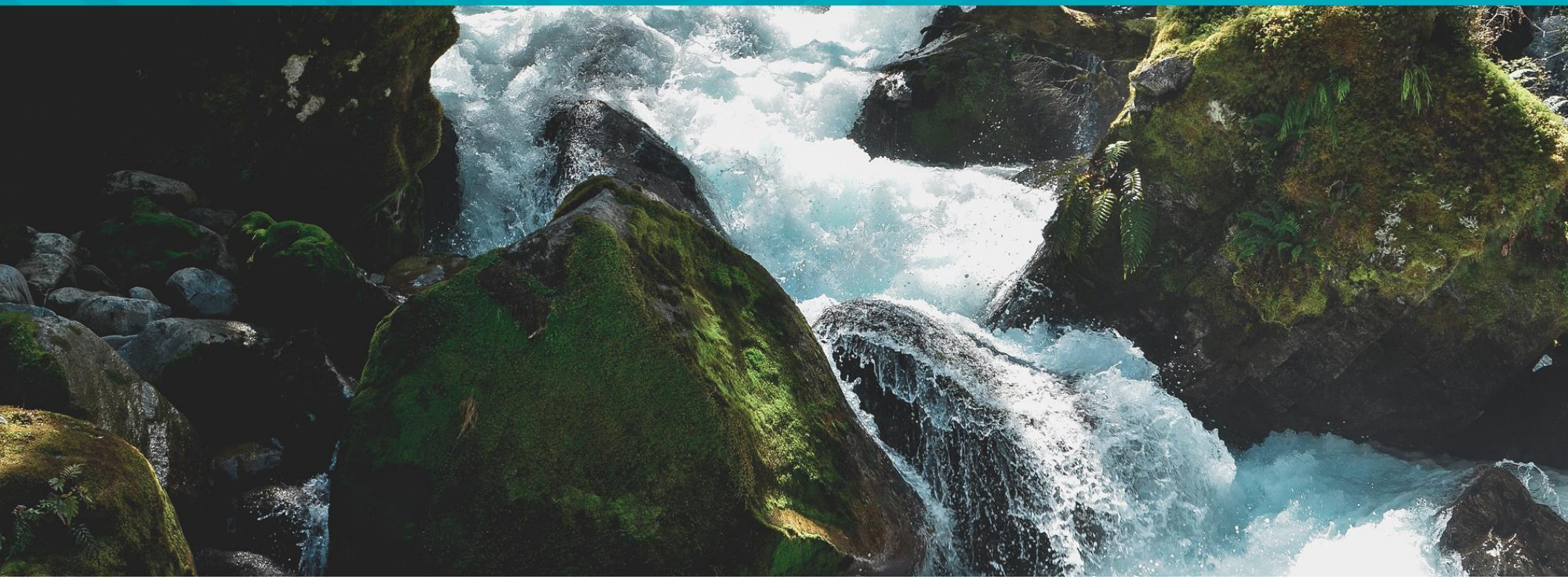
Unclassified

Wastewater Standards Technical Review Group

Wastewater Environmental Performance Standards: Discharge to Land



Karakia tīmatanga

Whakataka te hau ki te uru
Whakataka te hau ki te tonga
Kia mākinakina ki uta
Kia mātaratara ki tai
E hī ake ana te atākura
he tio, he huka, he hau hū
Tihei Mauri Ora!

Cease the winds from the West
Cease the winds from the south
Let the breezes blow over the land
Let the breeze flow over the ocean
Let the red tipped dawn come with a sharpened air
A touch of frost, a promise of a day!
Sneeze, the breath of life!

Scope of report

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- The report was commissioned **to recommend wastewater environmental performance standards (including monitoring and reporting requirements) relating to discharge of wastewater to land** that will apply to new resource consents for publicly operated municipal wastewater treatment plants.
- Recommendations in the report must reflect:
  - international best practice approaches relating to national frameworks of consent-based standards, monitoring and reporting arrangements for WWTPs,
  - best practice approaches in existing resource consents, and
  - existing and proposed approaches in national direction or regional plans that may affect any future standards for WWTPs.

New Zealand context

New Zealand context

- The draft report provides a short overview of current discharge to land arrangements in NZ (pages 4-7).
- It notes that approximately 30% of the 321 WWTPs owned and operated by councils discharge to land (serving 8% of the population).
- The draft report refers to a 2016 survey by Lowe Environmental Impact that found a large percent of land discharges are high-rate discharges such as through soakage trenches or wetland systems (*figure 1*).
- In 2019, GHD and Boffa Miskell reviewed resource consents for discharge from NZ WWTPs. For land-based disposal, human health measures (E. coli/ Enterococci/ faecal coliforms) were the most common parameter measured, followed by BOD, nitrogen and suspended solids.

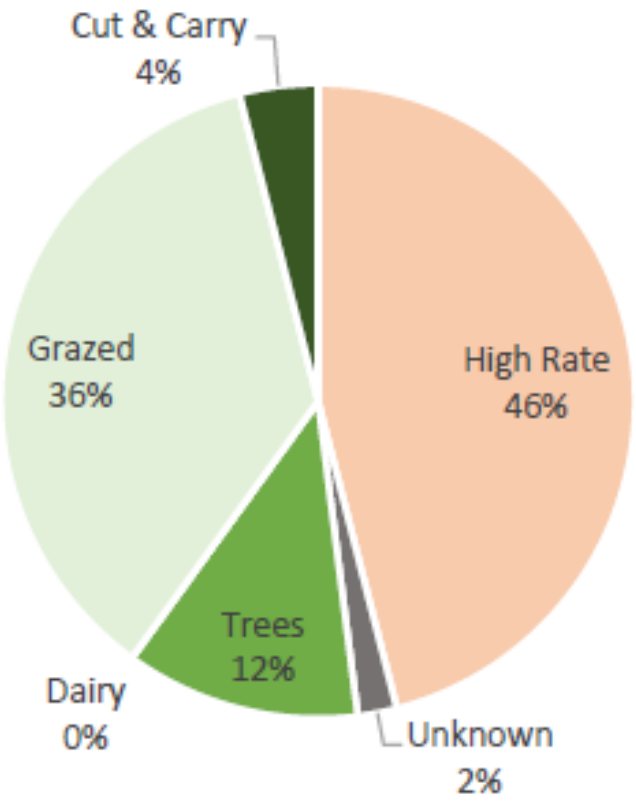

Figure 1: Land dischargers (Lowe, 2016)

New Zealand context (contd.)

- The draft report notes that in NZ there are no standardised consent conditions for wastewater treatment, including discharge of effluent to land. This has led to a vast degree of variance across the country in both the management practices and performance standards for treated wastewater.
- Some regions indicate a preference for land-based disposal of wastewater in their regional plan
- For example, the Greater Wellington Regional Council Natural Resources Plan states that discharges of treated wastewater to coastal water are discouraged and new wastewater discharges to freshwater are avoided unless discharge to land is not practicable.
- The proposed regional plan for Northland states that consents for discharge of wastewater to water will generally not be granted unless discharge to land has been considered and found not be environmentally, economically, or practically viable.
- The draft report notes that nitrogen loss limits (nitrogen leaching limits) are specified in regional plans around the country for intensive farming land uses.

Focus Questions

- Is the information in the report about discharge to land in NZ up to date?
- Can you provide sources of additional information that would be useful as part of describing the problem definition / current practice in New Zealand? This would be valuable for the discussion document.
- In your experience are high-rate discharges, particularly discharges to wetlands classified as discharges to land or water?

International Practice

International approaches

- The draft report summarises the approaches taken in some other countries (pages 7-8, Appendix A). There is information about approaches in the European Union and the United Kingdom, the United States and Australia.
- The draft report notes that many international approaches on the land application of wastewater involve the beneficial reuse of treated wastewater for horticulture or agricultural soil treatment purposes.
- The European Union and UK use regulations to set requirements for discharge of wastewater to land and beneficial reuse. The other countries summarised in the report (USA, Australia) use guidelines to regulate this area.

Summary: international

Country/ Governing Body	Regulation/ guidelines	Discharge options	Parameters regulated
European Union and the United Kingdom	Regulation (EU) 2020/741	• Irrigation of food crops. Irrigation methods and suitable crops are determined by water quality. • Industrial and energy water usage. • Amenity-related and environmental purposes.	• E. coli • BOD5 • TSS • Turbidity • Legionella spp.
United States Federal Regulations	Land Treatment of Municipal Wastewater Effluents (2006)	Slow rate land treatment (application to vegetated soil surface). Overland flow treatment (application to relatively impermeable soils on gentle grass covered slopes). Soil aquifer treatment (application to earthen basins in permeable soils).	Process design manual, guidance only
	Guidelines for water reuse (2012)	Water quality suggestions for BOD, SS, E. coli, chlorine depending on the use.	Guidelines only
Australia	Australian Guidelines for Sewerage Systems, Effluent Management (1997)	Evaporation ponds. Evapotranspiration (irrigation, agricultural or landscape). Infiltration.	Guidelines only
	Australian Guidelines for Water Recycling (2006)	Water quality objectives for BOD, SS, E. coli depending on the use.	Guidelines only

Focus Questions

- Is the information in the report about the international approaches accurate? Are there areas where further work would be useful?
- Can you provide sources of additional information that would be useful as part of describing in other jurisdictions? This would be valuable for the discussion document.

Iwi and hapū perspectives and case study insights

Iwi and hapū perspectives

- Hapū and iwi have a strong preference for human waste to be discharged to land, rather than water. In some situations, however, land-based discharge is not feasible. Ensuring wastewater makes contact with land before reaching the waterways is seen as a way to whakanoa (remove tapu) wastewater.
- A range of land-based solutions and new technologies are being employed ‘at-place’ to reduce the effects on the land before discharging to waterways, where discharge to land is not an option.
- High standards of wastewater treatment is an expectation as is ensuring wastewater discharge does not cross into other hapū and iwi boundaries
- The draft report has iwi/hapū values and perspectives on discharging treated wastewater to land (page 6) and Māori rights and interests in the resource management (RM) system (page 7). This includes Treaty settlement obligations and mechanisms for Māori participation with the RM system. Any framework for standards or associated guidance would therefore need to ensure that national standards uphold these obligations
- Iwi/hapū (and community) express the importance of meaningful and early engagement and involvement in decision making on matters affecting them.

Case study insights

- In the Rotoiti-Rotomā case study, iwi/hapū shared a strong preference for land-based discharge over water-based discharge as it more closely aligns with their responsibility to protect and strengthen the mauri (spiritual life force) of the lakes.
- Several case studies highlighted the use of innovative technology to support options for land-based wastewater discharge, for example the Rotoiti Rotomā pre-treatment systems to ensure high levels of wastewater treatment, reducing the discharge of raw sewerage to the lakes if there is any pipe damage and leakage.
- Often, land-based discharge options are not practical given the costs associated with acquiring land for land-based treatment and disposal.
- There were examples from case study participants that confirmed the role that independent consultants can play in bridging between council and Iwi/hapū for improved communication and information sharing
- The case studies affirmed a view that high levels of wastewater treatment are required before any discharge to land, and new technology should be leveraged to support land-based discharge solutions where possible.

Recommendations in draft report

Recommendations in draft report

- The draft report proposes parameters for which standards could be applied for discharge to land (next slide).
- The draft report notes that performance standards could set parameters for a select few, or a range of parameters.
- The draft report recommends further discussion with:
  - regional councils, operators and review of recently consented WWTPs to understand if these parameters are being monitored already; and
  - the wastewater industry to determine the impact these standards may have on the existing capacity of wastewater operations staff and the availability of treatment plant and equipment.

Parameter	Commentary
Total Suspended Solids (TSS)	• Common parameter in international guidelines and standards, and New Zealand consents.
Five-day biochemical oxygen demand (BOD5)	• Common parameter in international guidelines and standards, and New Zealand consents.
Chemical Oxygen Demand (COD)	• Relatively common parameter in international guidelines and standards • Simpler and more cost-effective to monitor and measure than BOD
Turbidity	• Specified in USA for reuse to food crops • Not specified in case studies or recently granted consents.
Faecal Coliform (E.coli/Enterococci)	• Common parameter in international guidelines and standards. • Common parameter in New Zealand consents.
Total Nitrogen	• Generally specified as a loading rate. Maximum kg/ha/year in regional plans and for irrigation of dairy effluent. • Nitrogen limits in case study consents.
Ammoniacal Nitrogen/Ammonia	• Not generally specified in international standards or guidelines. • Not specified in case studies or recently granted consents. • Important nutrient for plants but harmful if runoff into aquatic environment.
Total Phosphorus	• Seen in the case studies and consents assessed. • Higher treatment will be required for removal. • Limit will depend on application rate to ensure that the infiltration capacity of soils is not exceeded. • Important nutrient for plants but harmful if runoff into aquatic environment.
pH	• Not generally specified in international standards or guidelines. • Not specified in case studies or recently granted consents.
Polyfluoroalkyl Substances (PFAS) and microplastics	• Specified in 2024 EU directive but not in any water reuse standards/guidelines reviewed.
Elements	• International guidelines for recommend maximum concentrations for long-term continuous use on soils. • Biosolid performance standards have maximum concentrations specified. • ANZECC & ARMCANZ Guidelines for Irrigation water quality have limits for heavy metals.

Comparison of numerical values for performance parameters

Guidelines	Conditions	Microbial	BOD5 (mg/l)	TSS (mg/l)	TN (mg/l)	TP (mg/l)
EU (EU 202/741)	Reclaimed water quality requirements for reuse of water quality class D	≤ 10 000	In accordance with Directive 91/271/EEC (25mg/l)	In accordance with Directive 91/271/EEC (25mg/l)		
ANZECC & ARMCANZ Guidelines for fresh and marine water quality (2000) for irrigation water quality	Water quality for irrigation and general water use	<10-10,000 cfu/100 ml depending on intended use			25-125 mg/L (short term irrigation – up to 20 years)	0.8-12 mg/L (short term irrigation – up to 20 years)
NES-FW 2020					190 kg/n/ha/year "permitted national baseline"	
USA 2012 Guidelines for water reuse	Guidelines for non -food crops	200 CFU/100 ml	30	30		
Australian guidelines for water recycling (2006)	Landscape irrigation with no public access (note non food crops only specify E. coli limit	1000 cfu/100 ml (if no disinfected	20	30		

Recommended limits

The draft report proposes the following limits:

- Biochemical oxygen demand (BOD5) 25 mg/l (or an equivalent parameter, if a relationship is established).
- Total Suspended Solids (TSS) 35 mg/l.
- Escherichia coli (E. coli) limit set at place
- Total phosphorous (TP) limit set at place
- Total Nitrogen (TN) limit set at place

Monitoring and Reporting requirements

- The draft report recommends that monitoring and reporting requirements for wastewater discharge to land is the same as discharge to water.
- As an objective of these standards is to increase the transparency of wastewater performance, the draft report recommends regular and transparent reporting. Aligned with international best practice, the draft report recommends that reporting should be accessible and displayed online in a central database.
- At place engagement with mana whenua will also be required to understand the local environment (e.g. what areas are wāhi tapu), and cultural practices (e.g. what areas are used for mahinga kai), and to identify preferences for monitoring and reporting, such as frequency and any other additional reporting requirements specific to the location.

The draft report recommends:

- Minimum annual number of samples should be determined according to the size of the treatment plant, receiving environment sensitivity, consideration of mana whenua and community and the monitoring technology available at the time.
- Monitoring results should be published monthly, while an annual compliance report should be prepared and published yearly.
- A Cultural Monitoring Plan should be required in respect of each WWTP to support monitoring of the mauri and health of relevant receiving environments.

Focus questions

- We are interested in your feedback on these recommendations.
- There are a number of areas we would like to discuss for further work:
    - standardisation of two parameters (TSS and BOD) is recommended in the draft report - this will not incentivise consenting arrangements as other key parameters (nutrients and pathogens) will need to continue to be set through resource consents;
    - are there opportunities to set wastewater treatment requirements for discharge to land using the treatment requirements the group has discussed for discharge to freshwater as an initial starting point;
    - are there opportunities to identify types of land (for example, some types of land identified in the Water NZ biosolids technical guide) that would be inappropriate for wastewater discharge;
- It would be useful to discuss contaminants of emerging concern and any areas you consider are worth understanding or investigating further.

Karakia whakakapi

Unuhia, unuhia
Unuhia ki te uru, tapu nui
Kia wātea, kia māmā
Te ngākau, te tinanga
Te wairua I te ara tangata
Tīhei Mauri Ora

Draw on, draw on
Draw on the supreme sacredness
To clear, to free the heart
The body, and the spirit of people
Sneeze, the breath of life!