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A COLLABORATIVE APPROACH TO GUIDANCE ON THE USE OF OVERSEER IN WATER MANAGEMENT

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Abstract

The 2014 National Policy Statement for Freshwater Management (NPS-FM) requires the maintenance or improvement of water quality. This is to be achieved through regional councils setting water quality objectives and limits. The process for setting objectives and limits requires information on current state and anticipated rates of contaminant losses to water. In some areas, farming is a significant contributor of nutrient losses that impact on water quality outcomes. Because it is not feasible to measure nutrient losses for each farm, modelling is the only way such nutrient losses can be estimated.

OVERSEER® Nutrient Budgets (OVERSEER) is New Zealand's leading farm-scale nutrient modelling software. As part of generating a nutrient budget for a farm, OVERSEER estimates a farm's nutrient losses based on farm system parameters. Because of this, OVERSEER enables rules to be set based on estimated nutrient losses rather than controlling farm inputs and practices. This output-based approach offers flexibility for farmers to determine how they will reduce their nutrient losses and thereby supports innovation in the primary sector.

Given the option to use an outputs-based approach to achieve water quality objectives, some Councils have already started to use OVERSEER in their planning and rule setting. The challenges and opportunities around using modelled information in regulation are now being tested.

While Councils take different approaches to managing the specific risks in their regions, many face similar challenges in applying OVERSEER generated nutrient loss information in the Resource Management Act rules framework. To address this, a collaborative project is now underway to provide guidance on the appropriate use of OVERSEER in policy, planning and compliance.

Guidance will provide usage options alongside their policy implications, including:

- Management of version updates and output uncertainty
- Integration with other planning and modelling tools
- Data input, auditing and management considerations.

To ensure the guidance is widely applicable, development is governed by a project board of five regional councils, the Ministry for Primary Industries, the Ministry for the Environment, OVERSEER Limited, Dairy Companies Association of NZ, Beef & Lamb NZ, HortNZ and the Foundation for Arable Research.

Project Background

Most regional councils across New Zealand are considering how to best manage diffuse farm sources of nitrogen and phosphorus given their impacts on stream, lake and estuary water quality. All regional councils are now obligated to implement the National Policy Statement for Freshwater Management (NPS-FM) (MfE, 2014). Key provisions include:

Objective A2: "The overall quality of fresh water within a region is maintained or improved…"

Policy A1: "…making or changing regional plans to… set freshwater quality limits…"

Policy A2: "…every regional council is to specify targets and implement methods… in a way that considers the sources of relevant contaminants...

The direct measurement of diffuse nutrient losses is impractical and prohibitively expensive and therefore models are used to estimate such losses. New Zealand is fortunate to have a world-class farm scale model in OVERSEER, a model that integrates decades of applied farm research investment. OVERSEER also has a wide and growing network of expert users and a management structure that enables ongoing investment and development (OVERSEER Ltd, 2015). The widespread use of OVERSEER, especially for optimising farm nutrient use, has net benefits to "NZ Inc" estimated at $271 million annually (Journeaux, 2016).

The combination of diffuse nutrient environmental impacts and NPS-FM policy pressure has raised expectations around using OVERSEER as a tool in the setting of nutrient limits, for monitoring and compliance, and to support decision making by farmers. These expectations need to be informed by the actual capabilities and limitations of OVERSEER, combined with recent council experience in using the model. This experience includes current regulatory use of OVERSEER in the following regional plans:

- Waikato Regional Plan, regarding Lake Taupo Catchment (WRC, 2011)
- Bay of Plenty Regional Plan, regarding five Rotorua lake catchments (BOPRC, 2008)
- Hawke's Bay Regional Resource Management Plan, regarding the Tukituki River Catchment (HBRC, 2015)
- Horizons One Plan, regarding Manawatu River and other catchments (Horizons, 2014)
- Canterbury Land and Water Regional Plan (Environment Canterbury, 2015)
- Otago Water Plan Change 6A (water quality), region wide (ORC, 2014).

The common rationale for those councils currently using the model is the desire to manage the adverse effects of farming activities, notably diffuse nutrient loss, without imposing constraints on farm inputs. A focus on managing outputs encourages on-farm and research innovation around alternative farm systems and inputs e.g. plantain and chicory; cow genetics; low N feed supplements; gibberellic acid; the use of infrastructure such as feed pads. Conversely, a regulatory focus on farm inputs (e.g. stocking rate and N fertiliser use) would be contrary to the RMA's "effects-based" principles.

Seeing the need for guidance, several regional councils have initiated a collaborative project with central government to develop guidance on the appropriate use of OVERSEER.

The various parties involved in the guidance project are well aware that there are strongly divergent views about the regulatory use of OVERSEER, with media headlines such as "Horizons councillor worries about Overseer's moving goalposts" (McBride, 2015) and "The trouble with Overseer" (Edmeades, 2015). Amongst those councils using it, widely different regulatory methods have been followed without clarity on why (Baker-Galloway, 2013). There is little Resource Management Act case law regarding the use of OVERSEER. There is no guidance on its use in planning outside evidence provided in specific hearings (Taupo, Tukituki, Canterbury and Horizons) and the information produced for the Taupo nutrient management programme (Nitrogen management in the Lake Taupo catchment (WRC, 2011a)).

Historically, descriptions of OVERSEER have been limited to scientific publications and highly technical documents. This has left policy and planning specialists with limited access to understand the scope of the model and therefore how it can be applied.

The project partners recognised that establishing national OVERSEER guidance appropriate to the planning process, that is descriptive rather than prescriptive, will assist regional councils to choose policy approaches that meet their water quality objectives.

Project Governance and Funding

The overall project (the 'OVERSEER Guidance for Regional Councils' project) is governed by a project board comprising representatives from regional councils, Ministry for the Environment, Ministry for Primary Industries (MPI), Dairy NZ, Dairy Companies Association of New Zealand, Beef + Lamb New Zealand, Horticulture New Zealand, Foundation for Arable Research and OVERSEER Limited. The board was set up at the direction of the Regional Chief Executives Forum following papers outlining a potential guidance project.

The overall cost of the project is approximately $300,000. There are 10 contributing regional council/unitary authorities, with 50% funding from MPI plus contributions from DCANZ and HortNZ. Project management is shared between MPI and Bay of Plenty Regional Council with oversight from the project board.

Project Phasing and Outputs

The first phase of the project produced two reports in 2015: (i) Technical Description of OVERSEER for Regional Councils and; (ii) A Stocktake of Regional Council Uses of OVERSEER. The second phase is underway (as at February 2016) and is scheduled to produce the core guidance material by mid-2016. The third and final phase of the project will address ongoing efforts needed to keep OVERSEER guidance for regional councils up-dated and relevant. These project outputs are addressed in turn below.

Stocktake of Regional Council Uses of OVERSEER

The stocktake project was carried out by Chris Arbuckle from Aspiring Environmental and involved surveys of regional council staff, reviews of regional plans and related literature, plus a workshop with council staff. A broad spectrum of current regional council uses was identified, including extension, science and catchment modelling, policy development, resource consents and compliance. Key findings include:

- Regional council use of OVERSEER will increase substantially as they implement their water management and limit setting policies in response to the NPS-FM
- Councils recognise that OVERSEER has historically been used as an advisory tool to help farmers improve farm management practices and the use of inputs like fertiliser and that it has become a trusted farm decision support tool

- OVERSEER's more recent adoption for regulatory use has been driven by a combination of (i) recognition of farm nutrient losses as a key cause of poorer water quality and (ii) the desire to manage outputs and effects, not farm inputs
- Councils recognise the significant challenges in using OVERSEER in policy development and regulation.

The stocktake report identified a range of guidance priorities for regional councils, including:

- High-level policy principles for each resource management use of OVERSEER
- A definitive OVERSEER model purpose statement, including a layman's explanation of the model outputs and reports
- Case studies and templates of consent documents and rules
- Methods to address model version changes and uncertainty in regulation
- An assessment of the degree of uncertainty for specific farm systems and soils.

Council policy developers noted the need to "fit the policy to the model, not fit the model to the policy". They also emphasised that a single comprehensive guidance document was needed, with input from regional councils, central government and OVERSEER owners.

Technical Description of OVERSEER for Regional Councils

The "plain English" technical description of OVERSEER is available here. It was prepared by AgResearch Ltd and is based on existing technical information and a workshop with users including regional councils. The topics covered in the report include:

- History
- The inputs needed and the reports produced
- Model engine and sub-models on N leaching and P runoff, including the relative impact of key biophysical and management factors on the quantum of N and P loss
- Limitations e.g. not accounting for transformation of N beyond the root zone
- Assumptions e.g. steady-state conditions; actual and reasonable inputs
- Uncertainty in model outputs and sensitivity of the model to specific inputs
- Where to find additional sources of information.

OVERSEER Guidance for Regional Councils

The guidance material is being prepared by a consortium led by Freeman Environmental, with additional input from a Technical Reference Group. The material will cover:

- Guidance on the principles governing the use of OVERSEER in Regional Plans.
- Guidance on the range of appropriate ways to use OVERSEER in policy, rules, compliance and advice.

The scope of the guidance will cover the following areas and topics:

- Principles for the use of OVERSEER, taking account of known model capabilities, assumptions and limitations
- Policy, Rules and Compliance, covering:
    - Policy and rule frameworks and their implications, costs and benefits
    - Model rule wording and consent conditions
    - User qualification, certification and audit requirements
    - Use in conjunction with farm plans and other models and methods
- Data management, including database privacy and access protocols.

The guidance is being developed as a collaborative exercise with input from both technical experts and regional council staff engaged in various stages of integrating OVERSEER into

regional plans. The Guidance will not be prescriptive, but cover the range of appropriate ways to use OVERSEER given its capabilities, limitations and the current policy setting.

Ongoing support around OVERSEER guidance for regional councils

While the production of the guidance will be a significant step to support regional councils in meeting their water management requirements, ongoing collaboration amongst regional councils, OVERSEER Limited, central government and rural industry bodies will ensure the guidance remains up to date and accessible. This will include:

- Updating the guidance documentation
- Knowledge transfer
- Improvements to OVERSEER
- Integration with other tools including farm plans, GIS and catchment-scale models.

Conclusion

OVERSEER is a software application capable of modelling an extensive array of farm systems to produce individualised nutrient budgets. Many regional councils are already using OVERSEER to assess nutrient losses at the farm and catchment scales and to help improve nutrient management decision making, and this usage is likely to grow as councils seek to implement the National Policy Statement for Freshwater Management 2014.

OVERSEER is a model and like all models, it has a range of capabilities, assumption and limitations. However, it is also the only viable means to estimate and hence manage farm nutrient losses. Councils need access to easily understandable, consistent and accurate information about OVERSEER, especially guidance on its application in policy and regulation.

Key industry agencies have joined a group of regional councils in a collaborative project to deliver this guidance material. This project will help farmers retain on-farm management flexibility whilst enabling regional councils to fulfil their water quality management obligations.

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