Compass Agribusiness

Independent Review: Manuherekia Catchment Economic Impacts

March 2021

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Compass
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1.0 INTRODUCTION

1.1 Purpose

This report has been prepared by Bruce Hamilton, Agribusiness Specialist, of Compass Agribusiness Management Limited to evaluate the financial impact and resultant financial viability of the affected farm models, impacted by the six proposed minimum flow scenarios and three reliability zones of the Manuherekia Valley.

We were engaged by Central Otago District Council to carry out the above analysis which included the following actions:

- Review land use areas provided by Otago Regional Council (ORC) and provide feedback regarding calculated areas for scale up calculations.
- Review the on-farm financial modelling and economic outcomes provided by Abacus Bio and Lewis Tucker and provide any constructive information/advice to promote robust model outcomes.
- Liaise with Abacus Bio and Lewis Tucker to ensure the valuation methodology is capturing the potential changes in land values relative to the financial impacts of the proposed minimum flows on farming systems.
- To support the information transfer and any required clarification of the financial models to assist with the Regional and District Impact Reports.

While this report has been prepared in good faith and is believed to be true, correct and complete as at the date of issue, neither Compass Agribusiness Management Limited or any of its related companies, officers or agents is liable for any error, omission, statement, or representation express or implied in or by this report.

1.2 Revisions and Limitations

Compass Agribusiness Management Limited reserves the right to withdraw, modify, revise or reissue this report at any time. Information has been provided from various service providers to complete this report up until the date of the 25th of March 2021. Compass Agribusiness Management has relied on this information and therefore any additional updates to this information will not be captured in this report.

2.0 CAPABILITY STATEMENT

Compass Agribusiness Management Limited is a privately-owned company that provides agricultural and rural business consultancy. We are primarily located in Otago, New Zealand as well as Victoria, Australia. We provide advice to clients throughout the South Island of New Zealand as well as in Victoria, Tasmania and New South Wales in Australia.

We have acted in advisory roles for the Manuherekia Catchment Water Strategy Group, Lindis and NOIC irrigation schemes and provide consultancy work for many large-scale irrigated farms throughout the South Island.
Our services include the full range of farm consultancy and advisory, as well as planning and business management. We also assist large scale commercial and family farming entities with financial management.

2.1 Bruce Hamilton

Bruce has been working as an agribusiness consultant with Compass Agribusiness for 10 years.

Bruce completed a degree in Agriculture Farm Management and Rural Valuation at Lincoln University, Canterbury, New Zealand.

Bruce is specifically involved in the areas of feasibility planning, farm management systems, financial budgeting and investment risk profiling. Bruce is the project manager for Compass Agribusiness' New Zealand Managed Assets which include several Central Otago based farms covering over 1,600ha and a total asset value in excess of $45M.

3.0 METHODOLOGY

The methodology involved a collaborative approach between Abacus Bio and Compass Agribusiness, which allowed an independent review of the on-farm models and suggested changes to these models to promote more robust outcomes. Abacus Bio is responsible for the modelling and these were independently reviewed by Compass Agribusiness.

The output of these models was relied upon by Lewis Tucker who provided the economic impact at catchment level under the different flow scenarios.

Information used in this report was gathered from the following sources:

1. Abacus Bio - reference 'Manuherekia Enterprise Model Methodology'
2. Lewis Tucker – reference 'Draft Manuherekia Catchment Economics'
3. Davis Ogilvie – various emails regarding land use.

4.0 LAND USE

The Manuherekia economic assessment requires a good understanding of land use within the irrigated area.

The land use was aligned to the four farm types (Dairy, Dairy Support, Sheep & Beef and Horticulture), of which Abacus Bio completed on-farm modelling for.

As the hydrology model has been used to assess changes in water supply reliability, there is a need to ensure the irrigated area used in the economic assessment is consistent with the *hydrology model*.

Currently ORC's irrigated land use map contains twenty different land use types as derived from the Agribase layer.

To create the information required by the economic assessment, Davis Ogilvie assigned each of the twenty land use types in the ORC map to one of the four farm types which have been modelled on-farm. See table below:

Landuse categories on ORC landuse Map	Landuse categories modelled on-farm and to be used in the catchment scale-up part of the Economic assessment
Arable cropping	Dairy
Beef cattle	Dairy support
Dairy cattle	Dairy
Deer	Dairy support
Dairy dry stock	Dairy support
Forestry	Sheep and Beef
Fruit growing	Hort
Goats	Hort
Grazing other peoples stock	Dairy support
Horses	Sheep and Beef
Lifestyle	Sheep and Beef
Native bush	Sheep and Beef
New record - unconfirmed	Sheep and Beef
Other planted types	Hort
Other - not covered elsewhere	Hort
Poultry farming	Hort
Sheep	Sheep and Beef
Sheep and beef	Sheep and Beef
Unspecified	Sheep and Beef
Viticulture	Hort

ORC provided Davis Ogilvie with both an irrigation map and a land use map for the Manuherekia catchment which Davis Ogilvie merged then analysed to get information required for both the hydrology model and the economic assessment.

The ORC map indicates there are 15,914 hectares irrigated in the Manuherekia Valley (excluding Little Valley, Crawford Hill and all of the Pool Burn and Ida Burn) whereas the hydrology model has 18,260 hectares irrigated in the same area.

Davis Ogilvie increased the area irrigated on ORC maps to roughly match (both in each reliability zone and the overall irrigated area) what is in the hydrology model.

This resulted in 2,370 hectares being added to the Lower Manuherekia reliability zone. In adding this irrigated land, Davis Ogilvie assumed the relative land use percentages remained the same.

The resulting table for the irrigated area catchment, scale up part of the economic assessment as follows:

	Landuse					
Reliability zone	Dairy	Dairy support	Sheep and Beef	Hort	**Total (ha)**	%
Upper Manuherekia	2062	1376	3340	0	**6778**	0.37
Tributaries (Dunstan, Lauder, Thomsons and Chatto)	452	951	5672	0	**7075**	0.39
Lower Manuherekia	0	886	2922	624	**4431**	0.24
Total (ha)	**2514**	**3213**	**11934**	**624**	**18284**	

The irrigated area of **18,284 hectares** in the Manuherekia Valley is based on the irrigated area that is in the *hydrology model*.

The hydrology model used a simple soil moisture model to determine irrigation demand (in mm/day/ha) and determines actual water supplied to determine estimated grass production.

The hydrology model assumes the same area is irrigated each year. In practice the irrigators irrigated a larger area in wet years (when there is plenty of water around) but pull back in dry years, therefore this is always open to a degree of error.

Land use is always a moving target and Davis Ogilvie has relied on data provided by ORC in terms of land use (via Agribase, irrigation maps and land use maps), then matched it to the hydrology model.

Ideally for complete transparency, ORC should disclose a brief and methodology of how they have obtained an irrigated area for the catchment and if they are in support of Davis Ogilvie's findings.

One major concern within the current land use data, is that horticulture is not accurately defined and there is a disconnect between the land use maps and irrigations maps provided by ORC and the hydrology model. This results in having to multiply land area by 2.15 to match the hydrology model.

Even though these landowners are small in comparative area (hectares) their overall EBIT per hectare could be circa twenty times that of a dairy farm. Due to the lack of reliable land use data, no economic impact was produced due to the inability to scale to a catchment wide effect. We feel horticulture is not represented as it should be within the current economic impact to the catchment and more work is required.

5.0 REVIEW OF ON-FARM MODELS AND FINANCIAL OUTPUTS

5.1 Background

Compass Agribusiness has assisted by reviewing of the on-farm models developed by Abacus Bio which provides the financial impacts of three farming systems and one horticultural system to an EBIT (earnings before interest and tax) and NPBT (net profit before tax) level.

Lewis Tucker has relied upon the financial outputs of these models to provide an overview of the impact to on-farm economics within the Manuherekia Catchment but has excluded horticulture due to the inability to correctly define land use in hectares for the different horticultural areas. Lewis Tucker provided a draft document which outlined the impact to on-farm economics based on the different flow scenarios that Compass Agribusiness reviewed.

The four farm systems modelled include:

1. Dairy
2. Dairy Support
3. Sheep and Beef
4. Cherries (has not been scaled up by Lewis Tucker)

These models have been extrapolated and adjusted across the catchment to capture three reliability zones. These being:

1. Omakau – Upper Manuherekia
2. Lauder – Tributaries
3. Alexandra – Lower Manuherekia

These models are based on an average efficient operator so any projected economic impact can be scaled to provide what would be considered a ‘fair and reasonable’ economic impact under each of the minimum flow scenarios.

Each of the above models, and within each catchment, were subjected to the effects of the six minimum flow scenarios being (l/s= litres per second):

1. Status Quo (base financial models)
2. 900 l/s
3. 1,500 l/s
4. 2,000 l/s
5. 2,500 l/s
6. 3,000 l/s.

To allow for seasonal climatic variations, each of the models represented was subjected to changes in pasture growth based (to reset the base model under status quo) on the following three scenarios.

1. Average year – monthly pasture growth estimates based on 47 years of climatic and hydrological data under different areas for spray, flood and dryland.
2. Dry season – average monthly pasture growth from a historically dry period between 2014-2017.
3. Wet season - average monthly pasture growth from a historically wet period between 2011-2013.

5.2 Key Conclusions

Compass Agribusiness has reviewed the on-farm models produced by Abacus Bio. The models outline a range of economic impacts required to understand the resultant position of each farm system, under the different flow scenarios, but do have limitations which are outlined in points 5,7,8 and 9 below and section 6 of this report.

Abacus Bio has considered the different financial impacts within three catchments, based on climatic factors and water reliability (under the different flow scenarios), and considered the effects of wet and dry seasons which has given Lewis Tucker the ability to provide a range of financial impacts under the different farming systems.

The overview provided by Lewis Tucker highlights much higher financial impacts under a dry season vs wet season, under the different minimum flow scenarios, but does not model the effect of three dry seasons in a row as a combined financial impact. An operator would want to know the combined effect under an average business/farm model to understand its financial viability.

The following are key conclusions and/or limitations from our review of the on-farm financial models.

1. We agree with the process of breaking down the catchment into three reliability zones as the areas have different water demands, as well as the modelling of an average, dry and wet seasons, to understand the range of financial impact. The impact of three dry seasons in a row is modelled within the Lewis Tucker report and shows the high degree of variability to EBIT that would be caused under the flow scenarios.
2. Within any modelling there is a degree of error, which has been reduced with the inclusion of a collaborative review approach.
3. Using 'average efficient' allows what would be considered a true financial impact to these systems and the catchment when scaled.
4. Under each of the farming systems there is an output 'EBIT per hectare by farm type'. The EBIT under each farm type could be *challenged depending on individual circumstances/benchmarking*, but it is very important to understanding the models outline the *reduction of marginal returns* under each of the six flow scenarios, and this should be the area of focus.
5. Any horticultural modelling is excluded from Lewis Tuckers Economic Impact report based on the inability to define the land use areas accurately. It is understood this represents 624 hectares of the command area and although small in land mass, the economic contribution (EBIT per ha) of these landholders would be above any pastoral agricultural systems. This should be addressed, with an exercise to accurately define land areas under different horticultural systems and economic modelling, so this group can be properly represented within the Catchment's economics.
6. Pasture growth forecasts have been forecasted by PZB Consulting and have been relied upon as accurate as it is based on annual climatic and hydrological information over the last 47 years.
7. Abacus Bio has utilised its own feed budgeting tool where feed demand and supply has been matched on a metabolisable energy (ME) basis for the animal. A recommendation to finetune and remove any potential errors would be to run the farm models with 'Farmax', which is a feed planning and budgeting tool that enables testing of commercial and biological feasibility of different land-use scenarios. 'Farmax' helps analyse and review the farm operations to determine the production and economic outcomes under various scenarios and matches animal production to overall feed demand.
8. Abacus Bio has also calculated the coefficient of variation (CoV) and the standard deviation of profitability within the farm systems (pages 7 to 11of their report 'Manuherekia Enterprise Model Methodology'). On a percentage basis it is important to note the range of the economic impacts based on the flow scenarios. A suggestion would be to understand the coefficient of variation of pasture growth on a monthly basis as this has a real effect on farm management.
   A high level of pasture growth variability is very difficult to manage and necessitates more radical management responses such as destocking. These more radical responses also tend to have longer term effects, in that they impact profitability in subsequent years due to the need to purchase new capital stock or buy in more supplements due to a lack of feed carried over from a previous year. What this means for the farmer is increased volatility.
9. The tipping point is when such variations in feed supply make a certain farming system unsustainable and therefore results in a negative change in the land class. The current limitation to the on-farm models are that

they do not take this tipping point into account, rather they import supplementary feed or reduce stock numbers to maintain the farming system.

6.0 VALUATION – IMPACT ON LAND VALUES

Although the cash impact is seen in the year-on-year economic impact to the farm models, one of the biggest likely impacts is on asset value. Asset value is driven by productive output, and the reliability of that productive output.

To determine the potential loss of asset value, two valuation methods could be considered which are:

1. Using a productive valuation which is based on productive output.
2. A yield-based valuation method which considers the economic farm surplus and applies a yield-based return.

The impact on land values is not completely understood as no detailed analysis has been completed within the current economic impact report.

From a banking perspective, it is critical to understand the impact of the minimum flows on land value, as reduced cashflows and reduction in asset value could potentially lead to businesses becoming insolvent or adjustments to business risk ratings, which increases their interest rate.

We strongly recommend this economic impact is modelled by a suitable service provider to understand the wider-reaching impacts on the balance sheet rather than just focusing on the cash impact.

7.0 CONCLUSION

The current modelling does provide a range of economic impacts under the different flow scenarios and highlights that scenarios above 1,500l/s would likely threaten business viability as the financial impacts are very significant.

Currently the range of modelled flow scenarios are extreme, when considering that any on-farm models become uneconomic after the flow rate of 1,500l/s. If I were a landholder with the catchment, I would be wanting to understand the economic impacts of smaller incremental flow scenarios from 900l/s to1,500l/s, as these still have a financial impact.

Within the current economic assessment, horticulture is not represented due to the inability to correctly define land use in hectares. As these farming systems are high input/high output systems we feel that the economic impact study should capture the effect to these landowners.

Due to the lack of modelling of impacts on land value, we feel the current assessment does not consider some potentially major shifts in asset values and what effect this has to the landowner, banking sector and immediate community.

The current modelling is useful in terms of understanding the impact of the minimum flow scenarios above 1,500l/s which makes current farming business potentially unviable. We do believe more modelling work is required to understand what the economic impact of flow scenarios is between 900 to 1,500l/s with inclusion of any impacts on land value or potential changes in land use.

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QUALITY ASSURANCE

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