In the matter of	The Resource Management Act 1991
And	
In the matter of	**Proposed Waikato Regional Plan Change 1 – Waikato and Waipā River Catchments Hearing A**

Statement of Primary Evidence of Christine Bridget Robson
for
Timberlands Limited
Submitter number 73036

Qualifications and experience

1. My name is Christine Bridget Robson. I am a consultant specialising in RMA environmental management, with particular interest in the effectiveness of the entire policy cycle, from the science that supports RMA policy development, to compliance with that policy.

2. My qualifications are BAgSc and MPhil in Resource and Environmental Planning, both from Massey University. My work experience, from the mid 1980's, has spanned central and regional government, and the forestry and energy industries. The subject of my work relevant to this case has included Land Use Capability assessment, RMA policy development for both BOPRC Regional Policy Statements, the development of and input to several regional plans, and the development of the Plantation Forestry NES. My policy experience is from the "ground zero" decisions on acquiring the raw science to policy development then through to policy implementation. Roles that have focussed on RMA policy advocacy and implementation have been primarily for large corporates. I've managed environmental operations for Carter Holt Harvey Forests and compliance for Waikato hydro and geothermal programmes for Mercury.

3. Although this is a Council Hearing, I have read the December 2014 Environment Court Practice Note - Code of Conduct for Expert Witnesses. I have complied with that Code when preparing my written statement of evidence and I agree to comply with it when I give any oral presentation.

Timberlands interest in Plan Change 1

4. Timberlands is a forest licensee with approximately 34,000 Ha of plantation forest in the upper reaches of the Waikato catchment. The relevant sub catchments appear to be numbers 54, 56, 58, 59, 62, 65, and 66.

5. Forestry has a very low N leach and pathogen signature and only has a discernible phosphate signature if planted on former farmland. The signature pollutant associated with forestry is sediment.

Hearing Part A – Overview and context, Overall direction

6. Splitting the PC1 hearing into three phases makes the hearing more manageable, however it does truncate some lines of sight for submitters with concerns with the detail that will be covered in parts B and C. I apologise if this evidence ventures into what those latter two sessions will cover.

7. Overall Timberlands supports the purpose of the proposed Plan Change 1, to improve the water quality of the Waikato and Waipa.

8. The intent of PC 1 in the main appears to be to put a regime in place that will set a trend in the desired direction and measure progress, rather than endeavouring to set fixed targets now. The first phase of the Plan Change introduces some obvious improvements to land use practice. Timberlands supports this requirement to use good management practices at an enterprise level. To make targeted/useful/ meaningful changes requires better information - matching activities to effects, identifying costs and values across industry groups using a standard methodology, and getting better attribution information. Actions to support these objectives are also supported.

9. At the level of the objectives, Timberlands does not support the plan framework elements that set a “hold the line” approach, followed by an intent to allocate in the next plan change. “Setting up for allocation” has been used to describe principles that lead towards that start point of allocation via grandparenting (of N leach capacity) at the property and sub catchment level. Timberlands opposes allocation. However, if allocation is to be used, Timberlands opposes via grandparenting and variants thereof outright and has a strong preference that any allocation be based on natural capital.

10. Timberlands supports a part of the amendments to Objective 1 made in the s42A report, <u>with the exception of those that require sub-catchments to meet limits based on present loads</u>. Preferred wording would therefore delete “in Table 3.11.1”:

    By 2096 at the latest, a reduction in the discharges of nitrogen, phosphorus, sediment and microbial pathogens to land and water results in achievement of the restoration and protection of the Waikato and Waipā Rivers, such that of the 80-year water quality attribute^ states^ ~~in Table 3.11-1~~ are met.

    This is because Timberlands opposes locking the 80 year nitrogen numerical attribute targets in Table 3.11-1 at the individual sub-catchment level, as that has the effect of

locking in the nature and scale of resource use within each sub-catchment. In sub catchments where the overall pollutant load is low it would prevent those with historically low discharges from changing to a higher emission profile and would thus have a de facto grandparenting effect at the sub-catchment level. Timberlands opposes grand parenting because it is inequitable and unreasonable. It restricts land use flexibility in and penalises those who have put in place measures to minimise environmental impacts. It sets the wrong incentives for water quality improvement.

11. Locking forestry to a very low level of N leach also puts forestry investment at risk, because any land user presently not in forestry will see that a change to forestry land use will become a lock into forestry land use. A policy regime that creates behaviour that would shun the lowest emission land use is a perverse one. Such a regime does not provide for as yet unforeseen land uses, or risks as yet unknown. This needs to be provided for, through land use flexibility that reflects the land's potential for use.

12. In a RMA s.5 context, PPC1 will enable the higher leaching elements of the pastoral farming community to provide for their economic and social well-being, while seriously constraining the capacity for other land users to do so. The combined effect of the objectives, policies and rules and methods are that land used for intensive pastoral agriculture, which has been identified as the most significant source of nitrogen leaching, is provided with an allocation of nitrogen at the same levels per hectare as over the benchmark period (other than those over the 75th percentile), from which to start a reduction process. Farmland will lose the cost-free opportunity to intensify production if that involves increased nitrogen leaching, but that land has been gifted significant quantities of N leach capacity. I.e. substantial tangible economic benefits are provided to high-leaching land uses and costs and constraints are imposed on low leaching land.

13. Through the limits imposed on the sub catchment water quality PC1 provides for the continuation of activities that create high levels of pollution. At the same time PC1 deprives land users who have not contributed to the adverse effects the right to alter their land use, except by purchasing rights off the high polluters. Providing for the social and economic well-being of one (polluting) section of the community at the expense of another (non-polluting) section is not consistent with the purpose of the Act of sustainable management of natural and physical resources. Nor is it efficient land use.

14. Sub catchment nitrogen targets in Table 3.11-1 may also lock in reductions to a greater extent than the degree of improvement required in any particular Freshwater Management Unit (FMU) overall.

15. Timberlands believe that it is more appropriate that the 80 year numerical attribute targets for nitrogen are expressed as a single set of TN numerical attribute targets measured in the main stem of the Waikato River at the bottom of each FMU. Timberlands further believes that the 10-year numerical nitrogen attribute targets are revised to show greater consistency between sub-catchments load, making sure that that the degree of reduction required is proportionate to the amount of current discharge (i.e. those discharging more must make greater reductions).

Collaborative stakeholder process risks

16. In developing PC1 Council planners were encouraged to use a Collaborative Stakeholder Group (CSG) process, based on all-sector collaboration principles underway at a national level, called the Land and Water Forum (LAWF). Plantation forestry was represented on the CSG however I note that the foresters dissented on some provisions proposed by the CSG, namely those that suggested a grandparenting approach to allocation at property and catchment level (policy 7).

17. PC1 sets in train an intent to allocate the ability to pollute to a certain extent, a capacity that is fundamental to land users' economic survival. Allocation is thus a competition for that resource, making the collaborative group process a competitive one – somewhat of an anathema to collaboration. The Healthy Rivers/Wai Ora Collaborative Stakeholder Group evaluation – summative report[1] had this to say about the group makeup and function:

> *25. Many stakeholders acknowledged WRC made considerable effort to provide an equitable process given the differences in resourcing of the various stakeholders and sectors. Even so, these differences in resourcing did affect people's ability to engage and participate. CGS members and WRC staff commented that these differences will always be there and are difficult to manage. Nevertheless WRC did attempt to bridge the gap.*
>
> *39. Equitable and fair representation and participation: Inequities in resourcing for collaborative group members impacts on the quality of member participation as well as their ability to communicate back to their sectors. Achieving equity and fairness is not easy, but needs to be carefully considered and resources should be available to support members where necessary.*
>
> *149. CSG meetings were intentionally designed, chaired and facilitated to ensure equity of expression of views. However, some CSG members and WRC stakeholders considered that some sectors had more opportunity to express their views because they had greater sector representation and support. The level of support and resource sitting behind the sectors appears to have had quite a strong influence on the extent to which people felt their views were able to influence the process. Some CSG members and WRC staff raised concerns about the number of sectors who appeared to have selected members with views aligned to the more powerful sector groups. Feedback suggested that it is important to have fair representation from those who will be and are significantly affected. One stakeholder commented that it comes down to '*being really careful about making sure that the group of people is a fair reflection of the basic problem you are trying to address.' (Supporting stakeholder)*
>
> *151. Despite considerable work by WRC to manage obvious inequities, significant disparity remained in the resources available to CSG members, with some sectors well-resourced and others much less so. Some stakeholders felt this inequity affected how well some members were able to participate and contribute to the process and to the final policy mix outcome.*

[1] Report presented to the Healthy Rivers Wai Ora Committee of 20 March 2018

157. Some CSG members were fully paid professionals who had significant organisational resources supporting them. Others had less capacity, with very little or no backing from their sectors. These differing levels of support affected some members' capacity to fulfil their roles as effectively as others, and to be heard. Members with fewer resources reported making personal and financial sacrifices to remain involved in the process, for example, some members reported their businesses and farms suffering while they juggled their work in the CSG process with their other commitments.

158. The evaluation found well-resourced and supported sectors felt heard and their ownership of the process was high. Some less well-resourced members described the larger sectors dominating the process with some even expressing the view that they sometimes 'found it quite intimidating to raise views contrary to those of the sectors with larger representation around the table' (CSG member). Some CSG members observed that well-resourced sectors put forward well-researched arguments while others who did not have the ability to do this were limited in their ability to have their perspectives heard.

18. The CSG collaborative process exposed Council to the risks associated with using collaboration to address competition for resources. Vested interests battling for a scarce resource where differing regimes will change outcomes for individuals and sectors by multiple millions of dollars creates significant risks for a collaborative process. In this instance those with the greatest level of N pollution have led and supported the discussion and direction that favours their members, which is grandparenting.

Risks associated with an allocation regime

19. Once a policy approach of allocation has been signalled, a rational property owner's behaviour will be driven to preserving their individual or sectors' position, not toward reducing pollution. Rational action also includes delaying pollution-reduction, if that would serve to sustain their allocation. Cap-allocate-and-trade thus does not provide any incentive to reduce N leaching, will not be directed to achieving the objective of improving water quality but instead will lead to perverse environmental outcomes.

20. In the s32 or other technical documents I have not seen an assessment of the effect of these risks: imperfect information, imprecise information, sticky markets, significant wealth transfer, policy capture or gaming. In my opinion these known hazards of allocation regimes must be well understood and explicitly considered in designing a regime, to minimise the impacts of these risks.

21. Plan Change 1 signals it is leading toward a regime that will set the maximum emission quantity in advance and distribute emissions permits within that envelope. Setting a cap on the overall emission quantity serves to create a price on emission units. That will be distributed to emitters via an initial allocation, or through trading with other emitters. As trading is a necessary component the mechanics of a trading regime to create an efficient, transparent market are also necessary. The permit trading price will fluctuate, depending on demand. For land use emissions the land use mix and within-sector variance will also be relevant. Emission units will change land value.

22. Tradable permits place a premium on accurate measurement of the initial problem, and of how it changes over time, as adjustments can be costly either in terms of compensation or through undermining the property right (because such permits are property rights, even though they fall short of fee-simple title). The effectiveness of permits can also be affected by factors such as the liquidity of the market, the quality of the property right, and the existence of market power[2].

23. The cost distribution for reducing emissions for emitters in the early stages of the allocation scheme is often to only pay for any extra permits bought from other emitters, as the initial permits have often been gifted ("grandparent"). Grandparenting supports cheaper compliance for status quo and is popular with higher emitters. All but grandparenting require trading capability to commence immediately to avoid significant business disruption. Cap and trade via grandparenting is better for near-term business profitability, however it is less likely to be the best outcome for society because it rewards high levels of emission. Such a system sets up not only an expectation, but also a property right to that pollutant, often driving behaviour completely contrary to the intent of the policy. Because the pollutant has a monetary value downward adjustments from that point become more difficult than they are now. As pollution units are attached to particular land parcels this also affects land value. The net effect is that it is a tradeable right and becomes embedded as a property right.

24. There is a long lead time between the leaching of nitrogen and its appearance in the river, so a feedback mechanism that considers this need to adapt would be required. It is inappropriate that Council creates a regime that tells landowners that it is acceptable to manage their land such that a certain level of nitrogen is leached from it, and they can trade the nitrogen they do not need, when the measurement of this leaching is subject to a large error.

25. Setting up for an allocation regime also requires that the resource is well enough understood to be able to price the units of allocation, for the trades of those units that must occur. Rough data with large uncertainties means an effective market cannot be created. I.e. data quality at the moment means that benchmarks cannot be accurately defined. Thus units of trade cannot be defined. To set up a market under these circumstances is not responsible.

26. It's evident that the assessment techniques used for the policy were designed for a farming context and thus do not always adequately represent differences between forestry and pastoral systems, which include:
    a. Relationship between land and crop. In farming the land owner is often integrally involved with the crop. For forestry the land owner and the crop owner are often two completely different entities. Any pollution constraints such as nitrogen limits are tied to land, not crop. The needs of the land owner and crop owner could thus be quite different. The rules may not affect the continuation of non-fertilised short rotation softwood regimes. However taking away optionality from the landowner will act to favour the lessee and damage the prospects of the landowner.

[2] http://www.treasury.govt.nz/publications/research-policy/wp/2003/03-02/08.htm

b. Modelling N. Overseer is designed for pastoral land management comparisons, not plantation forestry operations. Alternatives to Overseer exist for forests, but correlating N leaching modelling between overseer and other models is not agreed upon, made more difficult as Overseer's representation of N leaching substantially changes from version to version. Forestry N leach in Overseer only represents atmospheric N processes, which is substantially less than the margin of error of an Overseer output. We question the scientific or policy basis behind Council's numbers in this regard.
c. Economic effect of various policy options. EBIT (earnings before interest and tax) has been used as the methodology to assess farming profit. Foresters use IRR (internal rate of return) to assess the financial viability of forestry. This difference between sectors does not appear to have been recognised in economic assessments, not has the difference in marginal value to each enterprise type of adding N – covered further below.

Modelling

27. Timberlands notes that PC1 relies profoundly on modelling, of water quality, economics, and assessment of N leach.

28. For the allocation process proposed by Objective 1 to work, the nitrogen outputs per farm must be known. Overseer is the main model used to assess this. We know "*DairyNZ acknowledges that improvements are needed to its accuracy, and to incorporate variables such as soil type, but insists that it is currently the best available model*"[3] [4]. Timberlands' concern is that this model cannot produce accurate enough results for deterministic use, particularly where the allocation has multi-million dollar implications for land owners. It has opaque system design concepts (assumptions). TM ownership by the agricultural sector makes it inappropriate to be used in trade-offs between agriculture and other land uses, as it cannot be audited outside this sector. There are known within-model issues. There are known operator issues, meaning the model lacks repeatability. There are known data input issues due to lack of accurate records on farm, especially proof of placement of fertiliser, stock weights, movements and interchanges between management blocks over time. Poor data leads to interpretation error. Overseer has not been validated to the characteristics of many different soil types or climates thus its accuracy for many of the soils of the Waikato are unknown, and the climatic circumstances it has been tested in are not the same. Those using it do not appear to understand that despite its requirement for precise input data, it cannot generate precise, accurate and absolute output numbers.

29. The Overseer website clearly acknowledges uncertainty[5]

Models like Overseer must involve simplifications of complex processes and the predictions will always involve uncertainties. There are only limited test data; these do not cover all combinations of soils, climate and regional variation. Uncertainty will increase significantly as a situation moves from the information used to develop, calibrate and validate a model. Uncertainty can be decreased by obtaining more data

[3] http://www.pce.parliament.nz/media/1278/pce-water-quality-in-new-zealand.pdf
[4] https://www.parliament.nz/resource/en-nz/50DBSCH_SCR56973_1/5823f5c329d3f556af2788544fed21dbda88bbe4
[5] OVERSEER%20Summary%20for%20Agriculture%20Committee%202013%20(1).pdf

for calibration and validation; for different soil-types, climatic environments and [farming] enterprises. The Overseer owners also identify that as *Overseer is an important tool* ***to help support*** *farmers, industry and policymakers to increase land productivity while improving water quality, the owners are* ***In the longer term****, working to continue to decrease the uncertainty around estimates through improvements in the underlying science*.

30. It assumes best management practice: *"OVERSEER assumes some specific GMPs are used because not all processes can be adequately captured by a model, poor management is difficult to quantify, and a model like OVERSEER is not necessarily the best option to capture poor management practices. In general, if GMPs are not followed, environmental losses are higher*[6]*.* A table of assumptions Overseer is known to makes versus how often those are in place on a normal farm is at Annex A. The absence of these pre-conditions on many farms adds to the error factor that needs to be applied to any Overseer file output.

31. Overseer versions change frequently to reflect improved understanding of the systems it endeavours to model. New versions usually re-characterise the quantum of N leaching. This change in accuracy of algorithms demonstrates that Overseer outputs should not be used to characterise absolute numbers.

32. Overseer is a work in progress that is able to provide an estimate of output N loss. Overseer outputs cannot provide regulatory certainty on numbers of kilograms of nitrogen loss. We have no information on the confidence interval[7] on any figure that Overseer produces. A scientist involved early in the development of the model characterises this as at least 30% "*but it can be up to 100 percent if you get some of the input data wrong*" [8].

33. The tools used to characterise nitrogen inputs, processes and outputs have significant uncertainty. The Overseer owners describe this uncertainty thus:

    Quantifying and accounting for sources of uncertainty in models is particularly challenging, especially for a model describing complex farm systems like OVERSEER. A report by Ledgard and Waller (2001)[2] *estimated uncertainty of 25-30% for model predictions for N, which has since been widely quoted. However, this estimate didn't include errors associated with measurements, or uncertainty from data inputs, providing only part of the full picture of quantifying uncertainty, and is therefore limited.*

    This makes it inappropriate to allocate via a financial market mechanism based on Overseer results. I.e. 25kg/ha +/- 8kg/Ha of a particular version can't be readily translated into a price per kilo of N.

34. Timberlands firmly believes that Overseer is not fit for the purpose of N allocation, particularly when the benchmark will have to use a different version from the actual allocation. The design (comparative rather than absolute) as well as its lack of

[6] OVERSEER® Nutrient Budgets Technical Manual for the Engine (Version 6.2.3)
[7] http://www.crc.govt.nz/publications/Consent%20Notifications/HearingEvidenceWalterCClark.pdf para 41 to 42
[8] http://www.radionz.co.nz/news/rural/282599/world-class-soil-programme-'misused'

transparency, auditability, validation or verification makes the Overseer model an inappropriate choice for public policy that requires absolute output numbers.

Plan effectiveness

35. We contend that the science analysis relies very heavily on the model Overseer to characterise individual property N emissions, for sub catchment targets to be met. This overlooks the limitations of this model to precisely or accurately model N stocks and flows in any absolute sense.

36. Council is signalling that PC1 will lead to allocation. Allocation requires an accurate measure of the portfolio of pollution contributions in order to accurately allocate portions to various parties. If there is no way to provide competent data by measuring or modelling, then policy that uses an allocation approach cannot work as it lacks the tools to implement it. If the only tools provide a partial analysis of the pollution portfolio, the policy must respond to the quality of the data that informs it. It appears that insufficient attention has been paid to tools required for such a policy.

37. Policy design drives behaviour. Allocation does not drive pollution-reducing behaviour. It drives rivalry. Allocation behaviour is severely at odds with the objectives of the plan. After allocation has occurred it then drives behaviour of "test my performance against my agreed limit". To carry out such a test requires competent and trusted measurement techniques of the pollution. These techniques don't exist.

Conclusion

38. Timberlands believes that Council should not persevere with the design of the objectives that has the intent of leading to allocation, because it lacks the tools for fair, credible or defensible allocation approach. Timberlands requests that Objective 1 is modified so that it no longer creates a cap at the sub catchment level.
    i.e. *By 2096 at the latest, a reduction in the discharges of nitrogen, phosphorus, sediment and microbial pathogens to land and water results in achievement of the restoration and protection of the Waikato and Waipā Rivers, such that of the 80-year water quality attribute^ states^ ~~in Table 3.11-1~~ are met.*

Annex A – Good practice assumed by Overseer

Overseer assumption	Rules required to support assumption
Precision fertilising - Nitrogen fertiliser applied in compliance with the Fertiliser Research Guide Code of Practice.	Precision fertilising does not routinely occur. In most cases records kept are poor. Proof of placement is not kept by fertiliser companies nor provided to farmers. To "assume COP is in place" requires clear records of fertiliser applications in Kg per ha per year applied, and timing, relevant to each management block in Overseer.
Best Management Practices for Effluent Management in place	Effluent discharge to land needs to be in accordance with the most recent BMP code applied for storage (sealed), application (using soil moisture deficit principles), and nutrient loading (max of 150 kg N/ha/yr from all sources).
Surface runoff of effluent and sediment does not occur from hot spots, crops, or poor soil management. No contaminants enter groundwater. No Direct connectivity to waterbodies	Clear recommendations or rules are required to manage the contaminant loads from fodder crops. There is no definition nor rule for mob stocking on one paddock and loss of pasture cover. Control of the impact from sacrifice paddocks, mob stocking and risk of contaminant to ground and surface water in inclement weather events (similar risks to winter cropping).
Most N leached on livestock enterprises comes from the urine patches	If pasture cover is lost, and there is pooling in the area, and soil compaction/damage occurs, this increases the risk of preferential flow or runoff.
The more time animals spend on sealed surfaces in autumn/winter the greater the N loss reduction.	Overseer does not model herd homes appropriately.
Stock exclusion from waterways	Surface runoff and connectivity to waterways is covered but it expects riparian zones or buffer strips, to ensure no direct pathways from stock camping areas and tracks enter waterways.
Trapping and retaining nutrients and sediment in wetlands and vegetation buffers reduces direct contamination of waterways.	As above
irrigation of effluent only happens in conditions of soil moisture deficit	Irrigating dairy effluent to soil moisture deficit reduces drainage and runoff. N remains in the root zone for longer. This will require adequate pond capacity, based on pond calculator and accurate soil risk assessment for effluent application. All this is assumed to be in place, and in most cases is not.
Crude protein not above 22%	Understanding of the correct profile of effluent N concentrations and what the loading rate should be. The effluent block must be of sufficient size to be able to spread the amount of effluent generated at a rate and concentration that avoids over -application of N. The N in effluent increases with higher crude protein load in the diet. Excess crude protein (above 22%) in diet can increase urinary N excretion by 50+% above what Overseer assumes.
sufficient effluent storage volume	The ability to irrigate effluent to soil moisture deficit is determined by the level of storage available. If effluent storage is not large enough to allow for deferred irrigation when soil moisture levels are high, then the user must irrigate when soils are too wet, which greatly increases N loss.

Deficit and variable rate irrigation	Deficit and variable rate irrigation reduces the risk of sediment run-off and nutrient loss through drainage by keeping nutrients in the root zone. This requires monitoring of soil moisture deficits and irrigation scheduling to meet soil moisture deficit needs. Both of these have low actual uptake.
Overseer assumes no greater than 22 % Crude protein	In high legume pastures or highly N fertilised pastures in spring and summer this is closer to 30%. Overseer significantly underestimates the urea content of urine.
Use of cover crops during fallow period	All effort should be made to avoid bare soils. Cover crops reduce the amount of N leached during an otherwise fallow period for soil.