IN THE MATTER OF	The Resource Management Act 1991
AND	
IN THE MATTER OF	Lake Rotorua Nutrient Management – **PROPOSED PLAN CHANGE 10** to the Bay of Plenty Regional Water and Land Plan

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SUMMARY OF EVIDENCE OF NICOLA JANE SMITH
ON BEHALF OF THE BAY OF PLENTY REGIONAL COUNCIL

Evidence topic: Economic impacts – district and regional economy

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Qualifications and experience

1. My name is Nicola Jane Smith. I am an Associate Director at Market Economics Limited (M.E), at which I have been employed over the last 10 years. Through my PhD research and various work-related research and consultancy projects, I have a variety of experience in combined environment-economy modelling and evaluation. I have also developed or contributed to the development of a number of models of New Zealand's regional and national economies, primarily input-output, computable general equilibrium and system dynamics models. I have undertaken economic modelling and contributed to the production of written reports in four other studies concerned with evaluation of freshwater-related policies and initiatives. Currently I am involved in the development of the Southland Economic Model for Environment Southland – this is a multi-regional dynamic economic model intended for use in the development of freshwater limit-setting policies.

Scope of Evidence and Summary

2. My evidence explains the scope of the modelling work (M.E) undertook for the Regional Council, and the outcomes. I also explain how economic impact analysis ("EIA") utilising an economic input-output model works and some of the base assumptions.

Contract brief:

3. In short, the object of the modelling was to compare alternative scenarios for nitrogen discharge allocation among landowners to see what the potential economic impacts were at the wider district and regional levels. The purpose was to help inform Council

and stakeholders of the potential outcomes of the different allocation options under different trading assumptions.

4. M.E was requested to consider three allocation scenarios in its economic analysis. These were:

   (a) Single sector target scenario (‘Scenario 1’).

   (b) Natural capital allocation scenario (‘Scenario 4’).

   (c) Sector ranges scenario (‘Scenario 8’).

5. The modelled trading and land use change assumptions were:

   (a) Fully efficient trading (where all nitrogen discharge allowance trades that are economically desirable occur and land use moves to its most efficient use), with no restrictions on the amount of land use change.

   (b) Fully efficient (as above), with total land use change is limited to 5000 ha.

   (c) 50% trading frictions (where 50% of allowances are retained by farmers to whom these entitlements are allocated, with no restriction on the amount of land use change that can occur.

   (d) 50% trading frictions (as above), with total land use change limited to 5000 ha.

6. We also considered whether and to what extent there may be other positive impacts from land use change and a clean lake, as part of the context of these changes in the district and regional impact. This includes positive changes to employment and tourism spend, as might occur from the avoidance of adverse environmental effects (as associated with a lake associated with high nutrient loads).

Outcome of report

7. When trading is fully efficient the GDP and employment effects are the same for all allocation options. This is because under fully efficient trading the economic decisions of landowners take them all to the same point. Under fully efficient trading the district and regional value added is projected to decrease by $2.5m/yr (0.09% of total value added for the district) and $3.4m/yr (0.03% of regional value added).

8. In the scenarios where trading was assumed to be less efficient the sector ranges scenario (Scenario 8) performed the best in that the value added and employment impacts calculated were either equal to or less than those calculated for the other two nitrogen allocation scenarios. Under the 50% trading efficiency assumption, the sector range scenario reduced value added for the district and region by $3.5m (0.13%) and $4.3m (0.04%) respectively. Employment losses at the district and regional level were 76 and 83 respectively.

9. The results of the sector range scenario were followed closely by the single sector target scenario (Scenario 1), which was slightly more costly. The natural capital allocation scenario (Scenario 4) was the least favourable of the allocation options considered, - when trading frictions were incorporated into the analysis. The reason the natural capital allocation scenario is more costly when trading frictions exist is because it allocates nitrogen discharge allowances to activities that overall produce less economic output and incomes across the catchment. Although nitrogen trading allows for the nitrogen discharge allowances to be re-allocated so that greater levels of economic output and income can be generated, this cannot be fully achieved with trading frictions.

10. Regardless of the allocation option considered, a large portion of the economic impacts of the nitrogen controls on agriculture within the Lake Rotorua catchment will be felt outside of the catchment and district. In part this reflects the strong interconnections, as a result of supply-chain networks, between economic activities within the catchment and district, and activities elsewhere within the New Zealand economy.

11. Additionally, the incentives scheme to help encourage land use change through buying nitrogen allocation is funded by both the regional and national governments. This shares the costs and impacts of reducing nitrogen across the whole region and nation, and is a flow of funds into the district economy.

12. The nitrogen allocation options considered all result in an uneven distribution of impacts across economic industries, particularly for Rotorua District.

13. We also considered three tourism scenarios. These were a 1%, 2% and 3% change in Rotorua District's tourism demands, calculated with reference to 2012 tourism data. Conceptually these changes in tourism demands can be viewed as either avoided

losses or net gains. The basis of the consideration was a simple “what if” scenario of potential changes in tourism demands at district, regional and national levels.

14. The tourism scenarios were approximations because tourism demands are subject to significant fluctuations and high levels of uncertainty. The magnitude of economic losses avoided (or economic benefits gained) upon achievement of improved water quality depends upon a number of factors outside of the influence of the region and nation. This includes changes in disposable incomes within other countries, changes in the aviation market, and changes in attractions at competing destinations. .

15. Should the improvements in water quality help to avoid losses in (or even increase) tourism demands, the industries that will most benefit are among those least impacted from the likely changes in farm systems to meet nitrogen limits. In particular it is the service sectors that will be positively impacted by a gain in tourism. Just over half the value added gains that are calculated to occur in Rotorua District from increased tourism expenditure are within the two sub-industries accommodation and food and beverage services.

Basis of my opinion : EIA methodology – MRIO

16. I have applied economic impact analysis ("EIA") utilising an economic multi-regional input-output (MRIO) model. The model is described in detail in my report.

17. One of the core strengths of IO models is the ability to capture complex interactions and interdependencies which take place between different sectors within an economy. This means that it is possible to consider a vast number of the indirect or flow-on effects that occur throughout an economy as a result of any type of economic change. IO analysis also enables economic impacts to be evaluated at the level of individual sectors or industries, thus providing a disaggregated picture of the nature of economic impacts.

18. When undertaking economic modelling the initial task is to collate information on direct economic changes. A direct outcome of all of the nitrogen allocation scenarios considered was that agricultural land owners would need to ensure that the activities on their land changed to meet the specified levels of nitrogen output. For some farms this will mean changes in the types and magnitude of inputs used, for example removing summer crops and replacing with supplements and lowering fertiliser use. In many cases there is also changes in output (e.g. milk, livestock) produced per hectare. Still for other farms there may be changes in land use altogether, for example

from pastoral farming to forestry. Each set of changes will alter farm/ landowner budgets, potentially altering incomes generating from primary activities within the catchment as generated from farm wages/salaries and profits.

19. All of these direct changes in primary activities were provided to me in spreadsheets by Profession Graeme Doole as outputs from the catchment level modelling. These datasets were expenditure and revenue line items aggregated for the land use activities dairy, drystock, and forestry, the outlays and revenues calculated for land transition, and nitrogen trading revenues/costs. Additionally, Bay of Plenty Regional Council provided information on funds that were intended to be allocated towards the provision of advice and support for farmers, which was also included in the direct cost calculations.

Conclusion

20. In my opinion, based on the economic input-output modelling undertaken, the sector ranges scenario (Scenario 8) is the most favourable (least cost) of the three nitrogen allocation options considered, assuming that trading frictions will exist. Regardless of the allocation option taken, there will be some adverse economic consequences generated for the district and regional economies as a result of the reorganisation of pastoral and forestry activities in the catchment. The sector range scenario represents the least change from the status quo, so limits the disruption. In total with optimum land use change, the value added generated from the district's pastoral and forestry industries is calculated to change by -$\$_{2015}$ 2.6-3.2 million per year (representing 0.09% to 0.12% of the Rotorua district economy) depending on the nitrogen trading friction assumptions. Direct employment in these industries also falls by about 100 jobs (rounded to one significant figure), offset somewhat by about 20 additional jobs in forestry and related sectors.

21. Economic activities in the Rotorua catchment are interconnected with the wider district, regional and national economies. In absolute terms the nitrogen allocation schemes will overall cause greater value added and employment losses outside of Rotorua District than within the district. This results from backward and forward supply chain linkages, and reductions in consumer and government spending necessary to fund the incentives scheme, with flow-on impacts throughout the regional and national economies.

22. My study has not focused on evaluating all of the wider ecological and community benefits that will occur from reduction in nitrogen accumulation within the catchment. Changes in tourism demand is one likely outcome of changes in lake water quality. However future tourism growth trends are very uncertain. Using the same economic modelling as applied for evaluating the nitrogen allocation options it is shown that, should the nutrient allocation option concurrently result in avoidance of a 1% loss in tourism expenditure, the total value added loss for the district would be reduced by $\$_{2015}$1.4mil (i.e. 60% of the loss where fully efficient trading is assumed). Nevertheless the industries that are most likely to gain from the efforts to reduce nitrogen (e.g. industries providing accommodation and food services to tourists) are not those that are likely to face significant impacts from the nitrogen allocation rules. We can conceptualise the nitrogen allocation rules as a reorganisation of the rights to use natural capital in the catchment, which is of benefit to some parts of the community, but also a loss to other parts of the community.