Horticulture New Zealand
Ahumāra Kai Aotearoa

Drain Nutrient Solution Management

CODE OF PRACTICE

For covered cropping and hydroponic growers

Version 2.0 | JUNE 2026

DRAFT FOR CONSULTATION

Drain Nutrient Solution Management Code of Practice

Version 2.0 | June 2026

Document control

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Summary of changes since previous version (2020, version 1.2)

Change	References
Content merge, revision, and full content update, based on the 2007 and 2020 versions of this Code.	Whole document
Development of an Excel workbook to develop a Drain Solution Management Plan	Appendix A
Design update	Whole document
Name and terminology change to Drain Nutrient Solution Management.	Title

This Code of Practice will be reviewed, as necessary, by Horticulture New Zealand Incorporated. Suggestions for alterations, deletions or additions to this Code of Practice, should be sent, together with reasons for the change and relevant data and contact details of the person making the suggestion, to info@hortnz.co.nz.

Acknowledgements: This Drain Nutrient Solution Management Code of Practice for covered cropping and hydroponic growers has been updated by Agrilink NZ. The review and update was funded through the Growing Change project, by Horticulture New Zealand and Ministry for the Environment. The authors would like to acknowledge the funders of the 2020 version, Tomatoes New Zealand and Vegetables New Zealand, as well as the growers that contributed to the review and update of this version.

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Contents

1 Code of Practice overview

This Code of Practice is for growers with hydroponic or covered cropping systems. It provides a structured, risk-based approach to applying drain nutrient solution to land. Applying this valuable resource to land can support ongoing production of outdoor crops.

1.1 Introduction

Hydroponics or covered cropping systems above ground in soilless media usually generate drain nutrient solution. This is referred to as a run-to-waste system. As systems run, salts and other compounds build up, and the nutrient mix needs refreshing. Some modern operations are moving towards zero waste or closed reticulated systems. However, many soilless growing setups still produce some form of drain nutrient solution. While this solution may not be suitable to reuse within the same growing system, it can often be re-purposed. An example of this is using drain solution as a liquid fertiliser to grow other outdoor commercial crops.

It is important to manage drain solution application to land to minimise the risk of nutrient losses through leaching or overland flows. Loss of excess nutrients into waterbodies can impacts water quality and freshwater ecosystems. Industry standards (this Code of Practice) provide a structured process for operations to manage these risks. This approach supports the long-term sustainability of covered cropping and hydroponic growing systems.

This Code of Practice provides practical steps for storing and applying drain nutrient solution to land. Growers develop a Drain Solution Management Plan to cover requirements and considerations for storage and applications to land. It also assists growers to meet applicable council requirements. An Excel-based Drain Solution Management Plan workbook accompanies this Code of Practice.

This update builds on content from earlier versions, which include the original 2007 version, *A Code of Practice for the Management of Greenhouse Nutrient Discharges*, and the 2020 version, *Greenhouse Nutrient Solution Discharge: The requirements for achieving Good Practice*.

1.2 Scope and terminology

This Code of Practice applies to all hydroponic, covered, or indoor growing systems that grow crops above ground, and generate drain nutrient solution that will be applied to land. This includes vertical farms, tunnel houses, and greenhouse systems. The Code is intended to be flexible and suitable for operations of different sizes and levels of technology.

In this Code, the term *soilless growing system* will be used to refer to covered, indoor or hydroponic growing systems to which this Code applies. *Nutrient solution* refers to the solution used to grow the covered or hydroponic crop. *Fertigation* refers to the system used to deliver the solution to the plant. *Drain nutrient solution* or *drain solution* refers to the run-off solution collected from the *soilless growing system* that requires further management. Any reference to *land application* or *irrigation* in this Code of Practice specifically relates to the application of drain solution to land.

The Code of Practice focuses on the application of drain nutrient solution to land. It does not cover direct discharges to water – these are typically more tightly regulated under regional plans and resource consent may be required. Consult your council if you are unsure which rules apply to your situation.

1.3 How to use this Code of Practice

The Code of Practice directs growers to develop a Drain Solution Management Plan (DSMP) to manage risks to water from the application of drain nutrient solution to land.

Managing applications of drain nutrient solution to land follows the same principles as applying fertiliser to crops – the 4 Rs, which include Right product, Right rate, Right time and Right place. Planning applications to land is primarily about managing the timing and rate of drain solution applications. Timing and rate are largely dependent on how saturated the soils are, and the nutrient load of the solution applied. A DSMP helps growers demonstrate, with sufficient evidence, how applications to land are carried out in accordance with this Code of Practice.

This Code contains 8 sections to support growers to develop a Drain Solution Management Plan:

- Section 1 introduces the Code and includes a drain solution management hierarchy in Section 1.5 and alternatives to land application in Section 1.6.
- Section 2 describes the regional council regulatory context.
- Section 3 describes nutrient loss risk factors to consider when setting up a DSMP.
- Section 4 includes criteria and considerations when selecting an application site.
- Section 5 contains a set of calculations to help growers determine their nutrient load and estimate storage requirements for winter, when soils are often too saturated to irrigate.
- Section 6 includes key steps to follow when applying to land.
- Section 7 provides growers with a set of management practices they can implement to reduce nutrient loss risk and minimise environmental risk.
- Section 8 contains a checklist for growers to use, to capture key guidance included in this Code.

This Code is supported by several appendices:

- Appendix A contains the Drain Solution Management Plan (DSMP) workbook, which is a structured and practical tool growers can use to implement this Code.
- Appendix B contains further information and resources.
- Appendic C contains a lookup table, which supports growers when working through Section 5.
- Appendix D contains detailed rules information for each council, to support growers on what council rules may apply*.

This Code of Practice can be used as evidence to demonstrate compliance with applicable requirements. Most horticulture growers in New Zealand are certified under a Good Agricultural Practice (GAP) programme, either NZGAP or GLOBALG.A.P. to meet market and regulatory requirements. A DSMP will form part of a hydroponic or covered cropping operation's overall GAP farm plan.

NZGAP's Environment Management System (EMS) Add-on is designed to respond to New Zealand's national and regional environmental regulation. For example, farm environment plans and freshwater farm plans. The EMS Add-on is underpinned by this and other industry environmental codes of practice. Hydroponic and covered cropping growers using the EMS Add-on will develop a DSMP as part of their evidence to meet applicable requirements through GAP.

*This information will be moved to a separate reference document after consultation.

1.4 Drain Solution Management Plan

This Code of Practice directs growers to develop a DSMP to meet applicable regulatory requirements. Criteria for a DSMP includes:

- **Overview of growing operation**, including business environmental goals and objectives
- **Production site description**, including system diagrams and details on drain solution storage
- **Drain solution application site description**, including total area (hectares), site maps (soils layers/data), land-use, and application or irrigation system
- **Nutrient loss risk factors are identified** for the application site(s)
- **Description of management practices** used to minimise the risk of nutrient loss to freshwater from applying drain solution to land
- **Application record**, including volumes applied and nutrient loadings (kg N/ha, kg P/ha)
- **Maintenance schedule and records** for typical maintenance areas, including tanks, pump stations, pipe work and fittings, and irrigator sprinklers/nozzles
- **Other records and supporting documentation**, including consent details (if applicable), calculations for storage requirements including emergency storage, solution and soil test results, and nutrient budgets (for the application site).

An Excel-based DSMP workbook has been developed to support growers to implement this code of practice. The workbook contains fillable tabs for the information above. The workbook is not exhaustive, and growers need to be mindful that additional regulatory requirements may apply to their operation that this Code does not cover. The workbook is available on HortNZ's website and in Appendix A.

1.5 Drain solution management hierarchy

When considering the overall management of drain nutrient solution in soilless growing systems, work through the hierarchy in Figure 1.1 on the next page, as follows:

1. **Eliminate** the production of drain nutrient solution
2. **Minimise** the volume of drain nutrient solution produced
3. **Manage** drain solution application to land with a Drain Solution Management Plan

Eliminating the production of drain nutrient solution has significant benefits to the environment. In systems with no drain solution or very minimal drain solution, solution is recirculated back into the soilless growing system. In zero liquid discharge systems, any drain solution remaining is evaporated. However, fully closed reticulated systems can be complex, costly, and potentially very energy intensive. Minimising drain solution where possible is often more practical for growers with existing operations.

Minimising the quantity of drain nutrient solution generated from a soilless growing system, where practicable, has several advantages. It can reduce environmental impact by decreasing the volume applied to land. This can offer significant cost savings. Savings can include reduced fertigation and pump costs, smaller storage requirements, and less land required for application.

This Code focuses on the **Manage** step. By developing a DSMP, growers can effectively manage land applications to minimise risks to freshwater. Drain nutrient solution can be a valuable resource when applied to support the production of outdoor crops. The solution often contains essential macro- and micro- nutrients for plant growth. Part of effective management is finding ways to use drain solution to support the growth of another crop, for example, pasture, cut and carry silage, catch crops, or annual crops. However, not all growers will have a suitable quantity of land available to apply some or all their growing operation's drain nutrient solution to land. Alternative options for drain solution management are covered in Section 1.6.

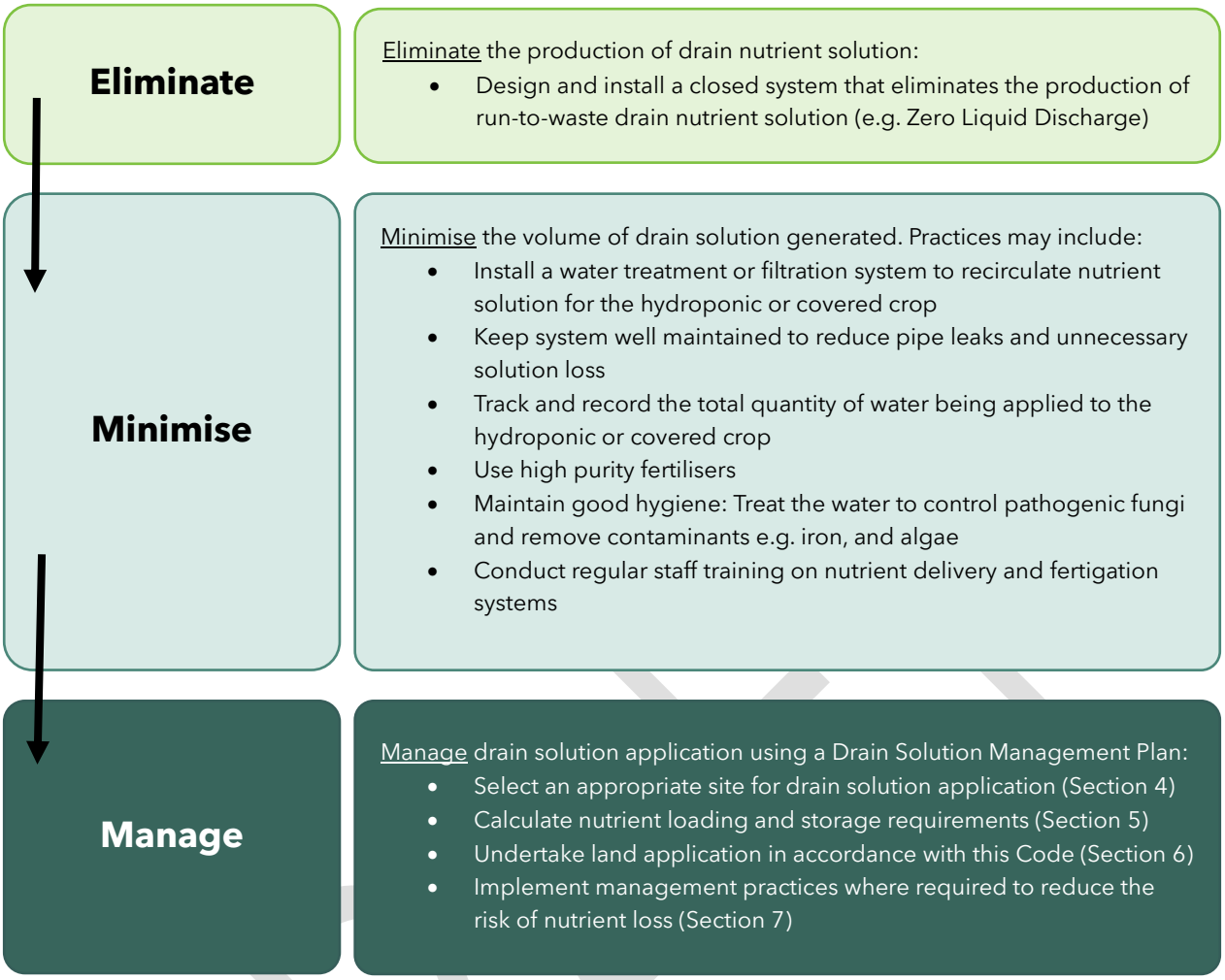

Figure 1.1: Hierarchy of management approaches for drain nutrient solution from soilless growing systems.

1.6 Potential alternatives to land application

It is not always feasible or appropriate for all operations to apply drain nutrient solution to land. For example, there may be limited land available for application, or circumstances where a full or partial refresh of nutrient solution is required (such as in response to a significant disease event) or insufficient storage to temporarily hold the volume of solution generated.

In these situations, growers may want to consider alternative approaches, accounting for site constraints, operational practicality, and relevant regulatory requirements. It is recognised that not all growers will be able to implement the same response. Approaches must be technically and economically viable for the operation concerned. Factors such as site constraints, crop type, seasonal conditions, infrastructure, and cost can all influence what is achievable for individual operations.

Alternative drain solution management options growers may want to consider include:

Collection and haulage

- Arranging for drain solution to be transported to land that is suitable for application, for example, to a neighbouring property. Regional council requirements for off-site application need to be consulted.
- Transporting drain solution to an off-site treatment or disposal facility using a liquid waste management service.

Connection to a council wastewater system

- In some locations, connection to a council wastewater system may be an option.
- This approach is likely to involve significant cost and may require consent or approval from the relevant authority. Ensure specialised advice is sought.

Managed draw-down at the end of a crop

- Where appropriate, drain solution may be reduced gradually through crop transpiration toward the end of a production cycle.
- This approach may be more applicable for operations that do not crop over winter, and where system and crop conditions allow.

Thermal evaporation

- Thermal evaporation is used in some Zero Liquid Discharge systems (i.e. closed reticulated systems). This involves using heat to evaporate water into a vapour, leaving behind solid waste (e.g. concentrated salts) and no liquid drain solution.
- While thermal evaporation substantially reduces liquid volumes, it typically requires a high energy input and careful consideration of cost and feasibility. Ensure specialised advice is sought.

2 Regulatory context

2.1 Overview

Applying drain nutrient solution to land needs to meet RMA and council requirements for discharges to land. This section is intended to assist growers understand the context and how the requirements can be met.

Each regional plan gives effect to the RMA and how access to natural resources (air, land and water) are governed in that region. At time of publication of this Code of Practice, the RMA is undergoing reform. This means in future there may be new replacement Acts that govern how resources are managed which will be implemented through national direction or new plans. Until a new plan is operative, the current rule framework will apply.

The RMA is relevant to the management of drain nutrient solution. The solution is considered a 'contaminant' and its application or irrigation to land is a 'discharge' under the Act. The RMA defines contaminant and includes a substance that is likely to change the physical, chemical or biological condition of land , air or water into which it is discharged[1]. While nutrient solution has worth as a source of nutrients for plants, it is classified as a contaminant under the RMA because of the potential to change the condition of the land to which it is applied. The RMA also defines discharge: 'includes emit, deposit and allow to escape.' Therefore, the application or irrigation of nutrient solution to land is a discharge under the RMA.

The Act requires regional councils to manage the discharge of contaminants to air, land or water to ensure that effects of the discharge do not cause adverse effects. Hence the discharge rules in a regional plan need to be complied with for the management of nutrient solution, which may be either a permitted activity or requiring resource consent.

Drain nutrient solution can be used as a fertiliser when applied to land. The application of fertiliser is also regarded as a discharge of a contaminant so all regional plans have rules to manage the effects of applying fertiliser, usually as a permitted activity.

Nutrient solution is made from dissolving solid fertiliser into a liquid as the means of transporting the nutrients to plants. Therefore, the solution is essentially a liquid form of fertiliser. The concentrated solution is diluted in the mixing tank to meet requirements of the plants. When there is nutrient solution that needs to be removed from the hydroponic growing operation, it may be classed as a fertiliser and managed under the fertiliser rules in a regional plan.

If a grower wishes to discharge directly to water, then other rules will apply and the relevant plan should be accessed in full to determine the relevant rules and conditions and planning advice sought.

There is variation between regional councils as to how discharges to land are managed. Requirements are dependent on the rule framework in the relevant plan. Appendix D includes an analysis of the relevant rules in regional plans for discharge of nutrient solution to land. This analysis is predicated on compliance with this Code of Practice, in particular:

- The discharge of drain nutrient solutions is in lieu of fertiliser application to land
- The composition of the discharge is known, particularly the N content.

[1] Refer to the RMA for full definition.

The rules that apply to the discharge of drain nutrient solution to land fall into four different categories, depending on the council.

1. Specific rules for nutrient solution
Some councils have a set of rules that specifically apply to nutrient solution discharge applications to land (e.g. Auckland, Northland Gisborne). In these regions, the specific activity rules will apply.

2. Fertiliser rules
Drain nutrient solution application to land can be classed as a fertiliser application by some councils, if the nutrient solution meets the fertiliser definition, rules, and conditions of application. The definition for fertiliser varies between plans. In some cases, nutrient solution will meet the definition of fertiliser, in other cases it won't. Under this Code, if nutrient solution is applied as a fertiliser, it must be applied so that it does not exceed fertiliser requirements for the land.

3. Specific rules for land use activities
Some councils have specific rules for land use activities like commercial vegetable growing (Horizons) or farming activities (Canterbury). In these regions, growers will need to comply with the land use rules which will include the management of drain nutrient solution when applied to land.

4. General discharge rules
If there are no specific rules for nutrient solution discharge or land use activity, and the solution does not meet the council's definition of a fertiliser, then the general discharge rules will apply. These rules sometimes require resource consent.

2.2 Activity status of rules

The rules in regional plans have a specific activity status which will determine whether the activity is permitted or requires resource consent, and what conditions or standards apply to the activity. Other considerations to be aware of relating to rules in regional plans are specific terms defined and adhering to external standards like codes of practice.

2.2.1 Permitted

Some regional plans include permitted activity rules with conditions. If those conditions can be met, then the activity is permitted and means that no resource consent is required. However, the standards or conditions of the rule need to be met, with evidence to demonstrate compliance if requested. Examples of conditions could include setbacks from waterbodies, minimising ponding and runoff, or compliance with an industry or other code of practice.

2.2.2 Resource consent required

If the permitted conditions cannot be met or there is no permitted activity rule, a resource consent for the discharge is required. This Code of Practice includes information for each council and the relevant rule where the conditions for a permitted activity cannot be met.

If a resource consent is required, the activity status for the consent will be stated in the plan and will be either controlled, restricted discretionary, discretionary, or non-complying. The requirements for the consent are set out in the plan and include matters that will be considered in an assessment of the application for consent. A resource consent application must address these requirements. For example, the Auckland rule for greenhouses over one hectare is a controlled activity and lists matters of control and assessment criteria.

2.2.3 Definitions

A number of terms in the rules may be defined in the definition section in a regional plan. Such definitions are important in terms of clarifying how a rule may be applied. For example, a rule requiring a setback from a waterbody relies on the plan's definition of a waterbody, therefore affecting how the rule is applied and complied with. Where there are specific rules for greenhouse nutrient solution discharge, they may have related definitions that determine what is included in the rules.

2.3 Complying with a code of practice

A condition of a rule may require an activity to comply with a specific code of practice. A grower will need to be able to show how the activity meets the requirements of that code. Such a rule will refer to a specific version of the code of practice and that is the version that is applicable for assessing compliance with a rule, even if a more recent version is available. For example: the Northland Regional Plan Rule c.6.9.3 has: the discharge of greenhouse nutrient solution is undertaken in accordance with the *Code of Practice for the Management of Greenhouse Nutrient Discharges 2007*.

In this rule, the 2007 version of the code of practice will remain until the plan is changed to refer to a later version.

2.4 Table of council rules

Appendix D* sets out the relevant regional council rules in respect of applying drain nutrient solution to land. These are provided to guide growers on what rules and conditions may apply. The full requirements in the plan should be used to determine compliance with the provisions. As this Code of Practice is designed for application of nutrient solution to land, the rules listed in Appendix D are for discharges onto or into land where it may enter water or for application of fertiliser, where appropriate. If a grower wishes to discharge directly to water, other rules will apply and the relevant plan should be accessed to determine the rules and conditions which will apply and planning advice sought.

It is recommended that you check with your regional council if you think your operation may trigger a rule in a regional plan. You may also choose to engage a suitably qualified and experienced consultant planner to determine this for you.

*This information will be moved to a separate reference document after consultation.

3 Nutrient loss risk factors

When applying drain nutrient solution to land, there is a risk that excess nutrients (e.g. nitrogen and phosphorus) can be lost through leaching or runoff and not taken up by plants. Loss of excess nutrients into nearby waterbodies can impact water quality and freshwater ecosystems. Losses can occur via leaching through the soil profile, or overland runoff during a rainfall or irrigation event. Nutrient losses also mean that additional nutrients, and therefore additional cost, may be needed to finish growing the crop growing on the application site.

This section provides descriptions of the relevant biophysical and management risk factors that can contribute to nutrient losses associated with applying drain nutrient solution to land. The sections following this build on this information and describe how these risks can be managed.

3.1 Biophysical risk factors

Biophysical risks relate to the application site's natural environment. Examples of biophysical risks are topography, rainfall, and soil texture. Table 3.1 describes each risk factor and how it relates to nutrient losses.

Table 3.1: Biophysical risk factors and their influence on potential nutrient loss to the environment. N and P refer to nitrogen and phosphorus, respectively.

Risk factor	Description
Topography	Depressions or low-lying areas on an application site have an increased risk of extended ponding. For sites near surface water, these depressions may connect to temporary flow paths across the site, which increases the risk of dissolved N & P entering waterbodies[2]. This risk increases during or after rainfall. Steeply sloped ground can increase loss of N & P via surface runoff or overland flow.
Rainfall	High annual rainfall, or significant rainfall events, increase drainage and the risk of nitrate leaching out of the soil profile. This risk increases on light soils or fallow ground. Heavy rainfall can also increase the risk of overland flow paths and surface runoff of N & P, especially for sites with depressions and ponding (see above), or steeply sloped sites.
Soil type	Soils with a lighter or coarse texture like sand have a lower water holding capacity and can be excessively free draining. These soils are more likely to leach nitrogen. Soils with poor drainage also increase the risk of nutrient loss because the risk of ponding and surface runoff increases. Caution should also be exercised if soils have a surface cap, or deep cracks, which increase the risk of surface runoff and bypass flow, respectively.
Proximity to waterbodies	Application sites close to waterbodies (e.g. drains, streams, rivers, coastal waterbodies) have an increased risk of nutrient loss to freshwater. This could occur if the delivery or irrigation system is incorrectly set up, resulting in application over drains or waterbodies, or if too much drain solution is applied, resulting in runoff directly into waterbodies.

[2] Critical source areas: Guidance for intensive winter grazing (Ministry for the Environment 2023)

3.2 Management risk factors

Management risk factors relate to what crop is grown on the application site, and other factors like the rate and timing of applications. Table 3.2 describes each risk factor and how it relates to nutrient loss.

Table 3.2: Management risk factors and their influence on potential nutrient loss to the environment. N and P refer to nitrogen and phosphorus, respectively.

Risk factor	Description
Crop rooting depth	Shallow-rooted crops primarily take up nutrients from the topsoil. As a result, leftover nutrients, particularly nitrate deeper down the soil profile, can leach after rainfall. In contrast, deeper rooted crops access nutrients from deeper soil layers, reducing the build-up of unused nutrients lower in the soil profile.
Seasonality and crop growth rates	Seasonality and temperature influence ground cover or crop growth on the application site. During winter, or in periods of slow growth, the crop will uptake N and P at a slower rate compared to other times of the year. This can increase the risk of nutrient loss, particularly as periods of slow growth often coincide with wetter weather.
Application rate and timing	The rate and timing of drain solution application influence the potential for nutrient losses to the environment. Applying drain solution at rates that exceed the soil's capacity to absorb and retain water can increase the risk of ponding, runoff, and nitrogen leaching. This risk is higher when soils are already wet or when rainfall occurs soon after application.
Irrigation management	The design, operation, and maintenance of irrigation or other delivery systems also influence nutrient loss risk. Uneven application of drain solution can result in over-application in some areas, increasing the risk of ponding, surface runoff, and nutrient movement to waterbodies. Equipment that is poorly maintained, incorrectly calibrated, or inaccurately positioned may reduce application accuracy and increase the likelihood of discharge occurring near sensitive areas such as drains, rivers, and other waterbodies.
Stock nutrient inputs and outputs	Animals grazing on the application site, particularly cattle, contribute additional nutrients to the system. If these nutrient inputs are not accounted for when planning drain nutrient solution applications, excess nutrients may accumulate in the soil and increase the risk of nutrient losses to freshwater.

4 Selecting an application site

When selecting a site to apply drain nutrient solution, there are several factors to consider. This section provides guidance on these factors. Examples include the ground cover or crop, delivery, application or irrigation system, nutrient loss risk factors (described in the previous section), setbacks from waterbodies, and considerations if applying to another landowner's property. Any risk factors identified should be supported with relevant management practices. This information forms the foundation of your Drain Solution Management Plan (DSMP).

The application site's annual rainfall and soil profile available water (PAW) will influence the storage calculations in Section 5.3.

4.1 Site information

Use the DSMP workbook (Appendix A) to capture application site information in tab *3. Application site*. Information includes,

- **Site details:** Address, area in hectares, physical description including land use and ground cover, and delivery or irrigation system.
- **Biophysical features:** Annual rainfall (mm), description of topography, slope, soil type and profile, and soil profile available water (PAW) (see Figure 4.1)
- **Environment and freshwater:** Identification of closest rivers or streams to the site
- **Risk factors:** Biophysical and management risk factors relating to the site. See Section 3: Nutrient loss risk factors
- **Risk management:** Management practices in place (Section 4.2 and Section 7)

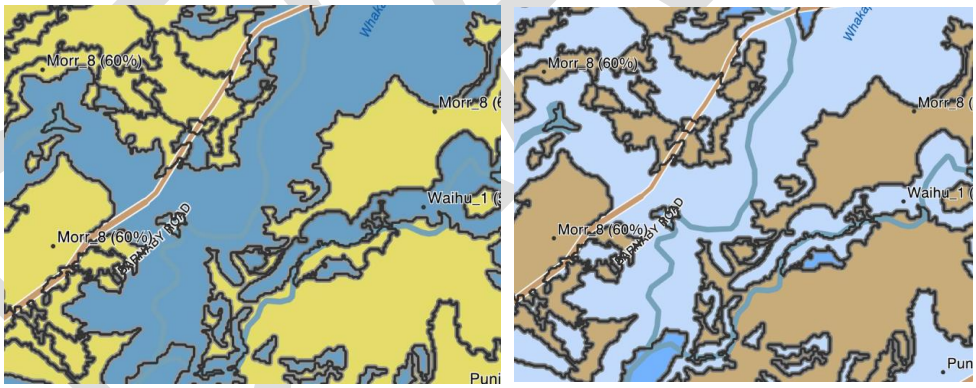

Figure 4.1: Example Smap screenshots, showing soil profile available water (PAW), and soil drainage characteristics. Smap is a free online mapping software, provided by Manaaki Whenua Landcare Research.

Depending on the land available next to your growing operation, you may look to pipe or transport drain solution to an adjacent or nearby landowner for use in their operation (e.g. for pasture growth on a dairy farm). In these situations, work closely with the landowner to ensure compliance with any resource consent or other council requirements that may apply.

4.1.1 Ground cover

Look for a nearby site with existing ground cover. Alternatively, find a site where a crop is intended to be grown, requiring the water and nutrients supplied by the drain solution. As the nutrient concentrations in the drain solution can be high, ideally the application site has a healthy, well-managed crop or ground cover, to reduce the risk of nutrient loss.

Good winter growth is also important, as slow growth over winter is a high-risk period for nutrient loss. The ground should never be fallow (i.e. without a growing crop) when applying drain solution.

Ground cover crops may include:

- Pasture harvesting e.g. silage and hay
- Pasture grazed by animals
- Crops – annual and permanent
- Catch crops

Look to sow or plant species that can use excess nitrogen in the soil. Catch crops are especially beneficial for this purpose. Good options for catch crops include cereals, such as oats and triticale[3]. More information on ground cover species to reduce nutrient loss is provided in Section 7: Management practices.

4.1.2 Delivery system

A delivery system needs to be set up to apply the drain nutrient solution. Drain solution is normally applied to land via an irrigation system. Several options may be available, depending on existing infrastructure[4]. Examples of systems that could be used include:

- Solid set sprinklers systems
- Moveable sprinklers (e.g. travelling irrigators, K-lines)
- Micro-irrigation: Drip and sprinklers

Many irrigation resources are available online – providing detailed information on different types of irrigation systems is outside the scope of this Code of Practice. For more information and links to further resources, refer to Appendix B, which includes the IrrigationNZ Codes of Practice for the design and installation of irrigation systems.

Site proximity to the main growing operation should also be considered, to avoid extensive piping or haulage.

4.1.3 Setbacks from waterbodies

Councils may require setback distances between the application site and certain features like surface waterbodies or drinking water bores. Refer to more information on rules in Appendix D.

In the absence of council requirements, a minimum five-metre setback from all rivers should be used as an interim measure. This may be reduced where an effective buffer (e.g. riparian strip) is in place to protect waterbodies. Where regulatory requirements specify a larger setback, those requirements take precedence. Over time, any runoff into rivers or drains needs to be controlled by contouring to intercept overland flow or using an appropriate treatment (e.g. vegetated buffer strip). See Section 7: Management practices, for more information.

[3] DairyNZ – Catch crops
[4] Overseer – Application system types

4.2 Managing nutrient loss risk factors

The previous Section 3: Nutrient loss risk factors outlined the dominant biophysical and management risk factors related to applying drain nutrient solution to land. Table 4.1 provides management practices to address the risks identified. Section 7: Management Practices includes more detail of each practice.

Table 4.1: Biophysical (light green) and management risk factors (white), to support managing the risk of nutrient loss on your application site.

Risk factor	Management practices
Topography	• Fill-in, or avoid applying on depressions where ponding is often observed. • Select a site that is flat or gently sloped to minimise run-off risk. • Contour the site to direct any flow paths to a border control (see Section 7 for more information on this). • Decrease the application rate to reduce the risk of ponding and allow the drain solution to infiltrate soil.
Rainfall	• Ensure drain solution is only applied when there is a soil moisture deficit. Do not apply when soils are saturated. • Avoid applying drain solution when rain is forecast. • Have sufficient storage to hold drain solution when the soil is saturated (Section 5.3).
Soil type	• Consider smaller, more frequent applications for more free draining soils. • Take care to ensure the site has sufficient soil moisture deficit before applying drain solution on poorly drained soils. • Have sufficient storage to hold drain solution when the soil is saturated (Section 5.3).
Proximity to waterbodies	• Use border controls around waterbodies to avoid drain solution directly entering nearby waterbodies. See Section 7 for more information. • Contour the site to prevent flow paths that form in heavy rain, flowing across the site directly into waterbodies.
Crop rooting depth	• Consider planting deep-rooted crops. Options are provided in Section 7. • Consider smaller applications on shallow-rooted crops to increase nutrient use efficiency.
Seasonality and crop growth rates	• Use a nutrient budget to inform the crop's nutrient growth requirement and apply drain solution in line with budget. Obtain a fertiliser recommendation as needed. • Consider pausing or reducing land applications in periods of slow growth, as nutrient uptake will be slower and risk of nutrient loss higher. Store drain solution until the crop is growing more actively. • Investigate winter-active crop options. See Section 7 for more information.
Application rate and timing	• Monitor soil moisture or keep a soil moisture budget to determine when there is sufficient soil moisture deficit to apply an application. Find soil moisture budget information in Appendix B.
Irrigation management	• Monitor the application site when irrigating to observe any ponding or uneven applications. • Regularly maintain and calibrate equipment to ensure the system is working as anticipated. Follow all IrrigationNZ Codes, linked in Appendix B.
Stock nutrient inputs and outputs	• Prepare a nutrient budget to capture animal inputs into the system, alongside drain solution applications, to guide decision making on when the crop has capacity to uptake the additional nutrients (i.e. the drain solution) applied. If applying to a neighbour's property, have relevant information like volumes and nutrient loads available upon request.

5 Calculating your requirements

Once a suitable application site is identified, the next step is to determine your system requirements. This helps to ensure drain nutrient solution can be applied at the right rate and timing to manage the risk of nutrient loss. These calculations will support you to maximise the nutrient use efficiency of your drain solution, for the crop or ground cover receiving the solution, whilst managing nutrient loss.

The calculations in this section include:

1. Calculating the volume of drain solution generated
2. Calculating the potential nutrient load on the application site (e.g. kg N/ha, kg P/ha)
3. Estimating storage capacity requirements to hold drain solution, based on annual rainfall and soil profile available water (PAW)

All calculations in this section are built into the Drain Solution Management Plan Excel workbook (Appendix A), under the *Calculator* tab. Read through this section first to understand what's behind the calculations, then refer to the workbook and input your own values.

5.1 Calculate the volume of drain solution generated

The volume of drain solution produced influences both the nutrient load and potential size of the application site, as well as the estimated volume of storage. This section supports you to calculate your daily drain solution volume, which can be multiplied out to a monthly, or annual basis.

The volume figures needed included:

- Summer* daily drain solution rate (m^3/ha/day or m^3/day for the production site)
- Winter* daily drain solution rate (m^3/ha/day or m^3/day for the production site)
- Average* daily drain solution rate (m^3/ha/day or m^3/day for the production site)

*Summer runs from 1 Oct to 30 April (212 days) and winter runs from 1 May to 30 Sept (153 days). From these figures, a weighted average drain solution rate is provided in the workbook calculator.

Seasonal daily drain solution rates are calculated because the quantity of drain solution varies over the production year. The winter daily drain solution rate is used to determine storage requirements in Section 5.3, as the ground is often too saturated to apply drain solution in winter and shoulder seasons (1 May to 30 Sept) for many regions. The summer and winter drain solution rates are averaged, to calculate an average drain solution rate for the production system, which is used to determine nutrient load in the next section.

To note, make sure the drain rates calculated are based on drain solution going into storage for further management (i.e. application to land). Exclude solution recirculated back into the system.

To calculate the daily drain solution rate, several methods can be used, depending on your system and setup:

1. Using flow meter data at the point of drain solution, if available. This is the most accurate form of measurement. Note down seasonal figures and calculate a yearly average.

2. Using the total volume of solution generated over a certain period, divide this by the number of days in that period. This could be done by monitoring changes in levels of storage tank over a given period, calculating the difference in volume, and dividing by the number of days.

3. Estimating drain solution rates using volumes supplied to plants and the percentage runoff (i.e. drain) of the system. These calculations are built into the *Calculator* tab in the Excel workbook, under 'Drain solution rate calculator'. The calculations can be viewed when in the Excel tab.

Whatever method and assumptions are used, continue to adopt these over time, for consistency. If using flow meter data or other measured volumes, ensure these are representative, and not under or over representing standard drain solution or run off rates for your growing operation.

5.2 Calculate the application site nutrient load

This is the quantity of nutrients in your drain solution that will be applied on to the application site. Understanding nutrient load is important because it helps determine whether the quantity of nutrients being applied to the crop or ground cover match the crop's growth demand at that time.

Several councils have rules that specify a maximum quantity of nitrogen or phosphorus that can be applied to land. Therefore, this calculation is important if needing to comply with council rules (see Appendix D).

5.2.1 Collect a sample for lab analysis

The first step to calculating nutrient load is to collect a sample of drain solution and send it off for lab testing. If you have runoff test results already, use these results.

To collect a sample for lab analysis:

1. Contact your preferred laboratory to request a chain of custody and collection container for a water sample to be tested for total nitrogen and total phosphorus.
2. Before collecting the sample, read all laboratory instructions on collection, handling and transport of water samples.
3. Collect a sample of the drain solution in the bottle.
4. Send the sample to the laboratory as soon as possible after collection, with the chain of custody.

Lab analyses of drain solution should be collected at least once a season, when the crop changes, or when the concentration of nutrients significantly changes. If the drain solution test results and nutrient loadings will inform a nutrient budget also test for mineral nitrogen concentrations (nitrate N and ammonium N).

5.2.2 Nutrient load calculation

Use the calculation below to work out the loads of nitrogen (kg N/ha/year) and phosphorus (kg P/ha/year) in the drain nutrient solution, and therefore loads being applied to the application site. Use the lab test results (the previous step), the daily drain solution rate (calculated in 5.1) and the application site area. Use the *Calculator tab* in the Excel workbook, or input the figures below into the equation:

- Total N in drain solution (ppm, mg/L, or g/m^3)
- Total P in drain solution (ppm, mg/L, or g/m^3)
- Application site area (ha)
- Average daily drain solution rate (m^3/ha/day or m^3/day for the production site)
- Production area (ha) – needed if the drain rate units are m^3/ha/day

For unit conversions, 1 ppm is equivalent to 1 mg/L or 1 g/m^3. If application site area is unknown (for example, if undertaking a desktop exercise), then test a range of different areas in the calculator to understand how area affects the nutrient load.

To calculate the nutrient load on an annual basis:

If drain rate is supplied in m^3/ha/day;

- Multiply the average drain solution rate (m^3/ha/day) by the total production area (ha) and 365 (days in one year) to calculate the annual drain solution volume in m^3.

If drain rate is supplied in m^3/day;

- Multiply the average drain solution rate (m^3/day) by 365 (days in one year) to calculate the annual drain solution volume in m^3.

Then, enter the values into the equation below:

$$\text{Nitrogen load on drain solution site (kg N/ha/year)} = \frac{\text{Annual drain solution } (m^3) \times \text{total N in drain solution (ppm)}}{\text{Application site area (ha)} \times 1000}$$

The same equation can be used to work out phosphorus loadings. Simply replace the total N concentration in ppm with the average concentration of P (ppm) in your drain solution.

Worked example

A capsicum grower in Northland has a 0.5-hectare greenhouse. The annual drain solution volume is 292 m^3, based on an average daily drain solution rate of 1.6 m^3/ha/day. The drain solution generally contains around 400 ppm total N, based on water testing. The grower uses an adjacent paddock for their drain solution to land applications – that paddock is 1.5 ha.

$$\text{Estimated nitrogen load on drain solution site (kg N/ha/year)} = \frac{292\ m^3 \times 400\ \text{ppm}}{1.5\ \text{ha} \times 1000}$$

Based on the grower's figures, they will be applying 78 kg N/ha/year to their application site. The grower will check with their council for any rules that may apply.

5.2.3 Interpreting your results

Your nutrient load results indicate the quantity of nutrients you have available to apply to the application site. Once calculated, you should:

Check the council rules

Check what council rules may apply in Appendix D. Some rules also have conditions or limits on the volumes of drain solution that can be applied to land, and over what period the limit applies.

Match nutrient load to crop uptake using decision support tools

Drain nutrient solution is a useful resource to support pasture and/or crop growth on the application site. To maximise nutrient use efficiency and limit potential nutrient loss, use a nutrient budget or similar decision support tool to match the nutrient load applied with pasture or crop uptake. Refer to Section 7: Management practices, for information on nutrient budgeting tools.

If your nutrient load might exceed relevant council requirements or significantly exceed the nutrient requirements for the crop growing on the application site, refer to Section 7 for management practices to address this, or Section 1.6 for alternative management options to manage your drain solution.

5.3 Estimate storage volume

All soilless growing systems that produce drain solution in winter and over the shoulder seasons require storage before application to land. There must be enough storage to hold drain solution when soil conditions at the application site are unsuitable, for example, when the soil is saturated and/or crop growth is slow. This will mostly occur over the winter months, when rainfall is high and evapotranspiration is low.

Even systems with minimal to no drain solution need to have emergency storage available, or a plan in place to manage solution, if a full system solution changeover is required. Section 1.6 provides some alternative management options.

5.3.1 Storage calculator

The Drain Solution Management Plan (DSMP) Excel workbook contains a storage calculator in the *Calculator* tab to help you estimate how much storage volume you may need to hold your drain solution over winter. The calculations are written out below, with supporting reference material provided in Appendix C.

Have the following information on hand for the calculations:

- Annual rainfall (mm) for the application site
- Soil profile available water (mm) for the application site
- Closest weather station (see Appendix C)
- Hydroponic or covered cropping production area (ha)
- Winter drain solution rate (m^3/ha/day or m^3/day)*
- Percentage of covered (e.g. tanks) vs. uncovered (e.g. lined outdoor ponds) storage volume

*If your winter drain rate is in m^3/ha/day, multiply the average drain solution rate (m^3/ha/day) by the total production area (ha) to convert units to m^3/day i.e. solution generated across the site.

This calculator is intended to be a guide only. If you currently have no storage, then work towards increasing storage up to the estimated volume, to see what volume works best for your specific operation and environment. If you have a large or complex production system, look to use a specialist consultant to calculate storage volume requirements. This will ensure storage requirements are based on the specific climate and soil conditions of your application site.

5.3.2 Biophysical risk assessment

When soils are saturated, the risk of nutrient loss, particularly nitrogen, increases. This is because the dominant leaching pathway for nitrogen is through the soil, below the plant's active root zone. Having sufficient storage capacity over winter is an important aspect of your DSMP because drain solution's nutrient composition may increase the risk of nutrient loss in times of slower plant growth.

Key drivers of nitrogen leaching risk are rainfall and soil profile available water (PAW). More information on PAW is provided on the next page. Rainfall and soil PAW form the basis of the biophysical risk assessment in Figure 5.1, which uses these parameters to estimate how many months of drain solution storage you should look to have available over winter.

This risk assessment is automatically calculated for you in the DSMP Excel workbook. If you don't know your annual rainfall or soil PAW, the calculator will use average values from the nearest weather station to your drain solution application site. The weather station lookup table that sits behind the workbook calculator is available in Appendix C.

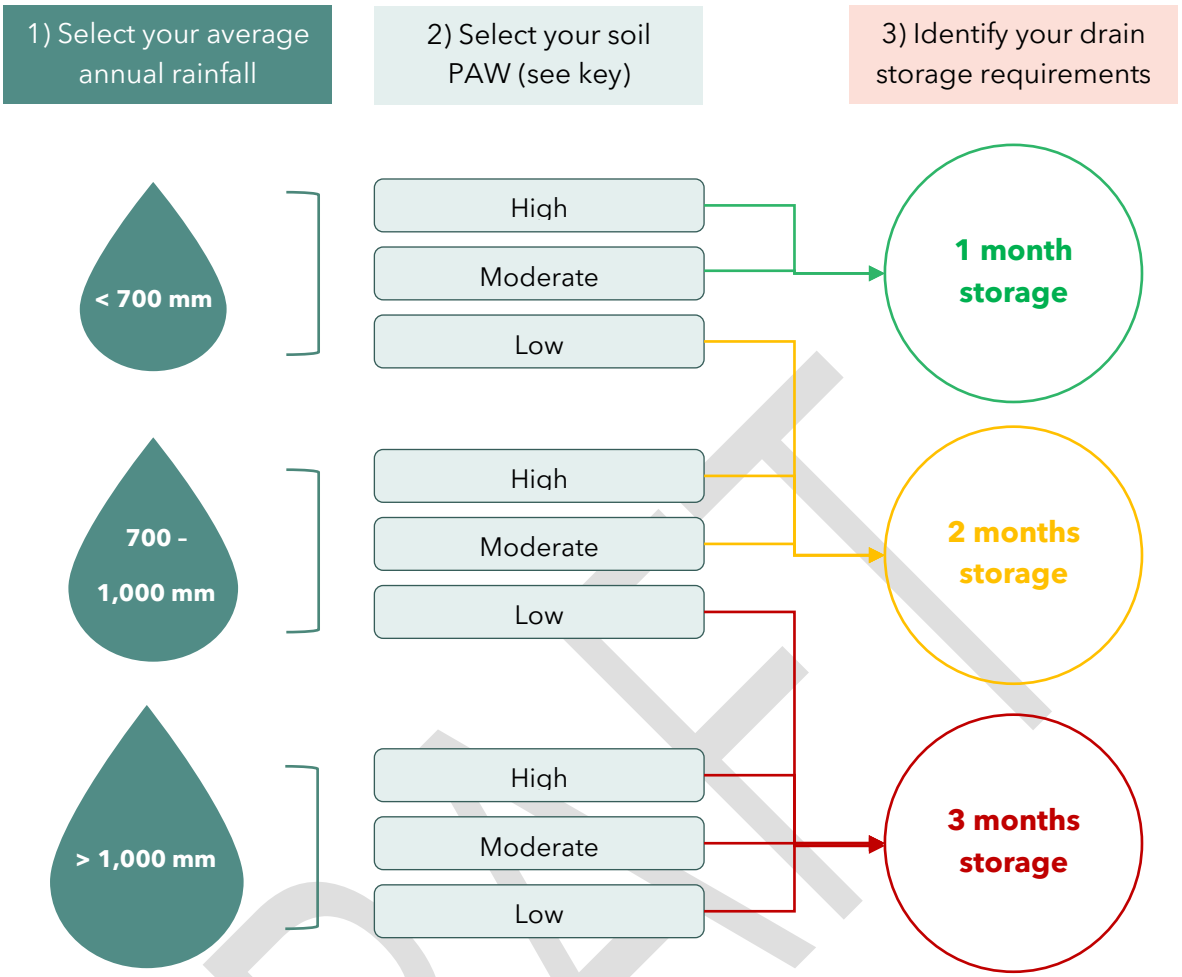

Figure 5.1: Biophysical risk assessment to estimate winter storage volume for drain solution. See the following section for a description of profile available water.

Soil profile available water

Soil profile available water (PAW) is the total amount of water that soil can hold and supply to plants within their root zone. PAW is a soil property influenced by soil texture, as texture affects the soil's ability to retain and release water to plants. Medium textured soils like loams generally hold more plant available water than sandy or heavy clay soils.

Figure 5.2 shows PAW mapped for New Zealand soils. PAW data has been sourced from the Fundamental Soil Layer[5] managed by Bioeconomy Science Institute - Manaaki Whenua Landcare Research (BSI-MWLR). This is a publicly available mapping tool that provides a range of information on soil properties across New Zealand. MWLR also manages the online soil information resource, S-map. S-map contains PAW estimates in the top 1m of soil. BSI-MWLR are actively updating S-map. PAW by rooting depth is available for some but not all of New Zealand soils, at the time of publication of this Code of Practice.

[5] https://soils.landcareresearch.co.nz/tools/fsl

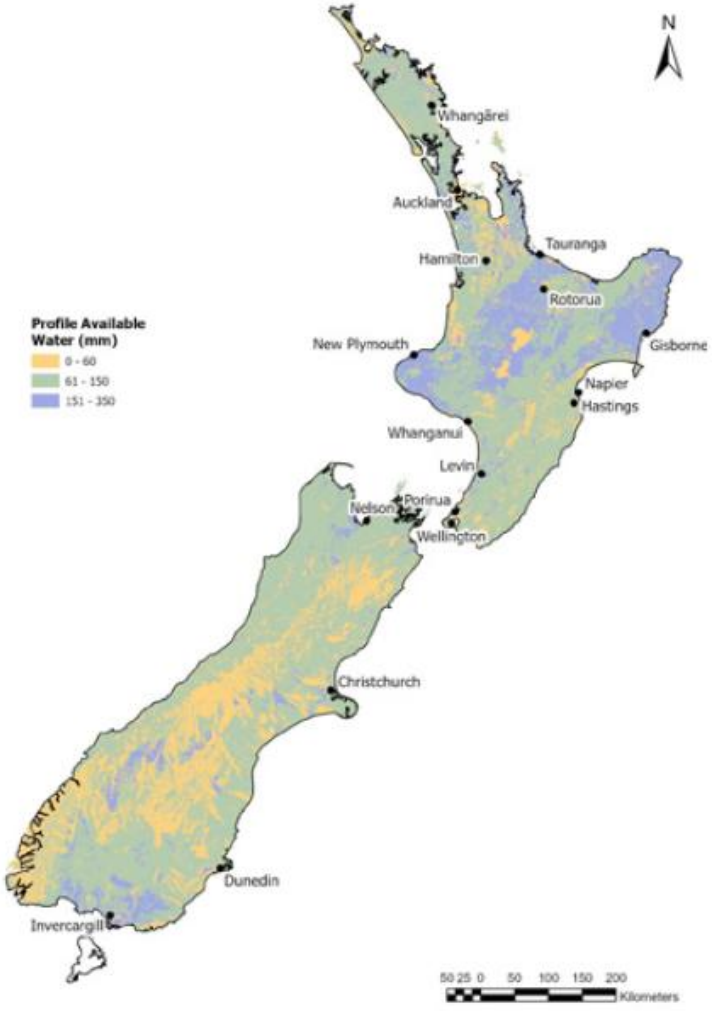

Figure 5.2: A map of PAW classes in the biophysical risk assessment to a depth of 0.9 m[6].

5.3.3 Storage volume calculation

To estimate storage volume, multiple the average daily winter drain solution generated from the production area (m^3/day) by the months of storage* as calculated in the biophysical risk assessment, with an additional multiplier to account for rainfall on uncovered storage (see next section).

*1 month = 30 days of storage; 2 months = 60 days of storage; and 3 months = 90 days of storage.

$$\text{Storage volume } (m^3) = \text{Daily winter drain solution rate } (m^3/\text{day}) \times \text{required days of storage} \times \text{percentage of covered storage volume } (\%) + \text{Daily winter drain solution rate } (m^3/\text{day}) \times \text{required days of storage} \times \text{percentage of uncovered storage volume } (\%) \times \text{uncovered multiplier}$$

To convert storage volume in m^3 to litres, multiply by 1,000:

- For example, 500 m^3 of storage is equivalent to 500,000 litres (l) of storage.

[6] Soil Profile Available Water – from the NZ Land Resource inventory (NZLRI) (accessed via the LRIS Portal) https://lris.scinfo.org.nz/layer/48100-fsl-profile-available-water/

Covered vs. uncovered storage

A multiplication factor is applied to your storage if it is uncovered because additional capacity for rainfall is needed. This is why the percentage of covered storage volume, and uncovered storage volume, is included in the above calculation. For the calculation, either input percentages based on your existing storage, or the proportion you plan to have, if installing more storage. The multiplier varies based on the site's winter rainfall profile and is linked to weather station data built into the *Calculator* tab in the Excel workbook. If the weather station cell in the Calculator is left blank, the default uncovered multiplier is 1.8. Find the lookup table in Appendix C.

Worked example

A grower operating a 2-hectare tomato glasshouse in Tuakau is looking to work out the estimated volume of winter storage for their drain solution. They have an average daily winter drain solution rate of 0.5 m^3/ha/day. Their annual rainfall is 1250 mm and the application site's soil profile available water is moderate (90 to 110 mm on Smap). They are looking at a 70% uncovered / 30% covered split of storage, based on their existing infrastructure.

- Their total site drain solution rate is 1.0 m^3/day (2 ha × 0.5 m^3/ha/day).
- Based on the site's biophysical features, they will need to have 3 months, or 90 days of storage available.
- As they are in Tuakau, their closest weather station, using the look-up table in Appendix C, is Auckland – Pukekohe. This means their uncovered multiplier is 1.84.

To calculate their estimated storage volume:

$$\text{Storage volume } (m^3) = \underbrace{1.0\ m^3/\text{day} \times 90 \times 30\%}_{} + \underbrace{1.0\ m^3/\text{day} \times 90 \times 70\% \times 1.84}_{}$$

The grower requires a total volume of 140 m^3 or 140,400 L to ensure there is sufficient capacity to store drain solution over winter, when soil conditions are saturated.

5.3.4 Other storage considerations

- Have sufficient storage to hold all solution from the production system, should a full solution changeover be required i.e. emergency storage. If you do not have sufficient storage, you need to have a clear plan on how you will manage your drain solution during wet periods or in emergency situations. Section 1.6 provides alternative management options.
- The storage system, including all tanks and ponds, should be maintained in a watertight condition to avoid leakages. This includes all pipes and holding tanks that drain solution flows through, before application to land.
- Consent is obtained when constructing storage, if required. This may involve district councils.

6 Land application

This section covers a pre-application check and how to responsibly apply drain nutrient solution to land. Both are key aspects of your Drain Solution Management Plan (DSMP). Use the DSMP Excel workbook in Appendix A to capture all information required in this section. Keep detailed records as evidence you are following industry standards and responsibly applying drain solution to land.

6.1 Pre-application check

The application site needs to be assessed before land application. This can be done either the day before, or the morning of your planned application. Assessing the site is especially important in winter and over the shoulder seasons (May to September), when the ground is often saturated and crop growth is slow. These conditions increase the risk of nutrient loss to waterbodies. Checking the conditions before each application helps to manage this risk.

A set of pre-application questions are provided in Table 6.1, with supporting information for each question supplied after the table. Use these questions as a decision framework to determine when conditions are appropriate to apply to land i.e. irrigate. There is a column in the DSMP Excel workbook, under the *Application Record* tab, to indicate you checked the conditions before applying to land.

If the answer to all questions is 'Yes', proceed with the land application following the steps in Section 6.2. If 'No' is answered for any questions, pause and re-evaluate until all conditions can be met.

Table 6.1: Pre-application check questions.

	GO	NO-GO
Are weather conditions suitable for land application today and later this week?	Yes	No
Do soil moisture levels indicate irrigation demand?	Yes	No
Does my crop growth indicate a demand for nutrients?	Yes	No
Will this land application comply with consent conditions or permitted activity rules that apply to my operation?	Yes	No
Is the delivery or irrigation system set up to apply the volume of drain solution planned to the application site?	Yes	No

Are weather conditions suitable for land application today and later this week?

Applying drain solution when weather conditions are wet, or rain is forecasted, increases the risk of soils becoming saturated, and nutrients leaching below the active root zone. It should not be raining, and no rain should be forecast for the following few days, when deciding to apply.

Do soil moisture levels indicate irrigation demand?

Assessing conditions to apply drain solution requires growers to have a method of calculating or monitoring soil moisture, to calculate the soil moisture deficit. This might include using a quick draw tensiometer (Figure 6.1, left), or hand-held time domain reflectometer (Figure 6.1, right). Soil moisture budgets can also be used. A deficit of > 5 mm is recommended in summer, and > 10 mm in winter.

Further information, including links to a soil water budget, is provided in Appendix B. For growers that don't have a soil moisture monitoring system in place, wait 7 days since the last rainfall event before applying to land, especially over the winter months (May to September).

Figure 6.1: Examples of soil moisture probes. Left – Quick draw tensiometer. Right – Hand-held time-domain reflectometer.

Does my crop growth indicate a demand for nutrients?

Look for signs the crop or ground cover is actively growing before applying drain solution, because this means the crop will be able to uptake the nutrients applied. A nutrient budgeting tool (see Section 7.1) will help with scheduling when to apply what quantity of nutrients, to match supply with demand.

Will this land application comply with consent conditions or permitted activity rules that apply to my operation?

Different regions have different rules that apply to drain solution management. See Appendix D for council rules. Maintain awareness of the rules that apply in your region, to your operation, and track nutrient loading on your application site. The Excel workbook contains a reporting dashboard to help you do this.

Is the delivery or irrigation system set up to apply the volume of drain solution planned to the application site?

Ensure the application system is ready to deliver the drain solution to where you plan on irrigating. Check it is maintained and operating correctly before proceeding.

6.2 Applying drain nutrient solution to land

Follow the steps below when applying drain nutrient solution to land. These are aimed at maximising nutrient use efficiency, minimising nutrient loss to the environment, and supporting compliance with council rules.

- Undertake all land applications in accordance with any permitted activity standards or consent conditions.
- Avoid exceeding the soil's water holding capacity when irrigating drain solution. Avoid applying to land if the soil is saturated.
- Ensure there is ground cover or a crop actively growing on the application site.
- Avoid applying drain solution into water or any other environmentally sensitive areas.
- Ensure there is no drainage, runoff, or ponding from the site.
- If soil is too dry and in a hydrophobic state, minimise runoff by encouraging infiltration through altering the rate and timing of the drain solution.
- If stock is present on the site, have a nutrient budget to monitor additional nutrient inputs and test soil to monitor potassium levels (see Section 7.2).

- Keep the application system well-maintained to ensure drain solution is evenly applied over the site.
- Keep records of all drain solution applications (see next section).
- Ensure all employees carrying out drain solution applications are trained and competent to do so.

6.3 Record keeping

6.3.1 Drain solution applications

Comprehensive records of all drain solution land applications need to be available, such as those recorded in your DSMP Workbook. Records should contain:

- Application date
- Location of application site
- Soil moisture level before application, if using a soil moisture probe or a soil water budget (optional)
- Total volume of drain solution applied
- Nitrogen applied in kg N/ha
- Phosphorus applied in kg P/ha (optional)
- Drain solution test results (total N and total P)
- Monthly and annual nitrogen applied in kg N/ha

The DSMP Workbook contains space to record this information. The *Reporting dashboard* tab allows you to calculate monthly and annual nutrient loadings.

6.3.2 Drain solution testing

Drain solution tests should be carried out at least once a season or for every significant production change in the covered cropping system. More information on solution testing is available in Section 5.2.

6.3.3 Soil testing

Collect an annual soil test for the site, or request it from the landowner, to understand trends in soil nutrient status including imbalances or build up. This is particularly important if using the site to graze stock. If imbalances start to occur, apply drain solution over a larger area, or find a new, suitable site. Section 7.2 under Management Practices provides more information on this.

6.3.4 Other supporting information

Have other supporting information on hand. This may include:

- Rainfall or weather data specific to your site (e.g. collected from an operation weather station)
- Irrigation system maintenance plans and records. A maintenance record tab is available in the Excel workbook to track any maintenance activities. See Appendix B for IrrigationNZ resources.
- Training records: As all staff operating the irrigation or delivery system need to have suitable training, records of this training should be available.
- Maps of application site and relevant features (e.g. topography, soil, freshwater bodies, catchment, any significant areas)

7 Management practices

This section contains a set of practices to manage the risk of nutrient loss when applying drain solution to land. These practices are referred to throughout this Code, to support you to address nutrient loss risk factors when identified. If implementing any of these management practices to support your Drain Solution Management Plan, capture these in the tab, *3. Application site*, where space is provided to detail how identified risk factors are being managed. Have supporting information on hand as evidence.

7.1 Prepare a nutrient budget

Nutrient budgeting is a useful management practice to support your Drain Solution Management Plan. A nutrient budget is an estimate of the nutrients entering, leaving, and remaining within a growing system over a set period. A basic nutrient budget quantifies the nutrients applied through fertiliser (inputs) and what is removed in the harvested crop (outputs).

For drain solution application to land, a nutrient budget can match the nutrient requirements of the crop growing on the application site with the nutrients supplied in the drain nutrient solution. Matching inputs (supply) with outputs (demand) helps to manage nutrient loss risk. Nutrient budgeting is particularly important if the site is grazed, because stock will input additional nitrogen and phosphorus that needs to be accounted for. Table 7.1 contains two nutrient budgeting tool options to consider.

Table 7.1: Decision support tools to match drain solution land applications with crop uptake.

Tool	Description	Crops	Cost*
SVS Tool	A nitrogen balance and decision-support tool designed specifically for vegetable production systems. It uses crop, soil, and weather data to help growers optimise nitrogen fertiliser applications in real time, improving efficiency while reducing environmental losses and supporting compliance.	Mainly developed for vegetable crops. Wide range of vegetable crops, arable, and green manures.	Free
OverseerFM	A farm nutrient budgeting and environmental management tool used to estimate nutrient flows (such as nitrogen and phosphorus) within pastoral and arable farming systems. It helps farmers and advisors make informed decisions to optimise productivity while meeting environmental and regulatory requirements.	Mainly developed for pastoral systems (dairy, beef, pig), arable, seed, green manures, forage.	$750/year + GST

*Last updated in 2026.

7.2 Soil testing for stock health

High potassium levels in pasture can lead to mineral imbalances between cations and have serious animal health implications if high levels of potassium-rich nutrients are being applied to the soil. Therefore, if stock are present on the application, regularly test soil to monitor potassium levels. Ideally keep soil Quick Test K levels between 7 to 10 to ensure optimum plant health without causing animal health concerns. The potassium content of the drain solution may determine the minimum application area, rather than nitrogen content if the site is being grazed, because of the risk to stock health when potassium levels are high.

7.3 Adjust system parameters to reduce nutrient load

The size of the application site, volume of drain solution applied, and drain solution nutrient concentration determines the quantity of nutrients applied (i.e. the nutrient load). In some cases, nutrient load will exceed the ground cover or crop's requirements, which can be determined using a nutrient budget. Exceeding a crop's requirement or demand for nutrients significantly increases the risk of nutrient loss.

Altering the application site size or volume of drain solution applied can reduce nutrient loadings:

- A larger application site means drain solution is applied over a larger area. This spreads out the nutrients applied, therefore reducing kg N/ha or kg P/ha applied.
- Reducing the volume of drain solution applied reduces the quantity of nutrients delivered in the drain solution, therefore also reducing nutrient loadings.

Use the *Calculator* tab in the Excel workbook to understand how these parameters impact your overall nutrient load, and how much additional land, or reduction in drain solution volume, might be needed, to better match nutrient supply with crop demand.

Practical options to adjust system parameters to reduce nutrient load include:

- Find a neighbouring property to apply drain solution on, if you have no further land near your production site available to increase your application area. Consider any requirements that may apply when irrigating drain solution on sites owned by someone else.
- Look into ways to minimise the volume of drain solution produced. The drain solution management hierarchy in Section 1.5 contains a list of ways to minimise drain solution volume.

To reduce the concentration of nutrients in the drain solution before application, which will also help to reduce nutrient load on the application site, see Section 7.5 about woodchip bioreactors.

7.4 Select a deep-rooted, winter-active ground cover or crop

The choice of ground cover or crop on the application site will significantly affect the quantity of nutrients taken up and utilised. As the risk of nutrient loss is highest in winter, planting a deep-rooted, winter-active crop, will help to manage this risk. If you can manage what ground cover or crop is sown on your application site, then consider the options in Table 7.2 below. If using a neighbouring property or crop, look for sites with crops that have high nitrogen requirements. Always ensure you are aware of any regulatory requirements that may apply when using someone else's land to apply or irrigate drain solution.

Depending on the availability of equipment (e.g. tractors, seed drills), catch crops can be a good choice for ground vegetation. Catch crops are grown to use excess nitrogen and other nutrients in the soil. They generally have deep root systems, establish quickly, and tolerate cooler, winter conditions[7]. If you choose to sow different catch crops across your application site, make sure at least one block or part of the site has an actively growing crop, to have land available to apply or irrigate drain solution. Do not apply drain solution on bare or fallow ground. Aim to sow any crops in autumn (i.e. before winter) to improve nutrient uptake, nutrient use efficiency, and reduce the risk of nitrogen leaching[8]. Refer to the

[7] DairyNZ – Catch crops
[8] Catch crops for reduced nitrate leaching (October 2024).

Catch Crops for Reduce Nitrate Leaching – Guidelines (October 2024) for more information – a link is provided in Appendix B.

Table 7.2: Catch crop options for improved nitrogen use efficiency on your application site.

Species	Considerations
Oats	Fast-growing and winter active. Use for silage or winter green feed, if the application site is stocked. High nitrogen uptake levels and good yield.
Triticale	Cereal catch crop, which is a cross between wheat and ryecorn. Good winter activity – similar to oats. Oats normally outperform triticale in terms of nitrogen uptake, except in cooler climates like Southland.
Italian ryegrass	Improved performance in cooler conditions compared to perennial ryegrass. Use with other cereals (e.g. oats) for silage, which can be harvested multiple times. Lower nitrogen uptake rates and overall yield compared to oats and triticale.

7.5 Woodchip bioreactor to pre-treat drain solution

Woodchip bioreactors, also known as denitrification beds, are a tool that can be used to reduce the concentration of nitrogen in your drain nutrient solution before it is applied over your site (Figure 7.1). Bioreactors work by using soil-denitrifying bacteria, present on the woodchips, to break down nitrate present in the solution[9]. The solution flows through the bioreactor and is collected at the other end after treatment, ready for land application. Once installed, woodchip bioreactors last 10-15 years, before needing replacement. Resources on installing a woodchip bioreactor are provided in Appendix B. If using a treatment device like a bioreactor, then drain solution needs to be tested again after treatment, to calculate the new nutrient load on the application site.

Image placeholder

Figure 7.1: Example of a large, woodchip bioreactor.

[9] Catchment solutions – Massey dairy farm bioreactor.

7.6 Use border controls near waterbodies

Border controls act as physical or vegetative barriers between the drain solution application site and waterbodies. They aim to minimise the risk of drain solution directly entering waterbodies when applying to land. Border controls, alongside careful application management, are the final barrier to protecting water quality.

In practice, a border control could be a riparian or vegetative strip along drains, or waterbodies next to the drain solution application site (Figure 7.2). When looking into border control options, consider the site's topography and runoff risk, and focus on parts of the site where a border control could intercept runoff, if it occurs. As in interim measure before border controls are in place, look to use a 5 m setback rule from all waterbodies. Some plans may require a greater setback.

Figure 7.2: Example of a waterbody riparian planting.

8 Checklist

This checklist supports growers to check off all key considerations when developing a comprehensive Drain Solution Management Plan, in accordance with this Code of Practice.

Planning and management	**YES**	**NO**
Goals or objectives are set for the long-term management of drain nutrient solution.		
Any regulations or requirements around the management and application of drain nutrient solution are understood and complied with, including regional plans.		
Any industry or customer requirements relating to the management of drain nutrient solution are implemented.		
Property maps and system design diagrams are available for the production site and application site.		
Eliminate and minimise		
Actions have been undertaken to eliminate and/or minimise the volume of drain solution produced (Section 1.5).		
Drain solution application site		
The application site has been assessed for suitability to apply drain solution, with supporting property details, biophysical features recorded, and a description of nearby freshwater and freshwater ecosystems nearby (Section 4.1).		
Key biophysical and management factors contributing to the risk of nutrient loss and freshwater systems are described, with management practices in place.		
The application site meets all applicable regulatory requirements (e.g. setback distance from bores, waterbodies, sensitive areas).		
Storage		
Sufficient storage is available to hold drain solution until conditions are suitable for application to land, or for emergency storage (Section 5.3).		
The storage system regularly maintained to ensure no leakage of nutrient solution.		
Applications		
A pre-application check is conducted before all drain solution applications (Section 6.1).		
All guidelines in Section 6.2 on applying drain solution are followed.		
A record of applications is kept, including volume applied and nitrogen loadings (Section 6.3.1)		
Nutrients supplied via drain solution, along with other nutrient sources (e.g. stock), match nutrient demand on the application site (Section 7.1).		
Drain solution and soil test results are available (Section 6.3.2).		

9 Bibliography

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Appendix A: Drain Solution Management Plan (DSMP) workbook

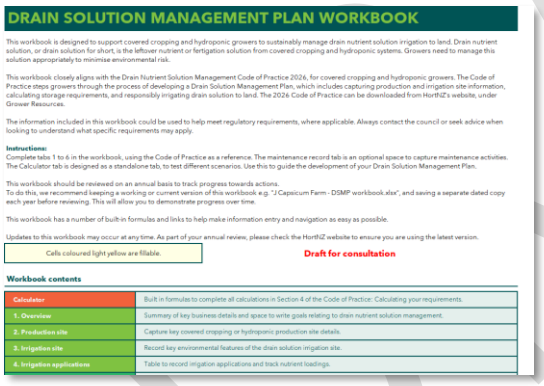
An Excel-based workbook has been developed alongside this Code of Practice update to support growers to implement a Drain Solution Management Plan. The workbook is available on HortNZ's website, linked here.

The workbook contains 9 tabs, with six key content tabs:

1. **Overview:** Record business information and goals and objectives
2. **Production site:** Capture production site information, including tanks and storage
3. **Application site:** Space to record information, risks, and mitigations for the drain solution site
4. **Application records:** Record table, including pre-application assessment
5. **Reporting dashboard:** Summary tab to track monthly and annual nutrient loadings and volumes applied
6. **Action plan:** Space to capture any actions relating to Drain solution management

Supporting tabs to enter information on:

- **Workbook guide:** Introduces workbook and contents page
- **Calculator:** Nutrient loading and storage calculations
- **Maintenance record:** Space to capture any maintenance on application and storage systems


DRAIN SOLUTION MANAGEMENT PLAN WORKBOOK

This workbook is designed to support covered cropping and hydroponic growers to sustainably manage drain nutrient solution irrigation to land. Drain nutrient solution, or drain solution for short, is the leftover nutrient or fertigation solution from covered cropping and hydroponic systems. Growers need to manage this solution appropriately to minimise environmental risk.

This workbook closely aligns with the Drain Nutrient Solution Management Code of Practice 2026, for covered cropping and hydroponic growers. The Code of Practice steps growers through the process of developing a Drain Solution Management Plan, which includes capturing production and irrigation site information, calculating storage requirements, and responsibly irrigating drain solution to land. The 2026 Code of Practice can be downloaded from HortNZ's website, under Grower Resources.

The information included in this workbook could be used to help meet regulatory requirements, where applicable. Always contact the council or seek advice when looking to understand what specific requirements may apply.

Instructions:
Complete tabs 1 to 6 in the workbook, using the Code of Practice as a reference. The maintenance record tab is an optional space to capture maintenance activities. The Calculator tab is designed as a standalone tab, to test different scenarios. Use this to guide the development of your Drain Solution Management Plan.

This workbook should be reviewed on an annual basis to track progress towards actions.
To do this, we recommend keeping a working or current version of this workbook e.g. "J Capsicum Farm - DSMP workbook.xlsx", and saving a separate dated copy each year before reviewing. This will allow you to demonstrate progress over time.

This workbook has a number of built-in formulas and links to help make information entry and navigation as easy as possible.

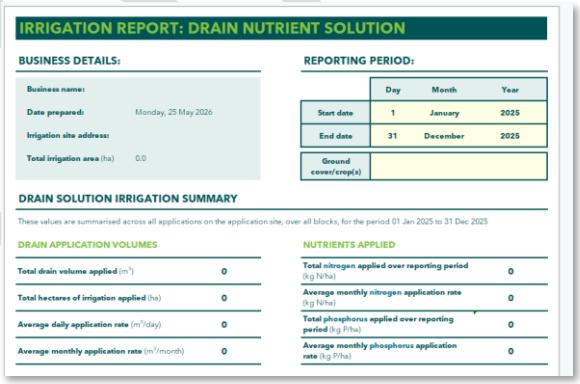
Updates to this workbook may occur at any time. As part of your annual review, please check the HortNZ website to ensure you are using the latest version.

Cells coloured light yellow are fillable.

Draft for consultation

Workbook contents

Calculator	Built in formulas to complete all calculations in Section 4 of the Code of Practice: Calculating your requirements.
1. Overview	Summary of key business details and space to write goals relating to drain nutrient solution management.
2. Production site	Capture key covered cropping or hydroponic production site details.
3. Irrigation site	Record key environmental features of the drain solution irrigation site.
4. Irrigation applications	Table to record irrigation applications and track nutrient loadings.


IRRIGATION REPORT: DRAIN NUTRIENT SOLUTION

BUSINESS DETAILS:

Business name:	
Date prepared:	Monday, 25 May 2026
Irrigation site address:	
Total irrigation area (ha)	0.0

REPORTING PERIOD:

	Day	Month	Year
Start date	1	January	2025
End date	31	December	2025
Ground cover/crop(s)			

DRAIN SOLUTION IRRIGATION SUMMARY

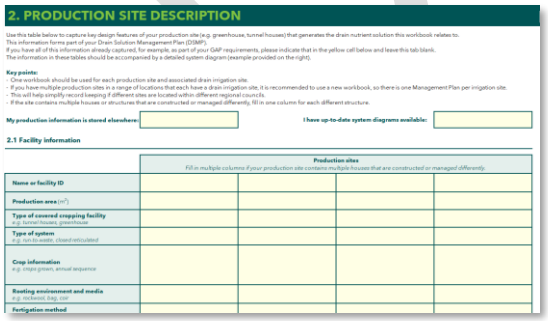
These values are summarised across all applications on the application site, over all blocks, for the period 01 Jan 2025 to 31 Dec 2025

DRAIN APPLICATION VOLUMES

Total drain volume applied (m^3)	0
Total hectares of irrigation applied (ha)	0
Average daily application rate (m^3/day)	0
Average monthly application rate (m^3/month)	0

NUTRIENTS APPLIED

Total nitrogen applied over reporting period (kg N/ha)	0
Average monthly nitrogen application rate (kg N/ha)	0
Total phosphorus applied over reporting period (kg P/ha)	0
Average monthly phosphorus application rate (kg P/ha)	0


2. PRODUCTION SITE DESCRIPTION

Use this table below to capture key design features of your production site (e.g. greenhouse, tunnel houses) that generates the drain nutrient solution this workbook relates to.
This information forms part of your Drain Solution Management Plan (DSMP).
If you have all of this information already captured, for example, as part of your GAP requirements, please indicate that in the yellow cell below and leave this tab blank.
The information in these tables should be accompanied by a detailed system diagram (example provided on the right).

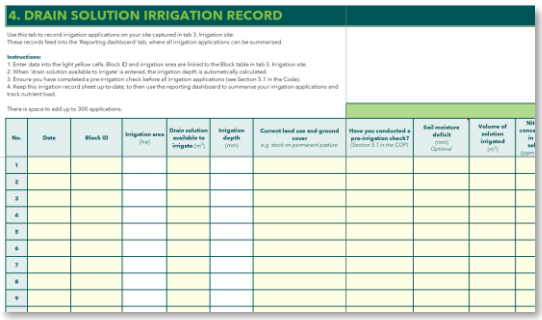
Key points:
- One workbook should be used for each production site and associated drain irrigation site.
- If you have multiple production sites in a range of locations that each have a drain irrigation site, it is recommended to use a new workbook, so there is one Management Plan per irrigation site.
- This will help simplify record keeping if different sites are located within different regional councils.
- If the site contains multiple houses or structures that are constructed or managed differently, fill in one column for each different structure.

My production information is stored elsewhere:

I have up-to-date system diagrams available:

2.1 Facility information

	Production sites *Fill in multiple columns if your production site contains multiple houses that are constructed or managed differently.*			
Name or facility ID				
Production area (m^2)				
Type of covered cropping facility e.g. tunnel house, greenhouse				
Type of system e.g. run-to-waste, closed-reticulated				
Crop information e.g. crops grown, annual sequence				
Rooting environment and media e.g. rockwool, bag, coir				
Fertigation method				


4. DRAIN SOLUTION IRRIGATION RECORD

Use this tab to record irrigation applications on your site captured in tab 3. Irrigation site.
These records feed into the 'Reporting dashboard' tab, where all irrigation applications can be summarised.

Instructions:
1. Enter data into the light yellow cells. Block ID and irrigation area are linked to the Block table in tab 3. Irrigation site.
2. When 'drain solution available to irrigate' is entered, the irrigation depth is automatically calculated.
3. Ensure you have completed a pre-irrigation check before all irrigation applications (see Section 3.1 in the Code).
4. Keep this irrigation record sheet up-to-date, to then use the reporting dashboard to summarise your irrigation applications and track nutrient load.

There is space to add up to 300 applications.

No.	Date	Block ID	Irrigation area (ha)	Drain solution available to irrigate (m^3)	Irrigation depth (mm)	Current land use and ground cover e.g. stock on permanent pasture	Have you conducted a pre-irrigation check? (Section 3.1 in the COP)	Soil moisture deficit (mm) Optional	Volume of solution irrigated (m^3)	NH conc. in sol (ppm)
1										
2										
3										
4										
5										
6										
7										
8										
9										

Appendix B: Resources

HortNZ Codes of Practice

The HortNZ Codes of Practice in this suite are listed below. These can be used by growers to build their overall farm or orchard plan.

Tool	Sector	Description
Nutrient Management Code of Practice 2026	All outdoor growing systems	This Code provides direction for horticultural growers to manage nutrient use responsibly, while maintaining crop productivity. It explains how nutrients cycle through growing systems, how to assess block level nutrient loss risk, and apply appropriate practices to manage those risks. A Nutrient & Erosion Management Excel workbook supports growers to develop a Nutrient Management Plan by documenting current practices, assessing risks, and planning nutrient use in a structured and practical way.
Erosion and Sediment Control Code of Practice 2026	All outdoor growing systems	This Code provides practical direction on managing erosion and sediment loss from horticultural production activities. It includes a block erosion risk assessment process, and range of risk-based practices to minimise erosion and soil loss, maintain soil health, and protect waterbodies. A Nutrient & Erosion Management Excel workbook supports growers to develop an Erosion and Sediment Control Plan by documenting current practices, assessing risks, and implementing erosion and sediment control measures in a structured and practical way.
Vehicle and Machinery Washdown Code of Practice 2026	All outdoor growing systems	This Code provides direction on practices to implement to reduce the movement of soil offsite, which also prevents the spread of pests, diseases, and contaminants. It includes direction on siting washdown areas, managing washwater, and protecting soil and water from contamination.
Drain Nutrient Solution Management Code of Practice 2026	Soilless growing systems that generate drain solution requiring management	This Code outlines practices to manage drain nutrient solution from soilless growing systems. It focuses on responsible drain solution land application to protect soil and water resources and optimise resource use. The Code helps growers reduce nutrient losses and manage environmental compliance expectations by developing a Drain Solution Management Plan, which is supported by a Drain Solution Management Plan Excel workbook.
Vegetable Washwater Management Code of Practice 2026	Vegetable growing operations that generate washwater from vegetable washing.	This Code provides guidance for vegetable growers, who use water for washing, to sustainably manage the resulting washwater produced. Guidance focuses on selecting the most appropriate treatment option for each grower's operation, providing high level information on a range of treatment options, with links to further resources where required.

Other resources

A range of resources are provided below. Depending on your operation size and level of technology, some resources may be more or less useful.

Sustainable water management

Name	Sector	Description
NZPPI Sustainable Water Management Code of Practice (2024)	NZ nursery production	Industry Code of Practice to promote sustainable water use, initiated by New Zealand Plant Producers Incorporated. https://nzppi.co.nz/WATER-CONSERVATION/29606/
Nursery Industry Water Management Best Practice Guidelines (2010)	Australia nursery industry	Industry Best Practice Guidelines for Australian nursery growers. https://nurseryproductionfms.com.au/wp-content/uploads/download-manager-files/Water-Management-Best-Practice-Guidelines.pdf
RII Best Practices Guide for Water Circularity (2023)	USA controlled environment agriculture operations	North American research body resource by the Resource Innovation Institute to support understanding of water conservation principles, technology available, maximising energy-efficiency, and protection of water resources. https://resourceinnovation.org/wp-content/uploads/2023/06/RII-Water-BPG-2023.pdf
Best Practice Guidelines for Greenhouse Water Management (2016)	European greenhouse growers	Overview of current best practice for the application and recycling of water and nutrients in greenhouses. Written for a European audience. https://hortamericas.com/wp-content/uploads/2018/09/grodan_best-practice-water-management.pdf
Water conservation for growers – Sustainabloom (2025)	USA floriculture industry, but applicable to covered cropping	Concise high-level resource for water management in floriculture production (but applicable principles). https://e1.nmcdn.io/assets/sustainabloom/wp-content/uploads/2025/11/21.ConsumerGuide_Water-Conservation-Growers.pdf

Management practices

Name	Sector	Description
Catch Crops for Reduce Nitrate Leaching – Guidelines (2024)	Agriculture, but applicable to all sectors	Guidance on the use of catch crops after forage crop grazing to take up nitrogen (N) during the coolest months of the year. It aims to explain the whys and hows to help manage your expectations and decision making. https://assets.far.org.nz/CB0-3368_BrendonMalcolm_Catch-Crop-Guidelines_UPDATE-Oct-2024.pdf
Carex handout: Edge-of-field nitrate reduction with woodchip bioreactors (2018)	All sectors	Guidance on building a bioreactor (denitrification bed) using wood-chip. Useful for reducing nitrogen levels in drain solution. Download from: https://figshare.com/articles/journal_contribution/CAREX_Toolbox_Handout_4_-_Nutrients_nitrate_/6848537

Irrigation and soil moisture monitoring

Name	Sector	Description
The New Zealand Piped Application Systems Design Code of Practice	Anyone who irrigates	IrrigationNZ Code of Practice for the design of piped application systems. Design and install in accordance to this Code if installing a piped system for drain solution application to land. https://www.irrigationnz.co.nz/Attachment?Action=Download&Attachment_id=48
The New Zealand Piped Application Systems Design Standards	Anyone who irrigates	IrrigationNZ Design Standards if installing a piped system for drain solution application to land. https://www.irrigationnz.co.nz/Folder?Action=View%20File&Folder_id=107&File=2013-INZ-Design-Standard.pdf
IrrigationNZ – Scheduling, including a soil water budget spreadsheet	Anyone who irrigates	IrrigationNZ guidance on soil moisture monitoring, including a soil water budget spreadsheet. https://www.irrigationnz.co.nz/PracticalResources/GMP/Scheduling
FAR – Soil water budget tool & user guide	Arable-based	FAR soil water budget tool, which includes user guidance on how to use the workbook. https://www.far.org.nz/resources/soil-water-budget-tool-user-guide

Appendix C: Storage lookup table

This table sits behind the Calculator tab of the Drain Solution Management Plan workbook. Use this to estimate storage volume in Section 5.3, or to understand more about how the calculations in the workbook function. When no climate, rainfall, or soil data is entered into the Calculator, the default values will be used. Climate data was originally sourced from CliFlo, the NIWA's original National Climate Database.

Storage			
			Uncovered
Weather station	Annual rainfall (mm)	Soil PAW (mm)	multiplier
Northland (Whangarei)	1,339	100	1.33
Auckland - Kumeu	1,217	100	1.51
Auckland - Pukekohe	1,324	100	1.84
Hamilton	1,139	100	1.43
Palmerston North	970	100	1.40
Levin	1,163	100	1.51
Gisborne	1,000	200	1.31
Hastings (Bridge Pa)	731	100	1.09
Nelson (Brightwater)	1,086	100	1.58
Christchurch (Lincoln)	611	100	1.15
Dunedin (Airport)	663	100	1.16
Default	1,339	50	1.8

Appendix D: Council rules review

This Appendix will be moved to a separate reference document after consultation.

D.1 Northland

Plan	Regional Plan for Northland Proposed Regional Plan for Northland February 2024
Rule #	C.6.3.2
Status	**Permitted**
Activity	Horticulture wastewater discharges to land – permitted activity
Definitions	**Horticulture wastewater** - Wastewater from vegetable washing and greenhouses which may include sediment and residues from the activity but does not include animal effluent or animal products. Other relevant definitions – refer to the plan: Intermittently flowing river, artificial watercourse, natural wetland, bore
Activity standards	The discharge of horticulture wastewater onto or into land is a permitted activity, provided: 1) there is no discharge onto or into land within: a) 20 metres of a stream, continually or intermittently flowing river, artificial watercourse, lake, natural wetland, or the coastal marine area, or b) 20 metres of a neighbouring property owned or occupied by another person, or c) 50 metres of any dwelling owned or occupied by another person, or d) 20 metres of the head of any drinking water supply bore, and 2) the discharge does not result in ponding on the land for longer than three hours, and 3) the discharge of vegetable washwater is undertaken in accordance with *Section 2 of Horticulture New Zealand's Vegetable Washwater Discharge Code of Practice 2017*, and 4) the discharge of greenhouse nutrient solution is undertaken in accordance with the *Code of Practice for the Management of Greenhouse Nutrient Discharges 2007*, and 5) upon written request by the Regional Council, the person doing the activity keeps a written record of the following information and provides it to the Regional Council's Compliance Manager in the form and frequency specified in the request: a) dates and time of the discharge, and b) land application area, and c) application rates. For the avoidance of doubt this rule covers the following RMA activities: • Discharge of horticulture wastewater onto or into land (s15(1) and s15(2A)).
Activity status if permitted conditions not met	C.6.3.6 Wastewater discharges to land – discretionary activity The discharge, onto or into land, of *farm wastewater*, *horticulture wastewater*, contaminants associated with the making or storage of silage, contaminants associated with the disposal of dead stock or offal, or milk, and any associated discharge of odour to air, that are not permitted, restricted discretionary, noncomplying activity, or prohibited activities in C.6.3 Production land charges of this Plan, are discretionary activities. For the avoidance of doubt this rule covers the following RMA activities: • Discharge of *farm wastewater, horticulture wastewater*, contaminants associated with the making or storage of silage, contaminants associated with the disposal of dead stock or offal, or milk onto or into land where it may enter water (s15(1)). • Discharge of *farm wastewater, horticulture wastewater*, contaminants associated with the making or storage of silage, contaminants associated with the disposal of dead stock or offal, or milk onto or into land, and any associated discharge of odour to air (s15(2A)).

D.2 Auckland

The Auckland Unitary Plan has two specific rules for greenhouse nutrient solution linked to the size of the greenhouse – up to 1 hectare or greater than 1 hectare.

Table E35.4.1 Activity table

Activity		Activity status
(A10)	The discharge of greenhouse nutrient solution onto or into land where the total floor area of the greenhouse is up to 1 hectare and that complies with Standard E35.6.1.1 and Standard E35.6.1.6	Permitted
(A11)	The discharge of greenhouse nutrient solution onto or into land where the total floor area of the greenhouse is greater than 1 hectare and that complies with Standard E35.6.2.1	Controlled

Total greenhouse floor area ≤ 1 ha

Plan	Auckland Unitary Plan Unitary Plan – E35 Rural production discharges
Rule #	E35.4.1 (A10) and permitted activity standards E35.6.1.1. (General) and E35.6.1.6 (Greenhouse nutrient solution)
Status	**Permitted**
Activity	Discharge of greenhouse nutrient solution onto or into land where the total floor area of the greenhouse is up to 1 hectare
Definitions	Greenhouse nutrient solution: The liquid that provides plants in a soil-less growing system with water and nutrients. Other definitions (refer to plan): Greenhouse, intermittent streams, artificial watercourses, surface water
Activity standards	All permitted activities in Table E35.4.1 Activity table must comply with the following general and activity specific standards. **E35.6.1.1. General standards for all permitted activities** (1) There must be no direct discharge or runoff to surface water, intermittent streams or artificial watercourses that connect to surface water. (2) Discharges must not result in surface ponding of more than three hours in duration. (3) The application rate of nitrogen from any combination of dairy effluent (excluding urine from grazing animals), nitrogenous fertiliser and other nitrogen discharges from the other rural production activities must not: a) exceed 150 kg nitrogen/hectare/year and 30 kg nitrogen/hectare/31 days onto grazed pasture underlain by sandy and volcanic soils; or b) exceed 200 kg nitrogen/hectare/year and 50 kg nitrogen/hectare/31 days onto grazed pasture underlain by soils other than those listed above; or c) exceed the reasonable nitrogen requirements of the crop being grown on ground other than grazed pasture. **E35.6.1.6. Discharge of greenhouse nutrient solution onto or into land where the total floor area of the greenhouse is up to 1 hectare** (1) The discharge of greenhouse nutrient solution must be in accordance with the A Code of Practice for The Management of Greenhouse Nutrient Discharges (June 2007).
Activity status if permitted conditions not met	E35.4.1 (A14) Rural production discharges that do not meet the permitted activity standards or controlled activity standards – Discretionary

Total greenhouse floor area > 1 ha

Plan	Auckland Unitary Plan Unitary Plan – E35 Rural production discharges
Rule #	E35.4.1 (A11) and controlled activity standards E35.6.2.1
Status	**Controlled**
Activity	The discharge of greenhouse nutrient solution onto or into land where the total floor area of the greenhouse is greater than 1 hectare and that complies with Standard E35.6.2.1
Definitions	Greenhouse nutrient solution: The liquid that provides plants in a soil-less growing system with water and nutrients. Other definitions (Refer to plan): Greenhouse, intermittent streams, artificial watercourses, surface water, natural stream management area
Activity standards	All activities listed as a controlled activity in Table E35.4.1 Activity table must comply with the following controlled activity standards. **E35.6.2.1. The discharge of greenhouse nutrient solution onto or into land where the total floor area of the greenhouse is greater than 1 hectare and that complies with Standard E35.6.2.1.** (1) The nutrient solution must be discharged to a defined disposal area. (2) The discharge system must incorporate secure storage. **E35.7. Assessment – controlled activities** **E35.7.1. Matters of control** The Council will reserve its control to all of the following matters when assessing a controlled activity resource consent application: (1) for the discharge of greenhouse nutrient solution onto or into land where the total floor area of the greenhouse is greater than 1 hectare and that complies with Standard E35.6.2.1: a) the effects on the environment as a result of all of the following: i. the disposal area; ii. the collection treatment and disposal equipment; iii. the storage system; and iv. monitoring requirements. **E35.7.2. Assessment criteria** The Council will consider the relevant assessment criteria for controlled activities from the list below: (1) for the discharge of greenhouse nutrient solution onto or into land where the total floor area of the greenhouse is greater than 1 hectare and that complies with Standard E35.6.2.1: a) whether the disposal area is suitable, including consideration of adjacent water bodies and land uses; b) whether the equipment for the collection, treatment and disposal of any discharge is adequate; and c) whether the capacity and security of the storage is suitable taking into account all of the following: i. the design and construction methods and materials used; ii. the potential for adverse effects on any adjacent natural resource overlay areas including the Wetland Management Areas Overlay, the Water Supply Management Areas Overlay, the Natural Stream Management Areas Overlay, the High-use Stream Management Areas Overlay, the Natural Lake Management Areas Overlay and the Quality-sensitive Aquifer Management Areas Overlay ; and iii. the measures to avoid, remedy or mitigate more than minor adverse effects on surface and groundwater water bodies.
Activity status if controlled conditions not met	E35.4.1 (A14) Rural production discharges that do not meet the permitted activity standards or controlled activity standards – Discretionary

D.3 Waikato

The Waikato Regional Plan provides for the application of fertiliser in a rule that includes application of nutrient solution (refer to the definition of fertiliser) subject to conditions. If the conditions cannot be met then the general discretionary rule applies.

Section 3.10 of the Waikato Regional Plan sets out specific provisions for the Land Taupo catchment. Growers in this catchment should refer to the specific provisions in the Plan.

Note that the plan may change when the provisions in PC1 (currently with the Environment Court) are settled and the relevant provisions may change.

Plan	Waikato Regional Plan Waikato Regional Plan – 3 Water module
Rule #	3.9.4.11 Permitted Activity Rule – Fertiliser Application
Status	**Permitted**
Definition of fertiliser	Any substance or mix of substances, that is not a biosolid or liquid or sludge derived from an activated wastewater treatment process and which is described as, or held to be for, or suitable for, sustaining or increasing the growth, productivity or quality of plants (or animals indirectly) through the application to plants and soils of the following nutrients: nitrogen, phosphorus, potassium, sulphur, magnesium, calcium, chloride, sodium, as "major nutrients" or manganese, iron, zinc, copper, boron, cobalt, molybdenum, iodine, selenium as "minor nutrients"; non-nutrient attributes of the materials used in the fertiliser and fertiliser additives.
Activity	The discharge of fertiliser into air and onto or into land outside the Lake Taupo Catchment is a **permitted activity** subject to the following conditions
Activity standards	a. The discharge shall not result in any objectionable odour or particulate matter beyond the subject property boundary. b. The discharge does not result in any avoidable direct application of fertiliser to any water body. c. Where the fertiliser is being used in other than domestic gardening situations the fertiliser must be applied in accordance with the NZ Fertiliser Manufacturers Research Association, 1998 (updated 2002): Code of Practice for Fertiliser Use. d. A nutrient management plan of the type specified in Table 3-10 must be used to plan fertiliser application where nitrogen fertiliser is being applied at rates greater than 60 kg/N/ha/year. e. The contents of the nutrient management plan required by condition d) must be made available to the Waikato Regional Council upon request. f. A nutrient management plan shall be provided to Waikato Regional Council on request in accordance with condition d) where fertiliser is to be applied to an area of land that has also had farm animal effluent applied to it within the preceding 12 months. NOTE: Refer to the regional plan Table 3-10 for the nutrient management plan
Activity status if permitted conditions not met	3.5.4.5 Discretionary Activity Rule – Discharges – General Rule Any discharge of a contaminant into water, or onto or into land, in circumstances which may result in that contaminant (or any other contaminant emanating as a result of natural processes from that contaminant) entering water, that is not specifically provided for by any rule, or does not meet the conditions of a permitted or a controlled activity rule in this Plan, is a discretionary activity (requiring resource consent). Information requirements to enable the assessment of any application under this Rule are set out in Section 8.1.2.2 of this Plan. In addition, assessment shall also take into account the matters identified in the policies in Section 3.5.3 of this Plan.

D.4 Bay of Plenty

The Bay of Plenty Regional Plan provides for the application of fertiliser in a rule that includes application of nutrient solution (refer to the definition of fertiliser) subject to standards/ conditions. If the conditions cannot be met then the general discretionary rule applies.

Note: Refer to the note below the table regarding Lake Rotorua catchment where other rules will apply.

Plan	Bay of Plenty Regional Plan https://atlas.boprc.govt.nz/api/v1/edms/document/A4378103/content
Rule #	DW R11 (Rule 20) Permitted – Application of Fertiliser to Land
Status	**Permitted**
Definition of fertiliser	Any substance which is described as or held out to be for, or suitable for sustaining or increasing the growth, productivity or quality of plants or animals through the application of the following essential nutrients to plants or soils: nitrogen, phosphorus, potassium, sulphur, magnesium, calcium, chloride, sodium, as major nutrients or manganese, iron, zinc, copper, boron, cobalt, molybdenum, selenium, as minor nutrients or additives, and any other product which is considered to meet identified soil or plant nutrient deficiencies and is applied with this as the principle objective. Products discharged or applied as part of a waste treatment process require resource consents and are not covered by this code. This definition is from The Code of Practices For Fertiliser Use 1998.
Activity	The discharge of fertiliser to land where the contaminant or its by-products may enter water, where the fertiliser is applied using ground-based operations, is a permitted activity subject to the following conditions
Activity standards	a) There shall be no direct discharge of fertiliser to groundwater, streams, rivers, lakes or wetlands. b) All practicable measures shall be taken to avoid the runoff of fertiliser to streams, rivers, lakes or wetlands. c) The fertiliser shall be applied at an appropriate time, rate and volume that avoids leaching of nutrients to groundwater. d) Fertiliser must be stored and used in a manner that complies with (a) to (c) above. e) Where the discharge of fertiliser is within 10 metres of a lake, river, stream or wetland, all reasonable steps shall be taken to apply the fertiliser accurately, and confine the fertiliser to the application site. This activity is also subject to the requirements of the rules in the Rotorua Lakes section.
Activity status if permitted conditions not met	DW R8 (Rule 37) Discretionary - Discharges to Water or Land Any: 1) Discharge of a contaminant to water. 2) Discharge of water to water. 3) Discharge of a contaminant onto or into land in circumstances which may result in the contaminant (or any other contaminant emanating as a result of natural processes from that contaminant) entering water. 4) Discharge of a contaminant from any industrial or trade premises onto or into land. That is not: a) Permitted by a rule in this regional plan. b) Permitted by a rule in any other Bay of Plenty regional plan. c) Prohibited by a rule in this regional plan. d) Restricted discretionary status by a rule in this regional plan. e) Controlled status by a rule in this regional plan. There are no activity standards for the discretionary rule but the plan lists a range of objectives, policies and methods that will be considered when assessing resource consent applications under Rule DW R8. The provisions cover a range of matters and the assessment will be against those relevant to the nature of the discharge.

This activity is also subject to the requirements of the rules in the RL Rotorua Lakes section of this regional plan. The activity will also be subject to the LR Lake Rotorua Nutrient Management rules if the discharge activity is within the Lake Rotorua groundwater catchment (see Map LR 1). All discharges to surface water that are discretionary under

this rule will be assessed against the Water Quality Classification of the receiving water body (refer to Schedule 9 and the Water Classification map).
Resource consent applicants who seek to exceed the relevant Water Quality Classification standards must provide evidence in their application to demonstrate how the adverse effects of the proposed activity will be avoided, remedied or mitigated to be consistent with IM O3.

D.5 Gisborne

The Tairawhiti Resource Management Plan has a specific rule for discharge of greenhouse nutrient solution.

Plan	Tairawhiti Resource Management Plan Tairāwhiti Resource Management Plan – Part C (C5-C8)
Rule #	6.2.9 (6)
Status	**Permitted**
Activity	Diffuse discharges from the discharge of greenhouse nutrient solution to land.
Activity standards	a) The discharge is in accordance with the Code of Practice for Management of Greenhouse Nutrient Discharges (2007); and b) The application rate of nitrogen does not exceed: i. 150 kg N/year and 30 kg N/ha/31 days onto grazed pasture underlain by sandy and pumice soils; ii. 200 kg N/year and 50 kg N/31 day onto grazed pasture underlain by soils other than those listed above; iii. Exceed the reasonable nitrogen requirements of the crop or vegetation being grown on ground other than grazed pasture. c) The application rate of phosphate does not exceed 100 kg P/ha/31 days.
Activity status if permitted conditions not met	6.2.9(8) – Discretionary Diffuse discharges that do not meet the permitted activity standards for the rules in section C6.2 or is not provided for by another rule in this Plan. There are no activity standards for Rule 6.2.9 (8) but policy 6.2.8 is relevant for assessment and may require a Farm Environment Plan.

D.6 Hawke's Bay

The Hawkes Bay Regional Plan has a definition of fertiliser that would include nutrient solution as a fertiliser and a permitted activity rule for its application and usage.

If resource consent is required, there are specific provisions for Tukituki, Tūtaekurī, Ahuriri, Ngaruroro and Karamū catchments which would need to be considered. (Refer to the plan for details)

Plan	Hawkes Bay Regional Resource Management Plan Hawke's Bay Regional Resource Management Plan – Chapter 6
Rule #	6.4.2 Rule 11 Fertiliser use
Status	**Permitted**
Definition of fertiliser	Any substance which is described as or held out to be suitable for sustaining or increasing growth, productivity or quality of plants or animals through the application of the following essential nutrients to plants or soil, whether in solid or fluid form: • nitrogen, phosphorous, potassium, sulphur, magnesium, calcium, chlorine, sodium as major nutrients, or • manganese, iron, copper, boron, cobalt, molybdenum, selenium as minor nutrients or additives and any other product which is considered to meet identified soil or plant nutrient deficiencies and is applied with this principal objective.
Activity	The discharge of contaminants into air, or into or onto land, arising from the storage, transfer or use of fertiliser

Activity standards	a. The discharge shall not cause any effects which are noxious, offensive or objectionable. Note: The HBRC will accept, as one means of compliance with condition (a), any discharge of fertiliser undertaken in accordance with the Code of Practice for Fertiliser Use (New Zealand Fertiliser Manufacturers' Research Association, 1998). NOTE Rule 11 does not encompass the use of biosolids, soil conditioners or animal effluent.
Activity status if permitted conditions not met	Rule 52 Discharges that do not comply with rules 9-14, 16, 31-51 – Discretionary Activity The discharge of: • contaminants onto or into land, or into water, or • water into water which does not comply with any condition on a permitted activity rule, or any standard or term on a controlled activity rule within this Plan, but which is not expressly classified as a discretionary, noncomplying or prohibited activity. Refer POL 14, 16, 17, 19, 22, 47, 48, 49, 71, 79 for matters to be assessed.

D.7 Taranaki

There is no specific rule for discharge of nutrient solution in the Taranaki Freshwater Plan.

The fertiliser rules requires that a fertiliser is approved under the Fertiliser Act or the ACVM Act. It is unlikely that nutrient solution would not meet this definition so the fertiliser rule is not applicable.

Rule 30 provides for discharge of 'on-farm waste material'. There is no definition for on-farm waste material but the rule provides for discharges that occur onto or into production land, which includes horticultural land so is the most appropriate rule in the Taranaki Plan.

Plan	Regional Freshwater Plan for Taranaki TRC – Discharges of contaminants to land and water (excluding discharges to water in the Hangatahua (Stony) River catchment)
Rule #	30
Status	**Permitted**
Activity	Discharge of offal, farm rubbish, leachate from silage pits and feedlots and other on-farm waste material into or onto land excluding those materials covered by Rules 22 and 35-39
Activity standards	• Discharge occurs onto or into production land; • Only waste generated on the subject property shall be discharged; • Discharge shall not occur within 50 m of any bore, well or spring used for water supply purposes; • Discharge shall not occur within 25 m of any surface water body; • Discharge shall not lead or be liable to lead to any contaminants entering surface water; (other standards relating to agrichemical solution and offal pits excluded).
Activity status if permitted conditions not met	**Discretionary** – Rule 44 Rule 44 includes discharges of contaminants to land which are provided for in Rules 21-42 but which does not meet the standards, terms or conditions of those rule. The rule lists relevant policies that will be considered in an assessment under the rule.

D.8 Manawatu – Whanganui - Horizons

The relevant rules for covered cropping and management of nutrient solution in the Horizons One Plan are determined by the crop, the size of the operation and whether it is an existing or a new operation.

The One Plan defines commercial vegetable growing as: using an area of land greater than 4 ha for producing vegetable crops for human consumption. It includes the whole rotational cycle, being the period of time that is required for the full sequence of crops, including any pasture phase in the rotation. Fruit crops, vegetables that are perennial, dry field peas or beans are not included.

Commercial vegetable growing is classed as a 'intensive farming land use' activity and specific rules apply where the activity is over 4ha and will vary depending on whether it is an existing or a new activity. The application of drain nutrient solution to land will be considered as part of the resource consent process.

Any operation growing vegetables in soilless media over 4ha will be classed as a commercial vegetable growing operation and require resource consent as a controlled activity under LF-LW-R14 Existing intensive farming land use activities or LF-LW-R15 New intensive land use activities. If the conditions of the rules are not met then existing operations will require a restricted discretionary consent under Rule LF-LW-R17 and for new operations a restricted discretionary consent under Rule LF-LW-R18. Note that the rules are designed for a range of farming land use activities so there are conditions that will not be relevant to vegetable growing operations.

For an operation growing vegetables under 4ha the permitted activity fertiliser rule LF-LW-R9 would apply to the application of nutrient solution to land. If conditions cannot be met then a discretionary activity consent under Rule LF-LW-R38 will be required.

For operations growing fruit, regardless of size, the permitted activity fertiliser rule LF-LW-R9 would apply to the application of nutrient solution to land. If conditions cannot be met then a discretionary activity consent under Rule LF-LW-R38 would be required.

The One Plan has permitted, controlled and restricted discretionary activity rules for a range of agricultural discharges (LF-LW-R9 – LF-LW-R19) but lists specific discharges which do not include nutrient solution. Therefore the discharge of nutrient solution is not specifically provided for and the rules relating to commercial vegetable growing or fertiliser will apply.

The tables below set out the relevant provisions dependent on the size of the operation:

- Existing vegetable growing operations over 4ha
- New vegetable growing operations over 4ha
- Vegetable growing operations 4ha or less and fruit operations (any size).

NOTE: PC2 which is currently before the Environment Court includes provisions for commercial vegetable growing – as defined below. It is unclear whether greenhouse growing and discharge of nutrient solution will be covered by new provisions in PC2.

Existing vegetable growing operations (including covered and hydroponics) over 4ha

Plan	Horizons One Plan for Manawatu – Whanganui Region One Plan Chapter 14: Discharges to Land and Water
Rule #	LF-LW-R14 Existing intensive farming land use activities
Status	Controlled
Definition of commercial vegetable growing	Means using an area of land greater than 4 ha for producing vegetable crops for human consumption. It includes the whole rotational cycle, being the period of time that is required for the full sequence of crops, including any pasture phase in the rotation. Fruit crops, vegetables that are perennial, dry field peas or beans are not included.
Activity	The use of land pursuant to s9(2) RMA for any of the following types of intensive farming: 1. dairy farming 2. commercial vegetable growing 3. cropping 4. intensive sheep and beef farming that was existing in the Water Management Sub-areas listed in and from the dates specified in Table 11 and any of the following discharge pursuant to ss15(1) or 15(2A) RMA associated with that intensive farming: 1. the discharge of fertiliser onto or into land 2. the discharge of contaminants onto or into land from a. the preparation, storage, use or transportation of stock feed on production land b. the use of a feedpad 3. the discharge of grade Aa biosolids or compost onto or into production land 4. the discharge of poultry farm litter onto or into production land 5. the discharge of farm animal effluent onto or into production land (or upon expiry or surrender of any existing consent for that discharge) including: a. effluent from dairy sheds and feedpads b. effluent received from piggeries c. sludge from farm effluent ponds d. poultry farm effluent and, as an ancillary activity, any discharge of contaminants into air pursuant to ss15(1) or 15(2A) RMA. Where the existing intensive farming land use is located partly on land within one or more of the water management sub-areas listed in Table 11 and partly on other land, this rule only applies: 1. if at least 20% of the existing intensive farming land use is located on land within the listed water management sub-areas; and 2. to the portion of the existing intensive farming land use that is located within the listed water management sub-areas.
Conditions	1. A nutrient management plan must be prepared for the land, and provided annually to the Regional Council. 2. The activity must be undertaken in accordance with the nutrient management plan prepared under (1). 3. The nutrient management plan prepared under (1) must demonstrate that the nitrogen leaching loss from the activity will not exceed the cumulative nitrogen leaching maximum specified in Table 12. 4. Cattle must be excluded from: a. Wetlands and lakes that are a rare habitat or threatened habitat, and b. the beds of rivers that are permanently flowing or have an active bed width greater than 1 m. 5. Rivers that are permanently flowing or have an active bed width greater than 1 m, that are crossed by cattle must be bridged or culverted, and the cattle must cross via that bridge or culvert, and run-off originating from the carriageway of the bridge or culvert must be discharged onto or into land. 6. The discharge of fertiliser onto or into land and, as an ancillary activity, any discharge of contaminants into air must comply with the conditions of RP-LF-W-R9 (Refer to rule below) 7. The discharge of contaminants onto or into land from: a. the preparation, storage, use or transportation of stock feed on production land, or b. the use of a feedpad and, as an

	ancillary activity, any discharge of contaminants into air must comply with the conditions of RP-LF-LW-R10. 8. The discharge of grade Aa biosolids or compost onto or into production land and any ancillary discharge of contaminants into air must comply with the conditions of RP-LF-LW-R11. 9. The discharge of poultry farm litter onto or into production land and any ancillary discharge of contaminants into air must comply with the conditions of RP-LF-LW-R12. 10. The discharge of farm animal effluent onto or into production land including: a. effluent from dairy sheds and feedpads b. effluent received from piggeries c. sludge from farm effluent ponds d. poultry farm effluent and, as an ancillary activity, any discharge of contaminants into air must comply with the conditions, standards and terms of RP-LF-LW-R16
Matters of control	Control is reserved over: 1. the implementation of the nutrient management plan 2. compliance with the cumulative nitrogen leaching maximum specified in Table 12 3. the matters of control in RP-LF-LW-R19 4. avoiding, remedying or mitigating the effects of odour, dust, fertiliser drift, or effluent drift 5. provision of information including the nutrient management plan 6. duration of consent 7. review of consent conditions 8. compliance monitoring 9. the matters in RP-LF-LW-P12. Resource consent applications under this rule will not be notified and written approval of affected persons will not be required (notice of applications need not be served on affected persons).
Activity status if controlled activity conditions not met	LF-LW-R17 Existing intensive farming land use activities not complying with LF-LW-R14 Restricted discretionary activity (Refer to plan for details
Other defined terms or parts of plan- refer to the plan	Nutrient management plan Fertiliser Table 12 Cumulative nitrogen leaching maximum by Land use capability class

New vegetable growing operations (including covered and hydroponics) over 4ha

Plan	Horizons One Plan for Manawatu – Whanganui Region One Plan Chapter 14: Discharges to Land and Water
Rule #	LF-LW-R14 Existing intensive farming land use activities
Status	Controlled
Definition of commercial vegetable growing	Means using an area of land greater than 4 ha for producing vegetable crops for human consumption. It includes the whole rotational cycle, being the period of time that is required for the full sequence of crops, including any pasture phase in the rotation. Fruit crops, vegetables that are perennial, dry field peas or beans are not included.
Activity	The use of land pursuant to s9(2) RMA for any of the following types of intensive farming: 1. dairy farming 2. commercial vegetable growing 3. cropping 4. intensive sheep and beef farming that occurs from the date this rule has legal effect anywhere within the Region and any of the following discharges pursuant to ss15(1) or 15(2A) RMA associated with that intensive farming: 1. the discharge of fertiliser onto or into land 2. the discharge of contaminants onto or into land from a. the preparation, storage, use or transportation of stock feed on production land b. the use of a feedpad 3. the discharge of grade Aa biosolids or compost onto or into production land 4. the discharge of poultry farm litter onto or into production land 5. the discharge of farm animal effluent onto or into production land including: a. effluent from dairy sheds and feedpads b. effluent received from piggeries c. sludge from farm effluent ponds d. poultry farm effluent and, as an ancillary activity, any discharge of contaminants into air pursuant to ss15(1) or 15(2A) RMA.
Conditions	1. A nutrient management plan must be prepared for the land, and provided annually to the Regional Council. 2. The activity must be undertaken in accordance with the nutrient management plan prepared under (1). 3. The nutrient management plan prepared under (1) must demonstrate that the nitrogen leaching loss from the activity will not exceed the cumulative nitrogen leaching maximum specified in Table 12. 4. Cattle must be excluded from: a. Wetlands and lakes that are a rare habitat or threatened habitat, and b. the beds of rivers that are permanently flowing or have an active bed width greater than 1 m. 5. Rivers that are permanently flowing or have an active bed width greater than 1 m, that are crossed by cattle must be bridged or culverted, and the cattle must cross via that bridge or culvert, and run-off originating from the carriageway of the bridge or culvert must be discharged onto or into land. 6. The discharge of fertiliser onto or into land and, as an ancillary activity, any discharge of contaminants into air must comply with the conditions of RP-LF-W-R9 (Refer to rule in table below) 7. The discharge of contaminants onto or into land from: a. the preparation, storage, use or transportation of stock feed on production land, or b. the use of a feedpad and, as an ancillary activity, any discharge of contaminants into air must comply with the conditions of RP-LF-LW-R10. 8. The discharge of grade Aa biosolids or compost onto or into production land and any ancillary discharge of contaminants into air must comply with the conditions of RP-LF-LW-R11. 9. The discharge of poultry farm litter onto or into production land and any ancillary discharge of contaminants into air must comply with the conditions of RP-LF-LW-R12. 10. The discharge of farm animal effluent onto or into production land including:

	a. effluent from dairy sheds and feedpads b. effluent received from piggeries c. sludge from farm effluent ponds d. poultry farm effluent and, as an ancillary activity, any discharge of contaminants into air must comply with the conditions, standards and terms of RP-LF-LW-R16
Matters of control	Control is reserved over: 1. the implementation of the nutrient management plan 2. compliance with the cumulative nitrogen leaching maximum specified in Table 12 3. the matters of control in RP-LF-LW-R19 4. avoiding, remedying or mitigating the effects of odour, dust, fertiliser drift, or effluent drift 5. provision of information including the nutrient management plan 6. duration of consent 7. review of consent conditions 8. compliance monitoring 9. the matters in RP-LF-LW-P12. Resource consent applications under this rule will not be notified and written approval of affected persons will not be required (notice of applications need not be served on affected persons).
Activity status if controlled activity conditions not met	LF-LW-R18 New intensive farming land use activities not complying with LF-LW-R15 Restricted discretionary activity (Refer to plan for details)
Other defined terms or parts of plan- refer to the plan	Nutrient management plan Fertiliser Table 12 Cumulative nitrogen leaching maximum by Land use capability class

Vegetable growing operations 4ha or less (existing or new) and all fruit growing operations

Plan	Horizons One Plan for Manawatu – Whanganui Region One Plan Chapter 14: Discharges to Land and Water
Rule #	LF-LW-R9 Fertiliser use
Status	Permitted
Definition of fertiliser	Fertiliser means any substance or mix of substances that is described as or held to be suitable for sustaining or increasing the growth, productivity or quality of plants (or animals indirectly) through the application to plants and soils of: (a) the following major nutrients: nitrogen, phosphorus, potassium, sulphur, magnesium, calcium, chloride and sodium (b) the following minor nutrients: manganese, iron, zinc, copper, boron, cobalt, molybdenum, iodine and selenium (c) non-nutrient attributes of the materials used in fertiliser (d) fertiliser additives but does not include biosolids or dead animal matter.
Activity	The discharge of fertiliser onto or into land pursuant to ss15(1) or 15(2A) RMA and, as an ancillary activity, any discharge of contaminants into air pursuant to ss15(1) or 15(2A) RMA, except where the discharge is undertaken in association with a use of land controlled by RP-LF-LW-R14, RP-LF-LW-R15, RPLF-LW-R17 and RP-LF-LW-R18.
Activity standards	1. There must be no direct discharge of fertiliser, into any surface waterbody or its bed or artificial watercourse other than as provided for under 2. 2. All reasonable measures must be taken to prevent: a. any discharge of fertiliser, within the bed of a river that is permanently flowing or has an active bed width greater than 2 m, or any lake or wetland that has an area of 1 ha or more b. any discharge into any rare habitat, threatened habitat or at-risk habitat, except for the purpose of enhancing such habitats. Under condition (2) "reasonable measures" includes the use of GPS technology. 3. For production land the fertiliser, must be discharged in accordance with the Code of Practice for Nutrient Management (New Zealand Fertiliser Manufacturers' Research Association, 2007). 4. Where nitrogen fertiliser is discharged onto land in excess of 60 kgN/ha/year averaged across the whole farm area or in excess of an average rate of 150 kgN/ha/year on any application area a nutrient budget undertaken using the OVERSEER® model, which takes into account all other sources of nitrogen, and covers and identifies the whole farm area including details of individual blocks and which is designed to minimise nitrogen leaching rates, must be used to plan and carry out the fertiliser discharge and be made available to the Regional Council upon request. If a nutrient management plan is required under RP-LF-LW-R14, RP-LF-LWR15, RP-LF-LW-R17 and RP-LF-LW-R18, then the nutrient budget required by this condition^ must be consistent with it and the activity must be carried out in accordance with it. 5. The discharge must not result in any offensive or objectionable odour or fertiliser drift beyond the property boundary.
Activity status if permitted conditions not met	LF-LW-R38 Discharges of water or contaminants to land or water not covered by other rules in this Plan or chapter The discharge of water or contaminants into surface water pursuant to s15(1)(a) RMA or discharge of contaminants onto or into land pursuant to ss15(1)(b), 15(1)(d) or 15(2A) RMA which are not regulated by other rules in this Plan, or which do not comply with the permitted activity, controlled activity or restricted discretionary activity rules in this chapter.
Assessment matters	Policy LF-LW-P5 sets out consent decision making for discharges to land and lists the matters the council must have regard to. Policy LF-LW-P6 Industry based standards provides for the use of industry based standards, including guidelines and codes of practice which represent best practice, and may accept compliance with those standards as being adequate to avoid remedy or mitigate adverse effects in relation to matters set out in LF-LW-P5. NOTE: This policy would provide for the Nutrient Solution COP could be used as part of a resource consent application.

D.9 Greater Wellington

Greater Wellington has a definition of fertiliser that would include nutrient solution as a fertiliser so the fertiliser rule R72 will apply.

There are rules for specific areas – called Whaitua – Ruamahanga, Wellington Harbour and Hutt Valley, Te Awarua-o-Porirua, Kapiti, and Wairarapa Coast. Refer to the plan for specific Whaitua provisions, which are in addition to Rule 72.

Plan	Natural Resources Plan for the Wellington Region GW – Natural Resource Plan Operative Version 2023
Rule #	5.2.9 Rule R72 Fertiliser
Status	**Permitted**
Definition of fertiliser	(a) A substance or biological compound, or mix of substances or biological compounds that is described as, or held out to be for, or suitable for, sustaining or increasing the growth, productivity, or quality of plants or, indirectly animals through the application to plants or soil of (i) Nitrogen, phosphorus, potassium, sulphur, magnesium, calcium, chlorine, and sodium as major nutrients, or (ii) Manganese, iron, zinc, copper, boron, cobalt, molybdenum, iodine, and selenium as minor nutrients, and (iii) Fertiliser additives, and (b) Includes non-nutrient attributes of the materials used in fertiliser, but (c) does not include; substances that are plant growth regulators that modify the physiological functions of plants, animal effluent, biosolids, compost, or solid animal waste.
Activity	Rule R72: Discharge of fertiliser from ground-based or aerial discharge – permitted activity The discharge of fertiliser onto or into land where a contaminant may enter water, or into air is a permitted activity, provided the following conditions are met:
Activity standards	(a) the discharge from ground-based application is not directly onto or into a surface water body, and (b) all reasonably practicable steps must be taken to prevent the discharge by a commercial operator undertaking aerial application onto or into a river with an active bed, lake, natural wetland, water race or an estuary outside the coastal marine area, and (c) the discharge does not cause an offensive or objectionable effect beyond the boundary of the property, and (d) the discharge by a commercial operator is in accordance with the Fertiliser Quality Council's Code of Practice for the Placement of Fertiliser in New Zealand 2018, and (e) the discharge by a non-commercial operator using groundspreading equipment, is in accordance with the Fertiliser Association of New Zealand's Code of Practice for Nutrient Management (With Emphasis on Fertiliser Use) 2013.
Activity status if permitted conditions not met	Rule R94: All other discharges – discretionary activity The discharge of water or contaminants into water, or onto or into land where it may enter water, that is not: (a) in a site or habitat identified in Schedule A (outstanding water bodies), Schedule C (mana whenua), Schedule F1 (rivers/lakes), Schedule F3 (identified natural wetlands), Schedule F4 (coastal sites) or Schedule H1 (contact recreation), and (b) a permitted, controlled, restricted discretionary, or non-complying activity under any other rule in the Plan, or a discretionary activity under Rules R55, R56, R58, R65, R83 or R90, is a discretionary activity.

D.10 Tasman

The Tasman Resource Management Plan has a definition and rule for fertiliser that would enable nutrient solution to be applied to land as a fertiliser. As nutrient solution has nutrient value as a fertiliser it is not considered to be part of a waste treatment or disposal process.

Plan	Tasman Resource Management Plan https://eplan.tasman.govt.nz/eplan/rules/0/221/0/16071/0/30
Rule #	36.5.2.1 Discharge of Fertiliser
Status	Permitted Activities
Definition of fertiliser	means a substance which is described as or held out to be for sustaining or increasing the growth, productivity or quality of plants or animals through application of essential nutrients to plants or the soil, but it does not include materials discharged or applied as part of a waste treatment or disposal process.
Activity	The discharge of fertiliser into the air or onto land is a permitted activity that may be undertaken without a resource consent, if it complies with the following conditions:
Activity standards	a) The discharge must be undertaken in such a way that fertiliser drift does not move over any adjoining property that is any: i. property registered or certified by the New Zealand Biological Producers & Consumers Society Incorporated or the Biodynamic Farming and Garden Association as an organically farmed property, provided that this registration or certification was established before any discharge activity is commenced; or ii. dwelling or any area within 30 metres of a dwelling; or iii. fruit on any horticultural planting; provided that this does not apply where there is a mutual agreement to this effect between the person who discharges or causes the discharge of any fertiliser, and any occupier of the adjoining property.
Activity status if permitted conditions not met	36.5.2.2 Controlled Activities (Discharge of Fertiliser) The discharge of fertiliser to land or into the air that does not comply with the conditions of rule 36.5.2.1 is a controlled activity. A resource consent is required and may include conditions on the following matters over which the Council has reserved control: 1. Provision of fertiliser application programmes for or notification of potentially affected people. 2. Method of application. 3. Type of fertiliser applied. 4. Record-keeping. 5. Methods to avoid or mitigate movement of fertiliser onto adjoining properties. 6. Establishment of buffer zones. 7. The duration of the consent (Section 123 of the Act) and the timing of reviews of conditions and purpose of reviews (Section 128). 8. Bonds, and covenants in respect of the performance of conditions, and administrative charges (Section 108).

D.11 Nelson

The Nelson Resource Management Plan has a definition and rule for fertiliser that could include application of nutrient solution, except that the permitted activity rule condition requires that the fertiliser is registered in NZ under the ACVM Act. As nutrient solution would be unlikely to meet this requirement a grower could apply for a Restricted Discretionary Activity consent under the fertiliser rule or a discretionary consent under the General discharge to land rule (FWr.25). Nutrient solution is not listed as a permitted activity in FWr.25 so a discretionary consent would be required. Both options are set out below.

Plan	Nelson Resource Management Plan https://nelson.isoplan.co.nz/operative/rules/0/81/0/29435/0/149
Rule #	FWr.24.3 Fertiliser discharges to land and air where it may enter water
Status	Restricted discretionary
Definition of fertiliser	means any substance which is held out by its manufacturer, distributor, or vendor to be, or is in fact suitable for, sustaining or increasing the growth, productivity, or quality of plants by its application to those plants or the soil in which they grow or will grow; and includes a substance imported, manufactured, or being manufactured, with the intention that it be so held out.
Activity	Any discharge of fertiliser onto land that contravenes a permitted activity condition is a restricted discretionary activity
Matters of discretion	Discretion restricted to: a. type and volume of fertiliser, and b. nature and sensitivity of receiving environment, and c. cumulative effects of fertiliser use.
Assessment matters	FWr.24.4 a. type and volume of fertilizer. b. nature and sensitivity of receiving environment c. current levels of phosphate and nitrate in the receiving water body as recorded in the Council's water monitoring programme.

Plan	Nelson Resource Management Plan https://nelson.isoplan.co.nz/operative/rules/0/81/0/29435/0/149
Rule #	FWr.25.3 General discharges to land where it may enter water
Status	Discretionary
Activity	Any discharge that contravenes a permitted activity, and is not listed as a non-complying or prohibited activity is discretionary.
Assessment matters	FWr.25.4 a. location and area of discharge. b. risk of contamination of surface or groundwater. c. the degree to which any discharge of stormwater to Council stormwater infrastructure does not comply with the NCC Stormwater Bylaw 2006 or section 9.3 of the NCC Land Development Manual 2010. A site assessment will have to be supplied when an application is made for a discretionary activity to discharge stormwater into the Council's stormwater infrastructure. This assessment must include: i. detail of how and why the stormwater discharge contravenes the permitted conditions, and ii. a plan of the site layout that identifies all actual and potential sources of stormwater pollution, and iii. identification of best practicable options to ensure that actual and potential contamination of stormwater is minimised at source.

D.12 Marlborough

The Marlborough Environment Plan is a Unitary Plan and includes both regional and district rules. The Rural Environment Chapter has a definition for fertiliser that would include nutrient solution so the permitted activity fertiliser rule 3.1.25 and standards 3.3.25 would apply when applying nutrient solution to land.

Plan	Marlborough Environment Plan (MEP) Volume 2 Ch 3 Rural Environment Operative in Part
Rule #	3.1.25 Storage and application (involving a discharge) of fertiliser or lime into or onto land.
Status	**Permitted**
Definition of fertiliser	means any substance (whether in solid or liquid form) that is described as or held out to be for, or suitable for sustaining or increasing the growth, productivity or quality of plants or animals through the application of the following essential nutrients to plants or soils; nitrogen, phosphorus, potassium, sulphur, magnesium, calcium, chloride, sodium as major nutrients, or manganese, iron, zinc, copper, boron, cobalt, molybdenum, iodine, selenium as minor nutrients or fertiliser additives, and includes non-nutrient attributes of materials used in fertiliser, but does not include substances that are plant growth regulators that modify physiological functions of plants. For the purposes of the Plan, fertiliser excludes compost.
Activity	Storage and application (involving a discharge) of fertiliser or lime into or onto land. Activity standards 3.3.25 Storage and application (involving a discharge) of fertiliser or lime into or onto land.
Activity standards	3.3.25.1. The application of fertiliser must not be applied to a Soil Sensitive Area identified as free-draining soils. 3.3.25.2. Fertiliser must be stored on an impermeable, bunded surface and covered at all times, except when fertiliser is being applied. 3.3.25.3. Total cumulative nitrogen (N) loading on the areal extent of land used for the application must not exceed 200kg N/ha/year (excluding N from direct animal inputs). 3.3.25.4. The application must not occur when the soil moisture exceeds field capacity. 3.3.25.5. All reasonable care must be exercised with the application of fertiliser, including compliance with Sections 5.2 and 5.3 of the Fertiliser Association of New Zealand's Code of Practice for Nutrient Management 2013, to ensure that the fertiliser does not pass beyond the legal boundary of the area of land on which the fertiliser is being applied. 3.3.25.6. All reasonable care must be exercised with the application of lime so as to ensure that the lime does not pass beyond the legal boundary of the area of land on which the lime is being applied.
Activity status if permitted conditions not met	Restricted discretionary activity 3.5.3. The application of fertiliser (involving a discharge) into or onto land for arable land use or horticultural land use that does not comply with Standard 3.3.25.3 (exceeding a total cumulative nitrogen (N) loading of 200kg N/ha/year). Matters over which the Council has restricted its discretion: 3.5.3.1. The reasonable crop demand for N. 3.5.3.2. The total cumulative Nitrogen (N) loading on the area extent of land used for the application. 3.5.3.3. The effects on community drinking water supply, the freshwater values of Marlborough's tangata whenua iwi, (including mahinga kai), water quality and aquatic ecosystems. Discretionary activity 3.6.1. Any activity provided for as a Permitted Activity, Controlled Activity or Restricted Discretionary Activity that does not meet the applicable standards is a discretionary activity 3.6.12. Any discharge of contaminants into or onto land, or to air, not provided for as a Permitted Activity or limited as a Prohibited Activity.

D.13 Environment Canterbury

The Canterbury Regional Land and Water Plan has a complex suite of rules for farming activities that vary depending on nutrient allocation zone, sub-region, size and activity.

The Plan has specific rules for commercial vegetable growing (5.42CA - 5.42CC) but the definition excludes crops grown under cover:

Commercial vegetable growing activity is a sub-set of 'farming activity' and means the growing, for the purpose of commercial gain, of vegetable crops for human consumption, on one or more parcels of land held in single or multiple ownership (whether or not held in common ownership) that constitutes a single operating unit, and may include crop-rotation across different parcels of land over time, but excludes vegetable crops grown under cover.

Therefore the specific commercial vegetable growing rules do not apply to covered crops and the management of nutrient solution.

Vegetable crops grown under cover are included as a farming activity so the rules relating to farming activities in the various nutrient allocation zones will apply. The farming activity will include all aspects of the covered cropping operation including nutrient solution management through its life cycle. The relevant rules are determined by area and location.

Red Nutrient allocation Zone:

- Rule 5.43 Permitted if less than 10 ha -no conditions
- Rule 5.44 Permitted if over 10ha and meets conditions
- Rules 5.44A – 5.48 if permitted activity conditions not met– requiring resource consent

Orange Nutrient allocation Zone

- Rule 5.54A Permitted if less that 10ha – no conditions
- Rule 5.54 Permitted if over 10ha and meets conditions
- Rules 5.54A – 5.56A if permitted activity conditions not met – requiring resource consent

Green or light blue allocation Zone –

- Rule 5.57 Permitted if less than 10 ha- no conditions
- Rule 5.57A Permitted if greater than 10 ha and meets conditions
- Rules 5.57B- 5.59 if permitted activity conditions not met – requiring resource consent

Rule 5.63 provides for incidental nutrient discharge where the land use activity is authorised in Rules 5.43 -5.59 – which includes the rules listed above.

The Canterbury plan also has specific sub-region rules. Growers need to check the appropriate sub-region for any specific rules.

Red Nutrient allocation Zone

Plan	Canterbury Land and Water Regional Plan Canterbury Land and Water Regional Plan
Rules #	5.42 and 5.44
Status	**Permitted**
Activity 10 ha or less	Within the Red Nutrient Allocation Zone, the use of land for a farming activity on a property 10 hectares or less in area is a permitted activity.
Activity greater than 10ha	Within the Red Nutrient Allocation Zone, the use of land for a farming activity on a property greater than 10 hectares in area is a permitted activity provided the following conditions are met: 1. The property is registered in the Farm Portal by 1 July 2019 and information about the farming activity and the property is reviewed and updated by the property owner or their agent every 36 months thereafter, or whenever a material change in the land use associated with the farming activity occurs, or whenever any boundary of the property is changed; and 2. The area of the property authorised to be irrigated with water is less than 50 hectares; and 3. For any property where, as at 13 February 2016, the area of the property authorised to be irrigated with water is less than 50 hectares, any increase in the area of the property that is irrigated is limited to 10 hectares above that which was irrigated at 13 February 2016; and 4. The area of the property used for winter grazing is less than: (a) 10 hectares, for any property less than 100 hectares in area; or (b) 10% of the area of the property, for any property between 100 hectares and 1000 hectares in area; or (c) 100 hectares, for any property greater than 1000 hectares in area; and 5. A Management Plan has been prepared in accordance with Schedule 7A and is implemented within 12 months of the rule being made operative and supplied to the Canterbury Regional Council on request.
Default if permitted activity conditions not met	5.44A – controlled activity 5.45 – restricted discretionary 5.46 Discretionary – farming enterprise 5.47 – non-complying 5.48 Prohibited activity
Incidental discharge rule	5.63 The discharge of nutrients onto or into land in circumstances that may result in a contaminant entering water that would otherwise contravene s15(1) of the RMA is a permitted activity, provided the following conditions are met: 1. The land use activity associated with the discharge is authorised under Rules 5.41 to 5.42C or Rules 5.43 to 5.59; or 2. The land use activity associated with the discharge is authorised under rules in Section 3.3: Cumulative Effects of Land Use on Water Quality of the Hurunui-Waiau River Regional Plan.

Orange Nutrient Allocation Zone

Plan	Canterbury Land and Water Regional Plan Canterbury Land and Water Regional Plan
Rules #	5.53 and 5.54
Status	**Permitted**
Activity 10 ha or less	Within the Orange Nutrient Allocation Zone, the use of land for a farming activity on a property 10 hectares or less in area is a permitted activity.
Activity greater than 10ha	Within the Orange Nutrient Allocation Zone, the use of land for a farming activity on a property greater than 10 hectares in area is a permitted activity provided the following conditions are met: 1. The property is registered in the Farm Portal by 1 July 2019 and information about the

	farming activity and the property is reviewed and updated by the property owner or their agent every 36 months thereafter, or whenever a material change in the land use associated with the farming activity occurs, or whenever any boundary of the property is changed; and 2. The area of the property irrigated with water is less than 50 hectares; and 3. The area of the property used for winter grazing is less than: (a) 10 hectares, for any property less than 100 hectares in area; or (b) 10% of the area of the property, for any property between 100 hectares and 1000 hectares in area; or (c) 100 hectares, for any property greater than 1000 hectares in area; and 4. A Management Plan has been prepared in accordance with Schedule 7A and is implemented within 12 months of the rule being made operative and supplied to the Canterbury Regional Council on request.
Default if permitted activity conditions not met	Rule 5.54A - controlled activity Rule 5.55 – restricted discretionary activity Rule 5.56 – discretionary – farming enterprise Rule 5.56A – non-complying
Incidental discharge rule	5.63 The discharge of nutrients onto or into land in circumstances that may result in a contaminant entering water that would otherwise contravene s15(1) of the RMA is a permitted activity, provided the following conditions are met: 1. The land use activity associated with the discharge is authorised under Rules 5.41 to 5.42C or Rules 5.43 to 5.59; or 2. The land use activity associated with the discharge is authorised under rules in Section 3.3: Cumulative Effects of Land Use on Water Quality of the Hurunui-Waiau River Regional Plan.

Green or Light Blue Nutrient Allocation Zone

Plan	Canterbury Land and Water Regional Plan Canterbury Land and Water Regional Plan
Rules #	5.57 and 5.57A
Status	**Permitted**
Activity 10 ha or less	Within the Green or Light Blue Nutrient Allocation Zone, the use of land for a farming activity on a property 10 hectares or less in area is a permitted activity.
Activity greater than 10ha	5.57A Within the Green or Light Blue Nutrient Allocation Zone, the use of land for a farming activity on a property greater than 10 hectares in area is a permitted activity provided the following conditions are met: 1. The property is registered in the Farm Portal by 1 January 2020 and information about the farming activity and the property is reviewed and updated by the property owner or their agent every 36 months thereafter or whenever a material change in the land use associated with the farming activity occurs or whenever any boundary of the property is changed; and 2. The area of the property irrigated with water is less than 50 hectares; and 3. The area of the property used for winter grazing is less than: (a) 10 hectares, for any property less than 100 hectares in area; or (b) 10% of the area of the property, for any property between 100 hectares and 1000 hectares in area; or (c) 100 hectares, for any property greater than 1000 hectares in area; and 4. A Management Plan has been prepared in accordance with Schedule 7A and is implemented within 12 months of the rule being made operative and supplied to the Canterbury Regional Council on request.
Default if permitted	5.457B – controlled activity 5.58 – restricted discretionary

activity conditions not met	5.58BDiscretionary – farming enterprise 5.49 – non-complying
Incidental discharge rule	5.63 The discharge of nutrients onto or into land in circumstances that may result in a contaminant entering water that would otherwise contravene s15(1) of the RMA is a permitted activity, provided the following conditions are met: 1. The land use activity associated with the discharge is authorised under Rules 5.41 to 5.42C or Rules 5.43 to 5.59; or 2. The land use activity associated with the discharge is authorised under rules in Section 3.3: Cumulative Effects of Land Use on Water Quality of the Hurunui-Waiau River Regional Plan.

D.14 West Coast

The definition of fertiliser would enable nutrient solution to be applied as a fertiliser. The permitted activity rule will apply except there is a limitation of phosphorus in the Lake Brunner catchment.

Plan	West Coast Regional Land and Water Plan https://www.wcrc.govt.nz/publications/regional-plans/regional-land-and-water-plan
Rule #	Rule 74 Application of fertiliser
Status	**Permitted**
Definition of fertiliser	means any proprietary substance specifically manufactured for use in increasing the nutrient status of land**.**
Activity	Except where Rule 15 applies the discharge of fertiliser into or onto land is a permitted activity provided that all of the following conditions are met:
Activity standards	(a) There is no discernible contamination of water; and (b) Any drift derived from the discharge is not noxious, dangerous, offensive or objectionable beyond the target area to such an extent that it has or is likely to have an adverse effect on the environment; and In the Lake Brunner catchment: (c) Phosphorus fertiliser shall not be discharged to land that is developed under Rule 15 unless it has a water solubility of less than 10%.

D.15 Otago

The Regional Water Plan for Otago has a definition for fertiliser that includes :
Any proprietary substance specifically manufactured for use in increasing the nutrient status of land. Excludes compost, effluent or seaweed.

The fertiliser rule requires that the application is carried out in accordance with the manufacturer's directions. It is considered that nutrient solution would be unlikely to meet this definition or rule as it is may not meet manufacturer's directions for application.
Therefore the general discharge rule would apply as a permitted activity or a restricted discretionary activity is the conditions of the permitted activity cannot be met.

Plan	Regional Plan: Water for Otago https://www.orc.govt.nz/your-council/plans-and-strategies/water-plans-and-policies/regional-plan-water-for-otago/
Rule #	12.C.1.1
Status	**Permitted**
Activity	12.C.1.1 The discharge of water or any contaminant to water, or onto or into land in circumstances which may result in a contaminant entering water, is a permitted activity, providing:
Activity standards	(a) The discharge does not result in flooding, erosion, land instability or property damage; and (b) There is no discharge of water from one catchment to water in another catchment; and (c) The discharge does not change the water level range or hydrological function of any Regionally Significant Wetland; and (d) When the discharge, including any discharge from a drain or water race, enters water in any lake, river, wetland or the coastal marine area; the discharge: (i) Does not result in: (1) A conspicuous change in colour or visual clarity; or (2) A noticeable increase in local sedimentation, in the receiving water (refer to Figure 5); and (ii) Does not have floatable or suspended organic materials; and (iii) Does not have an odour, oil or grease film, scum or foam; and (e) When the discharge enters water in any drain that goes to a lake, river, wetland, or the coastal marine area, the discharge: (i) Does not result in: (1) A conspicuous change in colour or visual clarity; or (2) A noticeable increase in local sedimentation, in the lake river, wetland or the coastal marine area (refer to Figure 6); and (ii) Does not result in the production of conspicuous floatable or suspended organic materials in the drain at the first of: (1)The downstream boundary of the landholding where the discharge occurs; or (2) Immediately before the drain enters a river, lake, wetland or the coastal marine area; and (iii) Does not have an odour, oil or grease film, scum or foam; and (f) When the discharge enters water in any water race that goes to a lake, river, wetland, or the coastal marine area, the discharge: (i) Does not result in: (1) A conspicuous change in colour or visual clarity; or (2) A noticeable increase in local sedimentation, in the water race (refer to Figure 7); and (ii) Does not result in the production of conspicuous floatable or suspended organic materials in the race at the first of: (1) The downstream boundary of the landholding where the discharge occurs; or (2) Immediately before the race enters a river, lake, wetland or the coastal marine area; and (iii) Does not have an odour, oil or grease film, scum or foam.

Activity status if permitted conditions not met	**12.C.2 Restricted discretionary activities:** Resource consent required 12.C.2.1 The discharge of water or any contaminant: (i) To water; or (ii) Onto or into land in circumstances which may result in a contaminant entering water, for a period up to five years, is a restricted discretionary activity, unless the discharge: (a) Is prohibited by a rule in 12.C.0; or (b) Is permitted by Rules 12.C.1.1, 12.C.1.1A or 12.C.1.2; or (c) Will result in flooding, erosion, land instability or property damage; or (d) Is of water from one catchment to water in another catchment; or (e) Will change the water level range or hydrological function of any Regionally Significant Wetland; or (f) Has previously been authorised by resource consent granted under this rule. The matters to which the Council has restricted the exercise of its discretion are set out in Rule 12.C.2.4. The Consent Authority is precluded from giving public notification of an application for a resource consent under this rule.
Matters of discretion	12C.2.4 Restricted discretionary activity discretions In considering any resource consent in terms of Rules 12.C.2.1 to 12.C.2.3, the Council will restrict the exercise of its discretion to: a) The nature, type, volume, frequency and location of the discharge; and b) The concentration and loading of contaminants in the discharge; and c) In the case of an application under Rules 12.C.2.1 and 12.C.2.3, the staged timeframe for achieving the permitted activity conditions in Rule 12.C.1.1; and d) In the case of an application under 12.C.2.2, the staged timeframe to address adverse effects on water quality; and e) In the case of an application previously consented under Rule 12.C.2.2, compliance with conditions of the previous resource consent; and f) Any change to infrastructure and the staging of implementation of those changes; and g) Any adverse effect on water quality, including cumulative effects, and consideration of trends in the quality of the receiving water; and h) Any adverse effect of the discharge on any natural or human use value, including Kāi Tahu values and use of the coastal marine area for contact recreation and seafood gathering; and i) The need for and extent of any mixing zone; and j) Any co-ordination of discharges across multiple landholdings; and k) The extent to which the contaminant results from the activities of the applicant; and l) Any effect on any Regionally Significant Wetland or on any regionally significant wetland value; and m) Any erosion, land instability, sedimentation or property damage resulting from the discharge; and n) Any financial contribution for any Regionally Significant Wetland or on any regionally significant wetland value; and o) The information and monitoring requirements; and p) The duration of the resource consent; and q) The review of conditions of the resource consent.

D.16 Southland

The Southland Land and Water Plan has a range of rules for discharges of agricultural discharges and horticultural washwater but these do not apply to discharges of nutrient solution.
The plan has a definition of fertiliser that would include nutrient solution so the application of fertiliser rule will apply.

The Plan divides the region into a number of physiographic zones which represents areas of the landscape with common attributes that influence water quality, such as climate, topography, geology and soil type. Zones differ in the way sediment, microbes and nutrients such as nitrogen and phosphorus accumulate and are transferred through the soil, aquifers and into water bodies. There are policies for each physiographic zone which would need to be considered if resource consent is required.

Plan	Southland Water and Land Plan (Operative in part) https://www.es.govt.nz/repository/libraries/id:26gi9ayo517q9stt81sd/hierarchy/about-us/plans-and-strategies/regional-plans/proposed-southland-water-and-land-plan/documents/pSWLP%20-%20Clean%20version%20following%209th%20Interim%20Decision%20PDF%20CURRENT.pdf
Rule #	Rule 14 Discharges of fertiliser
Status	**Permitted**
Definition of fertiliser	Means a substance or biological compound or mix of substances or biological compounds that is described as or held out to be for, or suitable for sustaining or increasing the growth, productivity or quality of plants or animals through the application of the following essential nutrients to plants or soils: nitrogen, phosphorus, potassium, sulphur, magnesium, calcium, chloride, sodium as major nutrients; or manganese, iron, zinc, copper, boron, cobalt, molybdenum, iodine, selenium as minor nutrients or fertiliser additives, and includes non- nutrient attributes of the materials used in fertiliser; but does not include substances that are plant growth regulators that modify the physiological functions of plants.
Activity	The discharge of fertiliser onto or into land in circumstances where contaminants may enter water is a permitted activity provided the following conditions are met:
Activity standards	(i) other than for incidental discharges of windblown fertiliser dust, there is no direct discharge of fertiliser into a lake, river artificial watercourse, modified watercourse, or natural wetland or into groundwater; (ii) there is no fertiliser discharged when the soil moisture exceeds field capacity; (iii) there is no fertiliser discharged directly into or within 3 metres of the boundary of any significant indigenous biodiversity site identified in a district plan that includes surface water; and (iv) where a lake, river artificial watercourse, modified watercourse or wetland: (1) has riparian planting from which stock is excluded, fertiliser may be discharged up to the paddock-side edge of the riparian planting but not onto the riparian planting, except for fertiliser required to establish the planting; or (2) does not have riparian planting from which stock is excluded, fertiliser is not discharged directly into or within 3 metres of the bed or within 3 metres of a wetland. b)The discharge of fertiliser onto or into land in circumstances where the fertiliser may enter water that does not meet the conditions of Rule 14(a) is a non-complying activity. Note: Where the discharge of fertiliser includes synthetic nitrogen fertilizer, the discharge activity is managed by Regulations 33 or 34 of the Resource Management (National Environmental Standards for Freshwater) Regulations 2020, in addition to Rule 14.
Activity status if Permitted conditions not met	Non complying The discharge of fertiliser onto or into land in circumstances where the fertiliser may enter water that does not meet the conditions of Rule 14(a) is a non-complying activity.
Assessment matters	Policy 16 Policies 39, 39A, 40 and 41.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