**BEFORE THE ENVIRONMENT COURT**
**I MUA I TE KOOTI TAIAO O AOTEAROA**

**Decision No. [2019] NZEnvC 136**

| | |
|---|---|
| IN THE MATTER | of the Resource Management Act 1991 |
| AND | of three appeals under clause 14 of Schedule 1 to the Act |
| BETWEEN | FEDERATED FARMERS OF NEW ZEALAND INCORPORATED |
| | (ENV-2017-AKL-146) |
| AND | CNI IWI LAND MANAGEMENT LIMITED |
| | (ENV-2017-AKL-148) |
| AND | MĀORI TRUSTEE |
| | (ENV-2017-AKL-149) |
| | Appellants |
| AND | BAY OF PLENTY REGIONAL COUNCIL |
| | Respondent |
| AND | ROTORUA DISTRICT COUNCIL |
| | TE PŪMAUTANGA O TE ARAWA TRUST |
| | TE MARU O NGĀTI RANGIWEWEHI IWI AUTHORITY |
| | TE KOMITI NUI O NGĀTI WHAKAUE |
| | HANCOCK FOREST MANAGEMENT (NZ) LIMITED |
| | PF OLSEN LIMITED |
| | KAINGAROA TIMBERLANDS PARTNERSHIP |
| | LACHLAN MCKENZIE |
| | LAKE ROTORUA PRIMARY PRODUCERS' COLLECTIVE |
| | Section 274 Parties |

THE SEAL OF THE ENVIRONMENT COURT NEW ZEALAND

| | |
|---|---|
| Court: | Judge D A Kirkpatrick<br>Commissioner R M Dunlop<br>Commissioner J A Hodges |
| Hearing: | at Rotorua from 4 to 8 March 2019<br>(closing submissions on 22 March 2019) |
| Appearances: | B Matheson and NJ Edwards for Federated Farmers of New Zealand<br>N Tahana and T Hullena for CNI Land Management Limited and Māori Trustee<br>S Wooler and R Zame for the Bay of Plenty Regional Council<br>T Le Bas and S Thomas for the Rotorua District Council<br>G K Chappell for Hancock Forest Management NZ Limited and P F Olsen Limited<br>S Hickman for Kaingaroa Timberlands Partnership |

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**INTERIM DECISION**

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**A: The most appropriate method to allocate nitrogen to rural land uses in the Rotorua Lake catchment is the sector range method proposed in PC10, with modifications.**

**B The appeals will now proceed to a Stage 2 hearing to address specific matters set out in this decision and to finalise the provisions of PC10.**

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## PART 1 – BACKGROUND

### Introduction

[1] The quality of the water in Te Rotorua-nui-ā-Kahumatamomoe / Lake Rotorua (**the Lake**) has been the subject of concern for many years. A focus of that concern has been on the quantities of nitrogen and phosphorus entering the lake, particularly as a result of discharges caused by or otherwise associated with human activity. Consequences of elevated levels of nitrogen and phosphorus entering the lake are increased algal growth and deterioration of water quality.

[2] Proposed Plan Change 10: Lake Rotorua Nutrient Management (**PC10**) seeks to address this concern. It was publicly notified by the Bay of Plenty Regional Council (**Regional Council**) on 29 February 2016. It introduces policies, rules and other methods to limit the amount of nitrogen from land use entering the lake. Its purpose is to reduce nitrogen losses from pastoral farming activities on rural land within the Lake Rotorua groundwater catchment in the Bay of Plenty Region. It is intended to contribute towards meeting the Sustainable Lake Load of 435 tonnes of nitrogen per year (**tN/y**) by 2032 in order to give effect to Policy WL 3B of the Bay of Plenty Regional Policy Statement (**RPS**), which provides:

> **RPS Policy WL 3B: Establishing limits for contaminants entering catchments at risk**
>
> Establish limits for the total amount of specified contaminants that enter the receiving waters within a catchment at risk including:
>
> (a) Contaminants to be managed to avoid compromising public health and each catchment's ecology, mauri, fishability, swimmability and aesthetics;
>
> (b) For the Rotorua Te Arawa Lakes the amount of nitrogen and phosphorus that can enter each lake in order to achieve its target trophic level index; and
>
> (c) For Lake Rotorua the total amount of nitrogen that enters the lake shall not exceed 435 tonnes per annum.

[3] It is proposed to include PC10 as a new chapter in the operative Bay of Plenty Regional Natural Resources Plan (**RNRP**).[1] Importantly, PC10 contains no new objectives and the relevant region-wide provisions continue to apply, save for those provisions as amended specifically for PC10. To this extent PC10 must be considered as an integral part of the RNRP and not in isolation.

[1] The RNRP replaced the Regional Water and Land Plan (**RWLP**) in September 2017. No rules, objectives or policies in the RWLP were changed as a result of the replacement.

[4] PC10 forms one part of an integrated framework for the Lake Rotorua catchment that the Regional Council has adopted, which in combination is intended to give effect to the particular requirement of Policy WL 3B(c) of the RPS. Other elements of the Integrated Framework include:

(a) an incentives fund to purchase and remove 100 tN/y of nitrogen discharges;[2]

(b) a gorse scheme to remove 30 tN/y; and

(c) engineering works, including those associated with the Rotorua wastewater treatment plant to remove a further 50 tN/y.

This Integrated Framework is described in more detail later in this decision.

[5] The Regional Council appointed an Independent Hearing Panel (**IHP**) to conduct the hearing process for PC10 under section 34A of the Resource Management Act 1991 (**the Act** or **RMA**). The IHP was given delegated authority under Sections 42A, 41B and 41C of the Act to hear and consider all submissions and evidence received on PC10 in their entirety. It was then to make a report on those matters and recommend decisions for the Regional Council to consider.

[6] The report and recommendations of the IHP (**IHP's Report**) were considered by the Regional Council on 2 August 2017. The Regional Council accepted the report and the recommendations from the IHP and adopted and notified these as the Regional Council's decisions on submissions. We refer to the version of PC10 adopted by the Regional Council as the **Decisions Version.**

[7] A number of amendments to the provisions of PC10 have been proposed by the Regional Council since the Decisions Version was publicly notified. These are summarised in the following Table 1 provided by Ms Wooler, counsel for the Regional Council. As no party challenged these changes, we accept them and refer to the version of PC10 with the amendments included as the **Appeals Version**.

[2] These nitrogen discharges have been calculated based on farm management software called OVERSEER® version 5.4. It is important to be aware that the methodology in PC10 uses Overseer version 6.2.0. The two versions produce different results for nitrogen discharges. We address this issue below.

**Table 1: Unchallenged amendments to provisions of PC10 (Appeals Version)**

| Amendments made | Location of Amendments |
|---|---|
| Alignment with Consent Order issued by the Court – dated 26th June 2018 resolving appeal by Ngāti Uenukukōpako Iwi Trust.[3] | LR P19<br>LR M1(c)<br>LR M5(g)<br>Schedule LR One E - Amendment of Nitrogen Discharge Allocation |
| Alignment with LR R11: Ensure trading can occur with use of alternative nutrient budget models | LRR10Schedule LR One D - Additional matters |
| Correction to policy reference – previously inserted policy disrupted numbering | LR R11(i) |
| Clarification of five-year timeframe and wording of reference to legislation | LR R11A |
| Updated to align with Regional Natural Resources Plan (i.e. reference to operative rules, tables, page numbers and plan sections under the new format) | Consequential amendments |

**Appeals**

[8] The Decisions Version was the subject of appeals by Federated Farmers of New Zealand Inc (**Federated Farmers**), CNI Iwi Land Management Ltd (**CNI**), the Māori Trustee and Ngati Uenukukopako Iwi Trust (**NUIT**). The relief sought in each of the appeals was refined between the date of filing and the date of the hearing. The relief now sought by each of the appellants is generally described in paragraphs [9] to [15] below.

[9] Federated Farmers and NUIT each lodged an appeal seeking relief in regard to provisions made for infrastructure and wastewater treatment. That part of the Federated Farmers appeal and the NUIT appeal in its entirety were resolved by a consent order of the Court dated 26 June 2018. This disposed of all issues arising out of PC10 in respect of the Rotorua wastewater treatment plant.

[3] While not referred to in the information provided by Ms Wooler, the Court notes for completeness it also aligns with resolution of part of Federated Farmers Appeal as discussed in para. [10].

[10] Federated Farmers also initially appealed against the Council's decision in its entirety and against every provision in PC10. By the time of hearing, Federated Farmers' position was that it was no longer seeking changes that brought into question the basic approach of PC10. Mr Matheson, counsel for Federated Farmers, confirmed in response to a clarification sought by the Court that only the implementation methods remain in dispute. These specific matters are to be addressed at Stage 2 of the hearing of these appeals.

[11] In its appeal, CNI did not support the nitrogen allocation method used in PC10. This allocates available nitrogen among the various land use activity sectors within the Lake Rotorua groundwater catchment and sets sector limits and/or ranges, which all dischargers in each sector must meet or be within. CNI considered that this approach gives preference to existing high nitrogen dischargers, especially existing dairy and drystock farmers. They also considered that it disadvantages forest, bush and scrub landowners, particularly some Māori land owners who may wish to convert their land to farming, by reducing or removing opportunities to develop such land for more intensive use.

[12] Instead, CNI proposed an alternative approach based on the natural capital of land for farm production, adopting the New Zealand Land Use Capability (**LUC**) Classification system[4] as a proxy for natural capital. They considered this would be a more equitable approach as it would reflect the underlying productive capacity of land without giving priority to existing high nitrogen dischargers and providing opportunities for land currently in forest, bush and scrub to be used more productively. CNI was supported in this approach by the Māori Trustee, the Rotorua District Council and a number of other parties under s 274 RMA as listed below, and these parties identified themselves as the Natural Capital Group (**NCG**)

[13] These competing allocation methods are explained in more detail later in this decision. For ease of reference in this decision, the method proposed by the Regional Council in PC10 is described as **the sector range approach** and the alternative method proposed by the NCG is described as the Alternative Natural Capital Approach (**ANCA**).

[14] The CNI appeal raised a number of other issues which we address in Part 4 of this decision, including that the Regional Council did not adequately:

(a) consult or engage with CNI;

(b) consider alternative nitrogen discharge methods;

[4] As described in the *Land Use Capability Survey Handbook (3rd ed. 2009)* Manaaki Whenua Landcare Research and available at: https://www.landcareresearch.co.nz/publications/books/luc

(c) consider controls on phosphorus; and

(d) define requirements for the use of best on-farm management practices.

[15] The sole relief now sought by the Māori Trustee is the adoption of ANCA.[5]

**Section 274 parties**

[16] The following parties joined the various appeals under s274 RMA:

(i) supporting CNI and the Māori Trustee:

(a) Rotorua District Council

(b) Te Pumautanga o Te Arawa Trust

(c) Te Maru o Ngati Rangiwewehi Iwi Authority

(d) Te Komiti Nui o Ngati Whakaue

(e) Hancock Forest Management (NZ) Limited

(f) PF Olsen Limited

(g) Kaingaroa Timberlands Partnership

(ii) supporting Federated Farmers:

(h) Lachlan Mckenzie

(i) Lake Rotorua Primary Producers' Collective

**Scope of hearing**

[17] During the course of pre-hearing conferences, it was agreed to hold the hearing of the appeals in two stages:

(a) Stage 1 to consider which allocation approach is the most appropriate basis on which to allocate discharges of nitrogen from rural land in the Lake Rotorua groundwater catchment to give effect to the relevant RPS and RNRP objectives; and

---

5 Joint memorandum of counsel for CNI Iwi Land Management Limited, Maori Trustee and Rotorua Lakes Council dated 22 November 2018.

(b) Stage 2 to consider the most appropriate planning provisions to be included in the RNRP in light of the decision on the appropriate allocation method.

[18] This interim decision relates to the Stage 1 hearing and its scope is limited to determining the most appropriate nitrogen allocation method. While there is discussion in a number of places in this decision about particular sources and discharges of nitrogen and various methods of addressing those, such discussion is not intended to determine or otherwise limit the scope of the Stage 2 inquiry.

**Summary of competing positions**

[19] The Regional Council considered the sector range approach in the Appeals Version of PC10 is more appropriate than ANCA for the following reasons:

(a) the sector range approach is more certain and therefore more likely to be effective;

(b) the sector range approach balances a wide range of public and private interests and values in a highly nutrient-constrained catchment. By comparison, ANCA would significantly benefit existing forestry interests and provide for the potential development of their land, but at the expense of those who currently require nitrogen to continue farming;

(c) the sector range approach provides some ability for the development of Māori-owned land through Rule LR 11A and the provision for some drystock land to increase nitrogen discharges to the bottom of the sector range. Overall, PC10 provides more nitrogen to Māori-owned land than ANCA;

(d) the sector range approach has a lower risk of widespread adverse economic and social effects than ANCA;

(e) ANCA would not provide for a more appropriate environmental outcome as LUC has been used as a proportioning tool and has no relationship to nitrogen leaching; and

(f) The provisions of the sector range approach are comprehensive and well-developed.

[20] Federated Farmers largely adopted the Regional Council's reasons based on the relative efficiency, effectiveness and uncertainties of each method. They submitted that the

sector range approach would result in less adverse social and economic effects than ANCA and would be more effective and efficient than ANCA.

[21] Mr P F Le Miére, the North Island Regional Policy Manager for Federated Farmers, explained the reasoning for its change in position as follows:

> ... following receipt of details regarding the alternative allocation approach sought by NCG, we realised that the Alternative Natural Capital Approach ("**ANCA**") was significantly worse for existing pastoral farmers and likely to cause significantly greater economic cost and hardship than PC10, for no better environmental outcome.

[22] He further explained that:

> Federated Farmers has some comparatively minor appeal points remaining. These relate to the implementation and practicality of PC10 e.g. drafting Nutrient Management Plans so that they provide sufficient certainty for Council whilst at the same time recognising that farming needs to be flexible to respond to unexpected events.

[23] NCG submitted that the ANCA allocation method will achieve the lake target in a way that is fairer, more equitable and more certain than PC10 because:

(a) ANCA presents the most appropriate allocation method to promote the sustainable management of natural and physical resources in the catchment;

(b) ANCA's allocation is based on the capacity of the land and not on the current land user's understanding of their perceived 'right' to pollute;

(c) ANCA uses the LUC classification system which is proven and reliable;

(d) ANCA is an impartial allocation approach which avoids picking winners and losers;

(e) ANCA's adaptive management approach integrates with the Integrated Framework; and

(f) ANCA is not as reliant on non-regulatory instruments.

[24] Mr A S Te Pou, the General manager of CNI, was clear that CNI does not seek to address a Treaty of Waitangi grievance by participating in PC10. However, he expressed an underlying concern in this way:

> When the land was taken we lost our *tino rangatiratanga* (self-determination). When the land was returned we were meant to receive our land back as well as the mana to make decisions for ourselves. PPC10 makes land use development within the catchment, even if it is for a sustainable land use, near impossible.

> This effectively perpetuates the injustice that the Settlement Act was intended to remedy.

[25] The Settlement Act referred to by Mr Te Pou is the CNI Forests Land Collective Settlement Act 2008, which involved a total area of 176,000 ha, with 3,180 ha of the total located within the Lake Rotorua groundwater catchment.

[26] Ms T Y M Bidois, General Manager of Te Tahuhu o Tawakeheimoa Trust representing Ngati Rangiwewehi, raised a concern identified in the Cultural Impact Assessment (**CIA**) prepared by NCG, of which she was one of the authors, about the effects of Rule 11 on Māori land:

> The CIA addresses matters pertaining to Rule 11, the application of mauri and reciprocity and also analysis on the lost opportunity for development. The inequity created by Rule 11 applies particularly to Māori land, which is largely undeveloped or under-developed within the catchment. Any undeveloped or underdeveloped land is effectively hamstrung by the grandparenting approach in PC10 which perpetuates the status quo.

[27] She also explained that the term "natural capacity" as used in the CIA has a much wider meaning than the physical attributes of the land, as referred to by Mr Willis, a planner called by Federated Farmers, and includes Māori cultural values such as Kaitiakitanga, Mauri (of land and water), Utu, and Rangatiratanga and that:

> The ANCA approach better encapsulates the principles in the CIA, in particular the Māori cultural values of mana whenua, including Ngāti Whakaue, Tuhourangai, and Ngāti Rangiwewehi.

[28] The Māori Trustee is concerned that PPC10 effectively penalises owners of Māori land for their historically low contribution to the current levels of nitrogen discharged to Lake Rotorua.

**Summary of principal issues remaining in dispute**

[29] The following principal issues arise for consideration and resolution as part of the Stage 1 hearing:

(a) The alternative nitrogen allocation methods, including their relative efficiency and effectiveness in implementing relevant RPS and RNRP objectives and provisions, their equity and fairness and their associated social, cultural and economic effects;

(b) The risks associated with each method;

(c) The way in which the matters listed in RPS Policy WL 5B: *Allocating the capacity to assimilate contaminants* are to be applied, including the role of Part 2 RMA in interpreting the Policy;

(d) The adequacy of consultation by the Council with Māori and, in particular, CNI and the Māori Trustee;

(e) Use of the Incentives Fund;

(f) Whether nitrogen allocation transfers should be managed by leasing or purchase; and

(g) The implications of market frictions on nitrogen trading under the two allocation methods.

**Our approach and preliminary clarifications**

[30] We were assisted by the completeness and clarity of the IHP's Report and recommendations, which formed the basis of the Regional Council's decision. We are required to have regard to that decision in accordance with s 290A RMA. To avoid needless repetition we have referred to, relied upon and adopted parts of the IHP's Report and recommendations, which we found both thorough and comprehensive, where they are relevant to our decision and remain current. The IHP's Report is available on the Regional Council's website on the page relating to Lake Rotorua Nutrient Management - Plan Change 10 and specifically at:

https://cdn.boprc.govt.nz/media/670432/1lake-rotorua-nutrient-management-plan-change-10-plus-cover-page-council-decison-report-dated-15-august-2017.pdf

[31] We note that the development of and extant provisions of PC10 are described in Part II of the IHP's Report. We adopt that part of the IHP's Report in its entirety and do not repeat its full contents in our decision. However, we address a number of matters from Part II of the IHP's Report in later parts of our decision, where necessary to provide context for our decision and/or to update information to reflect the evidence before us.

[32] We also note that the consideration of and evaluation of overarching major issues are described in Part IV of the IHP's Report. We adopt the following sections of Part IV, subject to comments as set out below.

(a) the wastewater treatment plant, subject to the subsequent provisions of the Consent Order referred to in paragraph [9] above;

(b) the collaborative process and consultation;

(c) consultation with Māori, noting the additional matters discussed in paragraphs [144] - [156] below setting out our own assessment of concerns raised by CNI and the Māori Trustee in relation to consultation with iwi.

(d) Iwi Management Plans, noting that we have also taken into account the NCG CIA provided as part of the evidence before us.

(e) Our own consideration of the matters in ss 6(e), 7(a) and 8 RMA in relation to matters of particular concern to Māori.

[33] While the IHP's Report also discusses the management of land use by rules to control nitrogen loss, that will be dealt with by us in the Stage 2 hearing.

[34] We have taken into account new or updated information that has become available since the Council hearing and provided to the Court through the hearing process, including but not limited to:

(a) The Council's February 2019 Lake Rotorua Science Review Summary Report (**Summary Report**) and Module 4 of the Science Review Report;

(b) The CIA dated 3 December 2018 prepared by the Te Arawa Lakes Trust and the Mana Whenua representatives of the Natural Capital Group, authored by Nicola Douglas, Gina Mohi, Lani Kereopa, Rangitihi Pene and Te Rangikaheke Bidois;

(c) The Alternative Natural Capital Approach as set out in the evidence;

(d) The National Policy Statement on Freshwater Management (**NPSFM**), as amended in 2017;

(e) Additional catchment, economic and farm scale modelling as presented in evidence;

(f) The outcomes of extensive expert conferencing as contained in the signed Joint Witness Statements (**JWS**), which we found particularly helpful and for which we express our appreciation to all participating experts and the facilitator, Environment Commissioner Leijnen; and

(g) Other new information included in the evidence before us.

[35] We explored uncertainties associated with both allocation methods in some detail at the hearing, including in relation to the use of the proprietary computer programme called Overseer. The sector range and ANCA methods both rely on the use of Overseer to calculate long-term average losses of nitrogen from below the root zone of rural land uses. We received expert evidence that Overseer is the most appropriate model to use for this purpose. While this approach has become common practice in many areas of New Zealand, it has notable limitations and presents both procedural and substantive risks when used in regulatory processes. We return to this later in our decision.

[36] When comparing the two allocation methods before us, we focussed on differences between them that were material to our determination of the most appropriate method. While there are a number of other differences that exist between the methods, we considered that referring to them in our decision would add complexity with no additional benefits in terms of outcome.

**Need for caution**

[37] It is an unavoidable conclusion from the evidence that there are many important aspects of nutrient management in the Lake Rotorua catchment that are uncertain, and that time will be required before the outcome of policies and methods put in place now will become apparent. Under these circumstances, it is necessary for all parties to accept that PC10 is part of a long-term process, and that further plan changes will likely be required in terms of policy direction in the future to take account of experience and further scientific data.

[38] This is recognised explicitly by the Regional Council in the introduction to PC10, which states:

> The need to achieve the sustainable lake load of 435 tonnes of nitrogen per annum is based on the best science available. Adaptive management is a core element of the implementation of nutrient management for the Lake Rotorua groundwater catchment. This includes regular reviews of the science and policy and responding to the outcomes of these reviews.

[39] Ms Wooler in submissions in reply explained that use of the phrase *adaptive management* in this context is a "reflection of the complexity of water management in the Lake Rotorua catchment, rather than any innate uncertainty in resulting effects of the actions being taken". We accept use of the phrase understood in this way and differentiated from the prerequisites for adaptive management contained in the *Sustain Our Sounds* decision.[6]

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6 *Sustain Our Sounds Inc v New Zealand King Salmon* [2014] NZSC 40 at [129] and [133].

[40] Understanding uncertainties is important for many reasons, including in terms of our decision when assessing the risk of acting or not acting if there is uncertain or insufficient information about the subject matter of the provisions, as required by s32(2)(c) RMA. We emphasise that our decision addresses the unique circumstances that exist in the Lake Rotorua groundwater catchment. The same circumstances likely do not exist anywhere else, so considerable caution should be used before seeking to transfer the findings of this decision to other locations without a thorough evaluation of their applicability and appropriateness.

## PART 2 - LEGAL AND STATUTORY CONTEXT

### Introduction

[41] The legal and statutory context for PC10 is described in Part III of the IHP's Report. We generally adopt that part of the IHP's Report and do not repeat its full contents here. We comment below on specific aspects of Part III where they are fundamental to our decision and to reflect the evidence before us. For clarity, we start by quoting from paragraph [170] of the IHP's Report, with which we agree:

> It is now well accepted that there is no legal presumption that the proposals advanced by the Regional Council in proposed PC10 are to be preferred to alternatives being promoted by other participants in the process.

### Part 2 RMA

[42] We set out below the matters in sections 6, 7 and 8 of the Act that are particularly relevant to our decision on the most appropriate nitrogen allocation method to be used in PC10.

(a) Section 6 – Matters of national importance

- (a) the preservation of the natural character of ... lakes ... and the protection of them from inappropriate ... use ...
- (e) the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga

(b) Section 7 – Other matters

- (a) kaitiakitanga;
- (aa) the ethic of stewardship;
- (b) the efficient use and development of natural and physical resources;

(c) the maintenance and enhancement of amenity values;

(f) maintenance and enhancement of the quality of the environment;

(h) the protection of the habitat of trout; and

(i) the effects of climate change.

(c) Section 8– Treaty of Waitangi

> In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi).

**Section 32 RMA**

[43] When undertaking our evaluation of the two allocation methods in our decision, we do so in accordance with the relevant requirements of s 32 RMA as they stood when PC10 was first notified on 29 February 2016.

[44] Section 32 of the RMA prescribes the requirements for preparing and publishing evaluation reports on proposed plan provisions for achieving relevant objectives. An evaluation report is to examine whether the proposed provisions, which in this case includes the allocation method, are the most appropriate way to achieve the purpose of the Act and the relevant objectives of the RPS and RNRP in accordance with s32(1)(b) RMA by:

(a) identifying other reasonably practicable options;

(b) assessing the efficiency and effectiveness of the provisions in doing so; and

(c) summarising the reasons for deciding on the better provisions.

[45] In assessing the efficiency and effectiveness of provisions, the assessment has to identify and assess the anticipated benefits and costs of the environmental, economic, social and cultural effects, including opportunities for economic growth and employment anticipated to be provided or reduced. The assessment has also, if practicable, to quantify the benefits and costs; and if there is uncertain or insufficient information about the subject matter of the provisions, has to assess the risk of acting or not acting (s32(2)(c) RMA).

[46] The report is to contain the level of detail that corresponds to the scale and significance of the environmental, economic, social and cultural effects anticipated from implementation of the proposal (s 32(1)(c) RMA). There can be no doubt that the overall effects of PC10 on rural land use, whichever allocation method is adopted, will be very significant for the Rotorua

district community, which is reflected in the level of detail included in our decision. We note that this decision satisfies the requirement in s32AA RMA for a further evaluation.

[47] We have taken into account s 32(3) RMA. We have satisfied ourselves, based on the evidence, that s 32(4) RMA does not apply, in that PC10 does not impose a greater prohibition or restriction that those in the NPSFM.

**Functions of the Regional Council under the RMA**

[48] Relevantly, the functions of the Regional Council listed in s 30(1) RMA for the purpose of giving effect to the Act in its region include:

> (a) the establishment, implementation, and review of objectives, policies, and methods to achieve integrated management of the natural and physical resources of the region:
>
> (b) the preparation of objectives and policies in relation to any actual or potential effects of the use, development, or protection of land which are of regional significance: ...
>
> (c) the control of the use of land for the purpose of –
>
> (ii) the maintenance and enhancement of the quality of water in water bodies ...
>
> (iiia) the maintenance and enhancement of ecosystems in water bodies ...
>
> (f) the control of discharges of contaminants into or onto land, air, or water and discharges of water into water: ...
>
> (ga) the establishment, implementation, and review of objectives, policies, and methods for maintaining indigenous biological diversity.

**Statutory authority for rules**

[49] Ms Wooler for the Regional Council explained that the PC10 provisions primarily comprise land use controls imposed by regional rules under s 9(2) RMA and that these are supported by a rule controlling discharges under s 15 RMA. The latter rule (LR R13) makes the discharge of nutrients onto land where a contaminant may enter water a permitted activity provided the land use associated with the discharge is authorised under the relevant regional land use rules (LR R1 to LR R11).

[50] Being regional land use rules rather than district land use rules, s 10 RMA does not apply and existing activities do not enjoy existing use rights. The relevant existing use rights regime is under s 20 RMA.

**National Policy Statement Freshwater Management**

[51] Section 67(3)(a) RMA requires a regional plan to give effect to any national policy statement (**NPS**). The only NPS that appears to be relevant to PC10 is the NPSFM. We must

accordingly be satisfied that PC10 gives effect to the provisions of the NPSFM as updated in 2017.

[52] The NPSFM includes the following provisions which are especially relevant in this case:

(a) Water Quality Objective A1: to safeguard the life-supporting capacity, ecosystem processes and indigenous species including their associated ecosystems of fresh water in sustainably managing the use and development of land and of discharges of contaminants;

(b) Water Quality Objective A2: the overall quality of fresh water within a freshwater management unit is maintained or improved while protecting the significant values of outstanding freshwater bodies;

(c) Water Quality Policy A1: among other things, sets freshwater quality limits for all freshwater management units in regions to give effect to the objectives in the NPSFM;

(d) Water Quality Policy A6: among other things, by every regional council developing regional targets to improve the quality of fresh water in specified rivers and lakes;

(e) Water Quality Policy A7: by every regional council considering, when giving effect to this national policy statement, how to enable communities to provide for their economic well-being, including productive economic opportunities, while managing within limits.

(f) National Objectives Framework Objective CA1: to provide an approach to establish freshwater objectives for national values that is nationally consistent and recognises regional and local circumstances.

(g) National Objectives Framework Policy CA2(d): among other things, for those attributes specified in Appendix 2, assigning an attribute state at or above the minimum acceptable state for that attribute.

[53] The national values for fresh water in Appendix 1 to the NPSFM include ecosystem health as a compulsory value. The attribute values in Appendix 2 include total nitrogen (trophic state) as an attribute for the value of ecosystem health in lakes.

[54] Ms Wooler for the Regional Council called Mr S Lamb to give expert planning evidence that PC10 went through comprehensive community consultation akin to that anticipated by the NPSFM and, together with the RPS and the RNRP, gives effect to the NPSFM as it relates to Lake Rotorua.

[55] We note that both the RPS and RNRP (when it was the RWLP) were prepared to meet the requirements of the NPSFM 2011, while the IHP's Report and recommendations were prepared to take into account the compulsory National Bottom Lines in the NPSFM 2014, which are unchanged in the NPSFM 2017 for ecosystem health in lakes in respect of total nitrogen (trophic state). It is also relevant that the introduction to PC10 states:

> Achieving the sustainable lake load for nitrogen also forms part of the National Policy Statement for Freshwater Management (NPSFM 2014) implementation. Council may need to consider further changes to the Plan to address other NPSFM 2014 attributes of relevance at some point in the future.

[56] Method LR M2 of PC10 requires five-yearly reviews of trends in lake water quality attributes and states:

> Regional Council will review and publish the science that determined the limits set in the RPS and the RNRP for Lake Rotorua on a five yearly basis. These reviews may include:
>
> (a) Review of trends in Lake water quality attributes including nitrogen, phosphorus, Chlorophyll a, algal blooms, clarity, trophic level index for in-lake, inflows, and outflow where relevant.

[57] None of the evidence presented to us specifically addressed compliance with the National Bottom Line for total nitrogen in the NPSFM. However, the IHP's Report at paragraph [56] records that Professor D P Hamilton, a specialist in lake water quality modelling giving evidence for the Regional Council, provided further evidence to the IHP that showed compliance of concentrations of chlorophyll-*a*, total phosphorus and total nitrogen with the relevant national bottom lines set out in the Attribute Tables in the NPSFM 2014 (and hence those in NPSFM 2017). That part of the IHP's Report was not challenged before us. In addition, we reviewed the water quality trends in the lake over the period 2001 to 2017, as set out in the Summary Report. This confirms compliance with the nitrogen National Bottom Line for at least the last 10 years.

[58] The planning experts considered the implications of the NPSFM at their first planning conference.[7] They recorded "We understand the Council's position is that all matters described in Objective CA1 and Policy CA2(a) - (f) of the NPS-FM have been taken into

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[7] At pages 17 and 18 of the first JWS Planning.

account by Council even though the TLI and nitrogen limit setting process was completed prior to the NPSFM becoming operative in 2014." That understanding was not challenged before us.

[59] The planning experts agreed at the conference that "The TLI, RPS nitrogen limit and subsequent PC10 uphold Objectives AA1 and AA2 and Policies AA1 to AA3 by providing a regulatory framework that upholds the limit and the TLI." They went on to say that PC10 "... will provide for the safeguarding of the life supporting capacity of water, ecosystem processes and indigenous species, including associated ecosystems and the health of people and their communities by managing the use and development of land in a manner that reduces discharges of contaminants into Lake Rotorua."[8]

[60] The planning experts further agreed that:

> Whether the NPS-FM has been given effect to (in terms of nitrogen and other contaminants) is not critical for these proceedings given that;
>
> a) Council's progressive implementation plan gives it until 2022 to do so in respect of the Rotorua lakes; and
>
> b) There is no disagreement between the experts that the TLI of 4.2 and the catchment N load of 435 tN are the appropriate objectives and limits for PC10.

[61] The planning experts noted that while PC10 only manages nitrogen discharges, "[b]ased on current information it is not anticipated that the objectives, policies and TLI set for Lake Rotorua in the RPS, RNRP and PC10 will be changed. Whether this remains the case will depend on the outcomes of the science review (method LR M2)."[9]

[62] No party identified any issues about PC10 giving effect to the NPSFM at the hearing before us and, based on the IHP's Report, the planning and water quality evidence and our own review of water quality trends, we are satisfied that the Appeals Version of PC10 gives effect to the nitrogen attribute requirements of the NPSFM.[10]

[63] It is relevant that even where National Bottom Lines are not met, which is not the case with regard to nitrogen in Lake Rotorua, the preamble to the NPSFM provides time before they must be met, noting that "[i]t is up to communities and iwi/hapū, through councils, to determine

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8 There is no Objective AA2 or Policies AA 2 or 3 in the NPSFM. It is unclear to us what the experts were referring to, but in any event, we have considered all relevant objectives and policies when reaching our conclusions below relating to the NPSFM.

9 At page 18 of the first JWS Planning.

10 Refer also NPSFM, Policy E1 in relation to having a progressive implementation programme.

the pathway and timeframe for ensuring freshwater management units meet the national bottom lines."

[64] Based on the above, we are satisfied that the Appeals Version of PC10 gives effect to the NPSFM in terms of nitrogen.

**Statutory Instruments, Objectives and Policies**

[65] Section 67(3)(c) RMA requires a regional plan to give effect to any regional policy statement, and so we have also considered the relevant objectives and policies of the RPS. As well, as PC10 does not propose any new objectives, it must be evaluated under s 32(1)(b) RMA in terms of whether its provisions are the most appropriate way to achieve the existing objectives of the RNRP.

[66] A number of objectives and policies from the RPS and the RNRP were drawn to the Court's attention in evidence. Both the IHP's Report and the Draft Statement of Agreed Facts dated 21 June 2018 (**SAF**) comprehensively set out the relevant objectives and policies. The CIA lists objectives and policies considered relevant by its authors. We have undertaken our own review and careful consideration of the objectives and policies and are satisfied that the above documents in combination identify all the objectives and policies relevant to our decision.

[67] The SAF records that "[a]ll objectives, in both the RPS and operative RNRP are considered to be directive" and that policies in the RPS with a "B" after the main policy number are directive.[11]

[68] With regard to the RNRP, we agree with the IHP's Report[12] that:

> As there are no new objectives proposed for the RWLP (*now, RNRP*) in PC10, the current objectives of the plan are of considerable importance. As PC10 proposes policies, methods and rules which will become part of the RWLP (*now, RNRP*), it is to the objectives of that plan that we should first turn.

[69] The IHP's Report goes on to say that "[a]ll the parties to this plan change appeared to accept that the objectives of the RNRP reflect the relevant principles of the RMA..." We were not presented with any submissions or evidence indicating disagreement with this statement, and we therefore proceed on the same basis as the IHP.

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11 Statement of Agreed Facts at section 2.1.

12 At paragraph [238].

[70] We do not reproduce relevant objectives and policies in our decision, except to a very limited extent. Whether specifically reproduced in our decision or not, we considered all the RPS and RNRP objectives and policies of particular relevance to Māori and water quality associated with PC10 and our decision on the nitrogen allocation method, including those related to matters of national importance, integrated resource management and land use.

## PART 3 - THE NEED FOR NUTRIENT CONTROL IN THE CATCHMENT

### Background

[71] Lake Rotorua is a taonga valued highly by tangata whenua and by the community at large, all of whom have an interest in protecting its qualities and attributes.

[72] The water quality in Lake Rotorua has deteriorated at least since the 1960s, driven by increases in nutrient discharges resulting from increasingly intensive rural and urban land use changes. Nutrient loads to the lake in the 1960s, prior to reticulated sewage discharges, were estimated to be 435 tN/y and 37 tonnes of phosphorus per year (tP/y).[13] These loads have increased substantially since then.

[73] Pastoral farming contributes the majority of nitrogen, and a major portion of the phosphorus, from animal urine and faeces and soil erosion exacerbated by animal movement.

[74] Further details are provided in paragraphs [9] to [13] and [294] to [333] of the IHP's Report. We are generally in agreement with these sections of the Report, including the findings. However, to ensure we base our decision on the most up-to-date information available, as set out in the evidence before us, we now provide our own analysis of the need for nutrient control in the lake catchment to achieve the relevant RPS objectives and policies and RNRP objectives.

### The Lake Rotorua groundwater catchment

[75] The extent of the Lake Rotorua groundwater catchment is shown on Map LR 1, which is reproduced from PC10 and shown as Appendix 3 to this decision.

[76] We note that Map LR 1 shows that the extent of the groundwater catchment differs from that of the surface water catchment on which the boundaries of the region are based. This results in some parts of the groundwater catchment being outside the Bay of Plenty Region, while some parts of the Waikato Region are within this catchment. Importantly, the

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13 Lake Rotorua Science Review – Summary Report, February 2019 at page 4.

groundwater catchment located in the Waikato Region is not presently subject to Lake Rotorua Nutrient Management rules. It will be necessary for the two Regional Councils to formally agree how cross-boundary issues relating to the management of nitrogen discharges will be addressed so as to give effect to relevant aspects of s 62(1)(h) RMA and RPS Policy IR 6B. The Regional Council is **directed** to provide an update of progress on the agreement process at the Stage 2 hearing.

**Current land use within the Rotorua Lake catchment**

[77] The total area of the Lake Rotorua groundwater catchment is 53,790 hectares (**ha**), of which 2,691 ha is in the Waikato region. Urban areas and the lake surface occupy 11,813 ha, with the remaining 39,286 ha within the Bay of Plenty region being rural land subject to PC10.[14] The total area of rural land in the groundwater catchment draining to Lake Rotorua from both regions is 41,977 ha.

[78] 16,410 ha of the total rural area of 41,977 ha is Māori-owned land, made up of 3,651 ha of Treaty Settlement land and 12,760 ha of freehold land (as defined in the Te Turi Whenua Māori Act 1993(**TTW**)). 3,226 ha of the Treaty Settlement land is owned by CNI Holdings Limited and 425 ha is owned by Ngati Rangiwewehi.

[79] Some of the land in the catchment is protected from further development and alternative uses, for example land subject to QEII covenants. Some other types of land have been identified as undevelopable, for example roads and houses. The NCG assessed the area of protected land as 9,408 ha and the area of non-developable land as 905 ha, a total of 10,313 ha of "non-flexible" land use.

[80] Existing land uses in the catchment are summarised in the following table. The protected and not protected areas are as defined by the NCG.

| Sector | Protected/Not protected | Area (ha) |
|---|---|---|
| Bush and Scrub | Protected | 7,842 |
| | Not protected | 1,871 |
| | Sub-total | 9,712 |
| Forestry | Protected | 734 |
| | Not protected | 8,415 |
| | Sub-total | 9,149 |
| House | Protected | 19 |

[14] PC10 Natural Capital Approach, 7 June 2018 at Table 1.

| | | |
|---|---|---|
| | Not protected | 906 |
| | Sub-total | 925 |
| Pastoral (Dairy) | Protected | 58 |
| | Not protected | 4,932 |
| | Sub-total | 4,990 |
| Pastoral (Drystock) | Protected | 755 |
| | Not protected | 16,466 |
| | Sub-total | 17,201 |
| Total | | 41,977 |

[81] Small rural properties are a feature of the Lake Rotorua catchment, with around 1,480 properties covering a total of 5,600 ha, of which 4,150 ha is effective area, that is, land used for grazing, cultivation, cropping, horticulture and effluent disposal. Approximately 70 per cent of small properties are less than 4 ha, covering a total area of 1,100 ha.

[82] In 2012, 132 smallholdings in the catchment were included in the Agricultural Production Census. Of these, 57 were less than 10 ha and 24 were less than 4 ha. The majority of GST-registered smallholdings (57 per cent) identified themselves as sheep and business farms. Two per cent identified themselves as dairy farms, and two per cent as deer farms. Drystock farming occurs on 90 per cent of small properties, and dairy support occurs on at least six per cent of small properties.[15]

[83] We note that we have not addressed the proposed plan provisions relating to properties less than 40 ha in area, as we consider they are best addressed in detail at the Stage 2 hearing.

**Nutrient sources in the Lake Rotorua catchment**

[84] Sources of nutrients in the catchment include pastoral farming, forestry, bush and scrub and gorse, other rural properties, stormwater run-off, rainfall and point sources such as community and on-site treated wastewater discharges and geothermal discharges. The scope of PC10, and hence this decision, is limited to the consideration of nitrogen discharges from pastoral farming activities.

[85] For completeness, we record that while some rural land is expected to become urban in the future, this will not result in any change in total nitrogen discharged to the lake. We also

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15 IHP's Report at paragraphs [38] and [39].

record that discharges of domestic wastewater from rural properties will be managed separately from PC10 as part of proposed Plan Change 14 - On Site Effluent Treatment (OSET), which at the time of the hearing had yet to be publicly notified by the Regional Council.

**Lake Rotorua and its water quality**

[86] Lake Rotorua covers an area of approximately 80 $km^2$ within a surface water catchment area of 502 $km^2$ and a groundwater catchment of 537 $km^2$.[16] The lake has a mean depth of 10 metres and an average retention time of 450 days.[17] For the purposes of the attribute table for total nitrogen in the NPSFM, we understand it is considered to be polymictic rather than seasonally stratified. It discharges through the Ohau Channel into Lake Rotoiti and then to the Kaituna River.

[87] The lake is most likely the most intensively researched lake in New Zealand, with scientific investigations undertaken in different forms since the late 1960s. On-going science reviews are incorporated in PC10 to reflect the Oturoa Agreement, reached between the Lake Rotorua Primary Producers' Collective (Inc), the Lakes Water Quality Society, Federated Farmers and the Regional Council and dated 18 February 2013, which led to a consent order that settled certain appeals against the RPS at that time. We were provided with an overview of the state of the science in the First Water Quality JWS, including an overview of science and restoration initiatives in Attachment 2 to that document. Immediately prior to the hearing we were provided with a Summary Report dated February 2019 from the 2017 Lake Rotorua Science Review.

[88] The lake is currently classified as eutrophic, which means that lake ecological communities are moderately affected by additional algal and plant growth arising from nutrient levels that are elevated well above natural reference conditions.[18]

[89] A water quality target has been established for the lake that is intended to reflect its water quality in the 1960s, at which time the community had not observed substantial deterioration of, or expressed major concern about, lake water quality. The target is expressed quantitatively by a Trophic Level Index (**TLI**), comprising the constituent measures of total phosphorus, total nitrogen, Secchi depth transparency and chlorophyll-*a*.

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16 First JWS Water Quality at paragraph 11 on page 38.
17 First JWS Water Quality at section 5.4 on page 23.
18 First JWS Water Quality at section 1.1 on page 4.

[90] RNRP Objective RL 01 (ii) directs that "The water quality in the Rotorua lakes is maintained or improved to meet the TLI of 4.2 for Lake Rotorua." Meeting this TLI will require sustainable loads of both nitrogen and phosphorus to the lake to be established and met.

[91] Climate change is predicted to increase air temperatures by approximately 2.5 degrees Celsius by 2099, which will increase the TLI by nearly 0.1 compared to the baseline 1960 to 1990 value. The water quality experts agree that there will be a need to evaluate climate change effects on lake water quality (and catchment loads) as part of on-going science reviews,[19] which has particular regard to s7(i) of the Act.

[92] The Sustainable Nitrogen Load to the lake has been the subject of numerous scientific studies since the late 1980s. It is presently set at 435 tN/y in Objective WL 3B(c) of the RPS. We note that some research has suggested that this load may need to be amended (possibly downwards) but that has not affected the current regional planning provisions or this decision due to the uncertainty in relation to it.[20]

[93] The generally accepted sustainable phosphorus load to the lake is 37 tP/y, based on a 1989 study.[21] There is currently insufficient scientific evidence to confirm this as a limit in the RPS or any other statutory planning document. More recent work indicates the sustainable phosphorus load necessary to reach the TLI of 4.2 is between 33.7 and 38.7 tP/y, generally in line with the earlier estimate.[22]

[94] The expert witnesses on water quality appearing before us agreed that the degree of uncertainty associated with the sustainable lake loads of both nitrogen and phosphorus is of the order of 10%.[23]

[95] In addition to external nutrient loads reaching the lake, internal loads within the lake can adversely affect water quality. Lake bed sediments are a reservoir of historical nutrient inputs to the lake and can release both nitrogen and phosphorus to the overlying water and contribute to phytoplankton growth. This is most likely to occur at times of low oxygen in the lake in calm summer conditions. Internal loads to the lake can be as high as external (catchment) loads in a given year.[24]

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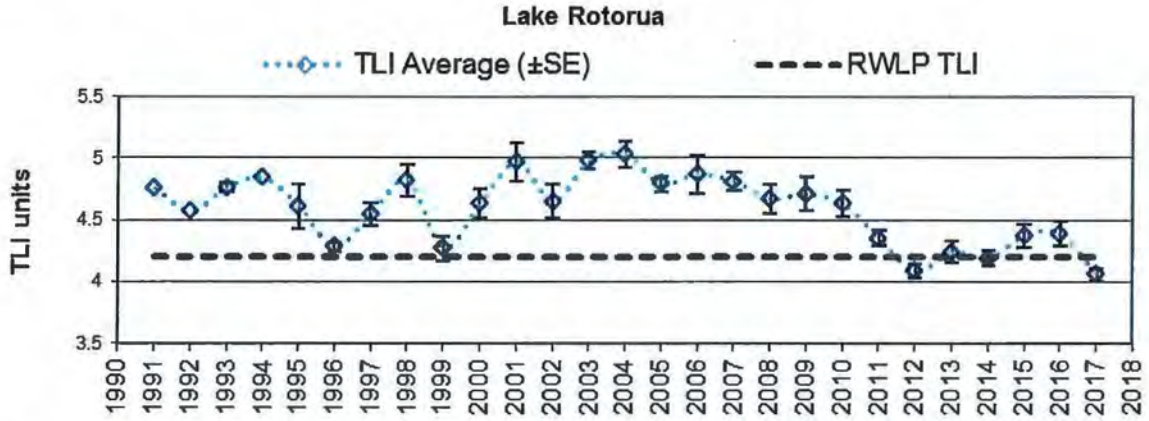
19 First JWS Water Quality at section 8.2 on page 33.
20 Lake Rotorua Science Review – Summary Report, February 2019 at page 5.
21 Rutherford et al. 1989.
22 First JWS Water Quality at paragraph 16 on page 39.
23 First JWS Water Quality at section 1.7 on page 12.
24 First JWS Water Quality at section 4.5 on page 17.

**Historical trends in the TLI of the Lake**

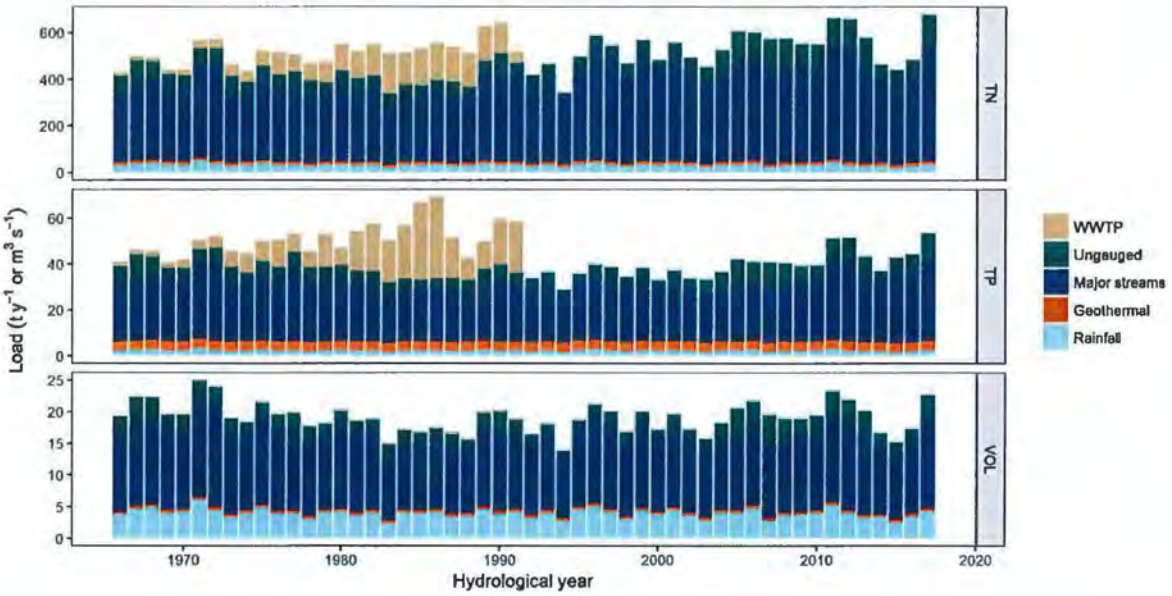
[96] The following figure, reproduced from Figure 4 on page 55 of the First Water Quality JWS, shows historical TLI values for Lake Rotorua since 1991.




[97] Since 2006, the TLI has improved markedly and in four out of the last 10 years the 4.2 target has been met. The timing of this improvement coincides with the dosing of alum to the Puarenga and Utuhina Streams, which started in 2006.[25]

**Historical nitrogen and phosphorus loads reaching the Lake**

[98] Estimates of total nitrogen and total phosphorus loads reaching Lake Rotorua between 1966 and 2017 are shown in the following figure, which is reproduced from Figure 1.2 in the First Water Quality JWS at paragraph 1.2. The third bar graph, labelled VOL, shows the volume of flow reaching the lake from different sources in cubic metres per second.




[25] First JWS Water Quality at sections 4.1 and 4.7.

[99] A significant reduction in both nitrogen and phosphorus loads to the lake occurred in the early 1990s, following the upgrade of the Rotorua wastewater treatment plant. At the same time, the direct discharge of treated wastewater to the Puarenga Stream and thence the lake was stopped and the treated wastewater was discharged onto land. Figure 1.2 reproduced above shows that total nitrogen loads to the lake in three of the seven most recent years of record exceeded the load prior to the upgrade of the wastewater treatment and disposal system.

[100] The most recent estimate of the total nitrogen load reaching the lake from the First Water Quality JWS is 600 (±60) tN/y. That JWS also estimates that the steady state load within the catchment, assuming current land use, is around 725 tN/y, with the difference between the two estimates being "the load to come."[26] The load to come is the nitrogen which is currently making its way slowly towards the lake through the groundwater from historical land use. There can be a lag between when nitrogen leaches below the root zone of plants on a property and when it reaches the lake, which is in the order of decades in the Lake Rotorua catchment.

[101] Total phosphorus loads to the lake have also increased significantly from those immediately following the upgrade of the wastewater treatment and disposal system and are currently approaching the sustainable lake load, even with alum dosing.

**Managing phosphorus in the catchment**

[102] There has been considerable scientific debate over the years as to whether the lake is nitrogen or phosphorus limited, that is, whether controlling either or both nutrients is necessary to manage the water quality of the lake. This is discussed in paragraphs [300], [301] and [326] to [328] of the IHP's Report, noting that after conferencing for the first instance hearing, the experts supported the management of both nitrogen and phosphorus "at this time."

[103] PC10 has a policy for diffuse and point source phosphorus discharges (LR P2). It requires phosphorus to be managed through the implementation of management practices to be detailed in Nutrient Management Plans but does not regulate the discharge of phosphorus. The water quality experts giving evidence before us advised that the control of both nitrogen and phosphorus is required to achieve the directed water quality outcome of TLI 4.2.[27] Based on the evidence of experts giving evidence to both the IHP and the Court, we are satisfied that

26 First JWS Water Quality at section 1.3 on page 6.
27 First JWS Water Quality at section 4.4 on page 17.

the effective control of both nutrients is required and that the intent of PC10 to control nitrogen is necessary.

[104] The current phosphorus load to the lake has been estimated to be 48.7 tP/y.[28] The expert witnesses agree that this needs to be reduced by 10 - 15 tP/y to reach the required sustainable lake load. A significant proportion of the reduction is currently being achieved by dosing the Utuhina and Puarenga streams with alum, but this is unlikely to be sustainable in the longer-term given the other potential effects of such dosing.

[105] Groundwater reaching Lake Rotorua is naturally enriched with dissolved reactive phosphorus, which has leached from bedrock as a result of long aquifer residence times. As a result, approximately 25.3 tP/y of the phosphorus estimated to be reaching the lake is from natural sources. This means that the necessary reductions in phosphorus loads of 10 - 15 tP/y will need to be met from the remaining 23.4 tP/y contributed from anthropogenic sources. This is likely to be challenging.[29]

[106] In our view, the significance of this evidence is that any expectation that controlling phosphorus may provide an element of relief from the need to proactively and strongly manage nitrogen would be ill-founded and unjustified.

**Method for assessing nitrogen loads in the catchment using Overseer**

[107] Both nitrogen allocation methods incorporate the use of Overseer software to calculate long-term average losses of nitrogen from below the root zone of rural land uses on an individual property and, in the case of the sector range method, on a sector basis.

[108] The Overseer software is jointly owned in equal shares by the Ministry for Primary Industries, AgResearch Limited and the Fertiliser Association of New Zealand. Use of it requires payment for user licences. The software models nutrient flows on a farm using farm information and scientific knowledge to produce, among other things, predictions of nutrient losses based on farm management practices. By modelling different scenarios, farmers can make decisions about their management approaches. The model's algorithms are not available for inspection and testing by either users or the Court. The Overseer software has gone through many versions since first being published as Overseer 2 in 2000. The current

28 First JWS Water Quality at paragraph 25 on page 42.

29 Lake Rotorua Science Review – Summary Report, February 2019 at pages 5 and 6, and First JWS Water Quality at paragraph 25 on page 42.

version is Overseer 6.3.0. The version used in PC10 is Overseer 6.2.0. Apparently, no library of earlier versions is publicly available.

[109] It is important to note that Overseer is a long-term prediction model of nitrogen outputs and cannot be used to predict short-term management outcomes or changes that may be required to day-to-day farm operations.

[110] The Regional Council's position is that "... the Integrated Framework when shown in PC10 should remain as shown in Overseer 5.4 as that is the base position from which all other computations in succeeding versions of Overseer occur." Counsel explained that the data "is a post-attenuation statement" provided in PC 10 for information only. Whatever the reason for its inclusion, the different ways that Overseer information was presented did not assist our understanding and introduces an unnecessary level of confusion.

[111] Overseer has notable limitations in a regulatory context. One of the main limitations is that different versions of Overseer may give materially different predicted nitrogen losses. By way of example, Version 5.4 (as used initially in PC10) and Version 6.2.0 (as now proposed) differ in their nitrogen loss predictions by approximately 88%, the later version giving the higher figure.[30] The evidence before us included reference to five different versions of Overseer. PC10 includes predictions based on both versions 5.4 and 6.2.0, even though the sustainable lake load to be achieved remains unchanged and is determined independent of Overseer.[31] We consider the uncertainty caused by referencing the Overseer versions 5.4, 6.2.0 and future versions in the same plan makes understanding of plan requirements more complex than necessary and potentially confusing for some users of the plan. We sought clarification on this matter from the Council and return to it later.

[112] A further notable limitation of the Overseer model is that the overall level of uncertainty associated with modelled outputs is difficult to ascertain. The only attempt to quantify this in evidence before the Court is in the First JWS on Water Quality, which referred to a degree of uncertainty of 30 - 50%.[32] In response to a question from the Court, Dr J C Rutherford, a specialist in water and nutrient management through catchments and engaged by the Regional Council confirmed "... for the period 2003 and 2011, I think that uncertainty of 30% in my opinion is consistent with what the owners of Overseer believe. Prior to that, some of the historic land use ... is a little bit less well defined and .... ascribed a higher uncertainty."

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30 First JWS Water Quality at section 5.3 on page 22.
31 BOPRC counsel Memorandum 2 April 2019 [13]
32 At section 5.5 on page 26.

[113] In December 2018 the Parliamentary Commissioner for the Environment published a report on Overseer[33] which identified the need for greater transparency and for a comprehensive and well-resourced review of the model, including an independent peer review. We were particularly interested in the section of the PCE's report on model uncertainty, which indicates uncertainty associated with Overseer Version 6 could be in the range 25 to 30% for farms within "the calibration range." It is unclear to us whether this includes errors associated with measurements and uncertainties arising from data inputs. The report goes on to note that for farms outside the calibration range, higher levels of uncertainty of 50% or greater are possible. For the avoidance of doubt, while lysimeter testing is being undertaken in the Lake Rotorua catchment which will increase certainty in the predicted nitrogen losses, Overseer has not yet been calibrated for conditions prevailing in the Lake Rotorua catchment, which means uncertainty could exceed ± 30%.

[114] This assessment of uncertainty is consistent with the Court's own experience and understanding gained from evidence presented in a number of other cases over several years, including this one, and we are satisfied that it represents the current state of knowledge. It is important to note that if a nitrogen loss below the root zone was predicted (hypothetically) by Overseer to be 4,000 kg a year for a particular property, the actual loss at an uncertainty of ± 30% could be anywhere between 2,800 and 5,200 kg a year, which is substantial and makes sound resource management planning problematic.

[115] Notwithstanding those concerns, we have no evidence that there is any realistic alternative method presently available to the Regional Council or to farmers to obtain the necessary information about nitrogen loads in order to manage them. We note that Policy LR P14 recognises the possibility that there may be alternatives to Overseer for nitrogen budgeting purposes, but requires any alternative to be authorised by the Regional Council.

[116] We are also particularly concerned to ensure that, as far as reasonably practicable, resources should be used for environmental improvements on-farm, not for unnecessarily high regulatory and monitoring costs.

[117] In summary, it is the Court's view that a range of specific requirements need to be met when using Overseer in a regulatory context, including:

33 *Overseer and regulatory insight: Models, uncertainty and cleaning up our waterways*, 12 December 2018, Parliamentary Commissioner for the Environment.

(a) A consistent approach to model input data and maximising the accuracy of that data;

(b) The use of best management practices appropriate for the local environmental conditions such as soil types and weather patterns;

(c) Using the model to predict trends and relative changes in farm management systems, rather than absolute values;[34]

(d) Calibrating the model outputs with field measurements for environments where conditions differ significantly from those where an acceptable level of calibration has been achieved;

(e) Using only appropriately qualified and experienced experts to run the model for compliance purposes;

(f) Establishing a clear, efficient and reliable process to review and update model outputs and management practices at appropriate intervals;

(g) Appropriate on-site verification that modelled inputs and outputs are being complied with, in addition to independent peer review of performance; and

(h) A compliance mechanism that is certain, reasonable, practical and legally enforceable.

[118] The Regional Council is **directed** to provide details at the Stage 2 hearing as to the methods incorporated or to be incorporated in PC10 to address the specific requirements listed in paragraph [117] which the Court considers necessary for Overseer to be acceptable for use in a regulatory context.

**Method for assessing changes in nitrogen loads before they enter the Lake**

[119] The overall assessment of the nitrogen cycle as it affects Lake Rotorua and Lake Taupo has been informed by the use of the ROTAN (ROtorua TAupo Nitrogen) model. This model was developed by the National Institute of Water and Atmospheric Research (**NIWA**). It is used to estimate what happens to nitrogen after it leaves a farm or other property, considering how long it takes to get to the lake, how much is attenuated or otherwise "lost" along the way and what the combined effect of all discharges is on the load reaching the lake. ROTAN makes extensive use of estimates of nitrogen loads from individual properties

[34] Second JWS on Overseer, at sections 2 and 12.

obtained from using Overseer. The current version of ROTAN, known as ROTAN-Annual, has been updated to use Overseer Version 6.2.0. ROTAN uses an annual time-scale.

[120] ROTAN routes water and nitrogen to the lake along three pathways, which can broadly be described as surface water, groundwater and streams, and quantifies attenuation along each pathway. Identified uncertainties associated with Overseer (30 - 50%) and the stream data used for calibration (10 - 15%) were taken into account during model calibration and then the probability of meeting the sustainable lake load was calculated. This showed that the proposed PC10 mitigations will be between 12 and 18% more or less than what is required to meet the sustainable load.[35]

[121] We received no detailed evidence on the ROTAN model but the water quality experts agreed that ROTAN is appropriate for predicting future loading of nitrogen in the catchment[36] and that the calibration and validation of ROTAN is appropriate.[37] There are three findings of the modelling and associated supporting information that are particularly important in terms of future nitrogen management in the Rotorua catchment and we discuss them below. They are:

(a) groundwater travel time and the load to come;

(b) attenuation; and

(c) the headroom available in the allocated loads to provide a factor of safety against over-allocation.

[122] When groundwater travel times are long, there is a significant degree of uncertainty as to how much nitrogen will be removed by natural processes before the groundwater reaches the lake. This determines the size of the nitrogen load that will eventually reach the lake. It is our understanding that there are no practicable ways to reliably monitor the load across the whole of a catchment or to confirm what the residual load might be. Response times to reduce any unforeseen increased load would be equally long. The actual load that will reach the lake is not able to be predicted with certainty, but the evidence before us indicates it will be significantly above the Sustainable Lake Load if appropriate land use management practices are not put in place.

[123] We raised our concerns with Dr Rutherford, who advised that the age of the groundwater in the catchment averages 60 years and ranges between 15 and 147 years. This

35 First JWS Water Quality at section 5.5.
36 First JWS Water Quality at section 6.2 on page 27.
37 First JWS Water Quality at section 6.3 on page 28.

means that it could be many decades before some of the load to come reaches the lake, and that any remedial actions required would take even longer to have any effect. Dr Rutherford stated that the situation will vary from catchment to catchment and referred to experience in the Ngongotaha sub-catchment, where groundwater travel times are in the order of 15 years. A change to less intense land use in that catchment some years ago is now being reflected in monitoring results that show reduced nitrogen loads reaching the lake. While it cannot be assumed that the results will be directly transferable to all sub-catchments, it is a helpful indicator which may show future trends, reduce uncertainty and has the potential to be developed further in future science reviews.

[124] Attenuation in the context of water quality refers to:

> the difference between the catchment nutrient losses and catchment nutrient loads. Attenuation accounts for all processes that remove nutrients from the water between where losses are measured or estimated and where they enter the lake.[38]

[125] We asked Dr Rutherford for clarification of how attenuation is dealt with in the ROTAN model, which he indicated is a product of calibrating the model. He explained that when Overseer version 5.4 was being used to assess nitrogen in the Awahou Spring sub-catchment, he needed to put attenuation to zero, which he noted in his report as an unusual finding. He further explained that when Overseer version 6.2.0 was used, predicted nitrogen losses were 88% higher and the average attenuation in the calibrated model became 42%, which he considered to be more in accordance with published values of catchment-scale attenuation. He confirmed that if further increases in nitrogen were predicted to occur in newer versions of Overseer, the modelled attenuation would also increase, but pointed out that what is real is what is measured in the Awahou Spring.

[126] The extent of attenuation that can be relied on in the catchment is fundamentally critical to understanding future nitrogen loads reaching the lake, and the limits that will need to be placed on nitrogen discharges from land within the catchment in the future. This is a highly complex subject where reliable information is not available to quantify overall attenuation and variability across the catchment. On the other hand, we have difficulty in placing significant reliance on model predictions of attenuation that move up or down to facilitate calibration of the model.

[127] An important issue to be considered is that the Rotorua catchment appears to have limitations in its ability to attenuate nitrogen through natural systems. Based on the First JWS on Water Quality, groundwaters are uniformly well oxygenated and there is an absence of

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38 First JWS Water Quality at section 3 on page 15.

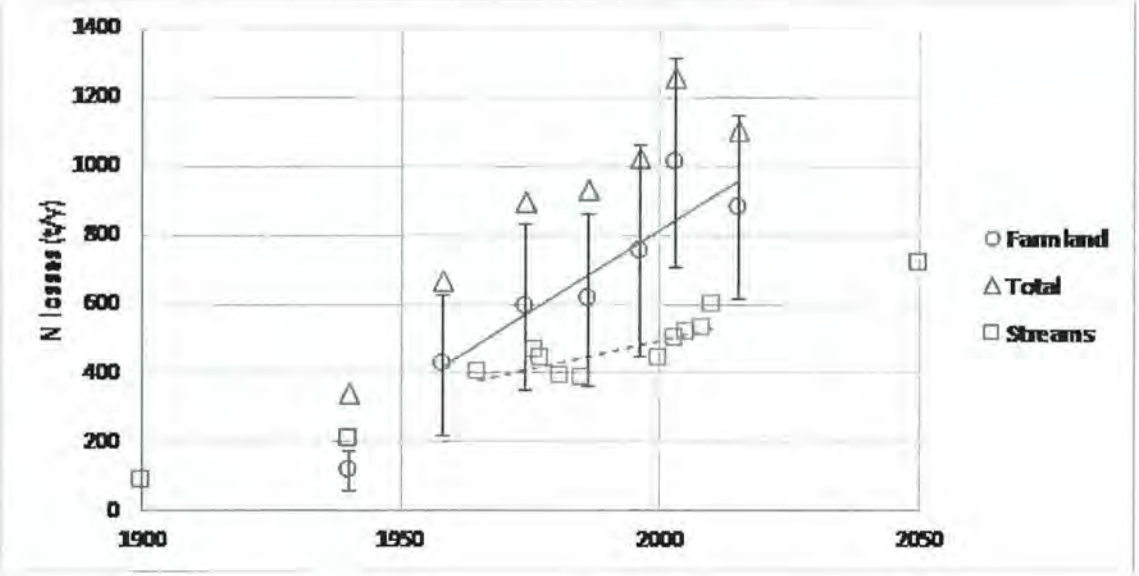
bioavailable carbon below the root zone to facilitate denitrification. This means that more nitrate can be expected to travel with the groundwater to the lake, more so than in a situation where a high level of attenuation can be expected within the catchment. This can occur in catchments where natural conditions provide the right combination of factors to allow nitrogen to be transformed from the ammoniacal form to nitrate (nitrification) and from nitrate to nitrogen gas (denitrification) as it travels down the catchment.

[128] We accept that the ROTAN model and its science provide us with the best currently available information. However, further specific research into attenuation in the catchment generally is required as part of on-going science reviews, perhaps as part of proposed method LR M2 (c) (ii).

[129] The significance of this issue will become clearer later in the decision, as there is no meaningful headroom available under either allocation method to provide any factor of safety against over-allocation of nitrogen in the catchment, based on Overseer predictions using version 6.2.0.

**Understanding of historical changes in nitrogen loads in the catchment**

[130] Changes in total nitrogen loads from farmland and point sources in the lake catchment between 1900 and 2015 are summarised in the following figure, which is reproduced from Figure 1.1 in the First JWS on Water Quality at paragraph 1.2:[39]




[39] Palliser, C.C, Rutherford, J. C. & MacCormick, A.J., *Eutrophication in Lake Rotorua. 1 Using OVERSEER to estimate historic nitrogen loads*, New Zealand Journal of Agricultural Research, Vol. 62, 2019, Issue 1.

[131] The x axis shows years from 1900 to 2050 in 50 year bands; the y axis shows nitrogen losses in tonnes per year in 200t bands. The circles denote estimated nitrogen losses from farmland, calculated for the period 1940 to 1996 by using Overseer from historical land use maps and published agricultural statistics assuming "typical" farming systems and for 2003 and 2015 by "benchmarking" farm data collected by the Regional Council. The vertical lines denote uncertainty in estimated losses that stem from the Overseer model and its input data. The triangles are the total loads, including sewage, geothermal, forest and rain on the lake. The squares are published estimates of stream total nitrogen loads which show a significant increasing trend. The difference between total losses (triangles) and stream loads (squares) is the combined result of groundwater lags and attenuation.[40] The line of best fit shows a significant increasing trend between 1958 and 2015.

[132] No one disputed before us, and there can be no doubt, that action is necessary to address discharges of nitrogen to Lake Rotorua in order to promote its sustainable management. There was no challenge to the basic proposition that controls on land use must form a core element of such action. The issues arising from the appeals are in relation to the form that such controls should take and, more particularly, which of the sector range and ANCA methods provides a better basis for managing the discharge of nitrogen from rural activities to achieve the settled RPS and RNRP limits described above.

**Need for consistency in assessments of nitrogen loads**

[133] We are bound to say that we were not assisted by the presentation in evidence of nitrogen load information based on different versions of Overseer, often in the same document, with a lack of clarity as to which version applied. Accurate and up-to-date information is needed to enable anyone to understand these loads at source (below the root zone) and on entry to the lake from different land use sectors and other sources such as rainfall direct on the lake, geothermal discharges, and discharges of treated wastewater and from urban areas. This is fundamental information required to enable us to satisfy ourselves that the Sustainable Lake Load can be met.

[134] This information has equal importance whichever nitrogen allocation method is adopted. While we focused on the sector range method proposed in PC10, as more information is available, and it is the more complex of the two methods in terms of understanding loads, it can be adapted for consideration of ANCA.

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40 First JWS Water Quality at section 1.2 on page 5.

[135] The information in the primary evidence did not, in our view, provide us with either a complete or an appropriately explained understanding of this important information. We were not assisted by the way information is presented in Table LR 1 in the Appeals Version of PC10 in that it shows the correct Sustainable Lake Load, but other nitrogen loads were those predicted by Overseer Version 5.4, which bear no relation to the loads that are required to be met under PC10 based on Overseer version 6.2.0. For the avoidance of doubt all nitrogen loads referred to in the rest of our decision are in terms of Overseer version 6.2.0 unless otherwise stated and except for the Sustainable Lake Load which is an absolute figure.

[136] We are of the view that if Table LR 1 is to be included as part of an operative PC10, it needs to provide more information to ensure much greater clarity as to the role played by controls on nitrogen discharge loads from rural activities in a catchment-wide context. It should also be based on Overseer version 6.2.0

[137] It was not until we were provided with Table 4 in the Summary Report, just prior to the start of the hearing, that we received our first relatively complete picture of the catchment-wide loads. However, as Table 4 was based on load predictions using Overseer version 6.3.0, it also did not provide the information we needed. We were subsequently provided with an updated Table 4 with loads based on Overseer 6.2.0. While this assisted in providing further clarification of currently predicted catchment loads, it included anomalies with information in PC10 or presented in evidence relating to the sector range methodology in PC10 as proposed.

[138] We sought clarification by way of a series of questions set out in a Minute dated 7 June 2019. Counsel for the Regional Council filed and served responses to each question by memorandum dated 28 June 2019 and, in addition, attached Module 4 from the Lake Rotorua Science Review – PC10 Catchment N Accounting, dated November 2018. The updated Table 4 included as Appendix 2 of the memorandum is shown as Appendix 4 to this decision.

[139] We are told that the updated Table 4 is based on the most accurate and up-to-date understanding of the estimates of loads and reductions within the whole of the Lake Rotorua Groundwater Catchment. The PC10 allocations are based on Overseer Version 6.2.0 and the 2001 – 2004 benchmarking data. The table is based on complex science with significant uncertainties but brings together current knowledge in a relatively concise and understandable form.

[140] Concerns were expressed by the NCG that the figures in Table 4 raised questions about the accuracy of some figures and the consequences if there are inaccuracies. These were canvassed at a judicial telephone conference held on 23 July 2019. We confirm that

reference to Table 4 in this decision is to assist in resolving the Stage 1 issue of the most appropriate allocation methodology and does not predetermine any of the detailed implementation issues that may arise in Stage 2. We expect that there will be further clarification of at least some aspects of Table 4 at the Stage 2 hearing and on the form of any summary of loads to be included in the operative version of PC10, but we are satisfied that the table in Appendix 4 provides an appropriate basis for making our interim decision.

[141] More specifically, the table sets out a logical and transparent presentation of the whole nitrogen transfer process that first summarises the loads from each source or sector as they currently exist, based on Overseer version 6.2.0, or as they arrive naturally at the lake (as in the case of rainfall). Then, in sequence, it shows or allows simple calculation for each sector or source where applicable:

(a) predicted reductions through rules for the dairy and drystock sectors;

(b) predicted reductions through the Incentives Fund, assuming equal take-up by the dairy and drystock sectors;

(c) predicted reductions through engineering works;

(d) predicted reductions through the gorse scheme;

(e) the estimated loads after all reductions but before attenuation, as applicable;

(f) estimated attenuation; and

(g) estimated load entering the lake.

[142] The table enables us to understand the likelihood that the Sustainable Lake Load will be met based on the best currently available information, understand the consequences of increasing or decreasing source loads, as occurred as an outcome of the IHP process and undertake sensitivity analyses to test the effects of changing assumptions.

## PART 4 – OTHER MATTERS RAISED IN APPEALS

[143] This part of our decision addresses other issues raised in CNI's appeal, as set out in paragraph [14] above.

**Consultation with CNI and the Māori Trustee**

[144] CNI and the Māori Trustee raised a number of concerns about the adequacy of the PC10 consultation process. The evidence called on behalf of CNI was that it did not receive project updates or invitations to attend meetings. The evidence of Mr A S Te Pou was that:

> ... CNI Iwi Holdings has an important role as the collective entity for the eight CNI Iwi for the purpose of the Central North Island Forests Land Collective Settlement. As such, in relation to any resource management issue affecting the CNI Iwi Land, CNI Iwi Holdings should have been recognised as a relevant iwi authority representing those collective iwi interests in those lands.

[145] He also gave evidence in relation to the Lake Rotorua Stakeholder Advisory Group (**StAG**):

- There was no representative of CNI Iwi Holdings on StAG
- CNI Iwi Holdings was effectively excluded from the StAG discussions
- ... there was no invitation to attend and no agenda or dates of meetings was provided to CNI Iwi Holdings to enable CNI Iwi Holdings to participate.

[146] The particular statutory requirements in relation to consultation about making and changing plans are set out in Schedule 1 to the RMA and relevantly include:

(a) Clause 1A, which provides consultation on a proposed plan is to be conducted by the Council in accordance with any applicable Mana Whakahono a Rohe;[41]

(b) Clause 3(1)(d) which requires that the tangata whenua of the area who may be affected are consulted through iwi authorities; and

(c) Clause 3B which elaborates on how iwi authorities recorded under s35A are to be consulted.

[147] As the RMA has only relatively recently been amended to provide for Mana Whakahono a Rohe, it is unsurprising there is no operative document of that kind in place which would be relevant in this case. Ngati Rangiwewehi appears to have started down that path.[42]

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41 As made under ss 58L – 58U RMA, inserted on 19 April 2017 by s 51 Resource Legislation Amendment Act 2017.

42 The CIA at p1652 explains that Ngati Rangiwewehi, a s.274 party to the CNI appeal, has initiated a Mana Whakahono a Rohe with the Council. We infer that it remains to be finalised.

[148] Also relevant in this context is the requirement of s 8 RMA to take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi) which include the obligations of partnership and good faith relations and incorporate the duty to consult Māori, especially where information and/or knowledge are incomplete.[43]

[149] There are provisions in the RPS that are relevant to consultation with iwi, including:

(a) Policy IR 4B: Using consultation in the identification and resolution of resource management issues;

(b) Policy IW 2B: Recognising matters of significance to Māori; and

(c) Policy IW 3B: Recognising the Treaty in the exercise of functions and powers under the Act.

[150] The chapter of the RNRP dealing with kaitiakitanga includes objectives for the recognition of Treaty principles, acting in partnership, consultation with tangata whenua, taking tangata whenua concerns about land and water into account in RMA processes, maintaining or improving the biological and physical aspects of the mauri of water and land, and the extent of the spiritual, cultural and historical values of land and water to tangata whenua. Twenty policies implement those objectives, including:

(a) Policy KT P5: To ensure that resource management issues of concern to tangata whenua are taken into account and addressed, where these concerns are relevant and within the functions of the Regional Council; and

(b) Policy KT P8: To recognise that kaitiakitanga involves, among other things, the use and development of land and water by tangata whenua.

[151] The case for the Regional Council is that it engaged with Iwi appropriately, offering many avenues in which CNI could participate in the consultation process. We were told that between August and September 2015 the Regional Council contacted all Te Arawa Iwi authorities with offers of engagement meetings with Council staff.

[152] CNI made a submission on the draft PC10 rules. The Regional Council was therefore aware of CNI's interest and considered their position before publicly notifying PC10. While CNI felt there were shortcomings in the consultation undertaken by the Regional Council, it nonetheless informed the IHP what it was seeking, and its views were taken into account by

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43 Waitangi Tribunal, *The Treaty of Waitangi: The Principles of the Treaty*, p 2 and *A Guide to the Principles of the Treaty of Waitangi as Expressed by the Courts and Waitangi Tribunal* (2001), p 86.

the IHP. The IHP's Report shows that CNI presented evidence to the IHP and submitted presentations.[44] The IHP acknowledged the Regional Council's efforts to engage meaningfully with Iwi authorities and other Māori landowners.

[153] Appeals against the IHP's decision were lodged with the Court on 26 September 2017. Mandatory Court-directed mediation between the parties took place on 8 February 2018. As no agreement was reached on the most appropriate nitrogen allocation method, the Court directed that the matter proceed to a hearing and that statements of issues in dispute were to be provided by 27 February 2018. A pre-hearing conference was convened in Rotorua on 12 April 2018, following which the Court directed that Court-facilitated expert conferencing take place in relation to a wide range of outstanding issues between the parties. It was anticipated at that time that a conferencing period of eight weeks would be suitable and that allowing for an evidence timetable of approximately eight weeks, a hearing in September or October 2018 should be achievable.

[154] To allow time for NCG to provide sufficient details of ANCA to ensure meaningful conferencing could take place amongst five expert groups at 10 individual conferences, conferencing was not completed until 5 October 2018, some 21 weeks after the prehearing conference and substantially longer than originally anticipated. After conferencing was completed, NCG advised that they were engaging additional experts, one of whom disregarded the outcomes of the earlier conferencing by experts in the same field. NCG subsequently provided a cultural impact assessment on 5 November and an updated version of ANCA on 22 November 2018. NCG provided further technical reports in December 2018.

[155] We are satisfied that the Council was aware of the interests of CNI, the Māori Trustee and supporting s.274 parties when formulating, consulting on and hearing first instance submissions and that relevant RPS and RNRP provisions in relation to consultation were given effect. We are satisfied that NCG and its members were given an adequate opportunity to make other parties and the Court aware of the ANCA nitrogen allocation method as far as it had been developed. The hearing on the current appeal has afforded a further opportunity for its consideration. We are satisfied that sufficient consultation by the Regional Council with members of NCG has occurred through the hearing and appeal process.

[156] We also consider that consultation outcomes cannot be considered in isolation from the many other matters that need to be taken into account when evaluating the

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44 IHP Report at [270] – [283] and Appendix 1.

appropriateness of the provisions in PC10. We have considered both allocation methods comprehensively on their merits, as set out in detail in this decision.

**Other nitrogen discharge allocation methods**

[157] The Regional Council evaluated the broad effects of several possible nitrogen allocation systems, including systems incorporating a number of different sector ranges and a natural capital alternative. It called Dr G J Doole, the leader of the economics team at DairyNZ Ltd, to give expert evidence of this evaluation. It is clear to us that Dr Doole, with others on behalf of the Regional Council, considered a wide range of alternative allocation methods. We are satisfied that the Regional Council has met the requirements of s32(10(b)(i) of the Act to identify "other reasonably practicable options for achieving the objectives." At the hearing no method was advanced by any party other than the sector range approach supported by the Regional Council and the ANCA approach presented by NCG.

**Controls on phosphorus**

[158] These are addressed in paragraphs [102] - [106] above.

**Use of best on-farm management practices**

[159] This is addressed in terms on Nutrient Management Plans in paragraphs [174] and [184] – [188] below.

## PART 5 - ALTERNATIVE ALLOCATION METHODS

**The Integrated Framework**

[160] The Regional Council has adopted a package of methods to give effect to the relevant objectives and policies of the RPS and to seek to reduce the nitrogen load to Lake Rotorua to 435 tN/y. The package of methods includes an integrated programme of regulated land use Nitrogen Discharge Allocations for each property, engineering solutions, incentives and gorse conversion. The package is referred to by the Regional Council as the Integrated Framework.

[161] The Integrated Framework was developed through the StAG process. It was adopted by the Regional Council on 17 September 2013 as being the preferred approach to managing nitrogen losses from rural land use activities in the Lake Rotorua groundwater catchment. The engineering solutions also include methods to address nitrogen discharges from the urban

part of the catchment. It provides the basis for the proportional nitrogen reductions that apply to pastoral land use activities being implemented through rules.[45]

[162] The engineering solutions are common to both the sector range and the ANCA allocation methods. They are not the subject of our decision but are referred to in Table 4 at Appendix 4 to this decision and in several places in the IHP's Report.

[163] A key element of the Integrated Framework as proposed is the Incentives Fund, which provides an option for landowners to sell nitrogen outside of the rules framework, as discussed below. The scheme is funded by central and regional government as part of a wider community contribution to funding improvements in lake water quality. The scheme has a target to permanently remove 193 tonnes of nitrogen by 2022 using a fund of $40 million. The Regional Council recognises there is a risk that the target may not be met and will use a review process to manage the risk.

[164] The ANCA allocation method does not use the Incentives Fund as anticipated in PC10[46]. Firstly, it would not permit the sale of nitrogen below a property's Natural Capital Allocation (**NCA**) of nitrogen. Secondly, ANCA would only allocate 600 tN/y to land uses in accordance with their Land Use Classification (**LUC**) and not the extra 193 tN/y allowed for by PC10. In short, ANCA would "not allocate an extra 193 tN to buy back through the Incentives Fund". Rather, it proposes the $40 million be used to achieve the 2022 catchment intermediate Managed Reduction Target (**MRT**) of a 70% nitrogen reduction as required by RPS Policy WL 6B(c). In this way the ANCA proposal would in its words use the Incentives Fund "to pay land owners for meeting their 2032 NCA ten years early (by 2022)".

[165] It is a matter of concern that 2022 is now substantially closer than when that target was set in the RPS, which became operative in 2014. By the time PC10 becomes operative, there may be only around two years remaining before the relevant rules under either allocation method must be met. The Council is **directed** to consider this matter further and set out the extent to which it considers it to be an issue at the Stage 2 hearing, together with proposals to address any issue identified.

[166] We note that both methods provide for nitrogen trading. We address this primarily in our evaluation in Part 6 of our decision.

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45 Introduction to PC10.

46 PPC10 Alternative Natural Capital Approach (ANCA) updated version 22 November 2018, pp 25 -26.

[167] The Integrated Framework includes the element of gorse conversion to remove high nitrogen-fixing gorse and replace it with production forest, native bush or other low nitrogen-fixing cover. This is funded separately from the Incentives Fund. It also falls outside the scope of PC10 and was not addressed in any detail in the evidence.

[168] The Regional Council's original Integrated Framework assumed that its Gorse Scheme would deliver an anticipated reduction of 30 tN/y in load to the lake. However, when we sought clarification of the current status of the Scheme in our Minute dated 7 June 2019, we learned that the current estimate (as shown in Table 4, Appendix 4) is less than half the originally assumed load. The anticipated quantity of nitrogen arising from gorse reduction will need to be included in PC10 before it is made operative.

[169] The ANCA allocation method does not use the Gorse Scheme as anticipated in PC10. Instead it allocates all available nitrogen to land uses in accordance with their LUC.

[170] While the Gorse Scheme does not form part of PC10, Mr N J King, a witness for NCG, raised an issue that could be relevant to the extent the target is met, saying that a number of Māori land entities had been approached to consider a gorse conversion incentive scheme that funded Māori land trusts to permanently convert gorse on Māori land to a land use with less intensive nitrogen and phosphorus leaching rates. He went on to say that the Gorse Conversion Deed, which is for a 999-year term, requires that the land owners maintain the land in accordance with a gorse conversion plan and ensure that the nitrogen discharge allowance (**NDA**) is not exceeded. This limits the use to which the land may be put. Farming would not be possible on land that is converted from gorse in this way.

[171] Mr King expressed a number of concerns in relation to the requirements of the gorse conversion scheme, indicating that the Māori Trustee would not agree or consider an agreement that locks Māori land owners in for 999 years and limits the options available regarding their land and its use.

**The sector range allocation method**

[172] The conceptual elements of the sector range method as proposed by the Regional Council may be summarised as follows:

(a) Grouping land uses into five sectors – drystock, dairy, bush and scrub, plantation forestry and house lots.

(b) Predicting nitrogen losses using Overseer Version 6.2.0, with a requirement to use defined input standards intended to reflect local conditions.

(c) Benchmarking predicted nitrogen and phosphorus losses from land use activities at a block and farm or property scale for the period 2001 to 2004 and capping nitrogen at benchmarked levels in accordance with Rule 11 in the RWLP (now, Rules RL 1 to 9 in Chapter 12 of the RNRP).

(d) Allocating annual nitrogen discharge limits to individual properties in accordance with the Integrated Framework, including establishing a sector average and sector ranges for the dairy and drystock sectors.

(e) Setting Nitrogen Discharge Allocations to be achieved by 2032 and Managed Reduction Targets to be met by 1 July 2022 and 1 July 2027 for individual blocks and properties.

(f) Allowing the permanent transfer of nitrogen from one property to another, subject to conditions.

(g) Removing nitrogen from the catchment for a period of 999 years through the non-statutory Incentives Fund and Gorse Scheme.

(h) Providing for controlled activity and restricted discretionary activity land use consents for a duration of twenty years and non-complying activity consents, where granted, for durations less than 20 years, subject to their being no exceedance of the Sustainable Lake Load.

(i) Requiring the preparation of Nutrient Management Plans as the primary point of monitoring and, if necessary, compliance.

(j) Keeping bush and scrub, forestry and house sectors at benchmarked levels, which for ease of reference we note are 2.5 kgN/ha/y for forestry, 3 kgN/ha/y for bush and scrub and 15.6 kgN/ha/y for a house.[47]

(k) Developing five "reference files", one for each land use sector, to be used to update NDAs for each property in response to changes arising from future Overseer versions.

(l) Including rules to manage nitrogen losses from a range of land uses in the catchment.

47 PC10 at Table LR 8.

[173] Element (b) is the same or generally similar in the ANCA method. We compare specific differences between the two methods in our evaluation.

[174] We note that in accordance with Method LR M5 (e), the Regional Council will encourage and support good management practices to be implemented on rural properties/farming enterprises to reduce nitrogen and phosphorus loss in the catchment. In our view, this cannot be relied on to provide an adequate level of certainty that the desired nutrient reduction targets will be achieved in the most effective way. We return to this later.

[175] In relation to element (c) - benchmarking, the intent of the rules (previously Rule 11 in section 9 of the RWLP; now, Rules RL 1 to 9 in Chapter 12 of the RNRP) was to prevent a net increase in the export of nitrogen or phosphorus from the cumulative effects of all activities in the Lake Rotorua and other lake catchments. Around three-quarters of the land area in the Lake Rotorua groundwater catchment has been benchmarked but many smaller properties have not been. Non-benchmarked land has been placed into its appropriate sector based on 2002/3 aerial photography.

[176] Some properties have benchmarks based on Overseer files prepared in accordance with the rules. Where these files are held by the Regional Council, the properties have been assigned a 2017 Start Point Allocation based on the property specific file, updated using Overseer Version 6.2.0. Where the Regional Council does not hold the original Overseer file, a 6.2.0 discharge was estimated based on the average Overseer shift for the relevant land use from Version 5.4 to 6.2.0.

[177] Derived benchmarks were determined for other properties as follows:

(a) Non-benchmarked dairy or drystock blocks received marks at the bottom of their respective sector ranges;

(b) Non-benchmarked bush and scrub or forestry blocks received the average Overseer 6.2.0 discharge for their sector; and

(c) Non-benchmarked house blocks received the Overseer 6.2.0 nitrogen loss for benchmarked house blocks of the same size.

[178] The evidence of witnesses called on behalf of NCG was that the old Rule 11 reference point is inappropriate as it caps nitrogen discharges from individual properties at levels existing in 2001 to 2004. There is no scope in the present appeals for the Court to make any change to that old Rule 11 or the corresponding Rules RL 1 to 9 in Chapter 12 of the RNRP. The question of whether the same or different nitrogen caps should apply to different types of land

in the Lake Rotorua catchment in the future is one we take into account below in our decision on which allocation method is appropriate.

[179] In relation to element (d), sector range nitrogen reductions are the reductions required to achieve an overall 35.3% reduction from the dairy sector and an overall 17.2% reduction from the drystock sector, as required by the Integrated Framework. The method does not require all blocks or individual properties to meet the overall reduction as long as the sector as a whole does. However, all blocks must lie within ranges which define upper and lower limits for the dairy and drystock sectors.

[180] As explained previously, the Regional Council evaluated the broad effects of several possible nitrogen allocation systems, as outlined in the evidence of Dr Doole, including systems incorporating a number of different sector ranges and a natural capital alternative.[48] Based on the findings of economic modelling, the Regional Council adopted the following sector ranges:

(a) Dairy: a range of 54.6 - 72.8 kgN/ha/y with a sector average of 64.5 kgN/ha/y; and

(b) Drystock: a range of 18 - 54.6 kgN/ha/y with a sector average of 25.6 kgN/ha/y.

[181] In relation to element (e), Nitrogen Discharge Allocations (**NDAs**) are defined in PC10 as the maximum allowable annual nitrogen discharge loads for dairy and drystock activities that can occur from a property or farming activity after 1 July 2032. Managed Reduction Targets (**MRTs**) set nitrogen discharge targets to be met in 2022 and 2027. Each block's 2032 allocation is calculated based on its sector, its Start Point Allocation and the relevant sector range reduction. Where individual blocks fall above the upper limit of the sector range (after applying the standard sector percentage average), they must reduce their discharge to not exceed the upper limit. Individual blocks that fall below the range may increase their discharge up to the bottom of the range.

[182] Modelling indicates that substantial reductions in nitrogen discharges will be necessary for most blocks to meet the provisions of PC10, with less than a quarter of the blocks falling at or below the lower limit of the sector range.

[183] In relation to element (f), nitrogen trading forms part of PC10 to assist with achieving efficient economic outcomes. No trading is allowed before 1 July 2022 to avoid conflict with

[48] At paragraph 18.

the acquisition of nitrogen by the Incentives Fund. Trading can occur at any time after 1 July 2022 as a controlled activity under Rule LR R10. Forestry land can participate in the trading scheme but land not defined as rural land on Map LR 1 cannot.

[184] In relation to element (i), Nutrient Management Plans (**NMPs**) are required to take account of sources of nitrogen and phosphorus associated with the farming activity and to identify proposed nitrogen and phosphorus management practices and mitigation measures. They are the primary point of monitoring (by the landowner) and if necessary compliance, particularly in terms of the mitigation actions, described land uses and Overseer input parameters specified in the NMP.

[185] Each NMP sets out the relevant Start Point Allocations, MRTs and NDAs. They must also include a pathway demonstrating potential mitigation actions and/or management options to achieve future MRTs and the 2032 NDA. Other requirements include details of the specific data and records that will be kept to measure compliance with specific targets and mitigation actions. They are to include a description of any specific risks related to nitrogen leaching and run-off risks and how these will be addressed. In addition, the NMPs must address phosphorus management, effluent management, gorse management, water irrigation management and fertiliser management.

[186] NMPs must be updated at no more than five-yearly intervals and in response to a number of events specified in Schedule LR Six of PC10.

[187] NMPs are the basis for compliance action if this is required. Mr Lamb stated that the alternative of using Overseer as the compliance point is not practical and could lead to poor outcomes for farming enterprises. For example, increased annual rainfall in a particular locality could result in a breach of an Overseer number. He also stated that enforcement on this basis would not be considered as a reasonable approach and is unlikely to be achievable.

[188] We have some concerns at what appears to be a lack of engagement in on-farm monitoring in relation to compliance by the Regional Council and we **direct** that further evidence is provided at the Stage 2 hearing to enable us to consider the proposed method in more detail.

[189] In relation to element (k), reference files are used in PC10 to provide a means of updating NDAs to respond to new nitrogen load predictions resulting from new versions of Overseer, as described in Schedule LR Five of PC10. They are designed to maintain the relativity between total discharges for each sector and are to be used as follows:

(a) Five reference files have been established, for a hypothetical dairy farm, a hypothetical drystock farm, plantation forestry, bush and scrub, and house blocks. The dairy and drystock reference files are for hypothetical farm systems that proportionally represent the biophysical characteristics of the benchmarking files and capture the averaged benchmarked farm system for the sector. They are designed to mimic the average benchmarked discharge in each subsequent version of Overseer.

(b) Historically, discharges from plantation forestry, bush and scrub, and house blocks have been assumed to be constant, however the reference files are considered necessary by the Regional Council to allow for change in the future.

(c) For each sector, the block NDAs are compared to the reference file to determine the block allocation as a percentage of the reference file figure. For each block, four percentages are determined, being Start Point, 2022 MRT, 2027 MRT and 2032 NDA. These percentages remain fixed and do not change with each new version of Overseer.

(d) As new versions of Overseer are released, the five reference files are rerun using the latest version. Block files are updated to provide revised MRTs and NDAs using the relevant percentages. As individual farms will differ from the hypothetical reference files, the degree of change will not be the same as indicated by the reference file. Some farms will be more or less affected. We were advised that further work is proposed to address this variation and we **direct** that an update be provided at the Stage 2 hearing, including any proposed amendments to PC10. This update should go some way to addressing the matter raised by Ms Robson in paragraph 11 of her rebuttal evidence in relation to the effects of Overseer Version changes on bush and scrub and forestry land.

[190] When providing the update at the Stage 2 hearing, the Regional Council is also **directed** to clarify its intentions with regard to linkages between the proposed five-yearly review of NMPs and reviews of nitrogen predictions resulting from new versions of Overseer published between reviews.

**The ANCA allocation method**

[191] We have relied on the ANCA approach described in the updated version dated 22 November 2018 and the evidence presented by NCG at the hearing.

[192] ANCA relies, in part, on the proposed annual nitrogen reductions from engineering solutions. It does not include separate provisions for sector reductions from the dairy and drystock sectors, which form an integral part of the Integrated Framework. No separate provision is included for a gorse programme in ANCA. It uses the Incentives Fund differently from the way envisaged in the Integrated Framework: under ANCA the Incentives Fund is proposed to be used as a mechanism for transition to more sustainable land use sooner than currently proposed in PC10 using the sector range method.

[193] The conceptual elements of the ANCA approach as proposed by NCG may be summarised in terms of its differences from the sector range approach by observing that ANCA:

(a) Considers land as a resource requiring sustainable management in its own right.

(b) Does not take into account historical land use or nitrogen discharges.

(c) Allocates nitrogen on the basis of a direct link to the innate productive capacity of the underlying land resource using the New Zealand Land Resource Inventory (NZLRI) Land Use Capability classification system as a proxy.

(d) Differentiates land by characterising it as either "Non-Flexible Use Land"[49] or "Flexible Use Land" with defined provisions to accommodate circumstances where it moves from one to the other characterisation.

(e) Sets Natural Capital Allowances (**NCAs**) for annual nitrogen discharges from individual properties to be met by 31 December 2031 and allocates a total of 600 tN/y, where this total equates to the total allocation of 793 tN/y in the sector range method less the 193 tN/y anticipated being acquired by the Incentives Fund by 2022.

(f) Adopts the same MRTs as the sector range method for 2022 and 2027.

(g) Precludes the permanent transfer of nitrogen to prevent the alienation of land from its natural capital allocation, by restricting any transfer to a lease or other temporary arrangement only.

49 For example, land gazetted as reserve or subject to a conservation covenant.

(h) Ensures the term of any new nitrogen discharge consents issued will conclude by 31 December 2031.

(i) Requires the use of good management practices appropriate to the region, soil type and rainfall.

(j) Uses the same reference files as the sector range method to address changes in Overseer versions but uses them differently.

(k) Resets the policies, methods and rules in PC10 for an end point allocation consistent with natural capital principles.

[194] In relation to item (e), the 600 tN/y is apportioned by LUC area according to relative productive capacity in terms of the ratio between LUC classes. This ratio is derived from the attainable potential livestock carrying capacity stated in the NZLRI for each LUC unit listed in the extended legend in the LUC worksheets for the Bay of Plenty, weighted by subclass area.[50] This sets the number of stock units that the land can carry per hectare. [51] For each sub-class the stocking rate is multiplied by area to create a weighted average stocking rate for each LUC class 2 to 7. This results in a weighted average distribution of nitrogen across the total groundwater catchment area that reflects the relative productive capacity of different land types.

[195] This weighted average stocking rate is multiplied by the area of LUC class to create the total stock carrying capacity by LUC class. The proportions of each class are then calculated. The same proportions are used to distribute the 600 tN/y across LUC classes 2 to 7, as shown in the following table. LUC class 8 is limited to 3 kgN/ha/y as it is considered unsuitable for uses other than forestry.

| LUC class | ANCA nitrogen allocation in kgN/ha/y |
|---|---|
| 2 | 20.7 |
| 3 | 20.3 |
| 4 | 19.7 |

50 Mackay EIC [19] and [58]

51 *Land Use Capability Survey Handbook*, above, fn 4, p 114. Note that the NZLRI stock carrying capacities do not apply to dairying or cropping systems.

| | |
|---|---|
| 6 | 15.9 |
| 7 | 13.7 |
| 8 | 3.0 |

[196] The 600 tN/y is allocated across all Flexible Use Land. NCAs are set for each property based on the area of each LUC class within the property multiplied by the relevant nitrogen allocations from the above table. These must be achieved by 31 December 2031.

[197] As noted above, ANCA uses the same reference files as PC10. However, it uses them differently. Rather than using the reference files directly to create a new sector and subsequently a new property NCA, ANCA uses the Reference Files to adjust the total nitrogen pool for the whole of the groundwater catchment. It then adjusts the LUC Allocations, which are used to recalculate NCAs by property. This is discussed in more detail below.

## PART 6 - EVALUATION

### Basis of evaluation

[198] Our evaluation of the competing allocation methods is undertaken under the following headings:

(a) Use of LUC

(b) Practical considerations relating to changing from one land use type to another

(c) Nitrogen reductions to be achieved by the two allocation methods by 2032

(d) Comparison in terms of nitrogen headroom

(e) Comparison in terms of providing for land use change

(f) Comparison in terms of robustness and reliability of process

(g) Comparison in terms of effects on Māori owned land

(h) Comparison in terms of social effects

(i) Comparison in terms of cultural effects

(j) Comparison in terms of natural environment effects

(k) Reliance on and basis of nitrogen trading

(l) Comparison in terms of economic effects

(m) Comparison in terms of relevant plan provisions

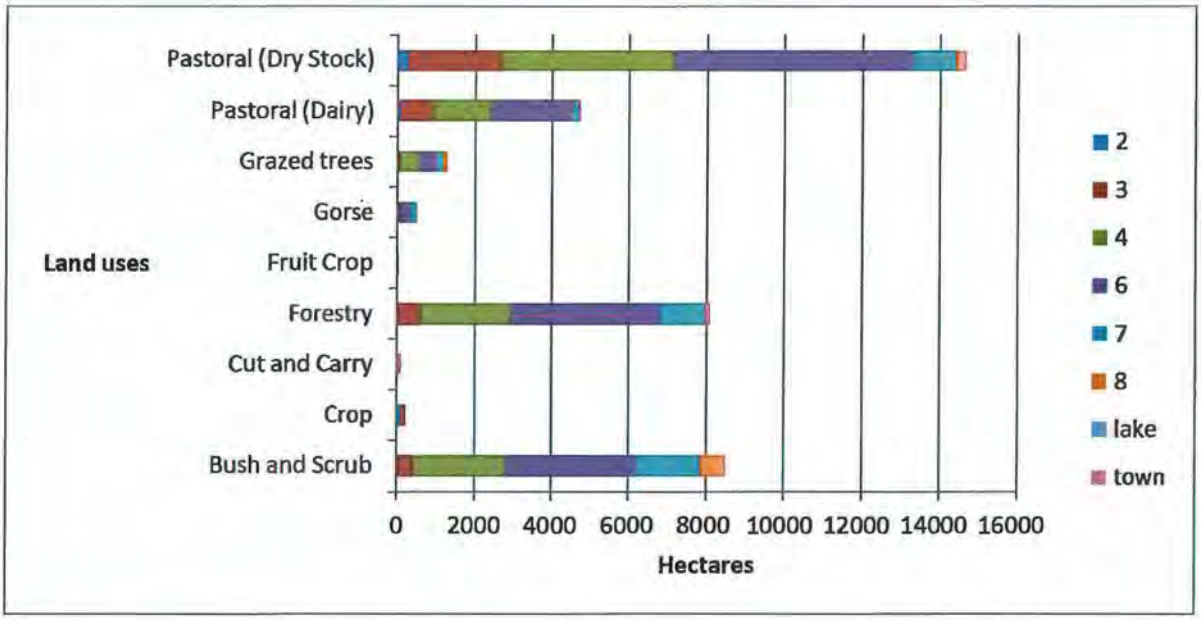
(n) Section 32 evaluation

(o) Overall comparison of allocation methods

**Use of LUC**

[199] The Land Use Capability (**LUC**) system has been used in New Zealand to help achieve sustainable land development and management on individual farms, in whole catchments and at the district, regional and national level since 1952. It has two main components: the Land Resource Inventory which is an assessment of physical factors critical for long-term land use and management and the LUC Classification by which land is categorised into eight classes according to its long-term capability to sustain one or more productive uses. The classes are ranked from 1 to 8 according to increasing limitations as to their use and correspondingly decreasing versatility. There are subclasses for physical limitations or hazards which are identified by erodibility, wetness, poor soil and poor climate and then units grouped according to their management and conservation requirements. There are also physical factors in the Land Resource Inventory, including rock type, soil, slope angle, erosion type and severity and vegetation cover. A full description of the national LUC classification system was provided to us in the JWS on LUC and in the evidence of Dr A D Mackay, who is a principal scientist employed by AgResearch Ltd and engaged by NCG.

[200] The following Figure 1 from the SAF provides an overview of land uses in the catchment by LUC class within the PC10 boundary, excluding the Waikato region. Note that no Class 1 land is identified in the catchment.




[201] The following Table 1 from the SAF provides a breakdown of LUC and land use based on land uses recorded in the Regional Council's benchmark data received during 2001 to 2004 and 2003 aerial photographs for non-benchmarked properties.

| Sum of Area ha | LUC Class | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Land Use Adjusted** | **2** | **3** | **4** | **6** | **7** | **8** | **lake** | **town** | **Grand Total** |
| Bush and Scrub | 18 | 432 | 2385 | 3415 | 1594 | 562 | 19 | 57 | 8483 |
| Crop | 102 | 100 | 21 | 2 | | | | 15 | 239 |
| Cut and Carry | 17 | 28 | 5 | 3 | 1 | | 1 | 60 | 114 |
| Forestry | 5 | 612 | 2324 | 3891 | 1121 | 53 | 1 | 86 | 8093 |
| Fruit Crop | 2 | 12 | 14 | 3 | | | | 0 | 32 |
| Gorse | 3 | 17 | 63 | 322 | 80 | 1 | | 3 | 490 |
| Grazed trees | 0 | 78 | 504 | 472 | 152 | 80 | 0 | 1 | 1287 |
| House | 11 | 96 | 120 | 81 | 11 | 0 | 0 | 24 | 342 |
| Lake or waterway | 0 | 2 | 0 | 3 | 1 | | 7 | 0 | 14 |
| Non-productive | 4 | 22 | 18 | 20 | 11 | 1 | 1 | 7 | 84 |
| Pastoral (Dairy) | 78 | 830 | 1532 | 2110 | 159 | 7 | 0 | 4 | 4719 |
| Pastoral (Dry Stock) | 270 | 2449 | 4440 | 6191 | 1067 | 96 | 9 | 132 | 14654 |
| Reticulated Housing | 2 | 16 | 10 | 5 | 0 | | 0 | 11 | 44 |
| Roading | 16 | 100 | 138 | 136 | 27 | 0 | 1 | 6 | 424 |
| Urban Open Space | 0 | 21 | 23 | 3 | 0 | | 0 | 7 | 54 |
| Wetland | 7 | 98 | 27 | 85 | 5 | | 10 | 11 | 244 |
| Grand Total | 534 | 4911 | 11626 | 16742 | 4231 | 801 | 48 | 425 | 39318 |

[202] Dr Mackay was the principal investigator in the development of ANCA. He considered that allocating a nutrient loss limit based on the natural capital (inherent capability) of the soil offers an approach for developing policy that is linked directly to the underlying land resources. He acknowledged that direct methods for calculating a soil's natural capital are still in development, but stated that frameworks for classifying and measuring soil natural capital are developing. It is appropriate that Dr Mackay made this acknowledgement. However, it leads

to immediate follow-up questions, including about how far the development processes have advanced, what the current reliability of the emerging frameworks is likely to be and whether the policy outcomes would better achieve the purpose of the Act, and the relevant provisions of the higher order instruments, than the sector range method.

[203] In the absence of a method for calculating a soil's natural capital, ANCA adopts LUC as a proxy for the ability of the soil to sustain a legume-based pasture which fixes nitrogen under optimum management and the pressure of grazing animals.

[204] Dr Mackay cited the Horizons One Plan (the Manawatu-Wanganui Regional Policy Statement and Regional Plan) and the Hawkes Bay Regional Plan Change 6 as examples of where a natural capital approach, with LUC used as a proxy for natural capital, is used elsewhere in New Zealand. We understand these are the only examples. He explained that in these cases, the potential attainable livestock numbers were converted to pasture production for use in Overseer to calculate nitrogen leaching losses for each LUC class.

[205] Dr Mackay acknowledged that using benchmarking as a starting point is a very effective action to stop further increases in nitrogen leaching and any further decline in water quality, but opined that it is sub-optimal in the use of resources. His evidence was that land could sustain more intensive land uses than existing activities without having any further adverse effects on the lake water quality by reconfiguring current land uses. He provided no detailed supporting analysis.

[206] We accept Dr Mackay's evidence that different soils have different productive capacities, and that some existing land uses are located on soils that have or are likely to have limitations in terms of their abilities to mitigate nitrogen losses, while other land has the potential to be used more intensively than at present. We also accept that LUC can be and is used in a number of ways in different types of planning processes. We note that it is not used for the purpose proposed in ANCA anywhere else in New Zealand and we received no evidence to show that it is used in this way overseas. We conclude that its use for this purpose is at this stage untested.

[207] Dr Mackay provided no comprehensive catchment-wide analysis of issues such as relative nitrogen losses from different LUC classes and potential changes (positive or negative) to total nitrogen loads to the lake as a result of relocating higher nitrogen-discharging activities. Such analysis is needed to fully test his opinions on the benefits of ANCA in order to determine whether ANCA as proposed would give effect to the NPSFM and the RPS and

better assist the Regional Council to carry out its functions in order to achieve the purpose of the RMA.

[208] We were assisted in assessing these matters further by the JWS on LUC. There was no disagreement recorded in that JWS other than differing views on the attainable potential livestock carrying capacity. The following evidence from the JWS (with relevant paragraph numbers in brackets) was particularly helpful:

(a) There is presently no alternative classification system that might be useful as a resource for the management of nitrogen loss from rural production activities that are as well defined as LUC (4.1).

(b) An alternative system called Land Use Suitability also considers social, economic and environmental factors and off-site impacts, but it is still in development (4.2).

(c) Climate change is not reflected in LUC (4.4).

(d) LUC can be used as a proxy for natural capital (5.2).

(e) Nitrogen losses in ANCA are determined from individual farming activities using Overseer in the same way as they are determined in the sector range method (5.4).

(f) The attainable potential livestock carrying capacity is used to determine the relative productive capacity between LUC classes. This is referred to as the carrying capacity potential in the JWS on LUC. The experts expressed differing views on the use of carrying capacity as a proxy for natural capital (5.5).

(g) A number of issues were identified relating to an alternative method based on LUC (6):

- Carrying capacity is outdated and needs upgrading to incorporate all modern land uses and technologies;
- Using a weighted average of carrying capacity by LUC unit for each land use class could result in an unfair nitrogen distribution through variation within units;
- The coarse scale of mapping (at 1:50,000) means some land is misclassified, but a finer scale would change the ANCA allocation;

- Subjective variation occurs among assessors given the qualitative elements of LUC classification;
- Methods to extend the proxy to include the risk of land losing nitrogen below the root zone could be considered;
- There is a lack of understanding of the variation in nitrogen attenuation across the catchment, which affects the ability to understand contributions of nitrogen from each individual property to the total load.

(h) When LUC was developed, there was no consideration of nitrogen loss. There is some scientific uncertainty with respect to nitrogen losses from the types of soil in the Rotorua catchment (5.6).

(i) It appears that susceptibility to lose nitrogen from the root zone is not associated with LUC in the Rotorua catchment (5.8).

[209] The last point is, in our view, particularly important.

[210] Dr L R Lilburne, a senior soil scientist employed by Manaaki Whenua – Landcare Research and called by the Regional Council, stated that ANCA does not consider the variability of carrying capacity within each LUC Class. She said that Class 3 varies between 20 and 24 units; class 4 between 15 and 25 units and class 6 between 10 and 23 units. In other words, she pointed out that there is considerable variation in productivity (as measured by carrying capacity) within each LUC class. We accept it may be possible to address this in any final rules framework, but with an added level of complexity.

[211] Dr Lilburne also elaborated on concerns that LUC does not address the loss of nutrients from land packages. She referred to the substantial variation in losses of nitrogen (as predicted by Overseer) within each LUC class. She explained that part of the reason for this variation is the strong gradient in rainfall across the catchment and that higher rainfall leads to higher losses of nitrogen, but this difference is not captured in the LUC classification. We agree with Dr Lilburne that this is an issue and note that it is also a consideration for the sector range method.

[212] The focus of PC10 is to reduce nitrogen from existing land uses in order to meet the Sustainable Lake Load as directed by the RPS. For ANCA to be a more appropriate method of achieving the relevant objectives, a matter we must consider is whether ANCA has a level

of certainty of meeting the nitrogen reduction target which is comparable to the sector range approach.

[213] We agree with Dr Lilburne that LUC is just one aspect of natural capital. There are other physical aspects of natural capital that are relevant in the context in which its use is being proposed in the Rotorua catchment. One of these is the land's ability to reduce nitrogen discharges below the root zone and another is the influence of rainfall on that process. It is clear from the evidence that nitrogen losses from equivalent LUC class land will vary, potentially significantly, depending on whether the land is in a high, moderate or low rainfall area within the catchment. The expert evidence is that further work is required to address the nitrogen reduction capability of different LUC classes. In combination, these factors and others give rise to uncertainties as to the outcomes that would be achieved from the ANCA method in terms of overall productive capacity and, perhaps more importantly in this case, whether the anticipated nitrogen reductions will be achieved. It is possible that both of the desired outcomes are achievable, but we have no evidential basis to provide a reasonable level of certainty that they will, given the current state of knowledge.

[214] Another relevant aspect of natural capital is the ability of the land to attenuate the actual quantity of nitrogen from the time it leaves the root zone to the time it reaches the lake. The water quality experts considered the effects of any change in allocation methods on nutrient loads reaching the lake.[52] They agreed that if an alternative method resulted in a significant change in the spatial distribution of land use, with the same total nitrogen loss from the land, there may be a change in the amount of attenuation and the timing of nutrient loads reaching the lake.

[215] We were presented with no analysis by NCG of this potential effect in order to allow us to assess its significance. From the information we have, we conclude that there would be an unknown element of risk in proceeding without additional investigations.

[216] We acknowledge there are differing views between experts on the extent of the reliance that can be placed on existing LUC data in the Lake Rotorua catchment. Once again, the evidence presented is insufficient to allow us to draw conclusions other than that there would be an unknown element of risk in proceeding without additional information.

[217] Further uncertainties exist in terms of the robustness of the proposed use of carrying capacity in allocating nitrogen. We note Dr Mackay's evidence that nitrogen leaching risk is

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52 First JWS water Quality at section 6.9.

weakly linked to inherent land characteristics, but strongly linked to land management. We consider this weakens the case for basing allocation on LUC.

[218] Overall, we consider a more robust evidential basis would be required before the appropriateness of basing nitrogen allocation on LUC class could be determined with an acceptable level of certainty. Most particularly, we consider that, in the current case, the relationship between LUC and nitrogen losses below the root zone would need to be reliably established.

[219] The lack of certainty is relevant to our assessment of whether a nitrogen allocation method based on LUC is the most appropriate compared to the sector range method in terms of the Act and relevant plan provisions. We evaluate this below but note that Policy IR 3B(e)(4) of the RPS encourages developments, activities or land use changes to recognise the advantages and constraints of land use capability. Based on the evidence before us, we are satisfied that the constraints, including unknowns and uncertainties, outweigh the advantages, which makes ANCA less appropriate than the sector range in terms of this policy.

**Practical considerations arising from changing from one land use type to another**

[220] One of the advantages promoted for ANCA is that it would provide owners with opportunities to change from low nitrogen discharging land uses to more productive and higher nitrogen discharging land uses. NCG provided no substantive evidence to support this proposition in terms of practicability including, in particular, its economic viability.

[221] Ms C B Robson, who has a background in agricultural science and environmental planning, was called for NCG. She identified papakāinga, tourism ventures, visitor accommodation, short rotation carbon crops, various forms of horticulture including orcharding or any form of agriculture as possible future uses. Other experts referred to pastoral farming.

[222] The type of land use changes that might be contemplated were explored with a number of other witnesses during the hearing. Further possible uses identified were adventure tourism, sheep milking, other stock such as alpacas or goats, horticulture, chestnuts, blueberries and viticulture.

[223] Dr Doole said in answer to questions that his economic modelling applied to an area of more than 20,000 ha of land, so that while some land use change might make sense at an enterprise or farm level, this provided quite a small opportunity at a catchment-wide level. He outlined difficulties he saw in modelling innovation in land use, but he considered that both proposed plan frameworks would spur innovation.

[224] We were told by Mr Le Miére that climatic conditions in the Rotorua catchment place limitations on uses to which some land can be put. In response to a question from the Court, he replied that:

> My experience is the environment up there isn't conducive to many crops with the altitude and the temperatures, et cetera, so it's not particularly conducive to vegetable production, kiwifruit, those sort of things, so there might be some tree crops in terms of chestnuts, walnuts, those sort of things.

[225] In terms of affordability, Mr Le Miére estimated that conversion from forestry to sheep and beef farming would cost around $16,500/ha with a carbon tax at $6/t and around $31,500/ha with the tax at $25/t. He estimated that conversion from forestry to dairy would cost around $37,550/ha with a carbon tax at $6/t and around $52,500/ha with the tax at $25/t. Mr P R Journeaux for the Regional Council similarly estimated the costs of conversion from forestry to dairy at $32,600/ha with carbon tax of $17,500/ha, or a total of approximately $50,00/ha. The JWS on Economics states that it is unprofitable to convert from forestry to any pastoral land use and that this is a strong constraint on its optionality.

[226] We accept that use of the land for papakāinga, tourism ventures and visitor accommodation and the like could be economically viable and attractive to some land owners but would anticipate such uses would occupy relatively modest areas of land. We were told some tourism ventures are already being considered by CNI. Such uses would be generally low nitrogen-discharging activities in the context of the catchment as a whole. While we heard no evidence of the details associated with the other land uses identified by Ms Robson, we consider that these uses should not be precluded from consideration and we address this below.

[227] Based on the evidence, we find it is unlikely that any significant conversion from forestry or bush and scrub to pastoral use would be likely to occur on economic grounds alone. We find that other types of land use including papakāinga, tourism ventures, visitor accommodation and possibly short rotation carbon crops and various forms of horticulture including orcharding are or could be practicable in certain situations. RPS Policy IW 1B relevantly states:

> Provide for the development of multiple-owned Māori land in a manner which: ...
>
> (b) enables Māori to develop papakāinga, marae and associated community facilities or housing ...
>
> (c) enables Māori to develop multiply owned Māori land and resources to provide social and economic benefits; ...

[228] We consider that PC10 should recognise these potential uses of Treaty Settlement land in an appropriate way, which we understand to be consistent with Mr Lamb's evidence as set out below. The Council is **directed** to consider, in consultation with NCG, what might be an appropriate nitrogen allocation for such uses and make provision by way of a proposed rule in evidence at the Stage 2 hearing.

[229] We recognise that any such allocation is likely to require further reductions in allocations for the dairy and dry stock sectors within the current PC10 framework. However, while we do not consider the allocation will need to be large based on the evidence, we consider it is necessary to have appropriate regard to the equity and cultural values provisions of RPS Policy WL 5B.

**Nitrogen reductions to be achieved by 2032**

[230] The allowable nitrogen discharge allocations for both methods are described above. The current average discharge in the dairy sector is in the order of 100 kgN/ha/y. Broadly speaking, the sector range method requires an average reduction of around 35% down to a sector average of around 65 kgN/ha/y. Under ANCA, dairy farms are required to reduce nitrogen discharges to less than 18 kgN/ha/y overall[53] and, as a consequence, must reduce existing nitrogen discharges by an average of more than 80%.

[231] The current average discharge in the drystock sector is in the order of 31 kgN/ha/y. Under the sector range method drystock farms are required to reduce nitrogen discharges by around 17% to an average of 25.6 kgN/ha/y. Under ANCA, drystock farms are required to reduce nitrogen discharges to less than 18 kgN/ha/y overall and, as a consequence, must reduce existing nitrogen discharges by an average of more than 40%.

[232] Under ANCA, forestry and bush and scrub are allocated approximately six times more nitrogen to discharge than under PC10.

[233] Clearly, the differences between ANCA and PC10 are substantial in terms of reductions or increases in nitrogen allocation. The consequences of these differences must also be expected to be substantial, requiring full understanding before any decision is made.

[234] Based on the above, we find that the sector range method is more effective and efficient in terms of minimising the extent of nitrogen reductions to be achieved from existing land uses, and their associated effects. While ANCA could potentially allow more efficient use

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53 Calculated using the area of each LUC class and the corresponding per ha nitrogen discharge allocation.

of forestry and bush and scrub land because of a greater nitrogen allocation, the weight of economic evidence on conversion costs is that this is unlikely, and we find that the sector range method remains overall more effective and efficient.

**Comparison in terms of nitrogen headroom**

[235] For the purposes of this decision, nitrogen headroom is the quantity of nitrogen available for allocation in the Rotorua catchment minus the quantity that is allocated. In situations where headroom is available, it provides some allowance for new land uses or for variations in the science or model predictions or it may be held in reserve as a contingency for unforeseen circumstances. In situations where headroom is not available, any failure to meet predicted nitrogen load reductions is very likely to result in a failure to meet the Sustainable Lake Load of 435 tN/y. That would mean that the Regional Plan would not give effect to RPS Policy WL 3B(c) and so it would be contrary to s 67(3)(c) RMA. Put simply, the combination of all loads to the lake, after any applicable reduction or attenuation, must amount to no more than the Sustainable Lake Load.

[236] Mr Lamb uses a figure of 27.4 tN/y as the additional load arising from Rule LR R11A - Te Ture Whenua Māori conversion and from Rule LR R8 - non-benchmarked properties. The overall catchment balance shown in the table at Appendix 4 provides for this additional load within the 435 tN/y Sustainable Lake Load to the lake set by RPS Policy WL 3B(c).

[237] Ms A E McGregor gave evidence on catchment accounting for NCG. We reviewed carefully her calculations of actual or potential additional loads under PC10. She assumed some 12 to 13 tN/y load reduction required in the Waikato region could reduce the headroom as there are currently no plan provisions operative in the Waikato region that will ensure the reduction occurs. It is our expectation that to satisfy the provisions of s62(1)(h) of the Act and RPS Policy IR 6B such provisions will be introduced and no reduction in headroom for this reason is required.

[238] Ms McGregor also suggested that there could be a further shortfall of 154 tN/y if the Incentives Fund acquires no additional nitrogen beyond the present level. While we accept there are unknowns as to the level of take-up of the fund that will occur, we consider there are similar or potentially greater uncertainties in how the fund would be taken up under ANCA, meaning it cannot be considered as a differentiator between the allocation methods. In any event, the Incentives Fund is a non-statutory method outside the scope of PC10 and we have no jurisdiction to determine its use. Further, some witnesses questioned whether the authorities contributing to the fund would agree to the alternative use of the fund proposed by NCG.

[239] Ms McGregor set out her assessment of shortfalls that could occur under ANCA, which indicated there would effectively be no available headroom once the proposed ANCA allocations are taken up.

[240] We sought clarification of the total nitrogen load balance in the Lake Rotorua catchment in our Minute dated 7 June 2019. In part, this was to ensure we had an accurate understanding of the headroom available under the sector range allocation method. The Council's response confirmed there is limited if any headroom, meaning that to provide an allowance for other uses, other allocations would need to be reduced. There is therefore no difference between the methods in this regard.

[241] We consider that it would be prudent to include a degree of headroom to provide a contingency. However, we accept that PC10 is seeking to correct an unacceptable existing situation in terms of nitrogen loads reaching the lake. PC10 is unlikely to be the last step that will be required in the journey towards attaining a sustainable lake state. Further changes in the proposed nitrogen allocations could need to be made in the future.

**Comparison in terms of land use change**

[242] The Regional Council undertook extensive economic modelling work which was described to us in the evidence of Ms S Barns and Dr Doole. As part of the work, the Regional Council modelled the prospective effects of the two alternative allocation methods on land use change. Dr Doole summarised the land use change under different scenarios and the following Table 3 from his paper *Economic assessment of allocating nitrogen based on sector ranges and Land Use Capability classifications in the Lake Rotorua Catchment*, 3 December 2018, (Attachment 3 to his evidence in chief) shows that. The scenarios are the baseline (labelled "Base"), Sector Range allocation ("SR"), LUC allocation ("LUC"), Sector Range allocation with Frictions ("SR+F"), and LUC allocation with Frictions ("LUC+F").

| Land use | Base | SR | LUC | SR+F | LUC+F |
|---|---|---|---|---|---|
| Dairy | 4,718 | 2,372 | 2,372 | 2,372 | 1,575 |
| Dairy support | 2,619 | 658 | 658 | 658 | 659 |
| Sheep and beef | 10,902 | 14,063 | 14,063 | 14,063 | 19,134 |
| Sheep and dairy support | 3,075 | 1,300 | 1,300 | 1,300 | 1,300 |
| Forestry | 8,095 | 11,016 | 11,016 | 11,016 | 7,480 |
| Bush and scrub | 8,669 | 8,669 | 8,669 | 8,669 | 7,930 |

[243] "Frictions" here refer to the consequences of inefficiencies in markets. Such inefficiencies may arise from a variety of transaction costs, including distance, poor information and poor regulation. While theoretical economic analysis may treat these as being within the degree of precision or rounding or simply omit them, in real markets frictions occur everywhere, much as they do in the physical world. We are satisfied that a fully efficient trading scheme is not a realistic expectation in the Rotorua catchment and that some frictions, or impediments to efficient trading, must be anticipated. We discuss this further as part of our economic evaluation.

[244] The modelling results in the table indicate the importance of friction. When it is included, the modelling shows that there are significant differences between the two methods and that in all cases land use change under ANCA can reasonably be expected to be greater than under the sector range method.

[245] Dr Doole's evidence was that the amount of land allocated to dairy farms is likely to drop as a result of PC10 by more than 45%, irrespective of the allocation method, as a result of the high nitrogen-leaching footprint of dairy production that both methods seek to address. The forestry area is likely to expand under both allocation methods, given its low nitrogen-leaching footprint. The area allocated to sheep and beef farming is also likely to expand, while the area allocated to sheep and dairy support is likely to decrease.

[246] There was no disagreement among the expert witnesses that adoption of the ANCA method would result in greater changes in pastoral land use than the sector range method. We find that the sector range method is more likely than the ANCA method to minimise the extent of land use change in the catchment. It is consequently more likely to reduce the short to medium-term effects of land use change on people and communities.

**Comparison in terms of robustness and reliability of process**

[247] It is clear that there are many uncertainties to be considered when setting policy directions for nutrient management in sensitive lake catchments. When comparing different methods, it is essential to understand their relative robustness and reliability as key components of the selection process.

[248] While a number of components of the processes in the two methods are the same or similar, there are four significant differences:

(a) The extent to which each is used elsewhere;

(b) The way in which reference files are used to adjust NDAs/NCAs in response to new versions of Overseer;

(c) The way in which relativity is maintained between land use types; and

(d) The basis for and extent of reliance on nitrogen trading.

We address (a) to (c) immediately below and (d) later in this decision

*Extent of use elsewhere*

[249] Mr P S Wilson, an economist called by NCG, has extensive policy experience and knowledge in relevant practice areas. He was unaware of any schemes around the world where nitrogen allocation is based on LUC. As noted above, the only plans based on LUC in New Zealand are the Manawatu-Wanganui Regional (Horizons One) Plan and the Hawkes Bay Regional Plan (Change 6). Both plans use LUC differently than is proposed in ANCA.

[250] The Horizons One Plan was made operative in December 2014 and includes provisions for managing discharges based on quantities of nitrogen that could be leached by intensive farming activities from different LUC-class land. Following a decision of this Court in declaratory proceedings brought by the Wellington Fish and Game Council in 2017,[54] the Regional Council initiated a plan change in late 2018 to address unforeseen consequences of some of the One Plan provisions. This experience emphasises the complexity of the issue and the need to understand and plan for uncertainty.

[251] Change 6 to the Hawke's Bay Regional Plan was made operative on 1 October 2015. It sets LUC Natural Capital Nitrogen Leaching Rates for all LUC classes 1 to 8. We received no evidence to assist us in understanding what experience has been gained since Change 6 became operative.

[252] These two examples have only been operative for relatively short periods and do not provide much basis for understanding the strengths and weaknesses of a method using LUC classes for allocation of nitrogen. This leaves greater relative uncertainty compared to the sector range method based on existing farming practices and records of the effects of existing activities, where most uncertainties appear to have been identified, the limitations are reasonably well understood, and particular measures to address them are proposed.

54 *Wellington Fish and Game Council v Manawatu-Wanganui Regional Council* [2017] NZEnvC 37.

*Use of reference files to adjust NDAs in response to new versions of Overseer*

[253] Both allocation methods use reference files to adjust nitrogen allocations to reflect new versions of Overseer, as described above.

[254] Adjustments in the sector range method are based on the five individual reference files for the sectors: dairy, drystock, plantation forestry, bush and scrub and house blocks. While this allows the relativity of average percentages discharged by each sector to be maintained, it does not result in direct "like for like" comparisons for individual farms. Farms towards the upper and lower limits of the dairy and drystock sector ranges could be either advantaged or disadvantaged compared to those closer to the average of the range. As recorded earlier, we were told that the Regional Council is aware of this limitation of the adjustment method and is considering modifications to remove or reduce this limitation. We **direct** that this be addressed at the Stage 2 hearing.

[255] Under ANCA, the same reference files are summed to determine the total adjusted rural sector pool of nitrogen in the catchment. The nitrogen allocation to each LUC class of land is recalculated for new Overseer versions to reflect the change in the average of the reference file values and applied to each property to get updated NCAs.

[256] There was disagreement among the experts as to whether the use of the reference files in both methods was comparable. Ms McGregor described the use of the reference file system in ANCA as slightly modified from its use in the sector range method. Mr A C MacCormick for the Regional Council considered the changes to the use of reference files to be more than slight and opined that the changes may significantly erode or increase the reduction targets from one Overseer version to the next, without any reference to the actual farm systems. Mr I F Millner for Federated Farmers considered that the reference file system was developed specifically for the sector range method and said that he had difficulty understanding how the system could be applied under ANCA or what results it would produce. He reviewed the issues as he saw them in some detail and made the following points:

(a) The reference file adjustment factor approach In ANCA does not maintain the same relativity between LUC classes over time due to non-relative changes in how the reference files are affected by Overseer updates.

(b) The spread between LUC classes 2 and 7 changes from a base of 7 kgN/ha using version 6.2.2 to 6.16 kgN/ha using version 6.3 (a 12% change).

(c) This makes planning and investing to achieve a farmer's 2032 NCA difficult and uncertain.

(d) It also means that the natural capital allocation is not driven by the inherent characteristics of the soil, otherwise the relativity between classes would be maintained.

(e) The nitrogen allocation for farm systems that are different from the hypothetical reference file farm system will be at risk of not closely tracking the reference files. This is also potentially an issue under the sector range method but that is more of an implementation issue that could be addressed in various ways, including using more reference files or updating the reference file assumptions to reflect farm systems changes in the catchment.

(f) Mr Millner did not see how the issue could be as easily addressed under ANCA because the reference files were not designed for the ANCA framework and the application of them in ANCA results in factors other than LUC as a proxy for natural capital influencing allocation values.

[257] We have considered the detailed evidence of these experts very carefully. We checked the examples used by them. We were particularly concerned that the combination or summing of the reference files produced anomalous results, distorting the Overseer model predictions in a way that produced incongruous outcomes for the dairy and drystock sectors. We therefore prefer the evidence of Mr MacCormick and Mr Millner to the evidence of Ms McGregor. In our view, these anomalies would result in greater uncertainty for farmers than the sector range method and could require unnecessary changes in farm management practices. These costs would be for uncertain benefits in terms of total catchment nitrogen load, and when there had been no physical on-farm changes of any kind.

[258] We consider the uncertainties, potential for unintended consequences, implementation practicalities and potential for adverse effects on farm management make the proposed ANCA reference file method less appropriate than the sector range method and would be unlikely to deliver the outcomes required by the RPS. Without substantial modification, ANCA would be less efficient and effective. While the sector range method is acknowledged by Mr MacCormick as requiring some modification, particularly of the reference file method, his evidence is the issues can be addressed through relatively minor modifications. In terms of the reference file element, the sector range method has significant advantages over ANCA in terms of efficiency and effectiveness and therefore in terms of robustness and reliability of process.

*Maintaining relativity between land use types*

[259] A key difference between the methods is that the sector range method incorporates a land use sector approach and ANCA does not. We explored the criticality of sector differentiation with Mr MacCormick. His view is that the sectors respond to changes in Overseer significantly differently, so that without sufficient sector differentiation, one sector will be exposed to changes in the other sector. Based on our evaluation of the use of reference files in the two methods as set out above, we agree with Mr MacCormick. In our view, the sector range method better addresses sector differences than ANCA in the sense that the discharge limits required in one sector do not inappropriately affect those required in other sectors, or flow on to farm level management responses.

[260] A second issue arising from relativities between sectors is that Overseer does not have a technical module for forests and so can only estimate nitrogen leaching there. The forest nitrogen leaching number remained constant despite Overseer version changes (that is, it got proportionately less between Overseer versions 5.4 and 6.2.0). This requires further consideration and we **direct** that it be addressed by the Regional Council at the Stage 2 hearing.

**Comparison in terms of effects on Māori owned land**

[261] "Māori Land" includes land held in multiple ownership under the Te Ture Whenua Māori Act 1993 (**TTW land**) and Treaty Settlement land such as the CNI and Ngati Rangiwewehi Blocks. There are some 15,409 ha of Māori owned land within the Lake Rotorua groundwater catchment area, comprising 11,835 ha of TTW land and 3,240 ha of Treaty Settlement land. Approximately 5,818 ha are on LUC Classes 2 to 4, and 9,903 ha are on LUC Classes 6 to 8. The predominant rural land uses are forestry (5,839 ha), drystock (4,611 ha), dairy (1,226 ha), grazed trees (553 ha) and bush and scrub, including some gorse (2,882 ha). Approximately 81% of the bush and scrub is protected.[55]

[262] Rule LR 11A of PC10 provides for 800 ha of TTW land to be converted to the bottom of the drystock range as a restricted discretionary activity, with conversion required to occur within five years of a resource consent being granted to prevent nitrogen banking.[56] Mr Lamb gave evidence that this provision reflected the need to balance subpart (a) of Policy IW 1B (*enables sustainable development consistent with Part 2 of the Act*) with subpart (c) (*enables Māori to develop multiply owned Māori land and resources to provide social and economic*

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55 First JWS Planning at pages 14 and 15.

56 First JWS Planning at page 16.

*benefits*). He also referred to the increase to the bottom of the drystock range for 1,830 ha of Māori pastoral land, out of a total of 2,810ha.

[263] After considering the CIA prepared for the appeal and the economic evidence on the cost of land conversion, Mr Lamb went on to suggest that the Court may wish to examine Rule LR 11A to broaden its application. He noted that the rule has two limitations: it is limited to TTW land and the conversion is only to low intensity farming. Removing these limitations would result in this provision applying to Māori Land generally and enabling conversions leading to a higher level of nitrogen loss. Mr Lamb said that this change would be considered in terms of being additional to rather than in conflict with the direction in RPS Policy IW 3B. The amount of nitrogen loss would need to relate to the sector ranges and could be made conditional on efficient use.

[264] The economic expert witnesses identified the different effects of the two allocation methods on different Māori land owners as follows:[57]

(a) The ANCA allocation is unambiguously better for owners of Treaty Settlement Land, netting this group nearly 49 tonnes more nitrogen than they would receive under the sector range method;

(b) Owners of Māori land under the Te Ture Whenua Māori Land Act are worse off under ANCA than the sector range method with a net reduction of 40 tonnes when moving from sector range to ANCA; and

(c) The overall effect for all Māori land of all types is a gain of 8.8 tonnes when ANCA is the allocation method.

[265] Ms McGregor included adjustments which would mean Māori owned land would be better off by 3.5 tN overall under ANCA, with gains to forestry and dry stock land offsetting less allocation to dairy.

[266] Mr Lamb assessed that in comparing ANCA to the sector range method, Māori forestry land gains substantially, Māori pastoral land loses substantially and overall Māori land in total receives slightly less allocation (when LR R11A is included). He provided an example of effects on pastoral land that, under ANCA, the three large Ngāti Whakaue farm properties would face a 30% (16 tN/y) nitrogen reduction from their calculated NDA levels.

57 JWS Economics at section 8.2.8.

[267] Mr Lamb identified 27.4 tN/y to be applied through RPS Policy WL 6B that is not allocated but that is available to meet the requirements of conversions under LR R11A (conversion of Te Ture Whenua land) and LR R8 (commercial non-benchmarked enterprises).

[268] It appears that in the sense of increasing their respective nitrogen allocations, for Treaty Settlement Land the ANCA method is more effective and for TTW land the sector range method is more effective. Whether the resulting allocations are efficient in terms of s 7(b) RMA is a different matter that we address below. When all Māori owned land is considered, there is no clear evidential basis for saying that either allocation method is more efficient and effective than the other.

**Comparison in terms of social effects**

[269] We received very little empirical evidence on the likely social effects of the two proposed allocation methods from expert witnesses. Such expert evidence as was given was limited to high-level statements of general opinion with no supporting analysis that we could rely on in terms of catchment-wide effects.

[270] The Regional Council identified that the number of farming families affected are from 26 dairy farms and about 130 drystock properties. The Council anticipates that under the sector range method many dairy farmers will be able to continue their current farming but will have to make sometimes substantial changes in land use practices. Some dairy farmers will not be able to continue in that land use and will have to consider changing to drystock or some other form of use. The Council expects that some farmers will choose to leave the catchment. Many and possibly most of the drystock farms will be able to continue to farm with changes in land use practices. Job losses in the Rotorua district pastoral sector under the sector range method were estimated to be between 90 and 110, with a small number of losses in associated sectors.[58]

[271] While we received no evidence on the social effects of the ANCA method on pastoral farmers, they would clearly, in our view, be significantly greater than those arising from the sector range method.

[272] Mr G R Eccles, a planning expert engaged by NGC, considered that the philosophy underpinning PC10 heavily equates social effects with economic losses and that it is too simplistic to use economic effects as a proxy for social effects. He considered it faulty logic to assume that if land use changes and then, for economic or other reasons, existing members

58 JWS Economics at section 8.2.4.

of the community elect or are forced to move on, other people will not move in and begin to contribute to the community. Should a particular land use no longer be a viable economic activity in its current location in the Lake Rotorua catchment, then under the ANCA method the potential to establish an alternative land use would not be extinguished. His view was that just as the existing pastoral sector will undoubtedly suffer some of the social effects of the required nitrogen reductions, so have and will other sectors of the wider community, including the owners and beneficiaries of under-developed Māori owned land and forestry interests.

[273] He expressed the concern that the sector range method makes higher and better economic use of Treaty Settlement Land very difficult, resulting in lost social and cultural opportunities in terms of employment and economic growth, perpetuating inequity. Mr Eccles was not aware of any other plan in New Zealand that takes a resource such as the ability to discharge nitrogen from one group of land owners and transfers it to another. Mr Mackay gave evidence that he did not consider social and cultural effects when developing ANCA.

[274] Federated Farmers called two members of the farming community who described how they would be affected by the different proposals. Ms Patterson, a dairy farmer in a high rainfall area of the catchment, provided a careful and thorough evaluation of the anticipated effects of both allocation methods on her family farm. In order to meet their 2032 NDA under the sector range method, they would need to make significant changes to their farm system and it was not yet clear to them whether it would remain financially viable. She said there was no escaping the fact that limits on discharging nitrogen by any method under PC10 will have a significant impact on her farm, business and family but expressed the hope that they could adapt, adjust and continue in some form.

[275] By Ms Patterson's calculations, under ANCA it would be necessary to reduce nitrogen discharges by more than 80% compared to present discharges, meaning her family could not continue as dairy farmers and other potentially viable farming or forestry options would generate insufficient income to meet expenses or service debt. She expected that their sharemilkers and their families would inevitably leave the district, and that this would have an impact on the local community, including the likely adverse effects on school rolls and on sporting and community organisations.

[276] We also heard from Mr Heather, a drystock farmer from Ngongotaha, whose evidence was also thorough and clear in terms of the effects of the two allocation methods. He advised that the effects of the sector range method on him would be very significant and the effects of ANCA would prevent him from continuing any meaningful farming activities or continuing his extensive environmental restoration work on his property.

[277] Mr Le Miére's evidence was that:

> The Rotorua rural community is a tight knit community. They support, provide for and are there for each other in a way that is unlike my experiences in many other catchments. They are aware of how each farm depends on the other, the importance of a clean lake and how they fit into the wider environment.

[278] The sector range method will result in adverse social effects on the farming and farm support communities in the Rotorua catchment. These effects will vary depending on individual circumstances. The effects are likely to be substantial for individual farmers and their families and workers both in the short and medium to long-term. The effects of the ANCA method on the same communities will be greater again, almost certainly resulting in increased numbers of farmers having to discontinue farming.

[279] The sector range method largely retains the status quo in terms of social effects on the owners of land in forestry and bush and scrub. While it does provide a theoretical opportunity to purchase nitrogen through trading and move into alternative land uses, we do not consider this opportunity material in terms of social effects because of its limited extent. For the owners involved, continuing with the status quo under the sector range method is seen as an adverse social effect as it removes opportunities to improve their well-being. The ANCA method, on the other hand, would transfer substantially increased nitrogen discharge allocations to these owners, with economic benefits and associated social enhancement opportunities.

[280] In our view, while the economic benefits of ANCA to the owners of land in forestry and bush and scrub are clear, we agree with Mr Eccles that it is too simplistic to use economic effects as a proxy for social effects. Having said that, we are also mindful that anyone who incurs economic costs is seldom left better off or neutral in social terms. We heard no evidence that provides us with a reliable basis for assessing the social benefits of ANCA as distinct from cultural effects, which we come to next. We have no certainty that they would be significant or when they would occur. What is clear is that the adverse social effects of ANCA on the farming community would be significant in the short-term and almost certainly substantial in the medium to long-term. On balance, we find that the sector range method is more appropriate in terms of managing adverse effects on social aspects of the existing environment than ANCA's potential but uncertain benefits for the future social environment.

**Comparison in terms of cultural effects**

[281] The CIA compiled by a collective of Mana Whenua Groups and the CNI Collective with significant holdings in the Rotorua-nui-a-Kahumatamomoe caldera and provided by NCG concluded that the ANCA method would be preferable to the sector range method on cultural

impact grounds. The CIA summarises the outcome of an assessment and comparison of the sector range and ANCA allocation methods against cultural values in detail. Among many other things, the CIA determined that the sector range allocation method:

(a) considers the mauri of the water as more important than the mauri of the land and other eco system services and does not enable mauri to be provided for across the entire ecosystem and for future generations;

(b) does not employ sustainable land management practice and encourages the over-utilisation of land beyond its natural capacity;

(c) inhibits Mana Whenua's ability to meet their social, economic and cultural outcomes which are considered essential as hunga tiaki (the protection of mauri) and which impacts on the value of rangatiratanga; and

(d) subjects Mana Whenua to the role of environmental, social and cultural and economic refugees with land that cannot meet its full potential.

[282] The CIA then sets out its determination of the ANCA allocation method, recording, among other things, that it:

(a) best represents the values of kaitiakitanga, provides for rangatiratanga and enables the values of utu and muru to be exercised;

(b) aligns with the values and matauranga of Te Arawa hapū and iwi within the Lake Rotorua caldera;

(c) considers the mauri of land and lakes in the allocation of nutrients;

(d) can deliver economic, cultural, social and environmental outcomes and enables the exercise of kaitiakitanga by Mana Whenua; and

(e) best represents sustainable land management.

[283] The matters addressed in the CIA were reinforced through the evidence presented by NCG. This evidence was not challenged.

[284] The evidence in relation to the Treaty Settlement land must also be considered with anticipated effects of the ANCA method in terms of nitrogen allocations to owners of Māori freehold land, as addressed above. As already noted, the sector range method would achieve a degree of mitigation of adverse cultural effects by reducing adverse effects on the water

quality of Lake Rotorua, which is agreed by all to be a taonga. There is also the mitigating effect of Rule 11A, included on the recommendation of the IHP in the Decisions Version of PC10, and the potential to provide further mitigation of cultural effects by including a nitrogen allocation available for alternative uses of land under TTW currently in forestry or bush and scrub.

[285] We accept the comparison of the two allocation methods on cultural values as set out in the CIA and summarised above. On that basis, we find that ANCA is more effective and efficient, overall, than the sector range method in terms of mitigating cultural effects. We observe that it effectively does so by making some Māori land owners better off at the expense of other Māori land owners in terms of nitrogen allocations. In our view, this would reduce the benefits in terms of overall equity for Māori land owners as a whole.

**Comparison in terms of natural environment effects**

[286] Both allocation methods are intended to ensure the required nitrogen reductions from land uses in the catchment are achieved to enable the sustainable lake load of 435 tN/y to be met, as directed by the RPS.

[287] Both allocation methods involve significant uncertainties as to whether the intended outcomes will be achieved, as discussed above. Some of these risks are common to both, others are not. Additional uncertainties associated with ANCA include, but are not limited to, whether:

(a) the productive capacity of land based on LUC classes is an appropriate method to determine how much nitrogen will leach below the root zone;

(b) changes in the quantities and timing of total nitrogen loads reaching the lake would be greater or less if the location of land uses changes within the catchment; and

(c) the short-term effects of significantly changing land use on sediment discharges and some other contaminants, for example phosphorus, would be greater or less in the event that significant land use change occurs.

[288] It is our view that there is a potential for any or all the additional uncertainties to result in increased contaminant loads to the lake and longer timeframes to be required before the desired environmental outcomes would be achieved. Until such times as these uncertainties are addressed, we consider that the sector range method is likely to be more effective and

efficient than ANCA in terms of mitigating the adverse effects of nitrogen discharges from farming activities on the natural environment.

**Reliance on and basis of nitrogen trading**

[289] The sector range method allows the transfer of nitrogen discharge allocations between properties and farming enterprises to permanently increase the allocation for one of them, subject to resource consent conditions. These conditions include both the term of any consent and evidence of a legally binding agreement between the parties.[59]

[290] ANCA prevents any permanent transfer of nitrogen and provides for the lease of nitrogen under or over the base capability allocated to the land unit.

[291] All relevant experts appearing before us agree that the sector range method does not rely on trading but that trading is critical for ANCA. Ms Barns explained that an efficient market is not essential under the sector range method because those who need nitrogen are allocated nitrogen. Mr Fraser stated at the Economics Expert Conference that:

> NCG considers efficient trading is critical to making ANCA achieve its goal of low cost abatement. This is because the initial allocation of N to pastoral agriculture is generally insufficient for even efficient farms to continue without some level of purchasing (NB: this is especially so for dairy but even still relevant to dry stock – especially high leaching dry stock farms).[60]

[292] The only known case of nitrogen trading is in the Lake Taupo catchment, so there is limited experience to draw on. We were provided with widely conflicting economic evidence on many different aspects of trading. Before proceeding further, we consider it is sensible to preface this discussion of economic issues by two general observations:

(a) Most theoretical economic analyses of particular matters, or at least the elements of them, are conditioned on the premise that all other things are equal; and

(b) That premise is rarely true in the real world.

[293] Generally, a market is a framework in which people can trade things. Most markets arise through people's voluntary interactions in seeking some form of benefit through trade. Activity in a market is usually the result of supply from those willing to offer something and demand from those willing to acquire that thing. Well-functioning markets tend to lead to economically efficient outcomes. All markets are regulated at least to the extent of property,

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59 PC10, Schedule LR Seven

60 JWS Economics at section 8.2.2.

contract and commercial laws generally; some markets are subject to additional levels of regulation, whether by controls on particular things that can be traded or by particular terms and conditions on which trades can occur. Some markets are created by regulation, either directly or through its effects. Markets can fail where opportunities to gain benefit are not well distributed, which can be a result of poorly defined rights or other poor regulation.

[294] In regulating nitrogen discharges in an economy where the ability to discharge has real value, PC10 may be expected to give rise to at least some of the factors necessary for the creation of a market for the capacity to discharge nitrogen. For example, the dairy sector could reasonably be expected to respond to reduced nitrogen discharge limits by a mix of changed on-farm management practices and the permanent acquisition of nitrogen allocation from willing sellers.

[295] The sector range method contemplates such a market arising and does not restrict it but also does not rely on it. Rights to discharge nitrogen may be leased or sold. The price would be negotiated between willing sellers and buyers without regulatory constraint. The restrictions on trading would be within the framework of the resource consents granted by the Regional Council, in terms of the extent to which tradeable rights would be available and the manner in which trades would be recorded and enforced. In these circumstances we have no reason to doubt that there could be a market under the sector range method. The extent to which it existed and operated would depend on other factors, most likely the extent to which dairy farming was a more viable activity than others in the catchment.

[296] The situation under the ANCA method would be less certain. Trading is likely to be essential to its operation. The price could potentially be subject to limits to be set by the Regional Council. Rights to discharge could not be transferred but could be leased during the period of the relevant resource consent. The allocation according to LUC classes rather than existing activities would put some landowners in possession of more discharge rights than their present activities require, and conversely leave some with less than their existing activities require. Trading would depend on whether the former (for example, forestry owners) would elect: to use their allocation to convert to more intensive forms of production; or to trade their allocation with the latter (such as dairy farm owners); or simply to hold their allocation unused; or some combination of those. The inability to transfer rights necessarily reduces their value and would potentially make the duration and conditions of leases a significant factor. Further complicating this scenario would be the relationship (or not) between activities, such as harvest dates for forests and investment in dairy infrastructure.

[297] NCG proposes that the Regional Council purchases available nitrogen and resells it at a price equal to or below an agreed maximum price.[61] However, all the expert witnesses on economics agree it would be inappropriate for the Regional Council to fix the price,[62] and modelling suggests the price would be significantly greater (possibly by at least three times) than the nitrogen price of $5/kgN/ha/y assumed by NCG in its updated description of ANCA dated 22 November 2018.[63] Such an increase would clearly have significant effects on farm economics and so reduce some of the benefits of ANCA advanced by NCG.

[298] The version of ANCA dated 22 November 2018 identifies "resource consents as the legal mechanism to record the lease status. The suggested maximum term of a lease would be 30 years to reflect the time taken for a forest to mature to point of harvest and complete harvesting, and the common term of a mortgage."[64] It also says that ANCA "does not provide for leasing of N from Flexible Use Land that is discharging below its NCA (e.g. Forestry or Bush and Scrub) until 2032."[65]

[299] Policy LR P7 of PC10 enables the authorised transfer of nitrogen loss entitlements between properties/farming enterprises from 1 July 2022 to encourage efficient outcomes. Such transfers would be controlled activities under Rule LR R10 and must comply with Schedule LR Seven. Controlled activities are for a term of 20 years under Policy LR P16. Schedule LR Seven states that "The transfer of Nitrogen Discharge Allowance between properties/farming enterprises can enable a destination property/farming enterprise to permanently increase its Nitrogen Discharge Allowance." Evidence of the legal basis for transferring a nitrogen allowance is required and must be authorised by the Regional Council.

[300] Having carefully considered the leasing proposals in ANCA alongside the provisions of PC10 and the diverse expert opinions on the merits of leasing compared to more permanent nitrogen transfer, we consider there are two considerations of particular importance:

(a) reliance on leasing rather than permanent transfer involves greater uncertainty and greater investment risk both before and after 2032 for enterprises needing to acquire increased nitrogen discharge allowances; and

(b) there can be no certainty that owners with nitrogen to trade would do so, or the price they would trade at.

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61 PPC Alternative Natural Capital Approach updated version 22 November 2018 at page 20.
62 JWS Economics at section 10.8
63 PPC Alternative Natural Capital Approach updated version 22 November 2018 at page 19
64 At 4.2.1
65 At 5.1

[301] We are satisfied on the basis of these two considerations that the sector range provisions in PC10 will result in more efficient and effective business outcomes than ANCA. In a 'perfect' market, the supply and demand for nitrogen might well result in a price that farms are in a position to pay and still be economically viable[66] but we are neither confident that a perfect market would eventuate nor comfortable with the likely outcomes if it failed to do so.

[302] Ms Barns' evidence is that under ANCA about 140 farmers are competing for nitrogen from a pool of 149 tonnes, of which 75% is owned by nine entities. We consider this is a much less favourable market environment for purchasers of nitrogen discharge allowances than one where there is likely to be a more balanced mix of buyers and sellers.

[303] Information from the Lake Taupō Protection Trust suggests that agreements are likely to cost in the order of $5,000 and upwards. Ms Barns estimates the cost of obtaining a resource consent could be between $700 and $1,000.

[304] All the expert witnesses on economics except Mr PJ Fraser, a witness for NCG, expected that the market would be 'sticky' or affected by frictions under either nitrogen allocation method and limited due to a range of frictions within it. The majority view was that there would be a trading scheme, but it would be unlikely to be efficient. Mr Fraser considered that the market would respond to minimise the economic shock imposed by PC10 through least cost abatement and efficient allocation, and over the long run ensure dynamic efficiency and the maintenance of optionality.

[305] Having considered all the evidence carefully, we accept and agree with the view of the majority of the expert witnesses and note that the evidence demonstrates to us that any expectation that there will not be frictions is unrealistic.

[306] When all of the above considerations are considered together: the low nitrogen price assumed by NCG; the assumption that a low friction market will develop; the frequency and cost of nitrogen transfers and associated consents; potential uncertainties associated with leasing; and the total reliance on effective trading for ANCA to be effective and efficient; there are significant unknowns that, in our view, bring the feasibility of the ANCA proposal as a whole into question.

**Comparison in terms of economic effects**

[307] We were presented with voluminous evidence on economic issues. The Regional Council's evidence was based on extensive modelling undertaken over a number of years for

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66 ANCA 22 September 2018 Section 4.2.1 p18

many different allocation methods. It considered economic effects at the farm, catchment, district, regional and national levels. A limited amount of farm-scale modelling was undertaken for NCG,[67] which we discuss below. Mr Wilson did not undertake any modelling himself and he relied in part on Dr Doole's modelling.

[308] Dr N J Smith, an ecological economist called by the Regional Council, undertook modelling in November 2018 to compare the economic impacts in terms of employment and value added of the sector range and ANCA allocation methods. The reductions in total value added across all modelled scenarios for the two methods are set out in the following table, in 2018 NZ$ millions:

| Geographic Area | Sector Range | ANCA |
|---|---|---|
| Rotorua District | 3.5 to 6.7 | 7.5 to 15.8 |
| Bay of Plenty Region | 6.8 to 8.4 | 8.9 to 16.8 |
| New Zealand | Approx. 21 | 21.4 to 31 |

In addition, the modelling predicted that job losses would be greater under ANCA than under the sector range method.

[309] The views of the economic experts engaged by NCG are that both the sector range and ANCA methods have total economic impacts that are indistinguishable from zero at the regional and national levels. While these experts criticised the Regional Council's modelling, they provided no modelling of their own nor any empirical justification to demonstrate that the broad findings of Dr Doole should be disregarded. Dr Doole provided a comprehensive and reasoned description of why he considered the criticisms of his analysis were without merit, and we found his reasoning to be sound and generally aligned with our own assessment.

[310] We accept that there is an element of uncertainty about the modelled outputs. This is the case with most if not all types of modelling:

> All models are wrong but some are useful. Now it would be very remarkable if any system existing in the real world could be exactly represented by any simple model. ... For such a model there is no need to ask the question "Is the model true?" If "truth" is to be the "whole truth" the answer must be "No". The only question of interest is "Is the model illuminating and useful?"[68]

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67 Ridler and Sulzberger, *The relationship between nitrogen and farm profits in the Lake Rotorua catchment*, Report One (Dairy) and Report Two (Drystock), December 2018.

68 George Box, *Robustness in the strategy of scientific model building,* in Launer, R. L. & Wilkinson, G. N. eds, *Robustness in Statistics*, 1979, pp. 201–236.

[311] At a conceptual level, we can find no basis for concluding that the Regional Council's key finding, that the loss of added value is greater under ANCA than under PC10, is incorrect. We accept Dr Smith's modelled findings in principle, but consider that in terms of weight, while regional and national effects are relevant, the primary economic effects that will help determine the most efficient and effective allocation method are those at the local and lake catchment level.

[312] When considering the economic effects on individual farms we took into account the expert evidence of Mr L A Matheson and Dr Doole called by the Regional Council, the Ridler and Sulzberger modelling undertaken for NCG and the expert evidence of Mr Wilson, Dr Scrimgeour and Mr Fraser called by NCG and Mr M C Copeland called by Federated Farmers.

[313] Mr Matheson modelled seven dairy and 36 drystock farm systems to achieve what he considered to be a realistic interpretation of farming systems in the catchment. We agree the approach is reasonable. The Ridler and Sulzberger modelling was limited to two dairy and two drystock farm systems and was considered problematic by Mr L A Matheson due to a lack of representativeness, lack of recognition of the relationship between climate, soil and pasture production on nitrogen losses and profitability, the low nitrogen leaching price assumed and assumptions about farmers' abilities to adapt to different farming methods. We share these concerns and, as we were unable to test the modelling reports' findings with Mr Ridler and Mr Sulzberger, we must give reduced weight to their findings.

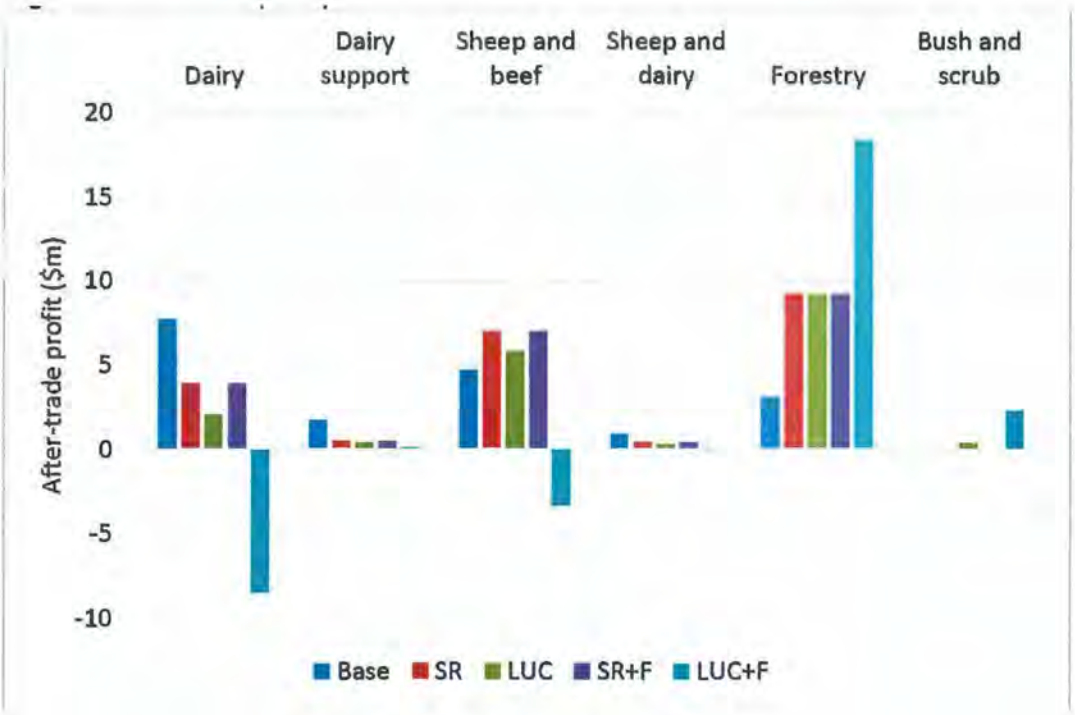
[314] We found Dr Doole's evidence and supporting information to be comprehensive and thorough, and his responses to questions to be carefully thought through, clear and focused. The only challenge to his evidence of any substance related to assumed trading frictions, and much of his modelling was relied on by other experts, including economists called by NCG and Federated Farmers. Mr Copeland specifically recorded in his evidence that:

> I have relied upon the modelling work undertaken by the BOPRC experts, including Professor Doole and Dr Smith, to reach my conclusion about the comparative economic effects of PC10 and ANCA. By and large, I agree with Professor Doole's and Dr Smith's evidence.

[315] From our review of Dr Doole's evidence and taking into account the limited challenge to the evidence, we are satisfied that it provides a robust basis for decision-making and obviates the need to traverse the evidence in detail. It is clear to us that Dr Doole and others on behalf of the Regional Council have considered a wide range of alternative allocation methods (at least 14 that we are aware of) and their implications for farm management. Of particular assistance is the direct comparative economic modelling of sector range and ANCA methods in December 2018. Of further note is the Regional Council's use of workshops

involving a range of domain experts to develop model protocols, and opportunities for stakeholders to review them before they were applied, which we consider adds an extra level of confidence to the modelling process.

[316] Key economic effects of the two methods are shown on Dr Doole's Figure 2 in his evidence in chief, showing after-trade profit in $m for each sector in each model scenario, and reproduced here:




[317] Dr Doole explained his Figure 2 and his conclusions as follows:

> After-trade profits are shown for each sector for five scenarios. These scenarios are for: the baseline (labelled "Base), Sector Range allocation ("SR"), LUC allocation ("LUC"), Sector Range allocation with Frictions ("SR+F"), and LUC allocation with Frictions ("LUC+F"). Profit is halved in the dairy sector with the sector range allocation, but declines by around 75% under the LUC allocation. Concomitant impacts are felt in the dairy support and sheep and dairy sectors. Frictions in the market for NDAs lead to substantial losses in the dairy, and sheep and beef sectors under a LUC allocation, as these farms are faced with having to purchase nitrogen at elevated prices.
>
> Overall, the assessment highlights that the proposed sector range allocation will result in changes in land use and land management as landholders both mitigate and trade nitrogen to meet their individual property limits. There is an alignment of nitrogen allocation with current rates of leaching, reducing the cost of abatement within the sector range approach. This approach recognises the high value of the existing, diverse capital resources that currently accrue to a given unit of land and collectively determine its productivity and profitability.
>
> In contrast, an allocation based on LUC reduces the correlation between nitrogen allocation and profitable levels of nitrogen loss for a current landholder. It places incumbent pastoral businesses, especially dairy farms, at a significantly higher risk of insolvency if landholders are unable to access affordable nitrogen due to the existence of market frictions. The

presence of market frictions is more likely than not, due to the presence of risk aversion, information gaps, market power, and pervasive uncertainty. Further, the levels of nitrogen reduction required within the catchment are significant, with these constraints reducing the volume that can be traded.

[318] We note the following conclusions in the JWS on Economics and consider (f) and (g) to be particularly important:

(a) All relevant experts agree that in the short to medium-term, there may be additional stranded assets and social economic distribution costs associated with the change of ownership of nitrogen.

(b) In the absence of trading, dairying would not be possible under ANCA and there would be a significant reduction in land values, which would reduce back to drystock equivalent level.

(c) There will be some reduction in optionality and an accompanying reduction in land values for drystock farming under ANCA, particularly in the absence of trading. Some values would decrease, most would be affected to only a small degree.

(d) Forestry land values would remain similar to current levels under ANCA and possibly increase because of the ability to change to more intensive land use and the increased windfall gain in nitrogen allocation which could be leased to provide improved returns on the land.

(e) Future land prices will adjust in anticipation of either allocation scheme prior to 2032.

(f) It is unprofitable to convert from forestry to any pastoral land use. It is a strong constraint to optionality.

(g) There is limited optionality value for land in bush and scrub because of a high conversion cost to pastoral use.

[319] Mr Fraser and Mr Wilson were critical of and disagreed markedly with the opinions of their peers. In their opinions, an allocation system starting from historical land use is inappropriate for a number of reasons. These include, but are not limited to, unfairly benefitting existing polluters and encouraging inefficient land use by constraining the ability of low nitrogen discharging land owners to develop their land.

[320] Mr Fraser focused on the allocation regime after 2032 and on the question of which nitrogen allocation regime would be superior from an economic perspective and in light of farm-level abatement opportunities. He assumed that an efficient nitrogen trading regime based on an ANCA allocation is feasible within the Rotorua catchment. A key point made in Mr Fraser's evidence was that ANCA has clear advantages over the sector range method in terms of achieving economic efficiency objectives.

[321] Key points made by Mr Wilson were:

(a) ANCA is designed to stimulate efficient trading in the ability to leach nitrogen;

(b) ANCA is supported by robust economic analysis and modelling;

(c) ANCA's principal advantage over the sector range method is that it allows land users great flexibility in deciding how to use their land;

(d) Gifting nitrogen discharge rights under ANCA has equity advantages in terms of distributing property rights more evenly;

(e) Status quo bias is evident in the Regional Council modelling; and

(f) Overall, from an economic perspective, ANCA is superior to PC10 and should be used by the Court as the basis for making those improvements.

[322] While there may be accepted theoretical foundations for these views, we found little if any empirical justification to enable us to reach the same conclusions in the context of the other evidence we heard. We found no evidence of extensive macro- or microeconomic analysis of the Rotorua economy undertaken by Mr Wilson, as inferred by Mr Fraser. The only micro-economic analysis presented to the Court was provided in the evidence of Mrs Paterson and Mr Heather. Both carefully assessed the likely implications of the ANCA method for the viability of their farms based on detailed empirical factors and identified the challenging economic decisions that will be required under PC10, whichever allocation method is adopted. There was nothing presented to us to suggest that the evidence of their farms was not reasonably representative of other pastoral farms in the catchment.

[323] In making regional rules under the RMA, s 68(3) requires a regional council and, on appeal, the Court to have regard to the actual or potential effect on the environment of activities, including, in particular, any adverse effect. The focus in these proceedings is on the adverse effects of rural land uses which discharge nitrogen on water quality. But that focus must not obscure our regard, in light of the whole purpose of the RMA, for the converse effect

of the proposed rules on the environment, including people and communities. In our view, this makes it important to consider how any proposed planning method will be applied and what the consequences will be. Ultimately in this case, plan provisions that will work reliably and consistently on the farm are what will determine success or otherwise in terms of the relevant plan objectives and policies to achieve sustainable management of natural and physical resources in this catchment.

[324] For these reasons, we doubt that the most appropriate provisions to be used in PC10 are necessarily those that may be described as efficient and effective (in terms of s 32(1)(b)(ii) RMA) or that promote only the efficient use and development of natural and physical resources (in terms of s 7(b) RMA) where efficiency is assessed solely in quantitative terms.

**Comparison in terms of relevant planning provisions**

***RPS Policy WL 3B(c): Establishing limits for contaminants entering catchments at risk***

[325] Both methods are intended to give effect to RPS Policy WL 3B(c), which requires that the total amount of nitrogen that enters Lake Rotorua shall not exceed 435 tonnes per annum. Some adjustments are likely to be required to the sector range method to avoid an over-allocation or negative headroom situation arising at the time the plan change becomes operative, in light of the matters considered above at paragraphs [235] – [241]. We expect the risks of over-allocation can be corrected through the Stage 2 hearing process. Otherwise, we are satisfied that the sector range approach will give effect to this Policy. The uncertainties and unknowns associated with ANCA, as discussed above, make it at least uncertain whether ANCA will give effect to the Policy.

***RPS Policy WL 5B: Allocating the capacity to assimilate contaminants***

[326] This policy sets nine matters to which regard must be had when allocating the capacity to assimilate contaminants in the Lake Rotorua catchment. In our view, the sector range method is more consistent with this Policy, on balance, than ANCA. In making this finding, we took into account the four StAG principles, with due consideration to weight and generally similar aspects of Policy WL5B, namely:

(a) In terms of equity/fairness, including inter-generational equity, there would be no major windfalls for any sector;

(b) In terms of the immediate impact, preference is given to the allocation approach that has the least overall economic impact;

(c) In terms of existing on farm capital investment, essentially repeats principle or consideration (h) in the policy; and

(d) practices that cause high N loss, relative to sector norms, will not be rewarded

[327] In forming our view, we considered each of the nine "principles and considerations" listed in the policy on an equal basis, as the policy does not rank or otherwise differentiate between them in terms of the weight they are to be given. The task was made more difficult because the principles and considerations are not as explicit as would normally be expected in a statutory document. They are not stated as principles at all. The extent to which they can be referred to as considerations is limited as they are not expressed in a way that offers guidance. We are left to treat them as factors and derive our own assessment based on the evidence before us.

[328] We find as follows in terms of each factor as listed in Policy WL 5B:

(a) *Equity/Fairness, including intergenerational equity*: Neither method can be equitable and fair to all landowners. Under both methods, pastoral farmers will be significantly adversely affected, in some cases very significantly or substantially. ANCA would result in significantly greater adverse effects on these landowners than the sector range method, including on some owners of Māori freehold land, while forest and bush and scrub land owners would receive windfall gains. On balance, we find that the sector range method has greater regard to equity and fairness.

(b) *Extent of the immediate impact*: There is no clear evidence that allows us to differentiate between the methods on the basis of extent of immediate impact with any degree of certainty. However, the need to plan for and meet substantially lower nitrogen discharge allowances under ANCA, albeit some 10 to 12 years in the future, would in our view result in a need to start planning at an early stage, resulting in a greater immediate effect under ANCA than under the sector range method. On balance, we find that the sector range method has greater regard to the extent of immediate impact recognising that it is less likely to alter nitrogen discharge allocation intergenerationally.

(c) *Public and private benefits and costs*: In the event that the money allocated to the Incentives Fund can be transferred to ANCA, we were presented with no evidence that allows us to differentiate reliably between the two methods in terms of public and private benefits and costs. If such a transfer were not

available, there would be a greater private cost. We make no finding in terms of which method has greater regard to public and private benefits and costs.

(d) *Iwi land ownership and its status including any Crown obligation*: We find that ANCA has marginally greater regard to iwi land ownership. While it benefits owners of Treaty Settlement land it disadvantages owners of Māori freehold land by an almost similar amount.

(e) *Cultural values*: We find that ANCA has greater regard to Māori cultural values, subject to the preceding factor.

(f) *Resource use efficiency*: We consider that ANCA is unlikely to result in any significant shift away from forestry for the reasons set out earlier in our decision, with no significant increase in resource use efficiency as a result. Uses of pastoral land will either have to pay more to operate than they would under the sector range method because of the need to lease nitrogen or change to a less intensive use. Accordingly, we are satisfied that the sector range method has greater regard to resource use efficiency. We consider the topic of efficiency further below.

(g) *Existing land use*: The sector range method uses existing land use as a key starting point, whereas ANCA takes no account of existing land use. We therefore find that the sector range method clearly has greater regard to existing land use than ANCA.

(h) *Existing on farm capital investment*: We find that the sector range method clearly has greater regard to on-farm capital investment than ANCA, with less potential for fixed assets to be stranded.

(i) *Ease of transfer of the allocation*: We are satisfied from the evidence that there are significant uncertainties in relation to the ease of transfer of nitrogen allocations under ANCA. Taking this into account we are satisfied that transfer of nitrogen allocations can be expected to be easier overall under the sector range method than ANCA.

[329] Overall, we find that the sector range method has greater regard to the factors listed in RPS Policy WL 5B than ANCA. However, as noted above, these factors are not expressed as principles and considerations and so are not as explicit as would normally be expected in a statutory document. This gives rise to a concern that the relevant plan provisions do or may

not give effect to Part 2 of the Act in terms of the allocation of nitrogen to land uses in the Lake Rotorua catchment. To address this concern, we considered the two allocation methods in terms of the requirements of s7(b) of the Act, which require us to have particular regard to the efficient use and development of natural and physical resources.

[330] We start by referring to our remarks above at [293] – [294] on markets generally. We observe that, at least in the context of s 7(b) RMA, efficiency is not an end in itself: rather, it is way of using and developing resources. In the wider scheme of the RMA, and as indicated by the evaluation requirement in s32(1)(b)(ii) RMA, the meaning of efficiency therefore depends on the particular planning objective or objectives being pursued and the corresponding policies which guide that pursuit. These objectives and policies are likely to import constraints on one's choices in the use and development of resources. Such considerations are likely to go beyond the distributional or allocative operations of an ordinary market, particularly where unquantifiable and incommensurable costs or benefits are present such as those identified in Part 2 RMA. This means that the option of maximum output at least cost may well not be the most efficient.

[331] For those reasons, we respectfully adopt the definition of *efficiency* used by another division of the Court in *Rogers v Christchurch City Council*,[69] which is *the production of the required result with little or no wastage*. The *required result* is to be identified by reference to the relevant planning provisions. *Wastage* includes adverse effects on the environment, as broadly defined under the RMA and as relevantly identified in the same planning provisions. We then draw on the findings set out elsewhere in this decision and in particular that ANCA is significantly less certain than the sector range method in terms of the reliability of outcome, and that:

(a) ANCA would have more adverse effects on economic growth and employment than the sector range method;

(b) the sector range method would have more adverse effects on TTW land than ANCA, but ANCA would have more adverse effects on Maori freehold land than the sector range method, with little evidential basis for differentiating between the methods when Maori owned land as a whole is considered;

(c) ANCA would have more disruptive effects on land use, overall, in the catchment than the sector range method; and

69 *Rogers v Christchurch City Council*, [2019] NZEnvC 119 at [81] – [85].

(d) ANCA would have greater adverse social and economic effects than the sector range method.

[332] Taking the above evaluation into account, we are satisfied that the sector range method has greater regard to the principles and considerations in RPS Policy WL 5B than ANCA.

***RPS Policy WL 6B: Managing the reduction of nutrient losses***

[333] This will need to be considered as part of the Stage 2 hearing.

***Iwi Resource Management***

[334] Both the RPS and RNRP contain objectives and policies relating to Iwi Resource Management. The objectives and policies strongly reinforce the requirements of the Act in recognising and providing for the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga (s6(e)), having particular regard to kaitiakitanga (s7(a)) and taking into account the principles of the Treaty of Waitangi (s8). The objectives and policies are comprehensively set out in the SAF, the IHP decision and the CIA and while we do not reproduce them here, we have carefully considered them all to the extent that they are relevant to our decision.

[335] We consider the following provisions to be of particular relevance to our decision, in addition to those arising from sections 6(e), 7(a) and 8 of the Act:

| | |
|---|---|
| RPS Objective 12 | Kaitiakitanga is recognised and the principles of the Treaty of Waitangi (Te Tiriti o Waitangi) are systematically taken into account in the practice of resource management. |
| RPS Objective 16 | Multiple-owned Māori land is developed and used in a manner that enables Māori to provide for their social, economic and cultural wellbeing and their health and safety, while maintaining and safeguarding its mauri |
| RPS Policy IW 1B (b) & (c) | Provide for the development of multiple-owned Māori land in a manner which enables Māori to develop papakāinga, marae and associated community facilities or housing or enables Māori to develop multiply owned Māori land and resources to provide social and economic benefits. |

| | |
|---|---|
| RNRP KT02 (Objective 6) | Maintain the biological and physical aspects of the mauri of water, land and geothermal resources; and where practicable achieve the ongoing improvement of the biological and physical aspects of the mauri where it has been degraded |
| RNRP IM P8 (Policy 32) | To allow resource use and development where there are beneficial effects on the social, cultural and economic wellbeing of people and communities; and adverse effects on the environment are avoided, remedied or mitigated. |

[336] We accept that ANCA could facilitate greater opportunities for the development of multiple-owned Māori land and to satisfy Policy 32 above than the sector range method. However, it will not necessarily ensure such development occurs. The evidence before us is that development opportunities for forest and bush and scrub land to change to other land uses are limited in the Rotorua catchment, particularly any change to pastoral land use on the grounds of cost alone. It is necessary to consider that the ANCA nitrogen allocation method would come at considerable cost to other Māori land owners. It would also have substantial social and economic effects on other land owners in the catchment. We are also mindful that more intensive use of Treaty Settlement land may have unanticipated adverse environmental effects because of the uncertainty that attaches to factors like the LUC/nitrogen loss relationship, nitrogen attenuation rates in different areas of the catchment and rainfall effects.

[337] We have identified a need for PC10 to include additional provisions related to the development of Treaty Settlement land, and with these in place, in our view, the sector range allocation method is more appropriate than ANCA in terms of balancing all the relevant provisions of the superior documents. The additional provisions identified are intended to be consistent with the Treaty principle of equity in the sense of taking an active measure to better restore, albeit modestly, the balance between what was lost historically by the CNI Iwi and their Settlement position. It might also be seen in a small way as providing a degree of redress and assisting with the restoration of tribal mana whilst not creating fresh injustices for others.

***RPS Policy IR 1B: applying a precautionary approach to manage natural and physical resources***

[338] The Policy relates to Objective 10 of the RPS: Cumulative effects of existing and new activities are appropriately managed and to Objective 11: An integrated approach to resource management issues is adopted by resource users and decision makers. The Policy applies to reviewing or replacing plans.

[339] The Policy is:

> Apply a precautionary approach to the management of natural and physical resources, where there is scientific uncertainty and a threat of serious or irreversible adverse effects on the resource and the built environment.

[340] The evidence is clear that there is scientific uncertainty and a threat of serious adverse effects on Lake Rotorua, meaning that the Policy applies to PC10. Of the two nitrogen allocation methods, there is greater uncertainty associated with ANCA and we are satisfied that the sector range method is the most appropriate in terms of this Policy.

***RNRP Policy LM P2 (23): To develop equitable and workable provisions in relation to existing land uses, where investigations indicate that changes to existing land management practices, or land use restrictions are required to maintain or improve water quality.***

***RNRP Policy RL P1 (33): To promote and support land use change and/or land management practices in the catchments of the Rotorua Lakes that will achieve lake water quality improvement.***

[341] In broad terms, these provisions require the development of equitable and workable provisions for land uses where investigations indicate that changes to existing land management practices, or land use restrictions, are required to maintain or improve water quality. On plain reading, the provisions relate to existing land uses that are required to be changed or have restrictions imposed on them to maintain or improve water quality. There is no requirement under the provisions, elsewhere in the regional planning documents or in the Act itself to require the imposition of additional changes to or restrictions on the same land to provide a pool of nitrogen to distribute to other land users as part of the process to maintain or improve water quality.

[342] When considered alongside RPS Policy WL 5B (c) and RNRP Objective RL 01 (11) relating to the TLI of the lake, our view is that the higher order plan provisions are directed towards reducing nitrogen discharges from existing land uses to ensure the lake water quality targets are met. On this approach, the sector range method is clearly more appropriate than ANCA. An alternative interpretation, if available, would not cause us to change our overall findings.

[343] We reviewed and carefully considered all other relevant RPS and RNRP objectives and policies and do not consider they assist us in deciding between allocation methods.

[344] We conclude that the sector range method better gives effect to the relevant objectives and policies of the RPS and the RNRP than the ANCA method.

**Section 32 Evaluation**

[345] We summarised the requirements of s32 of the Act as they apply to our decision in paragraphs [43] to [47] above. Section 32 requires a judgement as to what, on balance, are the most appropriate provisions when considered against the relevant objectives of the plan.

[346] NCG produced an interim s32 Assessment dated 16 July 2018 which was intended to be part of an iterative process that would continue through and beyond expert conferencing, but we were only provided with that document. The assessment focussed on a comparison of the two alternatives in terms of the 'principles and considerations' set out in RPS Policy WL 5B.

[347] The Regional Council prepared a s32 Evaluation Report in December 2015. This considered the sector range method and the LUC/natural capital method as alternatives, along with others. It included an evaluation of allocation approaches against the StAG principles, an assessment of the economic impact of the allocation options and a comparison of sector range and natural capital allocations.

[348] The information in both the Regional Council and NCG documents is now substantially out of date.

[349] In view of the limitations of both evaluation documents in terms of currently available information, we undertook our own evaluation of the two methods as set out below, drawing on our earlier findings, including that the sector range method is far more certain in terms of outcomes that can be relied on than ANCA.

[350] Our earlier findings are that:

(a) The sector range method is more effective and efficient overall in terms of minimising the effects of reductions in nitrogen allocations required (paragraph [234]);

(b) Neither allocation methods provides an allowance for nitrogen headroom (paragraph [240]), so there is little to choose between the methods on that ground;

(c) The sector range method is more likely to minimise disruptive effects on land use in the catchment (paragraph [246]);

(d) The sector range method is significantly more efficient and effective than ANCA in terms of robustness and reliability of process (paragraph [258]);

(e) For Treaty Settlement Land, ANCA is more effective and for TTW land, the sector range method is more effective. When all Māori land is considered, there is no clear evidential basis for saying that either allocation method is more efficient and effective than the other (paragraph [268]);

(f) On balance, the sector range method is more efficient and effective than ANCA on social grounds (paragraph [280]);

(g) ANCA is more likely to be effective and efficient than the sector range method in terms of mitigating cultural effects (paragraph [285]);

(h) The sector range method is more effective and efficient than ANCA in terms of mitigating natural environment effects (paragraph [288]); and

(i) The sector range method is more effective and efficient than ANCA on economic grounds (paragraphs [301] and [306]).

[351] We are satisfied that the Regional Council has identified other reasonably practicable options to achieve the objectives as required by s32(b)(i) RMA and note that no other party suggested any other alternative than ANCA in evidence at the appeal hearing.

[352] As noted in paragraph [344], we find that the sector range method better gives effect to the relevant plan provisions than ANCA.

[353] Our reasons for deciding on the most appropriate allocation method as required by s32(b)(iii) RMA are set out below. We have evaluated the two alternative allocation methods at a level of detail that corresponds to the scale and significance of the environmental, economic, social, and cultural effects that are anticipated from the implementation of the proposal, which are very significant for the Lake Rotorua catchment community.

[354] We are satisfied that the sector range method will have fewer adverse effects on economic growth and employment than ANCA, as set out in paragraph [311].

[355] The option of not acting does not exist, given RPS Policy WL 3B(c) and s67(3)(a) and (c) of the Act. Of the two alternatives, acting by adopting the sector range method is significantly more certain and is more complete in terms of available information than ANCA.

[356] We find that the sector range method is the most appropriate way to achieve the relevant objectives of the RPS and the RNRP.

**Overall comparison of allocation methods**

[357] Many factors and reasons need to be taken into account when determining the most appropriate allocation method to meet the relevant plan provisions and give effect to the RPS. Concerns have been raised about the relative equity of the two methods and the nature, intensity and scale of effects each will have on different sections of the community.

[358] We are not starting from a clean sheet of paper. The starting point must be what exists today, where to the best of our knowledge, existing discharges are legally authorised and land owners acted in good faith to develop their land in accordance with their discharge rights. Against this, it can never be assumed that historical practices will remain appropriate in perpetuity; there will always be the need to move away from less sustainable activities towards those that are more sustainable. Higher level statutory planning instruments in this case require no less. This will almost certainly be an iterative process, as the science gets better understood and social, economic, cultural and environmental considerations are better appreciated with experience.

[359] Unavoidably, and for the reasons set out above, any allocation method in the Lake Rotorua catchment will have to be implemented in an environment of uncertainty, particularly where:

(a) natural attenuation processes continue to be researched;

(b) questions remain about the reliability of the Overseer model and its practical application as a method of predicting nitrogen losses; and

(c) monitoring progress in improving lake water quality will be difficult because of the long groundwater travel times that exist in the catchment.

[360] In our view, key considerations in the choice between alternative methods are the extent to which their uncertainties are understood, the potential for unforeseen consequences to arise and the robustness of mechanisms in place to manage those in order to ensure, to the greatest extent possible, that the desired lake water quality objectives will be met.

[361] Both allocation methods before the Court involve many details which, for the selected method, will need to be addressed more fully at the Stage 2 hearing. For the purposes of this interim decision, we have focussed on the key differences between the methods that are

fundamental to our decision as to which of the two methods is the most appropriate way to achieve the purpose of the Act and give effect to the relevant objectives in the RPS and RNRP.

[362] The Lake Rotorua catchment is seriously over-allocated in terms of its capacity to cope with discharges of nutrients from human activities. This is not a situation where there is an existing surplus of nitrogen to allocate, so the first priority must be to reduce existing nitrogen (and phosphorus) discharges substantially if the desired water quality outcomes for the lake are to be achieved in the most practicable timeframe. The options to do this are limited. A requirement that existing farmers substantially reduce their discharges to meet a defined and agreed water quality target is a significant matter. To require them in addition to make substantial further reductions which are then allocated to others for their own use would go a significant step further. There would need to be compelling reasons in the public interest to use rules in a regional plan to compel such transfers. The evidence failed to demonstrate that such reasons exist, particularly when considered alongside the reasons outlined above for preferring the sector range method.

[363] Plans and plan changes must be supported by robust investigation, evaluation and community input if they are to meet the requirements of the RMA and achieve its purpose. In our view, the sector range nitrogen allocation method included in PC10 is substantially more appropriate in terms of these criteria.

[364] In our view, the ANCA method is significantly less robust than the sector range method. Overall, we consider a more comprehensive evidential basis would be required before the appropriateness of adopting ANCA could be determined with an acceptable level of confidence. Firstly, we consider the relationship between LUC classes and nitrogen losses below the root zone would need to be reliably established. We do not consider that LUC, on its own, can be relied on as a proxy for natural capital. Additional factors requiring consideration include rainfall and attenuation in the different pathways to the lake, amongst others.

[365] We acknowledge there are current uncertainties about the quantities of nitrogen reaching the lake from existing land uses, but in our view, it would involve an unacceptable level of risk to assume that potentially significant relocation of land uses within the catchment could be enabled without assessing and better understanding the likely environmental consequences. The NCG's evidence provides no assessment of such consequences, leaving us with no certainty as to the overall effects on nitrogen loads to the lake.

[366] We were provided with no evidential basis to show that there is any reasonable likelihood of changes from forestry to significantly higher nitrogen discharge activities under ANCA on cost grounds alone. Under these circumstances, ANCA would result primarily in the diversion of a valuable asset from one group of landowners, including Māori land owners, and allocating it to another group with no demonstrated environmental benefit, and potentially no significantly greater change in land use than might occur under PC10 as proposed.

[367] We found earlier that the uncertainties, potential for unintended consequences, implementation practicalities and potential for adverse effects on farm management make the proposed ANCA reference file method less appropriate than the sector range method and would be unlikely to deliver the outcomes required by the RPS. As these matters have not been addressed adequately, we cannot support the ANCA method.

[368] On the other hand, the Regional Council has clearly recognised the inherent difficulties when using Overseer in a regulatory setting and has put considerable effort into understanding and managing those difficulties, for which the Council is to be commended. We consider the use of benchmarking, reference files, and five-yearly Nutrient Management Plan reviews designed as an integral part of PC10 as deserving of particular mention for their likely contribution to simplifying the use of Overseer, making it a more efficient management tool and providing greater certainty for farm managers and the regulator. Overall, we consider the proposed use of Overseer as included in PC10 is acceptable given our current state of knowledge. However, this will need to be confirmed through working experience and, in our view, should be considered as a "work in progress", which is likely to require modification over time.

[369] There are significant differences between the methods in terms of their reliance on nitrogen trading, with the sector range method significantly less reliant than ANCA, which could not function without trading. ANCA assumes a low nitrogen price for trading, that a low friction market will develop, does not analyse the frequency and cost of nitrogen transfers and associated consents or the potential uncertainties associated with leasing nitrogen. These are significant unknowns which, for a method that is totally reliant on effective trading to be effective and efficient, bring into question the feasibility of the ANCA proposal as a whole.

[370] We understand the attraction of a natural capital approach in principle, including to the CNI interests who, having regained some of their land, understandably seek to optimise its use for productive purposes, together with the cultural considerations that attach to that prospect. We trust the CNI interests will recognise that they are part of a wider community, many of whom also face the prospect of making a major contribution to the reinstatement of a

prized taonga. There is mana to be gained by all who commit to this outcome. More prosaically perhaps the ANCA proposal before us:

(a) is unproven;

(b) includes a method of responding to Overseer version changes would be unlikely to deliver the outcomes required by the RPS;

(c) relies heavily on a trading scheme that includes unknowns that bring into question the feasibility of the ANCA proposal as a whole;

(d) relies on expert opinion on other key matters that is not supported by empirical evidence or catchment-specific analyses;

(e) while advantaging one group of Māori land owners, would disadvantage others in terms of the opportunity to use and develop land;

(f) would have particularly high adverse economic and social effects on the Lake Rotorua catchment community as a whole, with insufficient countervailing benefits;

(g) gives lesser effect to the relevant plan provisions that the sector range method; and.

(h) is not the most appropriate way to achieve the relevant objectives of the RPS and the RNRP in accordance with s32 of the Act.

[371] By way of an overall comparison of the two allocation methods, we find that the sector range method is most appropriate by a significant margin and on most bases of comparison. Even if we were wrong in some of our findings, we do not consider it would affect the overall conclusion.

## PART 7 - DECISION AND DIRECTIONS

### Decision

[372] The most appropriate method to allocate nitrogen to rural land uses in the Rotorua Lake catchment is the sector range method proposed in PC10, with modifications.

[373] The appeals will now proceed to a Stage 2 hearing to address specific matters set out in this decision and to finalise the provisions of PC10.

**Directions**

[374] The Regional Council is **directed** to provide further evidence on the following matters at the Stage 2 hearing:

(a) Progress on an agreement with the Waikato Regional Council as to how related cross-boundary issues will be addressed to give effect to relevant aspects of s 62(1)(h) RMA and RPS Policy IR 6B (see paragraph [76]).

(b) Methods incorporated or to be incorporated in PC10 to address the specific requirements listed in paragraph [117] of our decision, which the Court considers necessary for Overseer to be acceptable for use in regulation (see paragraph [118]).

(c) The extent to which it will still be possible to achieve the 2022 catchment intermediate Managed Reduction Target (**MRT**) of a 70% nitrogen reduction as required by RPS Policy WL 6B(c), or if it is not possible, what process will be used to make any required changes to the RPS (see paragraph [165]).

(d) How will the Court's concerns about what appears to be a lack of engagement in on-farm monitoring in relation to compliance by the Regional Council be addressed? (see paragraph [188]).

(e) A change in the reference file methodology to ensure farms towards the upper and lower limits of the dairy and drystock sector ranges are not unreasonably advantaged or disadvantaged compared to those closer to the average of the range (see paragraphs [189(d)] and [254]).

(f) The relationship between the proposed five-yearly review of NMPs and reviews of nitrogen predictions resulting from new versions of Overseer published between reviews (see paragraph [190]).

(g) What changes to the rules are considered appropriate, following consultation with NCG, to address the matters raised in relation to an additional allocation to Treaty Settlement land similar to "Provide for the development of multiple-owned Māori land in a manner which enables Māori to develop papakāinga, marae and associated community facilities or housing or enables Māori to

develop multiply owned Māori land and resources to provide social and economic benefits" in accordance with RPS Policy IW 1B (b) and (c) (see paragraph [228]).

(h) How the Regional Council intends to address the fact that Overseer does not have a technical module for forests and can only estimate nitrogen leaching (see paragraph [260]).

For the Court:

- 9 AUG 2019

Judge D A Kirkpatrick
Environment Judge

R M Dunlop
Environment Commissioner

J A Hodges
Environment Commissioner

## Appendix 1 – List of witnesses

**Bay of Plenty Regional Council**

Andrew Bruere
James Christopher Rutherford
David Philip Hamilton
Alastair Charles MacCormick
Linda Robyn Lilburne
Sandra Barns
Dr Graeme John Doole
Lee Antony Matheson
Dr Nicola Jane Smith
Philip Ross Journeaux
Stephen Lamb
Alan Matheson

**Federated Farmers**

Paul Frederick Le Miere
Christine Paterson
Neil John Heather
Ian Francis Millner
Michael Campbell Copeland
Gerard Matthew Willis

**Natural Capital Group**

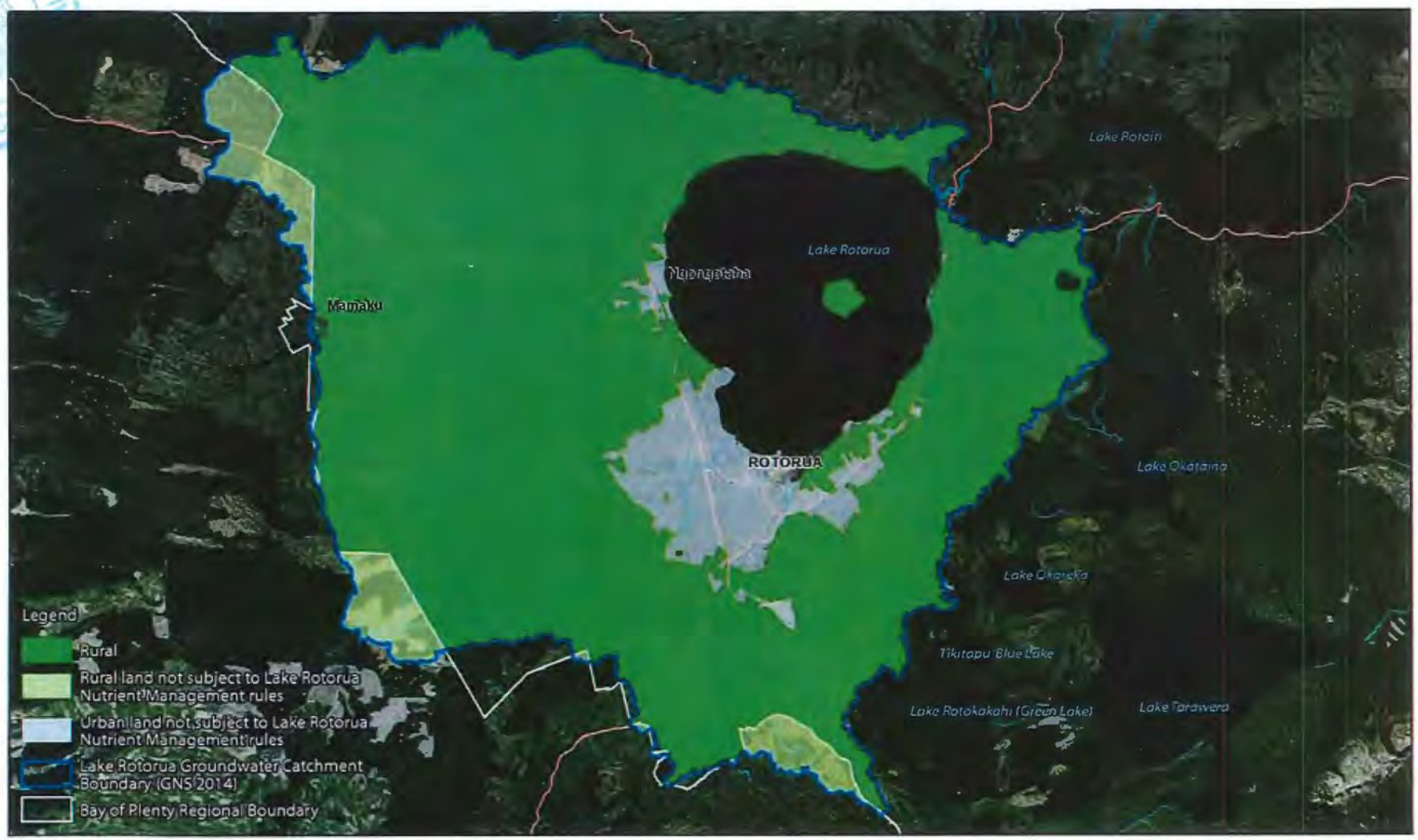
Te Rangikaheke Yvonne Moana Bidois
Matthew John Te Pou
Alamoti Sione Te Pou
Neville Joseph King
Christopher Read Richards
Aimee Elizabeth McGregor
Alec Donald MacKay
Peter Stuart Wilson
Dr Francis Gordon Scrimgeour
Peter James Fraser
Christine Bridget Robson
Grant Robert Eccles

## Appendix 2 – Definitions, abbreviations and acronyms

We have accepted the definitions included in PC10. The following definitions, abbreviations and acronyms are used in our decision.

| | |
|---|---|
| ANCA | Alternative Natural Capital Approach |
| Appeals Version | Version of PC10 including amendments to the Decisions Version in response to appeals |
| Attenuation | The difference between catchment nutrient losses and catchment nutrient loads |
| CIA | Cultural Impact Assessment |
| CNI | CNI Iwi Land Management Ltd |
| Decisions Version | Version of PC10 adopted by the Bay of Plenty Regional Council |
| Effective area | The part of the property/farming enterprise that is used for grazing, cultivation, cropping, horticulture and effluent disposal. |
| Flexible use land | Term used by NCG meaning all rural land in the Rotorua catchment that has not been defined as *Non-flexible land* |
| Headroom | The quantity of nitrogen available for allocation in the Rotorua catchment minus the quantity that is allocated |
| IHP | Independent Hearing Panel appointed by the Bay of Plenty Regional Council to conduct the hearing process for PC10 under section 34A of the Act |
| IHP's Report | Report and recommendations of the IHP |
| Integrated Framework | A package of methods to give effect to relevant policies of the RPS |
| JWS | Joint Witness Statement prepared by expert witnesses |
| Load to come | Nitrogen which is currently making its way slowly towards the lake through the groundwater from historical land use |
| LUC | Land use capability classification in the New Zealand Land Resource Inventory |
| MRT | Managed reduction target, being the maximum amount of nitrogen loss that is allowed to occur from a property/farming enterprise at a target date (1 July 2022 and 1 July 2027). |
| NCA | Natural capital allocation of nitrogen at a property level in ANCA |
| NDA | Nitrogen discharge allowance at a property level in the sector range method |

| | |
|---|---|
| NCG | Natural Capital Group |
| NIWA | National Institute of Water and Atmospheric Research |
| Non-flexible use land | Term used by NCG meaning land use that cannot be intensified due to a permanent incumbrance, protection or similar limitation on that land |
| Non-developable land | Term used by NCG and defined on page 10 of ANCA, updated 22 November 2018 |
| NPSFM | National Policy Statement Freshwater Management, Updated 2017 |
| NUIT | Ngati Uenukukopako Iwi Trust |
| NMP | Nutrient Management Plan |
| Protected land | Term used by NCG and defined on page 10 of ANCA, updated 22 November 2018 |
| RDDC | Bay of Plenty Regional Council Regional Direction and Delivery Committee |
| RNRP | Bay of Plenty Regional Natural Resources Plan |
| RPS | Bay of Plenty Regional Policy Statement |
| RWLP | Bay of Plenty Regional Water and Land Plan |
| SAF | Draft Statement of Agreed Facts dated 21 June 2018 |
| Sector range | Nitrogen allocation method included in PC10 |
| StAG | Lake Rotorua Stakeholder Advisory Group |
| Summary report | Lake Rotorua Science Review Summary Report, February 2019 |
| Sustainable Lake Load | The maximum nitrogen load reaching Lake Rotorua as defined in directive RPS Policy WL 3B |
| TLI | Trophic Level Index |
| tN/y | Tonnes of nitrogen per year |
| tP/y | Tonnes of phosphorus per year |
| TTW | Te Ture Whenua Māori Act 1993 |




Plan Change 10 - Lake Rotorua Nutrient Management Boundaries

BAY OF PLENTY REGIONAL COUNCIL
TOI MOANA



2 0 2 4 6
km

GIS-532337-1
Sheet 1 of 1
Printed 21/12/2016

# *Table 4 of the Science Review Summary shown in OVERSEER version 6.2.0 (circulated dataset) to 1 decimal place.*

| Land use | Area (ha) | Load to land (tN/y) | Rules additions (LR R11A and schedule 1(d)) | Pre-attenuation reductions (tN/y) | | | | Load to land before attenuation and after reductions (tN/y) | Attenuation factor | Load to lake after attenuation and before reductions (tN/y) | Post attenuation reductions (tN/y) | | | | Load to lake after attenuation and reductions (tN/y) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Rules | Incentives | Engineering | Gorse | | | | Rules | Incentives | Engineering | Gorse | |
| Dairy | 4990 | 509.5 | | -183.7 | -96.4 | -5.0 | | 224.4 | 43% | 290.3 | -104.7 | -54.9 | -2.8 | | 127.9 |
| Drystock | 15873 | 505.2 | 27.4 | -123.6 | -96.4 | -12.0 | | 300.6 | 43% | 287.8 | -54.8 | -54.9 | -6.8 | | 171.3 |
| Grazed trees | 1346 | 11.2 | | | | | | 11.2 | 43% | 6.4 | | | | | 6.4 |
| Forestry | 9163 | 23.2 | | | | | | 23.2 | 43% | 13.2 | | | | | 13.2 |
| Bush and scrub | 9994 | 30.1 | | | | | | 30.1 | 43% | 17.1 | | | | | 17.1 |
| House | 396 | 27.3 | | | | -8.8 | | 18.5 | 22% | 21.3 | | | -6.9 | | 14.4 |
| Reticulated housing | 2589 | 13.4 | | | | | | 13.4 | 43% | 7.6 | | | | | 7.6 |
| Urban Open Space | 522 | 11.2 | | | | -2.0 | | 9.2 | 43% | 6.4 | | | -1.1 | | 5.3 |
| Lake or waterway | 8145 | | | | | | | | | | | | | | |
| Non-productive | 237 | 0.1 | | | | | | 0.1 | 43% | 0.1 | | | | | 0.1 |
| Roading | 534 | 0.3 | | | | | | 0.3 | 0% | 0.3 | | | | | 0.3 |
| | | | | | | | | | | | | | | | |
| *Gorse* | *882* | 13.9 | | | | | -10.4 | 3.5 | 43% | 7.9 | | | | -5.9 | 2.0 |
| *Rain on lake* | *8082* | 30.0 | | | | | | 30.0 | 0% | 30.0 | | | | | 30.0 |
| *WWTP 2001-2004* | *1* | 56.0 | | | | | | 56.0 | 40% | 33.6 | | | | | 29.8 |
| *Engineering (WWTP improvements)* | | | | | | *-6.4* | | -6.4 | 40% | | | | *-3.8* | | |
| *Engineering (other)* | | | | | | *-11.2* | | -11.2 | 40% | | | | *-6.7* | | *-6.7* |
| *Tikitere* | *1* | 25.0 | | | | -20.0 | | 5.0 | 0% | 25.0 | | | -20.0 | | 5.0 |
| *Urban stormwater* | *2589* | 7.8 | | | | -2.0 | | 5.8 | 0% | 7.8 | | | -2.0 | | 5.8 |
| *Whakarewarewa* | *44* | 0.3 | | | | | | 0.3 | 43% | 0.2 | | | | | 0.2 |
| Totals | 53789 | 1264.5 | 27.4 | -307.3 | -192.8 | -67.4 | -10.4 | 714.0 | | 755.0 | -159.5 | -109.8 | -50.1 | -5.9 | 429.7 |