BEFORE INDEPENDENT HEARING COMMISIONERS

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER Proposed Waikato Regional Plan Change 1: Waikato and Waipa River Catchment

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STATEMENT OF PRIMARY EVIDENCE OF ASLAN WRIGHT-STOW FOR DAIRYNZ LIMITED SUBMITTER 74050

3 May 2019

DairyNZ

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& SH 26 Newstead
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Qualifications and experience

1. My full name is Aslan Edward Wright-Stow. I am currently Environment and Catchment Manager at DairyNZ, and prior to this position I was a Principal Technician at NIWA for 17 years (until April 2017). My research experience includes land use impacts on water quality with a focus on biological indicators as measures of stream health, and mitigations as tools for reducing impacts on receiving waterways. I have led many consultancy projects relating to water quality and assessment of environmental effects (AEE) and monitoring programmes assessing the effects of Good Management Practice in farm systems.

2. During my time at DairyNZ I have led the Environmental Readiness Project which has workstreams that aim to research the drivers of water quality outcomes, and the performance and efficacy of mitigations to reduce the impacts of dairy farming on downstream receiving environments. I currently lead the Environmental Stewardship Programme which encompasses the above mentioned Environmental Readiness Project, as well as Farming Within Limits, Rural Land Use and Climate Change Projects, collectively aimed at understanding and improving environmental outcomes.

Code of Conduct

3. I have read the Environment Court's Code of Conduct for Expert Witnesses contained in Practice Note 2014 and agree to comply with it.

Scope of Evidence

4. My evidence pertains to Proposed Waikato Regional Plan Change 1 – Waikato and Waipa River catchments (PC1). It addresses promising mitigation technologies that may be taken up by dairy farmers in order to reduce their environmental footprint, using the example of constructed wetlands. I have been asked by DairyNZ to comment on the circumstances when mitigations are poorly or not at all represented in Overseer. I understand that in these circumstances, plan users must provide "sufficient evidence … to show the mitigation will be effective in reducing nitrogen leaching" (Officers Report para 112).

Burden of proof for demonstrating nitrogen reductions from mitigations

5. Constructed wetlands (CWs) are a promising mitigation option available to meet PC1 contaminant targets. They are part of a suite of mitigations referred to as edge of field mitigations (Doole 2015 page 24 -26), which includes detention bunds and sediment traps, and small or medium CWs. However, there are gaps in our understanding of how they perform in different landscape settings and how to optimise their performance. Consequently, further research is needed to better quantify the environmental performance and benefits of these mitigations nationally. As part of my role at DairyNZ I have been involved in work to ensure farmers and other stakeholders such as regional councils have access to robust research that assists them to determine how mitigations can be used to reduce nutrients in limit-setting processes.

6. CWs are generally designed to remove, absorb, and store nutrient and sediment loads. They can be designed to treat surface runoff or sub-surface drainage waters. Inflowing water is dispersed and slowed down to promote settling and deposition of suspended particles and phosphorus bound to sediment (Tanner et al., 2005; McDowell and Nash, 2012). This is especially important for the treatment of surface runoff enriched with sediment and phosphorus.

7. CWs have been shown to be an effective mitigation strategy for managing farm contaminant loads from sub-surface drainage. For example, guidelines for the treatment of tile/mole drainage through CWs have estimated that on average, between 22% and 53% (+/- 15%) of total annual catchment nitrate removal is possible from wetlands that cover 1% and 5% of total catchment area, respectively (Tanner et al., 2010). Although the use of CWs is well understood in principle, they still lack specific practical guidance and certainty on optimal design and performance across a range of landscapes and flow pathways across New Zealand. In the remainder of my evidence I set out projects I am involved in to further quantify the performance of CWs in the New Zealand environment.

8. To better quantify the environmental performance of CWs, DairyNZ and NIWA (with support from Regional Councils) have jointly undertaken the "INTERCEPTOR" project. INTERCEPTOR aims to develop robust performance criteria for diffuse contaminant attenuation and scientifically-based optimised practical guidance, to accelerate the wide-scale implementation of CWs in NZ for managing farm and catchment contaminant loads. The 5+ year project, beginning with development of provisional performance and design guidelines, has an annual budget of ~$360,000,

excluding any construction, planting or fencing costs. In total this work is expected to cost around $1.9 million in science related expenses (monitoring, analysis, reporting, guidance material); well beyond the amount that could reasonably be expected from farmers to provide "sufficient evidence … to show the mitigation will be effective in reducing nitrogen leaching" (Officers Report para 112). Preliminary results are promising for mitigation of phosphorus, sediment and nitrogen. The meta-analysis suggests that for "New Zealand relevant climates" median Nitrate, Total Phosphorus and Suspended Solids reductions of 42%, 21% and 41% could be expected from constructed wetlands intercepting all flow-paths (surface, subsurface and mixed surface and subsurface). Standard deviation for the variables was ± 21%, ± 63% and ±44%, respectively suggesting nitrate reductions were most consistent.

9. In 2008, a wetland module was developed by NIWA which AgResearch implemented into OVERSEER in version 5 of the model (Rutherford et al. 2007). Several modifications have been made since 2008. Two types of wetland can be modelled in OVERSEER: constructed wetlands and seepage wetlands. Currently neither module is used widely by farmers or rural professionals for the following reasons: for CWs; wetland performance has only been quantified at a limited number of case study locations around the country and variability due to differences in design or environmental conditions has not been addressed, especially between regions (Rutherford 2017). For seepage wetlands; the input variables are complex and highly subjective; the module is conservative (i.e., contaminant load reductions are low (Rutherford 2017)); the module is not currently supported by most regional councils because of the subjective nature of inputs. DairyNZ is working closely with Overseer, NIWA and AgResearch to improve the wetland module in the Overseer model for all four contaminants. The aim of the collaboration is to improve usability of the wetland modules and better align the contaminant reductions with the CW and seepage wetland reviews undertaken by Tanner et al. (2019) and Rutherford (2017), respectively. One aim of thorough vetting of promising mitigation strategies and technologies that have the potential to significantly reduce contaminant loads, is to remove the burden from farmers to prove their efficacy.

10. DairyNZ is also about to initiate a joint project with NIWA to develop a GIS layer for New Zealand that will help estimate dominant catchment flow pathways. The aim of this work is to be able to determine both the dominant flow type (surface, shallow groundwater, deep groundwater) and help develop a tool for calculating receiving catchment area. In combination, these tools will help with selecting the best locations within a catchment for placement of edge-of-field mitigations and estimating the area of the catchment likely to be intercepted by the mitigation.

Conclusion

11. In my opinion, it is important further research into promising mitigation strategies and technologies in the New Zealand environment be made available to farmers to assist them to meet limits on their farms. With the increased research and quantification of the effectiveness of mitigation strategies and technologies, such as constructed wetlands, I anticipate containment targets will be able to be met with more certainty in the future. The extensive research partnerships undertaken by DairyNZ to quantify the mitigation effectiveness of constructed wetlands demonstrates the hurdle presented to farmers by requiring them to provide sufficient evidence of mitigations effectiveness. In my opinion, an effective strategy to meet catchment targets for all contaminants, not only nitrogen, is through the access to robust, scientifically proven mitigation technologies and their efficacy in different environments. I also support ongoing quantification of new mitigation strategies and technologies as they become available to help farmers meet their environmental obligations.

3 May 2019

Aslan Edward Wright-Stow

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