

SUBMISSION

To: Taumata Arowai (email: korero@taumataarowai.govt.nz)

From: Lowe Environmental Impact (email: office@lei.co.nz)

Date: 24 April 2025

Subject: Questionnaire Response: Submission on proposed wastewater environmental performance standards

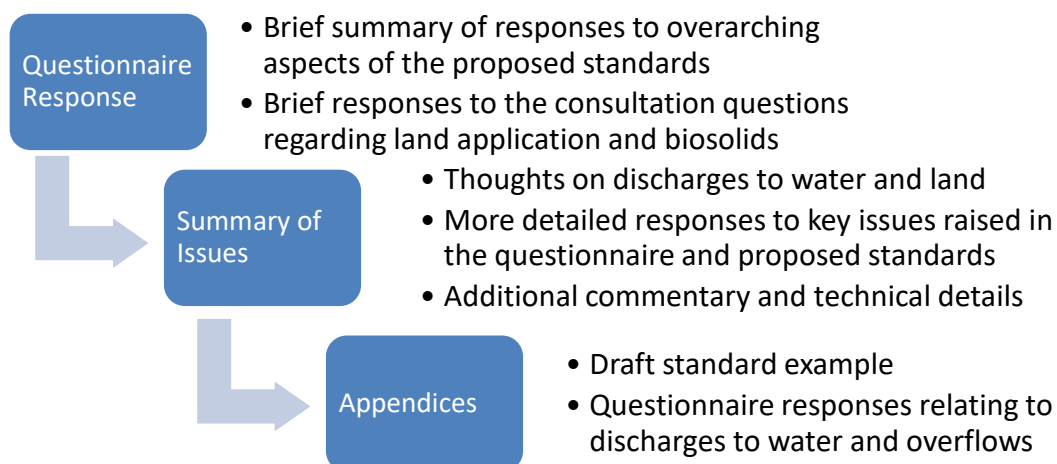
This document serves as the first in a series of papers that collectively provide a submission from Lowe Environmental Impact (LEI) regarding Taumata Arowai's proposals for national standards for wastewater discharges.

LEI is a consultancy specialising in designing, consenting, and monitoring land discharge systems for wastewater treatment. Land treatment systems often involve discharges to water, and we comment on these where appropriate, but our main focus for this submission is on the proposed standards for wastewater land discharge and management of biosolids.

INTRODUCTION

On 24 February 2025, Taumata Arowai initiated public consultation on its proposals for national standards for wastewater discharges which address four key aspects: discharges to water, discharges to land, overflow and bypass discharges of raw wastewater, and discharges of biosolids to land. Specific questions were included in the proposals to help focus submissions.

A number of LEI's responses to the questionnaire and commentary on elements of the proposals warrant more detailed information, which is technical in nature; so LEI are preparing a series of documents with different levels of detail, which all support this submission. The relationship between these documents is as follows:





The intention of this structure is to provide LEI's core views on the questionnaire topics and to refer readers to the linked documents for more in-depth information. This enables readers to choose to read the depth of technical detail that suits their level of interest.

The table below of LEI's responses to the proposal's questionnaire focuses on general matters, discharges to land, and biosolids – these being LEI's core areas of expertise.

LEI staff have been directly involved with developing the Biosolids Guidelines (including the 2003 Guidelines), so LEI's submission includes some responses to help clarify the incorporation of the Biosolids Guidelines into the Standards.

In relation to discharges to water, overflows, and bypasses, while not core areas of LEI's expertise, we have provided comment in the supporting documents.

Raw wastewater overflows are always an element of reticulated wastewater systems that LEI has needed to address as an integral part of discharge management, so LEI's submission includes some commentary on these.

RESPONSES TO THE CONSULTATION QUESTIONNAIRE

Consultation Question	LEI Response
Scope of Proposed Discharge Standards	
Do you agree with the areas the first set of standards are proposed to cover?	Yes, all four types of wastewater discharges are appropriate and timely for national standardisation for consenting with 35-year terms or controlled activity status for discharges that comply with these standards and relevant criteria. LEI fully supports the development of nationally consistent wastewater discharge standards. Some of the exclusions could be reduced by including them in the standards. Non-potable beneficial reuse should be included in land discharge standards, as this is often a related outcome of discharges onto farmland and provides a significant future opportunity for the use of treated wastewater. LEI supports the exclusion of emerging contaminants and other chemicals from limits and monitoring because this is appropriate until scientists become more confident of thresholds for adverse effects. Small WWTP's should have different standards than larger WWTP's. However, future WWTP's for small communities should also be allowed to achieve the standards for existing small WWTP's. Scale and significance of the discharge is important to consider. There appears to be a conflict where the standards impose discharge limits that determine the consent term and classification, but when a WWTP is unable to meet the discharge quality limits, the Regional Council is unable to specify different discharge quality limits in the granting of a resource consent. This looks to be a Catch 22 situation that will force WWTP's to be upgraded to achieve the discharge quality standards regardless of other factors.



Consultation Question	LEI Response
What areas should we prioritise to introduce wastewater standards in future?	1. Existing small community WWTP discharge standards. 2. Biosolids discharge to land standards. 3. Discharge standards for combined land and water systems, rapid infiltration systems, and treatment that includes wetlands. 4. Private systems that may be vested in public ownership or operation. 5. Future small community WWTP's.
What topics should we cover in the guidance material to support implementation of the standards?	Technical Manual of methodologies and scoring criteria for land suitability categorisation, risk mitigations, discharge design and management, and classification of overall suitability of a land discharge system for achieving the standards.
Are there particular groups we should work with to develop guidance and if so, who?	Yes. Water New Zealand, Local Government New Zealand, and New Zealand Land Treatment Collective (NZLTC).
How should factors such as climate change, population growth, or consumer complaints be addressed when considering a 35-year consent term?	Consent conditions often include regular (5- or 10-yearly) reviews that can be triggered by and consider all of these issues. This is related to the compliance function of Regional Councils and incurs some cost for the consent holder, but reviews are usually cheaper and more tightly focussed than consent renewals. Reviews can add or amend consent conditions, require changes to monitoring or management, modify limits, require infrastructure upgrades, or require more detailed investigations and action plans. There is scope for a specific review or optimisation condition to be developed that allows incorporation of new ideas and standards or requirements, while providing ongoing certainty that does not incur additional costs. Such a review condition could be used universally across all wastewater discharge consents. Growth of communities' wastewater discharge to land can be partially managed by staged implementation of treatment infrastructure, using mass loading rates and capping nutrient discharge mass. This can be achieved by allowing for increased treatment as flows increase while maintaining catchment nutrient balances. This gives communities the flexibility to invest in combinations of land area and WWTP upgrades to improve discharge quality. Alternatively, if the consent application, regardless of whether it is for new or renewed discharges, can be processed with certainty, such as a controlled activity with standard conditions, a shorter duration than 35 years could be appropriate. This is because it will no longer be expensive and uncertain to re-consent and update the system to deal with changes that have occurred in the interim.
How long should wastewater treatment plants be able to operate under section 124 of the	The reasons for s124 RMA continuing to allow WWTP's to discharge for many years after their consents expire are typically related to concerns about effects of re-consenting these discharges and/or



Consultation Question	LEI Response
RMA once wastewater standards have been set?	stalled consultation. Environment Court appeals are also a common reason for long s124 RMA periods. Whilst lengthy s124 RMA periods are undesirable, the only way to end these is to process the renewal consent application. Processing without sufficient information and/or inconclusive consultation will lead Regional Councils to decline those consents or grant them for short terms. This increases the risk of appeals to the Environment Court further extending s124 RMA times, and additional costs. If s124 RMA continuations of expired consents are given a fixed timeframe, while this creates a consent processing endpoint, it may not change the overall duration. This may create situations where discharges continue but without any consent. This means that consent conditions will no longer apply, and Councils will face an on-going risk of enforcement action. Having national standards will help address the consent process uncertainty and overcome the obstacles that currently prevent consent renewals being processed and cause lengthy s124 periods. There does not appear to be a practical way of minimising s124 RMA timeframes without causing other legal and consent processing issues. Therefore, LEI does not support a time restriction for s124.
Discharge to Land Standards	
Are the proposed parameters appropriate to manage the impact of wastewater discharges to land?	<u>Overall</u> Adopting standards that provide clear minimum requirements are appropriate. The key is ensuring that minimum requirements are appropriate and relevant to the land characteristics and land use; which both influence potential offsite environmental effects and the long term viability of the land based system. Our view is the selection of parameters and rationale for setting limits does not appear to be consistent with how the parameters for discharges to water have been selected. A consistent approach is a relevant consideration as there are often opportunities to have both water and land discharges for the same facility. <u>Nutrients</u> Using total land-based nitrogen and total phosphorus loading rates as the primary parameters to manage the impacts are appropriate. LEI fully endorses this approach because loads are easily measured, within the control of the consent holder, and directly manage adverse effects. The alternative approach of limiting nutrient losses based on Overseer modelling that many Regional Councils rely on is a more problematic way to assess and manage adverse effects. It is often subjective, open to interpretation and adds costs. The use of the loading rates, however, should consider land type and land management. Both vary considerably around the country and the proposed standard limits are in some cases too high, and others potentially too low. The land loading limits would benefit from linkages with land management considerations.



Consultation Question	LEI Response
	Aside from the suitability of the methodology, the limits proposed for Class 1 locations are high, possibly too high and unsustainable. The hydraulic loads (annual water application depths) may also be unsustainably high for low-strength wastewater and nitrogen loads above 300 kg N/ha/y. Soil's ability to retain phosphorus needs to be considered in the standards, as this is highly variable around the country. Further, having low Total Phosphorus limits, often associated with surface water discharges to minimise aquatic effects, will increase sludge volumes generated by WWTP's. Where a dual discharge system is used this could be an unnecessary cost for both the new infrastructure but also the need to eventually manage and discharge the sludge. <u>Pathogens</u> In many cases, using <i>E. coli</i> concentrations is not relevant. The proposed limits are very low and, in many agricultural settings, not needed. However, when considering amenity land uses near spray irrigation, they might warrant some restrictions if buffers and wind speed limits are insufficient to manage health risks. Soils can tolerate higher pathogen concentrations than waterways. Buffers and wind speed restrictions for spray irrigation and driplines placing the wastewater either on the ground or subsurface readily manage pathogens and protect public health. Soils will usually filter out pathogens, and most pathogens will die in soil. Sunlight and drying will kill pathogens. Exclusion periods for stock and people accessing the discharge area can readily manage health risks. Limiting <i>E. coli</i> in its current form is not supported and is not considered necessary. We note that such a limit may significantly encourage preference for water discharges. WWTP's discharging to land and water will likely need to achieve the more restrictive limits all the time. This will in many cases, incur cost by requiring additional treatment technology. <u>Hydraulic Rates</u> Adopting daily discharge rates and application event limits are appropriate parameters for managing discharges to land. However, limiting <u>all</u> discharges to 5 mm/h and 15 mm/event is not necessary in some instances. The standards need to clarify that the 15 mm/event is appropriate, or whether it should be 15 mm/day. Minimum return periods and/or maximum weekly limits could be specified. There should ideally be clear limits for deficit, non-deficit, and perhaps rapid infiltration discharge regimes. These would be more appropriate and more flexible than the proposed fixed limits of 5 mm/h and 15 mm/event. Currently these limits would exclude a number of currently consented systems that have acceptable effects on the environment and potentially require significant upgrades if they were to be re-consented to meet these limits.



Consultation Question	LEI Response
	The proposed limits provide no linkage with the soil properties nor with limiting soil moisture and drainage to groundwater. Specifying deficit and non-deficit limits for different soil types would help to address this. Sandy sites are better able to cope with higher applications and year-round than heavier clay soils which potentially should have a lesser application rate limit. See LEI's Summary of Issues for more details on the proposed parameters.
What benefits and challenges do you anticipate in implementing the proposed approach? Are there other particular matters that could be addressed through guidance material?	<u>Benefits</u> Standardised discharge parameters and consent conditions with 35-year terms are highly beneficial. This avoids debate about site suitability and land discharge limits. Existing publicly accessible online GIS data layers support the initial desktop site selection and assessment processes proposed. GIS data is commonly used by land discharge designers for initial assessments of site suitability. Attributes typically include soil properties, terrain (slope, elevation, and waterways), current land uses, flood hazard risks, geology, groundwater, and heritage sites. Climate and soil moisture deficit variations are also included in initial assessments. The S-map soil categories can be combined with terrain data to categorise the land according to the soil and landscape classifications prescribed by the Dairy NZ Code of Practice for Farm Dairy Effluent or other guidelines. These may be more appropriate than the risk categories proposed in Taumata Arowai's standards. This initial assessment process and sources of data could be incorporated into the information made available, and/or used to refine the category criteria that have been used. Standardised buffers and other risk management measures will be beneficial for designing and consenting land discharge systems. It will be helpful to develop a standardised methodology for assessing the effectiveness of mitigation measures for reducing risks and to classify the suitability of the site and proposed land discharge system. <u>Challenges</u> <i>Site Selection and Discharge Design</i> The standards have an incomplete process for selecting sites, developing designs, incorporating mitigation measures, and minimising adverse effects. The land suitability assessments and risk management process are not consistent with best practice, Dairy NZ Code of Practice, or LTC Guidelines (which are referenced in the Standards). It is unclear how mitigations (especially design mitigations) reduce the risks and enable systems. This is an iterative process, which the current flow chart in the draft standards does not clearly show. There is also confusion about the various types of categories used for different attributes or parameters in the draft standards' tables and flow chart.



Consultation Question	LEI Response
	The land selection and discharge management proposal is unclear. Guidelines ideally need to be developed and robustly reviewed before confirming the standards. We note that it would be challenging to do this before August 2025. Points of note: we do not consider natural hazards to be fatal to land discharges. Flooding can be accommodated. Volcanic eruptions are rare. Faults rarely rupture the land surface, and shaking can be destructive across very large areas and long distances from the earthquake's epicentre. While we anticipate the iterative implementation of the risk, mitigation, and site characterisation process would incorporate a scale and significance assessment, this detail appears still to be developed. Therefore, care is needed to not overstate the risks of natural hazards. Good practice with developing land discharge systems involves an iterative process of adjusting design and mitigation measures to reduce adverse effects until an integrated system and acceptable effects are achieved. Storage and discharge management, including to surface water, can be adjusted to reduce effects. The current proposal does not appear to provide for this. <i>Efficiency of Funding Environmental Improvements</i> Land discharges can be expensive ways to improve waterway health. Investment into rural catchments to reduce nutrient loads from other diffuse sources can be much more financially efficient than WWTP upgrades to reduce discharge effects when adopting a holistic approach. Acknowledgement of this potential offset mitigation is needed. Discharging to land can achieve direct benefits for waterways, as it removes a source of contamination from the waterway. However, the cost of accessing land (lease or purchase), constructing discharge systems, and operating them is high and needs to be weighed alongside WWTP upgrades and continued surface water discharges. There are no incentives to develop land discharge systems when it is cheaper to upgrade WWTP's and obtain consents for discharges to water. It is unclear where the standards consider tangata whenua/awa values, which typically prefer land discharges over water discharges. It is also unclear how consideration is given to Regional Council policy which in most regional plans is directive to adopting land application systems. <i>Combined Land and Water Discharge Systems</i> The standards do not integrate water and land systems at all, yet combined systems are commonplace. Reference is given to mix and match, but it is unclear how water and land discharges regulated by different standards work together. A standard for combined land and



Consultation Question	LEI Response
	water discharge systems would be very helpful, or at least a linkage between water and land discharges. <i>Exclusions</i> The focus of the standards is very narrow. There are other land discharge systems, and a much broader range of mix and match options, that provide for beneficial reuse that could be included. The standard is too narrow in its scope or at least does not set up the development of other complementary standards. The exclusions lend themselves to being covered in their own standard. This includes rapid infiltration and beneficial reuse; albeit beneficial use needs closer attention to its definition to identify current and future opportunities for New Zealand. This standard needs to be clearly defined as a discharge to land by irrigation standard, and there should be acknowledgment that other standards, such as high rate systems, need to be developed.
Are the monitoring and reporting requirements proportionate to the potential impacts of the different discharge scenarios?	Groundwater monitoring can be onerous for large sites and terrain or groundwater with diverse downstream directions. The prescriptive approach is good but questionable if it is appropriate for varying land use and site conditions.
Other feedback	It is unclear how these standards will be implemented: • Will they be Regulations, NES/NPS, and/or Guidelines? • How will these interact with Regional Plan Policies and Rules? • Will the Regional Plan provisions be replaced, or only overridden in specific circumstances? The example WWTP's described in the supporting material have errors which provide incorrect details of the schemes. This has the scope to lead to conclusions and recommendations that are incorrect. Details provided require correction. A number of WWTP's have been successfully consented in the last 10 years based on good or best practice that meet Regional Council Policies and RMA principles, yet they may not fully comply with the proposed standard. In particular, the hydraulic, pathogen, and nitrogen limits are different for these recently consented systems. It is unclear how these systems will be managed in the future, including expectations with modifications. This might be a rough ride for the community, given considerable investment has already been made.
Biosolids Discharge to Land Standards	
General comments	Relying on the draft Beneficial Use of Biosolids and other Organic Materials on Land (Good Practice Guide) 2024 is sensible and fully supported. This will rapidly implement the Guidelines instead of waiting until each Regional Council decides to prioritise Plan Changes to incorporate the Biosolids Guidelines. It will also ensure that all Regional Councils implement these Guidelines in the same way.



Consultation Question	LEI Response
	Our understanding is that sludge is not intended to be included in the Biosolids Guidelines, so in our view, it would be appropriate for opportunities to be created for sludge management. It would be beneficial if materials that did not meet the definition of biosolids, as set out in the Standards, are not precluded from opportunities for alternative management and consenting pathways i.e. application of fresh or unstabilised sludge into land.
What matters of control or restricted discretion should sit with consenting authorities to manage the reuse of biosolids?	Matters of control must be based on the Guidelines and may include other matters that relate to the management of potential effects on neighbours. For lower grade biosolids and sludges, a similar land application site selection process to the land discharge (irrigation) process should be followed. Factors of control could be specified, including nutrient and contaminant loading rates (kg/ha/yr), buffer distances, application methods, vector reduction techniques, post application land use, and stock exclusion periods.
What should the permitted activity standards include?	Grade A1 biosolids applied to land in accordance with the Guidelines. The definition for "biosolids" needs to be nationally consistent and to match the Biosolids Guidelines' descriptions and exclusions. Some Regional Plans exclude all human waste from their definitions of biosolids and/or their related land discharge rules.
How should contaminants of emerging concern in biosolids be addressed in the short-term?	Contaminants to be considered should match the approach suggested in the Biosolids Guidelines. The approach suggested is that, as evidence of adverse effects of emerging contaminants in soils and groundwater is generated, the Guidelines and Standards can be amended. The small portion of WWTP sludge that is discharged to land as biosolids instead of landfill means that this research and implementation is not urgent. Research is also likely to require years to complete robust risk assessments. This most closely aligns with Option 1 in the consultation document.

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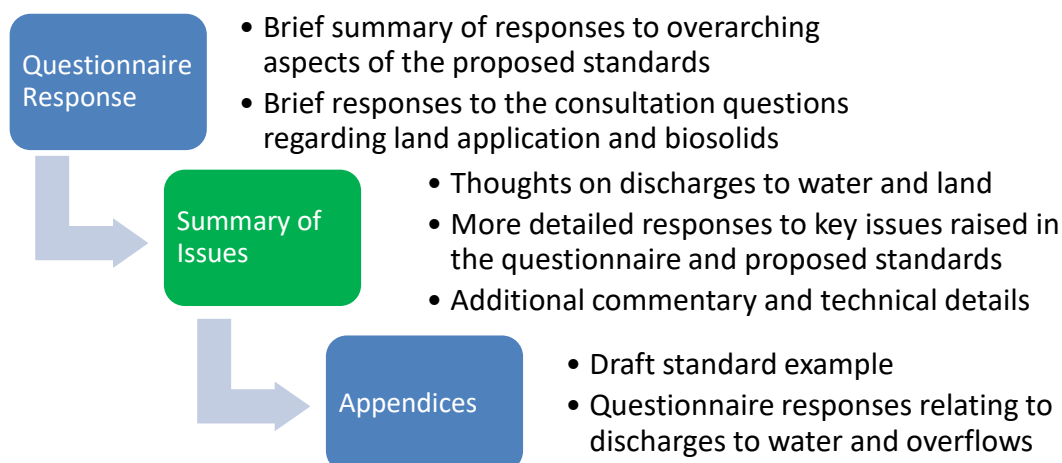
Subject: Summary of issues related to LEI's submission on proposed wastewater environmental performance standards

This document serves as the second in a series of papers that collectively provide a submission from Lowe Environmental Impact (LEI) regarding Taumata Arowai's proposals for national standards for wastewater discharges. This is LEI's Summary of Issues that discusses several technical matters relating to land (and water) discharges.

INTRODUCTION

On 24 February 2025, Taumata Arowai invited submissions on proposed wastewater environmental performance standards for New Zealand. When addressing the specific questions that Taumata Arowai have sought feedback on, LEI identified a range of issues that needed more detailed explanations. Some of these issues are not incorporated into the questionnaire but are important elements of designing and operating successful land discharge systems. To address this, LEI has prepared this separate Summary of Issues and more detailed technical documents (this document and appendices).

LEI's submission is comprised of several documents which are linked as follows:



The intention of this structure is to provide LEI's core views on the questionnaire topics and to refer readers to the linked documents for more in-depth information. This enables readers to choose to read the technical detail that suits their level of interest.

This Summary of Issues document provides more integrated feedback on key elements of the proposed land discharge standards. This reflects LEI's extensive experience with land treatment across New Zealand and the complex interrelated nature of designing and operating



land treatment systems. Combined land and water discharge systems (which often include storage) add another layer of complexity, which is also addressed where relevant in this Summary of Issues and/or technical documents.

GENERAL FEEDBACK ON THE PROPOSED STANDARDS

LEI supports the introduction of national wastewater standards for discharges to land and water, overflow and bypass discharges, and biosolids applications to land. Most of the proposals are appropriate at a high level and reflect good practices for managing wastewater and minimising adverse effects on the environment. We consider that it is appropriate that Taumata Arowai develops a nationally consistent approach, however this should be based on good science, engineering and management. This will ultimately reduce local influence and variability of consenting processes and decisions, plus reduce costs and time to get systems operational. Where these proposed standards are met, there will also be reductions in Regional Council concerns and opposing submissions on consent applications.

As described below and in the supporting appendices for LEI's submission, some elements of the proposed standards are inconsistent with good practice guidelines that are regularly used now for land discharges. The proposed standards refer to the New Zealand Guidelines for Utilisation of Sewage Effluent on Land (2000) by the New Zealand Land Treatment Collective (NZLTC), but some elements of the site assessment and classification processes outlined in the proposed standards are not consistent with these Guidelines. We note that AS/NZS 1547:2012 is for the design and operation of on-site wastewater systems, which can guide, but in our view is not appropriate for scaling up to land discharge systems for public wastewater systems.

To assist and support, there would be benefit for the NZLTC Guidelines (or an iteration of them) to be updated to address more recent developments and to provide most of the guidance that the proposed standards anticipate will be developed during implementation. This might mean a focussed version of the NZLTC Guidelines could provide specific criteria and land discharge design procedures for a range of discharge and land management systems that comply with the proposed standards.

While the consultation documents for discharges to water and land do not provide a consent activity status i.e. permitted, controlled or discretionary, LEI support the use of controlled activity status and longer consent terms for discharges that meet the proposed standards. We also believe there is scope for expanding the range of discharge types and reducing the constraints for discharges to both water and land that are enabled by the proposed standards.

Land discharge systems commonly include discharges to water during wet periods, so we have included some commentary on key aspects of discharges to water that are relevant to dual discharge or what the proposed standards call 'mix and match' systems. It is important that the proposed standards are integrated and consistent for dual discharges, ideally with incentives to favour discharges to land over discharges to water because this is favoured by most Regional Plans and tangata whenua. We note that some aspects of the proposed standards as currently written would incentivise discharges to water instead of incentivising discharges to land.



There is an opportunity to develop the land discharge standards and guidance to integrate with the water discharge standards and ensure that land discharge systems are designed and operated in accordance with good practices. Time is short for achieving this, but we believe that it is very important to allow for this to occur before finalising the proposed water discharge standards. This will avoid creating conflicting or inadvertent outcomes for discharges to land and water when implementing the proposed standards.

To assist with developing national standards, we have proposed improvements below to help bridge gaps in the design process and address the proposed standards' variance with good practice.

ISSUES RELATED TO THE PROPOSED LAND DISCHARGE STANDARDS

As noted above and in our responses to the questionnaire, some responses require more detailed information. The additional technical details are provided below and/or in the attached appendices.

The following points summarise potential issues with the proposed standard in its current form:

- Some terms are not well defined or inconsistent with standard irrigation terminology;
- It is complicated and unlikely to save time and money;
- A number of existing technical resources available nationally are not used;
- The risk assessment system accompanying the proposed standard will take time to bed in and produce benefits;
- There is conflict between nutrient management (environmental effects) and public health objectives; and
- There is limited consideration given to robust operational and management considerations.

Developing and implementing a standard takes time. The proposal for a land application standard should be based on sound agricultural, science, engineering and land management principles. Rushing to develop and implement a new system has the potential to create additional costs, inconsistency, excuses and confusion with system owners, designers and regulators. Consideration should be given to existing resources, and the adoption of systems that are known to work well; to produce sound environmental outcomes and meet regulatory requirements.

Scope

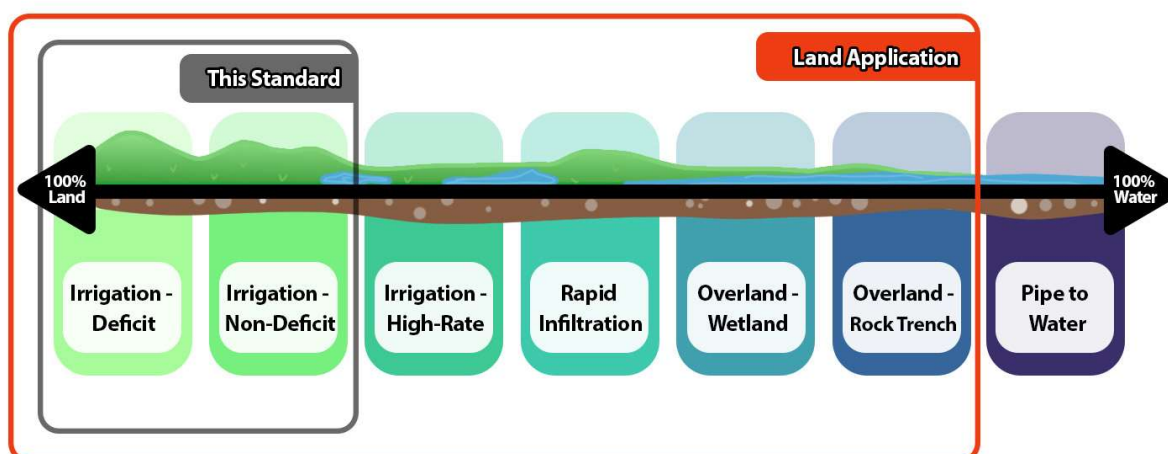
What is included

The intent of the proposed standards is to focus on low-risk irrigation systems, using spray irrigators or sub-surface driplines to apply low to modest volumes and nutrient loads to land. This intent is a sensible first step for standards, as the effects on the environment are likely to be more consistently predictable and less than minor, so long as saturated soils are avoided and drainage rates are kept reasonably low. Storage ponds and/or water discharges are strongly recommended for enabling many land discharge systems to cease or reduce application depths over winter and during wet weather events.



Discharge Continuum

Land application systems fall on a continuum of low-rate to high-rate systems, of which when related to soil moisture conditions are considered to reflect deficit to non-deficit conditions. Such systems fall into a wider suite of discharge methods, as shown below and discussed in more detail in Appendix 2.



Recycle water

We note that the proposed standards exclude reuse or recycling of treated wastewater for non-potable purposes, and provide examples of excluded uses such as irrigation of sports fields, parks, horticulture, or dust suppression. LEI supports these exclusions for the examples in the current draft, as they generally can have higher public health risks.

However, it isn't clear if other types of reuse are excluded other than by restricting the *type of land use* that is allowed by the proposed standards.

There are various definitions for reuse and recycling in the supporting information that could lead to confusion. Where discharges to land are providing some agronomic benefits, this beneficial reuse can be either a by-product or a core purpose of the land discharge system. LEI's philosophy has always been that land discharge systems should be aiming to achieve at least some agronomic benefits, not just be seen as disposal systems, which are simply an extension of the 'flush and forget' mentality of sewage services.

For clarity, LEI is of the view that the proposed standards should include all forms of low-rate irrigation and non-public land uses, i.e. it should not preclude irrigation of forested areas, cut and carry pasture, non-human consumed harvested crops, and pasture areas.

Intensification

Land discharge consents often include land use nutrient loss (intensification) assessments and consents. It is not possible to separate land use nutrient management from consents for discharges of treated wastewater to land; they are inextricably linked and integrated. Typically, an appropriate starting point for a risk assessment is for the land treatment system to maintain the current nutrient loss rates. Should this not occur, or by virtue of establishing



new irrigation, then additional considerations will need to be given with intensification provisions as prescribed in many regional plans. The proposed standards and technical advice are silent on this aspect and further guidance should be provided.

Management responsibilities

Where the land is not owned by the Council (it is leased from farmers instead), there is overlap of liability for compliance and site management. Roles and liabilities can be effectively managed through lease agreements and Management and Operation Plans. Our experience with a range of industries, Councils, contractors, and farmers co-operatively operating various land treatment systems has proven how well these arrangements can work. A critical aspect for systems is the establishment of enduring relationships, and appropriate guidance that change of council staff, revision of council budgets and sale of properties do not influence the long term performance of the system. This is potentially as important as risk assessment and design components. The proposed standards have deferred such information to implementation, however we are of the opinion that management of these relationships should lie more firmly in the proposed standards themselves.

High-rate systems

We note that rapid infiltration and wetland systems are excluded from the proposed standards. LEI believe that it would be quite straightforward to develop a discharge standard for rapid infiltration and wetlands that provide land treatment and discharge services. However, we acknowledge that such guidance should sit parallel to the proposed standards.

Groundwater Injection

Injection into groundwater is excluded from the proposed standards. LEI support this, as the character of the groundwater body will determine the appropriate discharge constraints. It is not possible to specify national standards for discharge volumes and quality because of the highly variable groundwater characteristics. We note that such discharge options would be an exception and not the norm, and therefore warrant specific critical consideration.

Discharge Quality and Integration with Discharge to Water

Many discharges to water often already have land application components or will include these in future if they transition to land treatment. We note that many WWTP's are typically unable to switch their treatment processes, or control discharge quality, to suit differing receiving environments. There may be exceptions such as where a wetland or UV system is incorporated into the treatment train that wastewater passes through before it discharges to the waterway or land. Consequently, the standards for discharges to water must integrate with and be compatible with the land discharge standards.

Mix and Match/Dual Systems

A key aspect of this integration is to ensure that the dilution calculations for discharges to water are adaptable to account for reducing volume, and time of discharges to water so that they occur when storage and application to land are diverting wastewater from the waterway. The proposed standards would benefit from a clear calculation methodology that accounts for discharges to water that avoid low river flows and instead target periods of faster river flow rates. Storage may increase the volumes that are discharged to water during some days, but the faster river flow rates can more readily assimilate discharges and will typically be more heavily contaminated by stormwater and farm runoff than low river flows.



Clarifying What is Proposed

At a high level, the proposed standards provide details of exclusions; leaving the question of what is included. A more constructive and positive approach could be to take a direct approach clearly setting out what is included, therefore leaving no doubt as to what is not included. A revised title could be **"discharge to land of treated municipal wastewater using piped irrigation technology"**.

Site Suitability and Risk Assessment Process

Refinement of Risk Criteria

The proposed standard discharge limits should reflect the site suitability criteria and outcomes of design parameters, operational constraints, and mitigation measures. Guidance for the site risk assessment, including adjustments for these mitigation measures, needs to be developed to create an integral package which is agreed upon with experts before creating the final Regulations.

Design limiting factor

When developing a land application system it is common to identify the design limiting factor. Often this relates to the constraints of the site. With design and appropriate mitigation the limiting factor can switch to another factor. The proposed standards identify this approach in so far as limits being set for application rates, nitrogen, phosphorus and pathogens. However, the proposed standards do not provide for mitigation to switch the limiting factor to other parameters.

Typically, in land application systems for municipal wastewater, nutrient and pathogen mitigation can be provided so that the limiting factor switches to hydraulic loading, being the ability to get water into the soil and not generate excessive drainage, saturated conditions, ponding or runoff. It is LEI's view that the proposed standards should provide for firstly mitigation to allow the limiting factor to switch, and secondly soil hydraulic limitations to be considered other than the proposed limit on application rate and depth.

A key part of the design process is to appropriately factor in storage and treatment. The volume and strength of the wastewater is unable to be strongly influenced at its source (except for trade waste), so Councils must design the WWTP and discharge systems to cope with the wastewater generated by the community.

Hydraulic loading rates, application timing, soil moisture, and drainage losses can only be managed by sufficient storage or discharging to water. Storage also provides additional treatment time for reducing nutrients and pathogens, but this is seasonal and typically a minor benefit. Loading rates of nutrients and pathogens can only be reduced by expanding land areas or improving treatment.

The normal sequence of design is to identify the land area required to cope with the proposed hydraulic regime and weather, optimise the land area and storage volume, and then consider whether adjustments are necessary for achieving appropriate nutrient and pathogen loads. If the nutrient or pathogen loads need to be reduced, the options are to expand the land area or to upgrade the treatment processes.



There is also a balance between treatment processes to adjust (reduce) concentrations of individual contaminants and land discharge and/or land use management to cope with the loads applied. The iterative process needs to consider potential adjustments to all aspects of the wastewater system and select the optimum combination of responses.

Rigidity of Standards

There is often tension between prescriptive standards that are inflexible and guidelines that are open to debate and interpretation. It is LEI's position that it is better for New Zealand to adopt robust standards that provide 'recipes' for common types of land discharge systems and their soil types. This will be prescriptive for limits ideally based on soil types and then mitigation measures that allow for flexibility to match each unique site and WWTP.

Suitability and Selection Criteria

The site selection and soil suitability assessments presented in the proposed standards appear to be generally based on AS/NZS 1547:2012. These are assessments for designing and operating on-site domestic wastewater management systems – typically for servicing single dwellings. This AS/NZS is inappropriate for applying its constraints to large-scale WWTP discharges because it is relevant to small automated on-site wastewater systems. Specifically, it does not reflect large-scale spray irrigation systems and the active management of these systems for large volumes of treated wastewater.

Alternative Assessment Criteria

When considering existing assessment criteria, we suggest that the existing Dairy NZ land assessment and classification system could be used instead of that in the proposed standards. Dairy effluent and treated human effluent can be largely discharged to land with similar constraints, albeit more restrictive subtleties for protecting human health.

The Dairy NZ Farm Dairy Effluent Code of Practice (FDE CoP¹) utilises assessment criteria that classifies soil and landscape features as follows:

- A. Artificial Drainage or Coarse Soil Structure
- B. Impeded Drainage or Low Infiltration Rate
- C. Sloping Land (>7° slope) and "Hump and Hollow" Drained Land
- D. Well Drained Flat Land (<7° slope)
- E. Other Well Drained but Very Stony Flat Land (<7° slope)

The Dairy NZ FDE CoP uses these classifications in combination with the nutrient content of the effluent, nutrient budgets, knowledge of soil water holding capacity, soil infiltration rates, and climate data to determine the appropriate application depths as follows:

¹ <https://www.dairynz.co.nz/media/xomlwdav/fde-design-standards-and-cop-2015.pdf>



Table 1: Application depth and storage requirements for different soil and landscape features (modified from: Houlbrooke & Monaghan, 2009)

FDE risk category	A	B	C	D	E
Soil and landscape feature	Artificial drainage or coarse soil structure	Impeded drainage or low infiltration rate	Sloping land (> 7°) and Hump and Hollow drained land	Well drained flat land (< 7°)	Other well drained but very stony ^(a) flat land (< 7°)
Application depth of FDE to land (mm)	< Soil water deficit	< Soil water deficit	< Soil water deficit	< 50% of PAW ₃₀ ^(b)	≤ 10 mm & < 50% of PAW ₃₀ ^(b)
Storage requirement	Apply FDE only when soil water deficit exists	Apply FDE only when soil water deficit exists	Apply FDE only when soil water deficit exists	Do not apply within 24-hours of soil saturation	Do not apply within 24-hours of soil saturation

(a) Very stony = soils with > 35% stone content in the top 20 cm of soil.

(b) Soil water holding capacity in upper 30 cm of soil.

Further opportunity to use the FDE CoP assessment criteria is provided in Appendix 2.

Consistency of Taumata Arowai Proposals with Adequately Operating Existing Systems

We note that the proposed standards are intended to apply to existing and new land discharges. A large number of existing sites, soils, and discharge regimes do not comply with the constraints proposed for these standards, yet they have been operating successfully for many years. This is because the application management, mitigation measures, land uses, and/or receiving environment are appropriate for keeping adverse effects within acceptable ranges.

It would be unfortunate if the proposed standards were used to enforce unnecessary upgrades to WWTP treatment and/or changes to the land discharge design and operation – especially if they are operating adequately. We note that in many cases tens of thousands of dollars have been spent on investigation, design and consenting, and this has produced an acceptable system, denoted by the granting of a resource consent. Additional costs would be unwarranted for upgrades. Equally, the lessening of system performance down to the proposed standards would cause system redundancy and potentially an increase in effects to that which saw existing consents granted.

Determination of Site and Risk Categories and Assignment of Class

The proposed standards apply two categorisation phases in the determination of Site Class (Class 1, 2 or 3). It is understood that the tool for categorising risk is under development and



consequently, no review is able to be provided by LEI. This section provides comments on the suitability and application of the factors that are used to define the Site Capability Category.

Risk and mitigation are key to assessing the potential for effects from a land treatment system and so support for the Class approach is conditional on an appropriate and adequate risk assessment tool being available.

The proposed standards document would benefit from being clearer in the adoption and use of the terms Risk Category, Site Capability Category and Class, in particular, to avoid overlapping meanings for the terms. For example, the site assessment diagram² of the proposed land discharge standards uses Levels 1-5 for the initial Risk Category and Categories 1-5 for the Site Capability Category, but these terminologies are not consistent with the categories used in the site classification matrix³ of the proposed land discharge standards. We also note that the combination of Category 4 site suitability with Category 4 site risk in this matrix states "Standards don't apply (Category 5)." It would be more consistent and clearer if this was Class 4, not Category 5.

Site Capability Category Factors

Seven factors are listed for determination of the Site Capability Category. LEI is generally in support of the factors adopted but notes some tension between being prescriptive (Category descriptors given in the site capability assessment Table) and enabling professional judgement (notes above and below this Table in the supporting Technical Advice document⁴).

The **Drainage** factor is well aligned with similar classification systems. There is scope to further refine the drainage to align with the FDE risk classification as given in S-Map soil description sheets. This would adjust the categories to "high risk" and "low risk" soils.

The **Soil Type and Suitability** factor focuses on soil texture which is not well aligned with footnote 1 for the site capability assessment table presented in the supporting technical document for the proposed standards. It is appropriate to evaluate the soil type/sibling/series and its suitability to receive wastewater. Soil texture, which is typically related to one soil horizon, does not encompass the soil type and suitability. There may be scope to combine the soil specific factors (drainage, soil type and suitability, soil moisture regime) in-line with other evaluation systems (the FDE methodology has been identified elsewhere in this memo).

Inclusion of **Climate & soil moisture regime** as factors to determine Site Capability is appropriate and recommended. The associated descriptors are not necessarily related to the factor. Instead, descriptors could be linked to the ability to support more, or less permissive irrigation regimes i.e. non-deficit, deficit, deferred.

The value of the **Land use** factor is in describing the potential for growing a high nutrient removal crop. It is noted that an either/or approach has been adopted for this factor. There is scope to refine these descriptors to reflect a broader range of crops. This would allow for

² Page 28 of the Discussion document: Proposed wastewater environmental performance standards

³ Top right of page 29 of the Discussion document: Proposed wastewater environmental performance standards

⁴ Pages 23-25 of the Technical Advice on Wastewater Performance Standards: Discharge to Land (GHD)



consideration of low production and non-productive land uses more easily e.g. plantation or indigenous forestry).

LEI supports the use of **Topography** as a factor. It is noted that slope has been used as a proxy for topography. The shape of the landform should be considered in wastewater application, in addition to slope. Regarding the slope and, based on our experience of these systems, our recommendation is that Category 1 should be changed to <5 degrees (or <3 degrees to align with NZ soil description conventions).

Depth to groundwater is key to the ability for vadose zone treatment of applied wastewater. Depths adopted for this factor could be linked to data used to develop the ESR/GNS Microbial Risk Assessment tool. This would assist to avoid extensive reassessment of the Site Capability through additional assessments.

In addition to **Natural Hazards**, considerations may be wāhi tapu sites, current and planned infrastructure, fencing, energy sources and location of services (gas line, power lines, chorus fibre cables etc).

Use of Mitigation

As noted in the GHD technical advice, an iterative process is typically followed when designing land treatment systems, whereby the site's risks and characteristics are addressed through buffers, soil moisture triggers, design features (types of sprinklers or sub-surface driplines), application rates, nutrient and hydraulic loads, discharge management protocols, storage, weather event controls, farm management, and various mitigation measures. After several iterations, the final design and operating constraints are used to determine whether the discharges are appropriate for the land and contribute acceptable losses to groundwater and surface water.

A flaw in the proposed standards is the use of mitigations to change the site's risk category. This is incorrect, as the site's inherent risks remain unchanged, but the risks of adverse effects from the discharges of treated wastewater to that land are reduced with mitigation.

Limits should be set based on design iteration outcomes. It is therefore important that single limits are not fixed for all land discharge systems to achieve, as this is inconsistent with best practice methodology that should be followed when designing and consenting land treatment systems. However, specific limits should be set that reflect the limitations of site characteristics. Potential limits should focus on nutrients, pathogens and soil hydraulics, with mitigation allowing the limit applied to be changed to account for the most relevant limiting factor.

Further, the proposed standards do not provide any details on how design and operational features of the land discharge system would be taken into account. These can be very important to reduce the risks of adverse effects on the land, groundwater, and surface water. It is noted that the details are to be provided in future guidance materials for helping suitably qualified practitioners to adjust site scores, but we are of the opinion that it is important to address this up front as part of the assessment system, ideally with management having its own minimum standard. Ideally, the implementation guidelines would have been completed or at least at an advanced stage before these proposed standards were published for



submissions, as they may address this issue. However, the absence of guidance has restricted the ability for potential submitters to fully review and understand the proposed standards and implications. The NZLTC Land Treatment Guidelines and relevant elements of the Dairy NZ FDE CoP should be incorporated into the guidelines for these proposed standards.

Discharge Rates

Low rate applications are the intended scope of these proposed standards, being limited to no more than 5 mm/h and 15 mm per application event and modest nutrient load limits for Class 2 and 3 sites.

However, from a hydraulic perspective, the frequency of application events is not considered, which does not address or limit drainage to groundwater, particularly during winter and for moderately draining soils. Ideally, the application event frequency should allow for return periods (typically 3-14 days) and to apply these loading rate limits as an average over the return period. A maximum 24-hour application rate is still necessary to prevent excessive intermittent applications, but a limit of 15 mm may not be appropriate for all soils and sites.

Timing and soil moisture are crucial parameters that are used to control irrigation events to minimise drainage losses and maximise agronomic benefits. A water balance approach can be more appropriate for estimating land areas, where the annual soil moisture deficit is used to estimate the annual irrigation depth. During summer, a return period of 1-3 days may be appropriate, while much longer return periods will be needed during wet periods and winter months. The proposed standards are silent on managing soil moisture. This is a flaw that needs to be addressed, as this is the basis for potential adverse effects.

A vital consideration is whether the application rates are deficit based (being application does not induce drainage) or non-deficit (allowing drainage to result following application). This directly affects land area required, plant growth rates, soil characteristics, land management, and drainage rates of water and nutrients leached to groundwater. Soils with even and slow matrix flows are better suited to receiving non-deficit applications sustainably, whereas sloping sites and soils with excessive drainage or drainage limitations should ideally be irrigated on a deficit basis.

Irrigating up to 15 mm per application event, if daily, will rapidly become non-deficit during autumn and remain non-deficit into late spring or even early summer. Deficit irrigation only occurs during late spring into autumn with pauses during wet periods and throughout winter. Immediately, this suggests that year round irrigation is not possible, necessitating either large storage or alternative discharge means. The proposed standards are silent on this factor; and could/should be more specific about the intended types of discharge regimes and consistent with this terminology.

Including a specific change in drainage depth from the current depth of drainage within the proposed standards would be more effective than limiting just the application events and annual nutrient loads. I.e annual drainage shall not increase by more than a set [50%] percentage. We note that LEI developed a similar soil moisture based controlled activity rule along these lines for municipal wastewater for the Wellington Regional Council.



Discharge Quality

E. coli

The standards' proposed limits for *E. coli* for Class 2 and 3 are very low (stringent) and below (less than) the limits for discharges to water except for rivers that provide low dilution rates (< 50 times). These proposed standards do not take into account the soil's innate ability to remove pathogens. Given the cost and ability to achieve these pathogen reductions for many small communities that have pond based WWTPs, there is no incentive to discharge to land, so water discharges will be preferred. It will be very difficult for many WWTP's to achieve these limits and for land treatment systems, they are not appropriate.

We note that the limits for *E. coli* do not provide any flexibility for different designs, mitigations, or management practices. Driplines reduce health risks for stock and people, especially when installed sub-surface. Buffers, application timing during the day and wind speed restrictions are examples of mitigations that can address health risks for sprinkler systems. Resting periods between irrigation events and stock access or harvesting also protect against health risks. We believe that these mitigations should be incorporated into decision making.

Nutrient concentration

The nitrogen and phosphorus load limits in the table at the bottom right of page 29 of the proposed standards imply that total nitrogen is typically about five times the concentration of total phosphorus. This conflicts with the 1-10 times range of relationships between these nutrients for the proposed discharge to water standards. Water New Zealand's Good Practice Guide: Waste Stabilisation Ponds indicates that total nitrogen is typically about 3-5 times total phosphorus for pond-based WWTP's and typically about 1-3 times total phosphorus for WWTP's that include denitrification processes. The low phosphorus concentrations will have the consequence of increasing sludge production at WWTP, which consequently needs to be managed. Consistency is required.

Nutrient mass loading

LEI strongly supports the proposal to adopt a nutrient mass loading approach. We consider input limits are a very useful management tool and can be easily monitored for compliance.

Regarding the limits, nitrogen loads of up to 150 and 250 kg N/ha/y and total phosphorus loads of up to 50 kg P/ha/y are supported. These are in our view sustainable for the categories of soils and risks that are used in the proposed site risk assessment where low nutrient export rates (from harvesting and/or stock) occur. However, allowing nitrogen loads of 500 kg /ha/y seems to be a fairly high load that a system applying this level should require specialised input. This is particularly so given these higher rates will most likely be non-deficit, which may generate high losses of nutrients to groundwater and surface water. These high rates can easily exceed that which can be used for agronomic benefit, a catchment nutrient balance with offsets in nutrient loss from a non-wastewater application site is considered necessary to allow the high loading rate system's effects to be managed.

Undersupply of nutrients and over treatment

When hydraulic loads are elevated, soils and plants can become deficient in nitrogen, which may force scheme operators to add synthetic fertiliser to the land. This would defeat the



purpose and cost of removing nitrogen from the treated wastewater before discharging it to land. It is much better to retain nitrogen in the form of ammonia in the treated wastewater as much as possible and irrigate it to land for maximum plant growth benefits. Consideration should be given not to over treat wastewater and instead aim to use the land as part of the treatment system and not just a dispersal area.

Nutrient removal through land management

There is no explicit consideration of land management implications or nutrient removal by stock exports, cut and carry, or crop harvesting in the site capability assessment. However, the original GHD advice included all inputs (fertiliser and excreta) and exports (animals and harvesting) in these limits, so the total nitrogen and total phosphorus loads appear to be the net loads applied from all sources after subtracting all nutrient losses. The net load approach creates operational difficulties, while a set input load per ha, as mentioned earlier, is easy to administer and show compliance. The loading rate definition issue requires clarification.

Grazing

Stock grazing the irrigated land is a common pasture management system, and stand-down periods can protect animal health. The calculation of net nutrient loads if this is used needs to be very clear and explicit in the standards as to what inputs are included and what losses subtracted. LEI recommends simplifying this to only assess nutrient inputs from fertiliser and treated wastewater for loads up to 250 kg N/ha/y, with nutrient budgets for higher application rates.

Nutrient modelling and land management

Many Regional Plans seek to control nutrient losses (especially nitrogen) through nutrient management plans. OverseerFM® (or alternatives) is used to demonstrate whether the likely losses are acceptable. Crops and stock are incorporated into OverseerFM® calculations. While OverseerFM® should not be used as a reliable predictor of leaching concentrations or loads, it is still a useful tool for indications of long-term nutrient management factors that should be included here for nation-wide standardisation of assessments. We note that Farm Plans require this anyway. Modelling nutrient losses need to be considered in the proposed standards, especially as they may align or have obligations as set by other regulatory processes.

In our view, limits on hydraulic and nutrient loads applied to land, combined with soil characteristics, are not sufficient on their own to predict or manage nutrient losses. Pasture (land cover) management, crop nitrogen content, grazing, and harvesting all affect nutrient losses. Monitoring data held by LEI indicates that nitrogen losses can be similar across a wide range of application rates. Low application rates are sometimes losing as much nitrogen as higher application rate systems. A dominant factor in nutrient losses is winter irrigation, as soils are wetter and plants are less able to absorb water and nutrients.

The proposed discharge standards would benefit from allowing different discharge limits and designs for different land categories, similar to the proposals for different kinds of water bodies. This would make the land discharge standards more broadly applicable and more flexible for real world situations.



Wastewater Contaminants

What to monitor

The treated wastewater parameters requiring monitoring to demonstrate compliance with the proposed standards are volume, total nitrogen, total phosphorus, and *E. coli*. These are the minimum parameters to monitor in wastewater for land discharges of treated wastewater.

While not necessary for setting limits, CBOD_5 and cations (sodium, potassium, calcium, and magnesium) in the treated wastewater should be included in land discharge monitoring programmes because these parameters can affect soil characteristics and plant health. Sodium is particularly important for soil properties except for sandy soils.

The proposed standards include monitoring of soils for cations, which LEI supports, but physical characteristics such as field capacity, plant available water capacity, and hydraulic conductivity should also be included. Vegetation health should also be regularly monitored. It is also helpful to monitor plant dry matter mass and nitrogen content when it is harvested.

Trade waste

Where a community's wastewater system receives significant hazardous trade waste inputs from industries, relevant toxic metals should also be monitored in the treated wastewater and sludge. Regional Councils could be allowed to retain their discretion to impose monitoring and limits for these industrial contaminants.

Emerging Contaminants

Emerging contaminants are raised as a topic for feedback. LEI note that this is a very broad and evolving issue and is relevant for both discharges to water and discharges to land. Studies to date have identified concerns and adverse effects on aquatic ecosystems, but soils and plants appear to be much more robust and less susceptible to harmful effects; however changes in this opinion should be informed by topical robust research as it evolves. This highlights that standards should have the ability to evolve over time.

Monitoring for emerging contaminants in treated wastewater is difficult, as there is a huge range of compounds that could be considered, but most are at trace concentrations and many are unable to be reliably identified by laboratory techniques or at reasonable cost. Analyses of soils, biota, and plants for these contaminants and their metabolites are even more difficult and complex than for water and aquatic ecosystems.

We note that many years of complex research are required for determining whether specific contaminants are causing adverse effects and to identify an appropriate limit for confidently preventing adverse effects on soil quality, soil biota, plants, and groundwater quality.

Treatment processes typically used in New Zealand do not target or achieve high removal rates for most emerging contaminants. If treatment processes are required to remove more of these contaminants, the WWTP's will generate more sludge (biosolids) that needs to be managed, and some emerging contaminants will tend to accumulate in the sludge instead of being broken down. If the sludge is applied to land, especially if this is where the treated wastewater is discharged, emerging contaminants may be discharged to land at higher rates. However, this means that higher concentrations in sludge will require management.



Appendix 1: Lowe Environmental Impact's Expertise

Lowe Environmental Impact (LEI) was established in 2010 and brings together many years of practical experience focussed on specialist services and expertise for land treatment of wastes, irrigation and nutrient management, agricultural engineering and science, and community wastewater projects. A range of broader services are also provided, including project management, resource consent assistance, peer reviewing and technical reporting and policy advice to Regional and District Councils.

LEI staff are active and long-standing members of the New Zealand Land Treatment Collective (NZLTC) and Water New Zealand. LEI staff have expertise in farm management, irrigation, soil science, wastewater treatment, surface water and groundwater quality, air quality, planning, and project management. The primary focus for LEI is land treatment of treated wastewater from farms, industries, and communities.

LEI staff have been directly involved with developing AS/NZS 1543:2012, NZ Land Treatment Guidelines, Biosolids Guidelines, and assisting with teaching Massey University farm nutrient management courses and Opus On-Site Wastewater courses. LEI staff have helped develop the NZ OSET design standards including the national testing programme and have been reviewers for certifying the treatment performance of OSWW systems.

LEI's website has a selection of relevant LEI technical papers and publications, many of which are relevant to this consultation.

LEI have worked for a wide range of Councils, industries, and farmers to undertake site feasibility assessments, develop designs, obtain consents, oversee construction and operation, monitor the environment, and review land and water discharge systems for wastewater treatment plants (WWTP) throughout New Zealand.

APPENDIX 2 – DISCHARGE TO LAND OPTIONS FOR WASTEWATER STANDARDS

To: Taumata Arowai
From: Hamish Lowe, LEI
Date: 24 April 2025
Subject: Proposed Wastewater Standard – Discharge to land alternative options

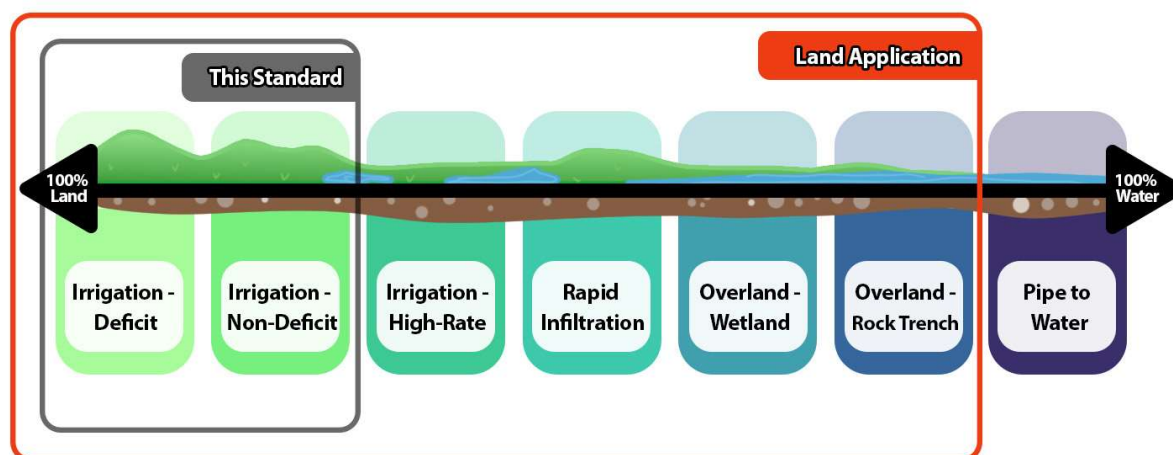
This memo sets out two considerations for an alternative and simplified approach for managing discharges to land to that in Taumata Arowai's proposed discharge to land standard. While both suggestions could be adopted, albeit with tweaks, the intention is to identify simplified ways to deal with some of the primary concerns that have triggered the need for the standards; being costs, timing and uncertainty.

Definitions and Clarification

The currently proposed standard mixes definitions and provides a degree of inconsistency with well-defined terms. Clarification is needed.

At a high level, the standard provides examples of excluded discharge systems and some parameter limits, which create some uncertainty of what is excluded. A more constructive and positive approach could be to clearly specify what is included, therefore leaving no doubt as to what is not included. A revised title could be **"discharge to land of municipal wastewater using piped irrigation technology"**.

To support current industry best practice, clarity should be given to the land application continuum of treatment to disposal, and the overlapping application regimes of deficit to non-deficit to high-rate discharge. The following figure demonstrates this concept:



The primary focus areas for risk in the proposed standard are nutrients and pathogens, with hydraulic management considerations tucked into the detail. It should be noted that without



hydraulic management there is no vector and therefore no risk i.e. without water there will be no leaching or transmission of pathogens. As illustrated in the figure above, the definition of varying systems is based on *hydraulic* management. Consequently, our view is the primary consideration should be hydraulic management, with nutrients and pathogens considered as a consequence of how water is distributed.

This position is supported by the fact that the volume of wastewater cannot be changed, while nutrient and pathogens content can. Wastewater volume cannot be shrunk, but can be redirected to either storage or an alternative discharge - being a different land based option or water.

While the proposed standard identifies that it is applicable to low rate discharges and specifies application rate limits of 5 mm/h and 15 mm/event, it does not mention soil moisture limits or further define low rate irrigation. The proposed standard excludes rapid infiltration and wetland systems, but it is not clear what other discharge systems are excluded and included.

The proposed standard places risk assessments for nutrients alongside pathogens – however, risks and mitigation for nutrients are not consistent with those for pathogens. Therefore, different criteria should be used when applying standards to that proposed.

- Nutrient risks relate to primarily to land form, system loading and land management – and result in environmental harm.
- Pathogen risks relate primarily to irrigation technology, land management and ambient meteorological conditions – and result in public or stock health harm.

As noted above, the volume of wastewater requiring discharge is unable to be strongly influenced at its source (except for trade waste), so Councils must design the WWTP and discharge systems (with or without storage) to match the flows. Storage obviously helps to smooth out peaks and troughs in flow rates and assists with timing discharges to match limitations in the receiving environments. However, the land area must fundamentally be large enough to accommodate the wastewater volume while remaining within the soil's ability to cope with the water.

A secondary consideration after addressing the hydraulic loads is then whether the loads of nutrients and pathogens are appropriate for the soil and site. If not, either the land area needs to be expanded or treatment needs to be upgraded.

Proposal

Two proposals are suggested:

- FDE Model - this option proposes to utilise existing systems, both in terms of accessing resource information and a risk-based system specification for managing land application systems. The primary opportunity is to consider the soil hydraulic and nutrient based land management risk framework currently used for Farm Dairy Effluent (FDE), albeit with some minor modifications.



- Controlled Activity Model - there is a high level of certainty of effects if specific design and management principles are observed. If basic specifications are met, matters for control could provide certainty and flexibility for both consent holders (District and City Councils) and regulators (Regional Councils).

Benefits

FDE Model – Adopting a modification of an existing FDE system and the inclusion of additional existing resources has a number of benefits. These include:

- Receiving environment details are available without the need to collect additional information, albeit there is potential for ground truthing where needed;
- The current FDE framework is based on sound science (Houlbrooke and Monaghan, 2009);
- The existing framework can be made relevant to municipal wastewater with subtle changes;
- Utilising the existing risk management model allows existing resources, limits, and implementation methods/strategies to be used;
- Regional Councils have a high level of familiarity with the FDE process, and the inclusion of a municipal version should be met with limited reservations; and
- Timing of implementation could be expedited.

This is based on a risk assessment methodology and provides thresholds that indicate higher risks of effects on the environment. Low risk and tightly defined discharge systems would be Controlled activities. As risks increase, the activity status changes to Restricted Discretionary or Discretionary.

Controlled Activity Model – A controlled activity model would clearly set out specifications needed when investigating, designing, managing and operating a system. It provides a framework that is consistent with existing Regional Council activity thresholds, and can adopt many of the requirements that are needed to provide certainty with respect to the level of effect anticipated.

This is a more prescriptive model than the FDE model and uses a style and wording similar to many Regional Plan rules. If a proposal does not meet one or more of the prescribed requirements, but remains within 20 % of the Controlled Activity limits, it could be considered a Restricted Discretionary Activity. If it exceeds 20 % of the Controlled Activity limits, it is a Discretionary Activity.

This model achieves a similar outcome to the FDE model, but in a different way. It focuses more on the site characterisation and land management documentation than the FDE model.



FDE Model

The suggested FDE model is a refinement of the Code of Practice developed for DairyNZ and in this case uses a four-tier consent activity status approach that applies a predetermined criteria – essentially being groupings of the five FDE soil risk categories alongside design and management limitations. Table 1 below provides the criteria and performance standards for each activity status. The buffer and mitigation requirements are described in more detail in Table 2.

For context, the FDE soil risk category developed by Houlbrooke and Monaghan (2009) is attached as Attachment 1. The DairyNZ FDE criteria did not include nutrient or pathogen limitations because FDE has quite consistent nutrient concentrations and lower health risks for people and cattle than human wastewater. However, when adopting this FDE approach Regional Councils have typically imposed a nitrogen load limit of 150 kg N/ha/y for all soil categories.

Regarding pathogens, their receptor risks (people) are different to hydraulic and nutrient receptors risks (environment), and as a result mitigation is typically different. The risks of pathogens can be managed by adopting appropriate buffers, being the distance from the design wetted zone of the irrigation system to a specific receptor. It is suggested that proposed systems that are assessed against Criteria 1, 2 and 3 meet the following pathogen buffer requirements. Failure to meet these buffer requirements results in the proposed system being assessed as a discretionary activity, essentially falling into Criteria 4.

When considering pathogen risks, requirements are dependent on two critical factors; being how the water is applied and land use around the site. These in turn influence the stock exclusion times, buffer distance to receptors and the level of treatment before discharge. The table below sets out requirements for pathogen management for Criteria 1, 2 and 3 systems.



Table 1: Criteria and Performance Standards

	Criteria 1	Criteria 2	Criteria 3	Criteria 4
Activity status	<u>Controlled activity</u> meeting minimum standards and all buffers and mitigations	<u>Controlled activity</u> meeting minimum standards and all buffers and mitigations	<u>Restricted discretionary</u> as not meeting minimum standards in Criteria 1 and 2	<u>Discretionary</u> as not meeting minimum standards and/or exceeding restricted discretionary limits
Limitation	Control reserved over monitoring, and nutrients to match agronomic systems	Control reserved over monitoring, and nutrients to match agronomic systems	Restriction reserved over requirement that is exceeded and monitoring, nutrients to match agronomic and management regime.	Assessment and restrictions as needed to understand effects.
Irrigation system	Deficit	Non-deficit	Deficit or non-deficit	
Soils risk category (FDE categories)	A, B and C	D and E	A, B, C, D and E	
Soil hydraulic limitations - total annual hydraulic loading - maximum hydraulic loading per event and in any 24 hour period - maximum hydraulic application rate - minimum return period - soil moisture	< 450 mm/yr 20 mm 10 mm/hr 4 days maximum irrigation to refill soil to 95% AWC	<2,000 mm/yr 25 mm/day 15 mm/hr 2 days modelled change in drainage to 1.5 times using daily soil moisture balance	Not exceeding Criterial 1 or 2 (dependent on soil) type by <u>no more than 20 %</u>	As justified
Nutrient loading rate limitations - grazed, cut and leave or amenity - Nitrogen/Phosphorus - cut and carry - Nitrogen/Phosphorus	190 kg/ha/y / 50 kg/ha/y 300 kg/ha/y / 80 kg/ha/y	200 kg/ha/y / 55 kg/ha/y 400 kg/ha/y / 105 kg/ha/y	Not exceeding Criterial 1 or 2 (dependent on soil) type by <u>no more than 20 %</u>	As justified
Pathogen management	Meeting minimum standards for all buffers including wind speed and effluent quality			As justified
Catchment nutrient budget	At least maintained. Use of Overseer or similar.			As justified
Management, monitoring and reporting	[To be developed]			As justified



Table 2: Buffer Performance Standards

Buffers and Mitigations	Application System	
	Spray	Dripline
Inside edge of buffer area	Outer-most wetted area when under normal operation	From the discharge line
Shut down requirements	Wind shut off required when the 10-minute average wind speed exceeds 10 m/s, unless the extra buffer mitigation can be provided.	When seasonal groundwater (including perched) is within 600 mm of the discharge line
Boundary	50 m	5 m
Houses - notional boundary	150 m	5 m
Cultural from historic sites and marked urupā, papakainga	50 m	10 m
Waterways that have water present	30 m	10 m
Public gathering or access way	50 m	10 m
Buffer mitigation	To avoid the need for shut off when wind exceeds the shutdown requirements, the buffer can be extended by 3 x the nominated distance i.e. no irrigation within 450 m to a house when the house is down wind.	Subsurface application: buffers may be reduced to 50 % of that stated with appropriate justification.
<i>E. coli</i> limitations	<i>E. coli</i> <10,000 MPN/100 ml. If exceeded, the buffers double.	Surface application: <10,000 MPN/100 ml. Subsurface application: unrestricted
Stock management	No grazing within 24 hours after application event.	Surface application: no grazing within 24 hours after events. Subsurface application: unrestricted
Harvest management	No harvesting within 48 hours of application events.	No harvesting within 48 hours of application events.

In addition to the criteria and requirements above, a package of reporting and management obligations should also be established. Rather than being lost in the detail, it is recommended that they be set and if not met then an alternative approval process (more stringent) should be taken.

Controlled Activity Model

A Controlled Activity model could be used to provide certainty that a consent would be granted if all specific criteria could be met. The proposed example below is from a recent regional council plan review process. In a modified form this could be considered for the national standard (implemented as a Regulation or NES).



Discharge of treated wastewater to land – controlled activity

The discharge of treated wastewater onto or into land, and the associated discharge of odour is a controlled activity, provided the following conditions are met:

- (a) the discharge is not located within a community drinking water supply protection area as shown on Map, and
- (b) the discharge shall contain no more than 10 % v/v trade wastes based on daily dry weather flow, averaged over a calendar year, and
- (c) the hydraulic loading rate shall not exceed 10 mm/hr or 20 mm per application event and can only occur when soil moisture deficit is greater than the application event, and
- (d) the pathogen concentration in wastewater shall have been reduced to a level commensurate with its having been treated to a tertiary level before discharge for surface application and secondary level for subsurface irrigation, and shall not exceed an *Escherichia coli* (*E. coli*) concentration of 10,000 cfu/100 mL for surface and no limit subsurface discharge respectively, and
- (e) the application method is either a subsurface or surface drip irrigation or low pressure spray irrigation system less than or equal to 1.5m above ground surface, and
- (f) the distribution uniformity of the spray irrigation system shall be greater than or equal to 80 %, with drip irrigation emitters at a minimum spacing of 0.6m x 1m, and
- (g) the application shall not result in significant ponding (areas of ponded effluent on the ground surface greater than 10 m² for a period greater than 12 hours) or runoff (visible overland flow); and
- (h) the nitrogen loading rate of the wastewater applied shall not exceed the following limits for the specified land uses:
 - (i) 190 kg N/ha/year if mown without grass removal, or grazed, or
 - (ii) 300 kg N/ha/year if cut, harvested and removed, and
- (i) the phosphorus loading rate of the wastewater applied shall not exceed the following limits for the specified land uses:
 - (i) 50 kg P/ha/year if mown without grass removal, or grazed, or
 - (ii) 80 kg P/ha/year if cut, harvested and removed, and
- (j) the application must be onto actively growing vegetation which is not dormant. Application shall not be onto fallow land or areas that have no vegetative growth, and
- (k) for spray irrigation, the discharge is not located within:
 - (i) 50 m of a surface water body, coastal marine area or property boundary, or
 - (ii) 150 m of any marae, schools, shops, playgrounds, bore used for water abstraction for potable supply, places of work or residential dwellings not on the application property; and
- (l) for surface and subsurface drip irrigation, the discharge is not located within:
 - (i) 5 m of a surface water body, coastal marine area or property boundary, or
 - (ii) 150 m of a bore used for water abstraction for potable supply, and
- (m) there shall be a minimum depth to groundwater of at least 1 m below the point of application, and



- (n) a deficit irrigation regime is used for the application of treated wastewater to land, and
- (o) the application of wastewater to land by spray irrigation shall have automated shut off controls so that there shall be no irrigation when the wind speed 10 minute average exceeds 10 m/s, and
- (p) the normal droplet size delivered by wastewater irrigation shall not have a volume median diameter less than 1,700 μm or an equivalent volume mean diameter, and
- (q) the discharge of odour is not offensive or objectionable beyond the boundary of the property.

Matters of control

1. Provision of a Site Investigation and Design Report, which shall include as a minimum:
 - i. the suitability of the soil to receive treated wastewater
 - ii. how the discharge system is designed based on the soil characteristics to mitigate adverse effects on soils, ground and surface water
 - iii. soil saturated hydraulic conductivity is shown to be greater than 10mm/hr
 - iv. soil water holding capacity is shown to be greater than 30mm
 - v. a map showing soil unit boundaries, soil textural and structural changes, and high risk soils
 - vi. details of existing soil concentrations of nutrients and metals and an assessment of the potential cumulative effects of the proposed wastewater application including the addition of any other wastes or fertilisers
2. Provision of an Operation and Management Plan, which shall include as a minimum:
 - i. a description of the discharge system, including a site map indicating the location of discharge infrastructure and monitoring sites
 - ii. the intended operating and maintenance procedures, including how the system will be operated and maintained to meet the requirements of the conditions of the activity
 - iii. measures to ensure that the wastewater being discharged is not odorous
 - iv. on-site responsibilities, including operation of the discharge facility, operation of the soil moisture monitoring or balance system, operation during high winds
 - v. key operational matters, including daily, weekly and monthly maintenance checks and keeping of a maintenance register to record the details of all maintenance events or any systems malfunction
 - vi. details of signage warning of the public health risk of coming into contact with wastewater, particularly in publicly accessible areas or where the application site borders a publicly accessible area
 - vii. details of site induction procedures to warn any person that may come into contact with the wastewater about the potential risks of doing so



- viii. a contingency plan in the event of system malfunctions or breakdowns showing how adverse environmental and public health effects will be avoided
 - ix. how changes in wastewater composition and volume are to be managed
 - x. procedures for recording and responding to any complaints
 - xi. procedures for the annual review of the Operation and Management Plan to incorporate any proposed changes to the management of the activities
- 3. Provision of a Monitoring and Reporting Plan, which shall include as a minimum monitoring procedures covering all aspects of the activity to demonstrate compliance with the conditions, including:
 - i. monitoring of the discharged wastewater quality for biological oxygen demand (five day), total suspended solids, total nitrogen, total phosphorus and *E. coli*
 - ii. continuous flow monitoring of the discharged wastewater
 - iii. soil moisture monitoring (if used rather than a daily water balance)
 - iv. the intended programme for soil quality, chemical, hydraulic and structural monitoring, vegetation assessment, surface water quality monitoring, groundwater quality monitoring
 - v. details of surface and groundwater monitoring to be undertaken
 - vi. record keeping of the land application area used each day, application depth, managing a deficit irrigation system and climatic conditions
 - vii. records of land management, including grazing and harvesting frequency, including dry matter and nutrient removal where appropriate
 - viii. the location of monitoring sites detailed on site maps
 - ix. details of the frequency of sampling and reporting
 - x. measures to ensure reporting requirements are met
 - xi. a record of all complaints received a record of infrastructure modifications
 - xii. details of who will undertake the monitoring and procedures to be used
- 4. Review of the conditions of consent, in accordance with Section 128 of the RMA, including for the purposes of assessing whether any emerging contaminants should be monitored in the soil, herbage or groundwater, taking into consideration the degree of certainty about the fate and risk to the environment from these contaminants. Notification In respect of Rule ..., applications are precluded from public notification (unless special circumstances exist). Note Permission may be required from the relevant city or district council in respect of the Building Act 1991 or other legislation or bylaws.



Discharge of treated wastewater to land – Restricted Discretionary Activity

The discharge of treated wastewater onto or into land, and the associated discharge of odour that fails to meet all requirements of a controlled activity is a restricted discretionary activity, provided that the nutrient application rate limits for controlled activities are not exceeded by **more than 20 %**.

Matters of Control - Discretion is restricted to managing the effects of each performance standard that is exceeded and monitoring, nutrients to match agronomic and management regime.

Discharge of treated wastewater to land – Discretionary Activity

The discharge of treated wastewater onto or into land, and the associated discharge of odour that fails to meet all performance standards of a restricted discretionary activity is a discretionary activity.

Summary comments

In conclusion the following comments are noted:

- There is scope to rationalise the proposed standards and existing risk assessment framework. Two options are presented above:
 - a similar risk assessment type approach to that included with the proposed standard, but utilising existing resource information and a process familiar to most regional councils; and
 - a prescriptive process that adopts many elements of best practice for design and management of land application systems.
- Regardless of option, the system should:
 - Develop a system that ensures hydraulic loading rates minimise nutrient losses from the site;
 - Develop sound management practices that are enduring;
 - Align with agricultural best practice and ensure that nutrients meet agronomic limits; and
 - Utilise national GIS layers – maybe with additional built-in functionality for localised weighting.
- There is a need to be real with extent of use and potential risk of land treatment systems when considering the wider context of the frequency of use and potential environmental effects if developed and run correctly – being low on both accounts; and
- Acceptance of land application of wastewater should be encouraged and efforts made to 'normalise' and 'engage' public in the benefits of use, particularly when reuse provides for nutrient use and water conservation while avoiding adverse effects on land, soil, public health, and surface water quality.



Attachment 1: FDE criteria

Table 5: Application depth and storage requirements for different soil and landscape features (modified from: Houlbrooke & Monaghan, 2009)

FDE risk category	A	B	C	D	E
Soil and landscape feature	Artificial drainage or coarse soil structure	Impeded drainage or low infiltration rate	Sloping land ($> 7^\circ$) and Hump and Hollow drained land	Well drained flat land ($< 7^\circ$)	Other well drained but very stony ^(a) flat land ($< 7^\circ$)
Application depth of FDE to land (mm)	$<$ Soil water deficit	$<$ Soil water deficit	$<$ Soil water deficit	$< 50\%$ of PAW_{30} ^(b)	≤ 10 mm & $< 50\%$ of PAW_{30} ^(b)
Storage requirement	Apply FDE only when soil water deficit exists	Apply FDE only when soil water deficit exists	Apply FDE only when soil water deficit exists	Do not apply within 24-hours of soil saturation	Do not apply within 24-hours of soil saturation

(a) Very stony = soils with $> 35\%$ stone content in the top 20 cm of soil.

(b) Soil water holding capacity in upper 30 cm of soil.



Appendix 3: Responses to Questionnaire About Discharges to Water and Overflow and Bypass Discharges

Consultation Question	LEI Response
Discharge to Water Standards	
How should we consider checks and balances to protect against situations where the degree of microbial contamination may change throughout the duration of a consent?	This is outside of LEI's primary expertise, but, in LEI's experience with designing and consenting discharges to water, public health warning signs about the discharges and hazards of swimming and shellfish gathering are usually sufficient. Dilution of the plume and the assimilative capacity of the receiving waterway are usually sufficient indicators of acceptability. QRMA is only necessary when the pathogen discharges are high and there are popular swimming and shellfish gathering areas within a short distance downstream.
Are the areas for exceptions appropriate to manage the impacts of discharges and do you anticipate implementation challenges?	Most of the exceptions are appropriate. The term 'naturally high levels' needs to be carefully defined. It may be difficult to identify the extent of natural contributions to contamination of waterways when farming and urban sources exist.
How should the exceptions be further defined to ensure there are no unintended consequences?	The exceptions need to clarify that site-specific assessments of effects and consent conditions need to occur for each of these situations. However, the standards do not allow for discharge quality to be any different from the standards, which limits any tailoring of treatment and discharges to specific situations. It is unclear how the exceptions can be consented when the consents are unable to specify more restrictive or less restrictive conditions. The expectations of consenting outcomes for these exceptions need to be explicitly described in a Policy. Are they intended to be given more restrictive or less restrictive consent conditions? Will discharges near potable water sources be prohibited or non-complying? Human drinking water sources should be more tightly defined to match the Taumata Arowai or NES-SHDW criteria for water suppliers, as there are numerous individual rural household bores.
Are the treatment limits, and monitoring and reporting requirements proportionate to the potential impacts of the different discharge scenarios?	The quality and volume of the discharge is factored into the standards, but the receiving water quality and cumulative effects are not considered except for discharges into pristine and naturally contaminated waterways. These types of waterways are not well defined, and it is not clear whether a waterway's pre-existing failure to meet NOF Band A limits for a single parameter means that all wastewater discharge consents must be processed outside of the discharge standards. The limits also do not consider the very significant costs that will be required to upgrade WWTP's to achieve them. This will be particularly difficult for small to medium communities to afford, even with Local Water Done Well contributions. Consideration of the cost implications is required and/or a reasonable timeline to meet the standards. Although the proposed standards briefly mention that 'mix and match' land and water discharge systems will be able to adjust the dilution ratio calculation to reflect the river flows occurring when



Consultation Question	LEI Response
	discharging to water, this is not clear, and the adjustment calculation is not provided. The standards need to provide a calculation method to adjust limits to reflect the benefits of storage and/or combined land and water discharge (CLAWD) systems. For instance, during low flow times, wastewater is not discharged and is either stored or applied to the land. The brief comment in the standards seems to acknowledge that comparing the median discharge volume with the MALF of the waterway is too conservative for these situations. One way to accommodate these systems would be to consider the minimum flow and average discharge rate for the period when the discharge occurs. The standards should clearly describe how dilution ratios are to be adjusted to match the minimum flow rates that can receive discharges. Reporting to Taumata Arowai and being audited annually is an additional cost and duplication of consent compliance reporting should be avoided. Continuous and fortnightly monitoring can be onerous and not beneficial for all times of the year. TSS, cBODs, and pathogens are not able to be continuously monitored. Labs are not available on weekends to receive and analyse grab samples. Monthly monitoring of pond-based WWTP's is usually adequate. However, specifying limits for 95th percentiles of annual monitoring is problematic for monthly samples. It may be better to approximate this with 10 out of 12 monthly results being required to meet the limits. We suggest that adjustments to the sampling regime are required. Monitoring the receiving waterway upstream and downstream to confirm the scale of adverse effects is recommended.
What benefits and challenges do you anticipate in implementing the proposed approach? Are there particular matters that could be addressed through guidance material?	<u>Benefits</u> Standardised discharge parameters and consent conditions with 35-year terms are highly beneficial. This avoids debate about treatment technologies, target performance, and suitability of discharging into the waterway, which is a beneficial outcome of national standards. <u>Challenges</u> As new technology becomes available, or new public health and/or environmental concerns emerge, there needs to be a mechanism to review and reconsider the suitability of the standards at that location. The dilution calculation methods and limits need to be adjusted to account for storage and dual land and water discharge systems that minimise or avoid summer discharges to water. Some discharges into estuaries only occur during out-going tides, so the standards also need to accommodate these scenarios. The costs of WWTP upgrades will be very challenging to achieve these standards. Small rural communities will struggle to afford



Consultation Question	LEI Response
	this. An implementation timeline to meet the standards would be appropriate.
What feedback do you have for managing periphyton in hard bottomed or rocky streams or rivers?	Managing periphyton is complex, and it is relatively difficult and expensive to capture robust data. The duration and frequency of high periphyton growth that negatively impacts instream health is important to incorporate into the standard. It is likely that periphyton effects will occur during times of low stream flow, stable river conditions, and warm temperatures. An exceed probability approach for $x \text{ mg/m}^2$ in $Y \text{ yrs}$ is recommended. Excluding discharges to hard-bottomed or rocky waterways from the standard and instead requiring case-by-case assessment defeats the goal of these standards to cover most types of discharges to water. Periphyton growth is effectively addressed by using land discharges and storage to cease or minimise discharges to waterways during summer.
What detail should be covered in guidance to support implementing this approach for managing periphyton?	This is outside of LEI's expertise.
How should we define small plants and what changes to the default standards should apply to them?	The limits of 1,000 people and cBOD_5 of 85 kg/d are too low. Small pond systems tend to serve communities up to about 5,000 people, but a more balanced definition for small WWTP's might be for up to 2,500 people or incoming cBOD_5 of up to 210 kg/d. However, this is likely to generate debate as to the acceptability of the point source load into what is often a small waterway with often low summer base flows. We question if it should matter what the size of the community the WWTP is treating, but to look at the instream load at summer low flow and having standards which appropriately protect the waterway's functions. This does not mean the same limits would apply to all waterways or similar population sizes. Small pond-based WWTP's will struggle to achieve the TSS, <i>E. coli</i>, and ammonia limits. The treatment complexity and cost of managing (reducing) pathogens from the predominantly pond-based systems for small communities will make meeting the water and land discharge <i>E. coli</i> standards problematic. This will be a disincentive for any transition to land discharge systems, and in fact will create challenges for many existing water and land discharge systems. There is no clarity about consenting of new small WWTP's nor what process is to occur when a 'small' population exceeds the population limit (community growth). It is unclear how long will be allowed for WWTP upgrades when a community's population exceeds the limit for small WWTP's. Consideration may want to be given to the consenting challenges that may be faced with 1) discharges to small/low flow streams; 2)



Consultation Question	LEI Response
	catchments that have a high nutrient base load; and 3) waterways that are in sensitive catchments. Future WWTP's for small communities should also be accommodated by the standards, perhaps by allowing them to meet limits for existing small WWTP's instead of being required to immediately achieve all the standards for medium-sized WWTP's. Allowing an initially lower standard might encourage new WWTP's for small communities without requiring expensive high-tech treatment immediately.
Other matters outside scope of consultation questions	<u>Mix and match discharges</u> Little is said about the many WWTP's that discharge both to land and water. Some key considerations include: • Recognising the benefits of avoiding discharges during low flow conditions; • The inclusion of storage to avoid discharges to surface waters when seasonal land discharges should be reducing - i.e. autumn when low flow conditions are developing and it is not ideal to be irrigating; • The inclusion of land disposal or high rate land systems to address the need to reduce/avoid irrigation, avoid surface water discharges or manage wet weather high flows. This is also a significantly important issue for tangata whenua where there is a preference to avoid direct surface water discharge with some form of passage through Papatuanuku first; and • The inclusion of industrial and non-potable reuse.
Overflow and Bypass Discharge to Water Standards	
Is the current definition of overflow fit-for-purpose, and if not, what changes do you suggest?	LEI support this definition. It is clear and appropriate.
Does the proposed definition of bypasses adequately cover these situations, and if not, what changes do you suggest?	LEI support this definition. It is clear and appropriate.
How should Wastewater Risk Management Plans relate to existing risk management planning tools, and if the Local Government (Water Services) Bill proceeds, stormwater risk management plans?	Because most overflows occur during storm events, it is logical that Wastewater Risk Management Plans (WRMP) link with Stormwater Risk Management Plans. Stormwater contributes to wastewater flows and wastewater overflows generally discharge into stormwater systems and add to the volume of water needing to pass through flooded rivers. Contaminant loads and lack of recreation are also relevant to risks.
What should be covered in guidance to support developing wastewater risk management plans?	Guidance on minimum contents and standardised calculations and management strategies would be helpful.
We understand wastewater risk management plans are already required in some regions – what approaches have worked well and where is there room for improvement?	LEI has limited experience with these, so is unable to comment.



Consultation Question	LEI Response
How should Wastewater Risk Management Plans interact with the proposed consenting pathways for overflows and bypasses?	WRMP's can guide regulators with understanding the likely frequency and volume of overflows. WRMP's should be required to be revised at least every three years (in sync with LTP and Asset Management Strategy consultation) to reflect updated monitoring data gathered from consented overflow points.
Do you support setting all wastewater network overflows as controlled activity?	LEI supports this proposal, because overflows are unavoidable, particularly with increasingly large and frequent storm events and growing populations. A controlled activity is more acceptable than a permitted activity or a more restrictive consenting activity because it acknowledges the inevitability of discharges while enabling a level of management and monitoring to occur. The standards should allow for WWTP bypasses to assist with 'mix and match' discharge systems.
What matters of control should remain with consenting authorities to reduce the impact and frequency of overflows and bypasses?	There should not be a limit of two overflows per annum by 2040, as overflows are usually driven by storms which are unpredictable in size and frequency. The standards need a trigger and frequency that is acceptable (eg 1:10 AEP). This needs to link to and match Taumata Arowai's existing Network Environmental Performance requirements to monitor and annually report on these. Perhaps this could apply to dry weather overflow events alone. Given the limited ability for Councils to influence overflows, the Regional Councils should only have control over the existence of a WRMP and monitoring of its implementation and effectiveness at reducing overflows.
Are there examples of existing approaches to managing overflows that would work well as matters of control?	Regular network inspections (often using CCTV and smoke testing) and catchment flow investigations are effective at identifying sources of groundwater and stormwater. These should feature in WRMP's.
What other factors need to be considered when making overflows and bypasses a controlled activity? What matters would be helpful to address through guidance?	The standards should acknowledge the need for a minimum storage or buffer volume. Monitoring of overflow volumes and durations is very difficult, as overflow pipes are not always full and the outlet may have resistance from floodwaters applying backpressure. Outlets below flood levels are impossible to visually monitor for discharges. Water level monitoring in pump wells does not prove when overflows are occurring.
What transition arrangements should apply for scenarios where Regional Councils already have consenting pathways for overflows?	Consents lodged before the standards are implemented should be processed in accordance with the standards without delay.
What matters should be covered in guidance material to support monitoring and reporting requirements?	Guidance on effective overflow design and monitoring would be very helpful.
Do you support establishing a framework that determines how overflows are managed based on risk?	LEI supports this proposal.