

**BEFORE COMMISSIONERS APPOINTED
BY THE WAIKATO REGIONAL COUNCIL**

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of the First Schedule to the Act

AND

IN THE MATTER of Waikato Regional Plan Change 1- Waikato
and Waipā River Catchments and Variation 1
to Plan Change 1

AND

IN THE MATTER of submissions under clause 6 First Schedule

BY **BEEF + LAMB NEW ZEALAND LIMITED**
Submitter

BRIEF OF EVDIENCE OF RICHARD PARKES
5 July 2019

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BACKGROUND

1. My name is Richard Parkes.
2. My area of expertise is in Sustainable Agriculture, Farm Systems, Extension and Education. I have over 20 years' experience specialising in agriculture systems and soil conservation and nutrient management.
3. I gave evidence for Beef + Lamb New Zealand Ltd (B+LNZ) as part of its case on the hearing stream 1 (HS1) topics. In my HS1 evidence, dated 15 February 2019, I set out my qualifications, current employment and employment history and professional affiliations. I confirm those details remain current.
4. In addition, I am currently member of the Good Farming Practice Governance Group (GFP GG). The GFP GG developed the Good Farming Practice Action Plan for Water Quality 2018.
5. In preparing this evidence I have reviewed:
 - (a) The reports and statements of evidence of other experts giving evidence relevant to my area of expertise, including:
 1. Dr Merrin Whatley;
 2. Dr Jane Chrystal;
 3. Mr Gerardus Kessels;
 4. The report prepared by Neels Botha Ltd for WRC (May, 2019);
 5. The report prepared by Ruth Hungerford for WRC and B+LNZ (April 2019)
 - (b) The Council Officers' section 42A report;
 - (c) Plan Change 1 and Variation 1; and
 - (d) The section 32 report.

6. I reconfirm that I have read the Code of Conduct for Expert Witnesses in the Environment Court's 2014 Practice Note and agree to comply with it. I confirm that the opinions I have expressed represent my true and complete professional opinions. The matters addressed by my evidence are within my field of professional expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

SCOPE OF EVIDENCE

7. I have been asked by B+LNZ to prepare evidence in relation to the sheep and beef sector generally and the implications of Plan Change 1 and Variation 1 (PC1) to the sector in the Waikato.
8. I am aware of the directions of the Hearing Panel to allocate blocks of time for particular topics. This brief of evidence relates primarily to hearing stream 3 (HS 3) and builds on from the evidence provided for HS1 and HS2. Specifically, this brief of evidence focuses taking a sub catchment/community collective approach and builds on my evidence presented in HS 1 and HS 2 on tailored Land/Farm Environment Plans.
9. I consider methods that, in my opinion, are more likely to achieve freshwater ecological health while sustaining communities. Those methods have the following characteristics in common:
 - (a) They are tailored to the farm and its natural resources;
 - (b) Enable flexibility, adaptation and innovation by the farmer and the sector;
 - (c) They seek to engage farmers and provide a sense of ownership of the solutions, including understanding the issues and linking practice change to outcomes; and
 - (d) Are spatially appropriate to allow for local solutions (on-farm and sub-catchment) to regional problems.
10. I describe sub – catchment planning and how it supports both farm and catchment planning.

EXECUTIVE SUMMARY

11. Catchment planning needs to not only occur at all scales, farm, sub-catchment, Freshwater Management Unit and Catchment but it needs to involve all those affected by the plan as active participants in the process. It requires a framework that supports and empowers collective community ownership of the issues and the solutions. This intern will provide a more enduring and outcomes-based approach than reliance on activity or individual specific input based regulatory frameworks. Such planning enables individuals to see their actions within the context of the larger picture and to appreciate their contribution to the combined impacts at the catchment scale (OECD, 2017; Fenemor et al., 2011). A sub-catchment approach provides for a whole-of-catchment approach, which connects communities with each other and environmental outcomes of their actions.
12. I support the officers' preliminary view that focusing on sub-catchment would have real benefits in terms of implementing local solutions and community commitment (para 143, page 28). Sub-catchment approaches empower communities to understand local and broader spatial-scale issues that relate to environmental health. It enables communities to find solutions that are spatially explicit, and efficient and effective at achieving freshwater objectives.
13. Sub-catchment planning provides a platform for councils and communities, including tangata whenua, to get together to discuss the values of the freshwater bodies in their rohe, impacts on those values, and empowers and supports tailored intervention. It provides the opportunity to both consider and recognise Te Mana o te Wai, as well as climate change, protection and restoration of biodiversity, enhancing community wellbeing, and cultural connection, recreational, and economic values.
14. As detailed in my HS1 evidence, the majority (e.g. 80%) of P surface runoff losses occur from areas that occupy a minority (e.g. 20%) of the catchment (Gburek et al 1998). Sub-catchment planning enables the identification of these areas of risk and supports the efficient and effective targeting of resources. Targeting risk closer to source is far more cost-efficient and environmentally effective than targeting the bottom of catchments.

15. Land Environment or Farm Environment Plans (I use this term interchangeably) offer a tailored approach to understanding and categorising a farm's natural capital assets (geology, topography, soils, climate, biodiversity, and water resources), and identifying and managing environmental risks. Such plans are also critical in ensuring that decisions are prioritised in line with business, family, social and cultural goals. In my experience, if developed by the farmer and when sitting within a catchment context, these plans can result in "issue and solution" ownership and ultimately optimal use of natural resources on that property to deliver cumulative environmental benefits.
16. I support the PC1 approach of adopting tailored farm environment planning as a key tool within its management framework, but these plans should integrate with sub-catchment planning as illustrated in Figure 3 and discussed under the heading 'Sub – catchment planning Framework'.
17. The Good Farming Practice (GFP) Action plan is a voluntary commitment and like the 21 GFPs it contains, it was not developed for the purpose of becoming regulation. Good Farming Practice (GFP) are intended to be an evolving suit of practical measures, and as such I do not support their inclusion through regulation in a way that is prescriptive and reduces the role of innovation and on farm adaption. I do not agree with the s42A Officers recommendation "*identifying that the more widely recognised 'good farming practice' (GFP) framework is an important foundation for FEP's, in terms of guiding their development, providing more outcomes focussed approach, and checking on implementation.*" And propose instead that Farmers be audited against the actions identified in the Waikato FEP that was developed by B+LNZ with Waikato Regional Council.
18. Farmers learn from people they trust, each other and seeing theory implemented and working on the ground. Farmers have low trust in the environmental information coming out of regional councils hence there is immense opportunity for councils to leverage off industry organisations that have farmer trust and networks. Connect farm planning with sub catchment planning provides farmers with a trusted support network.
19. Sub catchment plans will need to be supported by a plan for monitoring, evaluation and reporting. I support the Officers recommendation in the s42A

report (para 164 page 30) that additional wording to PC1 needs to be made to clarify the need for sub catchment monitoring.

SUB CATCHMENT PLANNING

20. Catchment planning needs to occur across a broad range of spatial scales including farm, sub-catchment, and Freshwater Management Unit to ensure that the integrated nature of natural resources in particular freshwater are understood, and that all those affected by the plan are involved as active participants in the process. It requires a framework that supports and empowers collective community ownership of the issues and the solutions. This provides a more enduring and outcomes-based approach than reliance on prescriptive regulatory frameworks (OECD, 2017).
21. The integrated catchment management (ICM) approach most likely to achieve positive outcomes as presented by Memon et al, (2010) contains the following:
 - (a) Inclusiveness
 - (b) Rules that promote: fairness, equality, continuous improvement and mutual gains.
 - (c) Mutual accountability
 - (d) Participant norms
 - (e) Collaborative capacity building leadership
 - (f) Commitment to collaboration (i.e. participants willingly direct their resources to cooperate in good faith), and
 - (g) Integrating and applying a broad knowledge base.
22. This in turn builds community resilience which has a positive impact on ecosystem resilience as shown in Figure 1.

Figure 1: Integrated catchment management develops community resilience to build ecosystem resilience (Fenemor et al., 2011).



23. In the Evidence in Chief of Mr Gerry Kessels from HS1 he supports the officers 'preliminary view that "*focussing on sub catchments could have real benefits in terms of implementing local solutions and community commitment...*". He also outlines based on his personal experience and that of others the key elements which regional plans should be considered to support and empower a water management group at a sub catchment scale, I agree with Mr Kessels. These can be summarised as:
- (a) Ensuring the water management group structure is at a sub catchment scale and representative of all stakeholders within that sub catchment, and ideally the group has legal status;
 - (b) Specifications of more than one outcome, e.g. A range of water quality and habitat standards, for every water management group confluence point;
 - (c) Policies and methods which provide clear criteria or conditions for a groups to recognise and what its environment must contain;
 - (d) A regional plan must specify that water management groups environment plan must be approved by the regional council prior to implementation;
 - (e) The environment plans need to contain several key elements including- goals, mapping or land use and effects of each land use

practice, mitigation actions, monitoring and reporting strategies, review and auditing process, an adaptive management approach to account for the complex and non-static ecosystem management dynamics at play and consequences for non-achievement.

24. Sub-catchment planning allows for the integration of catchment planning at landscape, whole catchment, sub-catchment and farm scale. Such planning enables individuals to see their actions within the context of the larger picture and to appreciate their contribution to the combined impacts at the catchment scale (OECD, 2017; Fenemor et al., 2011).
25. Sub-catchment approaches support integrated and holistic approaches, such as ki uta ki tai (from the mountains to the sea). A sub-catchment approach provides for a whole-of-catchment approach, which connects communities with each other and environmental outcomes of their actions.
26. Catchment planning needs sit at both the farm and sub - catchment level. At the farm level, farm plans will contain prioritised actions. This approach supports peer review and accountability. Catchment actions may be a collective of farm-based actions or involve collective and coordinated investment in, for example, constructed wetlands, managing drainage networks to reduce contaminant loss, landscape scale species restoration or predator control. Catchment programmes can support the adoption of active farm plans and the delivery of community aspirations for the sustainable management of their natural resources, including freshwater objectives.
27. In my opinion participatory approaches such as sub-catchment management are essential to achieving long-term goals. They allow for the identification and implementation of innovative solutions. When individuals have little or no involvement in the change process then there is little ownership of the solutions and the regulatory bottom line becomes the focus (OECD, 2017).
28. I support the officers' preliminary view that focusing on sub-catchment could have real benefits in terms of implementing local solutions and community commitment (para 143, page 28). Sub-catchment approaches empower communities to understand local and broader spatial-scale issues that relate to environmental health. It enables communities to find solutions that

are spatially explicit, and efficient and effective at achieving freshwater objectives.

29. Sub-catchment planning provides a platform for councils and communities, including tangata whenua, to get together to discuss the values of the freshwater bodies in their rohe, impacts on those values, and empowers and supports tailored intervention. It provides the opportunity to both consider and recognise Te Mana o te Wai, as well as climate change, protection and restoration of biodiversity, enhancing community wellbeing, and cultural connection, recreational, and economic values.

TARGETED CONTAMINANT MITIGATION

30. As detailed in my HS1 evidence, the majority (e.g. 80%) of P surface runoff losses occur from areas that occupy a minority (e.g. 20%) of the catchment (Gburek et al 1998). Sub-catchment planning enables the identification of these areas of risk and supports the efficient and effective targeting of resources. Targeting risk closer to source is far more cost-efficient and environmentally effective than targeting the bottom of catchments. By identifying Critical Source Areas (CSAs) in a watershed, we can prioritise conservation practices to better protect water quality and reduce costs. The CSA concept may not apply equally to all nonpoint source pollutants. Nitrogen issues, for example, can be spatially extensive where leaching coincides with excess nitrate in the soil profile over broad areas (Heathwaite et al. 2000).
31. The Section 42A report identifies that by *“pooling resources and choosing the best location a much more effective and less costly solution may result”* (para 138 page 27). Pooling resources and choosing the best location is an effective and less costly solution than a “broad brush” approach. These benefits go beyond constructed wetlands. As presented in HS1 evidence of both myself and Dr Chrystal, sub-catchment approaches, which may be supported by advanced land management tools such as Land Use Capability Indicator (LUCI) and MitAgator, provide the opportunity to target intervention at those areas within the catchment where the biggest environmental outcomes can be achieved. This includes all contaminants of concern such as *E. coli*, sediment, P, pathogens, and N. These mitigations can then drop down into farm specific plans.

32. Discharges from CSAs lend themselves well to being managed through tailored farm-specific management plans. Such plans help farmers to identify, record and implement actions to manage these areas in a way that will significantly reduce the loss from those areas. For example, Dodd et al. (2016) state that maximum efficiency from mitigations in the long-term is best achieved by:
- (a) “Reducing contaminant discharges from drystock operations in the long-term when they are:
 - i. Chosen on the basis of suitability to the farm;
 - ii. Implemented on the basis of cost-effectiveness; and
 - iii. Implemented in critical source areas.
 - (b) With the result that 25-50% of some contaminant losses can be mitigated without impairing farm earnings.”
33. Farmers of extensive sheep and beef farms (those below around 16-18 SU/ha) have very few choices when examining mitigation options to further reduce nitrogen discharges. This is because as a rule, the sector already:
- (a) has limited inputs, such as nitrogen fertiliser, on pasture;
 - (b) farms to their grass curve, (i.e. stock the land according to pasture growth);
 - (c) are typically net exporters of feed;
 - (d) winter stock on-farm, including non-capital stock; and
 - (e) do not generally use off-paddock structures, such as stand-off pads and wintering barns.
34. Research undertaken in Southland as part of The Southland Economic Project (Moran et al. 2017), and in Waikato (as presented by Dr Chrystal and Mr Beetham in HS1) shows that seeking further nitrogen reductions from already low-leaching land uses such as sheep and beef farming can significantly impact on the viability of the farming business. Furthermore, it also reduces the ability for the farm to be optimised to address other

environmental concerns such as biodiversity, climate change, erosion, and phosphorus and pathogen losses.

35. In relation to the Officers concerns identified in the Block 1 c42A Report (Page 27a) about sub-catchment approaches that do not take a catchment wide view to reducing contaminant losses, particularly those contaminants that are cumulative across the whole catchment. I would comment that mitigation resources are best targeted at contaminants of concern at source and at all scales; farm, sub catchment, FMU and catchment. For example, N may be a contaminant of concern in a catchment but mitigations targeting N in a blanket fashion across the catchment may result in high compliance and engagement cost for farms and will have negligible impact on catchment load. In the case of sheep and beef farms where the impact of such mitigation in such a blanket approach would be marginal, resources would be better targeted at reducing sediment, pathogens and P. Granted everyone has a role to play in reducing N catchment load but if the load is not being generated from that part of the catchment (farm, sub-catchment FMU) then the cost effectiveness of those mitigation will be marginal. Planning at all scales including farm and sub catchment planning will enable efficient and targeted allocation of mitigation resource.

LAND AND ENVIRONMENT PLANNING (LEP)

36. Land Environment or Farm Environment Plans (I use this term interchangeably) offer a tailored approach to understanding and categorising a farm's natural capital assets (geology, topography, soils, climate, biodiversity, and water resources), and identifying and managing environmental risks. Such plans are also critical in ensuring that decisions are prioritised in line with business, family, social and cultural goals. In my experience, if developed by the farmer and when sitting within a catchment context, these plans can result in "issue and solution" ownership and ultimately optimal use of natural resources on that property.
37. Tailored Land Environment Plans (LEP) enable farmers to understand their natural resources and the farms natural capital and to identify risk and prioritise actions across their property for the purpose of maintaining and enhancing their natural resources including soil, water quality, and biodiversity. This approach allows for the complexity and dynamic nature of the farming landscape by supporting active management of livestock and

water at the farm and paddock scale. With mitigations being targeted at the environmental issues/ including freshwater ecosystem impacts of concern in a catchment.

38. As part of a specific Farm Environment Plan farm scale (1:10,000) scale Land Use Capability (LUC) mapping should be undertaken. This assessment is undertaken regardless of land use and is used to ascertain the lands capability for use, while taking into account it's physical limitations and its versatility for sustained production (Lynn et al.,2009).
39. Land Use Capability assessment provides a useful tool to determine the predominate slope of a parcel of land, its stock holding capacity, as well as its limitations including for cultivation. As I have already noted above, as part of a specific FEP farm scale (1:10,000) plan, LUC mapping should be undertaken. This assessment is undertaken regardless of land use and is used to ascertain the lands capability for use, while taking into account it's physical limitations and its versatility for sustained production (Lynn et al.,2009). In most cases pasture harvested from various LUC classes is typically closely correlated to the natural carrying capacity and the subsequent suitability of the land to carry a certain stocking rate. As a consequence of this LUC is an ideal tool for both catchment and farm scale planning as it is undertaken regardless of land use.
40. I support the PC1 approach of adopting tailored farm environment planning as a key tool within its management framework, but these plans should integrate with a sub-catchment plan which intern should integrate with FMU plans and intern Catchment plans as illustrated in Figure 3 and discussed under the heading 'Sub – catchment planning Framework'.
41. The Good Farming Practice (GFP) Action plan is a voluntary commitment and like the 21 GFPs it contains, it was not developed for the purpose of becoming regulation. Good Farming Practice (GFP) are intended to be an evolving suit of practical measures, and as such I do not support their inclusion through regulation in a way that is prescriptive and reduces the role of innovation and on farm adaption and as consequently do not agree with the s42A Officers recommendation *"identifying that the more widely recognised 'good farming practice' (GFP) framework is an important foundation for FEP's, in terms of guiding their development, providing more outcomes focussed approach, and checking on implementation."*

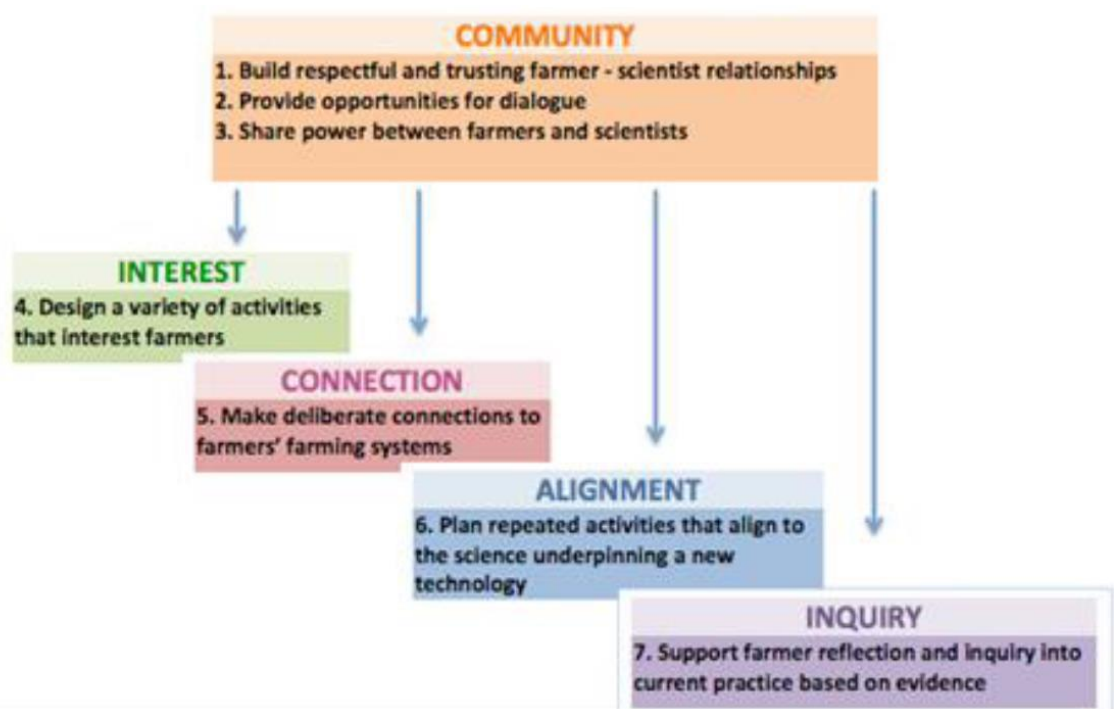
42. The B+LNZ LEP programme will both deliver and drive the evolution of the Agreed National Good Farming Practice Principles for the Sheep and Beef Sector. The B+LNZ LEP programme enables farmers to identify and update GFP for their situation. I propose that the Waikato FEP developed by B+LNZ with Waikato Regional Council be used in a revision of Schedule 1. My evidence in HS2 detailed this approach. I agree with the Officers recommendation for the auditing of FEP's and on the farm actions should be required.
43. In the summary or recommendations for Farm Environment Plans (Schedule 1) in the s42A Report (para 178 p 34) I agree with that FEP's should be a key component of PC1 but disagree with the statement that 'they are intended to guide the adoption of a range of farm-specific actions to reduce contaminant loss.' This is an overly simplistic characterisation of a FEP and mis represents the true value that the FEP/LEP provides. Rather than simply focussing on the actions within an existing farm system or land use, correctly applied FEP/ LEP provide fundamental information to the land owner or manager on their natural capital assets, such as soil, geology, climate, and the sensitivity of associated ecosystems including biodiversity and freshwater, and enable land use and farm system to be optimised to deliver on healthy environment, maximising the ecosystem services that the farm provides along with its economic viability. As such the primary foundation to an effective LEP or FEP is the stock take of the farms natural capital, an analysis of its strengths and weaknesses, followed by the identification of the farm system and management considerations that enable the land to be farmed within the limits of that natural capital.

BEHAVIOUR CHANGE – HOW FARMERS LEARN

44. Farmers learn from people they trust, each other and seeing theory implemented and working on the ground. Farmers have low trust in the environmental information coming out of regional councils hence there is immense opportunity for councils to leverage off industry organisations that have farmer trust and networks. Connecting farm planning with sub catchment planning provides farmers with a trusted support network.

45. Sewell et al., 2014 identified five critical success factors and seven educational principals required for promoting farmer learning (Figure 2). These factors and principals develop trust with the farmer and provide the opportunity for farmers to be an active and respected participant in enquiry. Sub catchment planning as the vehicle for PC1 implementation should allow for these incorporate these factors.

Figure 2: Success factors and educational principles for promoting farmer learning.



46. As we know in New Zealand local government tasked with both sustainably managing natural resources but unfortunately farmers lack trust in the advice on environmental performance provided by local governments (Brown et al. 2016). Brown *et al.* 2016 go onto sight empirical evidence that indicates that New Zealand farmers are more likely to adopt new practices after seeing them successfully demonstrated. The conclusion they then draw is that 'local government would do well to partner with those of have tried the practices themselves and those with large farmer networks". B+LNZ have established a number of demonstration farms for this purpose.

There are currently three B+LNZ Environment Demonstration Farms in the Waikato Region.

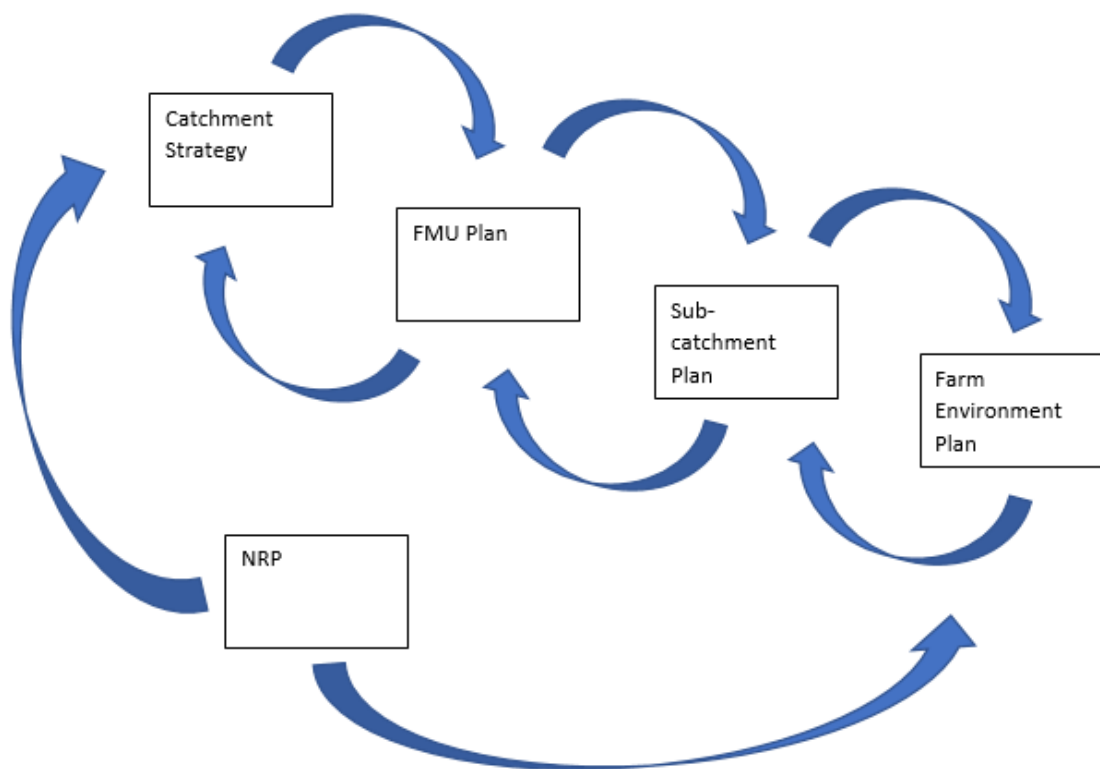
47. In work undertaken by the Department of Agriculture, Forestry and Fisheries in Queensland looking at the benefit-cost of addressing rural diffuse pollution with an integrated farm extension framework and published in the Extension Farming Systems Journal they present an argument that increased public investment in voluntary extension programs that target high risk agricultural sub-catchments is an economic efficient intervention to reduce rural diffuse pollution. Their study showed that a voluntary extension approach supported by incentives and investment in on farm trials, demonstration sites and including farmers as active participants in learning would have a positive internal rate of return of 13.4% from the ongoing investment by government with a benefit cost ration of 1.61 (Stockwell et al. 2012).

SUB CATCHMENT PLANNING FRAMEWORK

48. Sub-catchment planning with farmers and community as active participants provides, in my opinion, an effective tool to deliver on the outcomes sought by PC1, and as such should be incorporated more holistically and in a more direct way within the Plan. PC1 has the opportunity to introduce both legal and social (peer) accountability.
49. As evidenced above LEPs/FEP's need to be delivered in conjunction with sub – catchment planning for mitigation to be targeted at source. Also, it is established that farmers learn from those they trust (extensively each other or those they have enduring relationships with) and from seeing change implemented successfully on the ground. Sub catchment planning when conducted with the farmer as an active participant introduces two things;
 - (a) Knowledge connections, farmers build awareness of how their land management decisions impact on the environment (natural resource). This awareness is an essential step in the behavioural change process that can't be bypassed.
 - (b) Social accountability, farmers become accountable to their peers. This can be a key driver of practice change

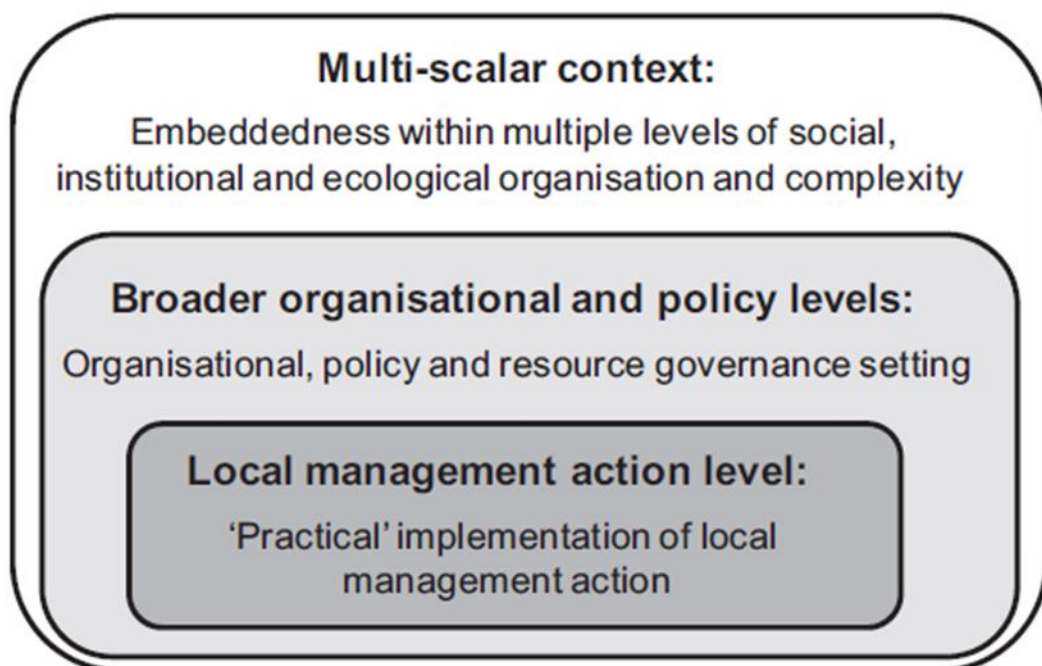
50. Each sub-catchment should identify local priorities and determine how the goals and strategies of the FMU Plan and Catchment Plan are best achieved in their rohi. The sub-catchment plans should define the specific action and priorities to deliver the FMU and Catchment Plan. Actions and projects should be tailored to meet the issues, risks and opportunities that characterise the community, industries and landscapes of the region. Pc 1 needs to give clear provision for this.
51. Sub catchment plans will need to be supported by a plan for monitoring, evaluation and reporting. I support the Officers recommendation in the s42A report (para 164 page 30) that additional wording to PC1 needs to be made to clarify the need for sub catchment monitoring.
52. The sub-catchment planning frame work is illustrated in Figure 3 which shows how plans at different scales speak to each other and as integrated deliver on environmental outcomes and community values. The challenge for plan design is to support agile management on the ground and to do this the plan must create an agile or adaptive governance structure.

Figure 3. Overview of Sub-catchment planning framework



53. Patterson et al (2013) state that nonpoint source (NPS) water pollution in catchments is a 'wicked' problem that threatens water quality, water security, ecosystem health and biodiversity, and thus the provision of ecosystem services that support human livelihoods and wellbeing from local to global scales. They discuss how non-point source pollution (NPS) is a difficult problem to manage because water catchments are linked human and natural systems that are complex, dynamic, multi-actor, and multi-scalar in nature which in turn raises questions about understanding and influencing change across multiple levels of planning, decision-making and action. Their findings highlight the need for: (1) a systemic and integrative perspective for understanding and influencing change for managing the wicked problem of NPS water pollution; and (2) 'enabling' social and institutional arenas that support emergent and adaptive management structures, processes and innovations for addressing NPS water pollution in practice.

Figure. 4. Multiple management levels influence implementation of local management action for NPS pollution.



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