DRAFT Version 1.0

Draft Vegetable Washwater Discharge Code of Practice

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 discharge of vegetable washwater meets Good Practice.

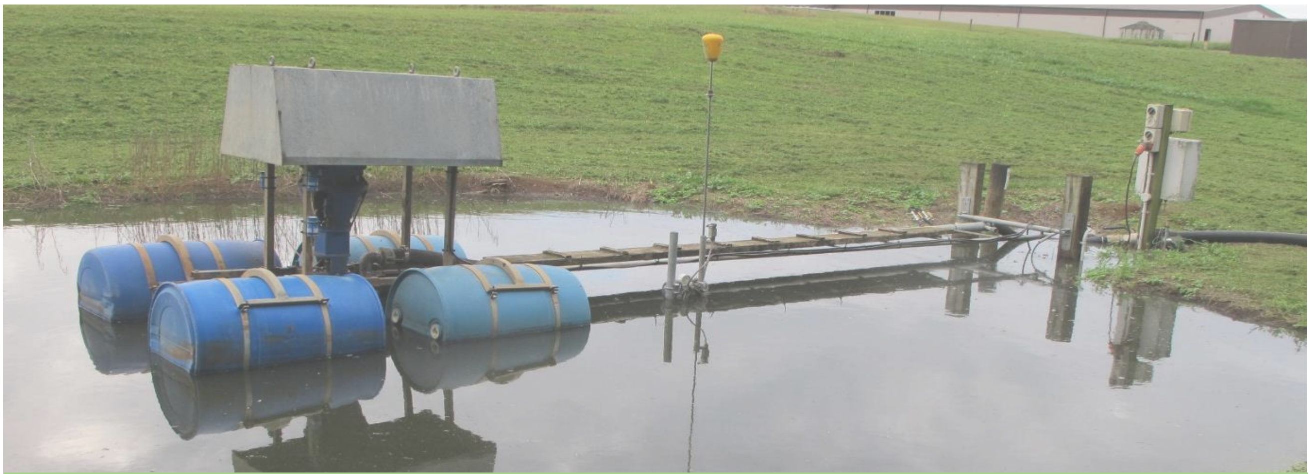
The primary contaminant is vegetable washwater is sediment. Disposal of washwater through the soil using an infiltration bed is a very effective way of removing suspended sediment. Consideration also needs to be given to nitrogen. If the levels are elevated then land application through an irrigation system may be more appropriate. When applying washwater to land the required application area is generally determined by the volume of water, not the nitrogen level as is the case for most other agricultural discharges.

Good Practice is to discharge the washwater through an infiltration bed where nutrient levels are low enough or apply the washwater to land through an efficient irrigation system where nutrients can be taken up by the plants. With an irrigated system, winter storage is one of the major considerations.

To meet Good Practice you need to achieve the conditions on the following checklist.

Further information on vegetable washwater systems can be found in *Vegetable Washwater – Literature and Council Policy Review* (Barber, Wharfe and Hodgson, 2017), available from HortNZ.

Always aim for Good Practice rather than just achieving council compliance.



Contacts

Horticulture New Zealand 04 472 3795

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Good Practice	✓ ×
Minimise discharge volumes through water conservation	
Minimise the volume of water being discharged. This includes monitoring and tracking water use, leak detection, and nozzles attached to end of hoses rather than the tap end. Where possible reuse in continuous recycling system filtered and disinfected water.	
Use of sanitisers	
Any sanitisers used in the washing process must have HSNO approval, follow the label recommendations, and meet NZS 8409:2004 Management of Agrichemicals.	
Soil-aquifer treatment system (SAT) - Infiltration bed	
Pre-treat with a sediment trap to minimise sediment load and clogging.	
Inflow N concentrations are < 1.2 ppm and P < 1.5 ppm[1], or there is a monitoring system below 1m to document that there are not elevated nutrient levels in the drainage water.	
Land application - Infrastructure and maintenance	
All discharged vegetable washwater 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 washwater must have sufficient capacity to store water 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 the Decision Tree for calculating these volumes.	
Application - Getting the right amount of discharged washwater on the soil at the right time and in the right place	
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.	
No discharges into surface water can occur. The irrigation system must be setup to ensure that discharged washwater 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.	

1. Inflow N and P concentrations are based on 50% and 98% removal respectively in the top 1m of soil to achieve the environmental standard of 0.61 ppm N and 0.03 ppm P.

Application - Getting the right amount of discharged washwater on the soil at the right time and in the right place (continued)	✓ ×
The application area is large enough to prevent the soils from becoming saturated or exceeding a nitrogen application rate of 150 kgN/ha/yr. See the following *Vegetable Washwater Discharge Decision Tree* for an example of the required application area.	
There is a 20m buffer between the application area and landholding boundary, lake, river, modified watercourse, artificial watercourse, ephemeral waterway, the coastal marine area, or natural wetland.	
There is a 20m buffer between the application area and residential dwelling.	
There is a 250m buffer between the application area and drinking water supply site.	

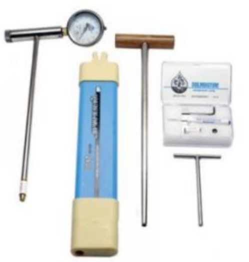
Recordkeeping for evidence of Good Practice	✓ ×
Correct storage volume (m^3).	
A property map with the size and unique code of each paddock used for irrigating discharged washwater.	
Soil moisture level. Soil moisture probes (see possible examples below), physical soil checks and rainfall records can be used to show that irrigation occurred when the soil had adequate capacity for the volume of solution applied.	
The date, soil moisture level, field code, area irrigated, and total volume of washwater applied is recorded.	

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).

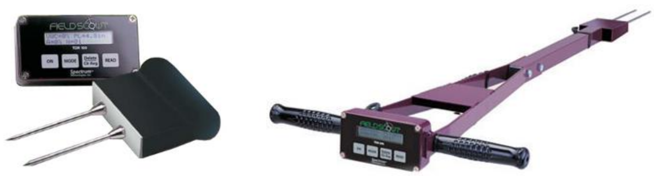
Five key elements of successful land application systems	✓ ×
Have sufficient winter storage.	
Know the soil moisture to determine when and how much to irrigate.	
Know and track water volumes and nitrogen application rates.	
Ensure even irrigation.	
Keep a record of your activities and prevailing conditions.	

Possible soil moisture probes:

Quick Draw Tensiometers
Approximately $975



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



Vegetable Washwater Discharge Decision Tree

Are N concentrations < 1.2 ppm and P < 1.5 ppm?

Yes → Consider a soil-aquifer treatment system (SAT) using an infiltration bed.

No ↓

Calculate the volume and key characteristics of the discharge.

Reference values.
Your measured values should be used as soil characteristics make a significant difference, and there is very limited literature.

Discharge prior to treatment	Root vegetables	Lettuce
Discharged water (m^3/t)	1.5 – 3.0	2.2 – 3.2
Sediment (g/m^3)	10,000	-
Nitrogen (ppm)	80	-
E. coli (cfu/100ml)	0.6	0.5

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 as waste.
- Connect to a sewer – consents may be required.
- Investigate denitrification / filter beds.
- Obtain a consent to discharge.

Yes ↓

Calculate the area needed.

Disposal area (ha) 1,000 tonnes - per year	Root vegetables	Lettuce
Water limit @ 150mm/year	**2.0**	-
Nitrogen limit @ 150kgN/ha/year	1.6	-

Next ↓

Calculate the storage volume needed.

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

Winter Storage 3 months Processing – 250 tonnes	Root vegetables	Lettuce
Covered storage (m^3)	560	675
Uncovered storage (m^3)	1,200	1,500

Next ↓

How will you manage the land application?

Refer to Irrigation NZ guidelines

Next ↓

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

See regional requirements on the next page

No → Apply for a resource consent.

Yes ↓

Apply discharged washwater to land using good management practices, including keeping records to show how conditions are being met.

Storage – Southland

Sufficient storage is essential for successfully managing your washwater discharges.

Calculating the required storage needs to take into account 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).

Dairy NZ 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/effluent/effluent-storage/

The tables below give the storage requirements for an operation processing 1,000 tonnes of root vegetables discharging an average of 10 m^3/day (3,000 m^3/year) into uncovered storage, and where the operation is irrigating onto high or low risk soils. These soil risk categories are described in the Dairy NZ booklet *Pocket guide to determine soil risk for farm dairy effluent application*. High risk soils generally have one or more of these characteristics: > 7 degrees, impeded drainage, low infiltration rate (<10mm/hr), mole or pipe drains, or coarse topsoil structure (> 80% of soil aggregates captured on a 10mm sieve).

High risk soil – average discharge of 10m^3/day when the soil is saturated (cannot irrigate)

	Uncovered storage (includes direct rainfall)				
	Volume (m^3)	Length (m)	Width (m)	Depth (m)	Batter (slope)
Gore	1,200	35	20	4	1.5 : 1
Woodlands	1,600	41	20	4	1.5 : 1

Low risk soil – average discharge of 10 m^3/day

	Uncovered storage (includes direct rainfall)				
	Volume (m^3)	Length (m)	Width (m)	Depth (m)	Batter (slope)
Gore	130	15	10	3	1.5 : 1
Woodlands	140	20	9	2	1.5 : 1

Council	**Permitted** [1]		**Conditions**
	Discharge to water	**Discharge to land**	
Southland Regional Council	x	✓ < 20 m^3/day	No overland flow, ponding, or application to saturated soils. No measurable concentrations of chemical additives and a range of separation distances.

1. Permitted subject to conditions.