Implications of Applying Tukituki River Catchment Plan Change 6 to the Heretaunga Plains

A report for LandWISE Inc.

by

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Introduction

As new regulations are being applied to the Tukituki Region concerning water quality and quantity issues, current practices must be re-evaluated. This report will discuss the levels of awareness, the scale of potential impact, and what changes may be required if Plan Change 6 Rules were to be implemented in the Heretaunga Plains. The information regarding this report was gathered through personal interviews as well as data provided by the Hawke's Bay Regional Council.

As undergraduate students seeking a degree in Natural Resources and Environmental Economics at the University of Tennessee, Knoxville, the implications and response to the new regulations were particularly interesting[1].

Tukituki Plan Change 6

As of Thursday, June 26, 2014, the Board of Inquiry has approved both the Tukituki Plan Change 6 and the Ruataniwha Dam Project. The decisions will put into effect new regulations pertaining to water quality and quantity issues, specifically the dual nutrient management of Nitrogen and Phosphorous levels. Plan Change 6 has four main methods of monitoring the farming practices of the Tukituki region to manage the ecological health of the waterways. These methods are the use of Overseer, the implementation of a Farm Environmental Management Plan (FEMP), the Land Use Capability (LUC) classes, and a Dissolved Inorganic Nitrogen limit.

Overseer

For nutrient budgeting, version 5 of the Overseer model is being used to guarantee that farmers are only applying the necessary level of nutrients to their land. While version 6 of this model is available, the regulations will be based upon the version 5 nutrient level recommendations. The model is known to work best for pastoral land use. Overseer has a 30% variance in what is predicted to leach off of a farm and the level of nutrients that actually leach off of the farm.

Farm Environmental Management Plan (FEMP)

Under Plan Change 6, each farm over 4 hectares will be required to make a FEMP. For the Tukituki region, this means approximately 1,050 nutrient budget plans will need to be prepared as part of the FEMP. The plans will require farmers to report practices to mitigate negative environmental impacts as well as nutrient budgeting management plans from the Overseer model. The FEMP must be reported by 1 July 2018 and updated every three years. The HBRC will undertake audits of the FEMP. All costs of the auditing and nutrient budgeting will be passed on to the farmer.

[1] Makenzie Read and Rachel Eatherly undertook Internships with LandWISE for four weeks in June 2014 as part of a Massey University programme. They were hosted at the Centre for Land and Water.

Land Use Capability (LUC)

Farms will have until 31 May 2020 to implement the changes necessary to achieve the LUC Nitrogen Leaching rates specified in the following table:

Table 1: Tukituki LUC Natural Capital Nitrogen Leaching Rates as determined by Overseer 5 (from Tukituki Plan Change 6, Table 5.9.1D)

LUC Class	I	II	III	IV	V	VI	VII
Rate (KgN/ha/year)	30.1	27.1	24.8	20.7	20	17	11.6

Under the draft decision of the Tukituki Plan Change 6, only those invested in the water storage scheme would be able to aggregate nitrogen leachates, but those that were not involved in the water storage scheme could not. However, in the final board decision, all farming systems can aggregate their nitrogen leaching as long as it is all contained within the same catchment.

The LUC is a multifactor index, with variables such as susceptibility to erosion, slope, depth, drainage or water holding capacity, overflow, salinity, and climatic limitations. Even within an LUC 3 class, the leaching risk may vary considerably. Defining at LUC Class level may not be as suitable as an approach as one that would use the specific LUC variables that are more directly related to leaching risk.

Dissolved Inorganic Nitrogen (DIN)

Parts of the Tukituki River are recognized as degraded, particularly due to periphyton growths over summer low-flow conditions. Periphyton growth is exacerbated by high nutrient conditions. Monthly in-stream monitoring will allow the council to track the levels of nutrients in the waterway. The Board agreed upon an in-stream concentration limit of 0.8mg/L for the Tukituki River Catchment.

We have not found clarity about the determination of 0.8 mg/L DIN. We have been informed it was “formed from scientific research around the relationship of Nitrates and the micro-invertebrate community index”. For the Tukituki River, Nitrate levels below 0.8 mg/L are predicted to have minimal impact on the ecological health of the aquatic life. The current concentration DIN levels in the lower Tukituki are 0.75 mg/L. Some suggest no difference in stream health at nitrogen concentrations between 0.1 and 2.3 mg/L.

Farming systems will not be held directly liable for meeting the 0.8 mg/L DIN limit; however, if the DIN is not met by 31 May 2020, then a claw back of nutrient budgeting limits will be taken into effect.

Claw-back

Discussion with Hawke's Bay Regional Council staff indicate the method for implementing a claw back to reach the DIN limit is not determined. However, the FEMP and Overseer will be vital in determining the areas that are leaching levels above the LUC limits. A claw-back will be deemed necessary when a 95% confidence interval is met on a five-year rolling average of the monthly nutrient level samples. The claw-back would inevitably affect the more intensive farmers and those farming LUC classes 3, 4, and above more severely.

Implications of Applying Plan Change 6 to the Heretaunga Plains

Given Plan Change 6 appears to have adopted Horizons Region approaches, it is highly foreseeable that these regulations could be applied to the Heretaunga Plains. Possible implications were discussed with members of the Hawke's Bay Regional Council, various farmers of the region, fertilizer representatives, a crop supply agronomist, a farming advocate, and an environmentalist. An information gap was discovered.

It quickly became evident that the levels of awareness and understanding of the Plan Change 6 regulations and the implications of these regulations varied significantly. A major concern expressed is that the Heretaunga Plains have a completely different set of circumstances that need to be addressed.

Overseer

A drawback of using Overseer as the main model for nutrient budgeting in the Heretaunga Plains is that Overseer works best for Pastoral Land Use, while most of the Heretaunga Plains is used for cropping. For nutrient budgeting to be an effective tool in regulating leaching rates, an alternative model is needed. Horticulture New Zealand and the Foundation for Arable Research are currently working on this but work is not expected to be completed until 2017. With 2018 being the deadline for implementing new practices to meet regulations, farmers and industry are concerned there may not be enough time to apply the new model.

Another issue with using Overseer for regulation purposes is the potential nutrient recommendation differences between the versions of the model. While version 6 is available, the regulations are based upon version 5. With updates to the model, the regulations would become less and less relevant or appropriate.

Farm Environmental Management Plan (FEMP)

The FEMP is intended to guide farm implementation of practices to mitigate the harmful effects of nutrient leaching. To be most beneficial, farmers should use the FEMP as a tool to optimise practices, rather than complying for compliance sake. Developing and auditing the FEMP would be a larger task in the Heretaunga Plains, as there are a lot of very small properties and many landowners compared with the Tukituki region. The FEMP are estimated to cost approximately $3,000-$5,000 for each farm, taking about

two or three days to complete. Hawke's Bay Regional Council estimated 20 additional staff would be required to audit these plans. The farmers will incur all of these costs.

Land Uses in the Heretaunga Plains:

For the sake of this report, a focus was placed on the Karamu Catchment, the largest catchment in the Heretaunga Plains. The ecological health of the Karamu Catchment is considered to be in poor shape as the macro-invertebrate health index is very low. Table 2 shows prominent Land Uses of that catchment and their corresponding LUC.

Table 2: Karamu Catchment Land Use by Land Use Capability Class

Catchment/LUC	Land Use/Ha					
	ARABLE	BEEF	SHEEP	FRUIT	VEGETABLES	VITICULTURE
Karamu	494.87	5,046.16	6,492.49	7,786.27	2,909.11	1,524.28
1.00	135.92	249.09	246.00	3,795.12	427.40	19.34
2.00	164.67	283.66	554.41	1,894.17	432.79	56.84
3.00	138.02	1,540.33	1,984.74	1,114.80	1,091.09	905.88
4.00	10.13	309.72	410.96	111.80	521.55	
5.00	10.88	831.12	1,534.14	122.09	107.29	52.96
6.00	14.94	1,797.99	1,616.41	51.93	261.05	171.80
7.00	18.32	14.40	81.14	626.12	58.72	307.33

As shown in Table 2, the Vegetable production is approximately one-third on LUC 1 and 2, one-third on LUC 3 and one-third on other LUC land. Since a low LUC allows for a higher rate of leaching, an LUC class of 1 and 2 would then be the most viable for production, which would presumably lead to a shift in land use to those LUC classes. Not only would this result in a shift of land use, but likely a shift in wealth as well, as the land on an LUC class 1 and 2 becomes most desirable for production. However, the LUC 1 and 2 land is already in use, so extra vegetable production would displace fruit production or beef/dairy/sheep.

Viticulture, recognized as a low N input system is focused largely on land with LUC 3 and 7. This is potentially a better land use on these areas.

Allocating nitrogen leaching rates using the LUC means that the crops with the highest leaching rates will need to be on the classes that allow for the most leaching. However, an analysis of individual crop's leaching rates has yet to be done. The council also expressed that not much is known about the leaching rates of orchards and vineyards. If a claw back were to be implemented, then the leaching rates on each LUC would become even more limiting.

Therefore, an individual crop leaching rate analysis would prove to be beneficial in determining the best use of the land. By using the land according to a crop leaching rate analysis, the value of production would increase while minimizing the impact on the environment.

An alternative approach recommended by some stakeholders is to allocate more N leaching to higher, more leaching prone, LUCs. The basis is that applying equivalent levels of management should produce lower amounts of leaching from "better" soils. This may be more equitable to farmers in the short term; however, it may not provide the greatest community benefit per unit of nitrogen leached.

Further Concerns

- Due to the co-limiting nature of the nutrients in the streams, are there future plans for regulating Phosphorous in the streams?
- How will applying nutrients as compost be regulated compared with mineral or soluble fertiliser?
- What level of purity of the waterways in the Heretaunga Plains is the community trying to achieve? Does the community want it to be used for recreational purposes or up to drinking water standards?
- Communication of expectations and regulations will be key in the implementation process if Plan Change 6 rules are applied to the Heretaunga Plains. With the help of NGOs, the information gap from council to farmer can be addressed.

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