

Office of the Minister for Primary Industries  
Office of the Minister for the Environment

Chair

Cabinet Economic Growth and Infrastructure Committee

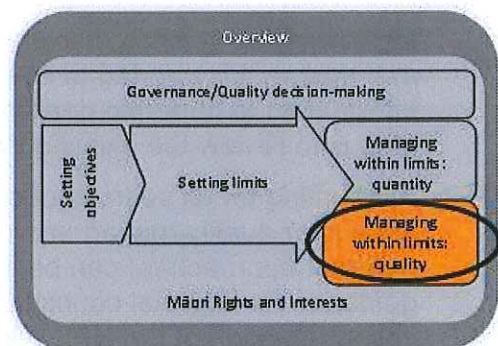
Water Reform Paper Three: Managing within water quality limits under the National Policy Statement for Freshwater Management

Proposal

1. This paper seeks agreement to an approach to managing within freshwater quality limits for inclusion in a water reform discussion document in early 2013 that sets out proposals for implementing a water reform strategy. For managing within quality limits this would include:
  - a. setting out the policy goal and objectives for water quality management under the National Policy Statement for Freshwater Management (NPS-FM)
  - b. identifying proposals for strengthening the foundations of the management regime in the near term, including the science, knowledge and information system, water quality accounting systems, water quality management planning including transition, and sector-based good management practice toolkits
  - c. signalling how longer term issues (e.g. ensuring efficient resource use) will be addressed, informed by robust information and ongoing evaluation of the impacts of different approaches.

Executive Summary

2. This paper is the third paper (of four) on the core policy elements of an overall package for a water reform strategy (see Annex A). Improving the water management system will require solutions that start now and adapt over the long-term. We recommend introducing changes over the next year and signalling that we will build on these progressively over time. Reform will require changes over a generation.
3. Implementation of the NPS-FM requires freshwater objectives and limits to be set by the end of 2030. 'Freshwater objectives' describe the environmental outcomes the community wants from a water body. 'Freshwater limits' are constraints on resource use to ensure the objectives for the water body are achieved. Although they need to be expressed in environmental terms, they can also provide for economic outcomes. Objectives and limits relate to both water quality and water quantity. Objective and limit setting under the NPS-FM is the subject of the parallel water reform paper (Paper Two).



4. Decisions on setting objectives and limits are intrinsically linked to decisions on how to manage to those objectives and limits. They should be made as part of a single process so that consideration of how activities can be managed informs the limits set. Setting and managing within water quality limits requires that all sources of contaminants and their impacts be accounted for, including identifying the contaminant or contaminants of concern.
5. Decisions on water quality limits establish the remaining assimilative capacity<sup>1</sup> available in a waterbody, if any, which is available for use by new or intensified discharging activities. While having limits in place is a necessary step for improving water quality management, it is not sufficient. An efficient, effective and equitable water quality management regime, supported by good information and high quality tools and processes, is also required. There is little direction on how to manage within water quality limits in the NPS-FM.
6. Currently problems are emerging that are preventing New Zealand from capitalising on the opportunities enabled by the setting of water quality limits. A strategy is needed for addressing these problems in a way that promotes the achievement of both the environmental and economic benefits of water reform.
7. The policy goal is to *ensure the regime for managing within quality limits maximises the value to society of the assimilative capacity of waterbodies (i.e. the agreed limit), both now and in the future, while ensuring iwi/Māori rights and interests are considered.*

*Proposals for discussion document*

8. We propose that a water reform discussion document in early 2013 include the following proposals for foundation measures that underpin good water quality management, to be implemented over 2013-2016:
  - a. improving the science, knowledge and information system
  - b. national guidance or regulation addressing accounting for all sources of contaminants and water quality management planning, and
  - c. development of sector-based good management practice toolkits.
9. Improving the science, knowledge and information system for water quality management is needed to ensure that it delivers the required economic and scientific information to underpin decision-making for setting and managing within limits. A first step is to review the existing Water Research Strategy in 2013.
10. Accounting for all sources of contaminants, including their impact on water quality and water quality management planning (including better evaluation of the impacts of different approaches) can be improved in the short term by developing national guidance for regional councils. This would address immediate concerns about the implementation of the NPS-FM. Guidance is needed on accounting for all sources of contaminants and their impacts on water quality, matching policy methods and tools (e.g. voluntary, regulatory and economic instruments) to the catchment and contaminant, the use of catchment and farm-scale models for policy purposes, and managing the transition to a limit-based regime, especially in catchments where discharges exceed limits. This could include development of specific strategies that councils could pick up to address particular contaminants. Some components of water quality management planning may be better suited to national regulation e.g.

<sup>1</sup> Assimilative capacity refers to the capacity (the limit) for a water body to absorb contaminants without exceeding a specific concentration, such as a water quality objective. In managing to quantity limits, a similar approach is used i.e. identifying the quantity of water available to be allocated to out-of-stream uses without breaching a water quantity limit.

national environmental standards. The discussion document would seek feedback on the components requiring national guidance or direction.

11. Credible sector-based good management practices (GMP) are needed to underpin both resource user and council decision-making. Resource users can use GMPs to identify the least-cost practices to meet water quality management responsibilities, and for inclusion in industry self-regulation. For example Irrigation New Zealand's Sustainable Farming Fund project to implement a cost-effective audited self-management system for irrigators, aims to add value to the farm business, whilst satisfying regulatory compliance and wider community needs. Regional councils can also use GMPs to select practices that are suitable for inclusion in regulations e.g. as conditions for permitted activity status. Over time, the degree of uptake will determine the need for any stronger national regulation of GMPs.
12. We propose that the discussion document signal an approach to, and timeframe for, addressing longer term issues, including improvements to the policy methods and tools available to regional councils, so that they encourage efficient resource use and enable innovation and economic growth. These could include removing any impediments to nesting good management practice and industry self-regulation (e.g. audited self-management) in a regulatory regime, discharge consent duration, and improved economic instruments (e.g. improving the efficiency of nutrient transfer/trading mechanisms or pricing of discharges).

#### *Iwi/Māori and water quality management*

13. The views of the Freshwater Iwi Advisors Group (Iwi Advisors) in relation to water quality management are noted in this paper.

#### *Impacts of the proposed approach*

14. In the long term, improving the regime for water quality management will enable the community-agreed objectives for water quality to be achieved efficiently and equitably, while also providing for economic growth. In the short term, this approach will enable immediate progress to be made on developing the foundations for good decisions on water quality management, at both regional council and resource user levels. It will also provide greater consistency between regional council approaches and increased certainty for resource users.

### **Background**

15. This paper is one of four papers on the core policy elements for a water reform strategy. On 19 November 2012 Cabinet agreed in principle that Government consult, through a discussion document in early 2013, on proposals to implement a water reform strategy that includes reforms to governance, setting objectives and limits, and managing limits for both quality and quantity [EGI Min (12) 26/2].
16. The paper has been informed by the recommendations in the third Land and Water Forum (Forum) report *Managing Water Quality and Allocating Water*. The Forum recommended that water, land and related resource use within limits should maximise economic benefits, and emphasised the role of good management practice in managing to water quality limits. The recommendations collectively support a high degree of regional-level discretion in policy and decision making, with a significant amount of central government guidance and support.
17. This paper outlines a proposed direction for reform in relation to managing within water quality limits. It responds to the July 2012 Cabinet Business Committee invitation to the Minister for Primary Industries and the Minister for the Environment to

report back to EGI by 30 November 2012 on new work under tranche three of Fresh Start for Fresh Water (FSFW), covering managing within water quantity and quality limits [CAB Min (12) 25/2 refers].

## Context

### *Alignment with other Government programmes*

18. Freshwater reform is linked closely to Phase Two of the resource management reforms, which are focusing on improvement of the Resource Management Act planning system. These include proposals for enhanced requirements for section 32 analyses (consideration of alternatives, benefits and costs). The economic information to underpin water quality management decisions also underpins the section 32 analysis requirements.
19. The Government recently confirmed its support for a programme of work to identify National Science Challenges (NSC) in Budget 2012, with \$60 million of additional funding over four years. Under each NSC, a number of initiatives will be developed and co-ordinated to achieve the outcomes sought, and connected with end-users to promote adoption. The Ministry of Business, Innovation and Employment (MBIE) advises that productive land and water management within environmental limits may be identified as one of these Challenges, and if so, the synergies between parts of the review of science and information proposed in this paper with the NSC process will need to be explored. The shortlist of proposed Challenges will be provided for approval by Cabinet in March 2013.
20. The Government's Fresh Start for Fresh Water Clean-Up Fund is a fixed term fund that provides financial assistance to regional councils for the remediation of historically contaminated freshwater bodies. A report back to the Economic Growth and Infrastructure committee on the Fund's operation is scheduled for December 2012. The paper includes discussion on aligning the remaining funding with national priorities emerging from the current reforms. It also highlights the need for any future funding decisions to be informed by the wider water reform package.

## Comment

21. The National Policy Statement for Freshwater Management (NPS-FM) requires regional councils to set enforceable quality limits for freshwater bodies no later than December 2030. However there is little guidance or direction on how those limits could or should be achieved.
22. The recommendations outlined in *Paper Two: Setting Objectives and Limits under the National Policy Statement for Freshwater Management* set out a proposed National Objectives Framework and bottom lines to assist regional councils and communities to set limits. Decisions on limits establish the remaining assimilative capacity in a waterbody, if any, which is available for use by new or intensified discharging activities.
23. The assimilative capacity available is linked not only to decisions on the water quality limit, but also to decisions on the water quantity limit. If less water is extracted, more assimilative capacity is available. As a result, regional council decisions on managing within quality limits need to be made as part of the decision process to set both quantity and quality limits, as each decision informs the others.
24. Managing to quality limits effectively and efficiently requires a considerable change in how regional councils develop and implement policies. Only seven percent of catchments had well-specified water quality limits in place in May 2012, so there is

little regional council experience in managing to such limits. It also requires a step-change in the day-to-day practices of resource users.

25. Developing objectives and enforceable limits is a *necessary* step for maintaining or improving water quality, as outlined in Paper Two. Limits provide a clear and common goal for catchment management decisions. However, setting limits is not *sufficient*. Further reform is needed to enable councils and land users to manage effectively (i.e. to meet the environmental objective) and efficiently (i.e. at least cost overall); and to maximise “headroom”<sup>2</sup> for economic growth within limits. Good scientific and economic information is needed to underpin decision-making on limits and managing within them, so that communities have clear information on the potential impacts.
26. The challenge for regional councils is to:
  - a. account for all sources of the contaminants to be managed (diffuse, point and legacy sources from past land use activities) and their impacts on water quality, and
  - b. develop effective and efficient water quality management instruments that are best suited to the objectives to be achieved, the relevant contaminants and their sources, and the catchment.
27. For example, if a water quality objective is to have water suitable for swimming, this may require a reduction in periphyton (e.g. algae) levels. The policy instrument chosen could regulate to cap nutrient discharges, require flushing flows to be released from stored water periodically, and/or require riparian planting as a condition of permitted activity status. However, if the contaminant to be managed is pathogens, and the primary source is waste water, then regulations requiring waste water treatment upgrades may be required.

#### *The use of models in water quality management*

28. Accounting for all sources of contaminants is achieved through the use of models to estimate and monitor contributions from point, diffuse and legacy sources. Models are used at the catchment scale to underpin decisions on limit setting and how to manage within limits. They can be used to predict the environmental and economic impacts so that trade-offs are explicitly and transparently considered in the decision-making process.
29. Models are also used at the business-scale, and regional councils are making increasing use of the nutrient management model OVERSEER® to set regulated caps (e.g. 25 kg of nitrogen per hectare per year) on farm diffuse discharges of nitrogen, and to monitor compliance with the cap. The use of OVERSEER® in these ways is controversial, in part due to the levels of accuracy in the estimates it provides. Problems have been highlighted with the setting of per-hectare discharge caps that are not transparently linked to the water quality outcomes sought, and short transition times to meet very demanding discharge caps. As with all models, new and innovative ways of reducing discharges take time to be built into the model and policies need to be designed to encourage new approaches that are not yet built into the model.

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<sup>2</sup> Where current discharges are lower than the limit, the gap is referred to as “headroom” in this paper. Where headroom exists, new higher-returning activities can establish in the catchment, even if they increase the overall level of discharges. In catchments that are already at the limit, improved water quality management by existing resource users can reduce discharge levels and create headroom for new and intensified existing activities.

30. Problems also occur when models are upgraded. This improves their accuracy and may cover a greater range of mitigation practices, but usually also results in changes in estimated levels of discharge. Regional council policies and rules need to explicitly outline the process to be used when a new version of a model such as OVERSEER® is released, to enable affected resource users to adjust. OVERSEER® was primarily developed as a decision support tool to underpin farm fertiliser decision-making. However as its potential use for policy purposes (greenhouse gas and water quality management) became apparent, the owners of OVERSEER®<sup>3</sup> have invested in improving the model with policy uses in mind.
31. Further improvement is needed (and planned), to ensure the model is increasingly fit for policy use, including the addition of a greater range of potential practices that can reduce discharges, and ongoing improvements in calibration and validation in different climatic and soil conditions. Additional information on models used for water quality management is included in Annex B.
32. A stronger central government role is needed to ensure that a more strategic approach is taken to the development and use of water quality models, as they are increasingly being used for policy purposes. Specific proposals are included in the Science knowledge and information section and in the Water quality management planning section of this paper.

*Problems associated with managing within water quality limits*

33. Although New Zealand's freshwater bodies are of good quality by world standards, water quality is coming under increasing pressure, as urban and rural land uses intensify. The approaches to water quality management used by regional councils in the past have not been sufficiently effective to manage water quality to meet community expectations in many catchments. Until recently, most of these approaches have focused on addressing point source (end-of-pipe) discharges. Setting well-specified water quality limits under the NPS-FM is an important first step in addressing these problems of ineffective water quality management.
34. However, a range of new issues are emerging as regional councils and resource users respond to the need to manage within limits. Councils and communities have expressed concerns about the tensions between environmental and economic impacts of managing within water quality limits. There are emerging problems that need to be resolved if councils and resource users are to effectively, efficiently and equitably manage within water quality limits set under the NPS-FM. They include the following:
  - a. in some cases, decisions on water quality limit setting and management are being made by regional councils with insufficient underpinning scientific and economic information, including catchment-scale models
  - b. inconsistent and incomplete systems and practices for identifying and accounting for sources of contaminants to be managed, including diffuse sources; and monitoring and reporting of discharges
  - c. some regional councils have insufficient capacity, knowledge, or experience with, the policy approaches and models required to efficiently, effectively and equitably manage within quality limits; including matching the policy tools and methods to the catchment and contaminant, and transition measures needed where discharges exceed the limit

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<sup>3</sup> The Ministry for Primary Industries, the Fertiliser Association and AgResearch are the current joint owners.

- d. many resource users have insufficient information on the practices they can adopt in order to meet their new water quality management responsibilities cost-effectively
  - e. the policy tools (e.g. regulatory and economic instruments) currently available to regional councils are likely to need improvement in the longer term, in order to meet the increased demands of managing within well-specified quality limits, while providing for economic growth and innovation.
35. There are likely to be significant benefits in addressing these problems, including better informed water quality management decisions, better environmental outcomes, increased certainty for resource users, increased consistency in council approaches, and opportunities for new higher returning activities to establish even when catchments are at, or breaching limits.

*Building a better regime for managing within limits*

36. An effective, efficient and equitable regime for managing within water quality limits must include the following components if the full economic potential of sustainable water quality management is to be realised:
- a. science, knowledge and information – robust economic and scientific information to underpin water quality management decision-making
  - b. accounting for all sources of contaminant – methods and processes to identify the sources of relevant contaminants and their impacts on water quality (point sources e.g. from pipes and drains, diffuse sources e.g. from leaching and run-off, and legacy sources from historic land uses), determine the manageable components, identify users of assimilative capacity, and monitor (or model) and report the amount of contaminant being discharged
  - c. water quality management planning – determining and subsequently implementing the methods, tools and models to use for efficient, effective and equitable water quality management
  - d. good management practices – consistent and credible information on the good management practices that can be used by each sector to cost-effectively meet water quality management responsibilities
  - e. industry self-regulation – approaches to water quality management that enable and reward industry self-regulation, including codes of practice and audited self-management, which may be recognised under the regional or national regulatory framework
  - f. regulation-based policy tools – regulatory approaches that are effective in managing to the limit, while enabling flexible responses by resource users, and providing incentives for efficient resource use and innovative ways to reduce discharges. This will create headroom for new or intensified discharging activities even in catchments that are approaching or at the limit. Regulation based tools incorporate good management practice, and may include industry self-regulation aspects
  - g. economic instruments – approaches that provide incentives for efficient resource use and innovative ways to reduce or offset discharges, and enable transfer of discharge consents; so that headroom is created for new or intensified discharging activities even in catchments where limits have been

breached. Economic instruments usually include a regulatory component e.g. discharge consents that can be transferred.

Figure One: Building an efficient and effective regime for managing within quality limits



37. Figure 1 illustrates the way the different components build on each other. For example, good water quality management planning is reliant on robust scientific and economic information, and reliable accounting for contaminant sources. This implies that:
- significant improvements can be made to the management system by addressing the foundation measures
  - some types of reform will not be possible without having the appropriate foundation measures in place. For example, an economic instrument such as pricing cannot be implemented without adequate contaminant accounting systems to confirm the level of discharge
  - reform initiatives should focus on building the foundations of the regime before considering new water quality management tools.

#### **Proposed approach to managing within water quality limits**

38. This paper seeks agreement to an approach to managing within water quality limits for inclusion in a water reform discussion document in early 2013. The discussion document will set out proposals for implementing a water reform strategy. For managing within water quality limits, this would include:
- setting out the policy goal and objectives for water quality management under the NPS-FM
  - identifying proposals for strengthening the foundations of the management regime in the near term, including the science, knowledge and information system, water quality accounting systems, water quality management planning including transition, and sector-specific good management practice information
  - signalling how longer term issues (e.g. ensuring efficient resource use), will be addressed, informed by robust information and ongoing evaluation of the impacts of different approaches.
39. This approach enables the foundations of the management regime to be progressed in the near term. At the same time, it provides clarity to all water users, iwi/Māori,

communities and regional councils about how the more complex and challenging aspects of managing within quality limits will be addressed to deliver the desired long-term economic and environmental gains.

40. The policy goal is to *ensure the regime for managing within quality limits maximises the value to society of the assimilative capacity of waterbodies (i.e. the agreed limit), both now and in the future, while ensuring iwi/Māori rights and interests are considered.*
41. This involves meeting the following objectives:
  - a. water quality is managed effectively, efficiently and equitably within limits, and catchment objectives are achieved
  - b. land and water decision-making and implementation is well-informed (drawing on readily understood good quality scientific and economic data), well-integrated and adaptive, at both council and land user levels
  - c. stakeholders have good levels of buy-in to their catchment's water quality objectives and approaches to managing to them
  - d. stakeholders have clarity and certainty on their entitlements, responsibilities and roles in water quality management
  - e. growth and development in catchments is facilitated through efficient resource use, and innovative approaches to managing water quality within limits, at individual, business and catchment levels
  - f. implementation and monitoring is efficient and cost-effective for stakeholders and those enforcing the regime
  - g. transition/adjustment methods minimise economic and social costs, and are seen as equitable.

#### *Foundation measures*

42. As discussed above, there are some foundation measures that will need to be implemented before more complex and challenging components of the regime can be effectively addressed.
43. We recommend that proposals for dealing with the foundation measures be included in a discussion document in early 2013 that sets out a water reform strategy. The discussion document will also seek feedback on the degree to which guidance or direction would be sufficient to address current problems.
- 44.
45. A number of the Forum's recommendations address the foundation measures. For example, the Forum notes "*good water quality management requires ... good science*", that "*councils should account for the contaminants of concern*", that there is a role for central government in "*identifying and disseminating best practice planning*" and that "*Good Management Practice should be defined and adopted in all catchments*".

46. Addressing these tools and methods nationally will coordinate effort, achieve economies of scale, reduce duplication of effort by regional councils, and achieve the desired objectives more quickly.

Science, knowledge and information for water quality decision making

47. High quality scientific research and economic information is essential for sound decision making on limit setting, managing within limits, and transition timeframes. The current science funding arrangements are spread across a number of funds and agencies within the Natural Resources Sector. These include MBIE's contestable funds, Envirolink funding for regional council research, and the Primary Growth Partnership for primary sector research. Co-ordination across providers and funders is inconsistent, and findings are not always disseminated to all potential users in readily useable forms. Future water research needs to be aligned with the changing requirements of regional councils and resource users as they seek to set and manage within limits.
48. We recommend that the discussion document seek public feedback on the priorities for review of the research and information system for water quality including:
  - a. scientific research, economic data and modelling tools for water quality
  - b. improving coordination across research providers
  - c. improving dissemination to end users.
49. The feedback from the discussion document can be incorporated into a review of the existing Water Research Strategy<sup>4</sup> in 2013, focussing on the development and dissemination of scientific and economic information and analysis. This review will explicitly consider the development and improvement of models used for water quality management, so that improvement of the key models used for policy purposes is fast-tracked.
50. This will underpin good quality decision-making at central government, regional council and resource user levels, in the longer term. We propose to adopt a similar approach to that used for the development of the water National Objectives Framework in 2012. This involved central government leading a multi-party stakeholder group, with membership from central government, science providers, sector organisations and regional councils.
51. This approach will identify information and research gaps, and may have funding implications. The current level of MBIE funding in the freshwater research pool is approximately \$18 million per year in existing contracts in the Environment Fund. There is \$1 million available for new freshwater projects in 2013-14 which is directly targeted to research gaps in the freshwater management framework, and will be available annually for up to six years. It is likely that supporting the water reform strategy will require more research investment than this fund can provide.
52. Regional councils also invest in freshwater science. For example, Environment Canterbury's budget for scientific investigations and monitoring work in the 2011/12 year is \$7.6 million. Councils also engage and participate in national research funded by central government, and assist to identify research gaps and opportunities. While alignment of research needs continues to improve, there is still significant opportunity

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<sup>4</sup> The Water Research Strategy was developed by officials in the Ministry for the Environment and the former Foundation for Research, Science and Technology in 2009.

to align freshwater research and science/monitoring in New Zealand, and maximise the return on research and science investment.

#### Accounting for all sources and water quality management planning

53. Papers One (Governance) and Two (Objective and Limit Setting) outlined the proposed planning processes and framework for setting objectives and limits. A single integrated planning process is needed to make decisions on quality and quantity limits, and how to manage within them, as each decision informs the others.
54. Identifying and accounting for all sources of contaminant and their impacts on water quality, underpins planning and monitoring of water quality management. Developing a consistent accounting framework will assist regional and national water quality management decision-making, and provides clarity and transparency for all stakeholders.
55. Individual councils are currently considering a range of new planning approaches to improve their management of water quality. Some of these are likely to be more efficient, effective and equitable than others. Some are also better targeted than others in terms of the contaminant to be managed, and the sources from which they flow. National guidance drawing on best practice in New Zealand and internationally would address immediate concerns about the policy approaches needed to effectively, efficiently and equitably manage within water quality limits, within a short timeframe. For example central government could sponsor the development of specific strategies that councils could adopt to address and manage specific contaminants. However, national direction through regulation could provide greater consistency and certainty for particular elements e.g. accounting for all sources.
56. We recommend that the discussion document seek public feedback on the following potential areas, including those best suited to direction rather than guidance:
  - a. identifying and accounting for all sources of the contaminants to be managed, including contributions from natural background and human-induced sources; and monitoring and reporting systems and policies to ensure information can be captured and used at the regional and national level
  - b. evaluating and selecting the policy methods and tools for water quality management in different types of catchment, and for different types of contaminant, as well as methods to manage adjustment through the transition period in catchments where discharges significantly exceed the limit
  - c. the use of models to guide decision-making on the management regime, and the way models should be applied in regulatory frameworks e.g. for compliance monitoring of nutrient discharge levels.
57. Initial reform of this nature has a number of benefits. Priority guidance material can be developed quickly in 2013 to meet the immediate need, whereas national regulations take longer. Guidance material also enables a more flexible approach than national regulation, e.g. providing a range of potential approaches, enabling regional councils to tailor policies, rules and methods to the circumstances in the region or catchment.
58. Guidance material has the potential to improve the quality of decision-making by councils, the consistency of approaches between regions and nationally, the selection and targeting of methods and tools to the contaminants of concern, and the sharing of information and experience. It is also likely to reduce conflict between parties on the approaches that should be used. Buy-in to the guidance material will

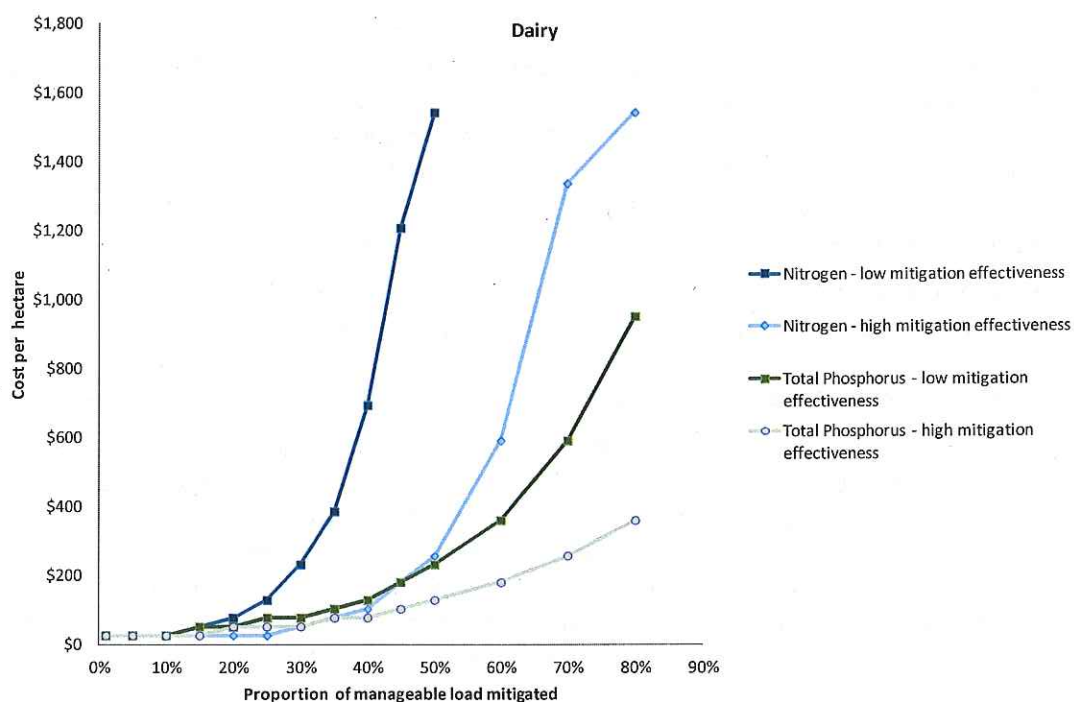
be achieved by developing it collaboratively. A review of the degree of uptake will determine the need for direction in future.

#### Sector-specific good management practices

59. Decisions on setting and managing within water quality limits need to be informed by good information on the management practices that resource users can realistically use to manage the effects of their activities on water quality.
60. Good management practices (GMPs) are critical tools for managing water quality to objectives and limits, and are an important foundation for all policy approaches (e.g. voluntary, regulatory or economic instruments). They can cover a range of practices, technologies and tools that individuals could use to manage the impacts of their business activities on water quality e.g. fencing off streams from livestock or management of waste treatment facilities can contribute to reductions in bacterial contamination of water. These may be supported or enforced by industry bodies as self-regulation (e.g. audited self-management, codes of practice), and regional councils may use them in regulatory frameworks to establish minimum standards for environmental performance (e.g. in some regions, forest harvest consents include requirements for harvest management plans that outline the GMPs to be used to manage impacts).
61. High quality information on GMPs provides the opportunity to tailor water quality management methods to the specific needs of a location or business. Information on the range of feasible GMPs applicable to a sector can be assembled into “toolkits” and used to provide a pick-list for a business to decide on the combination of practices that meet regulatory requirements at least cost, and that fit best with the business. They can also be used by regional councils to select practices for incorporation in regulations such as consent requirements, and at the national level for incorporation in codes of practice or national standards.
62. An example of GMPs is the AgResearch Mitigation Toolbox currently under development for the dairy and drystock farming sectors. The Toolbox will provide an assessment of the cost and effectiveness of a suite of options for reducing nutrient discharges, and an indicative ranking of where expenditure should be prioritised to ensure that maximum benefit is obtained for each dollar invested. AgResearch proposes to build the toolbox into the OVERSEER® model. Social research conducted by AgResearch indicates that farmers have a preference for choosing from a range of mitigation options, rather than a more prescriptive approach. The graph in Figure 2 is drawn from the draft AgResearch Mitigation Toolbox. It illustrates the reductions in discharges and economic impacts of successively adopting improved effluent and nutrient management practices, nitrification inhibitors, off-paddock wintering, and stream fencing. The modelling suggests that use of the most cost-effective GMPs can reduce nitrogen discharges by up to 25% at relatively low cost on dairy farms.
63. The AgResearch toolbox provides a useful basis for further development in the livestock sectors, and could be extended to other priority sectors. This may include horticulture, urban storm water, earthworks and construction sectors. However, there is significant variation both in the usefulness of existing GMPs, and in the application of them to water quality management. Development and use has been patchy across sectors and regions, with inconsistent approaches, application, content, audit, effectiveness and awareness. Some existing documents outlining potential GMPs may not be fit-for-purpose to inform decisions on managing within water quality limits.

64. Over the next three to five years limits will be set in many priority catchments and regional councils and resource users will need to respond new water quality management responsibilities. The timely development of consistent, fit-for-purpose toolboxes to assist in decision-making requires central government to take a stronger role. We propose officials work with key stakeholders over the next three years (2013-16) to consolidate existing GMPs, into sector-specific toolkits. The role of officials would be to facilitate the development of the toolkits by the sectors, working with a range of stakeholders including regional councils and science providers, to ensure they are consistent in quality, fit-for-purpose across the range of users, and delivered in a timely manner. Funding could be sought by the sectors from suitable funds to assist with the process e.g. the Sustainable Farming Fund. Stakeholders will also have the primary role in dissemination of the toolboxes to resource users. Alternatively central government could commission the toolkits from research agencies. However, this would reduce the buy-in by sectors and acceptability to the wider range of stakeholders.
65. In light of the number of sectors and GMPs available, prioritisation will be necessary to ensure maximum benefit from central government involvement. We recommend that the discussion document seek public feedback on:
- the development of sector-specific GMPs
  - the process for developing them
  - priority sectors for early development of toolboxes
  - the role of central government in ensuring robustness and accuracy of GMPs.

Figure 2: Nitrogen and phosphorus mitigation costs for dairy farms



Source: AgResearch

### *Longer term measures*

66. Reforms built on this foundation will need to be developed progressively in the longer term, informed by robust information and an evaluation of the impacts of different approaches. Aspects of any early guidance provided may need to be converted to direction, depending on uptake.
67. In addition, longer term measures will be needed to improve the policy methods and tools used by regional councils for water quality management. As water quality limits are progressively set in place, issues associated with enabling economic growth in catchments that are close to limits, or have breached them, will become more acute. We therefore recommend that the discussion document signal a process for progressing the longer term issues:
  - a. tools to increase incentives for efficient resource use, so that headroom is created in catchments that are close to or at limits e.g. recognition of good management practice by permitted activity status<sup>5</sup>, removing any impediments to nesting good management practice and industry self-regulation (e.g. audited self-management) in regulations, national standards for good management practice, or pricing of discharges
  - b. tools to enable economic growth in catchments that are at or over limits e.g. improved consent transfer and/or offsetting mechanisms, that enable new higher-value activities to establish, while maintaining or reducing catchment-wide discharges
  - c. tools such as discharge consents or regulatory requirements need to be of sufficient duration to provide investment certainty to resource users.
68. A number of the longer term issues raised in *Paper Four: Managing within limits-quantity* are also relevant to allocation-based approaches for managing water quality and measures.
69. Progressing these issues over a longer time frame will mean that future decisions will benefit from the ongoing development of information about the effectiveness and economic impacts of alternative approaches. It will also allow officials to work alongside regional councils, sector groups and resource users in developing proposals in these areas to ensure that a future regime is fit for purpose and does not impose unnecessary cost or burden on councils or resource users.
- 70.

### **Iwi/Māori and water quality management**

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<sup>5</sup> This approach was recommended by the Land and Water Forum in its third report.

73.

74.

### **Risks and mitigations**

75. There may be an expectation from Forum members that the proposals for managing within water quality limits outlined in the discussion document reflect only the recommendations contained in their report. Officials will use the work contained in the Forum's report as the starting point for proposals aimed at addressing the foundation measures outlined above.
76. There is a risk that the proposed staged approach is too slow, and inconsistent and inefficient regional policies are developed in the interim. This risk is mitigated by the development of guidance in 2013, which is relatively quick to prepare, and can respond to new problems as they occur. Delivering guidance and evaluating its effectiveness before making decisions on possible regulation minimises the risk of ineffective or inefficient central government regulation that may not be able to account for the significant local variations inherent in water quality management decisions. The additional reserve powers outlined in Paper One (Governance) are also a potential avenue for addressing this risk. Setting out a clear strategy and timeframe for addressing the longer term issues in the discussion document will also assist.
77. Some stakeholders may consider that the Government's proposed approach is insufficient to enable effective management of water quality. This risk can be best mitigated by illustrating how the proposals contained in this paper build on the Forum's recommendations, to which the major stakeholders have agreed. All the foundation measures in this paper are consistent with the Forum's water quality recommendations.

### **Consultation**

78. The following departments and agencies have been consulted on this paper and their views are reflected: the Office of Treaty Settlements, Department of Internal Affairs, Te Puni Kōkiri, Department of Conservation, the Treasury, and Ministry of Business, Innovation and Employment. The Department of the Prime Minister and Cabinet was notified of this paper.
79. The proposals in this paper have been informed by the Forum's recommendations.
80. The views of the Freshwater Iwi Advisors Group are noted in this paper.

## Financial implications

81. There are no financial implications arising directly from this paper. However, if the proposals contained in this paper are progressed following public consultation, financial implications are likely to arise.
82. The proposed review of science and information for freshwater, and the development of best practice guidance are estimated to cost \$1.05 -1.6 million spread over three years, plus existing personnel costs. The Ministry for Primary Industries' preliminary estimate is that partnering with sectors to develop good management practices could cost in the order of \$1.0 - 1.5 million per year for two years.

Table 1. Outline of range of costs for proposed reforms

Proposal	Financial implications (estimate of total)
Review of science and information for freshwater	\$600,000-1,000,000
Development of guidance material	\$450-600,000
Development and dissemination of good management practices	\$2-3,000,000

83. Proposals may impose additional costs on councils in some areas although may reduce costs in other areas (e.g. through reduced conflict and litigation). The extent to which the impact of proposals on costs is favourable or unfavourable will depend on the final form of the approaches adopted, and how councils choose to implement them.
84. Cost estimates and any funding proposals for the full water reform package will be further developed in advance of final decisions and, where appropriate, considered in agencies' 2013 Four-Year Plans and associated reprioritisation processes. At this stage, it is unclear how these costs may be distributed across Votes. Officials' objective is to manage within baselines where possible.

## Human rights

85. The proposals contained in this Cabinet paper are consistent with the New Zealand Bill of Rights Act 1990 and the Human Rights Act 1993.

## Legislative implications

86. There are no legislative implications arising directly from this paper. Some of the elements of a future reform package are likely to have legislative implications.

## Regulatory impact analysis

87. The regulatory impact analysis requirements do not apply to this paper as it does not seek substantive policy decisions. A regulatory impact statement will be prepared to support any future Cabinet consideration of options.

## Publicity

88. No publicity is proposed.

## Recommendations

89. The Minister for Primary Industries and the Minister for the Environment recommend that the Committee:
1. note that on 19 November 2012 Cabinet agreed in principle that Government consult, through a discussion document in early 2013, on proposals to implement a water reform strategy that includes reforms to governance, setting objectives and limits, and managing within limits for both quality and quantity [EGI Min (12) 26/2]
  2. note that this paper has built on the platform provided by the Land and Water Forum's recommendations in their second and third reports, discussions with the Freshwater Iwi Leaders Group and Freshwater Iwi Advisors Group, and further work undertaken by officials
  3. agree that:
    - 3.1. The desired results of a water reform strategy in relation to managing within quality limits are to ensure the regime maximises the value to society of the assimilative capacity (i.e. the agreed limit), both now and in the future, while ensuring iwi/Māori rights and interests are considered
    - 3.2. this will involve meeting the following objectives:
      - a. water quality is managed effectively, efficiently and equitably within limits, and catchment objectives are achieved
      - b. land and water decision-making and implementation is well-informed (drawing on readily understood good quality scientific and economic data), well-integrated and adaptive, at both council and land user levels
      - c. stakeholders have good levels of buy-in to their catchment's water quality objectives and approaches to managing to them
      - d. stakeholders have clarity and certainty on their entitlements, responsibilities and roles in water quality management
      - e. growth and development in catchments occur through efficient resource use, and innovative approaches to managing water quality within limits, at individual, business and catchment levels
      - f. implementation and monitoring is efficient and cost-effective for stakeholders and those enforcing the regime
      - g. transition/adjustment methods minimise economic and social costs, and are seen as equitable.
  4. agree that the policy goal and objectives in recommendation 3 be reflected in the discussion document referred to in recommendation 1
  5. agree that the discussion document include proposals to address the following foundation measures in relation to managing to quality limits
    - 5.1. improving the research and information system for water quality management so that it underpins good water quality management decisions at central government, regional council and resource user levels.
    - 5.2. improving water quality management planning through clear national best practice guidance or direction on priority components of the water

management regime, including accounting for all sources of contaminants, choice of methods and tools, policy use of models (e.g. model use to guide choice of policy methods, and for compliance monitoring of discharge levels) and managing the transition/adjustment

- 5.3. development and dissemination of good management practice toolkits for priority sectors to provide information to resource users, businesses, sector organisations and regional councils on the least-cost ways to meet water quality management responsibilities.
6. agree that the discussion document signal how the longer term issues will be addressed over the next several years
  - 6.1. tools to increase incentives for efficient resource use, so that headroom is created in catchments that are close to or at limits e.g. national standards for good management practice and pricing tools
  - 6.2. tools to enable economic growth in catchments that are at or over limits e.g. improved consent transfer and/or offsetting mechanisms
  - 6.3. tools to provide investment certainty to resource users e.g. discharge consents and regulatory requirements of sufficient duration
  - 6.4. central government direction to regional councils.
7. note that in December 2012 the Minister for Primary Industries and the Minister for the Environment will report to Cabinet with an overview of the package of proposals to be included in the water reform strategy discussion document, as decided in this and the companion papers, and an overview of how iwi rights and interests may be considered
8. note that the Minister for Primary Industries and the Minister for the Environment will report to Cabinet in early 2013 seeking approval for the release of the public discussion document on water reform that sets out proposals for implementing a water reform strategy
- 9.

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Hon David Carter  
**Minister for Primary Industries**

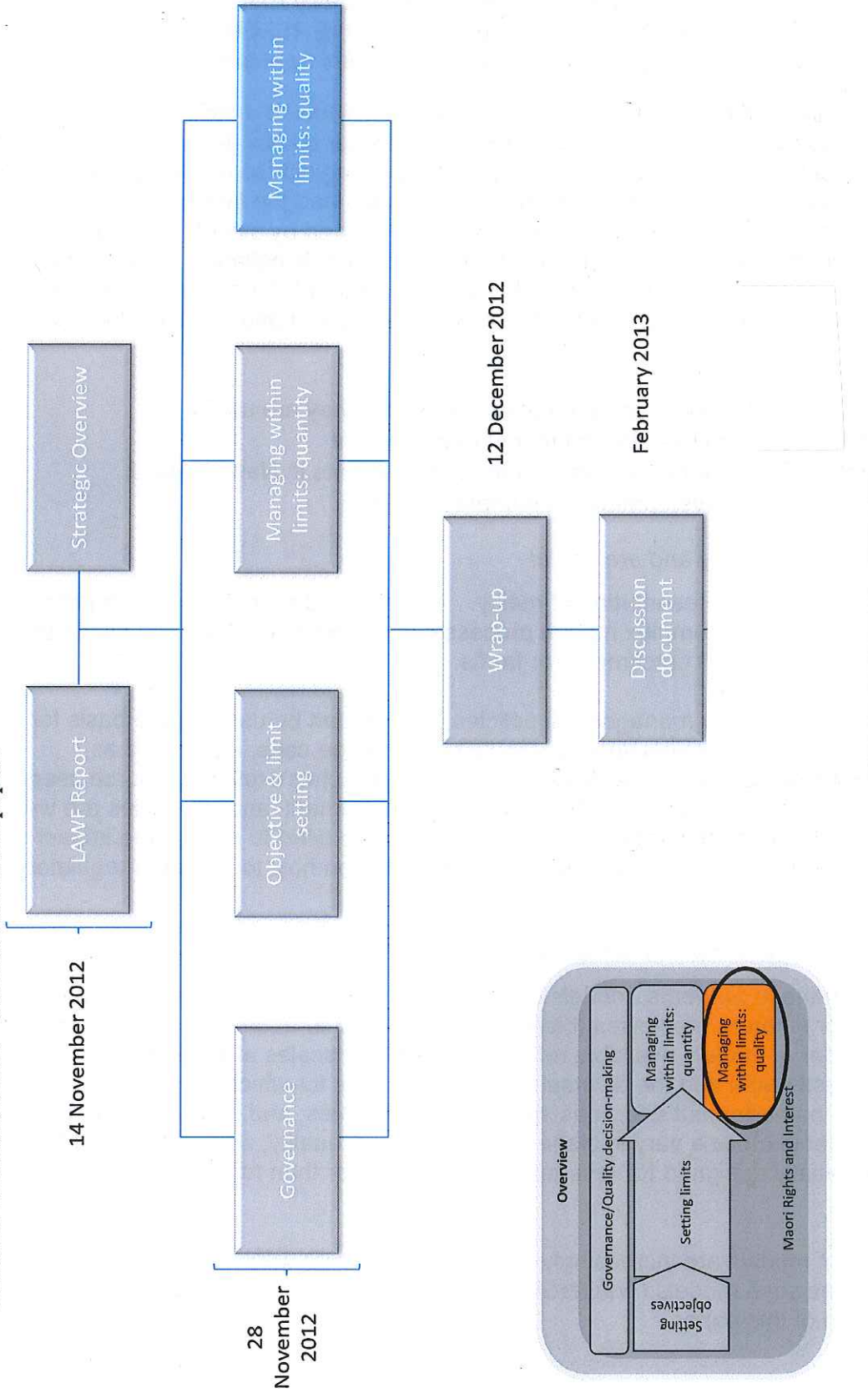
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Hon Amy Adams  
**Minister for the Environment**

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**Annex A: WATER REFORM – Schedule of Cabinet papers**



## **Annex B: Models to inform water quality management decisions**

Models are increasingly being used by regional councils to:

- investigate the impacts of land use activities on receiving waterbodies
- inform policies focussed on managing within water quality limits
- assess compliance with plan provisions (e.g. using OVERSEER<sup>®</sup> to estimate compliance with regulatory caps on nutrient discharges from farming activities).

Reliable estimation of diffuse nutrient discharges from land-based activities has become an increasingly important focus for regional councils, with water quality decline in some areas linked to increases in diffuse discharges. Directly measuring diffuse discharges is currently impracticable given the scale and variability of the problem and the lack of simple low-cost measuring devices. As a result, models have been developed by scientists as an alternative to direct measurement. The most advanced models estimate losses of nutrients (nitrogen and phosphorus) from agricultural land uses, either at the catchment or farm scale. Catchment scale models also exist to estimate sediment and pesticide losses.

This annex:

- explains that while models only approximate reality, they are useful
- outlines the roles models play in nutrient management
- describes three of the models used to manage nutrients in New Zealand
- outlines emerging developments in nutrient modelling.

### *Models approximate reality and are useful*

A model is a simplified representation of reality. Models used for nutrient management decision-making simplify complex natural processes that occur over time and space to predict nutrient losses from catchments or farms.

In developing water quality management policies, models can be used as the basis for output-based policy instruments such as regulated discharge caps, expressed as maximum allowable discharges per hectare. These approaches provide resource users with flexibility in how they respond to the regulatory requirement, and (if policies are well-designed) allow for innovative approaches. Models can be used to assess the impact of different management actions before decisions are made on how to meet the regulatory requirement.

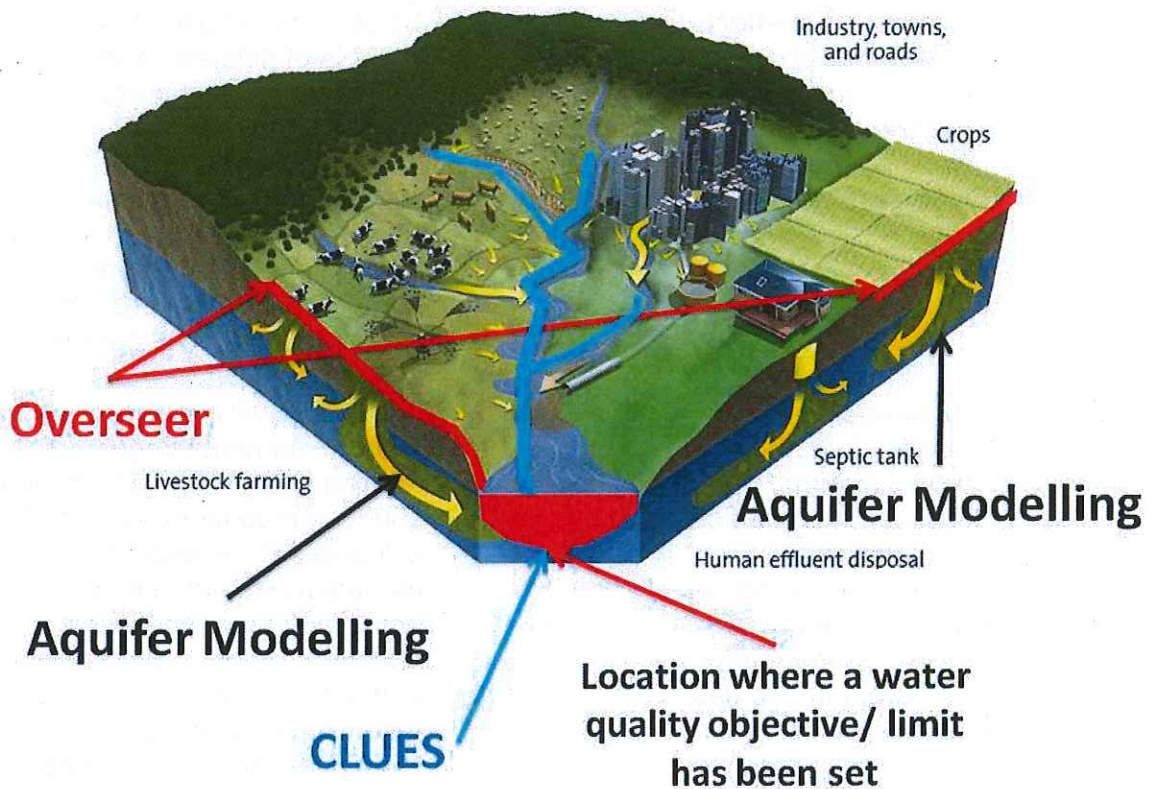
### *Models play a variety of roles in nutrient management*

To effectively manage nutrients, models operating at different scales (farm, catchment or regional) and for different processes (biophysical or/and socio-economic) are needed. The large number of models available reflects the different scales at which such nutrient losses can be estimated and the diverse range of purposes for which such models are used (e.g. farm management decisions such as fertiliser rates; and policy or regulatory use). The available models vary in stage of development, quality, and end uses. Most models were initially designed for research purposes, rather than for policy and regulatory purposes.

A small group of models are increasingly being used to inform water quality management decisions. Three such models (AquiferSim, CLUES and OVERSEER<sup>®</sup>) are discussed in the next section of this paper.

Figure B1 illustrates the way models can interact to provide effective water quality management, linking farm-scale activities to catchment outcomes. Yellow arrows indicate processes that facilitate contaminant movement to water (e.g. overland flow, point source discharges from pipes or drains, and aquifer transfer). Modelled diffuse discharges can be combined with direct measurement of consented point source discharges to estimate losses of contaminants to waterbodies.

**Figure B1: Use of models to inform water quality management decisions**



*Overview of three nutrient management models*

To illustrate the variety of roles that models can play, Table B1 describes three important nutrient management models:

- AquiferSim – a regional-scale model targeted at nitrate levels in groundwater
- CLUES (Catchment Land Use for Environmental Sustainability) – a series of linked models used to assess the effects of land use and land use change in a catchment on water quality and socioeconomic outcomes
- OVERSEER – a farm-based nutrient budgeting model.

**Table B1: Key features of three models used for water quality management**

<b>Model</b>	<b>Description</b>	<b>Scale</b>	<b>Scope</b>
<b>AquiferSim</b>	Models nitrate transport in Canterbury groundwater	Regional	AquiferSim estimates cumulative effects of land use and land use change on nitrate in groundwater based on Geographic Information System (GIS) inputs of land use, soils, climate, and aquifer characteristics.
<b>CLUES</b>	Assesses the effects of land use change on river and stream water quality and socio-economic indicators	A range of catchment scales but not suitable for small catchments	CLUES can be used to assess the impacts of different land use and land management practices (e.g. stocking rates, mitigation measures). It models annual average total nitrogen and phosphorus, E. coli and sediment loads in streams and predicts a range of socio-economic indicators such as farm employment and associated GDP.
<b>OVERSEER®</b>	An annual average nutrient budget model of farm systems that predicts the amount of nitrogen leaching from the root zone, phosphorus runoff, and greenhouse gas emissions	Whole farms or blocks within farms	OVERSEER® enables users to produce nutrient budgets for farming enterprises, and fertiliser and lime recommendations. It calculates the effects of management and mitigation options on nitrogen leaching, phosphorus runoff and greenhouse gas emissions. Users can test “what if” scenarios for changing inputs (e.g., fertilizer, irrigation).

*Emerging developments in nutrient modelling*

Emerging trends and developments in nutrient modelling include:

- greater focus on the importance of enabling the interoperability and linkages between different models (e.g. OVERSEER® provides data for CLUES; the more accurate OVERSEER® becomes, the more accurate CLUES becomes)
- improving data input protocols, ensuring standardised approaches are used for data input by all users
- improving the performance of sub-models representing the farm systems (e.g. pastoral, cropping) and management approaches of key sectors
- providing more training and audit processes for certified model users
- greater stakeholder involvement in developing the models to build trust and provide more transparency to the underpinning science.