Greenhouse Nutrient Solution Discharge

The requirements for achieving Good Practice

The following checklist, decision tree, and reference values is a self-audit to assist you in determining if your greenhouse nutrient solution discharge meets Good Practice.

Depending on your Regional Council's rules you may need to apply for a resource consent.

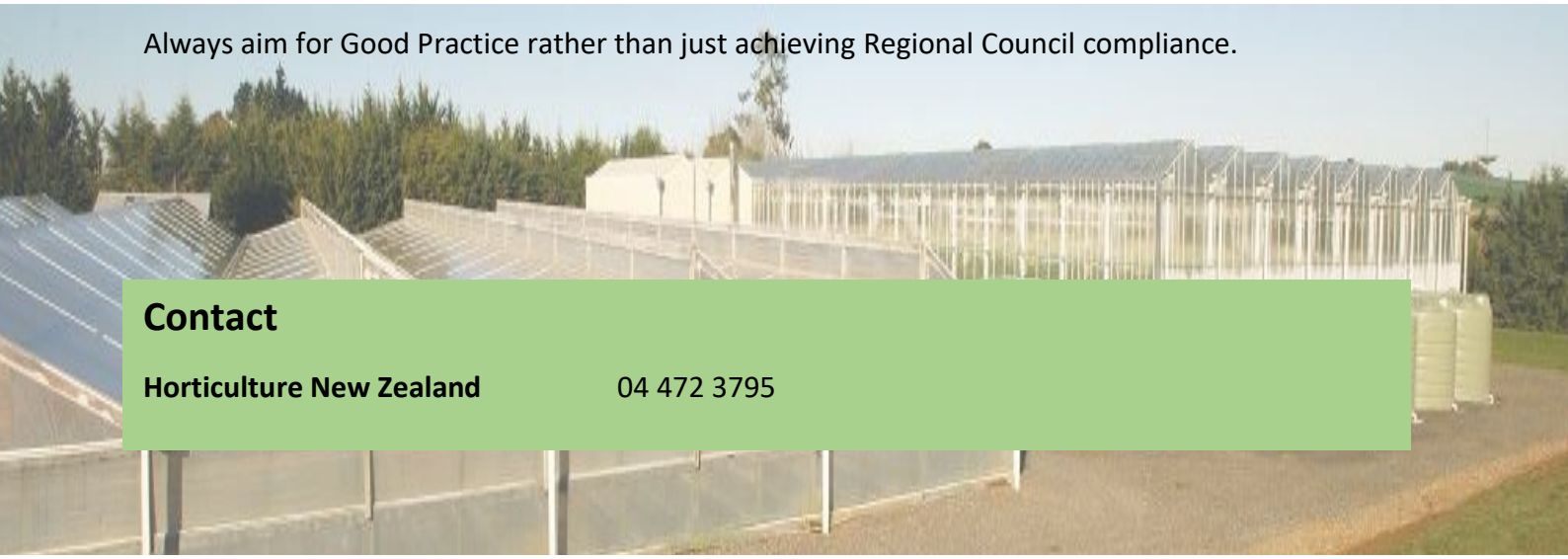
A Code of Practice for the Management of Greenhouse Nutrient Discharges (2007) and *A Growers' Guide to The Management of Greenhouse Nutrient Discharges* (2007) should be read as part of your nutrient solution discharge review. Both these documents can be obtained from Horticulture New Zealand.

If you need further assistance either contact Horticulture New Zealand or your Regional Council.

Good Practice requires that:

- Your irrigation discharge system always performs as designed with suitable contingencies that account for the time of year, weather conditions, breakdowns, or staff issues.
- Your staff responsible for the discharge system are fully trained in its operation and maintenance, and know what to do and who to contact if the system breaks down.
- You maintain records that show the system is performing correctly and confirms you comply with permitted or resource consent rules.

Always aim for Good Practice rather than just achieving Regional Council compliance.



Contact

Horticulture New Zealand 04 472 3795

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Good Practice

	✓ ✗
Infrastructure and maintenance	
All nutrient solution is fully contained within the system (pipe work, sumps, and ponds) prior to land application.	
There are no leakages or discharges to water or land from the storage structure. This means all storage ponds must be adequately sealed and all tanks must be maintained in a water tight condition.	
The storage system for discharged nutrients must have sufficient capacity to store discharged solution when soil conditions are unsuitable for application. The volume of storage required will vary depending on the volumes discharged in winter, and the soil type (see later calculations and examples).	
Application - Getting the right amount of discharged nutrient solution on the soil at the right time and in the right place	
All sources of nutrients are taken into account to determine the load, including nutrient solution, livestock, and solid fertiliser.	

The application area is large enough to ensure the nitrogen loading does not exceed:
• Grazed pasture[1]:
  ○ limit of 30 kg/ha/month and less than 150 kg/ha/year on sites underlain by sand and volcanic soils
  ○ limit of 50 kgN/ha/month and less than 200 kgN/ha/year on sites underlain by soils other than sand and volcanic soils
• Other cropped land: Maximum nitrogen loadings must be based on reasonable nitrogen requirements of the crop being grown and harvested
See the following Greenhouse Nutrient Solution Discharge Decision Tree for an example of the required application area.	

No discharges into surface water can occur. The irrigation system must be setup to ensure that discharged nutrient solution is applied in a way that does not result in runoff to waterways or artificial water courses.	
Discharges must not result in ponding of more than 3 hours duration following application.	
Application does not occur when soils are wet and do not have the capacity to fully accept the discharged solution. The guidance is that soils must have greater than a 10mm soil moisture deficit in the top 300mm of soil [2].	
A minimum 15m buffer exists between the irrigation field and any surface waters (including artificial drains) and 20m or more between bores and the irrigation field.	

[1] Check with your Regional Council for your nitrogen rate limits.

	✓ ✖
Recordkeeping for Regional Council evidence	
Correct storage volume (m^3).	
A property map with the size and unique code of each paddock used for irrigating discharged nutrient solution.	
Soil moisture levels. Soil moisture probes (see possible examples below), physical soil checks and rainfall records can be used to show that irrigation occurred when the soil had adequate capacity for the volume of solution applied.	
Daily diary: The date, soil moisture level, rainfall, field code, area irrigated, total volume of nutrient solution applied, and the cumulative nitrogen. See the *Code of Practice* for a suggested record keeping form.	
Laboratory results from analysis of discharged nutrient solution samples collected from the storage structure. It is recommended that samples are analysed at least annually for total nitrogen.	

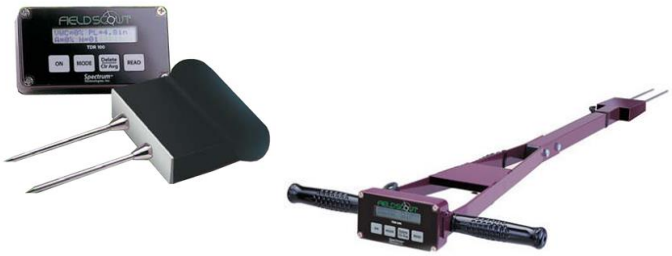
[2] Topography, rainfall, soil moisture, soil type and drainage all influence the risk of runoff and ponding. Therefore the soil moisture at the time of irrigation must be checked to ensure there is adequate capacity in the soil to accept the discharged solution. Good Practice is to walk over the irrigation area prior to each application event to check soil moisture conditions. Soil moisture can be checked using soil moisture probes or records of evapotranspiration, rainfall and irrigation events. As a general guide between May and August do not apply irrigation unless there has been 10 days without rain (<2mm).

Five key elements of success	✓ ✖
Have sufficient winter storage.	
Know the soil moisture to determine when and how much discharged nutrient solution to irrigate.	
Know and track nitrogen application rates.	
Ensure even irrigation.	
Keep a record of your activities and prevailing conditions.	

Possible soil moisture probes:

Quick Draw Tensiometers
Approximately $975

Hand-held time-domain reflectometer (TDR)
Approximately $1,300 - $1,900



Greenhouse Nutrient Solution Discharge Decision Tree

Do you discharge nutrient solution?

No → No problem

Yes

Calculate the volume and nitrogen content of the discharge.

Reference values.
Your measured values should be used.

Water and nitrogen 1 ha greenhouse - per year	Run-to-waste	Recirculate
Discharged solution (m^3/ha/yr)	4,000	1,000
Nitrogen concentration (ppm)	400	400
Nitrogen (kgN/ha/year)	1,600	400

Next

Is irrigating to your land an option?

No →

Other options include:

- Collect and supply to a neighbouring landowner with land for irrigation.
- Truck it away for alternative disposal.
- Connect to a sewer – consents may be required.
- Investigate denitrification / filter beds.
- Obtain a consent to discharge.

Yes

Calculate the area needed.

Disposal area 1 ha of greenhouse - per year	Run-to-waste	Recirculate
Area (ha) @ 150 kgN/ha/year	10.7	2.7
Area (ha) @ 200 kgN/ha/year	8.0	2.0

Next

Calculate the storage area needed.

Sufficient storage is crucial. You may need 3 months or more storage, at winter discharge rates. See the next page for examples.

Storage – 3 months 1 ha of greenhouse	Run-to-waste	Recirculate
Covered storage (m^3/ha)	1,000	250
Uncovered storage (m^3/ha)	1,600	400

Next

How will you manage the land application?

Refer to the Code of Practice

Next

Do you meet the permitted activity conditions in the Regional Plan?

No → Apply for a resource consent.

Check with your Regional Council, plus comply with Good Practice – see checklist

Yes

Apply discharged nutrient solution to land using good management practices, including keeping records to show how Good Practice and Regional Council rule conditions are being met.

Permitted Activity Rules and Storage Volumes – Auckland

Sufficient storage is essential for successfully managing your nutrient solution discharges.

Calculating the required storage needs to consider the period when the soil cannot be irrigated, the discharge rates over this time, the soil type, and for uncovered storage ponds rainfall (rain falling directly on the pond increases the storage requirements).

DairyNZ has guidance on storage requirements, soil risk, and application systems. The storage calculations below were determined using their Storage Calculator
http://www.dairynz.co.nz/environment/

The tables below give the storage requirements for a 1.0-hectare greenhouse discharging an average of 2.7 m^3/day (1,000 m^3/year) into both covered and uncovered storage, and where the operation is irrigating onto high or low risk soils. These soil risk categories are described in the DairyNZ booklet Pocket guide to determine soil risk.

High risk soil – average discharge of 2.7m^3/day when the soil is saturated (cannot irrigate)

	Covered storage			Uncovered storage (includes direct rainfall)				
	Volume (m^3)	Days of storage		Volume (m^3)	Length (m)	Width (m)	Depth (m)	Batter (slope)
Warkworth	290	107		493	20	17	4.0	1.5 : 1
Albany	257	95		373	19	15	4.0	1.5 : 1
Pukekohe	387	143		623	20	20	4.0	1.5 : 1
Waiuku	429	159		727	22	20	4.0	1.5 : 1
Auck. average	327	121		523	20	17	4.0	1.5 : 1

Low risk soil – average discharge of 2.7m^3/day

	Covered storage			Uncovered storage (includes direct rainfall)				
	Volume (m^3)	Days of storage		Volume (m^3)	Length (m)	Width (m)	Depth (m)	Batter (slope)
Warkworth	43	16		50	9	7	2.5	1 : 1
Albany	44	16		50	9	7	2.5	1 : 1
Pukekohe	51	19		57	10	7	2.5	1 : 1
Waiuku	78	29		98	10	10	2.5	1 : 1
Auck. average	52	19		61	9	8	2.5	1 : 1

Auckland Council Permitted Activity Rules

Permitted [1]		Conditions
Discharge to water	Discharge to land	
x	✓	Greenhouse is less than 1 hectare. Must be in accordance with *A Code of Practice for Management of Greenhouse Nutrient Discharges* (2007).

1. Permitted subject to conditions.