

Woldwide Four Limited

Farm Environmental Management Plan

March 2019



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This FEMP sets out the management practices that will be implemented and adopted to actively manage the operation of the property to ensure that environmental risks are managed appropriately, and resource consent conditions complied with.

Objectives of this plan:

- Comply with all legal requirements related to land use and discharge.
- Take all practicable steps to minimise the risk of harm to onsite and nearby water resources.
- Take all practicable steps to ensure that there is an adequate supply of soil nutrients to meet plant needs.
- Take all practicable steps to minimise the risk of harm to significant vegetation and/or wildlife habitat.

This will be achieved through;

- Identifying and documenting contaminant pathways for the property (based on Physiographic Zones);
- Identifying relevant good management practices (GMP) and where they are required to be implemented to minimise environmental risks; and
- Documenting evidence to be provided to show adherence with consent conditions.

As the person responsible for implementing this plan, I confirm that the information provided is correct:

Name:.....Signed:.....Date:.....

B: SITE PLANS

This FEMP contains various site plans identifying key features of the subject property in accordance with Part B(3) of Appendix N of the proposed Southland Water and Land Plan, 2018. The following table can be used as a reference point for locating these features.

KEY FEATURES	PLAN(S) WHERE KEY FEATURES ARE MAPPED
Site boundary	All site plans in this FEMP
Physiographic zones, variants and soil types	Figure 1 and 2: Physiographic Plan Figure 3 and 4: Soil map
Lakes, rivers, streams ponds, artificial watercourses, modified watercourses and natural wetlands	Appendix A: Existing Waterways and Critical Source Areas
Other critical source areas (gullies, swales etc)	Appendix A: Existing Waterways and Critical Source Areas
Land with a slope greater than 20 degrees	N/A
Existing and proposed riparian vegetation and fences (or other stock exclusion methods) adjacent to waterbodies	Appendix A: Waterway location, most have riparian planting
Places where stock access or cross water bodies (including bridges, culverts and fords)	Appendix A: crossings labelled
Known subsurface drainage system(s) and the location of drain outlets	Appendix B
All land that may be cultivated over the next 12 months	TBC – once consent granted
All land that may be intensively winter grazed over the next 12 months	TBC – once consent granted

C: PHYSIOGRAPHIC ZONES AND KEY CONTAMINANT PATHWAYS

This section of the FEMP documents the physiographic zones and key contaminant pathways present across the property.

The physiographic plans shows the spatial distribution of the physiographic zones on the entire property according to the Environment Southland Proposed Water and Land Plan 2018 (PSWLP) as mapped by Beacon Mapping Service. The mapping system also details the key contaminant pathways present for each physiographic zone and any variants for the location.

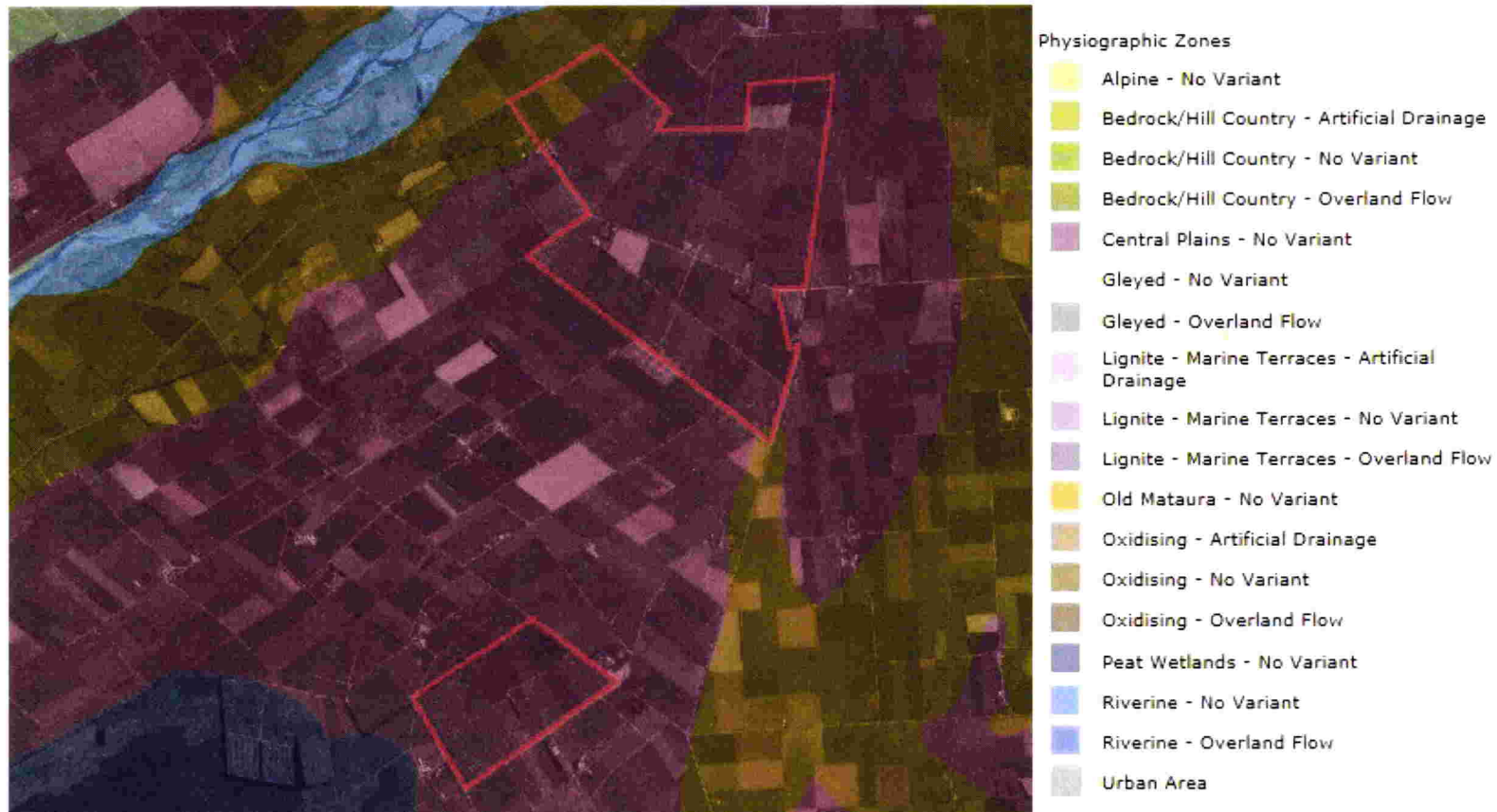


Figure 1: Physiographic Zones on the farm (showing dairy platform and Gladfield block)

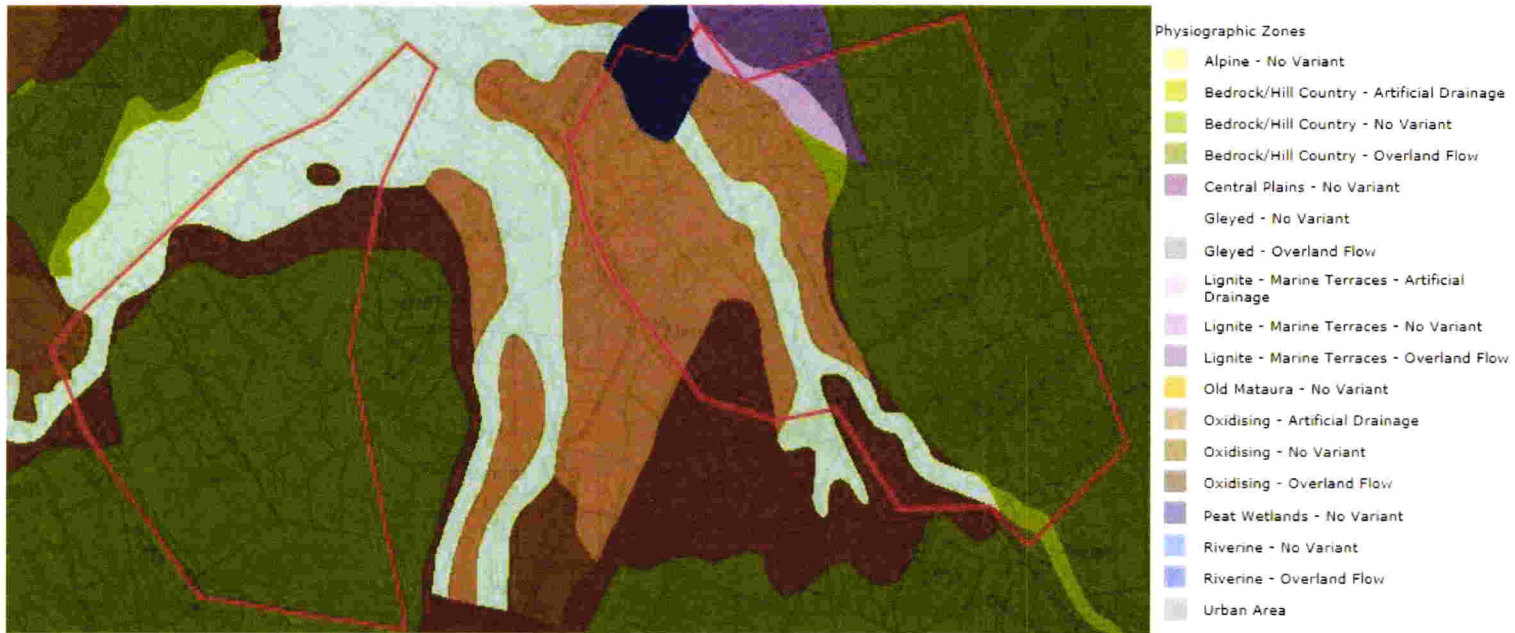


Figure 2: Physiographic zones at Woldwide Runoff

D: SOIL TYPES

This section of the FEMP documents the soil types present across the property. The Soil Maps below shows the spatial distribution of the soil types across entire property according to the Environment Southland Beacon Mapping Service.

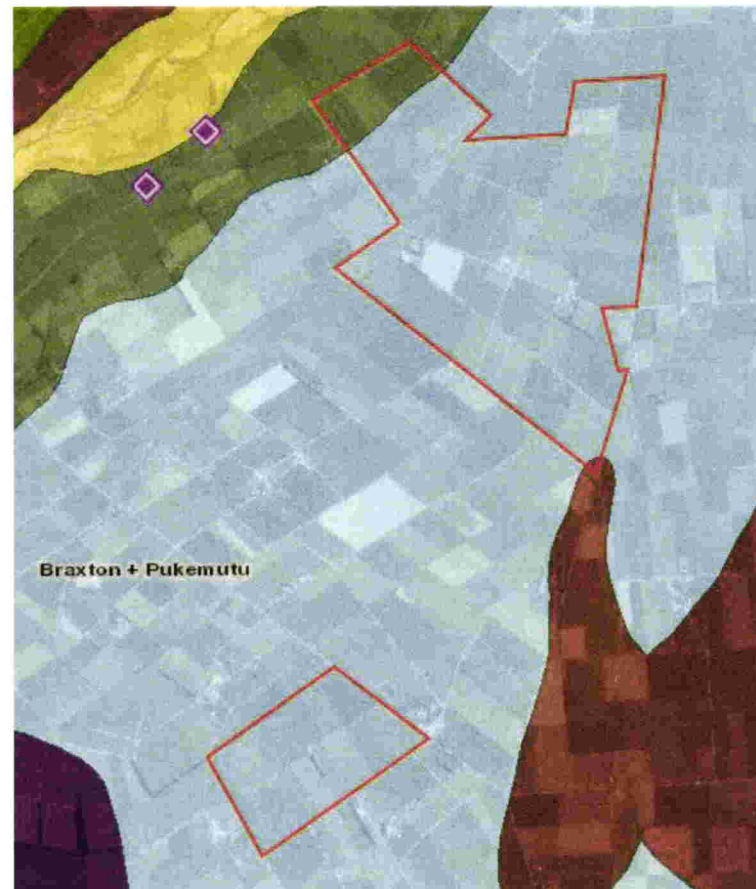


Figure 3: Soil types found on the farm (Blue = Braxton, Green= Tuatapere)

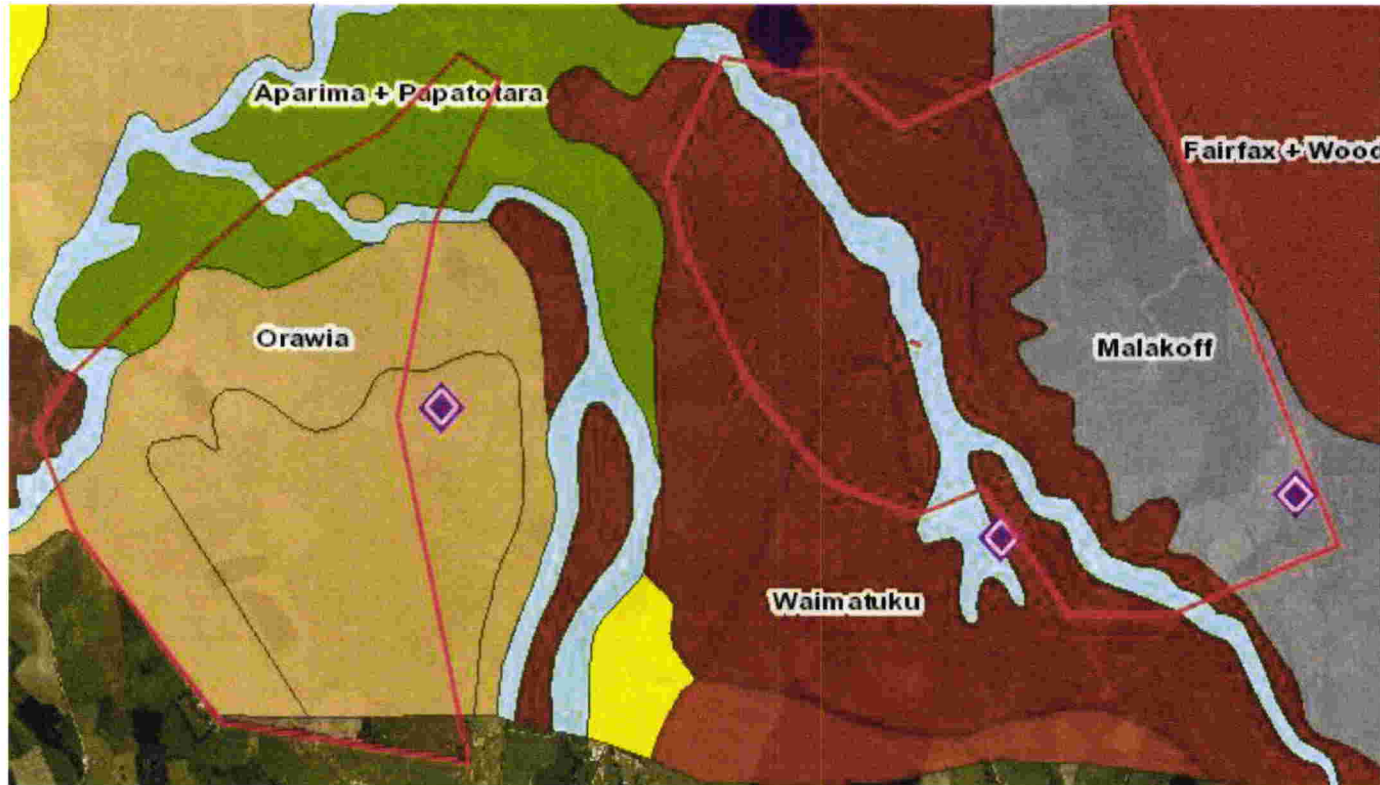


Figure 4: Soil types at Woldwide Runoff

E: GOOD MANAGEMENT PRACTICES - GENERAL

Mitigation	Good Management Practice	Review notes
Protect soil structure (will also help with P and N loss)	Wintering the milking herd on fodder beet on the support block (Gladfield and WRO)	
	Re-sow bare soils as soon as possible	
	Use of selective grazing to avoid grazing very wet paddocks and open the breaks up to avoid pugging and treading damage.	
Manage Critical Source Areas (CSA)	Avoid working CSAs and their margins	
	Leave grassed areas (or native vegetation) around CSAs especially when grazing winter forage crop and/or graze as "last bite". Grazing direction should be down the slope or towards CSA.	
	All riparian margins to be fenced and left to establish with grasses to enable filtration of contaminants that may be transported via overland flow processes.	
Additional P loss reduction	Reduce use of P fertilizer where Olsen P values are above agronomic optimum. Maintain Olsen P levels at around 40	
	Reduce the risk of run-off to laneways and other sources by ensuring crossings are adequately maintained and maintain gradients of laneways to direct runoff to pasture.	
Reduce accumulation of N in the soil	Use nutrient budgeting to manage nutrient inputs and outputs	
	Time N fertilizer application to meet crop and pasture demand using split applications and avoid high risk times of the year i.e when soil temperature is low or during drought periods	
Avoid preferential flow of FDE through soil	Defer effluent application when soil conditions are unsuitable especially when applying effluent to high risk paddocks	

profile and artificial drains	Apply effluent at low rates and depths and utilize entire effluent discharge area	
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F: RIPARIAN MANAGEMENT

The dairy farm and Gladfield are mapped to drain to Waimatuku Stream and Aparima River. Woldwide Runoff drains to the Orauea River.

All waterways are already fenced to exclude stock as required by the supplier on the dairy platform. Any other waterways on the support land are fenced. All riparian margins are left to establish with grasses and native vegetation in the first instance or as a minimum. Some waterways contain riparian planting.

Where appropriate and as part of good grazing management, temporary fencing will also be erected to prevent any point source discharges occurring. This includes fencing off swale areas where they may directly discharge to surface water. Such practices will be adopted as set out elsewhere in this plan as part of the management of CSAs, and as set out in the Environment Southland Factsheet on *Critical Source Areas*, and *Dairy NZ Wintering in Southland and South Otago Guide*.

Appendix A maps the waterways present on the property, any stock crossings and/or CSA's for riparian management.



Figure 5: Photos of artificial drainage channels on the farm with stock exclusion and riparian vegetation. Photo on the right shows artificial drain disappearing underground

G: INTENSIVE WINTER GRAZING

Intensive winter grazing is defined in the PSWLP as the *“Grazing of stock between May and September (inclusive) on forage crops (including brassica, beet and root vegetable crops), excluding pasture and cereal crops.”*

Appendix C includes a farm map of winter grazing paddocks for 2018/2019 and 2019/2020 seasons for the Gladfield block. Full cultivation is undertaken and crop type is fodder beet. Cropping on Woldwide Runoff TBC

The table below outlines the good management practices which will be adopted on site for the intensive winter grazing activity.

Mitigation	Good Management Practice	Review notes
Protect soil structure and reduce N and P loss from intensive winter grazing activities	Grazing direction top of slope to bottom of slope. Use break or block feeding and ensure a last bite of 5-20m is left from CSA's	
	Back fencing to prevent stock from entering previously grazed areas	
	Use of portable water troughs to prevent stock from entering previously grazed areas	
	Use portable feed containers for supplementary feed to avoid feed wastage (From May 2019)	

H: NUTRIENT MANAGEMENT

Nutrient management is a key component to ensuring good on farm environmental practice. The farm utilizes nutrient budgeting through their supplier (Fonterra) as well as via their fertilizer representative (Ravensdown) and will append full nutrient budgets by May 2019 in accordance with the PSWLP. Any resulting nutrient budgets are reviewed and updated as required especially if farm system changes are proposed, but not less than on an annual basis. Any budget reviews are guided by a fertiliser representative and nutrient management advisor.

Regular soil tests will be undertaken to establish the nutrient status of the soils. Soils should be at nutrient levels which avoid any adverse effects on the environment but maintain good pasture production and animal health, by ensuring that the soils are suitable for optimal plant nutrient uptake.

Areas which are receiving FDE will be carefully managed to ensure nitrogen loadings are at acceptable levels and are compliant with conditions imposed by resource consents. The annual effluent nitrogen loading rate shall not exceed 150kg/N/ha. Effluent will be applied utilising low rate application. Effluent management is discussed in Section H of this FEMP.

The table below describes the good management practices which will be adopted in relation to nutrient management.

Mitigation	Good Management Practice	Review notes
Minimise nutrient losses from farming activities to ground and surface water by utilizing nutrient budgeting	Whole farm nutrient modelling using OVERSEER budget (or equivalent model) prepared by a suitably qualified person	
	Whole farm nutrient budget reviewed annually and updated in accordance with significant farm system changes	
	Minimise N losses by using soil testing to guide fertilizer recommendations and match fertilizer application with plant and animal requirements.	
	Use of a fertilizer representative to advise on fertilizer type, timing and application rates. Split applications where application rates exceed 100kg P/ha	
	Limit P application between June and August	
	Crop rotations adjusted to maximise the use of residual N in the soil	

	Stock wintering practices adjusted to minimise nutrient losses	
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The following table sets out the evidence which needs to be collected for nutrient budgeting purposes:

Record	Nature of information/person	Collated (Y or N)
Production	Fonterra App, dockets	
Soil test results	Lab results, Ravensdown rep	
Fertiliser application records	MINDA land & feed, Ravensdown rep	
Proof of placement	MINDA land & feed	
Effluent application records	Dairy diary	
Crop rotation records	Farm map with total hectares	
Stock numbers	Culling timeframes Young stock grazed on farm Breeding bulls	
Record of supplements purchased	Invoices/Cash manager, MINDA	
Records of supplements made on farm	Invoices/Cash manager	
Farm map/effective hectares	Farm manager	

I: FARM DAIRY EFFLUENT

This section of this plan documents the methods that will be employed in the operation of the Farm Dairy Effluent (FDE) System to ensure that the discharge of effluent occurs in accordance with conditions of consent. Appendix D includes a full FDE Management Plan, monthly check sheets and staff training record.

Total effluent discharge area:	78 ha liquid effluent discharge area, 320 ha slurry discharge area
Available storage volume:	3,801m ³
Storage Type:	Effluent storage pond, concrete bunker, slurry effluent pond
Effluent application method:	Low rate pods Slurry tanker/muck spreader/umbillical Travelling irrigator
Maximum application rate and depth of application:	10mm/hr 25mm depth per application. 2.5mm depth for slurry/muck spreader/umbillical

Mitigation	Good Management Practice	Monitoring
Reduction in effluent generation	<ul style="list-style-type: none"> Reduce water use in shed by reusing clean water where possible Treat the herd gently to avoid upset 	N/A
Effluent applied only when soil conditions are appropriate	<ul style="list-style-type: none"> Sufficient storage provided so that when soils are at or above field capacity and/or during adverse weather conditions, effluent can be stored in the effluent storage pond until conditions are suitable for application Monitoring of soil moisture using the ES website. Paddocks will be inspected before effluent application to check that soil water deficit exists. 	N/A

	<ul style="list-style-type: none"> • Low rate application will be preferentially used during higher risk periods of the year with the travelling irrigator used mainly in summer when a greater soil moisture deficit occurs 	
Avoidance of direct effluent disposal or runoff to sensitive areas	<ul style="list-style-type: none"> • Effluent discharge will observe a range of buffers from sensitive receiving environments as shown on the Appendix I plan attached to the discharge permit • Low rate effluent discharge will avoid ponding and/or runoff • Effluent will not be discharged onto any land areas that have been grazed within the previous 5 days • Effluent discharge will be to the entire effluent discharge area 	Record irrigation dates, times and areas in the DAIRY DIARY
Avoidance of effluent contamination in tile drains	<ul style="list-style-type: none"> • Low rate effluent discharge to reduce the risk of through-drainage and associated risk of effluent entering water • Mapping of tile drains 	N/A
Efficient and effective collection, storage and delivery of effluent from infrastructure at all times	<ul style="list-style-type: none"> • Monthly/frequent system checks will be undertaken using the Monthly Effluent Check Sheet attached • All parts of the effluent system will be checked and maintained regularly • Leaks will be repaired immediately • Fail safe systems will be kept in place and kept in good working order i.e. automatic alarm and shut off system 	Record all repairs and maintenance (invoices, cash manager) Monthly Effluent Check Sheets filled out and signed
Staff appropriately trained in operation and understand the effluent system	<ul style="list-style-type: none"> • All staff involved in the management of the effluent system are fully trained in its use • All staff are familiar with and understand the conditions of consent • All new staff will be taken through the "Staff Training Guide" (attached) • Staff to take immediate action if incident or breakdowns occur including; <ul style="list-style-type: none"> - Rectifying the problem - Cleaning up if possible 	Keep signed training record in the back off this FEMP Ensure both farm manager and employee sign to confirm training
Application that is not offensive to neighbours	<ul style="list-style-type: none"> • Wind conditions will be checked to ensure the effluent can be discharged without resulting in spray drift and odour beyond the property boundary 	Complaints received by Environment Southland

	<ul style="list-style-type: none">• Observation of buffers to dwellings not located on the property (200 m) and property boundaries (20 m)	
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J: COMPLIANCE AND REPORTING

This section sets out the records which are required to be kept which will enable the Consent Holder to demonstrate compliance, as well as detailing the reporting requirements of the consents. The Consent Holder will also participate in annual compliance monitoring inspection programs that are to be implemented by Environment Southland.

Record	Kept	Date of most recent version
Nutrient budget		
Fertilizer application records		
Soil sampling results		
Water meter certification		
Water abstraction records		
Effluent system training record		
Effluent system monthly maintenance checks		
Effluent proof of placement		
Effluent application depth test results		

Annual reporting requirements are set out in the conditions of resource consent and include;

- Prior to the first exercise of the Effluent Discharge Consent the Consent Holder shall notify Environment Southland of the operator of the effluent system
- The Farm Environmental Management Plan shall be reviewed annually, and any amendments reported to Environment Southland by 31 June each year
- The Consent Holder shall provide records from the Water Permit to ES by 31 May each year

K: ANNUAL REVIEW AND AUDIT OF FEMP

This FEMP shall be reviewed on an at least annual basis. The review shall include (but not be limited to) an assessment of;

- Verification of compliance with conditions of consent
- Details of the implementation of GMPs and identification of any new GMPs that would be appropriate to employ on the farm to manage risks identified
- Review of the data obtained from the monitoring undertaken in accordance with this FEMP and any changes to farming practice required as a consequence
- A report detailing items above shall be submitted to the consent authority each year including an updated version of the FEMP if any amendments made
- Updated maps of winter crop paddocks and CSA's if applicable

M: INDUSTRY GUIDELINES

A complete list of the industry guidelines which have been referenced in the development of this FEMP are listed below. The Consent Holder is also referred to the following general sources for guidance in respect to the operation and management of their property.

Environment Southland www.es.govt.nz

Dairy NZ www.dairynz.co.nz

Fonterra www.fonterra.com

Dairy NZ – A staff guide to operating your effluent irrigation system – Low Rate System

Dairy NZ – A farmer's guide to managing farm dairy effluent – A good practice guide for land application systems

Dairy NZ – Wintering in Southland and South Otago – A land management guide to good environmental practice

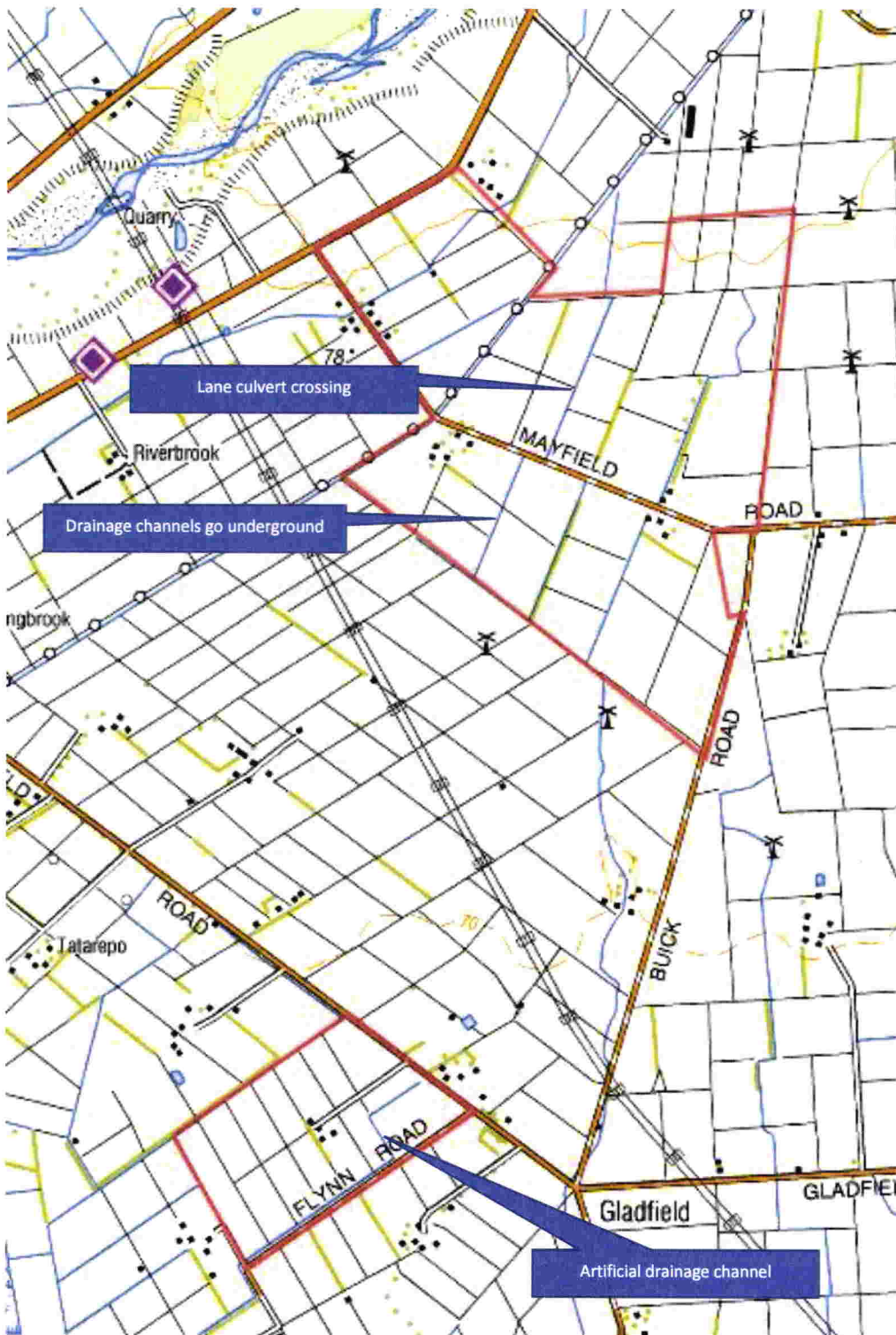
Dairy NZ – Land management on Canterbury Dairy Farms – Managing land to reduce sediment and phosphorous loss

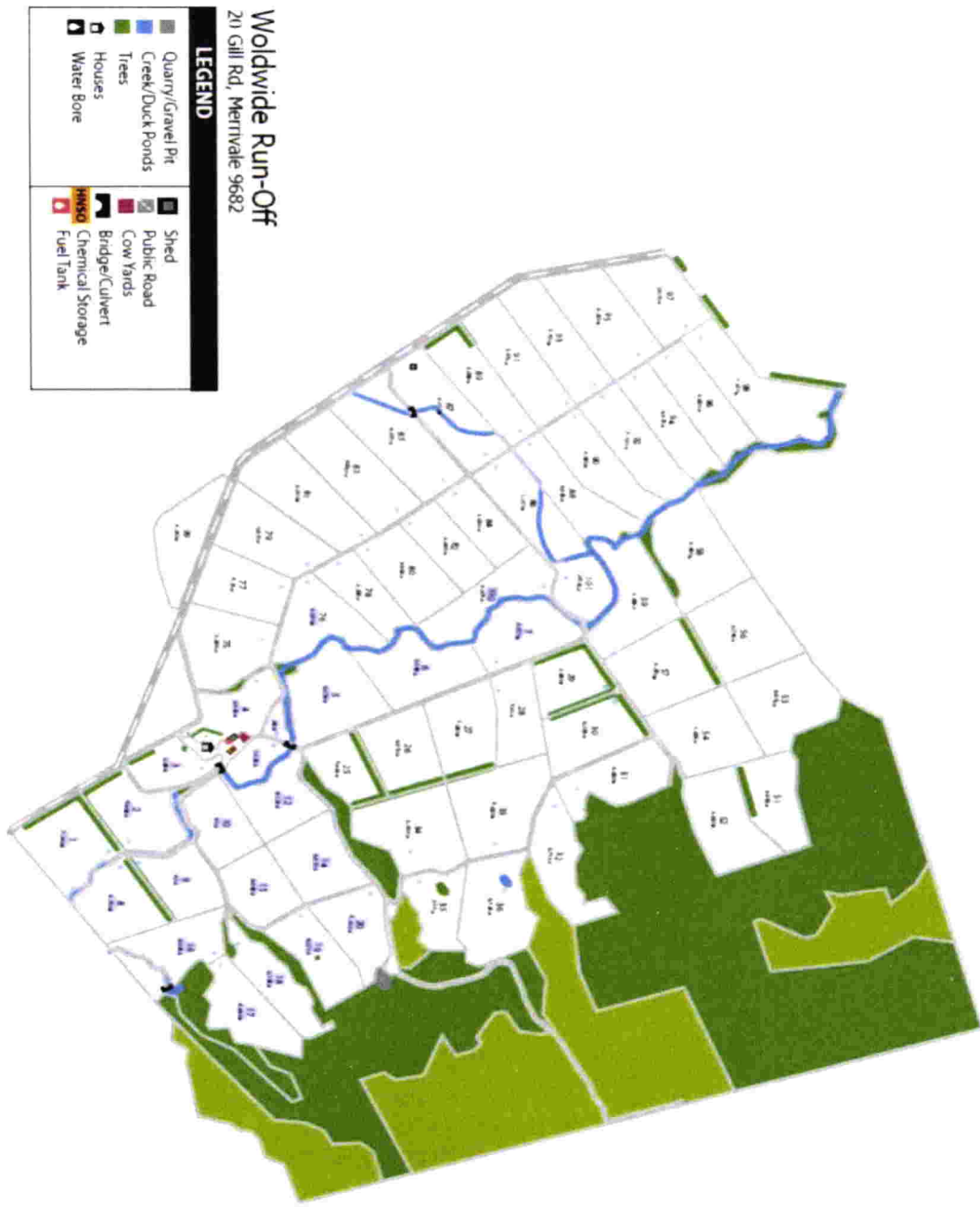
Environment Southland Factsheet – Critical Source Areas

Environment Canterbury – Information Sheet for Farmers on OVERSEER®

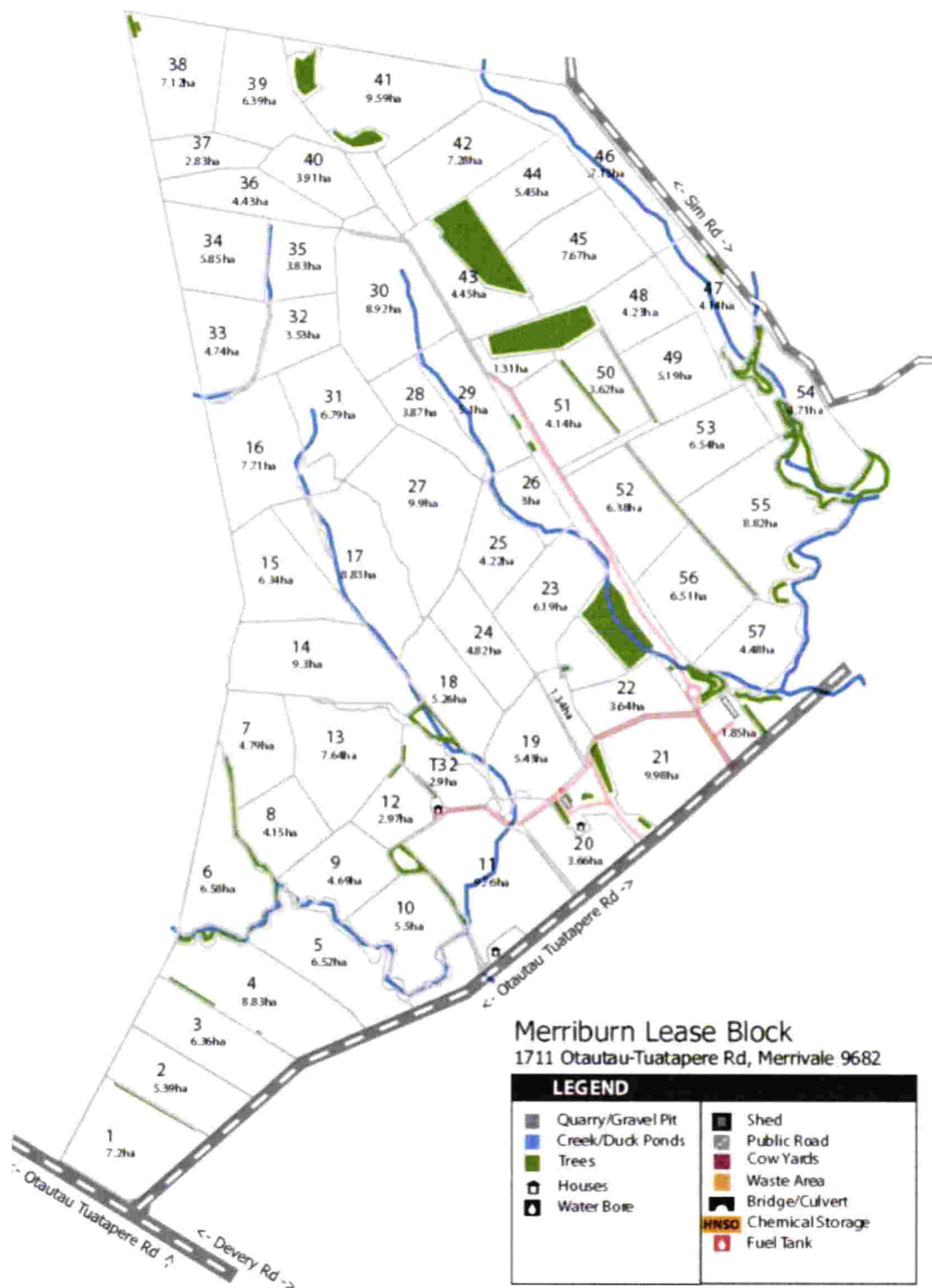
Sustainable Dairying: Water Accord

Attachment A – Waterways, CSA





Farm map for Woldwide Runoff original block (Merrivale Block)



Farm map for Woldwide Runoff lease block (Merriburn)

Appendix B – Tile drain map (Dairy platform)



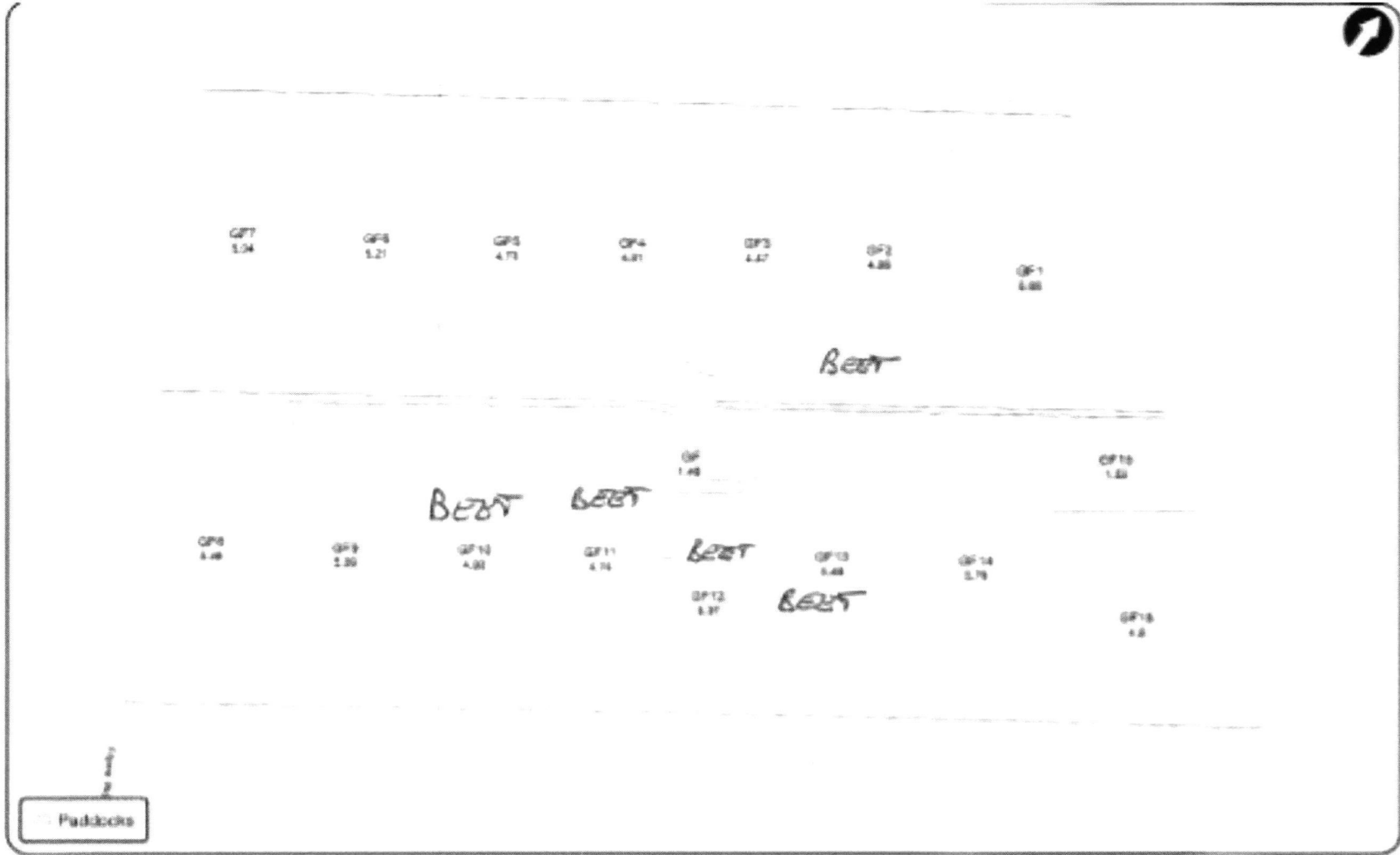
My Ravensdown Smart Maps
www.ravensdown.co.nz
Note: Areas are in hectares
Copyright Ravensdown Ltd

Drain map

0 50 100 150 200 Meters

ravensdown

Appendix C – Crop paddocks (Gladfield block)



Appendix D: Effluent Management

Effluent Orientation and Training Record

Season ___/___

Effluent Competencies	Employee name	Employee name	Employee name
General			
Understands the regional council rules and farm policies for effluent management			
Understands health and safety around the effluent system			
Understands record keeping for irrigator runs and maintenance			
At the Dairy			
Use of stormwater diversion system			
Good hosing practice and water management			
Animal handling to minimise effluent volume			
Cleaning the stone trap			
Sump, pump & pond monitoring and management (including float switches)			
In the Paddock			
When to irrigate: assessing soil and weather conditions			
Where to irrigate: runs, paddock rotations, high risk vs low risk soils etc (mark on farm map)			
Where not to irrigate: near waterways, drains, boundaries, slopes etc (mark on farm map)			
How the irrigator works, how to use it, set up, hose layout and performance checks			
Measuring the depth of effluent application			
Irrigator, pump maintenance/cleaning			
Greasing and general maintenance requirements (how and when)			
How to check and replace rubber nozzles and seals (same time as dairy rubber ware)			
Tyre pressure and condition			
Pipe-work, hose and hydrant condition			
Wire-rope, cam and ratchet condition			
Other			

Trainer signature			
Employee signature			
Date			



Date when staff become competent in each skill. If all training provided in one day, tick and date at the bottom.

Smart Water Use in the Farm Dairy

This guide looks at water use in and around the farm dairy, and whether there's potential for greater efficiency. Use it to evaluate your options for improvement.



Efficient use of water can help:

- control power use and costs
- manage effluent in a cost-effective manner
- get the most out of staff time
- reduce water costs if you pay for it by volume
- meet regulatory obligations that may apply in your region.




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Smart Water Use in the Farm Dairy

Milk cooling

Use source water from Tank 1.

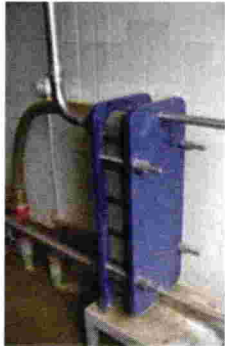
Aim for the recommended ratio of 2½ water: 1 milk

For example,

$$2.5 \text{ litres (water)} \times \text{peak daily litres (milk)} \\ \div 1,000 = \text{m}^3/\text{day water use}$$

To measure milk cooling efficiency

Measure exit flow into a 200 litre drum during milking.
Flow rate in litres/min x total daily milking time (clock this) ÷ 1,000 = m³/day water use

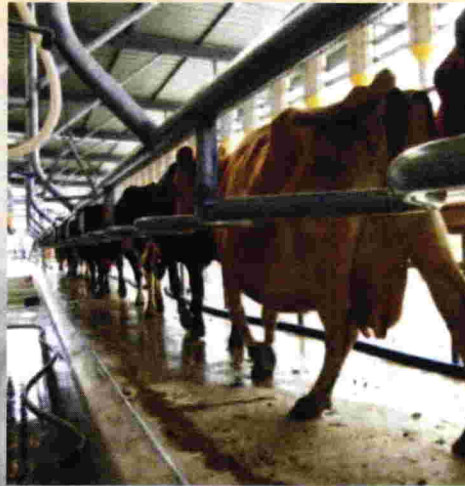


Alternatively, install a meter on the line delivering water to the plate cooler

Efficiency options

Things to consider if improved cooling efficiency is warranted:

- use of correct flow rates
- optimal plate spacing to increase flow
- pre-cool water source
- ice banks/heat exchangers (can be costly)



Return milk cooling water to Tank 2 for use in yard wash down.

Ensure adequate storage space remains to take all milk cooling water (use float ball or probes).

Capture roof water for reuse or at least exclude it from the yard to prevent increasing effluent volumes.

Yard wash down

To measure yard wash down water use

Follow the steps and calculations in the accompanying *Worksheet* to estimate water use.



Efficiency options

For manual yard washing, here are some ways to improve water-use efficiency.

- Pre-wet the yard on warm, sunny days with a yard hose or sprinkler
- Use a scraper or a chain (inside an old yard hose) on the backing gate to break up dung before hosing.
- Wash the yard after each milking.
- Work actively and close to the effluent
- Hose the yard with high water volume under low pressure.
- Include a timer setting on the yard wash down pump (set a time standard for wash down and train staff to achieve it).
- Consider capturing excess cooler water (that would otherwise go to waste) in tipper drums for yard wash.
- Flood wash with water recycled from the effluent pond (refer to conditions of use from your milk processor).



Plant/vat wash

Use water from Tank 1.

To track plant/vat water use

Wash tubs and hot water cylinders use set amounts of water. Refer to washing routine instructions supplied by the detergent companies.



Efficiency options

Here are some steps you can take to reduce plant/vat wash water use:

- Seek advice from your detergent rep on litres required for hot/cold wash options.
- Refill tanks/cylinder with automatic shut-off (to avoid overflows). Use a toilet cistern and trough floats as proven refill/shut-off options.
- Consider heat exchange or pre-heating to improve energy efficiency.

Milking routines

Procedures and practices during milking affect water-use efficiency. Below are some ways to cut water use:

- ❖ Pre-wet bail and yard
- ❖ Minimise sprinkler/spray washing.
- ❖ Hose little and often (as required) in pit area
- ❖ Put cups on dry, clean udders (see DairyNZ's SmartSAMM – www.smartsamm.co.nz)
- ❖ Implement a calm, consistent routine to reduce stress in animals and, in turn, effluent in the dairy (see DairyNZ's Milksmart – www.milksmart.co.nz)
- ❖ Maintain the dairy (paint/surfaces) to minimise the need for continual wetting
- ❖ For rotanes, use air jet or other methods instead of water to back cows off

Efficiency options

Here are a few more tips for efficient water use and to reduce water loss:

- Ensure high standard of water quality (if treatment is required)
- Do regular checks for pump pressure, line restrictions and possible leaks
- Reduce the number of hand-held hoses in use throughout the dairy.

As a measure of efficiency, yard wash water use should not exceed milk cooling water.