

MEMORANDUM OF RESPONSE

Prepared for: Nicola Scott (in response to peer review of “Impact of possible environmental policy interventions on case study farms” by Dr Richard Muirhead)

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1. Introduction

MRB authors have read Dr. Richard Muirhead’s peer review of the MRB prepared report “Impact of possible environmental policy interventions on case study farms”. Richard asks some valid questions and challenges the process taken by MRB to come to the conclusions made. As there are many different permutations to finding solutions for emission reductions in a biological system, MRB have followed the scope of works requested and have given adequate considerations to all relevant permutations given the time constraints to complete the work.

On reflection, I make the following responses to the comments within the Muirhead review.

2. Responses

1. Paragraph 2.
 - a. The farms selected for modelling are properties that MRB consultants are familiar with, which is important when considering the practical possibilities of agronomic system change (for whatever reason).
 - b. The systems may appear complex, but are typical of farm systems of the types modelled in the areas the farms are located.
 - c. There is always more than one solution to a problem. MRB have chosen to model the solutions we thought most fitting to the farm and most likely to achieve environmental, social and economic balance.
2. Paragraph 3.
 - a. The key focuses of the MRB scope of works from MfE were:
 - i. To assess a status quo emission and profitability status for the selected farms at a “Good Management Practice” level.
 - ii. To assess changes in N and P loss from different mitigation options proposed by MfE in the original MfE mitigation matrix.

- iii. Achieve production gains while maintaining or reducing nutrient emissions, and assess the economic impacts.
- b. With respect to P loss mitigation strategies, MRB reviewed a large amount of work completed by industry and concluded:
 - i. That the mitigation strategies employed were the most suitable to each farm. The document Muirhead has referred to (“Assessment of Strategies to Mitigate the Impact or Loss of Contaminants from Agricultural Land to Fresh Waters”) was reviewed by MRB in preparation of the P loss mitigation strategies.
 - ii. MRB utilised the riparian buffer, stream planting and poplar pole planting strategies suggested.
 - iii. RPR fertiliser was not employed in place of soluble phosphate fertilisers because timing of phosphate fertiliser was deemed to be at times of the year when runoff was not likely, and rainfall was about or less than 800mm, which RPR is not recommended for.
 - iv. P sorbing sausages along stream banks were not seen to be a practical solution and MRB do not advocate adding compounds to streams (like bentonite) to prevent phosphorus from dissolving into the stream.
 - v. Adding iron slags treatment systems to tile drains require a lot of maintenance and regular replacement of iron slag.
 - vi. Adding heavy metal sulphates to soils over a sustained period to flocculate phosphorus is an unsustainable practice as heavy metals are difficult to strip from soils once present.
 - vii. Overseer assumes that phosphorus is lost from the block reported, not necessarily from the farm. If there is a pastoral block between a high loss block and a water course, then the sediment is captured in the pasture paddock and is retained on the property.
 - viii. There are “fixed” point source losses that Overseer assumes around tracks, lanes and yards, stock camp areas and effluent systems that cannot be mitigated within Overseer. MRB did internally discuss merits of many point source discharge mitigation techniques including but not limited to: planting miscanthus along track edges as phosphate sync; smaller mobs walking on lanes resulting in less defecation on lanes and less point source discharge; capturing effluent from tracks. While some of the options considered were technically feasible, they were not employed as there was insufficient research located that indicated likely reductions to losses.

3. Paragraph 4.

- a. Debt is a part of farm businesses and in many instances, it is a legacy bought about by changes in climate, family circumstances and government policy.
- b. The scope of works required MRB to assess economic impact of farm nutrient loss mitigation. A full economic assessment considered existing debt and additional debt taken on as part of a mitigation strategy being deployed.
- c. Muirhead makes a judgement call that “debt should not be a factor in setting environmental targets”. It is important to consider all social implications of any policy change, this extends to social impacts of environmental targets because if an environmental target is economically un-attainable with current mitigation technologies

and techniques, regions will see not only an exit of existing operators if they are financially un-viable under proposed environmental policy targets and the incoming business purchaser will operate with a decreased level of productivity, resulting in a reduction in employment and a reduction in spending in the community, ultimately constricting community depth and prosperity.

4. Paragraph 6.

- a. MRB is a business of similarly skilled professionals who have a developed knowledge of all farms systems modelled, however, each consultant has specialised skills that pertain to the farm they modelled. With the breadth of knowledge within the consultants, each piece of work was peer reviewed internally by another consultant for consistency.
- b. Details on particulars of properties were excluded from MfE reports in the interest of farmer anonymity, this was a condition specified in the scope of works.
- c. As outlined in section 2.3 the farms selected were intended to be representative of farm type across Canterbury and as such contained a representative transect of soils, climate, system and irrigation infrastructure.

5. Paragraph 7.

- a. Stock exclusion from water courses was measured using Google Earth in conjunction with the farmer. On flat parts of properties, where the streams are straight, the fencing is a 5 metres minimum from the stream bank, and fencing is a direct co-efficient of the stream length. On more contoured blocks, the farmer has indicated where the fence would need to be installed to maintain a 5 metre minimum setback. The scope of works did not request scaling metrics be presented. This can be published on request of MfE as an out-of-scope piece of work.
- b. "Lost land value" is detailed in each of the sub sections and does not assume all land has the same productive capacity or earning capacity.
- c. Except "amenity value" the fenced off areas carry no earning value and therefore no additional capital value to the farm in excess of the fence erection costs.

6. Paragraph 8.

- a. The fence installation locations on the Red Meat/Hill Country Farm are in the locations that the land owning farmer described would be required to both manage stock and sensibly install fences so that they are secure from snow, tree or land slide destruction.
- b. While Muirhead may have seen fences on a hill farms that do not need a bull dozed track before the fence could be erected, in many locations where fences have not yet been erected, they require dozing of a track due to terrain or vegetative constraints.
- c. The area that is excluded from stock grazing is 53ha and is not an assumed area, it is a measured area.
- d. The cost of fence establishment was based on recent projects actual costs undertaken by the consultants' clients in the area, fencing similar terrain and include all gates, materials delivery, erection, tie downs and flood gates.
- e. Wetland re-vegetation costs have been provided by a local nursery that provide planning, travel, planting and maintenance. The cost of wetland establishment is deemed to be accurate by MRB despite the difference to NIWA estimates.
- f. Water reticulation costs include the costs of dam formation or tank delivery as priced by the farmer. Pipe and trough delivery and installation are based on actual costs of recent projects undertaken by the consultants' clients in modelled farm's geographic area. While

the Muirhead referred report provided estimates of stock water reticulation costs on a per hectare basis for Canterbury being much lower than the MRB report, table 3 in the Muirhead referred report also notes that in other parts of the country, capital costs of up to \$811/ha and as low as \$132/ha to complete a similar job. It is important to note that the Muirhead referred report (“Economic Evaluation of Stock Water Reticulation in Hill Country”) relies on reticulating stock water to an already subdivided farm. With having to exclude stock from more water courses in the MfE scenario 2 models, there are more water reticulation lines and more water troughs required than would be if the water courses were not fenced in some parts of the farm.

- g. The costs of water reticulation, wetland fencing, and stock exclusion are not seen by MRB to be a “significant over estimation” as Muirhead suggests, rather they are a properly scoped development costs for this representative farm as requested in the MfE scope of works.
 - h. Section 7.1.3 asserts that the fencing of all water ways and wetlands on hill country is not economically viable. Section 7.1.2 shows that the stock exclusion scenario modelled results in a \$36,283 reduction in Earnings Before Interest and Tax compared to the status quo. Giving no allowance for existing debt or depreciation, after accounting for cost of capital on development and additional overdraft interest costs of \$96,906, the farm would be making a loss of \$26,158 per year. The fencing of all water ways and wetlands on hill country is not economically viable.
 - i. The breakdown in Table 7.1.3.1 of the development cost of “high and low” stocking intensities demonstrated the relative cost centres of the development to the farm. It was not within the MfE scope of works to assess all of the incremental environmental benefits of incremental change given the time constraints and financial budget provided. You will note that the mitigation suites are a “pooled” combination of mitigation techniques to reflect these constraints. Further work could be undertaken to separate this but would be out of scope.
7. Paragraph 12.
- a. Stream distances were not metrics that were requested in the MfE scope of works for reported information. Red Meat/Hill Country length of stream is 13,632m.
8. Paragraph 13.
- a. Drainage density could be a useful measure to report, however, farmers tend to work in measures per stock unit or per hectare. If MfE would require further reporting metrics for farmers to utilise, MRB could prepare a document on a per hectare and per stock unit basis. This report was prepared for MfE with MRB’s understanding that it was to inform cabinet papers on economic and practical viability of proposed standards rather than to be used as a comparison document or information document for industry. Further industry focused reporting would be considered out of scope and additional to the original scope of works if requested by MfE.
9. Paragraph 14.
- a. In Section 5.1.1.2 outlines the areas of each crop grown. The 6ha of winter rape and 6ha of annual ryegrass are grown in the same calendar year so are only one area but are depicted as two crops. The areas are correct in Overseer and Farmax.

- b. Overseer is correct reading 196ha Darnley soil, 26ha Rakaia soil and 82ha Timaru soil. The final report in section 5.2.1.2 should read 26ha of Rakaia rather than the 13ha written. This is a typing error. Farmax is correct.

10. Paragraph 15.

- a. Table 48. Please see amended MRB report.
- b. MRB understand that Overseer has limitations in terms of fixed losses of phosphorus from tracks and lanes and Overseer assumes that the phosphorus is lost from the property, which may or not be the case. This final paragraph was intending to outline a possible consideration that could mitigate the additional phosphorus losses Overseer expected with the conversion from arable to livestock (dairy).

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