

April 2024

Responding to the Overseer model redevelopment review

A guide for councils



Ministry for the
Environment
Manatū Mō Te Taiao



Te Kāwanatanga o Aotearoa
New Zealand Government

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This document may be cited as: Ministry for the Environment. 2023. *Responding to the Overseer model redevelopment review: A guide for councils*. Wellington: Ministry for the Environment.

Published in July 2023 by the
Ministry for the Environment
Manatū Mō Te Taiao
PO Box 10362, Wellington 6143, New Zealand
environment.govt.nz

Updated April 2024

ISBN: 978-1-991077-23-3
Publication number: ME 1732

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Introduction

About this guide

This guide supports councils to assess and respond to the OverseerFM review 2021 and subsequent redevelopment, completed October 2023. It does not constitute government direction and should be read in conjunction with the:

- [Government's response to the findings of the Overseer peer review report](#) published in August 2021
- [redevelopment reports](#) published by Overseer Ltd
- final [Overseer Redevelopment Programme Report](#) published by the Ministry for Primary Industries in October 2023.

This guide replaces the previous guide published in July 2023. Changes were made to reflect the final [Overseer Redevelopment Programme Report](#) published by the Ministry for Primary Industries in October 2023. The report recommended the use of OverseerFM in regulation be limited to certain uses.

About OverseerFM

OverseerFM¹ was developed as a farm management tool to help farmers and growers with decisions on fertiliser application. The model was then adopted by regional councils in regulatory settings to manage the effects of nutrient losses from farms on the health of waterways.

Review of Overseer and redevelopment programme

In 2018, the Parliamentary Commissioner for the Environment concluded the model did not meet the levels of documentation, transparency and certainty considered desirable in a regulatory setting.

The Government appointed a Scientific Advisory Panel to complete an independent review of the Overseer model. The panel concluded OverseerFM is unlikely to be a reliable tool for predicting either relative or absolute nutrient loss estimates from farms². Following the independent review, the Government agreed to support a redevelopment programme to address some of the concerns raised. This work concluded in October 2023. To see the full timeline of the review, see the [Appendix](#).

¹ When referring to the tool, we use OverseerFM; when referring to the company, we use Overseer Ltd; and when referring to the models, we use Overseer models.

² Ministry for the Environment and Ministry for Primary Industries. 2021. [Overseer whole-model review: Assessment of the model approach](#). Page 5.

OverseerFM continues to be used in council planning documents in various ways, and each council will need to decide how best to respond. Some of the guidance in this document may not be relevant to every council, and this guidance does not override each council's obligations to implement their regional plans and resource consents in accordance with the law.

The Ministry will continue to support councils with their freshwater plans, consents and compliance monitoring and enforcement requirements.

This guide will be updated as required. For more information about OverseerFM versions and release notes, visit [Overseer Ltd's website](#).

Guidance for councils using OverseerFM to support regulatory outcomes

Previous Ministry guidance remains valid:

- When using OverseerFM, output numbers should not be used as absolute numbers.
- Regulators should continue to use a range of tools and evidence sources when assessing nutrient loss across farms and catchments (referred to as 'a multi-evidence approach').

Responding to the Overseer whole-model peer review

The Ministry for Primary Industries worked with a Technical Advisory Group (TAG) to establish a redevelopment programme for Overseer Ltd to address some of the technical issues raised by the Scientific Advisory Panel. The redevelopment programme was undertaken by NIWA, AgResearch, Plant and Food Research, Manaaki Whenua – Landcare Research, and Overseer Ltd. The initial work was completed in August 2022.

In September 2022, Overseer Ltd released the redevelopment technical reports to the TAG. The technical reports covered:

- analysis of the climate data used in the model with no significant difference found between daily and annual averaged climate data
- analysis of the sensitivity and uncertainty of input data confirming that soil and climate parameters are the main drivers of sensitivity and uncertainty
- new crops and deeper-rooted plants. This work is included in new versions of the Overseer model
- examination of N mineralisation and immobilisation and how this affects modelled outputs. This work is in the peer review process
- development of a multi-layer hydrology model which Overseer is working to include in future versions of the Overseer model.

In addition to the technical reports, Overseer Ltd published several technical manuals that describe model assumptions. Overseer Ltd has also established a managed transparency policy that allows users to access aspects of the model code.

The TAG met at the end of September 2022 to:

- discuss the redevelopment work and the reports
- advise the Ministry for the Environment (the Ministry) how it could incorporate the new information into the original guidance (first published in November 2021).

These reports have been publicly released by Overseer Ltd with the release of each model update. They can be found on their [website](#).

2022 TAG review outcomes

After considering the various technical reports, the TAG concluded that the changes to OverseerFM gave them more confidence in the tool for modelling nitrate loss on free draining soils. However, the TAG was unable to quantify the level of this confidence or determine specific use cases for the tool for different farm enterprise types.

The TAG requested that Overseer Ltd complete validation work to compare modelled loss with measured loss. The TAG stated this may enable them to make more specific statements on the tool's capability for modelling loss for regulatory purposes.

The TAG concluded that as of September 2022, and before the validation work, that the current guidance was still valid:

- Regulators should continue to use a range of tools when assessing farms and catchments when managing nutrients in a regulatory context.
- OverseerFM output numbers should not be used as absolute numbers.

2023 validation work

Model validation was completed in June 2023. Overseer Ltd's technical report³ concludes that "the comparison of the Overseer model N leaching estimates with experimental data produces a 'very good' performance rating for NZ paddock-scale grazing systems". It also concluded that "comparison of the Overseer model N leaching estimates with experimental data produces a 'satisfactory' to 'good' performance rating for a limited cropping system".

The TAG was reconvened and presented with the validation work in June 2023. After discussions, the TAG agreed they had increased confidence in OverseerFM; however, the Ministry's guidance remained valid and was not changed.

Public reports on the work are published on Overseer Limited's website.

October 2023 final report released

In October 2023, the final report was released by the Ministry for Primary Industries (MPI). It summarised the work programme and provided concluding comments about each of the Scientific Advisory Panel's concerns. The recommendation by MPI's Chief Science Advisor, is to "limit [the] use case for OverseerFM in regulation to subsurface drainage losses of nitrate"⁴.

MPI's reasons for this limited use case are:

- Testing against observations for losses of nitrate through leaching was found to be 'very good' in estimating nitrogen leaching from grazed pastures and 'satisfactory' and 'good' for estimating results for cropping data⁵.
- There is ongoing concern about the model's ability to model surface run-off⁶.
- Further research is required to identify when ammoniacal nitrogen is a significant contributor to N-loss on the farm⁷.

However, the Ministry's guidance remains consistent:

- When using OverseerFM, output numbers should not be used as absolute numbers, as it is a model, with uncertainty around simulated outputs.

³ [Assessment of Overseer model performance with experimental data from grazed pastures](#). (August 2023), page 21.

⁴ Overseer redevelopment programme report 2023, pages 4, 5 and 6

⁵ Overseer redevelopment programme report 2023, page 2.

⁶ Overseer redevelopment programme report 2023, pages 5 and 30.

⁷ Overseer redevelopment programme report 2023, pages 5 and 30.

- Regulators should continue to use a range of tools and sources of evidence when assessing nutrient management at farm and catchment scale (often referred to as 'a multi-evidence approach').

General principles

The Government's response in 2021 acknowledged that councils need a range of tools to achieve freshwater outcomes. At the time the Government committed to ensuring councils and resource users have access to reliable and practical tools to effectively manage nutrient discharges through the planning and consenting framework.

The Ministry recognises that councils must continue to implement their plans, administer existing consents, and process new consent applications in a way that promotes the objectives and policies of their respective plans and the National Environmental Standard for Freshwater, despite the issues raised in the review report.

The Ministry recommends councils remain alert to the Scientific Advisory Panel's concerns and become familiar with the technical reports and final report on the redevelopment programme. Where possible, within their existing policy and consenting frameworks, councils should adopt a best information approach and look for opportunities to support decisions made using OverseerFM data with other evidence.

When issuing new consents, preparing new regional plans, or changing existing plans, councils should use wording that will provide for maximum future flexibility for assessing nutrient loss from a range of tools that may become available.

Operative regional plans that use OverseerFM

Where operative plans use OverseerFM, considering other information in addition to OverseerFM outputs and reports, may give increased confidence in councils' nutrient-management decisions.

More information about implementing operative plans is provided in these sections:

- [Using OverseerFM in resource consent processing](#)
- [OverseerFM and compliance monitoring and enforcement.](#)

Proposed plans and plan reviews in process

The Ministry recognises councils have regional plans at varying stages of development. The effect of the review and technical reports on these plans will vary depending on the extent to which a plan uses OverseerFM as a nutrient management tool.

Current plan hearings and appeals

Councils continuing with existing plan processes are encouraged to take account of the findings in the review, technical reports, and final report where possible. Councils may wish to consider opportunities through the Resource Management Act 1991 (RMA) Schedule 1 process to complement the use of OverseerFM as a nutrient modelling tool. As highlighted in the Government's response in 2021 and MPI's final report 2023, this will be particularly important where landscape factors, types of drainage, and other evidence suggest nitrate-nitrogen is not the dominant species of nitrogen loss at the farm or catchment scale.

Plan development

The National Policy Statement of Freshwater Management 2020 (NPS-FM), clause 3.13, requires councils to set nutrient concentrations and exceedance criteria and translate these into limits on resource use (NPS-FM clause 3.12) (including property-scale controls). Refer to our guidance for [setting instream nutrient concentration thresholds for nutrient-affected attributes in rivers](#).

OverseerFM can still be used to help estimate catchment loads or limits (subject to the qualifications set out in section 4.2 of the [Government's response](#)). Therefore, preparations for publicly notifying new freshwater planning instruments to achieve target attribute states can continue.

Using OverseerFM in resource consent processing

Councils use OverseerFM to different degrees and in different contexts. Some councils have the model embedded within their planning and consenting framework. Others use it as a non-regulatory method to encourage good farm management practices. The Government's response outlined some general principles (section 4.1.1) for implementing existing consents and for consent processing. More detailed guidance follows, although due to the generic nature of the guidance, it may not be relevant to all councils.

Requirements for consent applications

Where regional plans require resource consents for an activity, an application for a resource consent must be made to the relevant consent authority and councils must process those applications subject to the RMA. Section 88 and Schedule 4 of the RMA state what information

must be included in an application and supporting assessment of environmental effects, including the provision of sufficient detail for processing.

OverseerFM outputs provided with resource consent applications are a common method used by applicants to develop supporting evidence in relation to nitrate-nitrogen losses below the root zone, and to a lesser extent, phosphorus loss. Overseer analyses inputs are also used to capture and compare detailed descriptions of the existing land use and the proposed activities. In some cases, plan rules require OverseerFM assessments to be undertaken as part of a consent process. Councils will need to be mindful of the uncertainty of such estimates, particularly where nitrate-nitrogen is not the dominant species of nitrogen loss at the farm or catchment scale. Where possible, councils are encouraged to seek additional evidence to support any conclusions reached.

Each council has its own information requirements for resource consent applications to be considered complete and sufficient for processing. They may also wish to consider whether the following information would be necessary and appropriate to support their decision-making:

- detailed descriptions of the existing land use and the proposed activities
- detailed descriptions of the receiving environment and its current state (both localised and catchment-scale), including:
 - all attributes and components of the local freshwater system
 - how the attributes and components are connected
 - identifying nearby water users and consented contaminant discharges
 - sensitive receiving environments (eg, wells, springs, wetlands, streams, lagoons, lakes)
- a monitoring plan for farm activities and for the receiving environment, including proposing actions or responses required should environmental deterioration occur
- a full assessment of relevant contaminants, determined by the proposed activity and the receiving environment.

The responsibility for providing information on the actual and potential effects of an activity lies with the consent applicant. Resource consent applicants may enlist technical experts to undertake assessments based on the research, models and tools available and provide those assessments with their applications.

Assessing resource consent applications

Councils are legally required to continue to process resource consent applications in a way that promotes the objectives and policies of their plans, irrespective of the matters raised by the review report 2021 and the final report 2023. Where a regional plan requires OverseerFM be used, this remains a legal requirement that applicants and consent holders must comply with.

Much of the discussion below relates to information and assessments required to give confidence to assessment of effects, where OverseerFM is not sufficient to provide that confidence. This is important as decisions on notification, affected parties, and ultimately, the application, may now require additional and different information.

Where regional plans provide an input-based regime, or an alternative model is available

There will be minimal impacts on processing resource consent applications where the relevant regional plan is focused on input-based controls and practices, rather than property-scale OverseerFM limits. The processing of such resource consents and substantive decision-making under input-based regimes can continue.

Some regional plans allow the use of alternative models to OverseerFM. When assessing and deciding on resource consents, councils must consider the effects of an activity on the environment. Any model used, should contribute to the achievement of water quality being maintained or improved.

Assessing the effects on the environment

When OverseerFM is used in regional plans, councils are encouraged to use OverseerFM in combination with a multi-evidence approach to determine actual and potential effects on the environment. Such information may include the input data and information typically used for OverseerFM assessments, or other farm management practices known to influence nitrogen loss.

Modelled estimates of nutrient outputs rely on detailed and robust farm management input data and a sound understanding of how changes in farm management practices might influence nutrient outputs. Irrespective of whether the on-farm actions or practices have been informed by OverseerFM or expert opinion, on-farm good management practices need to be supported by a robust collection of expert knowledge. This body of knowledge will continue to be useful in assessing the actual and potential effects of an activity.

Generally, the Overseer model has assumed that the inputs have been implemented on-farm in accordance with industry agreed good management practices. Regardless of loss numbers generated using OverseerFM, the ongoing implementation of these agreed good management practices will offer some opportunity to reduce contaminant loss risk.

Considering cultural values when processing farming land use and discharge permits

Councils are encouraged to engage with tangata whenua when processing resource consent applications for farming land use and discharge permits as set out in regional plans. This is particularly important where there is a risk that cultural values and mahinga kai (traditional food gathering practices) could be impacted by the proposed land use and discharge activity.

Relevant matters of control or discretion

Councils will need to closely consider controlled and restricted discretionary activities to determine whether additional information is required and if conditions requiring input-based controls or other restrictions should be imposed.

Request for further information and processing timeframes

Sufficient information and assessments of the actual and potential effects on the environment should be provided as part of an application for resource consent. However, requesting further information in accordance with section 92 of the RMA may be required. If additional information is required, and information has already been requested under section 92 of the RMA, timeframes may potentially be extended using section 37 of the RMA.

Resource consents under the National Environmental Standard for Freshwater

The National Environmental Standard for Freshwater (NES-F) contains regulations that apply to a range of activities that pose risks to freshwater and freshwater ecosystems. Much of the NES-F controls on intensification are temporary, in that many of the requirements no longer apply after regional plans are publicly notified to give effect to the NPS-FM.

The regulations apply to activities including land-use intensification and the associated discharges of contaminants into or onto land including where the contaminant may enter water (both surface and groundwater). The sections below provide further information about how councils may approach resource consent applications made under the NES-F.

Agricultural intensification

Temporary standards that relate to agricultural intensification are set out in Part 2, subpart 2 of the NES-F. Regulation 24 of the NES-F set out the conditions for granting resource consents for agricultural intensification activities that are classified as discretionary activities. A resource consent for a discretionary activity under subpart 2 of the NES-F (regulation 24) may only be granted if the consent authority is satisfied that granting the consent will not result in an increase in:

- a) contaminant loads in the catchment, compared with loads as at the close of 2 September 2020; or
- b) concentrations of contaminants in freshwater or other receiving environments (including the coastal marine area and geothermal water), compared with the concentrations as at the close of 2 September 2020.

Some councils and resource consent applicants may have expected OverseerFM modelling to be the primary method used by applicants to develop supporting evidence that the above two conditions have been met. Given the findings in the Overseer model final redevelopment report, OverseerFM may still be appropriate to prepare some of this evidence when nitrate loss through subsurface drainage (ie, nitrate leaching) is the main pathway for nutrient loss. However, the use of OverseerFM alone for this purpose is unlikely to provide sufficient certainty that the requirements of Regulation 24 are satisfied when regarding non-nitrate-nitrogen species.

Applicants are encouraged to continue to supply OverseerFM assessments as part of their application. Councils need to be mindful of model output uncertainty and should also consider other evidence to support any decisions.

Depending on the situation, applicants may need to provide assessments showing how all potential sources of relevant contaminants will be managed to ensure the risk of contaminant loss to water will not increase beyond the existing activity. Risks for contaminant losses may include:

- slope
- soil type
- climate
- depth of groundwater
- presence of surface water bodies, setbacks and riparian management
- changes in vegetation cover
- irrigation
- stock type and stocking rate
- forage type
- fertiliser application rates and timing
- stock management and wintering practices
- use of imported feed
- effluent management
- cropping and cultivation.

The consent applicant is responsible for demonstrating whether the activity can meet the conditions of Regulation 24 of the NES-F. There is a considerable body of scientific literature that can inform the likelihood and associated effects of contaminant losses through land-use intensification. This can be used by resource consent applicants (or technical experts engaged by the applicant) in preparing applications for agricultural intensification under the NES-F.

Synthetic nitrogen fertiliser cap⁸

Part 2, subpart 4 of the NES-F (which came into effect on 1 July 2021) regulates the application of synthetic nitrogen fertiliser to pastoral land. Regulations 32 and 33 of the NES-F limits the application of synthetic nitrogen fertiliser to 190 kilograms of nitrogen per hectare per year (kg N/ha/yr) as a permitted activity, referred to as the 'N cap'. If an applicant seeks to apply more synthetic nitrogen fertiliser than the N cap, a resource consent is required as a non-complying activity in accordance with Regulation 34(2) of the NES-F.

Regulation 34(2) of the NES-F states that a resource consent may be granted for the non-complying activity only if (in addition to section 104D of the RMA being satisfied):

- a) the applicant provides the consent authority with a report by a suitably qualified and experienced practitioner that—
 - i. sets out good practices for applying synthetic nitrogen fertiliser to the land in pastoral land use in each relevant contiguous landholding; and

⁸ Guidance for nitrogen cap can be found on the Ministry's website: [Synthetic nitrogen fertiliser cap | Ministry for the Environment](#).

- ii. states that granting the consent would not result in the rate at which nitrogen may enter water exceeding the baseline rate⁹ for each contiguous landholding; and
- b) the consent authority is satisfied as to the matters in the practitioner's report.

Most councils would expect an OverseerFM report and nutrient budget to be used in support of an application to demonstrate that the estimated baseline nitrogen leaching rate is not being exceeded despite the use of fertiliser above the N cap.

Previous guidance stated that the review report's (2021) findings and the 2022 redevelopment review meant that relying solely on the Overseer model may be insufficient to satisfy a council that this test is met. The MPI final report (October 2023) states increased confidence in OverseerFM for modelling of subsurface drainage of nitrate, but not for overland loss pathways of N or other species of N. Applicants are encouraged to use alternative sources of evidence to corroborate any Overseer modelling.

Regulation 34(6) of the NES-F provides an alternative pathway to the requirements of Regulation 34(2). Resource consent may be granted as a non-complying activity (subject to section 104D of the RMA) if the consent authority is satisfied that the applicant has provided a synthetic nitrogen reduction plan. The consent authority needs to be satisfied that at least one of the gateway tests in section 104D is satisfied.

The synthetic nitrogen reduction plan must demonstrate how the applicant will reduce their use of synthetic nitrogen fertiliser year by year so that their application of synthetic nitrogen does not exceed the N cap on or after 1 July 2023.

Councils must determine whether the matters requiring consideration in section 104 and the jurisdictional threshold in section 104D of the RMA can be met for consent applications to exceed the N cap. This requires the council to make a case-by-case assessment of the application considering the matters set out in section 104 and 104D of the RMA.

Resource consent conditions

Section 108 of the RMA enables the consent authority to include conditions on a resource consent. Conditions typically define the scope of the consent and specify limits or actions to avoid, remedy or mitigate the effects of the activity authorised by the resource consent.

Conditions that are input-based

Councils are encouraged to use a range of evidence when assessing the need for input-based consent conditions (eg, stocking rate and fertiliser application). OverseerFM is one method that could be used to run scenarios to test the effectiveness of different input-based conditions.

Conditions that include property-scale OverseerFM limits

Where regional plan rules mandate conditions that include property-scale OverseerFM limits, councils are encouraged to consider, where possible, a hybrid approach. This may include a requirement to report on input-based conditions and other non-model-dependant factors that

⁹ Baseline rate is defined in Regulation 34(5) of the NES-F.

are provided in application documents such as critical source areas, so that multiple pieces of evidence are relied on by the council. Where possible, councils should not write absolute OverseerFM output numbers into consent conditions.

Some activity classifications within regional plans may constrain the types of conditions that councils can include on resource consents (such as controlled or restricted discretionary activities). Such situations will need to be carefully considered, as conditions beyond matters of control or restricted discretion may not lawfully be included.

Resource consent durations

Section 123 of the RMA details the possible durations for resource consents. Councils may wish to consider granting resource consents for shorter durations and include reference only to property-scale OverseerFM limits.

A longer timeframe could be considered if flexibility is built into the conditions to allow either new management approaches, revised versions of the Overseer model, or other nutrient management tools, when they become available.

OverseerFM and compliance monitoring and enforcement

Existing resource consents and permitted activity rules remain valid authorisations of resource use. Councils can continue to monitor these authorisations to establish the level of compliance that is occurring with relevant national and regional policies and plans.

Enforcement of consent conditions

Conditions that specify the use of OverseerFM may remain enforceable. However, when making decisions about enforcement action councils should be aware of:

- the concerns raised in the review report (2021)
- the redevelopment reports.

We encourage councils to consider evidence in addition to model outputs if any enforcement action is to be undertaken.

Prioritising high-risk activities

If changes are required to the resource consent to ensure potential adverse effects are appropriately avoided, remedied or mitigated, the council may wish to consider reviewing the consent under section 128 of the RMA. It is possible that in some situations, a consent holder may apply to change consent conditions under section 127 of the RMA. Councils should continue to exercise their usual decision-making when considering these options.

To find out more about OverseerFM see the [Overseer page](#) on our website.

Appendix: Overseer Model review timeline

Date	Activity
December 2018	The Parliamentary Commissioner for the Environment published the report <i>Overseer and regulatory oversight: Models, uncertainty and cleaning up our waterways</i> .
March to October 2019	Terms of reference for the review of the Overseer model were developed in consultation with Overseer Ltd and Overseer owners.
May 2019	The Parliamentary Environment Committee initiated a joint briefing with the Primary Production Committee and held a joint hearing to consider the Parliamentary Commissioner for the Environment's report.
November 2019 to March 2020	Science Advisory Panel selection process and contracting. Panel membership finalised in March 2020. An expert panel of eight members was selected involving the Prime Minister's chief science adviser and the chief science advisers from MPI and the Ministry for the Environment.
February 2020	Project review scope and terms of reference finalised.
March 2020 to July 2021	The Science Advisory Panel held workshops and meetings considering multiple verbal and written presentations.
October 2020 to February 2021	The Science Advisory Panel's draft report provided to Overseer Ltd and Overseer owners for fact checking.
April 2021	The Ministry for the Environment and MPI convened an Expert Advisory Group to determine the implications of Science Advisory Panel report findings for regional council compliance and planning purposes.
30 June 2021	The Science Advisory Panel completes its final report.
July 2021	Government reviews the Science Advisory Panel's report.
August 2021	Government publishes its response.
September 2021	A Technical Advisory Group (TAG) was convened to provide advice on establishing an Overseer redevelopment programme.
December 2021	Work begins on Overseer redevelopment programme.
September 2022	The TAG was presented with redevelopment reports for consideration, Additional validation work was requested to be completed.
June 2023	Validation work was completed and presented to TAG. The TAG holds its final meeting.
October 2023	MPI publishes the final <i>Overseer Redevelopment Programme Report</i> .