

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

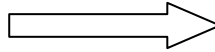
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Greenhouse Nutrient Solution Discharge Decision Tree

Do you discharge nutrient solution?

No



No problem



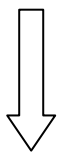
Yes

Calculate the volume and nitrogen content of the discharge.

Reference values.

Your measured values should be used.

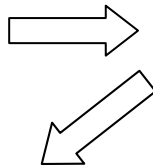
Water and nitrogen 1 ha greenhouse - per year	Run-to-waste	Recirculate
Discharged solution (m ³ /ha/yr)	4,000	1,000
Nitrogen concentration (ppm)	400	400
Nitrogen (kgN/ha/year)	1,600	400



Next

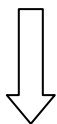
Is irrigating to your land an option?

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



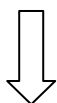
Next

Calculate the storage area needed.

Example N application limits. Note many councils now use modelled leaching rates rather than input limits.

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?

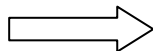
Refer to the Code of Practice



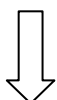
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Do you meet the permitted activity conditions in the Regional Plan?

No



Apply for a resource consent.



Yes

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

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.

C. Application - Getting the right amount of discharged nutrient solution on the soil at the right time and in the right place

Ref	Good/Best Management Practices	Complete? (Yes, Partial, No, n/a)				Date to be completed? (if Partial or No)	Comment/Agreed Action (if 'Partial' or 'No'. Justify if 'n/a')	Evidence (e.g. record, photo, observation)	Level
		Y	P	N	n/a				
1	All sources of nutrients are taken into account to determine the load, including nutrient solution, livestock, and solid fertiliser.								GMP
2	Worked through the Greenhouse Nutrient Solution Discharge Decision Tree for an example of the required application area.								GMP
3	The application area is large enough to ensure the nitrogen loading does not exceed: <ul style="list-style-type: none"> • Grazed pasture¹: <ul style="list-style-type: none"> ○ 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. 								GMP
4	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.								GMP
5	Discharges must not result in ponding of more than 3 hours duration following application.								GMP
6	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 .								GMP
7	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 .								GMP

¹ These limits are based on Auckland Council rules. Check with your Regional Council for your nitrogen rate limits and buffer requirements.

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	✓ x
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



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 m³/day (1,000 m³/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 2.7m³/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 2.7m³/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 <i>A Code of Practice for Management of Greenhouse Nutrient Discharges (2007)</i> .

1. Permitted subject to conditions.