

Modelling of District, Regional and National Level Impacts Associated with Rotorua District Nitrogen Reduction Programmes

Context

The Bay of Plenty Regional Policy Statement sets a nitrogen limit for Lake Rotorua of 435 tonnes/year. The estimated reduction of nitrogen required to reach this limit is 320 tonnes/year. Engineering solutions are expected to reduce the load by approximately 50 tonnes/year. The balance of 270 tonnes/year is expected to come from the rural/pastoral sector through an integrated framework comprised of three identified programmes: (1) Rules Programme, (2) Incentives Programme and (3) Gorse Programme. Under the Rules Programme, landowners in the catchment will be allocated Nitrogen Discharge Allowances (NDA) by an allocation method yet to be determined. Under the Incentives Programme, landowners will be able to sell their allocated NDA, creating further nutrient reductions. It is anticipated that most of the incentives reductions will come from land use change. The Gorse Programme objective is to reduce nutrients through conversion of mature gorse to forestry.

A variety of NDA allocation methods under the Rules Programme are possible. Six different allocation methods are to be evaluated via the use of farm system and catchment level modelling. This work is currently being undertaken by researchers from the University of Waikato/University of Western Australia (Graeme Doole) and DairyNZ (Oliver Parsons) and considers, in particular, the likely impacts on land use and farm management practices (including changes in farm inputs, production levels and profits).

This proposal presented by Market Economics Ltd (M.E) is for the final stage of the economic analysis, considering district, regional and nation-wide impacts. Specifically, the analysis will consider three scenarios covering low, medium and high impacts, based on the outcomes of the earlier modelling, including the anticipated levels of system and land use change.

Methodology

We propose to develop a regional economic model to assess the wider district and regional economic impacts associated with the farm system and catchment work. Robust economic analysis is fundamental to developing initiatives which will improve water quality. Specifically, this will require a two Stage process:

- (1) *Assessment of the Financial Modelling of Costs/Benefits.* This information, in the form of a Discounted Cash Flows (DCF) analysis, will be available either directly or indirectly from the earlier farm system and catchment modelling work. M.E, in collaboration with input from Drs Doole and Parsons as required, will code this information (i.e. all expenditure and revenue line items in the DCF analysis) into a form appropriate for inclusion into a regional level economic analysis. Specifically, this involves apportioning the farm level revenues and expenditures to various sectors in the

regional economy, accounting for variations in the level of these activities due to land use change. Financial items, for example, might include: changes in animal feed and nutrient input practices, changes in demand for primary sector servicing businesses (forestry contractors, accountancy, legal etc), and changes in household income and expenditure items (balancing of household budgets in terms of impacts of consumer spending). The analysis will consider the need for financing within any of the identified programmes and, in turn, what this means otherwise 'as planned' spending within the district, regional and national economies. The latter impacts (i.e the 'who pays?' analysis), which may be considerable, are often overlooked in Economic Impact Assessment undertaken within New Zealand, leading to significant overestimation of the actual impacts.

- (2) *Development of Multi-Regional Input Output Model* – M.E. will draw on its suite of proprietary regional economic accounts, termed Social Accounting Matrices (SAMs) in the development of a Multi-Regional Input-Output Model (MRIO).
- (3) *Calculation of the District/Regional Economic Impacts*. M.E will use the MRIO to assess the district/regional /national level economic impacts. Using this model, we will trace not only the direct economic consequences associated with the financial modelling in Stage 1 above, but also importantly the indirect backward (i.e. supply chain) and forward (i.e. from farm to processor) linkage impacts through the district, regional and rest of New Zealand economies. Induced impacts associated with changes in household expenditure arising from possibly the need to balance household budgets will also be accounted for.

Key outputs will be the *net* economic impacts (compared against a baseline¹ run of the model) in value added (Gross Regional Product), income and employment terms for the district/regional and national economies. This information will be prepared both as aggregate indicators, but also by key industries (e.g. sheep and beef farming, dairy farming, dairy factories, meat processing and so on) as identified within the study.

Deliverables

Economic Impact Assessment

- *Draft Economic Impact Report*. This will provide a full description of methodology and associated results in terms of the net economic impacts associated with farm and catchment level analyses, key conclusions, and recommendations for future work. Completed by mid-April 2015 – this assumes all relevant data inputs by third parties by the end of February 2014.
- *Final Economic Impact Report*. This report will integrate any comments received from the Stakeholder Advisory Group (and others as appropriate) on the Draft Economic impact Report. To be completed before the end of April 2015.

¹ It is important to note that an appropriate 'baseline' for comparison will be required. Importantly, a baseline run of the model may be more than just comparison against 'business-as-usual'. The baseline run should provide an accurate and fair counterfactual including farm level initiatives improving water quality that would likely occur independently of setting targets. The Council has indicated that Rule 11 within the Bay of Plenty Regional Water and Land Plan helps to set the appropriate status quo for the analysis.

Budget and Timetable

Table 1 provides a breakdown of the budget and timetable for this piece of work. The total cost for the work is budgeted at \$29,960+GST.

Table 1: Budget and Timetable

Tasks	Fees (excl GST)	Hours	Due	\$/hr
Stage 1: Linking to Financial Modelling of Costs/Benefits	2,440	15		163
Stage 2: Development of MRIO	2,880	20		144
Stage 3: Calculation of District/Regional/National Impacts	12,760	75	15-Mar-15	170
Draft Report	9,160	50	31-Mar-15	183
Final Report	2,720	15		181
Total	29,960			