Section of the RMA relied on in the rule

There is no obligation to identify in the Plan which section of the RMA Waikato Regional Council is relying on for a particular rule, nor is there anything to preclude a rule being drawn by reference to a number of provisions in the RMA. However, the provision the rule is drafted under is relevant in terms of whether a farmer has existing land use rights or whether their discharge requires authorisation in the Regional Plan and hence a resource consent.

Sections 9(3) (control of land) and 15 (control of discharges) start from different premises. Under s9(3), land uses are permitted unless subject to a rule in a regional plan, in which case a resource consent is required. By contrast, under s15, discharges are not allowed unless permitted by a rule in a regional plan, regulations, or a resource consent. Section 20A (existing use) applies only to activities that were lawful prior to the making of a rule in a regional plan that requires a resource consent for the activities in question.

In terms of s15 (1)(b) of the RMA all discharges of nitrogen as a contaminant from land use activities in the Catchment have probably been unlawful since the passage of the RMA and indeed have probably been so long before the RMA – see section 21 of the Water and Soil Conservation Act 1967. The words "probably unlawful" are used because it may not be possible to prove an actual breach due to the fact that these discharges are non-point source or diffuse discharges and thus difficult and often impossible to detect even if a large number of leachate samplers are installed on a farm property. This is why the Variation proceeds, in the case of pastoral farming, on the basis of calculations from inputs using the Overseer^{TM} model. It is also why the Variation proceeds, in the case of other nitrogen leaching activities, to adopt specific numbers for rule-making purposes.

It is accepted then that no nitrogen leaching activity has existing use rights under s20A (or s10) of the RMA.

These rules have been propounded by Waikato Regional Council pursuant to its function in terms of s30 (1) (c) (ii) of the RMA to control land use for the purpose of maintaining the water quality of Lake Taupo and also to give effect to both s9(3) and 15 (1) of the Act. It is emphasised though that the rules are land use rules and not discharge rules. The principal reason for this is that non-point source or diffuse discharges are inherently difficult to identify and measure and it is therefore difficult if not impossible to construct discharge controls that can be enforced.

Rule categories considered

The starting point for rule categories was to consider whether a permitted activity would be sufficient to manage the effects and provide the necessary certainty for Waikato Regional Council. A permitted activity was preferred by the affected landowners, as they perceived this to be the most flexible and least cost option for their businesses.

There are two main aspects to consider before a permitted activity rule can be put in place. The first aspect to consider is the clarity of the rule, so that Plan users can operate within its boundaries without reference to other documents outside the Plan and without requiring third party approvals. This is important because permitted activities must be able to be carried out as of right.

It is possible to prescribe standards and terms that a permitted activity must comply with. However, these standards must stand alone. It is not possible, in a permitted activity, to reserve any element of discretion to the Council or include matters that require a discretionary judgement. For example, a permitted activity rule could not say "pastoral farming is permitted provided it is carried out in a manner that is satisfactory to the Council".

One of the key issues which a permitted activity rule presents is that the Council does not have control over the use of Overseer™ during the benchmarking stage to establish a Nitrogen Discharge Allowance. In implementing the controlled activity rule Council intend to contract a small pool of Nutrient Management Advisors to work with farmers to establish a benchmark or Nitrogen Discharge Allowance. Consistent use of the model is important to achieve a consistent outcome. Under a permitted activity Council could not require any formal check on the consistency of the interpretation and use of the Overseer™ model to achieve the Nitrogen Discharge Allowance submitted by the landowner. Not having the control over who uses the model to determine the benchmark or Nitrogen Discharge Allowance would undermine the security and confidence of that Discharge Allowance. The Variation relies on accurate benchmarking in order to achieve the goal of maintaining current water quality. For this reason alone, providing for farming as a permitted activity under the Variation would not satisfactorily achieve the objectives of the Variation and is therefore not supported.

To avoid difficulties of referring to complex information and decisions outside the scope of a permitted activity rule, it would need to be very specific about how farming should be carried out. A rule of this nature would meet the criteria of being certain, but would not meet the flexibility criterion that is of particular importance to farmers. An early draft of a permitted activity rule provided a list of farm inputs, specifying that if any change to the amount and scale of each input occurred, then the landowner would be required to apply for a resource consent. For instance, the farm inputs that affect nitrogen leaching such as stock units, mix of stock type, amount of land in pasture, could not change from the date of notification. This draft rule was rejected as unworkable and rigid by the Taupo Lake Care farmer representatives.

The second aspect to consider before a permitted activity rule can be put in place, is the issue of monitoring and enforcement. Even if the Variation prescribes standards and conditions that do not entail the exercise of a discretion by the Council, the rule should not have onerous and complex reporting requirements. By their nature, permitted activities must be able to be carried out as of right and without reference to the Council. It would not be appropriate for a rule to make pastoral farming a permitted activity provided it does not increase the average annual discharge of nitrogen to land as measured by Overseer™, and require that annual reports of the amount of nitrogen discharged are provided to the Council. The condition of providing regular reports would not be consistent with the concept of an activity that can be carried out as of right. If a rule such as this was drafted, either the condition or the whole of the rule would be vulnerable to challenge.

In summary, Waikato Regional Council has concluded that the process of capping nitrogen from farming activities that requires accurate benchmarking, regular and complex monitoring and seasonal farm business decisions is more suited to controlled activity status.

Options for measuring non-point sources of nitrogen

Information relevant to developing a rule framework to manage effects of non-point source nitrogen includes knowledge about the interaction and measurement of farm level and environmental inputs that affect outputs of nitrogen.

In order for the chosen regulatory tool to be effective and efficient, it must provide for consistent and easily understandable nitrogen measurement. Timely awareness of increases in nitrogen above the level set in the resource consent is important.

In any particular year, there will be farm management changes that farmers will wish to make, in response to seasonal feed availability or price signals. Many of these seasonal adjustments will not change the long run nitrogen leaching from the property. However, there are farm management changes that are more significant for nitrogen losses from the property. These land use ‘step changes’ will cause nitrogen leaching to show a permanent increase, to the extent that the landowner will no longer comply with

their nitrogen allowance. For this reason, the rule must be drafted to take account of the factors that affect nitrogen leached and how they interact. In the longer term, both the regulatory agency and consent holder must develop a good understanding of farm nitrogen management, for effective implementation of Rule 3.10.5.3. Implementation costs are discussed further under the benefits and costs section of this rule discussion.

Input or output measurement

Farm management inputs that affect nitrogen leached include, but are not limited to:

- Fertiliser.
- Stock type.
- Stock density.
- Clover count.
- Rainfall.

These inputs can be measured by checking farm records kept for tax purposes, such as kill sheets for stock sold off the property and fertiliser receipts or by counting and measuring input. For instance, an overview at certain times of the year could pick up anomalies and compare with expected inputs, such as a flight over the Catchment to get an overview of extent of winter cropping areas.

The key output of concern in terms of effect on water quality, is the nitrogen leached below the root zone. Outputs can be measured using modelled estimates or by physically measuring outputs. Both modelling and physically measuring outputs have an associated margin of error.

Lysimeters are a common example of a physical output measure. Lysimeters are instruments that are placed in the ground below the root zone. They take water samples that are analysed in the lab, and provide actual measurements of nitrate contained in subsurface water.

A key difficulty in using lysimeters to measure outputs is that the amount of nitrate contained in the water sample relates to the location of the lysimeter relative to excreta patches and groundwater flow. Furthermore, there is no way to determine if nitrate losses from land use on neighbouring properties are being incorrectly attributed to the property being measured. Research has also demonstrated large variability in directly measured nitrogen leaching between years. A large number of years of measured data for a 'current' farm system and a 'new' farm system would be required before there would be any confidence that the effects of changes in farm management practices could be measured accurately.

The margins of error outlined above would make proving non compliance to a "beyond reasonable doubt" standard difficult, reducing enforceability of the rules, and thereby reducing the effectiveness of the control. There are also issues of trying to translate plot scale measurements to paddock, farm and Catchment scale predictions, which would introduce further uncertainty in the level of control being achieved.

This option is not an efficient use of resources as it is impractical and expensive. The costs of this option are in the order of tens of thousands of dollars for set-up, as well as ongoing costs of collecting, analysing and interpreting water samples. Under Waikato Regional Council's current cost recovery policy, the costs of monitoring resource consents are borne by the holder of the consent.

In assessing compliance with non-point source discharge rules, a Waikato Regional Council compliance officer can only practically assess activity on the land surface. Consequently, the most effective and efficient way of regulating non-point source discharges is to use farmer behaviours or practises as a proxy for determining compliance with controls on non-point source discharges of nutrients.

The Overseer™ model is a computer model developed by AgResearch (New Zealand Pastoral Agriculture Research Institute Limited) for producing a farm nutrient budget. A farm nutrient budget identifies and quantifies nutrient inputs and outputs to and from the farm. Nutrient inputs may be from a range of sources such as fertiliser, imported animal feed, atmospheric and effluent irrigated onto the farm. Nutrient outputs are ways in which nutrient leaves the farm such as farm produce (for example milk, meat and wool) and losses to the environment (for instance, leaching from soils and losses to the atmosphere)

The Overseer™ Model comprises three sub-models, which generate nutrient budgets for pastoral land use, cropping and horticulture respectively. A summary of the main nutrient inputs and outputs accounted for by each of these sub-models is presented in the following table.

	Sub-models of Overseer™ Model		
Nutrient Inputs	**Pastoral**	**Cropping**	**Horticulture**
Fertiliser	✓	✓	✓
Irrigated effluent	✓		
Atmosphere (added by rainfall or fixed by clover)	✓	✓	✓
Irrigated water	✓	✓	✓
Slow nutrient release from soil minerals	✓	✓	✓
Imported feed/supplements	✓		
Nutrients released from soil organic pools (normally from cultivation)		✓	
Nutrients carried in from the previous crop to the current crop		✓	
Calcium nitrate sprays			✓
Nutrients released by mineralization after cultivation during horticulture establishment			✓
Nutrient Outputs	**Pastoral**	**Cropping**	**Horticulture**
Product (milk, meat, fibre, crops, etc.)	✓	✓	✓
Movement of nutrients to non productive areas such as stock camps and sheds	✓		
Supplements removed off farm	✓		
Atmospheric loss	✓	✓	✓
Leaching/run-off	✓	✓	✓
Immobilisation/absorption of nutrient in soil	✓	✓	✓
Change in inorganic soil pool (as reflected in soil test values)	✓	✓	✓
Residues removed such as when residues are burnt or removed as straw etc.		✓	
Nutrients in residues left on site		✓	
Removal of prunings			✓
Nutrients lost in wind blown leaves			✓
Nutrients that accumulate in framework as crop matures			✓

The nutrient inputs and outputs are generated by feeding certain information into the model. For pastoral farms, the model has a detailed template and a shorter express template.

Versions of Overseer™

A key point about the use of the Overseer™ model is that, as with any model, it is only intended as an approximation of reality. Because of this, there will always be a gap between predicted leaching and actual leaching.

The Overseer™ model is however under a continual development process and can be altered to reflect the results of new research and take into account new farming technologies and nutrient leaching mitigation measures. Waikato Regional Council

seeks to take advantage of new versions for the primary reason that this will encourage the uptake of new farming technologies and nutrient leaching mitigation measures, as these mitigation measures are validated and incorporated into the Overseer™ model. Farmers can effectively 'free up' nitrogen through the use of these mitigation measures. Freed up nitrogen can then be used to intensify development within the farm or it can be traded. Ultimately, this will encourage the most efficient use of nitrogen in the Catchment. The intent of Rule 3.10.5.3 has been to incorporate new versions of Overseer™ by recalibrating Nitrogen Discharge Allowances with a new model, when a Nitrogen Management Plan is changed or consent to offset nitrogen is sought.

Concerns have been raised during the consultation and hearing process that Nitrogen Discharge Allowances could be reduced and therefore farming practices 'pegged back', should resource consents issued under Rule 3.10.5.3 be subjected to new versions of Overseer™. This is particularly when existing parameters within the model have been refined. The Nitrogen Discharge Allowance, issued under Rule 3.10.5.3, is only a means to translate benchmarking data (activities undertaken by a farmer during the benchmarking years or activities contained within the first Nitrogen Management Plan after a trade) into a universal number which can be compared against a change of practice in the future. Therefore, when benchmarking data is run through a new version of the Overseer™ model, regardless of whether the new Nitrogen Discharge Allowance figure is greater or less then the previous figure, the figure still represents activities undertaken by a farmer during the benchmarking years or under the first Nitrogen Management Plan authorised after a trade. Therefore under Rule 3.10.5.3 there will not be any instances where farming practices are 'pegged back' from those benchmarked.

The alternative to providing for the use of new versions of Overseer™ under Rule 3.10.5.3 would be to fix the version for the life of the plan or require that a variation of the plan is notified every time a new version is released. To fix the version for the life of the plan would mean that there would be no benefit to farmers to invest in nitrogen leaching mitigation measures and would therefore not promote the uptake of these activities. Proposing a Variation to the Variation whenever a new version is released would result in a significant cost to Waikato Regional Council in preparing and notifying variations and potentially significant costs to an individual choosing to invest time and money in participating in the Schedule 1 process each time a variation was notified. This approach is not supported.

Long run model

The other key point is that the model is a long run model, and cannot take account of weekly or monthly fluctuations in nitrogen leached.

Measure of compliance

Both the accuracy of the model and it inability to take into account short-term fluctuations in nitrogen leached are important when considering the measure of compliance in the rule. Waikato Regional Council has the responsibility to ensure the rules are able to be implemented in an effective and efficient manner. It is critical to the success of a rule framework that compliance with the rules can be assessed, and enforced if necessary. The Resource Management Act makes non-compliance with the rules in a plan a criminal offence as the penalty for non compliance includes up to two years in jail, as well as up to a $200,000 fine. Consequently, the burden of proof on the Council when enforcing the rules is "beyond reasonable doubt" rather than the lower civil burden of "on the balance of probabilities". The implication of this is that the control mechanisms need to be assessed to this higher standard of proof, and consequently, any compliance regime must provide a high degree of certainty for both the regulator and the landowner concerned.

Waikato Regional Council assessed several different options for drafting a rule that would ensure that non point sources of nitrogen were not increased on a farming

property. The key aspects that influenced its decision on the final form of the rule drafted were:

- The certainty and legal vires of the measure of compliance.
- That the farmer could relate the measure of compliance to familiar farm management aspects.
- Overall cost of monitoring and checking compliance with consent conditions by consent officers.

Issues around these factors included the fact that nitrogen leached will vary from year to year, and some, of the factors that influence this variance such as rainfall, are beyond a landowner's control.

The actual nitrogen leaching rate varies from one year to the next and one day to the next depending upon a wide range of factors, including rainfall and soil/groundwater/stream conditions. Overseer™ is a long-run model that cannot take short-term fluctuations into account.

Under a constant land use, there would be an approximate a 50 per cent probability that the average leaching rate would be exceeded in any day or year. This difficulty applies to any conditions in rules worded along the following lines:

- "The annual amount of nitrogen leached shall not exceed the average annual amount of nitrogen leached at the date of notification of this Plan variation" or:
- "A farm plan is completed showing that the nitrogen discharged remains at the same level and intensity as the date of notification of this plan."

One option that was considered is that the Overseer™ model is the measure of compliance. Under this option, Waikato Regional Council consent and compliance officers would request actual farm inputs from the previous year and re-run Overseer™ to check whether the farmer had gone over the benchmarked limit.

While this initially appeared an attractive option, it quickly became clear that there were significant limitations with this approach. Firstly, non-compliance would only be detected retrospectively, by which time it would be too late for the farmer to change their land management to address the problem, and the nitrogen would already be lost from the soil system. Secondly, current modelling tools such as Overseer™ predict long-term average losses, not actual annual losses, so seasonal variability would cause considerable variability in annual leaching losses under exactly the same management regime. The farmer would be at the mercy of the weather as to whether they comply or not in any given year. This variability could be largely accounted for using a rolling average approach to nitrogen loss, but this greatly complicates the both management of the property, and the ability to maintain effective control over Catchment scale nitrogen loss. Farmers get regular feedback on how their previous year's management has affected nitrogen leaching on their property.

In essence this is a 'backwards-looking' option, as compliance is expected by checking past farmer actions that have affected the nitrogen leached over the previous year(s). If the result of re-running Overseer™ reports that Total Nitrogen output was above the allowable nitrogen limit in the consent, then farmers would be in non-compliance and enforcement action could result.

As noted above, there are reasons beyond the farmer's control for this occurring. For instance, an especially wet season means more nitrogen is leached for the same inputs. In order to allow for factors beyond the farmer's control, some form of 'allowable change' would have to be clearly understood at the outset of the consent, either in the standards and terms in the rule or as a footnote to the rule. For instance the rule would refer to a publicly available Waikato Regional Council monitoring and compliance policy for that particular rule, stating the allowable change. However, inserting yearly 'allowable variability' is technically hard to determine and will change from year to year.

The other main option that was considered was that Overseer™ is the tool for developing the Nitrogen Management Plan, where Nitrogen Management Plan inputs are the means of measuring compliance, checked by Waikato Regional Council officer. This option avoids the problem of short term fluctuations in climate that affect modelled nitrogen leaching.

Input and management controls are measures such as stock type and stocking rate, feed and fertiliser inputs. Drafting a rule using these measures had potential as an effective option, as farmers are already used to planning using these measures. Furthermore, models such as Overseer™ use these input and management parameters in calculating nitrogen loss. Requiring farmers to stay within a certain framework of management strategies also removes the issue of variability. Provided farmers stayed within a management regime that Overseer™ predicted and complied with their Nitrogen Discharge Allowance, the actual long-term average nitrogen loss would be constant, as the overs and unders across years would balance out. This is particularly important in the Lake Taupo Catchment, where the groundwater moves through the soil over such a long timeframe that seasonal variability of losses is less relevant than the long-term average losses. Input and management controls are considered to be the most efficient and effective method of implementing a regulatory framework around nitrogen loss in the Catchment while still allowing compliance to be monitored and enforced.

Seasonal changes in stock density and type will be made by the farmer, so timing of monitoring compliance is crucial. There is still a need for allowable variability when cross checking farm records and counting and measuring inputs listed in the Nitrogen Management Plan.

This was the option chosen as most effective and efficient. The key aspects to this option are:

- Farm rules look forward to intended activities that will stay within the nitrogen limit contained in the resource consent condition.
- Overseer™ nutrient model is used as a tool to estimate nitrogen leaching.
- Nitrogen Management Plan contains a list of farm activities that set out what the farmer intends to do.
- Compliance with resource consents is through checking that farmers are sticking to the management activities set out in their Nitrogen Management Plan.

Benefits and costs

The benefits of this rule are:

- Reporting and auditing measures are based on inputs and management that farmers are familiar with and have to track for tax purposes.
- There is more flexibility for making necessary farm business decisions than under a permitted activity rule.
- Certainty for the regulatory authority and the regional community in achieving the Lake target is greater than a permitted activity rule due to closer tracking and checks.
- Having to develop a sophisticated understanding of nutrient management gives both the farming community and the rest of Waikato Regional Council ratepayers greater confidence that farmers are meeting environmental goals.
- Provision for any landowner to come to an arrangement with another landowner and offset nitrogen increases on their property, though trading part or all of another persons Nitrogen Discharge Allowance, gives social and economic benefits.
- The mechanism that has been used by Waikato Regional Council in the Variation, is that nitrogen offsets are achieved primarily through dual consent processes, including change processes under section 127 of the RMA.
- The consent provides a basis for keeping track of the nitrogen offsets arranged between landowner A and B. If there is no net increase in nitrogen leached as a

result of the arrangement, then Waikato Regional Council role is simply one of keeping information up to date and securing new allowances.

Social and cultural costs

There will be social and cultural costs associated with this rule. Ngati Tuwharetoa own a large amount of the private pastoral land in the Catchment. Farmer representatives from Ngati Tuwharetoa have been involved in the policy process and have made it very clear that the new regulation will cause considerable change to the way their businesses are managed on a day to day basis, and an even more significant change to future planning and development options. This is a social cost that will affect all farmers. The cultural cost to Ngati Tuwharetoa is that there is a threat to their ability to exercise Kaitiakitanga over their lands and resources.

Cost of change

Changing land use and management to improve water quality is not a new concept for farmers. Dairy and piggery effluent management has improved over time as controls have been placed on acceptable practices, aimed at reducing the load of nutrients and organic material into waterways. In the Lake Taupo Catchment, large areas of land have been retired by farmers and foresters (with government assistance for fencing, planting and water supply) in order to address the erosion, stream and Lake quality issues caused by initial development of the pumice soils around the Lake. The Clean Streams Accord aims to improve management practice around stock exclusion from waterways and nutrient management, again to improve water quality.

The new development in this variation is that control will be exerted on the amount of nitrogen leaving the farm. Farm management practices and nitrogen inputs will be recorded, but only for the purpose of being able to assess the amount leaving the farm. The farmer has freedom to manage their business, but must be able to show (via a Nitrogen budget) that their Nitrogen Management Plan will not breach their Nitrogen Discharge Allowance. This is a very different concept from controlling selected practices (for example, fertiliser timing) and prescribing certain actions in the hope that this will have the desired effect on water quality.

Financial cost of implementation

There are costs associated with Rule 3.10.5.3. These costs are borne by the Regional community, the contributors to the public fund and the landowners affected.

The cost of implementing the controlled activity rule was estimated by Waikato Regional Council using technical and farmer input about what is needed for each step of the process of obtaining a resource consent. A direct comparison with existing costs was not able to be made, as the Proposed Waikato Regional Plan does not contain any comparable rules for managing non point source discharges over a whole property.

The majority of properties greater than 4 hectares will need consents for their existing pastoral land use activities.

The implementation process is designed to deal with approximately 500 properties, accounting for approximately 98.5 per cent of the area of land under pasture in the Catchment.

There are three key roles that need to be undertaken to implement the Taupo Variation. These are:

(i) Specialist advisory role to help farmers understand how to plan farm management to account for nitrogen loss;
(ii) Compliance monitoring and enforcement role to ensure compliance with the rules; and
(iii) Consent processing role to process applications to use land for farming, and to provide advice and information about the rules and their requirements.

The advisory role is likely to require two full time equivalent staff for a period of approximately 3-4 years. The compliance monitoring role is likely to also require two full time equivalent staff, but this requirement will continue into the foreseeable future. For the consent processing and regulatory advisory role, one full time equivalent staff member will be required for the foreseeable future.

The expected total cost for implementing the Taupo variation therefore, is based around the cost of five full time equivalent staff. These staff will need to be skilled and qualified. Assuming an average annual salary of $60,000, and an overhead multiplier of 2.5, each full time equivalent is likely to cost around $150,000 per year. This equates to an annual cost of $750,000 per annum for at least the first four years of the project. The costs are likely to decrease to around $450,000 into the future.

The advice and assistance will be to develop nutrient budget models, and to develop Nitrogen Management Plans that detail viable land management options for farming within a nitrogen-leaching-restricted environment. This component of education is critical to the success of the regulation, as it is during this step that farmers learn to incorporate additional criteria in their decision-making processes that reflect the environmental outcomes being sought by the Council on behalf of the wider community.

There will be costs to farmers as they must contribute towards resource consent processing costs as well as pay for on-going compliance monitoring costs.

Efficiency of the method

The alternatives discussed in the first part of this section have shown that the Controlled Activity Rule 3.10.5.3 is a more efficient method than either a rule drafted as a permitted activity or drafted using a ‘backwards looking’ compliance measure.

Risks of acting or not acting

There is a considerable risk to the water quality of Lake Taupo if the controlled activity rule is not in place. In previous sections of this document, it has been discussed that voluntary action on its own will not be effective, due to the scale of the changes required to farm businesses.

Appropriateness of the method

The key challenge of controlling non-point sources of nitrogen is that the rule is legal, certain and enforceable, will achieve the objectives and policies in the Variation, and also provide a framework within which affected landowners can continue to run their farm businesses.

Benefits	Costs
• Land use is able to change and is guaranteed of obtaining consent, subject to the landowner showing that there will be no overall increase in nitrogen to the Lake. • Certainty that nitrogen is being capped. • Flexibility for seasonal business changes to respond to price or weather fluctuations, within the overall nitrogen allowance in the consent conditions. • Flexibility to alter nitrogen allowance through trading or offsetting arrangements. • Clear and enforceable boundaries established for farmer activities that affect the water quality of the Lake.	• Landowners incur costs of applying for resource consents. • Ongoing yearly consent charges for compliance monitoring or consent. • Set-up costs of new regulatory regime are considerable. • Need for appropriately skilled and experienced people to act as advisors to farmers in developing their Nitrogen Management Plans. • Limitations on farmer flexibility and constraint on the amount of choice of methods of increasing land profitability.

11.1.4 Controlled Activity Rule 3.10.5.4 – New Nitrogen Leaching Activities with Nitrogen Offset

Description

The Controlled Activity Rule 3.10.5.4 provides for new land use activities that result in increases in nitrogen leaching but are able to be offset by decreases in nitrogen leaching within the Lake Taupo Catchment. The rule covers situations where land changes from a low to a higher nitrogen leaching land use, but where there is no Catchment increase in nitrogen leaching. New farming or rural residential activities on land that was previously vegetated would be examples of this. Under this rule, a landowner who wishes to increase nitrogen leaching on their property, must show that this increase is offset by a decrease elsewhere.

The intent of this rule is to enable land use change which is neutral in terms of the environmental goals, but beneficial for the people concerned, as it allows them to realise a greater range of development options for their land. The key point in this rule is that land use changes that occur will not cause an overall increase in nitrogen entering the Lake.

Several examples of the types of changes that may occur will assist understanding the benefits and costs of the rule discussed later in this section. One example is where forestry owners may have existing forest on land that is highly suitable for agricultural farming operations due to its soil and contour. Another possibility is that land presently in shrubland on the lakeshore is suitable for rural residential development involving lifestyle farming pursuant to Rule 3.10.5.1. Both of these possible future land uses go from the low nitrogen leaching land use of native or plantation forest (permitted under Rule 3.10.5.2), to a higher nitrogen leaching land use. This change is managed using a controlled activity rule. Consent is guaranteed to be granted if the land user is able to show that they have complied with conditions, standards and terms a) – e).

The rule legitimises a land use change on a property. The rule is not to be used however to authorise the discharge of wastewater nitrogen. Wastewater discharges can only be authorised pursuant to Rules 3.10.6.1 to 3.10.6.6, or Rule 3.5.7.7 of the Regional Plan. However, a Nitrogen Discharge Allowance under this rule may need to be reduced to allow for additional nitrogen leaching from wastewater authorised by a wastewater consent. In this case, condition e) of the Rule states how much nitrogen is needed to offset any additional wastewater nitrogen.

Controlled Activity Rule – New Nitrogen Leaching Activities with Nitrogen Offset

Any use of land in the Lake Taupo catchment that is classified Rural Environment in the Taupo District Plan and does not meet Rules 3.10.5.1, 3.10.5.2 and 3.10.5.3 and which will increase the leaching of nitrogen from that land, excluding leaching from wastewater systems, is a **controlled activity** subject to the following conditions, standards and terms:

a) Any proposed increase in nitrogen leaching will be offset by a corresponding and equivalent decrease in nitrogen leaching on one or more other properties in the Lake Taupo catchment. The amount of nitrogen leaching increase shall determine the Nitrogen Discharge Allowance for the land. Where any part of the land subject to the controlled activity consent is subsequently sold or otherwise disposed of, the land so disposed of shall be allocated from the Nitrogen Discharge Allowance sufficient nitrogen by way of a new allowance calculated in accordance with condition e) of this rule to allow for the intended use of that land and to ensure that there is no net increase of nitrogen leaching in the Lake Taupo catchment.
b) Information shall be provided that shows that the corresponding and equivalent decrease in nitrogen leaching is secured by way of resource consent. This may be achieved by dual resource consent processes, including changes under s127 of the Resource Management Act 1991.
c) Once a Nitrogen Discharge Allowance has been determined in accordance with this Rule, or by Rule 3.10.5.3, any further decrease in nitrogen leaching shall be secured by way of a change to the Nitrogen Discharge Allowance.
d) Except where the activity is permitted by Rule 3.10.5.1, where the new nitrogen leaching land use authorised by this rule is farming, the activity shall comply with conditions b) to e) of Rule 3.10.5.3.
e) For the purposes of determining nitrogen leaching amounts for condition a) or offsetting to comply with this Rule the following leaching rates shall be applied where relevant:
    i) Use of land described under Rule 3.10.5.1 has a leaching rate of 8 kilograms per hectare per year
    ii) Use of land described under Rule 3.10.5.2 has a leaching rate of 2 kilograms of nitrogen per hectare per year
    iii) Use of land for farming activities except under Rule 3.10.5.1, that may result in nitrogen leaching from the land and entering water, has a nitrogen leaching rate of an amount calculated using Overseer™ Model
    iv) An advanced wastewater system in accordance with Rule 3.10.6.3 has a leaching rate of 3.5 kilograms of nitrogen per year
    v) A conventional wastewater system in accordance with Rule 3.10.6.4 has a leaching rate of 10.0 kilograms of nitrogen per year.

Waikato Regional Council reserves control over the following matters:

i. The applicable version of the Overseer™ model;
ii. The parameters or information to be used in the applicable version of the Overseer™ model;
iii. Any other information required to ensure compliance with conditions a) to e) of this Rule;
iv. The monitoring requirements for each resource consent holder's performance under the conditions of their consent including the Nitrogen Management Plan;
v. The circumstances under which the consent conditions may be reviewed;
vi. The duration of the resource consent; and
vii. The circumstances under which consents can be surrendered either in whole or part pursuant to s138 of the RMA; and
viii. The allocation of nitrogen from the Nitrogen Discharge Allowance to land areas when any part of the land to which the consent relates is sold or disposed of as described in condition a) of this Rule.

Notification:

Pursuant to s94D(3) of the Resource Management Act 1991, notice of controlled activity applications received in accordance with this rule, does not need to be served.

Advisory Notes:

Nitrogen Discharge Allowance

- Nitrogen Discharge Allowance means the maximum amount of nitrogen allowed to leach from land, as determined in accordance with Rule 3.10.5.3 or Rule 3.10.5.4. A Nitrogen Discharge Allowance will be specified as a condition of any consent granted under this rule and will be described as the total kilograms (or tonnage) of nitrogen permitted to be leached from the land to which the consent relates, each year.

Benchmark data

- Benchmark data means the parameters and information for farming activities during the benchmarking period under Rule 3.10.5.3 a), unless nitrogen offsetting has occurred, in which case benchmark data shall be the parameters and information for farming activities described in the first Nitrogen Management Plan registered with Waikato Regional Council following nitrogen offsetting under conditions f) or h) of Rule 3.10.5.3 or Rule 3.10.5.4.

Overseer™ Model

- The Overseer™ Model is a nutrient management computer model produced by AgResearch, FertResearch and the Ministry of Agriculture and Forestry, which provides estimates of the annual fate of nitrogen, phosphorus, potassium and other nutrients in kilograms per hectare per year.

The Latest Version of the Overseer™ Model

- The Waikato Regional Council shall ensure that notice is provided of any changes to the applicable version of the Overseer™ Model, and that electronic copies are made available on the internet or by way of order.

Changing Conditions of Consent

- Consent change processes under s127 of the Resource Management Act can be used by the consent holder to authorise changes to the Nitrogen Discharge Allowance under this rule.

Condition a) is intended to provide certainty that the landowner has made the necessary arrangements to ensure that there will be no Catchment increase in nitrogen leached as a result of the land use change proposed. The process that the landowner has to undertake is not specified in the rule, instead, the condition relates to the outcome of the arrangement which is an appropriate Nitrogen Discharge Allowance. In order to prevent any net increase in nitrogen leaching from a property which is the subject of a consent under this Rule when land is subdivided and subsequently sold, the condition also requires that when land is disposed of, nitrogen from the Nitrogen Discharge Allowance needs to be allocated to that land in such a way that there is sufficient allowance for the intended use and the nitrogen cap for that property is not exceeded.

Condition b) sets out the expectation of the offset being legally certain through the resource consent process. The decrease in nitrogen leaching being used to offset the increase must be consented. The condition notes that dual application processes may be carried out.

Condition c) expressly allows decreases in Nitrogen Discharge Allowances without any corresponding increase. The Lake Taupo Protection Trust could choose effect nitrogen reductions from a farming property by securing a decrease in the Nitrogen Discharge Allowance for the property in accordance with Condition c).

Condition d) ensures that any farming activities (except those permitted by Rule 3.10.5.1) enabled by this rule are subject to the standards terms and conditions set out in Rule 3.10.5.3 for creating and changing Nitrogen Management Plans and for compliance monitoring and enforcement.

Condition e) sets out standard leaching rates or the process by which leaching rates will be calculated for offsetting purposes. This is particularly important for low nitrogen

land uses that occur under the permitted activity rules which do not use a nutrient model as the specific method of calculating nitrogen leaching

The rule also sets out the matters over which Council retain their control. The matters enable Council to control the applicable version of the Overseer^{TM} model and among other things, the duration of the resource consent (this will be advised as a condition of any consent granted), the circumstances under which consents can be surrendered, and nitrogen allocated from the Nitrogen Discharge Allowance when land subject to a consent is disposed of.

The rule also states that notice of applications received in accordance with this rule, does not need to be served. In the case of consents under these rules, other parties are not expected to have any interest in the farm based information. Checks and balances in terms of certainty and the ability to be audited of the information supplies are provided in the consent process undertaken by Waikato Regional Council. Not serving notice of the application on affected parties would not affect the robustness of the consent process for this rule.

Alternatives considered

Waikato Regional Council considered the ability for offsetting to be undertaken as a permitted activity.

The benefits of this alternative are:

- Flexibility for landowners without incurring resource consent costs.
- Rule category signals that offsetting is encouraged.

However, there are a number of costs associated with this alternative, with the principle one being the economic cost of tracking and entering into alternative legal arrangements to secure the offsets (as opposed to resource consents). There is an environmental cost if the permitted activity conditions are not met, and land use change occurs without certainty of nitrogen offsets on other properties. As noted earlier, there is a less direct monitoring and enforcement relationship for permitted activity rules.

Under this alternative, in order to ensure properties adhere to the new nitrogen limits imposed through offsetting, landowners would need to secure these by way of encumbrances on property titles. In the absence of a resource consent, Waikato Regional Council must be satisfied that a suitable memorandum is in place in a permitted activity scenario. The memorandum would record the commitment of the landowner to perform the undertaking to the third party (in this case, Waikato Regional Council) and puts any purchaser of the land on notice that the land is subject to the encumbrance.

Memoranda of encumbrances were not designed with a nitrogen offsetting situation in mind as they are mechanisms used for securing permanent undertakings. They are frequently used by territorial authorities who want to secure undertakings from landowners that are very certain, and would be given effect to by a court. Nitrogen Discharge Allowances may be increased or decreased on an ongoing basis or at any time, therefore the encumbrances would need to be placed on and removed off titles on an on-going basis. The process of doing this is not straightforward and would result in potentially significant legal and administration costs.

The difficulties with making this approach work smoothly in practice together with the transaction costs have led to the rejection of this option.

Appropriateness of the method

Benefits	Costs
• Land use is able to change and is guaranteed of obtaining consent, subject to the landowner showing that there will be no overall increase in nitrogen to the Lake. • Certainty that nitrogen is being capped • Flexibility for seasonal business changes to respond to price or weather fluctuations, within the overall nitrogen allowance in the consent conditions. • Flexibility to alter nitrogen allowance through consent processes • Security that offsets can be tracked appropriately.	• This rule relies on nitrogen being available for offsetting which could lead to a constrained market if landowners decide to keep their full Nitrogen Discharge Allowances. • Resource consent costs.

11.1.5 Non-complying Activity Rule 3.10.5.5 – Land Uses that do not Comply with Rules 3.10.5.1- 3.10.5.4

Description

This rule is a 'catch-all' rule for land use activities that leach nitrogen in the Catchment of Lake Taupo, which do not comply with, and therefore cannot operate under the permitted and controlled activity rules 3.10.5.1 – 3.10.5.4 inclusive. The rule provides opportunity to grant resource consent to land uses that do not comply with the controlled activity rules for land use. Resource consents also may be declined under a non-complying activity.

The rule is as follows:

Rule 3.10.5.5 Non-complying Activity Rule – Land Uses that do not Comply with Rules 3.10.5.1- 3.10.5.4

The use of land in the Lake Taupo catchment for land use activities that do not meet Rules 3.10.5.1, 3.10.5.2, 3.10.5.3, and 3.10.5.4, and may result in nitrogen leaching from the land is a **non-complying activity**.

The objectives and policies in the Variation provide clear guidance of the water quality targets, both in the Lake as a whole, and for near-shore shallow waters. Policies in the Variation set out how the objectives will be achieved, and give specific guidance on achieving a Catchment-wide nitrogen limit. In assessing a proposal for a land use that will result in a nitrogen increase, where no provision is made for offsetting that increase, the objective and policies concerning the nitrogen cap will become particularly important.

The main alternatives considered by Waikato Regional Council was that the 'catch-all' rule should be written as a discretionary activity or a prohibited activity.

Discretionary activity

A discretionary (or restricted discretionary) activity rule would mean increases in nitrogen leaching to the Lake were provided for upon a case by case assessment. Assessment criteria could be drafted to better define under which circumstances a consent might be declined.

Non Complying activity

The key difference with a non-complying activity rule is that there are more stringent tests which must be applied before a consent can be granted, compared to a discretionary activity rule. Essentially, the proposal for resource consent must satisfy one of the two aspects listed in the Act. The proposal must either have effects which are no more than minor, or it must not be contrary to objectives and policies in the

Variation. The particular wording of section 104D of the RMA, which sets out restrictions for non-complying activities, is set out below:

1) Despite any decision made for the purpose of section 93 in relation to minor effects, a consent authority may grant a resource consent for a non-complying activity only if it is satisfied that either—
   a) the adverse effects of the activity on the environment (other than any effect to which section 104(3)(b) applies) will be minor; or
   b) the application is for an activity that will not be contrary to the objectives and policies of—
      i. the relevant plan, if there is a plan but no proposed plan in respect of the activity; or
      ii. the relevant proposed plan, if there is a proposed plan but no relevant plan in respect of the activity; or
      iii. both the relevant plan and the relevant proposed plan, if there is both a plan and a proposed plan in respect of the activity.

Prohibited activity
A prohibited activity status for any activities that did not comply with Rules 3.10.5.1, 3.10.5.2, 3.10.5.3, and 3.10.5.4, would prevent any applications being made for that activity and therefore prevent any resource consent from being granted.

Benefits and costs

Discretionary Activity
Under a discretionary activity there is significant risk that the Plan would fail to achieve its objectives due to cumulative granting of consents for minor exceedences.

It is very difficult to set appropriate criteria. There is currently considerable investment into the discovery and verification of nitrogen reducing technologies and low nitrogen leaching activities by crown research institutes and other research bodies. For example, a Foundation for Research Science and Technology funded project being lead by AgResearch, entitled “Nitrogen and Lake Taupo”, is currently underway. This programme focuses on development and evaluation of technologies and management practices to reduce nitrogen leaching from farms around Lake Taupo. It is therefore highly likely that over the life of the plan new activities and farm practices will emerge. It is difficult to foresee or predict these activities (and their environmental effects) and therefore design assessment criteria which will give meaningful guidance on the assessment of these activities.

Notwithstanding this, the objectives and policies of the plan are considered to be robust enough to give appropriate guidance to both applicants and decision makers on how applications will be assessed. Assessment criteria are likely to involve a repeat of plan objectives.

Non Complying Activity
The benefit of a non complying rule is that it sends a strong signal to plan users and the wider community, that any Catchment-wide increase in nitrogen is not intended by the Plan. A cost to some plan users is that there will be additional costs if their proposal is publicly notified. Some Resource Management Plans set a requirement that all non-complying activities will be publicly notified. Rule 3.10.5.5 of the Variation is silent on notification, and instead, this will be assessed on a case by case basis.

Prohibited Activity
A prohibited activity would unacceptably inhibit innovation in alternative practices and land uses. Alternative low nitrogen leaching practices and land uses which are not yet known or discovered, can be anticipated over the life of the plan. These practices and land uses should not be ruled out of being used in the Taupo Catchment, provided the adverse effects of the activities are no more than minor or the objectives and policies of the Regional Plan can be met.

Efficiency of the method

The rule is to provide some flexibility of decision making with respect to land use activities that are not authorised by the permitted or controlled activity rules. There may be some cases where a person wants to undertake an activity that does not meet the permitted or controlled activity rules, but which will not result in adverse effects on the Lake. The non-complying activity rule would enable such an activity. The method therefore provides some flexibility, within the clear policy guidance provided to support the rule. Therefore, the objectives of the Plan will be met but in a way that is not overly restrictive. This is considered an efficient way of supporting the objectives.

Appropriateness of the method

Benefits	Costs
• Provides flexibility to decision makers. • Sends a strong signal that Catchment-wide increases in nitrogen are not intended by the Plan.	• Additional costs to Regional Plan users who are only just outside the limits set in standards and terms in the controlled activity rule.

This is an efficient method where the benefits are considered to outweigh the costs. The method is therefore considered to be appropriate.

11.2 Wastewater rules

11.2.1 Permitted Activity Rule 3.10.6.1 - Discharge of Domestic Wastewater from Existing On-site Systems Within the Near-shore Zone

Description

This rule is to permit discharges from domestic on-site wastewater systems within a 'Near-shore Zone' for a period of time to coincide with current expectations for reticulation and centralised servicing of the main communities around that Lake edge that are currently serviced by on-site systems. After this time period elapses, these systems will then default to controlled activity status under Rule 3.10.6.5 unless they are improved to meet requirements of Rule 3.10.6.3.

Policy has been recommended to advocate that lakeshore communities currently serviced by on-site wastewater systems are reticulated and serviced by community wastewater treatment plants as soon as practicable. While working towards this policy, there will be a number of years during which existing on-site systems near the lakeshore will need to be authorised. It is considered that if these lakeshore systems are to be reticulated, it would not be economically efficient to require that they be upgraded to nitrogen removing systems in the interim. It would also not be economically efficient to consent each system individually, particularly given that such consents would be likely in most cases to have identical conditions attached. Therefore, it is considered that these wastewater systems should be permitted for a period of time that would coincide with when they are likely to be replaced by a centralised wastewater reticulation system. Based on the 2006 Taupo District Long-Term Council Community Plan, the expectation is that the main Lake shore communities still serviced by on-site wastewater systems will be reticulated by 2013. For this reason, the date at which the permitted period expires has been set at 30 June 2013.

It is expected that there is a 'zone' around the Lake within which on-site wastewater discharges could result in localised changes to water quality in Lake edge waters. On-site wastewater systems within this zone therefore increase the risk of nuisance plant growths and health effects in shallow Lake edge waters. Once communities within this Near-shore Zone have been reticulated, there may be some properties around the

Lake that are not economic to reticulate. These properties will default to controlled activity status after the period of time allowed for reticulation expires. This will allow the risks from the remaining on-site systems to be individually evaluated and appropriately managed by consent processes.

The size of the Near-shore Zone for the purpose of Rule 3.10.6.1, needs to be such that it includes all on-site systems which could increase the risk of near-shore effects. Sizing of the Near-shore Zone needs to be based on standard septic tank type wastewater systems, as these are most common around the Lake edge, and represent the greatest risk in terms of effects, compared to any advanced systems that may be present. The Near-shore Zone has been defined in the glossary as "The area of land from the Lake water margin at RL357.25, extending 200 metres inland. Where an urban area has residences serviced by on-site wastewater systems within 200 metres of the RL357.25 water level, the Near-shore Zone extends to include all properties within this urban area which are served by on-site wastewater systems".

The Barkle and Wang (2003) study stated that nitrogen concentrations are likely to dilute to within 0.1 parts per million of background levels, beyond about 110 metres. The 200 metre zone would allow for some margin of error, and for additive effects from more than one on-site system in close proximity. By way of comparison to the Barkle and Wang study, it has been estimated that on-site wastewater systems within 200 metres of estuaries in New England will contribute disproportionately to the nitrogen load entering the estuary (Marine Biological Laboratory Ecosystem Centre, http://ecosystems.mbl.edu/Research/Clue/waste.html).

With respect to health risks, Liping Pang et al. (2003) have studied risks from wastewater micro-organisms in the vicinity of Lake Okareka in the Rotorua District. The soil conditions around this Lake are considered comparable, in terms of permeability at least, to Lake Taupo Catchment soils. The study concluded that on-site wastewater systems should be set back from the Lake edge by 48 metres to minimise health risks. Therefore a Near-shore Zone of 200 metres for standard on-site wastewater systems would also ensure that health risks from wastewater discharges are minimised.

The Near-shore Zone needs to completely encompass any community immediately adjacent to the Lake edge, where there are still on-site wastewater systems. This is to ensure that if there are concentrations of on-site systems near the Lake edge after 30 June 2013 (that is, if anticipated reticulation has not occurred by this date), the effects of these on-site systems are assessed and managed through the consent process.

The proposed permitted activity rule for existing on-site wastewater systems in the Near-shore Zone is as follows:

Permitted Activity Rule 3.10.6.1 – Discharge of domestic wastewater from existing on-site systems within the near-shore zone

The discharge of domestic wastewater effluent (including grey water but not stormwater) onto or into land from an on-site domestic wastewater treatment and land application system in the Lake Taupo Near-shore Zone lawfully established or authorised before the date of notification of this rule is a **permitted activity** until 30th June 2013, subject to the following conditions:

a) During times of normal wet winter groundwater level there shall be at least 600 millimetres separation distance between the highest groundwater level and the bottom of the land application trench.
b) The volume of effluent to be discharged from any one system shall not exceed 1.3 cubic metres per day averaged over any one month period, or 3 cubic metres per day if the discharge was previously authorised by Rule 3.5.7.6 of the Waikato Regional Plan.
c) There shall be no overland flow or surface ponding of effluent.
d) The discharge shall not result in any objectionable effects from odour beyond the boundary of the subject property.

e) The owner of the wastewater system shall obtain and supply to the Taupo District Council, at intervals not exceeding 3 years, a report from a Waikato Regional Council approved inspector, certifying that the wastewater treatment and disposal system is fit for purpose and complies with the conditions of this rule. The report shall also include any recommended maintenance or repairs required. Such maintenance/repairs shall be carried out within 3 months of the date of the report. The first inspection is required by 9 July 2008.

f) Septic tanks shall be desludged before the combined sludge and scum layers occupy 50 percent of the tank depth, or within the time period recommended for desludging during the inspection required by condition e) of this rule.

Advisory Notes

- It is recommended that the on-site wastewater system is managed in accordance with the following principles:
  - Avoid discharging the following to the wastewater system: non-biodegradable chemicals, sanitary napkins, dental floss, kitty litter, coffee grounds, paper towels, oil and fat, paint, pesticides, high strength detergents;
  - Do not use, or minimise the use of, garbage disposal units;
  - Minimise water usage such as by installing water reduction fixtures on water outlets and ensuring taps are not left running or leaking;
  - Ensure rain gutters do not discharge to the wastewater system;
  - Do not pave over the land application area, and ensure vehicles and stock do not have access to the land application;
  - If the land application area is grassed, ensure it is mowed regularly so grass does not become rank;
  - If an effluent outlet filter is fitted to the wastewater system, it should be inspected annually and cleaned if slime build-up is blocking the filter orifices.

- The Waikato Regional Plan Lake Taupo Catchment Maps indicate the location of the Near-shore Zone.
- In any given case, the precise location of the inland extent of the Near-shore Zone boundary will need to be defined on a case by case basis.
- Wastewater discharges which do not comply with rules 3.10.6.1, 3.10.6.2, 3.10.6.3, 3.10.6.4, 3.10.6.5 and 3.10.6.6 are to be assessed as discretionary activities under rule 3.5.7.7 of the Waikato Regional Plan.

The main aim of this rule is to ensure that existing on-site wastewater systems within the Near-shore Zone are well managed so that they operate in a way that minimises environmental and health risks within the capability of the system.

The 600 millimetre separation distance between groundwater and the disposal trench is required to ensure maximum soil treatment of wastewater. This is particularly important to ensure micro organism die-off. The 1.3 cubic metre limit is because older systems were generally not designed to cope with greater than this daily discharge quantity (based on the earlier New Zealand wastewater standard, NZS 4610). Conditions c) and d) are to control health and amenity effects.

The rule requires that all on-site wastewater systems in the Near-shore Zone are checked on a three yearly basis, and that they are desludged as required. This is in recognition of the fact that the Standard for on-site wastewater, AS/NZS 1547:2000, strongly recommends that management of on-site systems is not left up to individual homeowners. The standard states that householder responsibility does not ensure appropriate management of wastewater systems. The requirement is also in recognition that particular care is needed with respect to management of wastewater systems in the Near-shore Zone, as they have potential for greater effects than those further from the Lake.

Condition f) specifies when septic tanks should be pumped out. This is the main maintenance requirement for conventional on-site wastewater systems.

There are a number of ways that householders can protect the functioning of the wastewater treatment and/or disposal system. These are described in the note to the rule and are recommended as good practice guidelines. It would not be possible to make these guidelines a mandatory part of the rule as they rely to some extent on discretion, and could not be monitored such that they are enforceable.

Benefits and costs

The benefits of this method are as follows:

- Increases the likelihood that failing on-site wastewater systems in the Near-shore Zone are identified and remedied.
- Helps to prevent contamination of ground and surface water, particularly from wastewater bacteria and viruses, biochemical oxygen demanding substances and the nutrient phosphorus.
- Minimises the risk of infectious diseases from wastewater, such as eye and ear infections, gastrointestinal illnesses and diseases such as hepatitis.
- Improves the life of the wastewater treatment and disposal system, which results in an economic benefit to the homeowner.

This method will not result in environmental or social costs.

The economic costs of this method are as follows:

- The owner of the wastewater system will need to cover the cost of the three yearly inspection and pump-out. The cost of the three yearly pump-out would be in the order of $250, and some properties might need the tank pumped out twice before community reticulation occurs. The inspection might be in the order of $50, although if the pump-out contractor is also trained to do the inspection, this may be included in the pump-out cost. Note that some properties may already be regularly pumped out, in which case this would not be a new cost.

- To track inspections, a database will be required. There will however be development and set-up costs for the database and ongoing costs for data input. Given that there are about 470 on-site systems in the Near-shore Zone, the task of data input would be quite manageable. To recover the costs of database management, and other costs such as management and training of inspectors, it is likely that owners of on-site systems would need to pay an annual charge. The annual administration charge for Waikato Regional Council consents is currently $105. It is assumed that administrative processes for consents are generally more complex than would be required for the on-site wastewater database, so perhaps $50 would be a reasonable annual charge for this.

Based on these assumptions, a typical property owner with an on-site system in the Near-shore Zone would need to pay approximately $150 per year to cover the costs of the three yearly inspections, pump-outs, and annual administrative charges. To put this in perspective, the cost is only about half that of the average property rate in the Taupo Catchment for reticulated wastewater services (which is about $300 per year).

Efficiency of the method

This method is not intended to achieve significant environmental improvement. It is a ‘stop-gap’, which temporarily authorises existing on-site wastewater systems in the Near-shore Zone, until centralised community systems can be built and houses provided with a reticulated wastewater system. However, it does implement a more rigorous management system for these on-site systems, which will result in some environmental improvement, particularly at the individual property scale. Failing systems will be identified and remedial measures taken, to ensure that some minimum level of performance is achieved.

Although the environmental benefits, from the wider Lake water quality perspective are only likely to be minor (at most), the economic and social costs of this method will also be no more than minor. Comparison of costs and benefits therefore indicates that the method is an efficient way of ensuring minimum standards are maintained for these near-shore systems until they can be reticulated.

Risks of acting or not acting

This rule increases Council's ability to identify on-site wastewater systems that could be causing localised environmental or health risks. At present there is no system in place that would indicate the extent to which such risks are currently occurring, but it is likely that some systems are failing and increasing the risk of contamination of ground or surface water. Such contamination could continue to cause health or environmental risks if this rule is not in place.

Appropriateness of method

The following table summarises the costs and benefits of this method:

Benefits	Costs
• Good management of wastewater promoted. • Failing on-site systems identified. • Reduces wastewater contamination of ground and surface water. • Reduces risk of infectious disease.	• Annual administrative cost of approx. $50 per property. • Three yearly pump-out cost of approx. $250 per property.

The method is considered to be appropriate as it supports the achievement of policy and objectives in a way that is both effective and efficient.

11.2.2 Permitted Activity Rule 3.10.6.2 – Discharge of Domestic Wastewater from Existing On-site Systems Outside the Near-shore Zone

Description

On-site wastewater systems outside the Near-shore Zone are not expected to increase the risk of nuisance plant growths or health effects in shallow lakeshore waters. They do however contribute in a small way to the cumulative nitrogen load entering the Lake. They can also provide localised health risks if failing systems cause surfacing of effluent. This rule permits existing on-site wastewater systems outside the Near-shore Zone for the life of the plan provided they are functioning appropriately. The alternative regulatory mechanism of consenting these systems has been rejected as this would create an additional administrative burden and additional costs to landowners for very little additional environmental benefit.

The proposed rule is as follows:

Permitted Activity Rule 3.10.6.2 – Discharge of domestic wastewater from existing on-site systems outside the near-shore zone

The discharge of domestic wastewater effluent (including grey water but not stormwater) onto or into land from an on-site domestic wastewater treatment and land application system outside the Lake Taupo Near-shore Zone, lawfully established or authorised before the date of notification of this rule, is a **permitted activity**, subject to the following conditions:

a) During times of normal wet winter groundwater level there shall be at least 600 millimetres separation distance between the highest groundwater level and the bottom of the land application trench.

b) The volume of effluent to be discharged from any one system shall not exceed 1.3 cubic metres per day averaged over any one month period, or 3 cubic metres per day if the discharge was previously authorised by Rule 3.5.7.6 of the Waikato Regional Plan.
c) There shall be no overland flow or surface ponding of effluent.
d) The discharge shall not result in any objectionable effects from odour beyond the boundary of the subject property.
e) Septic tanks shall be desludged before the combined sludge and scum layers occupy 50 percent of the tank depth.
f) This rule shall no longer apply where a property is subdivided such that the land area of the property serviced by the on-site system is reduced to less than four hectares.
g) Should the treatment and/or land application system fail to the extent that either the treatment system or land application system needs to be substantially replaced, if an effluent outlet filter is not part of the system, it shall be fitted as part of the system reinstatement.
h) The discharge shall not occur within 20 metres of a Significant Geothermal Feature.

Advisory Notes:

- It is recommended that the on-site wastewater system is managed in accordance with the following principles:
  - Avoid discharging the following to the wastewater system: non-biodegradable chemicals, sanitary napkins, dental floss, kitty litter, coffee grounds, paper towels, oil and fat, paint, pesticides, high strength detergents;
  - Do not use, or minimise the use of, garbage disposal units;
  - Minimise water usage such as by installing water reduction fixtures on water outlets and ensuring taps are not left running or leaking;
  - Ensure rain gutters do not discharge to the wastewater system;
  - Do not pave over the land application area, and ensure vehicles and stock do not have access to the land application area;
  - If the land application area is grassed, ensure it is mowed regularly so grass does not become rank;
  - If an effluent outlet filter is fitted to the wastewater system, it should be inspected annually and cleaned if slime build-up is blocking the filter orifices.

- For the purpose of condition f), if a section is subdivided such that this rule no longer applies, the discharge would need to be authorised by Rule 3.10.6.3 or 3.10.6.4, or by consent under Rule 3.5.7.7 of the Waikato Regional Plan.
- For the purpose of condition g), it is envisaged that 'substantially replaced' would be where the septic tank is replaced, or at least half of the disposal field is replaced, or other works of similar scale.
- The Waikato Regional Plan Lake Taupo Catchment Maps indicate the location of the Near-shore Zone.
- In any given case, the precise location of the inland extent of the Near-shore Zone boundary will need to be defined on a case by case basis.
- Wastewater discharges which do not comply with rules 3.10.6.1, 3.10.6.2, 3.10.6.3, 3.10.6.4, 3.10.6.5 and 3.10.6.6 are to be assessed as discretionary activities under rule 3.5.7.7 of the Waikato Regional Plan.

Most conditions of this rule are the same as those in the permitted activity rule for existing on-site systems in the Near-shore Zone, discussed in the previous section. The reasons for Conditions a) to e) are therefore to be found in this previous discussion.

No requirement for regular inspections is included with this rule (this requirement does apply to systems in the Near-shore Zone). The reason is that the cost of such inspections cannot be justified outside the Near-shore Zone. There are no objectives in the Variation that would be greatly supported by regular inspections of systems outside the Near-shore Zone. Such inspections would not reduce wastewater nitrogen leaching in any discernable way because conventional systems, whether performing well or poorly, do not reduce nitrogen. This is different to the case of wastewater systems in

the Near-shore Zone which can cause adverse effects to near-shore waters, particularly if performing poorly.

Condition f) is that the rule shall no longer apply where a property is subdivided such that the land area of the property serviced by the on-site system is reduced to less than four hectares. The permitted activity rule for new conventional wastewater systems allows new systems on properties four hectares or greater in area. The four hectare minimum property size is expected to ensure no net increase in nitrogen yield from the property (this is discussed in more detail in section 11.2.4) If an existing four hectare property with a conventional on-site wastewater system is subdivided, such that a second wastewater system is located within the four hectare area, the net nitrogen yield per hectare will increase. Condition f) of this rule therefore seeks to prevent this from occurring. The effect of the condition will be that if a property with an existing conventional wastewater system is subdivided such that the property is reduced to less than four hectares, the wastewater system would need to be replaced with an advanced nitrogen reducing system pursuant to rule 3.10.6.3.

Condition g) also does not appear in the rule for systems within the Near-shore Zone. This condition requires the installation of an effluent outlet filter if the existing conventional wastewater treatment or disposal system is substantially upgraded (the meaning of 'substantially upgraded' is explained in the note to the rule). This condition is included as a good management initiative which requires that if the system is upgraded in a 'substantial' way, the upgrade should include the installation of a filter. The logic is that the cost of the filter in such cases is unlikely to add greatly to the cost of the upgrade, yet will have a number of benefits such as improving treatment efficiency and reducing the chance of environmental and health effects from effluent field failure. The requirement is not extended to systems in the Near-shore Zone, as they are generally to be replaced by reticulated community systems by July 2013.

Benefits and costs

The benefits of this method are mainly that good practice management requirements are in place for on-site wastewater systems so that localised environmental and health effects are not permitted. In addition the provisions are to ensure that additional nitrogen leaching does not result from subdivision of sections with conventional on-site wastewater systems.

This method will not result in environmental or social costs.

In general the method should not create economic costs over and above existing provisions for on-site wastewater management, apart from the following:

- If a system is to be upgraded such that an effluent outlet filter needs to be fitted, the additional cost of the filter would be about $300. This would be offset to a large degree by relaxing the frequency of inspections and pump-outs from three yearly to five yearly.

- If a property serviced by a conventional wastewater system is subdivided such that the property size is reduced to less than four hectares, an advanced nitrogen reducing on-site wastewater system will need to be installed. Such systems cost in the order of $12,000. Advanced wastewater systems will also have additional management costs (the costs of advanced systems are discussed in more detail in section 11.2.3).

Efficiency of method

This method allows discharges from existing on-site wastewater systems during the life of the plan, provided they function adequately. The rule will not result in significant environmental improvement, but will manage, at the individual property level, environmental and health risks from on-site wastewater treatment and disposal. Costs of the method are minor.

Comparison of costs and benefits therefore indicates that the method is an efficient way of ensuring minimum standards are maintained for these on-site wastewater systems outside the Near-shore Zone.

Risks of acting or not acting

It is important that wastewater management standards are provided and enforced. If not, there would be significantly greater risk of environmental and health effects from badly designed and operated systems.

Appropriateness of method

The following table summarises the costs and benefits of this method:

Benefits	Costs
• Provides enforceable standards to ensure health and environmental effects minimised. • Ensures subdivision of properties with conventional wastewater systems does not result in additional nitrogen leaching.	• No additional cost (above existing provisions) unless property is subdivided or system substantially fails and requires installation of an effluent filter.

The method is considered to be appropriate as it supports the achievement of policy and objectives in a way that is both effective and efficient.

11.2.3 Permitted Activity Rule 3.10.6.3 – New Nitrogen Removing On-site Wastewater Systems

Policy has been proposed that allows new wastewater discharges within the Lake Taupo Catchment provided there is no net increase in nitrogen yield above that which occurs from existing land use and which does not increase nitrogen or micro-organisms in shallow near-shore waters of the Lake. This rule permits new nitrogen removing on-site wastewater systems that are consistent with these policies.

Consideration was also given to requiring consents for discharges from new nitrogen removing on-site wastewater systems via a controlled activity rule. The advantages and disadvantages of this approach are listed in the following table:

Advantages of Controlled Activity Rule for New Advanced On-site Wastewater Systems	Disadvantages of Controlled Activity Rule for New Advanced On-site Wastewater Systems
• Allows site specific requirements such as treatment standard. • Costs of authorisation, administration and monitoring easier to recover through consent process. • Administration and tracking of consents is a more established process than administration and tracking of permitted activities. • Consistency with respect to controlled activity status for land use that has potential to adversely affect the Lake.	• Potentially greater authorisation costs for householders. • Less certainty about likely requirements for householders and wastewater industry – potential for inconsistent standards and requirements. • Larger task for the Regional Council needing to individually assess applications (need for additional resources). • Likely to result in hundreds of nearly identical consents (unnecessary repetition and bureaucracy). • Precedent for controlled status for other parts of the Region where there is potential for wastewater effects.

After consideration of these advantages and disadvantages, it was decided that in this case, the additional bureaucracy involved in a controlled activity did not sufficiently outweigh the advantages, so this approach was rejected.

The permitted activity rule is as follows:

Permitted Activity Rule 3.10.6.3 – New nitrogen removing on-site wastewater systems

The discharge of domestic wastewater effluent (including grey water but not stormwater) onto or into land from an on-site wastewater treatment and land application system, established after the date of notification of this rule (9 July 2005), where the property:

1. is 5000 square metres or larger and the property satisfies land use rule 3.10.5.1; or
2. is 2500 square metres or larger, and less than 5000 square metres, and has been granted subdivision consent prior to the date of notification of this rule.

Is a **permitted activity**, subject to the following conditions:

Wastewater Treatment Plant

a) The wastewater treatment plant shall be water tight, and protected from stormwater ingress.
b) Effluent from the wastewater treatment plant shall not exceed concentrations of: 20 g/m^3 Biochemical Oxygen Demand, 30 g/m^3 Suspended Solids, 25 g/m^3 Total Nitrogen.
c) The wastewater treatment plant shall be installed in such a way that ensures easy access for sampling of effluent after treatment and before discharge to the land application area, and easy access for regular plant maintenance activities.

Land Application Area

d) The land application system shall be pump dosed, with the pump having a high-level alarm system.
e) The land application system shall consist of a dripper irrigation system set in a topsoil layer 100 to 200 millimetres below the ground surface or, if the slope of the land application area is less than 15 degrees, dripper lines may be set on the ground surface and covered by bark or similar material anchored by a durable netting.
f) The land application system shall be designed and installed such that during times of normal wet winter groundwater level there shall be at least 300 millimetres separation distance between the highest groundwater level and the dripper lines.
g) The loading rate shall not exceed 5 millimetres per day (5 litres per square metre).
h) The volume of effluent to be discharged from any one system shall not exceed 2 cubic metres per day averaged over any one month period.
i) There shall be no overland flow or surface ponding of effluent.
j) The discharge shall not result in any objectionable effects from odour beyond the boundary of the subject property.
k) The discharge shall not occur within 20 metres of a Significant Geothermal Feature, 20 metres of a water supply bore, or 20 metres of a surface water body.

Management and Information

l) Prior to installation of the on-site wastewater treatment and land application system, the property owner shall provide to the Taupo District Council a Site Assessment and Design Report drafted in accordance with AS/NZS 1547:2000, which contains sufficient information to demonstrate that the wastewater treatment and land application system is designed and will be appropriately located such that the conditions of this rule can be satisfied.
m) After the wastewater system has been installed, and prior to closing over and commissioning of the treatment and land application components, the property owner shall obtain a Post Installation Wastewater System Certificate from a Waikato Regional Council approved inspector which states that the wastewater

treatment and land application system has been installed in accordance with the Site Assessment and Design Report, and in accordance with the manufacturer's specifications.

n) The wastewater treatment and land application system shall be subject to a servicing and maintenance contract which ensures the system is inspected at least every six months from the date of commissioning, and in accordance with the manufacturer's specifications. The maintenance contract shall ensure that during the six monthly inspections, a sample of effluent is taken from the outlet stage of the treatment system, and prior to the land application system, and tested for Total Nitrogen. Sampling shall follow APHA protocol. Inspection reports and sampling results shall be provided to the Taupo District Council within two months of each inspection.

o) Prior to commissioning of the on-site wastewater system, the owner shall supply to the Taupo District Council a copy of:
   i) The Site Assessment and Design Report (required by condition l), details of the wastewater treatment plant, and of the type and location of the effluent distribution system;
   ii) A copy of the Post Installation Wastewater System Certificate (required by condition m);
   iii) A copy of the Servicing and Maintenance Contract (required by condition n);

Advisory Notes:

- Land application systems and wastewater treatment units should be designed, sited and constructed in accordance with sections 4.2, 4.3 and 4.5, and Appendices 4.2A - 4.2D, 4.3A3 and 4.5A - 4.5D of the On-site Domestic Wastewater Management Standard AS/NZS 1547:2000. Where not covered by this standard, design, siting and construction details should be in accordance with Auckland Regional Council's 2004 On-site Wastewater Disposal From Households and Institutions – Technical Publication 58, unless otherwise stated in the conditions of this rule.
- The Site Assessment and Design Report should be provided on the appropriate template provided by the Waikato Regional Council, and in accordance with the guidance provided in AS/NZS 1547:2000 for Site and Soil Evaluation Reports and Design Reports.
- Wastewater discharges which do not comply with rules 3.10.6.1, 3.10.6.2, 3.10.6.3, 3.10.6.4, 3.10.6.5 and 3.10.6.6 are to be assessed as discretionary activities under rule 3.5.7.7 of the Waikato Regional Plan

This rule applies to properties over 5000 square metres (apart from an exception explained below) that satisfy Permitted Land Use Rule 3.10.5.1. The minimum section size is explained below.

Rule 3.10.5.1 requires animal and fertiliser nitrogen to be limited such that the maximum nitrogen leaching from these activities is approximately 8 kilograms per hectare per year. The rule only applies to land used for farming activities at the time the rule was notified. The wastewater rule for new advanced on-site systems has been designed to ensure that on average, if a pastoral farm is subdivided, and a new wastewater system is installed in accordance with this rule, there will not be an increase in nitrogen yield from the subject land. This is explained as follows.

It is currently believed that on average, pastoral farming in the Catchment leaches about 14 kilograms of nitrogen per hectare per year. Earlier estimates, which where based on Table 6 in Finlayson and Thorrold (2001)62, indicated that average leaching was between 11 and 12 kilograms per hectare per year. However since then, later experience points to these figures being understated by 2-3 kilograms. This is based on staff conversations with Stewart Ledgard, and on a recent report prepared for Environment Waikato by Stewart Ledgard, Ian Power and Bruce Binnie63. This

[62] Finlayson, J. and Thorrold, B (2001). Estimating the costs of restrictions on nitrate emissions in the Taupo Catchment, Paper prepared for Environment Waikato, AgResearch Limited.

[63] Ledgard, S., Power, I. and Binnie, B. (2006). Development of Nitrogen Management Plans for Five Pastoral Farms in the Lake Taupo Catchment, Draft Client Report prepared for Environment Waikato, AgResearch Limited.

reported on examples where a low density sheep and beef farm was calculated to leach 12 kilograms of nitrogen per hectare per year, an average density sheep and beef farm and a 20 hectare lifestyle 'farmlet' leached 17 kilograms, a dairy runoff (where cows grazed for up to three months per year, with lower stocking rates for remaining months) leached 28 kilograms and a dairy farm leached 49 kilograms. The aim of the permitted activity rule for new advanced wastewater systems therefore was to ensure that subdivision development, where such systems were to be installed, would not cause total nitrogen leaching to exceed 14 kilograms per hectare per year.

The average household size in the Taupo District is 2.6 people (Taupo District Council, 2002)[64] and it is estimated that each person generates 12 grams of nitrogen per day (Gunn, 2003). Therefore the Total Nitrogen production from the average household will be 31.2 grams per day or approximately 11.4 kilograms per year. It is also estimated in Gunn (2003)[65] that an advanced domestic on-site wastewater treatment plant configured for nitrogen removal can be expected to remove 65 per cent of the nitrogen, and that a further 15 per cent of wastewater nitrogen will be removed through soil processes. This will reduce the 11.4 kilograms to 3.4 kilograms of nitrogen per year for the average family serviced by an advanced on-site wastewater system.

We can assume that if an owner of a 5000 square metre (minimum section size under Rule 3.10.6.3) residential property wishes to keep animals, only part of the land will be used for this purpose while the balance of the land will be used for the house and lawns. If we assume that half the property is stocked at permitted activity levels (as stated in Land Use Rule 3.10.5.1) used for animals, then 2500 square metres will be stocked at a rate equivalent to nitrogen leaching of eight kilograms per hectare per year. This equates to two kilograms per year for the 2500 square metres or quarter hectare part of the property that is stocked. The eight kilograms per hectare per year includes a background nitrogen leaching level of two kilograms per hectare per year. However, the other 2500 square metres of section will still have a background nitrogen leaching of two kilograms per hectare per year, which adds a further 0.5 kilograms of nitrogen. The advanced wastewater system will add a further 3.4 kilograms per year of nitrogen as explained above. Therefore, the total maximum nitrogen leaching for the property is expected to be 5.9 kilograms per year (that is two kilograms from animals/fertiliser/background on the grazed half of the property, 0.5 kilograms from background sources on the ungrazed half of the property and 3.4 kilograms from the wastewater system). As the property in this example is 5000 square metres, this level of nitrogen leaching is equivalent to 11.8 kilograms per hectare per year. As this is well less than the average nitrogen leaching from pastoral farms (14 kilograms per hectare per year), we can expect that on average, subdivisions of farm land, where land use is permitted by Rule 3.10.5.1 and wastewater is permitted by Rule 3.10.6.3, will not increase nitrogen leaching, and therefore the nitrogen cap is not exceeded.

The 5000 square metre minimum property size has been set to ensure the nitrogen leached from a typical subdivided property is likely to be less than the estimated pastoral farming leaching of 14 kilograms per hectare. If there was no minimum property size, on-site systems could be put onto properties that would be likely to leach more than the pastoral farming medium leaching. Note also that the 14 kilograms per hectare per year average is our best estimate of pastoral farming leaching to date, but there are uncertainties with this figure, so it is considered prudent to be conservative and ensure that if such land is subdivided, the resulting nitrogen leaching is well less than this figure.

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[64] Taupo District Council (2002). VAST – A Vibrant and Sustainable Taupo District. Taupo District Council, December 2002.

[65] Gunn, I. (2003). Overview of Issues Related to Nutrient Management of Lake Taupo Wastewater Treatment and Disposal. Auckland UniServices Ltd, Auckland, March 2003.

It is also worth noting that in fact animals are rarely kept on 5000 square metre properties in the Taupo Catchment (this information comes from a personal conversation held with Taupo District Council planners). On larger properties, where animals are more commonly kept, the relative contribution of wastewater nitrogen is less than for a 5000 square metre property, therefore it is even more likely that the nitrogen cap is satisfied in these cases. For example, on a 10,000 square metre (one hectare) property, assuming still that the house and lawns take up 2500 square metres, and the remaining land is used for permitted activity grazing, the maximum nitrogen leaching will be 9.9 kilograms per hectare per year (that is six from animals/fertiliser, 0.5 from background sources on the ungrazed part of the property and 3.4 from the wastewater system).

There is one special case where the rule does allow on-site systems on properties smaller than 5000 square metres, and that only applies to properties that have been subdivided (received subdivision consent) prior to the date of notification of the rule. In this case, the minimum property size is 2500 square metres. At the time of writing this Section 32 document, there were approximately 100 properties that fell into this category. It had been quite common in recent years, to subdivided properties to 3000-4000 square metre blocks in the Taupo Catchment, particularly in the Mapara Road area. If the allowance was not made in the rule, those property owners who had subdivided properties to less than 5000 square metres, would have needed to apply for a consent to authorise the new wastewater system. The allowance for permitted wastewater systems on smaller sections for this specific situation should not in fact result in a significant increase in nitrogen leaching to the Lake. This assumes that, as is likely the case, properties between 2500 and 5000 square metres do not carry animals, and that the properties were previously farmed such that the average nitrogen leaching rate was 14 kilograms per hectare per year. If a wastewater system authorised by Rule 3.10.6.3 is installed on a 3500 square metre property (that is, the average expected size of these 100 or so properties), to serve the average size family, the total nitrogen leaching from the property would be approximately 4.1 kilograms per year (3.4 kilograms for the wastewater system and 0.7 kilograms for background nitrogen). This would be equivalent to a nitrogen leaching rate of approximately 12 kilograms per hectare per year, which is still under the average pastoral farming leaching rate of 14 kilograms per hectare per year.

The conditions of Rule 3.10.6.3 set certain requirements for the wastewater system. Condition b) requires that the treatment plant achieves treatment targets of 20 grams per cubic metre Biochemical Oxygen Demand, 30 grams per cubic metre Suspended Solids, 25 grams per cubic metre Total Nitrogen. The Biochemical Oxygen Demand and Suspended Solids targets are necessary as they ensure that the effluent is of sufficient quality to be discharged via a dripper irrigation system (the purpose of this type of irrigation system is described later in this section). The Total Nitrogen target has been determined using the following method and assumptions:

- The average household of 2.6 people would discharge 468 litres of effluent per day, based on an average discharge per person of 180 litres per day (Auckland Regional Council Technical Publication No. 58 figure for households with standard facilities using on-site roof water tank supply).
- If the treatment system is to achieve a 65 per cent reduction in nitrogen (the basis of the minimum property size as discussed above), the concentration of nitrogen in the effluent leaving the treatment plant would need to average 23.3 grams per cubic metre (2.6 people, discharging 12 grams of nitrogen each per day, reduced by 65 per cent in the treatment plant, in 468 litres of effluent, equates to 23.3 grams per cubic metre of nitrogen in the effluent).
- In order to easily assess compliance, a maximum nitrogen limit is more appropriate than an average limit. Sufficient data is not available to statistically define a maximum limit that would consistently achieve the required average of 23.3 grams per cubic metre. The maximum limit of 25 grams per cubic metre is chosen as a

very conservative limit (that is, not very much greater than the average itself) that would ensure the required average is achieved.

- Published data (such as detailed in Gunn 2003) indicates that there are a number of wastewater systems on the market that can achieve this maximum limit. More significantly, recent testing of advanced nitrogen reducing wastewater package plants, at a Rotorua test site jointly set up by Environment Bay of Plenty, Rotorua District Council and Waikato Regional Council, shows that some systems can consistently achieve this maximum nitrogen limit (Doc No 1102601).

Conditions a) and c) ensure that firstly treatment is not compromised by stormwater infiltration (or wastewater leakage) and secondly the system can be easily monitored. It is envisaged that to satisfy Condition c), suitable access points to the treatment plant should be above ground.

Conditions d) to h) describe the type of effluent disposal required. These conditions are considered necessary to maximise soil remediation of effluent, particularly in terms of micro organism die-off and denitrification. A pumped dosed dripper irrigation system allows measured, intermittent dosing over the entire disposal area, which encourages periods of anoxic and aerobic conditions in the soil required for denitrification. This type of disposal system also is appropriate given the free draining soils typical of the Taupo Catchment, as it spreads the discharge over the whole disposal area.

Conditions i) and j) are to manage health and amenity effects, while condition k) establishes setbacks to further minimise effects on geothermal features and ground and surface water.

Condition l) requires that a Site Assessment and Design Report be prepared before the new system is installed. Reports on site conditions and wastewater system design requirements are strongly recommended in the wastewater standard AS/NZS 1547:2000. This is in recognition of the fact that although the permitted activity rule provides conditions that are suitable for most cases, there will be some sites that have special requirements due to the particular physical conditions that are present. The Site Assessment and Design Report may identify situations (such as where the land is subject to instability), where an on-site wastewater system is not appropriate. The condition makes the property owner responsible for obtaining the Site Assessment and Design Report. The Waikato Regional Council has provided a template for this report, which is be based on the AS/NZS 1547:2000 guidelines for Site and Soil Evaluation Reports and Design Reports. It is expected that the report will be completed by a wastewater engineer, manufacturer, designer or installer.

Condition m) requires that the property owner obtains a Post Installation Wastewater System Certificate from a Waikato Regional Council approved inspector. This is to ensure that the installed system is the same as that identified in the Site Assessment and Design Report, and that the system has been installed appropriately.

Condition n) requires that each system installed under this rule is subject to a servicing and maintenance contract. Advanced nitrogen reducing on-site wastewater systems need regular servicing and maintenance for them to consistently achieve good performance. Six monthly servicing is considered to be the minimum that would be required to ensure these systems continue to perform effectively.

Condition n) also requires six monthly testing of the effluent to check that it is achieving the required nitrogen removal. The reason that regular monitoring of suspended solids and biochemical oxygen demand is not also required, is that it is expected that if the disposal system is working effectively it is likely that the standards for these parameters are being met. It would cost about $190 per year to test for all three parameters on a six monthly basis and about $88 per year to test just for Total Nitrogen (this information comes from a personal conversation held with Hills Laboratory). Given that the main

issue with respect to Lake Taupo water quality is primarily focused on nitrogen, it is considered that the monitoring requirement should be limited to this parameter.

Condition o) requires that a copy of the Site Assessment and Design Report, details of the treatment and disposal system, a copy of the Post Installation Wastewater System Certificate and a copy of the Servicing and Maintenance Contract be provided to the Taupo District Council. As the expectation is that the District Council will manage site by site records for on-site wastewater plants in the Taupo Catchment, it is appropriate that the documents are provided to this Council.

The first advisory note states that the wastewater system should be constructed in accordance with certain sections of the On-site Domestic Wastewater Management Standard AS/NZS 1547:2000. These sections of the standard prescribe certain technical requirements of wastewater systems. Environment Waikato has signalled in Section 3.5.7.2 of the Proposed Waikato Regional Plan that it intends to develop a change to the Regional Plan with respect to wastewater rules, in part with the intention to investigate how this standard can be integrated into the rules. It is therefore considered that the standard should be used with respect to the Taupo wastewater rules.

The advisory note also states that where design, construction and siting details are not covered by the standard, they should be in accordance with the Auckland Regional Council's Technical Publication Number 58: *The ARC Manual of Alternative Wastewater Treatment and Disposal Systems: On-site Wastewater Disposal from Households and Institutions.* It is considered that this guideline represents the most advanced and up-to-date guideline of its kind in New Zealand, and that it identifies appropriate designs and management systems that are applicable to the Taupo Catchment.

As previously explained, the second advisory note to the rule advises that the Site Assessment and Design Report is to be provided on the appropriate Waikato Regional Council template and in accordance with guidelines in AS/NZS 1547:2000.

The third advisory note is to inform that where wastewater does not comply with the Taupo Variation wastewater rules, the discharge should be assessed under Discretionary Rule 3.5.7.7 of the Waikato Regional Plan.

Benefits and costs

The benefits and costs of this rule need to be viewed within the context of the level of risks to Lake Taupo from future subdivision. Recent demand for subdivision in the Taupo Catchment has been extremely high. At the time of writing this report, the Taupo District Council had current subdivision applications representing approximately 1000 properties. Many of these subdivisions are for rural-residential properties, and many of these are likely to be serviced by on-site wastewater systems. There is therefore considerable potential, during the life of the Regional Plan, for large areas of the Catchment to be converted from current uses to rural-residential properties, serviced by on-site wastewater systems. It is therefore fundamental in order to achieve the objectives that methods are in place that prevent increasing effects from new on-site wastewater discharges. This rule is the main vehicle for ensuring that this is the case.

The benefits of this rule are as follows:

- Ensures new on-site wastewater discharges do not cause a net increase in the nitrogen discharge to the Lake.
- Ensures new on-site wastewater discharges do not increase the risk of nuisance plant growths and health effects in shallow Lake edge waters.
- Allows new subdivisions in the Taupo Catchment to be served by on-site wastewater systems (this has a range of flow on social and economic benefits such

as availability of lifestyle choices, range of subdivision options for landowners, economic advantages to the town from allowing development of rural land).

- Ensures that new advanced nitrogen removing on-site wastewater systems are appropriately installed, managed and maintained, such that the risks of environmental, amenity and health effects in the vicinity of the property are minimised.

This method will not result in environmental costs. There will not be significant social costs as a result of this method.

The economic costs of this method are as follows:

- The cost of installing a secondary treatment on-site wastewater system configured for nitrogen removal (including the pump dosed dripper irrigation system) would be in the order of $12,000. Although this is a large cost, in most cases it is not likely to add substantially to the cost of buying a rural residential property, and building a house in the Taupo Catchment. If for example the cost of a property and new house was $300,000 (which in most cases would be at the low end of prices), the cost of the wastewater system would only represent four per cent of the total cost (compared to say 1.5 per cent for a conventional wastewater system). There will be some cases, such as where a person already owns a small property and wishes to build, for example, a modest bach, where the cost of an advanced system represents a significant additional financial burden.
- The cost of the maintenance contract is likely to be about $170 per year and power costs will add another $60 per year for sand filter type systems and $240 for mechanically aerated systems (this information from personal conversatinos with wastewater industry representatives). The cost of sample testing is likely to be about $88 per year. Each system may also attract an annual administrative charge of say $50. The total cost to the home owner with an advanced nitrogen reducing system (based on a sand filter type system), is therefore likely to be approximately $450 per year (averaging power cost estimates for sand filter and aerated type systems). By way of comparison, the average Taupo District Council wastewater rate is about $300.
- The preconstruction Site Assessment and Design Report would be a once only cost of perhaps $250 (say two hours of a wastewater consultant's time at $125 per hour).
- The costs to Taupo District Council for maintaining a database and overseeing inspectors is expected to be covered by an annual charge of perhaps $50. Details of how this charge might be recovered have yet to be worked out.
- The rule recommends that the Standard AS/NZS 1547:2000 and the Auckland Regional Council's Wastewater Technical Publication No. 58 should be used as technical guidelines with respect to design, construction, operation and maintenance of systems subject to this rule. It is envisaged that the Regional Council will ensure that wastewater inspectors are adequately trained in the use of this technical guideline. Based on conversations with Auckland Regional Council staff, it is likely that they will shortly have such a training system in place for their own inspectors that could be tapped into. The cost of such training is expected to be relatively minor.

Efficiency of method

This method allows new on-site wastewater discharges in the Taupo Catchment, provided they do not result in a net increase in nitrogen discharging to the Lake, or result in near-shore Lake water effects. It is a very important method that will help to ensure Lake Taupo water quality does not deteriorate further as a result of future subdivision pressures. It allows new development in the Catchment, of the sort that would normally be serviced by on-site systems, such as rural-residential or lifestyle properties. There are therefore significant environmental, economic and social benefits to be gained from this rule.

There are some significant capital and operational costs that property buyers will need to bare. However these costs are not considered to be excessive in comparison to the potential benefits. Comparison of costs and benefits therefore indicates that the method is an efficient way of ensuring minimum standards are maintained for these on-site wastewater systems outside the Near-shore Zone.

Risks of acting or not acting

It is very important that this method is in place. Given the strong demand for new rural-residential properties in the Taupo Catchment, and given that this situation is likely to continue, controls must be put in place to manage on-site wastewater discharges from these properties. If not, there is considerable likelihood that future subdivision and development will result in increasing eutrophication of Lake Taupo, and increasing risk of near-shore effects such as nuisance weeds and health effects.

Appropriateness of method

The following table summarises the costs and benefits of this method:

Benefits	Costs
• No net increase in nitrogen discharge to the Lake from new on-site wastewater discharges. • Near-shore effects from future on-site wastewater discharges avoided. • Allows new rural-residential subdivisions to be serviced by on-site system. • Ensures systems are appropriately installed, managed and maintained.	• Set up costs for new systems of $12,000 plus $250 for Site Assessment and Design Report. • Annual costs to home owners of approx. $450 per year. • Additional administrative costs to district and Regional Council .

The method is considered to be appropriate as it supports the achievement of policy and objectives in a way that is both effective and efficient.

11.2.4 Permitted Activity Rule 3.10.6.4 – New Conventional On-site Wastewater Systems

Description

It is possible to allow new discharges from conventional wastewater systems in the Catchment, which would nevertheless satisfy the policy and objectives. A conventional wastewater system is defined as an on-site wastewater system comprising a septic tank and an effluent outlet filter. Such treatment systems are not considered to remove nitrogen from the wastewater in any significant quantities. However, it is expected that about 15 per cent of the wastewater nitrogen can be removed through Taupo pumice soils.

This rule is a permitted activity rule to allow new discharges from conventional on-site systems in the Taupo Catchment. The rule is as follows:

Permitted Activity Rule 3.10.6.4 – New conventional on-site wastewater systems

The discharge of domestic wastewater effluent (including grey water but not stormwater) onto or into land from an on-site wastewater treatment and land application system, established after the date of notification of this rule (9 July 2005), where the property:

1. is outside the Lake Taupo Near-shore Zone; and
2. is on a property four hectares or larger and satisfies rule 3.10.5.1.

Is a **permitted activity**, subject to the following conditions:

Wastewater Treatment System

a) The wastewater treatment system shall be water tight, and protected from stormwater ingress.

b) Where the treatment system consists of a septic tank, it shall have the capacity stated in the following table and shall be fitted with an effluent outlet filter.

Design Population Equivalent (persons)	Number of Bedrooms	Tank Capacity (litres)
1-5	3	3000
6-7	4	3500
8	5	4000
9-10	6	4500

Effluent Disposal

c) The land application system shall be designed and installed such that the effluent will spread evenly through the whole length of the effluent distribution lines.

d) The land application system shall be designed and installed such that during times of normal wet winter ground water level there shall be at least 600 millimetres separation distance between the highest groundwater level and the bottom of the land application trench, unless secondary treated effluent is discharged through a dripper irrigation system in which case the separation distance shall be at least 300 millimetres.

e) The loading rate shall be in accordance with Technical Sheet 5-2, Summary of Land Disposal Methods and Recommended Loading Rates vs Soil Category, Appendix D, On-site Wastewater Systems: Design and Management Manual, Auckland Regional Council Technical Publication 58 (2004), unless secondary treated effluent is discharged, in which case the loading rate shall not exceed 5 millimetres per day (5 litres per square metre).

f) The volume of effluent to be discharged from any one system shall not exceed 2 cubic metres per day averaged over any one month period.

g) There shall be no overland flow or surface ponding of effluent.

h) The discharge shall not result in any objectionable effects from odour beyond the boundary of the subject property.

i) The discharge shall not occur within 20 metres of a Significant Geothermal Feature, 30 metres of a water supply bore, or 200 metres of a surface water body.

Management and Information

j) Prior to installation of the on-site wastewater treatment and land application system, the property owner shall provide to the Taupo District Council a Site Assessment and Design Report drafted in accordance with AS/NZS 1547:2000, which contains sufficient information to demonstrate that the wastewater treatment and land application system is designed and will be appropriately located such that the conditions of this rule can be satisfied.

k) After the wastewater system has been installed, and prior to closing over and commissioning of the treatment and land application components, the property owner shall obtain a Post Installation Wastewater System Certificate from a Waikato Regional Council approved inspector which states that the wastewater treatment and land application system has been installed in accordance with the Site Assessment and Design Report, and in accordance with the manufacturer's specifications

l) Prior to commissioning of the on-site wastewater system, the owner shall supply to the Taupo District Council:
    i. A copy of the Site Assessment and Design Report (required by condition j), details of the wastewater treatment plant, and the type and location of the land application system.
    ii. A copy of the Post Installation Wastewater System Certificate (required by condition k)

m) Septic tanks shall be desludged before the combined sludge and scum layers occupy 50 percent of the tank depth.

n) There shall be no more than one conventional wastewater system per four hectares of land area.

Advisory Notes:

- It is recommended that the on-site wastewater system is managed in accordance with the following principles:
  - Avoid discharging the following to the wastewater system: non-biodegradable chemicals, sanitary napkins, dental floss, kitty litter, coffee grounds, paper towels, oil and fat, paint, pesticides, high strength detergents;
  - Do not use, or minimise the use of, garbage disposal units;
  - Minimise water usage such as by installing water reduction fixtures on water outlets and ensuring taps are not left running or leaking;
  - Ensure rain gutters do not discharge to the wastewater system;
  - Do not pave over the land application area, and ensure vehicles and stock do not have access to the land application area;
  - If the land application area is grassed, ensure it is mowed regularly so grass does not become rank;
  - The effluent outlet filter should be inspected annually and cleaned if slime build up is blocking the filter orifices.

- Land application systems and wastewater treatment units should be designed, sited and constructed in accordance with sections 4.2, 4.3 and 4.5, and Appendices 4.2A - 4.2D, 4.3A3 and 4.5A - 4.5D of the On-site Domestic Wastewater Management Standard AS/NZS 1547:2000. Where not covered by this standard, design, siting and construction details should be in accordance with Auckland Regional Council's 2004 On-site Wastewater Disposal From Households and Institutions – Technical Publication 58, unless otherwise stated in the conditions of this rule.
- The Site Assessment and Design Report should be provided on the appropriate template provided by the Waikato Regional Council, and in accordance with the guidance provided in AS/NZS 1547:2000 for Site and Soil Evaluation Reports and Design Reports.
- For the purpose of condition n), if a property is subdivided such that this rule no longer applies, the discharge would need to be authorised by Rule 3.10.6.3 or by consent under Rule 3.5.7.7 of the Proposed Waikato Regional Plan.
- Wastewater discharges which do not comply with rules 3.10.6.1, 3.10.6.2, 3.10.6.3, 3.10.6.4, 3.10.6.5 and 3.10.6.6 are to be assessed as discretionary activities under rule 3.5.7.7 of the Waikato Regional Plan

This rule applies to properties over four hectares which are outside the 200 metre 'Near-shore Zone'. The four hectare size restriction is explained below. These conventional systems are not permitted within the Near-shore Zone, as the effluent is likely to be high in nitrogen and wastewater pathogens compared to secondary treatment systems. Keeping conventional systems away from the Lake edge in this way reduces the likelihood that the effluent adversely affects near-shore waters. Even at 200 metres from the lakeshore, these systems will only be allowed at very low density (that is, no more than one system per four hectares), which adds further protection in terms of near-shore effects.

As for Wastewater Rule 3.10.6.3, a new wastewater system pursuant to Rule 3.10.6.4 will only be allowed where the Permitted Land Use Rule 3.10.5.1 is satisfied. Again, the purpose of tying this wastewater rule to this land use rule is to ensure that if a new wastewater system is installed, it does not result in an increase in nitrogen leaching above that which currently occurs (that is, the nitrogen discharge stays within the nitrogen cap).

As explained in relation to Rule 3.10.6.3, Rule 3.10.5.1 requires animal and fertiliser nitrogen to be limited such that the nitrogen leaching from these activities is no more than eight kilograms per hectare per year. The rule only applies to land used for farming activities at the time the rule is notified. If a farming property was subdivided into four hectare blocks and the owners all wanted to keep the permitted activity level of animals and install a conventional on-site wastewater system pursuant to Rule 3.10.6.4, the nitrogen leaching could be calculated as follows.

If we again use the average household size for the Taupo District (2.6 people) and the estimated nitrogen production per person of 12 grams per day, the Total Nitrogen production for the average household is 31.2 grams per day or about 11.4 kilograms

per year. If we assume that a conventional wastewater system does not reduce nitrogen through the septic tank, but that nitrogen reduces by 15 per cent through the soil, the nitrogen leaching from the average conventional wastewater system will be almost 10 kilograms (9.67 kilograms) per system per year.

If the four hectare property has a quarter hectare house and lawn area, and the remainder of the property has the permitted activity levels of animals, the animal nitrogen inputs for the property will be 30 kilograms per year (that is 3.75 hectares at 8 kilograms nitrogen per hectare per year). The ungrazed part of the property has a background nitrogen input, at 2 kilograms per hectare per year, of 0.5 kilograms. The wastewater will add say a further 10 kilograms of nitrogen, so the Total Nitrogen from the four hectare property will be 40.5 kilograms per year, which equates to about 10 kilograms nitrogen per hectare per year for the subdivision.

This is well below the estimated average nitrogen leached from pastoral farming in the Taupo Catchment (that is 14 kilograms per hectare per year) so the minimum section size of four hectares, where conventional on-site wastewater systems are used, will ensure that the nitrogen cap is not exceeded. This is of course a conservatively large section size for this purpose. However it does give a large allowance for error with respect to the estimated 14 kilograms per hectare per year. In addition, four hectares is the same as the Taupo District Council controlled activity minimum property size for subdivision in the rural zone although this may change in the near future.

Rule 3.10.6.4 provides conditions that set minimum standards for conventional on-site wastewater systems. Condition a) recognises that excess water ingress into systems can diminish their treatment capacity. Condition b) sets the minimum size of the septic tank, which is based on the requirements of the Standard AS/NZS 1547:2000, and sets the requirement for an effluent outlet filter.

Conditions c) to i) describe the requirements of the disposal system. Condition c) requires that the effluent distributes evenly over the whole length of the disposal system. This is important to ensure maximum ground renovation of the effluent. This is particularly important in the highly permeable Taupo pumice soils, and requires special distribution systems to achieve, such as a pump or siphon dosed LPP (Low Pressure Pipe) or LPED (Low Pressure Effluent Distribution) system.

The requirement for a 600 millimetre separation distance to groundwater in Condition d) is also to ensure ground renovation of effluent occurs, particularly in terms of disinfection of the effluent. It should be noted that this separation distance is less than that required by Auckland Regional Council's Technical Publication 58. However the 600 millimetre separation distance is consistent with the separation distance in wastewater rules for other parts of the Waikato Region. Also new conventional wastewater systems will not be authorised within the 200 metre Near-shore Zone, so the potential for health effects from these systems on recreational beaches around Lake Taupo will be less than the potential effects from such systems for recreational beaches in the Auckland area where these systems can be located much closer to beaches.

Condition e) states that the loading rate should be in accordance with guidance in Auckland Regional Council's Technical Publication 58. This guidance ensures that the loading rate is low enough that effluent will readily soak away. However, where groundwater level is high, a secondary treatment wastewater plant will be required (refer to Condition d)), and the effluent needs to be loaded slow enough (that is less than 5 millimetres per day) to allow die-off of wastewater pathogens.

Condition f) sets the maximum daily effluent volume at 2 cubic metres per day, which coincides with the maximum on-site wastewater volume covered by the Standard AS/NZS 1547:2000.

Conditions g) and h) are to ensure the wastewater discharge does not cause health and amenity effects. Condition i) requires setbacks with respect to Significant Geothermal Features, water supply bores and surface water bodies. The 20 metre setback from Significant Geothermal Features, and the 30 metre setback from domestic water supply bores is to maintain consistency with the requirements of the Proposed Waikato Regional Plan. The 200 metre setback from a surface waterbody is to ensure groundwater with higher than background nitrogen concentrations does not discharge to surface waterbodies.

Condition j) requires that a Site Assessment and Design Report be prepared before the new system is installed. As previously stated, such reports are strongly recommended in the Wastewater Standard AS/NZS 1547:2000. This is in recognition of the fact that although the permitted activity rule provides conditions that are suitable for most cases, there will be some sites that have special requirements due to the particular physical conditions. The condition makes the property owner responsible for obtaining the Site Assessment and Design Report. The Waikato Regional Council has provided a template for this report, which is based on the AS/NZS 1547:2000 guidelines for Site and Soil Evaluation Reports and Design Reports. It is expected that the report will be completed by a wastewater engineer, manufacturer, designer or installer.

Condition k) requires that the property owner obtains a Post Installation Wastewater System Certificate from a Waikato Regional Council approved inspector. This is to ensure that the installed system is the same as that identified in the Site Assessment and Design Report, and that the system has been installed appropriately.

Condition l) requires that a copy of relevant documentation is provided to the Taupo District Council. This will allow the new wastewater system, together with appropriate information about the system, to be registered on a database, which will allow tracking of inspections and so on.

Condition m) requires that the wastewater system be desludged as required. Condition n) reinforces the requirement that only one conventional wastewater system is to be on any four hectare area of land.

The first advisory note provides good practice suggestions with respect to management of a conventional on-site wastewater system.

The second advisory note states that the wastewater system should be constructed in accordance with certain sections of the On-site Domestic Wastewater Management Standard AS/NZS 1547:2000. These sections of the Standard prescribe certain technical requirements of wastewater systems. Environment Waikato has signalled in section 3.5.7.2 of the Proposed Waikato Regional Plan that it intends to develop a change to the Regional Plan with respect to wastewater rules, in part with the intention to investigate how this Standard can be integrated into the rules. It is therefore considered that the Standard should be used with respect to the Taupo wastewater rules.

The advisory note also states that where design, construction and siting details are not covered by the Standard, they should be in accordance with the Auckland Regional Council's Technical Publication Number 58: *The ARC Manual of Alternative Wastewater Treatment and Disposal Systems: On-site Wastewater Disposal from Households and Institutions.* It is considered that this guideline represents the most advanced and up-to-date guideline of its kind in New Zealand, and that in general, it identifies appropriate designs and management systems that are applicable to the Taupo Catchment.

As previously explained, the third advisory note to the rule advises that the Site Assessment and Design Report is to be provided on the appropriate Waikato Regional Council template and in accordance with guidelines in AS/NZS 1547:2000.

The fourth advisory note explains which rules apply if the property is subdivided below four hectares.

The fifth advisory note is to inform that where wastewater does not comply with the Taupo Variation wastewater rules, the discharge should be assessed under Discretionary Rule 3.5.7.7 of the Waikato Regional Plan.

Benefits and costs

This rule deals with new on-site wastewater discharges from properties four hectares and over. The rule ensures that new conventional on-site wastewater systems can be installed while ensuring that near-shore effects are not caused by these systems, and that the new wastewater discharge does not result in an increase in nitrogen leaching to the Lake.

The benefits of this rule are as follows:

- Allows new large block subdivisions to be serviced by conventional on-site wastewater systems.
- Ensures new conventional wastewater systems are appropriately installed and maintained.
- Helps to prevent contamination of ground and surface water.
- Ensures new wastewater discharges from conventional systems do not increase nitrogen leaching to the Lake.
- Ensures new on-site wastewater discharges do not increase the risk of nuisance plant growths and health effects in shallow Lake edge waters.

This method will not result in environmental or social costs.

The economic costs of this method are as follows:

- The cost of installing a conventional on-site wastewater system is likely to be in the order of $4000.
- The Site Assessment and Design Report is likely to cost in the order of $250 (say two hours of a wastewater consultants time at $125 per hour).
- An annual administrative charge to cover the cost of database management and management of inspectors is likely to be in the order of $50.

Efficiency of method

This method allows new on-site wastewater discharges in the Taupo Catchment, on properties four hectares and over. It allows new large block subdivisions to be serviced by on-site wastewater systems without the need for expensive nitrogen reducing systems. However the requirements of the rule do ensure adverse environmental and health effects from these conventional wastewater systems will be avoided. In relation to these benefits, the costs are not considered significant. Comparison of costs and benefits therefore indicates that the method is an efficient way of satisfying the policy and objectives.

Risks of acting or not acting

This rule increases the ability of Council to ensure that conventional wastewater systems in the Taupo Catchment are well managed, and increases the likelihood that on-site wastewater systems in the Taupo Catchment function safely and such that environmental effects are minimised. Not acting will increase the likelihood that inappropriate wastewater systems are installed, or that they are installed in inappropriate locations, increasing the health and environmental risks from wastewater discharges. If conventional wastewater systems were not prevented in the Near-shore Zone, they could increase the risk of near-shore effects in the Lake.

Appropriateness of method

The following table summarises the costs and benefits of this method:

Benefits	Costs
• Allows new discharges from economical on-site wastewater systems on large properties. • Systems are installed and maintained such that environmental and health risks are minimised. • Ensures new wastewater discharges do not increase the risk of near-shore effects or result in increased nitrogen discharges to the Lake.	• Set up costs for new systems of $4,000 plus $250 for Site Assessment and Design Report. • Annual costs to home owners of approximately $50 per year for council administration.

The method is considered to be appropriate as it supports the achievement of policy and objectives in a way that is both effective and efficient.

11.2.5 Controlled Activity Rule 3.10.6.5 – Wastewater Systems in the Near-shore Zone after 30th June 2013

Description

Wastewater Rule 3.10.6.1 permits wastewater discharges in the Near-shore Zone, which existed at the time of notification of the rules, until 30 June 2013. After this date, these discharges will become controlled activities under Rule 3.10.6.5.

The rule is as follows:

3.10.6.5 Controlled Activity Rule - Wastewater Systems in the Near-shore Zone after 30th June 2013

The discharge of domestic wastewater effluent (including grey water but not stormwater) onto or into land from an on-site domestic wastewater treatment and land application system in the Lake Taupo Near-shore Zone, which was authorised by Rule 3.10.6.1, and which does not satisfy the conditions of Rule 3.10.6.3, is a **controlled activity** (requiring resource consent) on and after 30th June 2013 subject to the following standards and terms:

a) During times of normal wet winter groundwater level, there shall be at least 600 millimetres separation distance between the highest groundwater level and the bottom of the land application trench, unless secondary treated effluent is discharged through a dripper irrigation system in which case the separation distance shall be at least 300 millimetres.
b) The volume of effluent to be discharged from any one system shall not exceed 1.3 cubic metres per day averaged over any one month period, or 3 cubic metres per day if the discharge was previously authorised by Rule 3.5.7.6 of the Waikato Regional Plan.
c) There shall be no overland flow or surface ponding of effluent.
d) The discharge shall not result in any objectionable effects from odour beyond the boundary of the subject property.
e) If the wastewater system is within the area of benefit of a reticulated community wastewater treatment system, it shall be connected to the system as soon as practicable.

Waikato Regional Council reserves control over the following matters:

i. Wastewater system upgrades to avoid health or environmental effects;

ii. Wastewater system upgrades to avoid near shore effects either individually or in combination with other on-site wastewater systems;
iii. Wastewater system upgrades to avoid effects on any water supply bore;
iv. Restrictions on the use of the wastewater system;
v. Monitoring, maintenance and reporting requirements;
vi. The circumstances under which the consent conditions may be reviewed.

The controlled activity status for such discharges is considered appropriate as it is consistent with existing farming activities being controlled activities. As stated in section 11.2.1, the Taupo District Council 2006 Long-Term Council Community Plan has indicated that the largest communities around the Lake shore which are currently still serviced by on-site wastewater services are expected to be reticulated by the 2012/13 year. Controlled activity status will allow the risks from the remaining on-site systems after this time to be individually evaluated and appropriately managed by consent processes. Policy 8 indicates the expectation that if these remaining on-site systems are likely to cause increased concentrations of nitrogen or wastewater pathogens in shallow near-shore waters, they will be required to upgrade to avoid this effect.

Conditions a) to e) are also in Rule 3.10.6.1. The reasons for these conditions are provided in section 11.2.1 of this report. It is considered reasonable to include these conditions, because this rule is only to provide for on-site discharges which had been previously authorised by Rule 3.10.6.1. Such systems should therefore have complied with the conditions of this rule.

The rule includes a number of matters over which the Regional Council has reserved control. These are necessary in order that appropriate conditions can be placed on any resulting controlled activity consent, so that ongoing effects of the discharge can be avoided, remedied or mitigated.

Benefits and costs
The rule is to ensure on-site wastewater systems remaining in the Near-shore Zone after 30 June 2013 are managed so that near-shore effects are avoided. Section 4.6.1 of this report indicates that there may be approximately 470 on-site wastewater systems in the Near-shore Zone and that possibly 430 of these may be replaced by reticulated centralised community systems by 2013. If this is the case, there may only be 40 or so on-site systems left in the Near-shore Zone which would need to be individually consented under Rule 3.10.6.5.

It is difficult to estimate the possible costs of such consent processes as they will vary depending on site and wastewater system characteristics. However, for the purposes of this assessment, it is probably reasonable to assume the cost of each consent will be in the order of $800. This would place the cost to the community at say $32,000. This would be significantly less than the cost of upgrading these to advanced wastewater systems or replacing them with reticulated systems (particularly given that they are likely to be the more remote systems). Note also that currently, septic tank discharges which are consented are not generally subject to annual consent holder charges.

It is not expected that these remaining wastewater systems will represent a considerable risk to near-shore waters, given that they are likely to be individual systems or systems in small communities. However, they do still pose some risk to near-shore waters and therefore they should be managed appropriately. The consent process allows individual assessment of potential effects and individual solutions appropriate to each situation.

Based on these comments, the benefits of this rule are likely to be as follows:

- Allows appropriate site specific management of on-site wastewater systems in the Near-shore Zone after 2013.

- Ensures near-shore effects will be avoided from these remaining systems.

The method will not result in environmental or social costs.

The economic costs of this method are as follows:
- Consent costs are likely to be in the vicinity of $800 per property, which for the expected remaining wastewater systems subject to the rule may accumulate to $32,000.

Efficiency of method
There are some on-site wastewater systems which are not likely to be replaced by reticulated systems after 2013. Some of these are in communities (such as Motutere/Jellicoe Point) where standard septic tank wastewater systems are very close to the Lake edge. Such systems do represent a definite, albeit localised risk to near-shore Lake water quality. Overall, the environmental or health risk is probably small, but the cost to avoid problems is also likely to be small. This is therefore considered to be an efficient method for helping to achieve Objective 3.

Risks of acting or not acting
If the method is not included, on-site wastewater systems in the Near-shore Zone remaining after 2013 would default to Wastewater Discretionary Activity Rule 3.5.7.7. This rule would provide less certainty for homeowners that they would be able to get ongoing consent for their existing wastewater system. If such systems remained permitted in the long term (after 2013) there is a risk that near-shore effects would continue in the vicinity of such systems, even if they are operating well.

Appropriateness of the method
The following table summarises the costs and benefits of this method:

Benefits	Costs
• Manages on-site wastewater systems in the Near-shore zone so that near-shore effects are avoided in the long run.	• Approximately $800 per wastewater system

The method is considered to be appropriate as it supports the achievement of policy and objectives in a way that is both effective and efficient.

11.2.6 Restricted Discretionary Activity Rule 3.10.6.6 – New On-site Wastewater Systems Servicing Papakainga and Marae

Description
Wastewater Rule 3.10.6.6 allows for new papakainga and Marae wastewater servicing as restricted discretionary activities. This rule is to implement Policy 9.

The rule is as follows:

3.10.6.6 Restricted Discretionary Activity Rule - Papakainga and Marae Wastewater Discharges

The discharge of domestic wastewater effluent (including grey water but not stormwater) from papakainga or Marae buildings, onto or into land from an on-site domestic wastewater treatment and land application system in the Lake Taupo catchment, established after the date of notification of this rule, is a **restricted discretionary activity** (requiring resource consent) subject to the following standards and terms:

a) The discharge does not comply with Rules 3.10.6.1, 3.10.6.2, 3.10.6.3, 3.10.6.4 or 3.10.6.5.

b) The wastewater system is established to provide wastewater servicing of papakainga housing or Marae buildings on Maori land within the meaning of Section 2 and Section 129 (1)(a) and (b) of the Te Ture Whenua Maori Land Act 1993.

c) The volume of effluent to be discharged from any one system shall not exceed 2 cubic metres per day averaged over any one month period.

d) The wastewater system shall not be located within the area of benefit of a reticulated community wastewater treatment system.

e) A management plan shall be submitted demonstrating how the papakainga and Marae buildings will be developed and how wastewater will be managed.

f) Papakainga wastewater services shall not be used for commercial purposes.

Waikato Regional Council restricts its discretion over the following matters:

i. Methods to avoid effects, either individually or in combination with other on-site wastewater systems, on near shore Lake Taupo waters, other surface water or ground water bodies, domestic water supply bores and Significant Geothermal Features; (Note: These methods can include wastewater system design, controls on the use of the wastewater system, and may allow for low tech wastewater solutions if appropriate);
ii. Methods to achieve Policy 9;
iii. Methods to avoid health risks associated with on-site wastewater disposal;
iv. Monitoring, maintenance and reporting requirements;
v. The circumstances under which the consent conditions may be reviewed.

Notification:
Pursuant to s94D of the Resource Management Act 1991 applications received in accordance with this rule do not need to be notified and notice of applications does not need to be served.

The restricted discretionary status is considered appropriate as it allows for the activity, while ensuring that an application under the rule can be declined if the activity is not consistent with Policy 9 (and therefore would increase the risk of the other objectives not being met). However the status is also not as restrictive as a fully discretionary activity, which indicates the desire to allow for new papakainga and Marae facilities while ensuring the Lake is protected. The restricted status means that applications will not be subject to scrutiny with respect to the whole range of matters in Part II of the Resource Management Act.

Clause a) signals that this is a ‘special case’ rule for those specific situations where the permitted activity and controlled activity wastewater rules are not applicable, but where the activity should be allowed if certain Lake protections are achieved.

Clause b) restricts the provision to new papakainga and Marae buildings on Maori land meeting certain criteria in the Te Ture Whenua Maori Land Act 1993. It is important that the provision only relate to traditional Maori settlement requirements because the provision is specifically to recognise traditional rights which have been associated with Maori land, in many cases for hundreds of years. This is to be reiterated by including the following definition for papakainga in the Plan glossary: “a traditional layout of residential accommodation where dwellings are erected to exclusively house members of a whanau, hapu or iwi, on land which is owned by the whanau, hapu or iwi, and is

located on Maori land within the meaning of Section 2 and Section 129 (1)(a) and (b) of the Te Ture Whenua Maori Land Act 1993".

Clause c) restricts the provision to effluent volumes considered under the wastewater standard for on-site systems NZS/AS 1547:2000.

Clause d) recognises that reticulated community wastewater treatment systems generally produce better effluent than on-site systems. Therefore, if the papakainga or Marae are within the area of benefit of such a community system, the system should be used for the required wastewater servicing.

Clause e) is to ensure that the new wastewater systems will be appropriately managed, and that the Council has a clear understanding of the timetable of development.

Clause f) is to ensure that the provision is only used for traditional residential uses. Any new commercial developments should be dealt with under other rules based on a strict nitrogen cap regime.

Clauses i) to v) are the matters to which Council has restricted its discretion. The matters are to ensure that other objectives of the Variation are not put at risk. Of particular note is Clause ii) which ensures that consents will only be granted where the elements of Policy 9 are satisfied.

The rule allows for applications to be processed without need for public notification. The controls in the rule are sufficient to ensure that the wastewater discharges considered under the rule will not adversely affect other parties.

Benefits and costs

The rule is to ensure that the Variation does not prevent iwi from building new papakainga and expanding Marae facilities on traditional Maori land. This is to ensure iwi can continue to provide for their social and cultural wellbeing, and can maintain traditional relationships with their ancestral land. This is therefore a very important benefit for iwi.

There will be monetary costs of this rule as applicants will need to pay for preparation of applications, and for costs of processing and administration of consents by the regional council. However it is not expected that these costs will be significant, particularly in comparison to the benefits. Establishment of new papakainga and Marae facilities has not been a common event in the recent past. A single consent could be applied for to cover a comprehensive development to occur over a number of years into the future. The cost of consent per facility could therefore quite small.

The provision does allow, albeit in a very limited way, for the nitrogen cap established by the Variation to be breached. However, the protections in the provision are considered sufficient to ensure that if the provision does in actual fact result in some increase in wastewater nitrogen in the Catchment, the increase would be inconsequential in terms of its potential effect on Lake water quality. Decisions on any particular application under this rule will be informed by ongoing monitoring of Lake condition as well as monitoring of previous wastewater nitrogen increases allowed under the rule. It is reported in the Decision report for the Variation that if say 100 new papakainga houses were established over the next 10 years under this rule, this would represent an increase of only 0.1 per cent of the current nitrogen load to the Lake, which Waikato Regional Council scientists note would be inconsequential in terms of the potential effect on the Lake. As stated above, actual establishment of new papakainga and Marae facilities is not a common event. Also, it is expected that wastewater servicing for many new papakainga and Marae would not occur via this rule, as they could be established within the strict nitrogen cap imposed by the other Variation rules. For these reasons, if there is some additional nitrogen discharge due to this rule, it would not represent an environmental cost to the Lake.

Efficiency of method
This method allows for a very important cultural benefit as described above. It will ensure members of a whanau, hapu or iwi are not prevented by the Variation from establishing housing on their ancestral land. There will be some economic costs of the method, but these will be minor compared to the benefits. There will be no social or environmental costs. For these reasons, the method is considered to be an efficient way of achieving the policy and objectives.

Risks of acting or not acting
If this method is not part of the Variation, there will be some whanua, hapu and iwi who will not be able to provide for new papakainga and Marae facilities on their ancestral land. This would not be consistent with Part II of the Resource Management Act, particular with respect to sections 6(e) and 8. There is potentially some risk to the Catchment nitrogen cap because of this provision. However the risk is considered minor and it can be effectively managed under the provisions of the rule and Policy 9.

Appropriateness of method
The following table summarises the costs and benefits of this method:

Benefits	Costs
• Ensures the Variation does not result in provisions which prevent the establishment of additional papakainga and Marae facilities on ancestral land.	• Costs of preparing, processing and administering resource consents.

The method is considered to be appropriate as it supports the achievement of policy and objectives in a way that is both effective and efficient.