

Unclassified

# Wastewater Standards Technical Review Group



## Wastewater Environmental Performance Standards: Biosolids



# Karakia tīmatanga

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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

## Scope of report

- The report was commissioned **to recommend wastewater environmental performance standards (including monitoring and reporting requirements) relating to the reuse of biosolids** that are produced by 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.

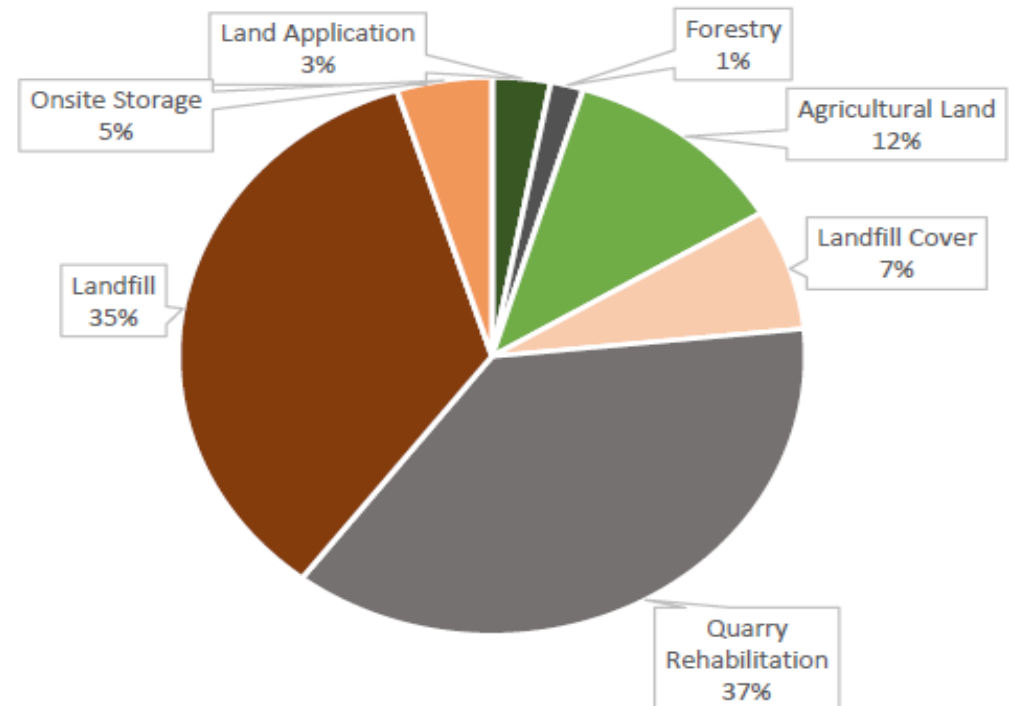


# New Zealand context



# New Zealand context

- The draft report provides a short overview of the reuse of biosolids in NZ (page 13).
- It provides information from a 2019 survey that found, among 16 biosolids utilities, 60% of the material was being used for broadly beneficial purposes (“resource recovery”), while 40% was being disposed of as a waste product (landfill or onsite storage).



## New Zealand context (cont.)

- The report authors reviewed regional plans and some consents to identify those that reference biosolids. The draft report provides the following examples where existing plans, consents, or infrastructure design cites or was based on the 2003 Water NZ biosolids guidelines (page 14).

Location	Information
Moturoa/Rabbit Island	Granted 14 April 2023. Biosolids to forestry land. Refers to the “Safe Application of Biosolids to Land in New Zealand Guidelines” (August 2003). Includes the requirement for a six-yearly monitoring and technology review report which includes an assessment of the activities subject to these consents against the biosolids guidelines and any subsequent update.
Auckland Unitary Plan	The Auckland Unitary Plan refers to the 2003 Biosolids guidelines
Wellington Sludge minimisation facility	The basis of design (2020) for the facility refers to the 2003 and 2017 Guidelines.

# Focus Questions

- Is the information in the report about reuse of biosolids 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.
- Do you know about other plans or consents that have used the 2003 Water NZ biosolids guidelines?



# International Practice

# International practice

- The draft report summarises approaches taken in other countries (pages 5 – 6, Appendix A and B). There is information about the approach taken in the European Union, England, Wales and Northern Ireland, USA, some Australian states and Canada.
- Countries use a mix of binding regulation (EU, USA and some Australian states), codes of practice (England, Wales and Northern Ireland) and guidelines (some Australian states). All of these countries have mature arrangements that have been in place for decades that have been subject to ongoing review. This includes some which have implemented binding regulation (EU – 1987, and USA – 1993).
- The main characteristics for biosolids regulation in other jurisdictions are:
  - limits on the concentration of target pollutants in biosolids (primarily heavy metals, pathogens and vectors)
  - ceiling concentrations and / or loading rates in the land the biosolids are being applied to;
  - restrictions on whether and how biosolids can be applied to different types of land (for example, forest or types of horticultural land where food is produced);
  - monitoring and reporting requirements that primarily relate to land that biosolids are applied to in significant quantities.

## Summary of biosolids guidelines overseas

Regulation/Guidelines	Heavy Metals	Pathogens	Vector Attraction	Grading
<b>European Union (regulations)</b>	Maximum heavy metal concentrations.	Not specified	Not specified	Not specified
<b>USA (regulations)</b>	Heavy metals—ceiling concentration, cumulative and annual limits.	Yes	Yes	The guidelines specify the maximum allowable concentrations of heavy metals in soil and sludge and outline the need for regular monitoring.
<b>Western Australia (guidelines)</b>	There are three contaminant grades (C1-C3) that focus largely on the weight % of heavy metals such as copper and zinc.	Western Australian guidelines for biosolids management differentiates between four pathogen grades and three contaminant grades, the combination of which determine the biosolids reuse potential.  There are four bio-solid pathogen grades (P1-4) with different requirements for treatment processes, microbial limits and vector attraction reduction control required to meet each grade, as described in Table 3 of the guidelines.	Not specified	Contaminant grades range from A-E for 18 contaminants that include heavy metals, pesticides, fungicides, and insecticides.  Stabilisation grading depends on the pathogen reduction and vector attraction reduction that the biosolids have undergone,
<b>England, Wales and Northern Ireland (not specified in report)</b>	The "Sewage Sludge in Agriculture: Code of Practice" provides guidelines for the safe recycling of sewage sludge in agriculture.  The guidelines specify the maximum allowable concentrations of heavy metals in soil and sludge and outline the need for regular monitoring.	Not specified	Not specified	Not specified

Regulation/Guidelines	Heavy Metals	Pathogens	Vector Attraction	Grading
<b>New South Wales (guidelines)</b>	Not specified	NSW sets five contaminant grades and three stabilisation grades that determine the biosolids reuse potential.	Not specified.	For each stabilisation grade the biosolids must satisfy one of the pathogen reduction process requirements and one of the vector attraction reduction requirements. Grade A also requires microbial testing to verify.
<b>Queensland (regulations)</b>	There are three contaminant grades that focus largely on the weight % of heavy metals.	There are 4 bio-solid pathogen grades with different requirements for treatment processes and microbial criteria	Not specified.	Not specified
<b>Tasmania (guidelines)</b>	Not specified	The guidelines include specific tables that outline acceptable limits for pathogens and contaminants in biosolids. This is crucial for ensuring that the application of biosolids does not pose health risks.	Not specified.	Biosolids are classified into different grades based on their quality, specifically regarding pathogen content and chemical composition. This classification helps determine the appropriate reuse options.
<b>Canada (not specified in report)</b>	'Guidance Document for the Beneficial Use of Municipal Biosolids, Municipal Sludge and Treated Septage' does not set specific limits, but instead refers to local guidelines/regulations for information on specific limits. The Guidance Document recommends parameters for heavy metals as a measure of the quality of wastewater residuals.	The Guidance Document recommends parameters for pathogens such as E. Coli, Salmonella and faecal coliform as a measure of the quality of wastewater residuals	The Guidance Document recommends parameters for vector attraction reduction and odour.	Not specified

# 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.



# **Review / replacement of Water NZ biosolids guidelines**



## Review of 2003 Water NZ biosolids guidelines

- The existing Water NZ biosolids guidelines have been in place since 2003. At the time they were made, the intention was for the guidelines to be implemented through a National Environmental Standard but this did not occur.
- Water NZ has been leading a review of the guidelines, together with a steering group chaired by Rob Tinholt. They are to be superseded by the ***Beneficial Use of Biosolids and Other Organic Materials on Land*** technical guide.
- Water NZ is about to circulate a final draft of the revised guidelines to key stakeholders (**attached**). An earlier draft of these guidelines was provided to the report authors.
- There has been ongoing consultation and collaboration on the revised guidelines as part of this work. This process has been supported by leading independent technical experts.

# Beneficial Use of Biosolids and Other Organic Materials on Land technical guide 2024

- Lesley Smith (Water NZ) and Rob Tinholt (Watercare) who been leading the work on the revised Beneficial Use of Biosolids and Other Organic Materials on Land technical guide, have agreed to present a summary to the technical review group.
- Slides will be circulated separately to support this presentation, focussing on:
  - what are the key characteristics of the framework;
  - what are the elements of the guidelines that could be implemented through a wastewater environmental performance standard; and
  - what are the emerging or challenging areas, and how should they be dealt with.

The background is a solid teal color with a subtle, repeating pattern of wavy, organic shapes that resemble stylized waves or perhaps the texture of water. The pattern is centered and fills the entire frame.

# Te ao Māori and case studies - biosolids

## Views of Māori relating to reuse of biosolids

- Māori have a very strong preference for human waste to be discharged to land, rather than water. This supports the development of a standards-based framework that includes arrangements that promote and support beneficial reuse of biosolids.
- The draft report has information on Māori perspectives on biosolids (page 6).
- Māori are generally opposed to disposal of human waste to areas where food is gathered. This view is based on the value system of tapu and noa, where human waste is tapu and must be disposed of in the correct way to render it noa.
- From a historical perspective, this view is based on long-established processes for managing human waste to ensure the health and welfare of a community. These practices and processes are still considered beneficial for public health. Any framework for standards or associated guidance would therefore need to ensure that this value system (tikanga, mātauranga, and broader te ao Māori perspectives) is considered.

## Case study insights relating to reuse of biosolids

- The draft report summarises the insights into reuse of biosolids from the case studies in Gisborne, Taipā, Porirua, Rotoiti / Rotomā, Cambridge, Pukekohe (page 13) and Porirua (page 11). Each of these 'at place' case study examples highlights the different characteristics and arrangements related to biosolids.
- There are sensitivities and practical considerations around biosolids being transported across different regions or tribal boundaries – respect for this preference was part of the decision-making for the arrangements in Rotoiti / Rotomā and Gisborne.
- Mana whenua also supported development of options that promoted beneficial reuse of biosolids – for example, in Gisborne disposal of a bag of sludge to landfill required an equivalent ratio of six bags of domestic waste. This was not seen as a good option as would lead to biosolids disposal driving an increase in overall waste.
- Opportunities to re-use biosolids through sale to local farmers is seen as a positive outcome of the Taipā treatment arrangements, although this has not occurred at this stage.
- In Rotoiti / Rotomā, onsite systems have been adopted by a small community to ensure a high level of treatment through natural processes. This is an innovative solution, noting that the onsite component means it is only likely to be suitable for small communities with a reasonably high level of buy-in to the arrangement and its maintenance.
- The Gisborne case study highlighted the importance of learning from international examples of burning biosolid waste to convert to energy, or using biosolids as fertiliser.
- Several case studies noted the benefits and complementarity of western science and mātauranga working in tandem to find solutions to achieve improved environmental outcomes.

# Recommendations in draft report



## Contaminant grade standards

The draft report proposes the following contaminant grade standards – achieving these standards would achieve Class 1 grading. If requirements are not met the biosolids would be graded Class 2.

Contaminant	Concentration limit (mg/kg dry weight)
Arsenic	30
Cadmium	10
Chromium	1500
Copper	1250
Lead	300
Mercury	7.5
Nickel	135
Zinc	1500
Nonyl phenol and ethoxylates (NP/NPE)	50
Phthalate (DEHP)	100
Linear alkydbenzene sulphonates (LAS)	2600
Musks – Tonalide	15
Musks – Galaxolid	50

## Nitrogen loading

- The draft report proposes a nitrogen loading approach to control product application to land.
- Nitrogen application rate should not exceed 200kg / ha / year over up to two years
- Some regional plans have stricter regulations for nitrogen loading – for example, in the Waikato Regional Plan has a maximum nitrogen loading rate of 150kg / ha / year. However, this applies to farm animal effluent, and not application of biosolids. The draft report therefore proposes that, if there are stricter limits in particular areas, those should apply in preference to the recommended loading rate. Similarly, if a person wishes to apply biosolids to land at a rate that exceeds 200kg / ha / year, it should have a resource consent.

## Chemicals of emerging concern

- The draft report notes that chemicals of emerging concern continue to be evaluated locally and internationally. This include PFAS, which are not part of the biosolids framework.
- It will be necessary to ensure there is ongoing review of this area, including engagement with international programmes of work, to ensure the framework accounts for any new information or changes in approach.

# Monitoring

The report proposes monitoring arrangements to verify the product grade and its stability for both pathogens and contaminants. It does not propose any specific monitoring arrangements in relation to application of biosolids to land (for example, to verify a person is complying with nitrogen loading application limits, or ceiling limits on land relating to heavy metals).

Grade	Sample type	Number of samples
A & B	Product verification	<ul style="list-style-type: none"> <li>Metals: 1 composite/week over a 3-month period.</li> <li>Organics: 1 composite sample<sup>2</sup>/month over a 3-month period.</li> </ul>
	Routine sampling	<ul style="list-style-type: none"> <li>Metals: 1 composite/2 week.</li> <li>Organics: 1 composite/2 months.</li> </ul>

Note: All values are to be 95th percentiles from the data set. No individual value from the data set shall exceed the limits by more than 20%.

Grade	Monitoring type	Sampling regime	Parameters to be monitored
A	Product verification	<p>≥ 7 evenly dispersed grab samples per month for a 3-month period with ≤ 3 failures. If &gt; 3 failures, then the 7 following consecutive grab samples must comply.<sup>1</sup></p>	<p>E. coli Campylobacter Salmonella Human adenovirus Helminth ova</p>
	Routine sampling	1 grab sample per week	E.coli Vector attraction reduction (VAR)
B	Product verification	Not applicable for pathogen testing	
	Routine sampling	Not applicable for pathogen testing	

Note: No more than three samples should be taken per day during product verification.

## Reporting requirements

- The draft report notes that the revised Water NZ technical guidelines include record keeping requirements for manufacturers, for discharges, and for third parties involved in the bulk transport of organic materials. However, there are no specific reporting requirements.
- The draft report therefore proposes all product compliance results should be reported to regional councils within 48 hours, who should publish them monthly on a website and provide them to mana whenua.
- It is not clear if this recommendation relates to nitrogen loading application, or to the pathogen and contaminant grading that is required as part of treatment / manufacture of biosolids.

## Focus Questions

- We are interested in your feedback on these recommendations, together with suggestions for other areas that will be required to develop.
- It would be useful to discuss whether requirements for / restrictions on application to land should differ for types of food crops, or other uses of land (see, for example, Appendix A, table 2).
- Are the proposed restrictions on where biosolids cannot be applied (page 7) appropriate? Are there other areas?
- It would be useful to discuss monitoring arrangements for land where biosolids are being used as fertiliser, together with loading / ceiling concentration requirements similar to the arrangements in the USA (see section A3 of Appendix A)?
- For reporting arrangements, separate systems appear to be necessary for ensuring that treatment processes / manufacture comply with requirements, and that application to land complies with any requirements. It would be good to discuss this area.
- It would be useful to discuss contaminants of emerging concern and any areas you consider are worth understanding or investigating further.

# Karakia whakakapi

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Unuhia, unuhia  
Unuhia ki te uru, tapu nui  
Kia wātea, kia māmā  
Te ngākau, te tinanga  
Te wairua I te ara tangata  
Tihei 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!