IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF Lake Rotorua Nutrient Management – **PROPOSED PLAN CHANGE 10** to the Bay of Plenty Regional Water and Land Plan

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SUMMARY STATEMENT OF EVIDENCE OF SIMON CHRISTOPHER PARK

ON BEHALF OF THE BAY OF PLENTY REGIONAL COUNCIL

Evidence topic: The use of OVERSEER® and reference files

Contents:

Qualifications and experience

1. My full name is **SIMON CHRISTOPHER PARK** and I am a director of Landconnect Ltd (formerly 'Headway Ltd'). I am contracted by Bay of Plenty Regional Council to provide advice on nutrient management issues within the Rotorua Te Arawa Lakes Programme. This is a contract that I have held in various permutations since 2006.

2. My field of expertise is the application of nutrient management knowledge within a RMA planning framework. As a contractor to the Regional Council, I have worked in several roles within the Lakes Programme, including: (i) a support role for the Lake Rotorua Primary Producers Collective; (ii) Secretariat to the Stakeholder Advisory Group (StAG); (iii) policy and technical advice on the use of the OVERSEER® within both the operative 'Rule 11' and the proposed PC10.

3. I have had the benefit of working with Rotorua farmers, agricultural advisors, scientists and Council staff over the past 10 years. I am therefore familiar with farm nutrient loss issues in the Lake Rotorua catchment, particularly in relation to the use of OVERSEER.

4. My background, experience and qualifications are set out in the full version of my evidence in chief, which I confirm but do not repeat in this summary. Likewise, I confirm my compliance with the Expert Witness code of conduct as set out in full there. I am authorised to provide this evidence by the Regional Council.

Scope of Evidence and Summary

5. My evidence addresses whether OVERSEER is 'fit for purpose' in the regulatory context of PC10, including the reference file method. I also provided input in response to OVERSEER and reference file issues raised in submissions.

6. In my opinion, OVERSEER is used appropriately within PC10 in two related ways: (i) to help quantify allowable nitrogen loss at the property level, and; (ii) within rules that require compliance with those property nitrogen limits.

7. This appropriate regulatory use of OVERSEER is based on both the robustness of the model and the methods adopted within PC10 to address the model's inherent limitations. It is therefore appropriate to retain the notified PC10 provisions related to OVERSEER but with some modification to the reference file method, as described in the evidence of Mr MacCormick and Mr Matheson.

The use of OVERSEER in regulation

8. OVERSEER was first developed over 20 years ago as a decision support tool to aid fertiliser decisions on New Zealand pastoral farms. OVERSEER has evolved to cover a wide range of land uses and to estimate nutrient losses from farms. The technical basis of the model is explained in AgResearch's plain English Technical Description (Watkins and Selbie, 2015). Since the mid-2000s, several regional councils found OVERSEER a useful tool to help manage diffuse nutrients within a regulatory framework. This growing regulatory use is described by Arbuckle (2015).

9. PC10 uses OVERSEER to estimate property N loss rate in both a predictive mode (using assumed future inputs) and a monitoring mode (using actual farm inputs). OVERSEER informs (i) catchment N load modelling; (ii) the Integrated Framework and N allocation (iii) Nitrogen Management Plans (NMPs).

10. Regional plan uses of OVERSEER are covered in Freeman et al. (2016) by identifying ways that OVERSEER can be used effectively in regulation whilst managing its limitations. In my opinion, PC10 is wholly consistent with the Freeman et al. (2016) national guidance on the appropriate use of OVERSEER in regulation.

11. Many submitters raise concerns about OVERSEER and the reference file method, broadly summarised as follows:

    (a) OVERSEER was not designed for regulation, particularly to set quantitative limits, and should only be used for guidance i.e. as a decision support tool

    (b) OVERSEER is not accurate and/or not calibrated for Rotorua conditions

    (c) Regular version changes make OVERSEER unreliable

    (d) Property N limits based on OVERSEER are not enforceable

    (e) Not all farm systems and/or mitigations are covered by OVERSEER

    (f) The reference file method is too complex, too focused on Council data management and flawed in being linked to a single OVERSEER version (6.2.0).

12. I addressed these submitter concerns in my evidence in chief, and more briefly below.

The need for quantitative assessment of N losses

13. PC10 requires a tool capable of setting and monitoring quantitative N limits at the property scale because both the RPS and the 'Integrated Framework' are explicitly quantitative i.e. the RPS sets a sustainable annual nitrogen load of 435 tonnes and the aggregate reductions needed are from a steady state load of 755 tonnes. The

rules-based reduction in rural land N losses is approximately 27%, with additional reductions under the incentives and gorse schemes. The RPS anticipates the use of rules to achieve the sustainable N load and such rules apply at the property level.

14. Most land in the Lake Rotorua groundwater catchment already has a property-based OVERSEER-derived quantitative nutrient benchmark (N and P) under the operative 'Rule 11' of the Regional Water and Land Plan. The N allocation method adopted in PC10 uses Rule 11 benchmarks to set new quantitative limits.

15. Several other regional councils have successfully incorporated OVERSEER into their regional plan regulations, albeit using a variety of methods. These methods are canvassed in a 2015 'Stocktake' report (Arbuckle, 2015). Arbuckle also notes that the regulatory use of OVERSEER has been unsuccessfully challenged at council Hearings, the Environment Court and the High Court.

OVERSEER's use as a decision support tool

16. OVERSEER can be used both as a regulatory and decision support tool, even though the latter use was the original basis for its development. These dual uses are complimentary rather than mutually exclusive, particularly when the different purposes are explicitly recognised. This dual use approach is supported by Freeman et al. (2016).

Using the most recent version of OVERSEER

17. The rationale for OVERSEER biannual version updates is to improve the user interface, fix bugs and incorporate new science, land uses and mitigations. As explained by Freeman et al. (2016, section 6.2): *'Version changes that result in changes in estimates of nutrient loss should be considered as moving towards a closer approximation of what the actual losses are likely to be i.e. reducing the uncertainty associated with nutrient loss estimates.'* My 2014 report (Park, 2014) and Freeman et al (2016) recommend always using the most recent version of OVERSEER.

18. PC10 (as notified) takes a hybrid approach to specifying the OVERSEER version:

    (a) The latest OVERSEER version will always be used by landowners and BOPRC to check compliance against N limits after the latter have been adjusted via the reference file method. This enables a 'like with like' comparison between a property's current OVERSEER file N output and the property's N limit.

(b) OVERSEER version 6.2.0 is used once to determine N allocation limits which are then expressed as percentages of the N loss derived from the relevant sector OVERSEER reference file. As new OVERSEER versions are released, the N limits move in proportion to any shifts in the sector reference file N loss. The rationale is that the proportionality of the initial N allocation is sound and should therefore be maintained into the future.

19. There are several alternative ways to address the challenge of ongoing OVERSEER version updates, including:

(a) Ignore version changes by using a specific OVERSEER® version indefinitely, with compliance against fixed NDA levels.

(b) Use a specific OVERSEER® version for a finite period, then formally update the specified version and recalculate NDAs via a plan change process.

(c) Do not specify any version, but rely on OVERSEER®-based actions being incorporated into the Nitrogen Management Plan which is subject to compliance monitoring.

(d) Always use the latest version of OVERSEER® and allow some informal compliance flexibility against fixed NDA levels.

20. The above alternatives either limit access to improving science or do not provide sufficient certainty for landowners and Council, compared to the reference file method.

PC10 reference to OVERSEER version 5.4 values

21. PC10 briefly refers to version 5.4 of OVERSEER when describing overall catchment N loads based on the 2011 ROTAN model, reflecting that version 5.4 was current in 2011. It is also noted that there predicted N loss from pastoral systems has approximately doubled between versions 5.4 and 6.2.3. In the real world, actual N leaching rates, attenuation and load to the lake will not change due to a model version update. In the PC10 context, the overall % N reduction effort needed from farmers is also unchanged, although there will be some redistribution of that reduction effort with version updates.

Uncertainty in OVERSEER and methods to reduce it

22. It is not feasible to directly measure N losses and hence it is necessary to use a model such as OVERSEER. Shepherd et al (2013) canvassed OVERSEER uncertainty and methods to reduce it, including: (i) additional calibration datasets that

extend beyond the biophysical parameters of the current datasets, and (ii) data input protocols.

23. The field trials used to calibrate OVERSEER were located on sites with typical annual rainfall of 800-1200 mm, whereas the Rotorua catchment rainfall range is 1300-2500 mm. OVERSEER can predict nitrogen loss outside its calibration range by applying science principles, particularly around N cycling, soil properties, hydrology and climate.

24. AgResearch reviewed available N leaching data from recent SFF projects in the Lake Rotorua catchment and compared it with OVERSEER N loss predictions. While both sites had below average rainfall for the catchment, AgResearch stated that:

> *'The analysis of these two trials showed that the comparison between measured vs. modelled N leaching values are reasonable when drainage values are aligned and the relativity of treatment effects (DCD, restricted grazing, reduced fertiliser) was of the right order'* (Watkins and Selbie, 2015).

25. Council initiated OVERSEER trials in April 2016 on two Rotorua dairy farms (pumice and podzol soils) with average annual rainfall of at least 2000 mm. The trials will run for three years and are being managed by AgResearch with funding from Council, DairyNZ and AgResearch. Trial results will enable calibration (or validation) of OVERSEER.

26. Method LR M2 provides for science and policy reviews every five years. Such reviews will be able to consider any OVERSEER improvements and changes in its calibration.

27. Different expert OVERSEER users can get different N loss rates for the same farm/year. This issue has been partly addressed by the Best Practice Data Input Standards (BPDIS, OVERSEER Ltd, 2016) which were introduced in 2013 and are updated with each OVERSEER version release. Given the importance of input consistency in the regulated Lake Rotorua catchment, Council developed a complementary suite of data input protocols that further limit user discretion and so minimise potential discrepancies between expert OVERSEER users.

28. Council seeks to further minimise potential discrepancies in OVERSEER N outputs by requiring that NMPs and OVERSEER nutrient budgets are prepared by a 'Suitably qualified and experienced person', approved by the Chief Executive (or delegate) of Council. Council staff also audit NMPs and accompanying OVERSEER files submitted by landowners and their advisors.

29. OVERSEER uncertainty is further reduced in PC10 through the consistent use of several biophysical input parameters. Even if OVERSEER is not accurately modelling the impact of these biophysical parameters, this 'inaccuracy' will largely cancel itself out when comparing different management scenarios on the same farm or on biophysically similar farms. These 'fixed' biophysical input parameters include soil type (based on Landcare's S-map) and slope (based on Council's GIS).

Compliance with OVERSEER N limits and NMPs

30. There is no case law on enforcement against OVERSEER N limits imposed through regional plans and resource consents. It may be difficult to prove an adverse effect given the uncertainty in OVERSEER predictions of that effect. This concern is amplified by when version changes can result in different N loss predictions with no change in farm inputs. PC10 largely addresses this compliance challenge by making NMPs the primary point of compliance (for activities requiring resource consent). While the NMP is partly based on an OVERSEER budget seeking to meet OVERSEER-derived N limits, it also comprises a set of defined actions to be implemented over a five year period. These actions and associated inputs (e.g. land use, stocking rate and fertiliser use) can be easily monitored by both the landowner and Council compliance staff.

Alternatives to using OVERSEER

31. Consideration of alternative methods to achieve control of nitrogen losses at the property scale need to be addressed in terms of the direction set by the (RPS) and current knowledge of nitrogen losses. The potential alternatives to using OVERSEER include direct measurement, other models, mandatory good practices and input controls. These are either impractical or inflexible and or insufficiently 'effects-based'.

32. PC10 is not inflexible on using OVERSEER – it does provide for the use of alternatives to OVERSEER via policy LR P14 and rule LR R11 for situations where a property cannot be readily modelled by OVERSEER.

Managing OVERSEER version changes with the reference file method

33. The reference file method is described in Schedule LR Five. There are five reference files covering the five rural land uses that form the basis of the PC10 N allocation scheme. These land uses are drystock, dairy, plantation forestry, native forestry and house blocks. I support amendments to Schedule LR Five (as recommended in Council's s42A report) to clarify that there are five reference files in total.

34. The drystock and dairy reference files are described in detail in Perrin Ag Consultants report 'Methodology for creation of NDA reference files and stocking rate table Version 2' (Feb 2016, and updated report Dec 2016) and in the evidence of Mr MacCormick. The reasons for adopting the reference file method are:

    (a) To allow the latest version of OVERSEER to be used with the 'best science', the fullest array of mitigations and model functionality, and the largest number of independent qualified expert users, all whilst;

    (b) To maintain the relativity of the initial N allocation distribution, including the differential allocation basis for the dairy, drystock and forestry sectors, and;

    (c) To enable a consistent, transparent, timely and cost-effective method of updating property N limits.

Responses to submissions

35. Several submissions raised concerns that the drystock and dairy reference files were based on 'hypothetical 2032 future' farm systems and are not representative of current practices e.g. cropping. This was discussed with several submitters on 15 September 2016, along with data analysis indicating the dairy reference file was not proportionally tracking dairy Rule 11 benchmark file N loss rates across recent OVERSEER versions. The meeting consensus was to identify the cause of the non-proportional dairy tracking and to reconfigure both dairy and drystock reference files to be representative of their respective benchmark datasets. These matters have been addressed in the evidence of Mr Matheson and Mr MacCormick and I concur with their recommendations to adopt amended reference files representative of dairy and drystock benchmark farms.

36. Submitters also queried the treatment of plantation forestry in Schedule Five, given OVERSEER estimates forestry N loss at a single value of 2.5 kg N/ha/yr. I concur with the recommendation by Ms Burton to replace Schedule Five's Table LR8 with a new table describing reference file parameters for plantation forestry, bush/scrub and house blocks. This amendment is particularly relevant to plantation forestry as it is likely that OVERSEER will, in the next few years, link to 'NuBalM', a forestry 'Nutrient Balance Model' being developed by Scion. This will enable forest species, site, climate and management factors to be taken into account in estimates of N loss.

Conclusion

37. In my opinion, OVERSEER is used appropriately in PC10 to set N limits and to help determine compliance against those N limits, particularly through the intermediary

mechanism of actions defined within a property NMP. It is also my opinion that the reference file method, subject to the modifications noted in my evidence (and canvassed in detail within the evidence of Mr Matheson and Mr MacCormick), will adequately manage OVERSEER version updates into the future.

Simon Park

Date: 28 February 2017

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