BEFORE THE HEARING COMMISSIONERS APPOINTED BY ENVIRONMENT CANTERBURY

IN THE MATTER	of the Resource Management Act 1991 (**RMA** or **the Act**)
AND	
IN THE MATTER	of Proposed Plan Change 7 to the Canterbury Land and Water Regional Plan

---

STATEMENT OF EVIDENCE OF ANDREW BARBER (FEPS & SEDIMENT) ON BEHALF OF HORTICULTURE NEW ZEALAND 17 JULY 2020

ATKINS | HOLM | MAJUREY

Helen Atkins
PO Box 1585
Shortland Street
AUCKLAND 1140

Solicitor on the record Helen Atkins Helen.Atkins@ahmlaw.nz (09) 304 0421

Contents

INTRODUCTION

Qualifications and experience

1. My name is Andrew John Barber. I am a Director of Agrilink NZ and work as an Agricultural Engineering Consultant based in Auckland. I have a Bachelor of Horticulture (Tech) with first class honours from Massey University.

2. I have spent 25 years as a consultant in the agricultural industry, specialising in resource use optimisation. This includes resource use benchmarking in the form of national and individualised reporting to growers comparing their performance to regional and national benchmarks.

3. In my years as a consultant I have helped develop vegetable industry soil and erosion management guidelines, and individual cultivated property erosion and sediment control plans.

4. I was Project Manager on the Franklin Sustainability Project (**FSP**) and provided technical advice on managing soil erosion on cultivated land. This was a multi-stakeholder project that ran between 1996 and 2004 which, while having a broad goal of improving the overall sustainability of outdoor vegetable production in the Franklin region, had a clear focus on keeping soil on the paddock and mitigating any effects of off-site discharges. The project directly involved the growers, Horticulture New Zealand, Ministry for the Environment, Ministry of Primary Industries (**MPI**), Auckland Council, Waikato Regional Council, and the Franklin District Council.

5. I managed and conducted research for the MPI Sustainable Farm Fund (**MPI SFF**) Don't Muddy the Water (**DMTW**) Project. This project has quantified the efficiency of Sediment Retention Ponds (**SRP**) and vegetated buffers on vegetable properties. It has also developed an erosion and sediment control app, Erosion & Sediment Control Plans, and is currently linking this through to New Zealand Good Agricultural Practice (**NZGAP**) Farm Environment Plan (**FEP**) audits (https://www.newzealandgap.co.nz/).

6. I have also worked on stormwater projects for the Franklin District Council where I designed the stormwater system for Pukekohe Hill and the Bombay Hills that ensured an integrated system between the council and grower drains that were sized to cope with high intensity storm events.

7. In 2014 I updated the Erosion and Sediment Control Guidelines for Vegetable Production. The DMTW Project was based largely on quantifying the efficiency of the SRP design in these guidelines.

Expert Witness Code of Conduct

8. I have been provided with a copy of the Code of Conduct for Expert Witnesses contained in the Environment Court's Practice Note dated 1 December 2014. I have read and agree to comply with that Code. This evidence is within my area of expertise, except where I state that I am relying upon the specified evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Purpose and scope of evidence

9. My evidence covers the following:

   (a) Farm Environment Plans – whole system approach;

   (b) Crop rotation and cover crops;

   (c) Erosion & sediment control;

   (d) Nutrient management; and

   (e) Benchmarking and reporting, tools for change.

Summary of conclusions

10. New Zealand Good Agricultural Practice (**NZGAP**) audited FEPs, with their practice-based Action Plan, are the best approach for minimising nutrient loss and sediment discharges. These FEPs fit within a whole system approach that goes from problem recognition, through research, Codes of Practice (**COP**), FEPs, implementation, auditing/certification, and reporting, which in turn loops back into problem recognition.

11. The use of cover crops, and more extensive crop rotations, while increasing the total commercial vegetable production (**CVP**) footprint, reduces the intensity and is an important production and environmental tool.

12. The industry has conducted considerable research into mitigating sediment loss. The DMTW Project quantified erosion and sediment loss, with and without mitigation measures, on

cultivated land. These trials were conducted by Agrilink NZ, NIWA, and Manaaki Whenua - Landcare Research.

13. An outcome from the DMTW Project was an app which supports the preparation of FEPs and where necessary site-specific Erosion & Sediment Control Plans (**E&S Control Plans**). Trial evidence showed SRPs capturing all bedload (95% of total soil erosion) and greater than 80% of suspended sediment. Vegetated buffer strips, depending on a range of factors, reduced sediment loss by approximately 75% plus.

14. FEPs and E&S Control Plans have been shown to lead to significant change. Implementation of these plans can be assured through the audited NZGAP programme.

15. Nutrient understanding, modelling, and management needs to be underpinned with better data. This is the focus of a new MPI and industry research project. This will occur concurrently with on-going improved practice, albeit these practice changes are not currently reflected in the modelling tools.

16. FEPs will lead to better information on grower practices. This will allow for a range of reports, including individualised benchmarking reports, which is a proven way of driving practice change.

FARM ENVIRONMENT PLANS – WHOLE SYSTEM APPROACH

17. I support the use of NZGAP audited FEPs as they are based on risk assessment and provide the ability to implement the most appropriate site-specific actions. I strongly oppose the use of a single tool, for example a mandated 5m vegetated buffer strip. While appropriate in some situations (flat land), an operation needs to consider a suite of measures that is most appropriate for a grower's situation.

18. The most appropriate mitigation measures should be selected through preparing an FEP rather than specifying one mitigation measure through a minimum standard. Assurance that the most appropriate mitigation measures have been selected is achieved based on the evidence presented to an NZGAP auditor.

19. FEPs are just one component of a whole system focused on implementing beneficial change, as shown by the Joining the Dots flow chart in **Figure 1**.

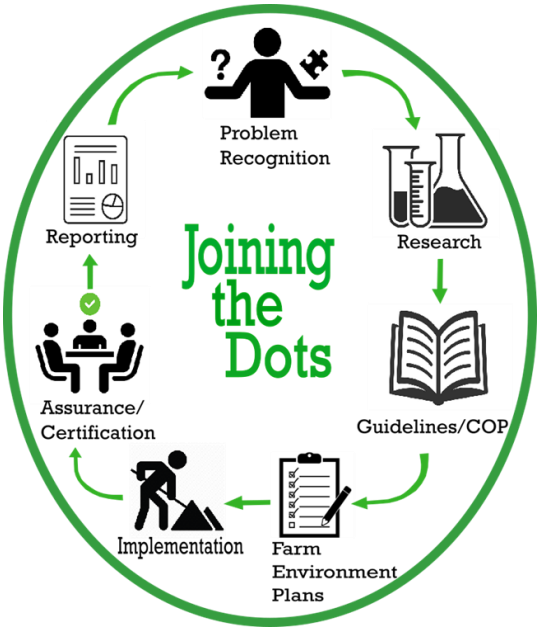

Figure 1 Joining the Dots flow chart depicting how FEP's are a component of a whole system that is focused on implementing change.

20. The first step towards improved practice is problem recognition. Without recognition, and consequently motivation to change, none of the subsequent steps described in Joining the Dots are likely to occur.

21. The new approach of FEPs gives structure during the "time for adoption" that was previously missing in the earlier FEP process. FEPs are underpinned by research, solution development, COPs, and dissemination. Crucially FEPs provide a structured process to plan, document, and implement good/best practice which is verified through independent audits.

22. The FEP process is based upon a risk assessment. Using sediment control as an example, a flat paddock has a very different risk profile compared to a steep paddock. This helps determine the choice of mitigation measures. When viewed across the whole property this risk assessment helps determine the prioritisation of mitigation measures.

23. The NZGAP FEP Action Plan captures the identified additional mitigation measures and their implementation timeframe. It is the role of independent auditors to certify that the FEP and subsequent actions have been completed.

24. The final step in Joining the Dots is reporting through to different audiences. This includes to councils on grower Environmental Management Systems (**EMS**) certification, or aggregated regional and national progress on Good/Best Management Practices, or as individualised benchmarking reports that support practice change. Reporting is described

in more detail in the section below *Benchmarking and Reporting Tools for Change*.

CROP ROTATION AND COVER CROPS

25. The ability to add new areas of land for CVP for the purposes of making the land less intensive would have a positive environmental outcome by reducing total contaminant discharges.

26. Adding additional cover crops or break crops to a CVP rotation is a very effective tool for reducing discharges of both nutrients and sediment. Anecdotally, nationally, the use of cover crops has increased significantly over the past 10 years and continues to increase. This is done for a range of reasons, but primarily it improves soil quality through the cover crop's roots binding the soil together during otherwise fallow periods and by increasing soil organic matter when the crop is incorporated back into the soil.

27. Reduced contaminant nutrient discharges can be achieved through lower or no fertiliser inputs into alternate non-vegetable crops (e.g. maize). These crops can mine nutrients from lower down in the soil profile and/or trap back into the organic pool excess nutrients from a previous crop.

28. These cover crops can also further reduce already low erosion rates on flat Canterbury cropping land, particularly over winter when the ground is saturated and at its most vulnerable to erosion.

EROSION & SEDIMENT CONTROL

29. The vegetable industry has been working on erosion and sediment control for many years. This work included the Erosion & Sediment Control Guidelines for Vegetable Production (Barber, 2014). Since then the industry has continued to work on minimising erosion and capturing sediment. The MPI SFF DMTW Project quantitatively determined the efficiency of various mitigation measures (Barber et. al., 2019).

30. DMTW was a 4-year MPS SFF project (407925) focussed on erosion and sediment control on cultivated horticultural land. The research included quantifying sediment retention pond efficiency, vegetated buffer strips, and erosion mitigation measures using wheel track ripping and dyking.

31. This research was then incorporated into an app, for use as part of a risk assessment process, and integrated in FEPs.

32. The industry is actively working to significantly reduce sediment loss. FEPs, E&S Control Plans, their associated benchmarking reports, and assurance through NZGAP will all play key roles in reducing sediment loss.

33. E&S discharges on flat Canterbury cropping land (< 1 degree) are extremely low. Unmitigated they are approximately 0.3 t/ha/yr. With cover cropping and a vegetated buffer strip this is further reduced to approximately 0.1 t/ha/yr. This (0.1 t/ha/yr) is comparable to pasture in the same location at 2.5 degrees.

34. The sediment loss rates described above were determined using the DMTW App, accessed here https://www.vri.org.nz/esc/. As demonstrated above, this app can be used to quantify the impact from a range of erosion and sediment control mitigation measures. It can also support the FEP soil risk assessment, as well as being used as a learning resource that links to guides and codes of practice.

NUTRIENT MANAGEMENT

35. The industry is about to embark upon a significant research project to model nitrogen losses in commercial vegetable production. The 4-year project is supported by MPI and horticultural product groups. Plant and Food Research are providing the science, and undertaking intensive monitoring in Canterbury.

36. MPI and the industry recognise that existing nutrient modelling tools for vegetable production have significant limitations. Research will refine Overseer and other tools and/or develop new tools.

37. The project's intended outcome is greater understanding of nitrogen management to reduce the risk of nitrate leaching. In turn this will reduce the impact of cropping practices on the environment and water quality while maintaining growers' license to operate.

38. This project is taking the same whole system approach, described above in Joining the Dots, of using research to support COP and modelling, FEPs, and right through to practice change and assurance.

BENCHMARKING AND REPORTING TOOLS FOR CHANGE

39. Benchmarking, harnessing, and learning from the collective knowledge of others, is a powerful well proven tool. Benchmarking and practice change has been well documented by the NZ Sustainability Dashboard Project. In the NZ wine industry members of Sustainable Winegrowing NZ receive individualised benchmarking reports that link to learning resources. These reports are used to engage in meaningful conversations from a basis of knowledge and understanding. An accelerated uptake of improved practices has resulted from the benchmarking reports and engagement. HortNZ is developing this capability by building upon the lessons learned from the NZ Sustainability Dashboard Project and are applying this to CVP discharges of nutrients and sediment.

40. In Nutrient Management Plans, management practices are recorded against a list of Good Management Practices (**GMP**). Over time metrics can be used to show progress. These could be aggregated to create meaningful benchmarks. Suitable practice-based metrics could include:

    (a) Frequency of soil tests;

    (b) Soil organic matter;

    (c) Nitrogen availability;

    (d) Frequency of fertiliser applications;

    (e) Area in cover crops.

41. While the development of a CVP Dashboard benchmarking tool is in its infancy, it is being supported by MPI through a data aggregation project. Any dashboard will be built upon a solid foundation of proven success of achieving practice change through the NZ Sustainability Dashboard Project.

42. One of the aims in instituting a benchmark reporting program is to track regional and national GMP changes over time. As participation increases, the industry will be able to track its progress at catchment, regional and national level.

43. Figure 2, below, shows an example of what aggregated E&S Control GMP data could look like.

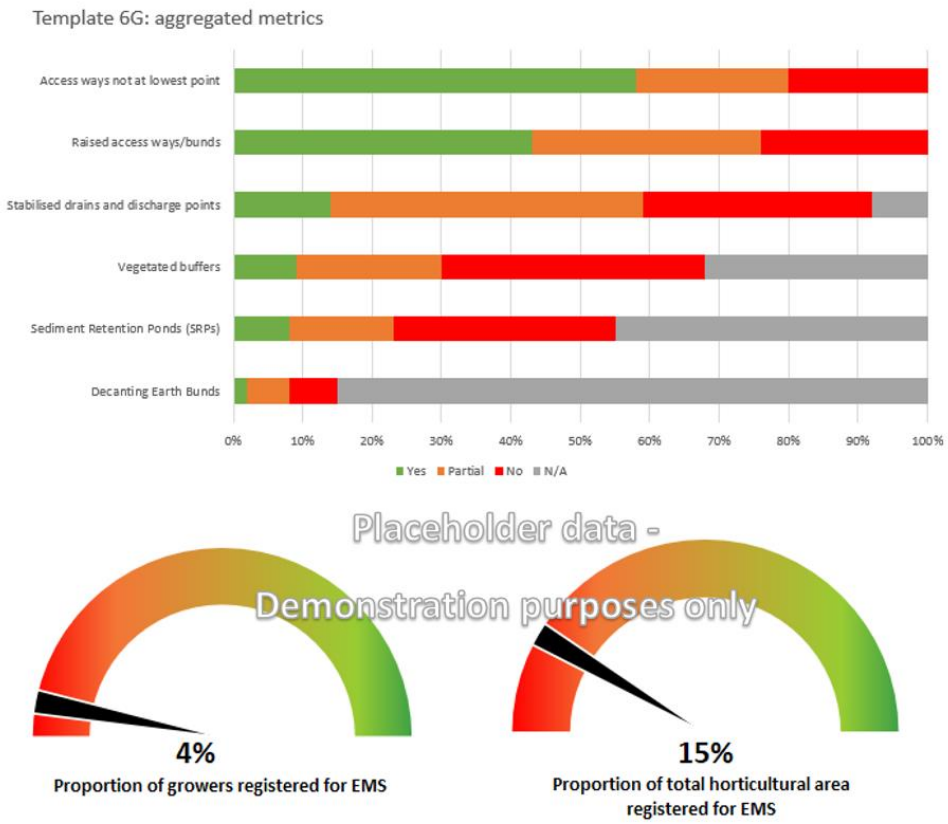

Figure 2 Demonstration of what aggregated E&S control and GMP data could look like

44. Appropriately tuned metrics used in individualised dashboard reports leads to practice-based change. These metrics however should not be used as the point of compliance.

45. For example, while nitrogen surplus has been discussed in industry nutrient workshops, from a technical perspective it is not a useful compliance metric. Preliminary results from research conducted by Plant & Food Research shows that crop type and its associated nitrogen surplus is poorly correlated to nutrient leaching.

SUMMARY OF CONCLUSIONS

46. My evidence supports the following conclusions:

(a) NZGAP audited FEPs are the best approach for minimising nutrient loss and sediment discharges.

(b) The increasing use of cover crops and more extensive crop rotations in CVP reduces the intensity and is an important production and environmental tool.

(c) There is considerable industry research into mitigating sediment loss which has resulted in an app which

supports the preparation of FEPs and where necessary site-specific E&S Control Plans.

(d) FEPs and E&S Control Plans (audited by NZGAP) have been shown to lead to significant change.

(e) There is a new MPI and industry research project to better understand nutrient use in CVP. Like the work done in relation to sediment this will inform best practice in the industry in relation to nutrient management.

47. In short, FEPs will lead to better information on grower practices. This will allow for benching and other reports which is a proven way of driving practice change in the industry.

Andrew Barber

17 July 2020