Water Services Authority
Taumata Arowai

Wastewater Environmental Performance Standards: discharge from wastewater treatment plants to land

Implementation guidance

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Contents

PLEASE NOTE THAT MINOR AND TECHNICAL AMENDMENTS TO THE REGULATIONS THAT ESTABLISH THIS STANDARD ARE UNDER CONSIDERATION.

PLEASE CONTACT THE AUTHORITY FOR FURTHER INFORMATION.

Disclaimer:

This document has been produced by the Water Services Authority – Taumata Arowai together with the New Zealand Land Treatment Collective to support interpretation of the Water Services (Wastewater Environmental Performance Standards) Regulations 2025 as they relate to discharge of treated wastewater to land.

This guidance does not constitute advice and does not replace technical or legal advice from qualified experts.

1. Introduction

New Zealand's first set of wastewater standards was enacted in late 2025 via the Water Services (Wastewater Environmental Performance Standards) Regulations 2025 (the Regulations). The Regulations aim to lift infrastructure performance, provide clarity and enable cost efficiencies. The Regulations set requirements for discharges to water, discharges to land, beneficial reuse of biosolids and management of overflows and bypasses.

Part 4 of the Regulations set the standard for discharge of treated wastewater to land (the standard). The standard gives operators of public wastewater treatment plants (such as local councils) a consistent approach to assess if a site is suitable for discharging treated wastewater and determine applicable treatment requirements when treated wastewater is discharged to land. It also sets consistent monitoring and reporting requirements.

The standard sets out steps for characterising a land application system. It sets out the basic requirements, while operators retain discretion as to how their individual discharge to land schemes are designed, managed or operated.

Decisions about how discharge to land schemes are designed need to be made with input from the community, including iwi.

This document supports implementation of the discharge to land standard. It includes guidance on assessing if land is suitable for receiving treated wastewater and then outlines compliance with specific discharge limits based on the risks associated with the selected land site.

2. Applicability and exclusions

[Note this section is under review, please contact the Authority for further information]

2.1 Applicability

The standard applies to public infrastructure in all regions of New Zealand, including council and government-owned wastewater treatment plants and networks. It does not apply to privately-owned systems and other circumstances set out in Table 1.

The standard is implemented through resource consents as they come up for renewal or are newly issued. Regional councils are responsible for applying the standard through the Resource Management Act 1991 (RMA) consenting processes. The standard does not apply to variations to existing consents before they expire.

The standard applies to both slow infiltration (<6 m) and rapid infiltration (>6 m) systems.

2.2 Treaty settlement obligations

The standard applies unless there is an inconsistency with relevant Treaty settlement arrangements and provisions in the Waikato-Waipā, Whangaehu and Whanganui River catchments.[1]

Where an inconsistency is identified, the applicant must work with the relevant iwi and hapū, network operators and consenting authority to identify consent conditions that are consistent with Treaty obligations.

2.3 Exceptions

Exceptions to the discharge to land standard are provided for in primary legislation and the regulations (regulation 87). Discharge to land arrangements that are not captured by the standard (see Table 1) will be subject to the resource consent conditions set by the relevant regional council or consenting authority. The standard may be updated in the future to cover a broader range of scenarios.

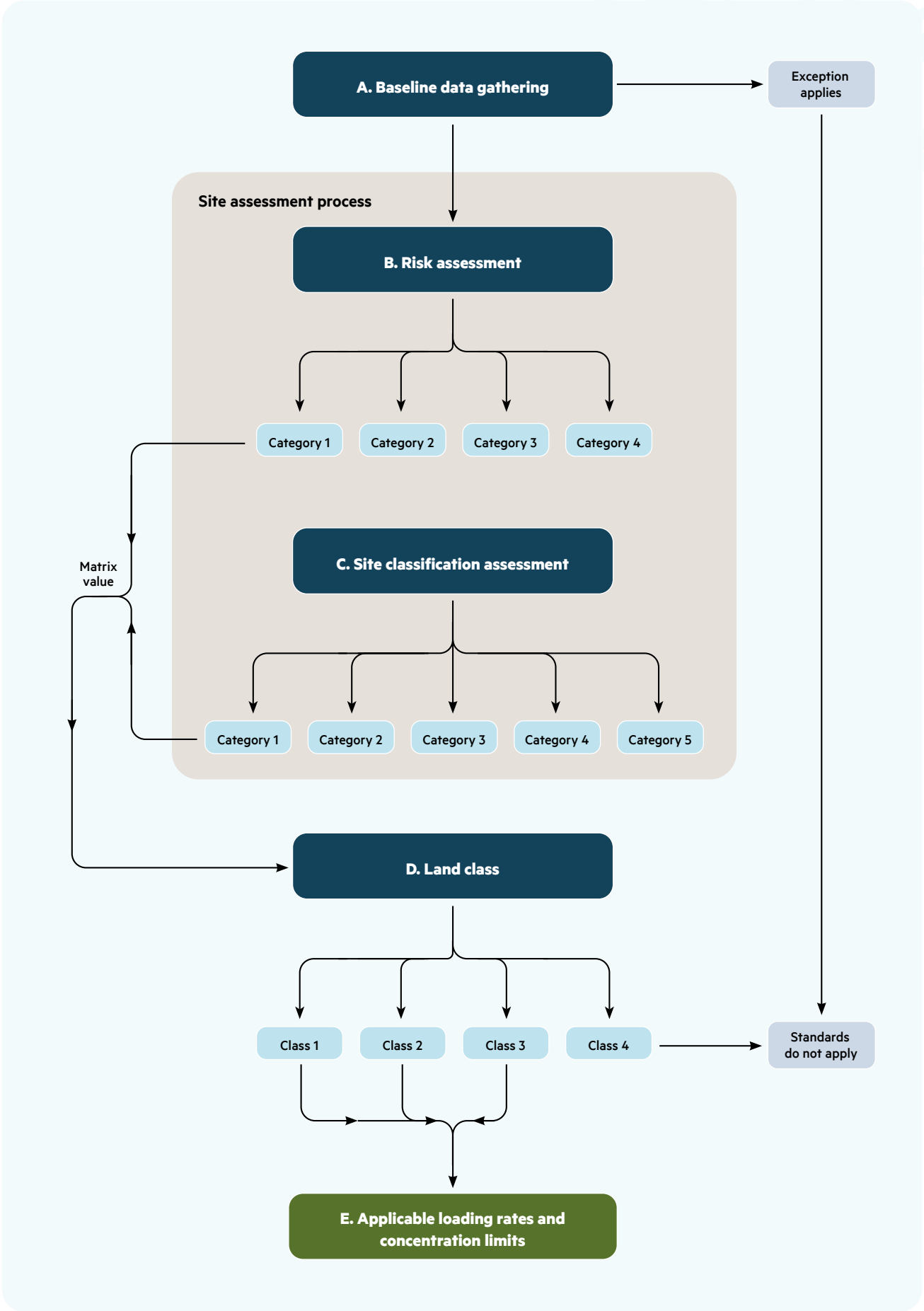
Table 1: Exceptions to the discharge to land standard

Exceptions	Description
Privately owned networks	The standard does not apply to privately owned wastewater infrastructure.
On-site wastewater management systems	The standard does not apply to wastewater treatment systems that fall within the scope of, and are assessed using, the Australian/New Zealand AS/NZS 1547:2012 (e.g. campground wastewater systems).
Industrial /trade waste	The standard does not apply to discharges from industrial/trade waste-only networks. For clarification, where industrial or trade waste is mixed with municipal waste for treatment at a publicly owned wastewater treatment plant, the standard does apply.
Discharge to land that is assigned to land class 4 under regulation 90	The standard does not apply in situations where, following completion of a risk assessment and site classification assessment under the Regulations, the proposed discharge site is designated as land class 4.
Discharge from a bypass	The standard does not apply to any discharge from, or associated with, any bypass of a treatment plant.
Discharge into a wetland	The standard does not apply to discharges to a wetland that is not used as part of the wastewater treatment process.
Irrigation linked to human consumption	The standard does not apply to a discharge to land for the purpose of irrigating pastoral, horticultural or arable crops that are grown for human consumption.
Seepage	The standard does not apply to seepage from a pond that is part of wastewater treatment or storage infrastructure. *For clarification, the standard does apply to piped discharge to land from wastewater treatment plants that use an oxidation pond as part of the treatment process.*

1 Refer section 58JB of the Resource Management Act 1991, and regulations 6 and 7 of the Water Services (Wastewater Environmental Performance Standards) Regulations 2025.

3. Quick overview of the discharge to land standard

Figure 1: Overview of process to apply discharge to land standard



Regulations 90-95 outline the site assessment process, comprising the risk assessment and the site classification assessment. The site assessment must be carried out by a suitably qualified and experienced person (SQEP) as defined by regulation 90.

3.1 Determining applicable discharge concentration limits

- **A. Baseline data gathering** – before initiating the site risk assessment and site classification assessment, a data-gathering exercise should collate what is known about the proposed discharge site.
- **B. Risk assessment** – the standard requires an assessment of the extent of potential risks which include a range of predefined nutrient and pathogen-based hazard types for a given site. A risk assessment framework should be used to assess each risk in terms of likelihood and severity of occurrence. Following the risk assessment, the operator must identify a combined risk score for a specific site using a risk matrix.
- **C. Site classification assessment** – the standard requires an assessment of a selected site's capability to receive, treat and move the treated wastewater in a manner that meets appropriate receiving environmental performance requirements. A range of natural, static and management factors are to be considered, with an overall site classification category established for a site. The calculated score may be the result of research, site investigations or proposed design. An appropriate classification category must be identified, reflecting the greatest or most significant site limitation for receiving wastewater projected for the site, once the system is operational at the design loading rate.
- **D. Land class** – the standard sets out the procedure for combining outputs from the risk assessment and site classification assessment to identify a land class.
- **E. Discharge concentration limits** – the land class or classes determine the relevant limits for total nitrogen and total phosphorus loadings and pathogen (*E. coli*) concentrations.

3.2 Operational requirements

- **Operations and maintenance manual** – consents granted using the standard must include an up-to-date operations and maintenance manual that describes how the system will be operated, monitored, maintained and managed to protect public health and the environment.
- **Monitoring** – Operators must monitor and record:
  - daily wastewater discharge volumes
  - nitrogen, phosphorus, and *E. coli* concentrations at frequencies set by the consent authority
  - area of land receiving wastewater
  - groundwater quality using downgradient monitoring bore and an upgradient bore were practical.
- **Reporting requirements** – Operators must publish quarterly reports which contain sampling results and summarise total nitrogen and phosphorus load from all sources. Operators must also publish an independently verified annual report which contains monitoring results for the full reporting year, and details of any compliance or enforcement actions taken.
- **Responding to exceedance of consented limits** – If a discharge exceeds consented limits, operators must notify the relevant consent authority, investigate the cause of the exceedance and implement corrective actions to avoid, remedy or mitigate the risk of future exceedance.

4. Baseline data gathering

Baseline data gathering can be undertaken to provide a preliminary overview of a site's suitability for the application of treated wastewater to land, either slow rate or rapid infiltration.

While the standard does not require a baseline assessment to be undertaken, correct application of the standard will require the availability of high quality and reliable information.

Matters needing to be determined for subsequent stages (e.g. likelihood and severity of risks, soil properties, groundwater depth etc) cannot be assessed without first collating site-specific information.

4.1 Context and purpose

A baseline data gathering exercise should gather existing information about the site that would inform its suitability for land application, including building knowledge of the site(s), its limitations and any significant barriers. It essentially begins an iterative process. The information from the baseline data gathering exercise will be further developed in subsequent phases of investigation should a land application system at the site be pursued.

4.2 What information should be collected?

The information collected will vary depending on the system proposed and specific site conditions.

For existing systems, much of the relevant information for baseline data gathering will already be available. Where existing monitoring data (groundwater or surface water) are available, these can be used in place of, or alongside, models to provide more certainty.

For a new site (e.g. one not previously used as a discharge field), projection will be required to estimate key criteria such as the hydraulic loading capacity and nutrient uptake capacity of the site when fully operational within a 35 year consent term.

Information collected should allow the beginning of the risk assessment and site classification assessment. Where gaps exist, the baseline data gathering may identify further information needed, including site investigations, before these required assessments can be undertaken.

Specific information needed from the assessment may include the following topics outlined in tables 2 and 3.

Table 2: information to inform risk assessment:

Nutrient leaching potential, in comparison to soil levels and existing land use
Nutrient pathway risks (groundwater and/or runoff)
Nutrient receptors, including: • Down gradient surface water environments, including existing nutrient levels • Groundwater quality, including nitrate concentrations.
Potential public health receptors, including: • Drinking water receptors (groundwater and surface water), or roof water from spray drift • Shellfish gathering and food source sites • Contact recreation potential associated with down gradient surface water site • Public access potential to the site, including direct access associated with recreational activities • Public proximity to the discharge to land site.
Public health pathway risk, including: • Spray drift from irrigation equipment • Runoff risk • Groundwater • Surface water pathway.

Table 3: information to inform site classification assessment for rapid and slow infiltration:

Soil maps differentiating: • Soil texture • Soil drainage class • Soil water holding (to inform soil moisture), and • Drainage characteristics (to inform soil moisture).
Site slope
Depth to groundwater (including seasonal variability and mounding resulting from the discharge to land)
Where groundwater mounding expected during the proposed consent term cannot be measured, aquifer attributes (to inform groundwater mounding), including: • Specific yield • Horizontal hydraulic conductivity • Thickness of saturated zone.
Drainage impediments in vadose (unsaturated) zone (geology, soils, perched groundwater)
Annual and seasonal hydraulic loads (to inform groundwater mounding and soil moisture for slow infiltration), expected to require treated wastewater quality to confirm nutrient loading rates are acceptable for intended/expected land class.
Slow infiltration only: • Land use (to inform nutrient uptake) • Where soil moisture expected during the consent term cannot be measured, site climate data, including rainfall records and potential evapotranspiration records.

5. Risk assessment

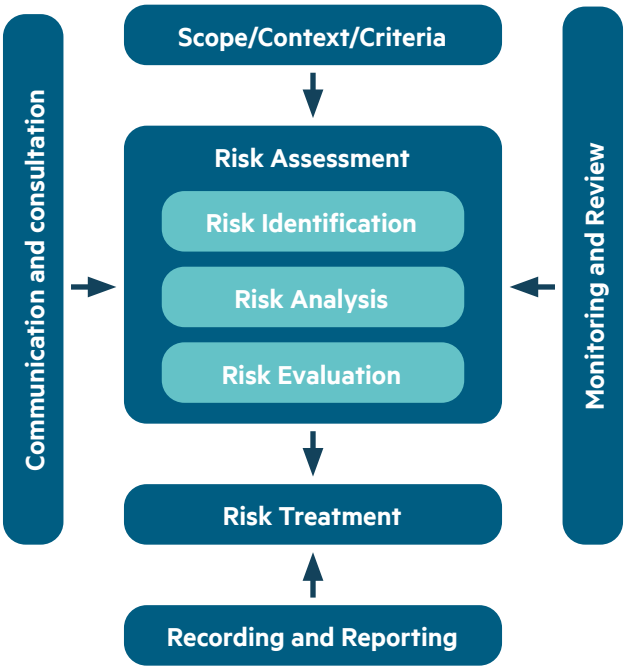
This section provides guidance on key aspects of the risk assessment as required by regulation 92.

Understanding environmental and public health risks for a site is a critical aspect of the risk assessment. This is used in parallel with the site classification assessment, to determine the overall land class of the site that leads to the determination of wastewater loading rates.

Risk assessments help identify the potential effects of a proposed wastewater discharge activity on the surrounding environment and on public health. An aspect that is critical for any risk assessment is consistency with interpretation.

Established risk matrix tools can help, e.g. *Risk management - Risk assessment techniques* (AS/NZS IEC 31010:2020) which adopts a historically consistent risk management framework, summarised in Figure 2.

Figure 2: Risk assessment framework.



The standard requires three risk assessment components:

- Component 1: Identification of risks
- Component 2: Risk analysis (assessing likelihood (a) and severity (b))
- Component 3: Evaluation.

5.1 Component 1: Identification of risks

Risk identification will need to be conducted on a site-by-site basis as the risks will be specific to each site and receiving environment. While the standard indicates some potential risks that need to be assessed, there may be other risks to consider as part of a comprehensive risk assessment. The risk assessment must be undertaken by a suitably qualified and experienced person (SQEP).

The key potential risks for a discharge to land activity relate to environmental and public health risks, relating to nitrogen species, phosphorus and pathogens:

- Table 4 sets out environmental risks identified in the standard must be considered over a 35-year consent duration.
- Table 5 sets out public health risks identified in the standard that must also be considered over a 35 year consent duration.

In addition to the risks in tables 4 and 5, any other risk that the person identifies as posing a significant risk to the environment or to public health should be considered.

Table 4: environmental risks identified in the standard

Risk	Detail
a. *Toxicity resulting from nitrogen or nitrogen compounds entering water.*	relates to the risk of toxicity effects of ammoniacal nitrogen, nitrate nitrogen and nitrite nitrogen in a freshwater or coastal water receiving environment. Toxicity risk specifically relates to eco-toxicity.
b. *Eutrophication resulting from nitrogen or phosphorus entering water.*	relates to the potential risk that resultant nitrogen or phosphorus concentrations cause or contribute to eutrophication, or algae growth, in a surface water receiving environment.
c. *Accumulation of phosphorus in the soil.*	relates to the accumulation of plant available phosphorus within the soils over the 35-year term of the proposed activity. While accumulation of phosphorus does not necessarily in itself cause an environmental effect, the risk of runoff of phosphorus ladened solids can present a eutrophication risk in the receiving environment.
d. *The release of nitrogen or phosphorus from the soil.*	relates to the risk of migration of nitrogen or phosphorus beyond the land area that is applied, potentially to a freshwater or coastal water environment. As such, this pathway risk can potentially impact on toxicity or eutrophication risk.

Table 5: public health risks identified in the standard

Risk	Detail
a. *A drinking water supply protection area becoming subject to a public health warning due to the presence of nitrate or pathogen.*	relates to potential contamination of a designated drinking water supply protection area. This generally relates to a drinking water supply source for a community, becoming contaminated with either pathogens or nitrate.
b. *A source of drinking water becoming subject to a public health warning due to the presence of nitrate or pathogens that exceed national drinking water standards.*	relates to either a surface water or groundwater source that is used for drinking water becoming contaminated with either nitrate nitrogen concentrations, or pathogen concentrations, beyond the allowances of the Drinking Water Standards for New Zealand 2022, as a result of the proposed or existing activity.
c. *The public being exposed to any pathogen as a result of having access to a discharge site.*	relates to the accumulation of plant available phosphorus within the soils over the 35-year term of the proposed activity. While accumulation of phosphorus does not necessarily in itself cause an environmental effect, the risk of runoff of phosphorus ladened solids can present a eutrophication risk in the receiving environment.
d. *Illness due to the public being exposed to a pathogen.*	may result from public being exposed to pathogens via other pathways such as: • spray drift from wastewater irrigation • consumption of food product contaminated by irrigated wastewater or water contaminated by the wastewater • contact recreation exposure to surface water contaminated with pathogens from the wastewater.

5.2 Component 2: Risk analysis (assessing likelihood and severity)

When assessing each of the above risks, that standard requires consideration of both the likelihood of each risk and the severity of the effects of each risk occurring. These are paired to provide an overall risk factor for that specific risk.

Likelihood and severity considerations are broken down into a series of levels – further detail below.

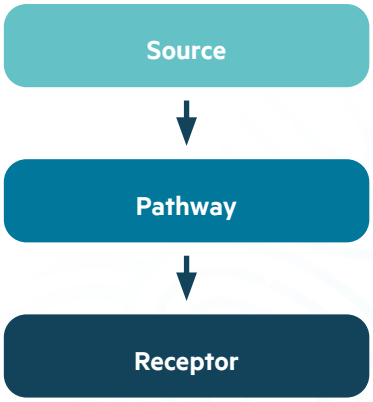
5.3 Component 2a: Risk analysis (likelihood assessment)

Table 6 sets out the categories against which the likelihood of a risk occurring must be assessed.

Table 6: Likelihood of occurrence

Likelihood category:	May be interpreted as:
Certain or almost certain	Expected to occur frequently or is almost inevitable
Likely	Is expected to occur is most circumstances
Possible	Might occur at some time
Unlikely	Could occur but is not expected
Rare	May occur only in exceptional circumstances
Nil	Will not occur

When identifying the likelihood of a risk occurring, it can help to consider whether the following linkages exist:



If any of the source, pathway or receptor linkages are missing for the entire period of the consented activity, then the likelihood of the risk occurring will be nil.

If the three linkages are all present for a period, then the risk frequency needs to be quantified to identify the (extent of the) likelihood.

Example 1:

If a wastewater irrigation system has the potential to leach nitrogen and pathogens below the soil to groundwater, and there is a pathway present that facilitates the flow of groundwater toward a nearby surface water body which is used as a drinking water source, then the likelihood is assessed based on the frequency of the 'source – pathway – receptor' linkage being complete.

Example 2:

If a night-time wastewater irrigation activity risks spray drift onto neighbouring land users, such as a cycle pathway, the likelihood would be assessed as the frequency of people using the cycle way at night when the wind is blowing in that direction. The likelihood assessment could also include subsequent exposure due to pathogens persisting on the ground and hard cycle way surfaces. Exposure could occur through contact with bike tyres and or footwear used by the general public. Both these exposure pathways could be assessed as "possible".

5.4 Component 2b: Risk analysis (severity assessment)

The severity of a risk occurring will be very site specific and depend on the type of risk being assessed, whether it is an environmental or public health risk.

For an environmental risk, the severity of the risk should be assessed against accepted standards and guidelines for the respective contaminants. Key environmental standards and guidelines include:

- NPS-FM 2020, National Policy Statement for Freshwater Management 2020 (amended October 2024)
- ANZG 2018, Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Australian and New Zealand.

Table 7 below provides guidance for assigning an environmental and public health-based severity category. This information is based on guidance in determining the extent of adverse effects that is available on the Quality Planning website.

Table 7: Severity of effects

Severity category:	Environmental Quantification	Public health risk
Negligible	No effects at all or adverse effects that are discernible day-to-day effects, but too small to adversely affect other persons or environment.	No health impact.
Minor	Adverse effects that are noticeable but will not cause any significant adverse impacts.	Minor illness, no hospitalisation
Moderate	Adverse effects that are noticeable that may cause an adverse impact but could be potentially mitigated or remedied.	Illness requiring medical attention
Significant	An effect that is noticeable and will have a serious adverse impact on the environment but could potentially be mitigated or remedied.	Multiple cases of illness
Extreme	Extensive adverse environmental health effects that cannot be avoided, remedied or mitigated.	Fatalities or long- term health effects

For example:

If an assessment of nitrate toxicity risk associated with nitrate concentration in a neighbouring surface water environment adjacent to a wastewater irrigation site concludes that the increase in nitrate nitrogen in the stream maintains the nitrate nitrogen concentration within the existing surface water quality band under the NPS-FM 2020, this severity would be assessed as "negligible".

To assess the severity of the risk to public health, the severity level needs to be a site-specific assessment using tools that are specific to the risk. Where there is a nil likelihood of the risk, an in-depth severity assessment may not be required. However, where there is a likelihood greater than nil, the potential severity of the risk will need to be quantified.

Where a risk is population based, such as contamination of a drinking water supply or contamination of a contact recreation site, use of a quantitative microbiological risk assessment (QMRA) process is recommended.

Where the risk is associated with a smaller specific number of people, such as contamination of individual dwelling water supplies or access of individuals to the wastewater irrigation area, the assessment may need to be done on an individual basis.

5.5 Component 3: Evaluation - Determination of risk factor and then assessment category

Following evaluation of the risks, there is a need to consider the relationship between the severity and likelihood for each risk, and then the relationship between the risks.

5.5.1 Determination of risk factors

Once the likelihood and severity of individual risks have been determined, a risk factor of low, medium, high or critical is identified (regulation 93(7)), shown below in Table 8.

Table 8: Risk factors

	Severity				
Likelihood	**Negligible**	**Minor**	**Moderate**	**Significant**	**Extreme**
Certain / almost certain	Low	Medium	High	Critical	Critical
Likely	Low	Medium	High	Critical	Critical
Possible	Low	Medium	Medium	High	Critical
Unlikely	Low	Low	Medium	Medium	High
Rare	Low	Low	Low	Low	High
Nil	Low	Low	Low	Low	Low

5.5.2 Consolidated risk factor

Once each risk has been individually assessed and a factor determined, the risks are consolidated to confirm the overall risk assessment category for the site. Under regulation 92(8), the overall risk assessment category (RAC) for the proposed activity is assigned and shown in Table 9.

Table 9: Collated risk factors

	Collated risk factors
RAC 1	• All low-risk factors
RAC 2	• 1 medium-risk factor with the rest all-low risk factors.
RAC 3	• 2 or more medium-risk factors with the rest all low-risk factors, or • 1 high-risk factor with the rest all medium- or low-risk factors,
RAC 4	• 2 or more high-risk factors with the rest all medium- or low-risk factors, or • 1 or more critical-risk factors.

The risk assessment category will be paired with a score from the site classification assessment to complete the site assessment and determine the relevant land class.

6. Site classification assessment

This section provides guidance on key aspects of the site classification assessment to determine site suitability for the land application of treated wastewater, as required by regulations 93 and 94.

6.1 Site classification categories

The Regulations require site characteristics to be defined for slow and rapid infiltration systems. Table 10 below lists the characteristics to be considered.

Table 10: Relevant characteristics for slow and rapid infiltration schemes.

Characteristic	Slow infiltration (< 6 m/yr)	Rapid infiltration (≥ 6 m/yr)
1. Drainage	✓	✓
2. Soil type and suitability	✓	✓
3. Climate and soil moisture attributes	✓	✗
4. Nutrient uptake from land use on the site	✓	✗
5. Slope	✓	✓
6. Depth to groundwater level	✓	✓

The Regulations describe how to assess each site characteristic and assign it a score or category. These categories are then used to complete the site classification assessment. More detail on how to consider and classify each characteristic is provided later in this section.

When undertaking a site assessment, there is an opportunity to divide the site into management areas. Management areas should be defined by differences in site characteristic categories, and can be assessed independently using the site classification process. Separating a site into management areas acknowledges the variability that may be present across a site and enables a site to have more than one resulting site classification and land class.

6.2 Initial screening of unsuitable site characteristics

To apply the standard, minimum site characteristics must be met. If any of the conditions listed in Table 11 are present at a site, or within any management area, the site or management area will not be suitable for land application using the standard. It may still be possible to obtain a resource consent for such a site under the relevant regional plan.

Table 11: Unsuitable site characteristics for slow and rapid infiltration schemes

	Slow infiltration (< 6 m/yr)	Rapid infiltration (≥ 6 m/yr)
Characteristic 1	Soils are very poorly drained. Extensive drainage impediments are present	Soils are poorly drained
Characteristic 2	Soils are clay or peat	Soils are clay, peat soil or water-repellent soil
Characteristic 3	Soil reaches saturation for prolonged periods in winter, without irrigation	Not applicable
Characteristic 4	Nutrient uptake from the overlying land use is negligible	Not applicable
Characteristic 5	Slopes are greater than or equal to 17 degrees	Slopes are greater than or equal to 15 degrees
Characteristic 6	Depth to groundwater, including groundwater mounding, is less than 1 m below ground level	Depth to groundwater, including groundwater mounding, is less than 1 m below ground level

6.3 Site characterisation data quality

The level of investigation and assessment used to determine the classification of site characteristics may be proportionate to the certainty required to inform the site classification assessment.

To help with prioritisation of data that should be collected, this guidance identifies three recommended data quality levels.

- **Screening level (desktop-based)** data may be suitable where:
  - » the characteristic category is not critical to the overall category, i.e., there are other characteristics that will determine the overall category score, or
  - » the certainty of the characteristic category outcome is high and further work will not change the category score.
- **Moderate level (site-based)** data may be suitable where:
  - » the characteristic is critical to the overall category, and
  - » certainty is moderate.
- **In-depth level (site-based)** data may be suitable where:
  - » the characteristic is critical to determining the overall category, and
  - » certainty is low.

Recommended methods for achieving each data quality level are outlined in the sections below for each site characteristic.

6.4 Characteristic 1: Drainage

Under the standard, the drainage site classification category is determined as a combination of soil drainage class, and whether a drainage impediment is present between the ground surface and the groundwater table.

6.4.1 Understanding soil drainage class

Soil drainage describes how effectively soil can remove excess water and maintain air voids. Drainage is assessed by observing the soil profile for visual signs of prolonged or periodic saturation. Key indicators include:

- peat: organic material.
- gleying: blue/green/grey subsoil.
- mottling: rust- or grey-coloured spots.

6.4.2 Understanding drainage impediments

Drainage impediments restrict downward water movement and may result in a perched water table, lateral flow or surface ponding, runoff and overland flow.

Examples include:

- pans (cemented or indurated layers)
- rock or underlying bedrock
- slowly permeable layers that cause perched water (infiltration rate < 4 mm/hr).

Drainage impediments below the groundwater level, or deeper than 5 m below ground level, can be disregarded.

6.4.3 Determining soil drainage class

The Bioeconomy Science Institute (formerly Manaaki Whenua Landcare Research) provides S-Map Online[2], which maps most soils across Aotearoa New Zealand. S-Map Online identifies soil map units containing one or more soil types, with associated drainage and texture information.

For more in-depth data, site-specific soil mapping may be of benefit if:

- The site is not mapped in S-Map Online.
- The site spans soil map units with different drainage or texture categories.
- S-Map Online data is published with low confidence.
- Observed soils do not align with mapped data.
- The site has been modified.
- Multiple soil siblings are present within a map unit and you cannot confidently identify which sibling(s) are present at the site.

Note, for site classification relating to a rapid-infiltration land application system, a soil can be considered a very well drained soil where it achieves a well drained soil class, and also achieves the Category 1 soil type and suitability requirements.

2 https://smap.landcareresearch.co.nz/

6.4.4 Determining the presence of drainage impediments

Drainage impediments may be assessed using the approaches outlined in table 12, depending on the certainty required.

Table 12: methods to assess drainage impediments

Screening level (desktop-based)	Assume based on hydrogeological context, and soil drainage observations (above)
Moderate level (site-based)	Observed and then measured from a network of auger observations.
In-depth level (site-based)	Observed and then measured from a network of test-pit observations and, in some cases, bore logs.

6.5 Characteristic 2: Soil type and suitability

6.5.1 Understanding soil type and suitability

Under the standard, soil type and suitability are predominately defined by soil texture, which reflects the relative proportions of gravel, sand, silt and clay.

Soil texture is used because it can indicate the following soil features, which are important for land application suitability:

- **Profile available water** represents the volume of applied water (rainfall, irrigation or treated wastewater) that can be retained within the soil profile for beneficial reuse, such as supporting plant growth (slow infiltration).
- **Contact surface area and contact time** relates to the interaction between the soil media and treated wastewater, which can maximise the land treatment of residual contaminants (slow infiltration).
- **Soil permeability** indicates the rate at which water moves through the soil (rapid infiltration).

6.5.2 Determining soil type

Soil texture and suitability should be determined using the same process outlined for soil drainage class (refer to Section 6.4.3).

When interpreting soil mapping for site classification, use the dominant texture in the soil profile.

6.6 Characteristic 3: Climate and soil moisture

6.6.1 Understanding climate and soil moisture:

Soil moisture describes the amount of water held within the soil at a given time. It is influenced by:

- rainfall
- evapotranspiration
- irrigation or land application rate
- soil permeability and drainage
- soil water holding properties and depth
- groundwater depth.

Soil moisture indicates how much additional water the soil can absorb before effects such as ponding, runoff or infiltration to groundwater (leaching) occur.

6.6.2 Determining soil moisture:

Soil moisture can be determined using the approaches outlined in table 13, depending on the certainty required for site classification. Soil moisture assessments should include the future irrigation loading of the application system as proposed in the design.

Table 13: methods to determine soil moisture

Screening level (desktop-based)	Assumed based on: • known irrigation rates and control triggers (i.e. rainfall or soil moisture) • site observations for saturation, such as pugging, ponding and runoff and soil drainage • site is soil moisture category 3, 4 or 5 only.
Moderate level (site-based)	Modelled using: • daily soil water balance over a minimum 10-year period • site-specific soil tests including unsaturated hydraulic conductivity (K_{40}), soil saturation, field capacity, wilting point • historical rainfall and potential evapotranspiration data from the closest weather station with a 10-year record.
In-depth level (site-based)	Measured with: • soil moisture probes are used and located within the highest rate irrigation zone where practicable • a minimum of daily recorded soil moisture readings for a 12-month period.

6.7 Characteristic 4: Nutrient uptake

6.7.1 Understanding nutrient uptake

Under the standard, nutrient uptake is the rate at which plants within the land application area absorb nitrogen from the soil and use it for growth. It indicates how effective the scheme is likely to be at removing residual nitrogen from treated wastewater and reducing the risk of nitrogen entering the environment. It should be noted that nutrient uptake will be greater than nutrient removal as some vegetation will be returned to the soil.

6.7.2 Determining nutrient uptake

Nutrient uptake can be determined using the approaches outlined in table 14, depending on the certainty required for site classification. It should be noted that nutrient uptake should consider changes in productivity expected from the hydraulic and nutrient loading proposed as part of the land application scheme.

Table 14: methods to determine nutrient uptake

Screening level (desktop-based)	Assumed based on: • published literature from credible sources • relevant to the site region, climate, nutrient and hydraulic loads and crop type.
Moderate level (site-based)	Modelled using: • calibrated modelling tools (e.g. Overseer FM) • site-specific input data.
In-depth level (site-based)	Measured and calculated from: • harvested masses (dry matter yields) over a minimum three-year period • at hydraulic and nutrient loading rates expected with the application of treated wastewater • annual median nitrogen content calculated from laboratory analysis (IANZ accredited) of at least five samples per year of harvested plant.

6.8 Characteristic 5: Slope

6.8.1 Understanding slope

Slope influences how water moves across and through land, affecting infiltration, runoff and erosion risk. Steeper slopes reduce the soil's ability to absorb treated wastewater and increase the potential for runoff and erosion. This makes steeper areas less suitable for land application.

6.8.2 How to find site elevation data

Use the following data sources (in order of preference) to determine slope across the site:

- Existing topographical survey, as built survey, or design levels
- Toitū Te Whenua Land Information New Zealand's Light Detection and Ranging (LiDAR) Digital Elevation Model (DEM) to 1m accuracy that covers most of New Zealand (various dates)
- Toitū Te Whenua Land Information New Zealand's LiDAR DEM to 8m accuracy that covers New Zealand (2012), confirmed by a site walkover.

For most sites, this information will be sufficient. Collect additional survey data if:

- the site has undergone notable landform change since the survey (e.g. earthworks or erosion)
- only the 8m LiDAR DEM is available and it does not reflect slope observed on site.

6.8.3 How to define management areas by slope

Where slope varies across the site, use elevation data to delineate slope management areas. You can do this manually from aerial mapping, contours or using digital tools such as Civil 3D, 12D, or geospatial software.

6.9 Characteristic 6: Depth to groundwater (including groundwater mounding)

6.9.1 Understanding depth to groundwater and mounding

Depth to groundwater describes how close the saturated zone is to the ground surface.

To determine the shallowest groundwater depth, consider:

- groundwater depths spatially, typically in low-lying areas, or areas closer to waterways
- groundwater depths seasonally, typically in late winter or early spring, following the cumulative effects of the wet season
- groundwater mounding from the land application.

Groundwater depth needs to be assessed both spatially and seasonally because each approach captures a different dimension of risk, as set out below:

- **Spatial assessment** identifies where groundwater is shallowest across a site (such as lowlying areas or near waterways), ensuring the most vulnerable location – not an average condition – defines risk
- **Seasonal assessment** identifies when groundwater is shallowest (typically late winter or early spring), ensuring site classification and discharge limits are based on the highest risk time of year rather than favourable sampling conditions.

Critical groundwater depths can be identified using the approaches set out in tables 15, 16 and 17 below, depending on the certainty required for site classification. It should be noted that groundwater levels considered here include, and are a result of, the proposed land application system, including anticipated irrigation rates and associated hydraulic loading.

Depth to groundwater does not include depth to perched groundwater.

Table 15: methods to determine critical groundwater spatially

Screening level (desktop-based)	Assumed: • site topographical and surface water features • validated with publicly available borehole data where possible.
Moderate level (site-based)	Groundwater depth map based on: • network of groundwater monitoring bores within 1km of the site • on-site standpipes or monitoring bores • site topographical and surface water features.
In-depth level (site-based)	Groundwater depth map based on: • a network of groundwater standpipes/bores at the site capable of identifying micro relief • site topographical and surface water features.

Table 16: methods to determine critical groundwater seasonally

Screening level (desktop-based)	Assumed: • a groundwater bore within 1km of the site • groundwater depth data collected late winter or early spring.
Moderate level (site-based)	Measured: • network of groundwater bores within 1km of the site • groundwater depth data collected late winter or early spring.
In-depth level (site-based)	Measured: • network of groundwater bores across the site • groundwater depth data collected for a minimum of 12 months • collected monthly at a minimum.

Table 17: methods to determine groundwater mounding

Screening level (desktop-based)	Assumed: • groundwater mounding estimates based on potential drainage and assumed aquifer parameters.
Moderate level (site-based)	Modelled: • modelled groundwater mounding based on measured aquifer parameters.
In-depth level (site-based)	Measured: • measurements of groundwater mounding during irrigation at rates equivalent to future land application rates.

6.9.2 Selecting your depth to groundwater category

A critical groundwater depth for each management area should be determined based on the combined groundwater depth of the existing site plus additional water from application drainage. A critical shallow groundwater location should be determined along with a critical groundwater season. These should also take into account any expected groundwater mounding.

6.10 Site classification

The overall site classification category for each management area is the highest (worst-case) category across all relevant site characteristics.

For example, a site that is well drained (category 1), with no drainage impediment (category 1), with loamy sand and sandy loam soils (category 1), that occasionally reaches saturation in winter without irrigation (category 4), has pasture growth that uptakes 200 kgN/ha/yr (category 3), has a site slope of less than 10 degrees (category 1) and its groundwater mounding levels are 2.5 m below ground level (category 3), would have an overall site classification of category 4.

This may be revised if mitigations can improve soil moisture such that the soil occasionally reaches saturation in winter, including with irrigation.

Note seasonality considerations may impact the site classification for mixed discharges. See chapter 8 for more information.

Tables 18 and 19 at the end of this chapter provide a summary of the categories (1 to 5) for each site characteristic for slow and rapid infiltration land application systems.

6.11 Determining site classification category

Following completion of the site classification process, the site classification category will be the highest classification category determined through the analysis described in this chapter.

For example, if a site has characteristics that meet category 1 for drainage, soil type and suitability, climate and soil moisture attributes and nutrient uptake, category 2 for slope and category 3 for depth to groundwater, the site classification category will be Category 3.

Table 18: Site classification criteria for slow infiltration land application

Site characteristics	Category 1	Category 2	Category 3	Category 4	Category 5
Drainage	Well drained. Free of any drainage impediment *i.e. no low permeability sub-surface layer.*	Moderately well drained. Free of any drainage impediment.	Imperfectly drained. Free of any drainage impediment.	Poorly drained. Minor drainage impediments *i.e. low permeability sub-surface layer between 0 -5 m below ground level (BGL), that will result in lateral movement of water.*	Very poorly drained. Extensive drainage impediments *i.e. low permeability sub-surface layer between 0-5m BGL, that will result in lateral movement of water that causes surface ponding or daylighting.*
Soil type and suitability	Fine sand, loamy sand, sandy loam, loam, or silt loam, *i.e. good land treatment via high field capacity and excellent wastewater contact with soil media.*	Does not apply	Fine-grained clay loam or silty clay loam, *i.e. some land treatment via moderate field capacity and good wastewater contact with soil media. Includes tephra- or basalt- derived clays.*	Coarse gravel soil, *i.e. limited or no land treatment due to low field capacity and limited contact of wastewater with soil media.*	Light or heavy clay, or peat soil, *i.e. limited or no land treatment due to high risk of cracking or subsoil drainage leading to bypass flow and limited wastewater contact with soil media. May not apply to tephra or basal derived clays.*
Climate and soil moisture attributes	If the soil remains below field capacity year-round with irrigation, *i.e. during irrigation, soil will always be below field capacity (deficit irrigation).*	If irrigation brings the soil above field capacity but the soil never reaches field saturation year-round, *i.e. during irrigation, including non-deficit conditions, soil will always be below saturation.*	If irrigation occasionally brings the soil to field saturation in winter, *i.e. during irrigation, soil occasionally reaches saturation in winter.*	If the soil occasionally reaches field saturation in winter without irrigation, *i.e. categories 1-3 are not met, and soil occasionally reaches saturation in winter, without irrigation.*	If the soil reaches field saturation for prolonged periods in winter without irrigation, *i.e. categories 1-3 are not met, and soil reaches saturation for prolonged periods in winter, without irrigation.*
Nutrient uptake from land use on the site ***(consider changes in productivity expected with wastewater application)***	≥ 400 kg N/ha/yr	Does not apply	>100 kg N/ha/yr, and ≤400 kgN/ha/yr	≤100 kg N/ha/yr, and not negligible	Negligible
Slope	≤10°	Does not apply	>10°, and <17°	Does not apply	≥ 17°
Shallowest depth to groundwater level ***(include expected impacts from groundwater mounding)***	≥ 5 m below ground level (BGL)	≥ 3 mBGL, and < 5 mBGL	≥ 1.5 mBGL, and < 3 mBGL	≥ 1 mBGL, and < 1.5 mBGL	< 1 mBGL

Table 19: Site classification criteria for rapid infiltration land application

Site characteristics	Category 1	Category 2	Category 3	Category 4	Category 5
Drainage	Very well drained. *i.e., well drained with category 1 soil type and suitability.* Free of any drainage impediment, *i.e. no low permeability ground layer.*	Well drained. Free of any drainage impediment.	Moderately well drained. Free of any drainage impediment.	Imperfectly drained.	Poorly drained.
Soil type and suitability	Well graded sand, sandy gravel or gravel cobbles. All with limited silt, clay or pumice, i.e. very high saturated hydraulic conductivity ≥ 10^{-3} m/s.	Fine sand, loamy sand or sandy loam, *i.e. high saturated hydraulic conductivity ≥ 10^{-4}, and < 10^{-3} m/s.*	Clay loam, or silty clay loam. All with adequate structure, *i.e. medium saturated hydraulic conductivity ≥ 10^{-5}, and < 10^{-4} m/s.*	Heavy textured clay, or silty clay. With limited structure, *i.e. poor saturated hydraulic conductivity ≥ 10-6, and < 10^{-5} m/s.*	Heavy clay, peat soil or water-repellent soil, *i.e. very poor saturated hydraulic conductivity < 10^{-6} m/s.*
Slope	Flat	< 5°	≥ 5°, and <10°	≥ 10°, and <15°	≥ 15°
Shallowest depth to groundwater level ***(include expected impacts from groundwater mounding)***	≥ 5 m below ground level (BGL)	≥ 3 mBGL, and < 5 mBGL	≥ 1.5 mBGL, and < 3 mBGL	≥ 1 mBGL, and < 1.5 mBGL	< 1 mBGL

7. Land class selection

Following completion of the site assessment in accordance with regulation 90 (comprising the risk assessment and the site classification assessment), a land class can be determined under regulation 91. The matrix to determine the land class is provided below in Table 20.

Table 20 – Land class

	Site classification category 1	Site classification category 2	Site classification category 3	Site classification category 4	Site classification category 5
Risk assessment category 1	Land class 1	Land class 1	Land class 2	Land class 3	Land class 4
Risk assessment category 2	Land class 1	Land class 2	Land class 2	Land class 3	Land class 4
Risk assessment category 3	Land class 2	Land class 2	Land class 2	Land class 3	Land class 4
Risk assessment category 4	Land class 2	Land class 2	Land class 3	Land class 4	Land class 4

In instances where the resulting land class is not considered reflective of the site's characteristics or risks, a more detailed site assessment process might be beneficial and may result in an improved understanding of the site and the proposed scheme design.

Where a site is determined to be within land class 4, a consent cannot be granted under the standard. It may still be possible to obtain a resource consent under the relevant regional plan.

7.1 Discharge concentration limits

For land classes 1 to 3, regulations 96 and 97 set loading rates and concentration limits for slow infiltration and rapid infiltration systems. These limits specify maximum allowable:

- total nitrogen per hectare per year
- total phosphorus per hectare per year
- *Escherichia coli (E. coli)* concentrations, which vary depending on land class and public access but are 90th percentile values.[3]

Tables 21 and 22 provide an overview of discharge concentration limits across land classes.

Discharges must remain below the limits specified in the consent at all times for each management area.

Compliance with the discharge loading limits for nitrogen and phosphorus is determined based on **all** nitrogen and phosphorus inputs.

Total Nutrient Applied
= Wastewater Applied + Fertiliser Applied
+ Farm Effluent Applications

All land application schemes must keep records of all nitrogen and phosphorus applied for compliance.

3 Measured as a 90th percentile means that 90% of the samples taken during the previous 365-day period do not exceed the specified concentration.

Table 21: Discharge concentration limits for slow infiltration discharges

For a land class 1 site:
a. The total nitrogen applied to the site must not exceed 550 kilograms per hectare per year
b. The total phosphorus applied to the site must not exceed 110 kilograms per hectare per year
c. If there is public access to the site, and the discharge is above ground, the concentration of *E. coli* must not exceed 1 cfu per 100 millilitres of wastewater measured as a 90th percentile
For a land class 2 site:
a. The total nitrogen applied to the site must not exceed 250 kilograms per hectare per year
b. The total phosphorus applied to the site must not exceed 50 kilograms per hectare per year
c. If there is no public access to the site, or the discharge is underground, the concentration of *E. coli* must not exceed 10,000 cfu per 100 millilitres of wastewater measured as a 90th percentile
d. If there is public access to the site, and the discharge is above ground, the concentration of *E. coli* must not exceed 1 cfu per 100 millilitres of wastewater measured as a 90th percentile
For a land class 3 site:
a. The total nitrogen applied to the site must not exceed 150 kilograms per hectare per year
b. The total phosphorus applied to the site must not exceed 30 kilograms per hectare per year
c. If there is no public access to the site, or the discharge is underground, the concentration of *E. coli* must not exceed 1,000 cfu per 100 millilitres of wastewater measured as a 90th percentile
d. If there is public access to the site, and the discharge is above ground, the concentration of *E. coli* must not exceed 1 cfu per 100 millilitres of wastewater measured as a 90th percentile
For a land class 4 site:
a. Regulation 87 applies (the site cannot be covered by the standard)

Table 22: Discharge concentration limits for rapid infiltration discharges

For a land class 1 site:
a. The total nitrogen applied to the site must not exceed 20,000 kilograms per hectare per year
b. The total phosphorus applied to the site must not exceed 7,000 kilograms per hectare per year
c. The concentration of *E. coli* must not exceed 100,000 cfu per 100 millilitres of wastewater measured as a 90th percentile.
For a land class 2 site:
a. The total nitrogen applied to the site must not exceed 10,000 kilograms per hectare per year
b. The total phosphorus applied to the site must not exceed 3,000 kilograms per hectare per year
c. The concentration of *E. coli* must not exceed 10,000 cfu per 100 millilitres of wastewater measured as a 90th percentile.
For a land class 3 site:
a. The total nitrogen applied to the site must not exceed 4,000 kilograms per hectare per year
b. The total phosphorus applied to the site must not exceed 1,000 kilograms per hectare per year
c. The concentration of *E. coli* must not exceed 1,000 cfu per 100 millilitres of wastewater measured as a 90th percentile.
For a land class 4 site:
a. Regulation 87 applies (the site cannot be covered by the standard)

8. Mixed discharge schemes

[Note this section is under review, please contact the Authority for further information]

A mixed discharge occurs when treated wastewater from a single source is discharged to more than one environment, either land or water, depending on receiving environment conditions. Mixed discharges are intended to:

- manage environmental effects through both the soil environment and the wider hydrological environment, e.g. discharge to land when excessive drainage can be avoided, and discharge to water if an acceptable dilution threshold is reached
- provide operational flexibility while maintaining environmental protection
- deliver lower overall environmental risk (when well designed and managed) than relying on a single discharge pathway.

Mixed discharges are typically authorised through a set of parallel yet interdependent resource consents. These consents must clearly define when discharge to land applies and when discharge to water is permitted, including the transition from one to the other.

8.1 Mixed discharge schemes are enabled by the standard

Regulations 72 to 76 apply to wastewater treatment plants that:

- discharge into a river in certain circumstances, but when these circumstances don't apply, it is a discharge to land, stored or managed in another way
- are permitted to discharge to water only in defined and limited circumstances.

This constitutes the regulatory definition of a dual (mixed) discharge pathway.

8.2 Scope and applicability - receiving environments covered

Mixed discharge provisions in the standard refer to freshwater (river) receiving environments. Mixed discharge schemes involving coastal waters such as estuaries or coastal marine areas are not provided for.

8.3 Operational structure of mixed discharge schemes - temporal specificity requirements

The standard requires mixed discharge schemes to specify defined time periods for each discharge pathway (to determine what requirements apply in what circumstances). Compliance cannot rely solely on operational triggers such as:

- river flow thresholds
- soil saturation levels.

As a result, consents are expected to:

- define fixed calendar or seasonal discharge periods for land and water discharges
- use operational triggers based on actual river flows or soil moisture conditions as secondary controls rather than the primary authorisation mechanism such as nominated months of discharge.

8.4 Use of real-time environmental data

The standard's water discharge dilution class framework does not currently support compliance based on real-time river flow data. Where real-time data is available, dilution class calculations may have limited practical value to meet standard provision (as currently written). In which case, operators:

- may use real-time river flow, or tidal, salinity, or current data (in coastal environments) to optimise operations
- but must demonstrate compliance against the assigned dilution class and the approved discharge period, rather than against instantaneous dilution alone.

8.5 Key consent and compliance requirements

8.5.1 Resource consent requirements

Resource consents are required for mixed discharge schemes. Typically, this will be two resource consents, with interdependent requirements. The consent must:

- permit discharge to water only during clearly defined pre-determined periods (regulation 74(1)(a)), which may be:
  - » seasonal
  - » flow-related
  - » mixing-related
  - » triggered when land application areas are unavailable (e.g. due to saturation)
- require discharge to land, storage or another approved method at all other times.

8.5.2 Dilution ratio calculation

For mixed discharge schemes, a special dilution ratio calculation applies under regulation 75. This calculation:

- is based on the flow conditions relevant to the authorised discharge period
- does not use the annual mean low flow.

In some cases, it may be appropriate to specify:

- a minimum river flow threshold that must be met before discharge to water is allowed.

This approach may better reflect operational realities where land application becomes unavailable due to wet conditions.

8.6 Wastewater discharge standard during water discharge periods

When discharge to water is permitted, the scheme must comply with all applicable requirements related to discharge of wastewater to water (those contained in Part 3 of the Regulations including:

- dilution class limits for contaminants; and
- any additional limits for special river types or coastal receiving environments.

Guidance on the environmental performance standard for discharge of wastewater to water is available on the Water Services Authority – Taumata Arowai website.[4]

8.7 Requirements during non-water discharge periods

When discharge to water is not authorised, the scheme is treated as a land discharge and must comply with the standard for discharge of wastewater to land, including the matters set out in this document.

8.8 Linking consent conditions to dilution calculations

Consents must explicitly link the period during which discharge to water is permitted to the period used to calculate the dilution ratio class.

For example, discharge to water may only occur when river flow exceeds a specified threshold (such as 80 m^3/s), ensuring the required dilution ratio is achieved.

Regulation 74 applies to timebased (mixed discharge) consents and requires the applicant to specify a river dilution ratio, but mandates that it be calculated using the alternative method in Regulation 75 rather than the standard method in Regulation 48.

8.9 Concurrent (true split) discharges

Some schemes may involve two concurrent discharges, where treated wastewater is discharged to land and water at the same time.

Concurrent discharges are not explicitly addressed in the current standard framework and may require:

- additional regulatory interpretation
- bespoke consent conditions to ensure environmental effects are appropriately managed.

4 Discharge to water standard | The Water Services Authority - Taumata Arowai

9. Operations and maintenance manual

An operations and maintenance manual (O&M manual) must be maintained for any proposed or existing land application activity consented under the standard. The requirement for an O&M manual is outlined in regulations 98 to 101.

9.1 Purpose of an O&M manual

An O&M manual serves two purposes under the standard.

a. It provides details to the consenting authority, at the time of consenting, as to how the proposed/existing scheme will be operated and maintained in order to avoid, remedy or mitigate effects on the receiving environment and public health and how this will be conducted in a safe way.

b. It is a live document that is maintained throughout the term of the consent. It provides operators with details as to how the discharge to land system can be operated in a safe and compliant way to avoid, remedy or mitigate effects on the receiving environment and public health.

9.2 Content of an O&M manual

Regulation 101 of the standard outlines the minimum requirements of what must be included in an O&M manual. Mandatory information is set out in Table 23 below. A sample table of contents for an O&M manual, including additional components to support best practice, is provided in Appendix C.

Table 23: required information for an O&M manual

1.	How the discharge to land scheme will be monitored.
2.	What actions will be taken in the event of a breach of discharge concentration limits specified under the standard.
3.	Safety plans and procedures.
4.	Emergency response plans and procedures.
5.	Description of, and technical specifications including drawings and schematics for, the systems, infrastructure and equipment used in the scheme.
6.	Operating instructions for the scheme including manufacturer service manuals and contacts for the systems, infrastructure and equipment used in the scheme.
7.	Inspection, maintenance, testing and replacement requirements for the systems, infrastructure, and equipment used in the scheme.
8.	Supplier and service provider details for the operation and maintenance of the scheme.
9.	Record-keeping requirements for the operation and maintenance of the systems, infrastructure and equipment used in the scheme.

9.3 O&M manual review and updates

Regulation 100 requires that a consent application for discharge to land includes a draft O&M manual, prepared in accordance with requirements of regulation 101. This draft O&M manual does not have to include all design and component specifications especially if the system has not been constructed.

As a live document, an O&M manual needs to be frequently amended to be up-to-date with current operation, maintenance and mitigation systems. Throughout the term of a consent, a discharge to land activity can go through many amendments, whether this includes changes to the operation, or equipment or implementation of additional mitigation measures to address potential effects. It is important that the O&M manual is adaptable but equally important that operators are advised of the amendments, and consenting authorities are advised of more than minor updates.

Below is a sample review and update procedure for discharge to land O&M manual.

1. Where an amendment is required to the O&M manual, prepare a draft amendment and notify the consenting authority of the proposed amendment.
2. Allow the consenting authority a specific number of working days to respond to the proposed amendment.
3. If the consenting authority responds, authorising the amendment, update the O&M manual and advise all operators.
4. If the consenting authority does not respond within the timeframe specified in step 2, and the amendment is within the limits of the consent conditions, then update the O&M manual and send a copy of the updated O&M manual to the consenting authority. Advise all operators of the amendments.
5. If the proposed change is outside of the consent conditions, then seek a change to the consent conditions under section 127 of the RMA.
6. At a minimum frequency (e.g. every two years):
    - review the O&M manual, assessing whether all aspects are still applicable
    - send any draft updates to the consenting authority for review, following the procedure outlined in steps 1 to 5 above
    - if no updates, advise the consenting authority accordingly.

10. Management plan

A management plan must be prepared for a proposed or existing land application activity as outlined in regulations 113 to 116. The management plan sets the key management requirements and limitations to avoid or mitigate effects on the receiving environment or public health. It also set out how the consent holder will respond to compliance issues or observed effects that may arise during the term of a consent.

A draft management plan must accompany an application for a resource consent under the standard. As part of considering the application, the consent authority can confirm the plan or determine content for the plan itself.

There may be duplication of content between the management plan and the O&M manual, which sets out how the system will be operated on a day-to day-basis.

Mandatory information for the management plan is set out in Table 24 below. A sample table of contents for a management plan, including additional best-practice components, is provided in Appendix D.

Table 24: required information for a management plan

1.	The objectives of the discharge to land scheme.
2.	A description of the discharge to land scheme.
3.	A description of who manages the scheme.
4.	How the scheme will be monitored.
5.	The actions that the consent holder will take if it breaches, or forecasts that it will breach, the specified discharge concentration limits.
6.	How any environmental effects of the scheme will be managed, and by whom.
7.	The auditing requirements for the scheme.
8.	A procedure for making complaints about the scheme.
9.	Any other regulatory compliance documents for the scheme (including any permits, consents or documents required under any other enactment).
10.	A description of when the management plan will be reviewed and by whom.

11. Monitoring and reporting

Monitoring and reporting requirements are key components of the discharge to land standard (regulations 104 to 112) and must be included as resource consent conditions.

Monitoring helps to:

- confirm that wastewater treatment is occurring as intended
- identify unforeseen changes in wastewater characteristics that may reasonably occur over a 35-year period
- confirm that wastewater discharge operations are functioning as intended and compliance limits are being met
- identify new or different risks and additional steps to manage risks
- confirm that actual effects to receptors and receiving environments are consistent with those identified through the risk assessment process.

11.1 Monitoring and reporting

Regulation 104 requires monitoring and reporting for all sites with resource consents that discharge treated wastewater to land. These requirements will be set out in the resource consent conditions and agreed through the consent application process. These conditions must meet the minimum requirements described in these guidelines.

Resource consents may also include additional monitoring and reporting conditions at the discretion of the relevant consenting authority. This may include stricter requirements, e.g. more frequent monitoring or monitoring in relation to contaminants other than those addressed in the standard.

11.2 Minimum monitoring requirements

Regulations 106 and 107 set the minimum compliance monitoring requirements for discharges of treated wastewater to land. These requirements are summarised in Table 25.

Table 25: Minimum compliance monitoring requirements

Type	Parameter	Unit	Frequency	Location
Location	Area of discharge	ha	daily	Area where treated wastewater is applied to land on the specific day
Wastewater	Total wastewater discharge volume	m^3	daily	
Wastewater	Total nitrogen concentration	mg/L	Intervals determined by the consent authority	Before discharge and storage, after treatment.
Wastewater	Total phosphorus concentration	mg/L		
Wastewater	*Escherichia coli (E. coli)*	cfu/100 mL		
Groundwater	Groundwater level	m below ground level (BGL)		All wells and bores at the site.
Groundwater	Groundwater level	m BGL		Groundwater monitoring bores, upgradient (where practicable) and downgradient from land discharge scheme.
Groundwater	Total nitrogen concentration	mg/L		
Groundwater	Total phosphorus concentration	mg/L		
Groundwater	*E. coli*	cfu/100 mL		

Regulation 105 requires that any samples analysed using laboratory-based methods must be tested by a laboratory that holds appropriate accreditation from International Accreditation New Zealand (IANZ).[5]

For *E. coli*, compliance is assessed using a 90th percentile concentration. While not a requirement of the standard, to support statistical assessment, a minimum of 10 wastewater samples per year is recommended.

There are no requirements to monitor soil conditions including soil chemistry, biology, hydraulics or structure. However, these may be included as resource conditions at the discretion of the consenting authority on a site-by-site basis.

Groundwater monitoring

To meet the minimum groundwater monitoring requirements under regulation 107, the following groundwater monitoring infrastructure must be maintained.

Required by standard	Recommended
a. At least one downgradient groundwater monitoring bore must be installed and maintained.	Downgradient monitoring bore should be positioned to capture a representative sample of shallow groundwater potentially affected by the land application scheme.
b. At least one upgradient groundwater monitoring bore should be installed, where practicable.	Location of the upgradient bore(s) should represent background (unimpacted) shallow groundwater conditions for the site.
c. Where the downgradient monitoring bore, or any other monitoring bore otherwise installed, is not located within the site, a separate groundwater monitoring bore should be installed within the site to meet the requirements set out in regulation 107(2)(c) to monitor groundwater levels within the discharge site.	Location of any separate groundwater monitoring bore should capture critical shallow groundwater and mounding zones. Where groundwater is critical to the classification of management areas, and spatial variations in groundwater result in different loading rates, a groundwater monitoring bore should be located within the critical shallow groundwater and mounding zone for each relevant management area.

11.3 Monitoring and reporting on nutrient limits

Regulation 108 sets out how to determine compliance with regulations 96 and 97, which set the discharge concentration limits (the total nitrogen and phosphorus loading rates to land and the 90th percentile *E. coli* concentration).

Monitoring for nitrogen and phosphorus loads should include the total nitrogen and phosphorus applied from all sources, and nitrogen uptake. It may include monitoring and reporting of other nutrient uptake and losses.

Reporting on compliance with discharge loading limits for nitrogen and phosphorus should be completed for each irrigation zone and each farm operational block. Compliance with the discharge loadings limits for nitrogen and phosphorus is determined based on the total nutrients applied from all sources.

11.4 Wastewater application

Assessment of cumulative wastewater nutrient application shall be assessed using the daily total wastewater volume applied to the management area, and wastewater monitoring of total nitrogen and total phosphorus concentrations.

Because it is unlikely that resource consents will stipulate daily flow composite monitoring or continuous monitoring of wastewater total nitrogen and total phosphorus, it is necessary to extrapolate the results of that monitoring to an average each day. This can be done by reviewing the data spread, skew and outliers, and determining the most appropriate method to measure the average, such as:

- rolling mean or median
- 12-month mean or median.

Using this data, the wastewater nutrient application each day to each irrigation zone can be estimated as follows:

$$TN = \frac{V \times [TN]}{1{,}000 \times A}$$

TN = Total Nutrient Load (kgN/ha/day)

V = Total Wastewater Volume (m^3/day)

[TN] = Total Nutrient Concentration (mg/L or g/m^3)

A = Area of Discharge (ha)

This should be tracked cumulatively throughout the reporting year for each irrigation area or sub area.

5 The Water Services Authority maintains a register of accredited laboratories for drinking water. A number of these laboratories may also be accredited for specific determinands that are prescribed in the wastewater standards. Enquiries should be made with individual laboratories.

11.5 Record keeping

Regulation 109 requires the water services organisation to keep the following records for a minimum of 10 years from the test date. Based on the monitoring requirements set out in the standard, this shall include:

- daily total wastewater discharge (m^3)
- daily discharge area (ha)
- treated wastewater quality samples for total nitrogen (mg/L), total phosphorus (mg/L) and *E. coli* (cfu/100mL)
- groundwater level (m BGL)
- groundwater quality samples for total nitrogen (mg/L), total phosphorus (mg/L) and *E. coli* (cfu/100mL).

11.6 Minimum reporting requirements

For consents granted under the standard, regulations 111 and 112 require consent holders to publish quarterly compliance monitoring reports and annual compliance monitoring reports.

11.7 Quarterly reports

Quarterly compliance monitoring reports must include the results of all monitoring required by the standard and the resource consent conditions for the quarter to which the report relates.

Results must be summarised and include:

a. results of all sampling required under the consent

b. flow rate and total volume of treated wastewater

c. total amount of nitrogen applied to the site from discharging treated wastewater

d. total amount of nitrogen applied to the site from all sources

e. total amount of phosphorus applied to the site from discharging treated wastewater

f. total amount of phosphorus applied to the site from all sources

g. total concentrations of *E. coli* in the treated wastewater that was discharged to the site.

Quarterly compliance monitoring reports must be published within **30 working days** of the end of each quarter. Copies must be provided to the:

- public, via a free-to-access website
- consent authority that granted the consent
- relevant regional council, where they did not grant the consent
- Water Services Authority – Taumata Arowai.

11.8 Annual reports

The annual compliance monitoring report must include the same monitoring results and assessments as the quarterly reports but for the full reporting year. The annual report must also include a description of any compliance and enforcement actions undertaken by the relevant regional council during the reporting year.

When summarising annual monitoring results, comparison with previous annual reports is recommended to support identification and commentary on longer-term trends.

The annual compliance monitoring report must be audited by a suitably qualified and experienced person (SQEP). The audit findings must be documented in a report and included with the annual compliance monitoring report.

Annual compliance monitoring reports must be published within 60 working days of the end of the reporting year. Copies must be provided to the same recipients specified for quarterly reports.

12. Compliance and enforcement

12.1 Legislative and regulatory framework

Compliance and enforcement for wastewater discharges is governed by the:

- Resource Management Act 1991 (RMA) (and any replacement legislation)
- Water Services Act 2021
- Water Services (Wastewater Environmental Performance Standards) Regulations 2025.

12.2 Roles and responsibilities

The role of Consent authorities (regional and unitary councils) includes:

- applying the standard when processing new or replacement wastewater discharge consents (as applicable), or processing consents in accordance with regional plans for discharges that are not covered by the standard;
- monitoring compliance with resource conditions; and
- taking enforcement action under the RMA (or replacement legislation), if considered appropriate, where non-compliance occurs.

The Water Services Authority – Taumata Arowai is responsible for:

- developing and overseeing nationally consistent wastewater standards;
- carrying out audits and compliance checks, under the Water Services Act 2021;
- monitoring environmental performance of wastewater networks at a national level; and
- collecting performance data from network operators and publishing annual reporting on network performance in the interests of public transparency.

12.3 Exceeding limits and non-compliance

If a discharge exceeds consented discharge concentration limits, regulation 103 sets out required actions operators must take, including:

- notifying the regional council or consent authority
- investigating the cause of the exceedance
- implementing corrective actions to avoid, remedy or mitigate the risk of exceeding the limit in future.

Consenting authorities may also specify additional actions that an operator must take to avoid, remedy or mitigate the effects of exceeding a relevant discharge limit as conditions of the consent.

13. Suitably qualified and experienced person

While there is no formal definition of a suitably qualified and experienced person (SQEP) in New Zealand legislative documents, the *Users' Guide: NES for Assessing and Managing Contaminants in Soil to Protect Human Health (2017)* provides some guidance on the skills and background needed.

The SQEP should:

- be independent to the proposal and activity
- apply good professional practice and report against relevant industry guidelines
- be expert in a specific and relevant field to the activity
- be experienced in drawing together multidisciplinary inputs and drawing conclusions
- be willing to stand by their experience and qualifications (e.g. provide expert testimony in the Environment Court that stands up to court scrutiny).

Professionals completing a site assessment, audit or other process under the standard should possess an appropriate professional qualification and at least five years' experience in a relevant discipline. They should demonstrate the technical competence to:

- undertake soil and site evaluations
- determine hydraulic and nutrient loading rates
- prepare compliant system designs
- produce documentation that meets the expectations of New Zealand standards and the applicable regional council requirements.

A SQEP should also have 5 or more years' of demonstrable experience in one or more of the following:

- land treatment system design, assessment or compliance
- soil investigation and site evaluation
- hydraulic loading, nutrient loading and irrigation design
- wastewater treatment and discharge system design
- preparation of technical reports for resource consent applications.

Appendix A: Interpretation

Abbreviations and acronyms used in the standard and guidance for wastewater discharges to land.

Acronym	Definition
Amm-N or NH_4	Ammoniacal Nitrogen
AS/NZS	Australian Standard / New Zealand Standard
cBOD5	5-day carbonaceous Biochemical Oxygen Demand
cfu	colony forming unit
E. coli	*Escherichia coli*
FIB	Faecal Indicator Bacteria
Kg ha yr	kilograms per hectare per year
RIB	Rapid Infiltration Basin
SQEP	Suitably Qualified and Experienced Person
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids

Glossary of terms used in the standard and guidance for wastewater discharges to land.

Term	Definition
Annual hydraulic load	The total amount of treated wastewater applied to the discharge site in a 12-month period. Measured by depth of water applied.
Application method	The specific technique or approach used to apply a substance, treatment or technology to a wastewater system. This includes the methods, equipment and procedures employed to achieve the desired treatment or effect, ensuring efficiency, effectiveness and compliance with relevant standard.
Aquifer	A body of permeable rock or sediments (e.g. sand and gravel) which can contain or transmit groundwater.
cBOD5	Carbonaceous biochemical oxygen demand during a 5-day period.
Cfu	colony forming units
Concentration	The measurement of the number of particles present in a given volume, often in a mixture or solution.
Consent authority	A regional council, a territorial authority or a local authority that is both a regional council and a territorial authority, whose permission is required to carry out an activity for which a resource consent is required under the RMA.
Contaminant	Any substance (including heavy metals, organic compounds and micro-organisms) that, either by itself or in combination with other substances, when discharged onto or into land or water, changes or is likely to change the physical, chemical or biological condition of that land or water.
Crop	Any food crop, fodder crop or crop grown for industrial or commercial purposes (whether or not the crop is edible).
Deficit irrigation system	Controlled application of treated wastewater to a site whereby after application there is no drainage as water is retained in the soil matrix or has been used by plants.
Discharge site or site	The area of land to which the treated wastewater is discharged.

Term	Definition
Discharge-to-land scheme or scheme	(a) Means a scheme for the discharge of treated wastewater to land under the Water Services (Wastewater Environmental Performance Standards) Regulations 2025. (b) Includes any systems, processes, infrastructure and equipment used in connection with discharging treated wastewater to land.
Downgradient	The direction in which groundwater flows, dictated by the hydraulic gradient of an aquifer, in which downgradient is the groundwater on the 'downstream' side relative to a specific area or point of reference (i.e. land discharge area).
Drinking Water Supply Protection Area	An area that a district plan, proposed district plan, regional plan or proposed regional plan designates for the purpose of protecting a drinking water supply.
Field capacity	The maximum amount of water that soil can retain after any excess water has drained away.
Field (soil) saturation	The maximum amount of water that soil can contain after which drainage is maximized and surface pond and/or runoff may occur.
Groundwater	All water beneath the surface of the earth contained within the saturated zone but excludes the water chemically combined in minerals.
Groundwater (seasonal or perched)	Water existing below ground level that is seasonally persistent and/or discontinuous often resulting from permeability limitation in a soil profile (e.g. pan).
Groundwater mounding	A localised, temporary rising of groundwater above the water table as the result of a wastewater discharge.
High-rate application (rate)	The discharge of wastewater to shallow basins or trenches constructed in permeable deposits of highly porous soils, with an application of equal to or greater than 6 m.
Horticultural land	Land used for process food crops, leaf crops and root crops.
Industrial and trade waste	Liquid waste, with or without suspended matter, from the receipt, manufacture, or processing of materials as part of a commercial, industrial, or trade process.
Land application system	The system used to apply effluent from a wastewater treatment unit into or onto the soil for further in-soil treatment and absorption or evaporation.
Land contact	Term used to describe wastewater systems where the treated wastewater contacts land before being discharged to surface or marine waters.
Loading rate numerical matrix	A tool used to determine the appropriate class of standard for wastewater discharge, combining risk category and site classification categories.
Low-rate application	The controlled application of treated wastewater to a vegetated soil surface, where wastewater receives treatment as it flows through the plan root / soil matrix. In accordance with the standard, the maximum rate is less than 6 m.
Management area	Sub-area within a land application area that is managed differently in some way, i.e. different infrastructure type, different land classification class, different risk class.
Mass loading	The quantity of a particular substance or pollutant that is introduced into a wastewater system over a specified period, typically expressed in units of mass per time (i.e. kilograms per day).
Non-deficit irrigation system	Refers to irrigation where rates that exceed the soil moisture holding capacity and evapotranspiration rates of the site, resulting in occasional induced drainage.
Operations and maintenance manual	Operations and maintenance manual (O&M manual) details the day-to-day operation and maintenance requirements of a land application system. This includes demonstrating how limits are to be met and actions should they be exceeded. In the case of the standard, it is defined under regulations 98 to 101.

Term	Definition
Oxidation pond	Is a shallow earthen basin referred to as a pond within which wastewater is treated biologically. Ponds are able to reduce the level of many contaminants in sewage including: Biochemical Oxygen Demand (BOD); suspended solids (SS); ammonia and the number of microbes, including those which may cause disease (pathogens) Note, in terms of regulation 87(f) discharge to land from oxidation ponds refers to leakage from oxidation ponds. Oxidation ponds that have a piped discharge to land are covered by the standards.
Pastoral land	Grazed land including land used for dairy, beef, sheep and deer production.
Pathogens	Disease-causing micro-organisms such as certain bacteria, viruses and parasites.
Perched groundwater	A shallow, unconfined body of groundwater that forms above a local impermeable or low permeability layer and is separated from the main groundwater system by an unsaturated zone.
Primary treatment	The separation of suspended material from wastewater in septic tanks, primary settling chambers or other structures, before effluent is discharged to either a secondary treatment process or to a land application system.
Rapid-infiltration discharge	The discharge of treated wastewater to land at a rate that results in the land receiving an annual hydraulic load of 6 m or more.
Receptors	Components of the natural environment that are affected by the construction and/or the operation of a proposed development, in this instance, discharge of wastewater to land.
Registered drinking water abstraction point	An abstraction point for a drinking water supply that is registered under section 23 of the Water Services Act 2021.
Risk	An expression of the likelihood of identified hazards causing harm in exposed populations or receiving environments, and the severity of the consequence (risk = likelihood x consequence).
Risk category	A 1 to 5 scale classification system used in the standard to determine the level of risk associated with discharging wastewater to land, based on a risk screening that evaluates factors such as contaminant concentrations including *E. coli*, Total Nitrogen and Total Phosphorus, as well receptor sensitivity.
Risk screening	The process of evaluating potential risks associated with discharging (treated) wastewater to land.
Secondary treatment	Aerobic biological processing and settling or filtering of effluent received from a primary treatment unit.
Sensitive sites	Sites at which wastewater should not be applied due to the ecological, social or cultural values associated with them.
Soil type(s)	Refers to the classification of soil (treatment unit) based on the soil's physical characteristics, including texture, composition and structure.
Upgradient	Refers to the direction from which groundwater flows, dictated by the hydraulic gradient of aquifer, where upgradient is the groundwater on the 'upstream' side relative to a specific area or point of reference (i.e. land discharge area).
Water body	Fresh water or geothermal water in a river, lake, stream, pond, wetland or aquifer, or any part thereof, that is not located within the coastal marine area

Appendix B: Sample table of contents for Operations & Maintenance manual

Sample provided by Land Treatment Collective (NZLTC) - includes both information required by the standard **and optional additional sections** to support best practice.

1. Introduction

a. Purpose of the O&M manual.

b. Structure of the O&M manual.

c. Roles and responsibilities [standard].

d. Key personnel contact details

- Environmental manager
- Operators
- Consent manager
- Asset manager
- Consenting authority consent manager
- Emergency contact details.

e. Related documentation.

f. O&M manual review and update procedures

- Frequency of O&M manual review
- Procedures for updates to O&M manuals
- Notification procedures for updates
- Version management procedures.

2. System layout and infrastructure details [standard]

a. Wastewater and irrigation scheme drawings [appended), including

- Wastewater treatment plant layout
- Irrigation scheme layout
- Reticulation scheme
- Pump station drawings
- Control valve drawing
- Irrigation equipment drawings
- Electrical drawings.

3. Health and safety [standard]

a. Key risks and associated isolation and mitigation.

4. Training procedures

a. Procedures for training new personnel.

b. Training records.

5. System operational instructions [standard]

a. Wastewater volumes.

b. Summary of consent limits.

c. Wastewater flow and balancing procedure.

d. Key equipment operation and maintenance manuals (appended).

e. Wastewater irrigation procedure, including pumping operation, irrigation control and timing methods.

f. Wastewater hydraulic loading and rotation procedure.

g. Wastewater nutrient loading procedure.

h. Buffer distance management and spray drift management.

i. Wet weather and soil moisture management.

j. Land use management, e.g. harvesting and rotation.

6. Maintenance requirements [standard]

a. Equipment maintenance

- A list of key equipment and suppliers or service providers (with references to appended O&M manuals for each key equipment item)
- A table of maintenance requirements and frequency for each key equipment item.

b. Infrastructure maintenance, including inspections, tasks and frequencies for:

- Flow balancing systems
- Reticulation pipes
- Electrical and control system
- Pasture and soil system
- Drainage systems (if any)
- Mitigation measures, including riparian and buffer zones.

7. **Monitoring plan [standard]**

   a. A schedule of consent and performance monitoring requirements, including:

      - Wastewater monitoring
      - Soil monitoring
      - Groundwater monitoring
      - Receiving surface water environment monitoring.

   b. Other monitoring not required by the standard could include:

      - Soil monitoring (chemistry, biological, hydraulic)
      - Discharge triggers (soil moisture rainfall, wind, river flow)
      - Application rates.

   c. The schedule should detail location, parameters and frequency of monitoring.

   d. A monitoring location figure.

   e. A summary of monitoring methodology, detailing monitoring type (grab or composite), monitoring equipment, sample containerising, analysis method (laboratory or on-site etc).

   f. A summary of how the monitoring data will be reviewed for trends and how mitigation measures will be identified and implement, if effects are identified.

8. **Record keeping and reporting [standard]**

   a. A summary of how data shall be recorded and maintained, along with who is responsible for maintaining the database.

   b. A summary of reporting requirements as required by the consent, including frequency, reporting items, and to whom the report is to be sent to.

9. **Non-compliance response [standard]**

   a. Standard non-compliance mitigation measures (if any).

   b. Notification requirements (consenting authority and/or others listed in the discharge consent).

   c. Notification timeline requirements.

   d. Public notification requirements and procedures, if there is a risk to the general public.

10. **Emergency response plan [standard]**

   a. Details of an emergency response plan, including emergency categorisation and response, decision flow chart.

   b. Contact details for emergency situations, including contact details for:

      - the consent holder
      - the consent authority
      - emergency services.

Appendix C: Sample table of contents for a Management plan

Sample provided by Land Treatment Collective (NZLTC) - includes both information required by the standard **and optional additional sections** to support best practice.

1. **Introduction**
    a. Purpose of the management plan.
    b. Structure of the management plan.
    c. Roles and responsibilities [required by the standard]
        - Who is responsible for the overall management of the discharge to land system (usually the environmental manager)
        - What other roles and responsibilities are present for managing the discharge to land system.
    d. Key personnel contact details
        - Environmental manager
        - Operators
        - Consent manager
        - Asset manager
        - Consenting authority consent manager
        - Emergency contact details.
    e. Related documentation or permits (to be appended) [required by the standard].
    f. Management plan review and update procedures [required by the standard]
        - Who is responsible for reviewing the management plan and required frequency of the review [required by the standard]
        - Procedures for updates to management plan
        - Notification procedures for updates
        - Version management procedures.

2. **Summary of discharge-to-land consent requirements (copy of resource consent(s) to be appended)**

3. **Summary of the objectives of the discharge to land system [required by the standard]:**
    a. System objective
    b. Summary of key management criteria
    c. Summary of key performance criteria
    d. Summary of key environmental controls.

4. **Description of the discharge to land scheme [required by the standard]**
    a. Wastewater discharge to land system description
    b. Wastewater discharge to land layout figure
    c. Wastewater volumes, concentrations and loads
    d. General wastewater discharge to land operation description
    e. Summary of key operational requirements and limitations to meet consent requirements and minimise environmental impacts:
        - Operational loading rate limits (hydraulic and nutrient)
        - Performance limitations (wet weather, wind, soil limitations etc)
        - Receiving environment limitations (soil, groundwater and surface water etc).

5. **Monitoring requirements [required by the standard]**
    a. A schedule of consent and performance monitoring requirements, including details of and locations of:
        - wastewater monitoring
        - soil monitoring
        - receiving environment.
    b. A summary of how the monitoring data will be reviewed for trends and how mitigation measures will be identified and implement, if effects are identified.

6. **Environmental effects response and management [required by the standard]**
    a. Details of key environmental parameters and potential effects to be managed.
    b. Details of who is responsible for managing the potential effects.
    c. Key potential mitigation measures for managing effects if they are observed.
    d. Notification requirements to the consenting authority if effects are identified.
    e. Review procedures for assessing effectiveness of mitigation measures.

7. **Non-compliance response [required by the standard]**
    a. Standard non-compliance mitigation measures if consent limits are breached or are projected to be breached.
    b. Notification requirements (consenting authority and/or others listed in the discharge consent).
    c. Notification timeline requirements.
    d. Public notification requirements and procedures if there is a risk to the general public.

8. **Complaints procedure [required by the standard]**
    a. Complaints hotline number.
    b. Complaints recording procedure.
    c. Complaints response procedure.
    d. Complaints notification procedure and timing.

9. **Discharge to land scheme auditing procedures [required by the standard]**
    a. Frequency of system auditing.
    b. Who is responsible for ensuring that audits are conducted.
    c. What are the prerequisites of the scheme auditors (independent, SQEP etc).
    d. What are the boundaries and key requirements of the audit specifically relating to the discharge to land scheme.

10. **Management plan review procedures [required by the standard]**
    a. Frequency of review of the management plan.
    b. Who is responsible for implementing the review.
    c. Notification of the reviewed document to the consenting authority.