

Application for Resource Consent (PART A)

This application is made under Section 88 of the Resource Management Act 1991



The purpose of this Part A form and the relevant Part B form(s) is to provide applications with guidance on information that is required under the Resource Management Act 1991. Please note that these forms are to act as a guide only, and Environment Southland reserves the right to request additional information.

To: Environment Southland
Private Bag 90116
Invercargill 9840



Full name, address and contact details of applicant (in whose name consent is to be issued)

Name: White Waters Limited
 Address: 893 Kakapo Road
RD2 Te Anau 9672
 Email: whitewater@farmside.co.nz
 Phone: 021 222 0533 Preferred Additional Fax: _____

Consultant contact details (if different from above)

Contact name/agent: Karen Ladbrook, RDAgritech Ltd
 Address: PO Box 1711
Invercargill 9840
 Email: karen@rda.co.nz
 Phone: 027 530 4470 Preferred 0800 732 474 Additional Fax: _____

Please tick the box for the consent(s) you are applying for and complete the relevant Part B form(s) where available:

Land Use	Discharge	Coastal
<input type="checkbox"/> Bore/well	<input type="checkbox"/> To air	<input type="checkbox"/> Whitebait stand
<input type="checkbox"/> New or expanded dairy farming	<input type="checkbox"/> To water	<input type="checkbox"/> Structures/occupation of space
<input checked="" type="checkbox"/> Effluent storage	<input checked="" type="checkbox"/> To land	<input type="checkbox"/> Removal of natural materials
<input type="checkbox"/> Cultivation	Water	<input type="checkbox"/> Disturb foreshore/seabed
<input type="checkbox"/> Tree planting	<input type="checkbox"/> Take and use surface water	<input type="checkbox"/> Discharge/deposit substances
<input type="checkbox"/> Gravel extraction	<input checked="" type="checkbox"/> Take and use groundwater	<input type="checkbox"/> Commercial surface water activity
<input type="checkbox"/> Hill country burning	<input type="checkbox"/> Dam water	<input type="checkbox"/> Reclaim/drain foreshore/seabed
<input type="checkbox"/> Riverbed activity (incl. streams/creeks and stopbanks)	<input type="checkbox"/> Divert water	<input type="checkbox"/> Marine farming
<input type="checkbox"/> Bridges and culverts		<input type="checkbox"/> Other coastal activities

1 Are there any **current** or **expired** consents relating to this proposal?

Yes No

If yes, please provide consent number(s) and description:

301177 to Discharge FDE to Land
302514-01 to Take Groundwater

2 Are any other consents required from Environment Southland or **other authorities**?

Yes No

If yes, please state the relevant authority and the type of consent(s) required:

Building Consent from Southland District Council.

3 For what **purpose** is this consent(s) required: (e.g. discharge of effluent, gravel extraction etc.)

Discharge effluent, take water, construct effluent storage.

4 **Location** of proposed activity

Address:

893 Kakapo Road

Te Anau

Legal Description:

Sec 2 S038507

Map Reference (NZTM 2000):

1198225

E

4960554

N

5 The name and address of the **owner /occupier**: (if other than the applicant)

Name:

Phone:

Address:

6 Please attach a map or a coloured aerial photograph, showing at a minimum, the location of the proposed activities.

Refer to AEE.

7 Assessment of effects on the environment (AEE)

Please complete the applicable Part B form(s) for the proposed activities. For those activities where no Part B form is available, please attach a written statement that assesses the effects that your activities may have on the environment. An assessment of effects **must** include the following information:

- (a) *If it likely that the activity will result in any significant adverse effect on the environment, a description of any possible alternative locations or methods for undertaking the activity:*
- (b) *An assessment of the actual or potential effect on the environment of the activity:*
- (c) *If the activity includes the use of hazardous substances and installations, an assessment of any risks to the environment that are likely to arise from such use:*
- (d) *If the activity includes the discharge of any contaminant, a description of—*
 - (i) *the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and*
 - (ii) *any possible alternative methods of discharge, including discharge into any other receiving environment:*
- (e) *A description of the mitigation measures (safeguards and contingency plans where relevant) to be undertaken to help or prevent or reduce the actual or potential effect:*
- (f) *Identification of the persons affected by the activity, any consultation undertaken, and any response to the views of any persons consulted:*
- (g) *If the scale and significance of the activity's effects are such that monitoring is required, a description of how and by whom the effects will be monitored if the activity is approved:*
- (h) *If the activity will, or is likely to, have adverse effects that are more than minor on the exercise of a protected customary right, a description of possible alternative locations or methods for the exercise of the activity (unless written approval for the activity is given by the protected customary rights group).*

You should also include:

- (a) *An assessment of the activity against any relevant provisions of any relevant objectives, policies, or rules:*
- (b) *Any information specified to be included in the application in accordance with the relevant regional plan:*
- (c) *For an application to replace an existing consent, an assessment of the value of the investment of the existing consent holder:*

An assessment of effects **must** address the following matters:

- (a) *any effect on those in the neighbourhood and, where relevant, the wider community, including any social, economic, or cultural effects:*
- (b) *any physical effect on the locality, including any landscape and visual effects:*
- (c) *any effect on ecosystems, including effects on plants or animals and any physical disturbance of habitats in the vicinity:*
- (d) *any effect on natural and physical resources having aesthetic, recreational, scientific, historical, spiritual, or cultural value, or other special value, for present or future generations:*
- (e) *any discharge of contaminants into the environment, including any unreasonable emission of noise, and options for the treatment and disposal of contaminants:*
- (f) *any risk to the neighbourhood, the wider community, or the environment through natural hazards or the use of hazardous substances or hazardous installations.*

8 Affected Parties

Please attach written approval from parties who may be affected by your activity. *Written Approval of an Affected Party* forms are available on the Environment Southland website. During the processing of your application, Council may determine that additional approvals are required.

Checklist: Have you included the following?

- Payment of the required deposit (*see attached fee schedule*) *Paid electronically by Applicant.*
- N/A* Written approval from all potentially affected parties (*forms available from the Environment Southland website*)
- Site plan/location map/sketch of the proposed activity
- A copy of the Certificate of Incorporation (*where applicant is a company*)
- Part B form(s) specific to your activity and/or a separate assessment of environmental effects (AEE)


Notes:

- (a) *If your application does not contain the necessary information and the appropriate fee, Environment Southland must return the application.*
- (b) *Council cannot accept electronic lodgement of applications at this time.*

Signature of applicant

I hereby certify that to the best of my knowledge and belief, the information given in this application is true and correct.

I undertake to pay all actual and reasonable application processing costs incurred by Environment Southland.

Name (block capitals) KAREN LADBROOK, RDAGRITECH
Signed  Date 06/04/2018
(Signature of applicant or person authorised to sign on behalf of applicant)

Application to Construct, Maintain and use Effluent Storage (PART B)

This application is made under Section 88 of the Resource Management Act 1991

A complete Part A form needs to be provided with this Part B form. The purpose of this Part B form is to provide applicants with guidance on information that is required under the Resource Management Act 1991. These forms are to act as a guide only and Environment Southland reserves the right to request additional information. **This form must be used when applying for consent to construct or reconstruct effluent storage, including waste-water, sludge or effluent from an industrial or trade processes or agricultural effluent (including treatment facilities, such as weeping walls and sludge beds).**

To: Environment Southland
Private Bag 90116
Invercargill 9840

1 Location of the storage:

Address: 893 Kakapo Road
 Legal Description(s): Sec 2 SO38507
 Map Reference (NZTM 2000): 1198225 4960554

2 What types of effluent storage are you proposing to construct, maintain and use?

Effluent pond (complete 2.2 below) Tank
 Other, please describe: _____

2.2 Proposed method of lining the pond: TANK

Compacted clay Synthetic liner Concrete
 Other, please describe: _____

4 Construction Details:

Name of designer:

Kliptank Ltd

Name of builder:

Kliptank Ltd

Name of construction supervisor:

Kliptank Ltd / Southland DC

Proposed timing of construction:

May 2018

What is the total volume of the storage? (cubic metres)

2,291 m³

5 For agricultural effluent storage and sludge design, is the storage to be constructed in accordance in accordance with:

IPENZ Practice Note 21: Farm Dairy Effluent Pond Design and Construction (2013); or

Yes

No

IPENZ Practice Note 27: Dairy Farm Infrastructure (2013)

Yes

No

If no, please advise what departure from the standards is proposed and why.

6 Please provide details of the proximity of the storage to:

Nearest surface watercourse:	<u>245</u>	metres
Nearest artificial watercourse:	<u>370</u>	metres
Registered drinking water supplies:	<u>N/A</u>	metres
Nearest underground drain:	<u>125</u>	metres
Property boundary:	<u>300</u>	metres
Dwellings on neighbouring properties:	<u>620</u>	metres
Coastal marine area:	<u>N/A</u>	metres
Historic heritage	<u>N/A</u>	metres
Urban areas	<u>N/A</u>	metres

8 Please provide a description of all of the sources of waste-water, sludge or effluent to be treated and/or stored in the storage, including the storage capacity of the effluent storage in relation to the volume and nature of the liquid that will enter. For agricultural effluent, you must also attach a Massey Pond Calculator assessment of storage requirements.

Dairy shed & yard washdown effluent.

- 9 Please provide a description the quality of the waste-water, sludge or effluent. Please include all operational procedures, emergency response and proposed monitoring devices to match the scale and quality of the waste-water, sludge or effluent being stored and sensitivity of surrounding environment.

Farm dairy effluent. Expected to be within normal quality parameters set out in Section 3.2 of the FDE Code of Practice.

High level alarms on tanks.
Refer also to AEE.

- 10 Please include an operational management plan that includes:

- Operational procedures:
 - For example, how will the pond be managed day to day?
- Emergency responses:
 - For example, what will you do if the pond fails?
- Monitoring and reporting you will undertake:
 - For example, the frequency of visual inspections; the use of inspection ports or an alarm on the pond.
- When pond drop tests will be completed

- 11 Please include engineering drawings for the proposed structure(s). This will include, but not be limited to:

- the height of the embankments; and
- placement and orientation of the effluent storage relative to flood flows and stormwater run-off.

- 12 Please include a map or aerial photograph showing the following:

- the location of the proposed storage;
- the total property area boundary;
- surface water bodies, artificial watercourses, installed subsurface drains and wetlands nearby;
- water supplies - bores, registered drinking etc.;
- the coastal marine area and the distance to it (if relevant);
- the location of any dairy sheds and residential dwellings; and
- any additional points of interest – historic heritage, places of assembly etc.

Please note that upon completion of the storage and prior to discharge, you will be required to provide certification of the design and build by a Chartered Professional Engineer.

END OF FORM

Resource Consent Application for the Discharge of Agricultural Effluent (Part B)



This application is made under Section 88 of the Resource Management Act 1991

A complete Part A form needs to be provided with this Part B form. The purpose of this Part B form is to provide applicants with guidance on information that is required under the Resource Management Act 1991. These forms are to act as a guide only and Environment Southland reserves the right to request additional information.

Section A: Application details

1. Please provide details of your existing resource consent to discharge agricultural effluent:

(a) Consent number

30177

(b) Expiry date

26 June 2017

2. What is the maximum number of animals from which you propose to collect effluent from under this resource consent application?

599

animals

Note: if you wish to increase the size of your milking herd, this form is not suitable for your use. Please contact Environment Southland staff for more information.

Section B: Location of discharge and description of surrounding environment

3. Location of the proposed discharge:

Address:

893 Kakapo Rd Te Anau

Map reference:

1198225 4960554

Legal description

Sec 2 SO 38507

4. Please complete the following tables which tell us about your property and effluent disposal area. Information can be found on the Environment Southland Website in the Beacon application, or by contacting Environment Southland.

Property Details:-	
Total Farm Area (ha)	206
Effective Farm Area (ha)	226
Size of effluent disposal area (ha)	103
Stocking rate	2.9 cows/ha
Freshwater Management Unit	Waiau.

Refer to AEE section 1.2.

Effluent Disposal Area Details				
Soils	Soil Type	Vulnerability Factors		
		Structural Compaction	Nutrient leaching	Waterlogging
FDE land classification	Category A – Artificial Drainage or coarse soil structure Category B – Impeded drainage or low infiltration Category C – Sloping land (over 7 degrees) Category D – Well drained flat land Category E – Other well drained but very stony flat land			
Physiographic zone (s)	Zone	Contaminant pathway(s) for Physiographic zone		

5. Are there any permanent or intermittent rivers, streams, lakes, drains, ponds or wetlands within 20 metres of the discharge area?

Yes (Go to question 6)
 No (Go to question 7)

6. Features of the rivers, streams, lakes, drains, ponds or wetlands within 20 metres from the discharge area include:

- (a) signs of instream life (e.g. fish, eels, bullies, crayfish, native birds, frogs)
- (b) areas where food is gathered from a water body (e.g. watercress, eels, wildfowl)
- (c) bird nesting habitats
- (d) areas of particular aesthetic, cultural, heritage or scientific value (e.g. archaeological sites)

Yes	No
	✓
	✓
	✓
	✓

7. Are there any bores or soakholes within 20 metres of the discharge area?

Yes

No

8. Are you proposing to discharge effluent within:

- (a) 20 metres of any lakes, rivers, ditches, drains, wetlands, or the coastal marine area?
- (b) 200 metres of a house on a neighbouring property or a public place such as a school or community hall?
- (c) 20 metres of a property boundary?
- (d) 100 metres of a bore?

Yes	No
	✓
	✓
	✓
	✓

8.1 If you are proposing to discharge effluent within these distances, what (if any) are the separation distances you are proposing?

	<u>Metres from discharge area</u>
(a) surface waterbodies	20
(b) artificial watercourses	20
(c) subsurface drains	20
(d) the coastal marine area	N/A
(e) residential dwellings and places of assembly	200
(f) landholding boundaries	20
(g) water abstraction points	100
(h) registered drinking water supplies	N/A

9. Please attach a scaled farm plan or a coloured aerial photograph, showing:

- farm boundaries;
- paddock boundaries;
- effluent disposal paddocks (numbered and size in hectares);
- irrigation system layout;
- tile drains/mole drains;
- streams, rivers, farm drains, springs and wetlands;
- bores within 100 m of the disposal area;
- any known water abstraction points within 100 m of the disposal area;
- buildings (houses, sheds, wintering pads) and/or other places of assembly;
- effluent storage pond(s) and any effluent treatment infrastructure;
- cow races;
- dairy shed location;
- any other discharge areas (such as whey);
- any areas prone to flooding;
- any swampy areas (i.e. where water builds up in the sediments close to the ground surface above layers of poorly draining soils) within the discharge area.

Section C: Description of proposed activity

10. Dairy shed effluent

- (a) How many cows will be milked each day? 599
- (b) How many times per day will you milk (maximum)? once/twice/three times per day
- (c) What is the length of the milking season? (please include dates)
285 days
20/08 - 31/05 (dates)
- (d) What is the volume of wash down effluent generated per day?
25,500 (litres/day)

11. Winter milking

- (a) Does your milking season include winter milking? NO
- (b) If yes, what is the number of cows to be milked in winter?
 _____ cows
- (c) How many times per day will you milk
once/twice/three times per day
- (d) Dates of winter milking season
 _____ (provide dates)

12. Feed pad/wintering pad/stand-off pads

- (a) Number of cows on feed/wintering/stand-off pad _____ cows
- (b) What is the size of the area? _____ square metres
- (c) Is the feed/wintering/stand-off pad roofed? _____ Yes/No
- (d) Is rainwater diversion in place? _____ Yes/No
- (e) Is it mechanically swept? _____ Yes/No
- (f) If it is washed down, amount of water used _____ litres/day
- (g) How is effluent from this facility disposed of? _____
- (h) Intended length of time the area is to be used _____ days per year

13 Please describe any other sources of effluent that is collected for discharge e.g. stock underpasses and silage pads

NONE

14. Total volume of effluent:

Using your answers to questions 11-14 (above) what is the total volume of effluent to be discharged (in cubic metres/day)?

Average effluent generation up to $25.5 \text{ m}^3/\text{d}$.
Up to $240 \text{ m}^3/\text{day}$ may be discharged.

Effluent irrigation rate and method

15. Please describe how effluent will be collected, treated and discharged to land and when it will be discharged to land:

Gravity - fed to pump near shed.
Pumped to storage tanks.
Irrigated to Land with slurry tanker.

Proposed instantaneous effluent application rate* N/A mm/hr

Proposed effluent application depth 5 mm per application

*This is the depth of effluent that would be applied to a soil surface if the irrigation system was run continuously for one hour.

16. Has the effluent irrigator discharge rate been checked and calibrated recently? This is particularly recommended for high rate irrigators.

No
 Yes

If yes, then please include the results of the test.

Section D: Storage facility

17. What volume of effluent storage and treatment do you have on site (m³)?

Please include a Massey Effluent Pond Calculation to show that you have, or will have sufficient effluent storage.

Effluent Pond/Tank	<u>1,100</u>	Cubic metres
Sump(s)	_____	Cubic metres
Weeping wall/sludge bed	_____	Cubic metres
Other (please specify)	_____	Cubic metres

18. Are you increasing storage on site?

- Yes (Go to question 19)
No (Go to question 20)

If you are increasing your storage then please complete the land use consent application form for effluent storage.

19. By how much and to what volume?

2063 Cubic metres

20. When was your effluent storage and treatment installed?

2013

21. Has your current effluent storage pond, tank or structure been certified by a Chartered Professional Engineer as being structurally sound?

No

YES

22. Have you undertaken an Effluent Pond Drop Test that has been certified by a Chartered Professional Engineer?

(Refer to Appendix P of the proposed Southland Water and Land Plan for the Effluent Pond Drop Test methodology (shown at the back of this form))

Yes

No

If you have certification from a Chartered Professional Engineer, please attach the certification to your consent application

23. Pond level drop

Information in this section will be known if you have had a drop test performed on your existing pond. Please contact the Consent Authority for advice as to whether or not you need to perform this test on your storage.

(a) What is the pond level drop for your storage facility? _____ (mm per 24 hours)

(b) What is the maximum depth of your pond (excluding freeboard) _____ (metres)

(c) Does your pond level drop exceed the maximum allowable pond level drop (see table below)?

No
 Yes

Maximum Depth of Pond (m) excluding freeboard	Maximum Allowable Pond Level Drop (mm per 24 hours)
<0.5	1.2
0.5 to 1.0	1.4
1.0 to 1.5	1.6
1.5 to 2.0	1.8
>2.0	2.0

Section E: Assessment of Effects

24. Please describe any possible long term or short term effects the discharge may have on the quality of the receiving environment and including effects on water bodies, biota (plant and animal life), soil quality, and human health:

Please refer to the attached.

Section F: Good Management Practices and Mitigation Measures

Please include a description of the monitoring or good management practices to be undertaken to help avoid, reduce, remedy or mitigate the actual or potential effects on environmental features and values.

25. Are there any times when you will avoid disposing the effluent to land?

Yes No

If yes, please indicate below the times you will avoid effluent disposal

- (a) When there is snow on the ground ✓
- (b) Areas where food is gathered from watercourses (e.g. watercress, eels, wildfowl)? ✓
- (c) When rainwater or irrigation water has ponded on the land surface ✓
- (d) When the soil temperature is at or below 5 degrees Celsius ✓
- (e) When the soil moisture conditions as per Council's monitoring site, or my own soil moisture site say it is unsuitable ✓
- (f) Other (please state) _____

To minimise the risk of adverse effects from odour and spray drift, it is recommended that effluent shall not be discharged within 20 metres of the property boundary or 200 metres of any residential dwelling other than those on the subject property. If you cannot adhere to this buffers, then please describe what effects there may be beyond the property boundary resulting from odour and/or spray drift.

26. **What contingency plans do you have in place in the event you are unable to discharge the effluent to land, including during bad weather conditions or if any equipment breaks down:**

Examples: The capacity of my storage facility is sufficient to defer irrigation in unfavourable weather conditions; or I plan to have the effluent taken off my property.

Deferred irrigation storage capacity.

27. **What good management practices will you use to avoid or mitigate the effects and the risks of your discharge to the environment? For example: low rate effluent discharge.** *These can be found on the Environment Southland website, including on the relevant Physiographic zone information sheets.*

Please refer to FEP.

My maintenance for my effluent system includes:

Please refer to FEP.

The checks I will undertake on my effluent storage and treatment and disposal system to ensure it is not leaking or is not broken are:

Please refer to FEP.

I monitor my effluent discharge by:

Please refer to FEP.

Section F: Other matters

28. Please specify the duration sought for the resource consent:

10 years

Please say why you think this consent duration is appropriate for your operation:

Please refer to AEE section 5.8.

29. Do you have a current collected agricultural effluent management plan?

Yes No

This plan can be part of the plan that you have prepared for your farm to meet the requirements of Appendix N of the proposed Plan. If you do have a plan which sets out how you manage your effluent then please include it in this application.

30. Have you identified any parties which may be affected by the activity?

Yes No

If **yes**, please indicate below

(a) Neighbours

(b) Other consent holders in the immediate area

(c) Department of Conservation

(d) Iwi (Te Ao Marama Inc; Te Rūnanga O Ngāi Tahu

(e) Local authorities

(f) Fish & Game New Zealand

(g) Other (please state)

Please include evidence of any consultation undertaken for this application.

Section G: Planning Assessment and Declaration

The Resource Management Act 1991 requires you to make your own assessment of your proposal against relevant policies. A separate planning assessment sheet is available to use, or you can do your own assessment. The planning assessment can be found on our website, under the application forms. An assessment must be included with your application.

I hereby certify that to the best of my knowledge and belief, the information given in this application is true and correct.

I undertake to pay all actual and reasonable application processing costs incurred by Environment Southland.

Name (please print) KAREN LADBROOK, RDAGRITECH

Signed *[Signature]*

Date 06/04/2018

END OF FORM

Application for a Water Permit (PART B) - To Take and Use Groundwater



This application is made under Section 88 of the Resource Management Act 1991

A complete Part A form needs to be provided with this Part B form. The purpose of this Part B form is to provide applicants with guidance on information that is required under the Resource Management Act 1991. These forms are to act as a guide only and Environment Southland reserves the right to request additional information. **Please also refer to Appendix A of the Regional Water Plan for Southland, 2010 AND Appendix L of the proposed Southland Water and Land Plan 2018 .**

User Charges: Please note that annual User Charges will apply to all water permits. Schedule 6 of Environment Southland's User Charges and Fees document outlines the Annual Research and Monitoring Charges, which you should consider before applying for a water permit. Please refer to www.es.govt.nz/resource-consent/fees for more information on annual user fees and charges.

To: Environment Southland
Private Bag 90116
Invercargill 9840

1 What is this application for?

a new groundwater take

the renewal of existing consent no:

302514-01

2 What duration of resource consent is sought?

10

years

3 For what purpose(s) will the water be used?

Stock water and/or dairy shed use

Irrigation

Community supply

Commercial/industrial

Other

If other, please describe:

4 Please provide details of the bore(s) from which you wish to take water. If you do not have an existing bore, you will need to apply for a consent to construct a bore before you apply to take groundwater. Please refer to the relevant Part B form.

Bore 1: NZTM 2000	<u>1198277</u>	E	<u>4961692</u>	N	Bore number:	<u>D43/0108</u>
Bore 2: NZTM 2000	E	N	Bore number:

	Bore depth (m)	Screen depth (m)	Diameter (mm)	Pump type	Pump capacity (l/s)
Bore 1	58.4	44.7	150		0.5
Bore 2					

5 How much water do you propose to take and at what rate will it be taken?

Maximum rate of take 42 litres per second

Maximum daily volume 40 cubic metres per day

Maximum weekly volume 280 cubic metres per week

Maximum monthly volume 1,240 cubic metres per month

Maximum annual volume 21,000 cubic metres per year

6 What is the frequency of the proposed water take?

How many hours per day (maximum)? 24

How many days per week (maximum)? 7

How days per month (maximum)? 31

7 Please state the name of the aquifer that you propose to take water from.

Te Anau

8 Do you intend to store your water before subsequent use?

If yes, what/how much storage will be provided? 100 m³

What type of storage facilities are proposed? 4x tanks

You may need a building permit and/or additional resource consents for the construction of storage facilities.

9 What type of water metering system is installed or proposed to be installed? Environment Southland prefers all takes for 5 l/s or more to be fitted with telemetry to report in line with the Resource Management (Measurement and Reporting of Water Takes) Regulations 2010.

Water meter Data logger Telemetry

10 If you propose to use water for stock and/or dairy shed use – please answer the following:

(a) What type of animal and numbers of stock will be supplied with water for drinking?

<input type="checkbox"/>	Sheep	Number	_____	Water required:	_____	litres/head/day
		:				
<input type="checkbox"/>	Beef cattle	Number	_____	Water required:	_____	litres/head/day
		:				
<input checked="" type="checkbox"/>	Dairy cows	Number	599	Water required:	20	litres/head/day
		:				
<input type="checkbox"/>	Other	Number	_____	Water required:	_____	litres/head/day
		:				

(b) How much water do you require for your dairy shed? 50 litres/head/day

11 If you propose to use water to irrigate land – please answer the following:

(a) How many hectares of land will be irrigated? _____

(b) What is the soil type(s) of the land being irrigated _____

(c) What will you be irrigating (i.e. crop, pasture etc)? _____

(d) What type of irrigation system will be used? _____

(e) What is the target application rate (mm/day and mm/year)? _____

(f) How have you calculated the amount of water you need? (attach separate pages if required)

12 If you propose to use water for industrial use – please answer the following:

(a) What type of industry will be using the water and how will the water be used?

(b) How have you calculated the amount of water you need? (attach separate pages if required)

13 If you propose to use water for commercial/domestic supply – please answer the following:

(a) What type of establishment will use the water?

	Households – number of households to be supplied: _____
--	---

	Camping grounds – maximum number of visitors and staff per year: _____
--	--

	Schools – maximum number of students and staff per year: _____
--	--

	Motel units – number and expected occupancy: _____
--	--

	Other: _____
--	--------------

(b) How have you calculated the amount of water you need? (attach separate pages if required)

14 If you propose to use water for any other purpose, please describe the amount of water you will need and how this has been calculated (please attach a separate sheet to this application, if necessary).

- 15 Please describe any other sources of water available for the property. Describe how much water is available and what it is used for.

Refer to Section 1.3 of the AEE.

- 16 Please also describe any measures you are proposing to minimise wastage of water and maximise its efficient use:

Regular checks of tanks & water system for leaks.

- 17 Does your proposed water take have any associated discharges? If yes, please describe.

Yes

No

Please note that a discharge into the environment may require a resource consent application to be made specifically for the discharge (please refer to the relevant Part B form).

Discharge of FDE.

Existing Environment

18 Are any of the following features found within the existing environment of the proposed activity? Describe these features in the space below, along with details of the assessment undertaken to determine the presence of these features.

- (a) Signs of instream life (e.g. fish, eels, bullies, crayfish, native birds, frogs)?
- (b) Areas where food is gathered from a water body (e.g. watercress, eels, wildfowl)?
- (c) Wetlands, wildlife habitats or bird nesting habitats (e.g. swamp areas)?
- (d) Other activities occurring in the area (e.g. commercial activity, fishing, swimming, boating)?
- (e) Areas of particular aesthetic, cultural, heritage or scientific value (e.g. archaeological sites)?
- (f) Waste discharges and/or monitoring sites?
- (g) Other water takes?
- (h) Surface water bodies? Natural springs?

Yes	No
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>

Please also include a map or aerial photograph showing the following:

- the location(s) of the existing points of take;
- the location of proposed points of take(s);
- the location of water measuring device(s);
- the total property area boundary;
- the area(s) to be irrigated (if relevant);
- the area(s) of community supply (if relevant);
- distances to any discharge activities;
- other surface water bodies and wetlands nearby and the distance from the point of take(s) to them;
- the coastline and the distance to it (if relevant);
- the location of any dairy sheds (if relevant).

Please refer to AEE.

Assessment of Effects

19 Will the take and use of groundwater have any effects on the following:

- (a) Aquifer storage volumes
- (b) Existing bore or well yields
- (c) River and stream flows, including minimum flows and allocation levels
- (d) Wetland and lake water levels
- (e) Groundwater quality

Yes	No
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>

*For those answered **No** above, please describe why there will be no effects. For those answered **Yes**, please describe how these effects may occur.*

20 Pursuant to Schedule 4 of the Resource Management Act, 1991, there are a number of matters that must be addressed by an assessment of environmental effects. Please discuss what effects the proposed activity will have on the following:

- (a) any effect on those in the neighbourhood and, where relevant, the wider community, including any social, economic, or cultural effects

Refer to AEE Section 4.3.

- (b) any physical effect on the locality, including any landscape and visual effects

as above

- (c) any effect on ecosystems, including effects on plants or animals and any physical disturbance of habitats in the vicinity

as above

- (d) any effect on natural and physical resources having aesthetic, recreational, scientific, historical, spiritual, or cultural value, or other special value, for present or future generations

as above

- (e) any discharge of contaminants into the environment, including any unreasonable emission of noise, and options for the treatment and disposal of contaminants

as above

- (f) any risk to the neighbourhood, the wider community, or the environment through natural hazards or the use of hazardous substances or hazardous installations

as above

- 21 Please include a description of the monitoring or mitigation measures (including safeguards and contingency plans where relevant) to be undertaken to help avoid, reduce, remedy or mitigate the actual or potential effects on environmental features and values.**

Regular checks.

Prompt repair of leaks.

Read meter weekly.

- 22 Please include a description of any possible alternative locations or methods for undertaking the activity and why these alternatives have not been selected.**

Refer to Section 1.3 of AEE.

- 23 Please include evidence of any consultation undertaken for this application. This may include (but not be limited to) consultation with adjoining landowners, other consent holders in the immediate area, iwi (e.g. Te Rūnanga O Ngāi Tahu, Te Ao Marama Inc.), government departments/ministries (e.g. DOC), territorial authorities and recreational associations.**
- 24 Appendix A of the Regional Water Plan for Southland, 2010, details the level of further assessment required as part of your application. This may include the following assessments (please attach as a separate report):**
- interference effects/drawdown;
 - radius of influence;
 - stream depletion effects;
 - an assessment of the dynamic aquifer response to abstraction.
- 25 Appendix L of the proposed Southland Water and Land Plan, 2016, details the level of further assessment required as part of your application. This may include the following assessments (please attach as a separate report):**
- aquifer test requirements;
 - stream depletion effects;
 - interference effects;
 - calculation of seasonal groundwater allocation;
 - establishing allocation volumes for confined aquifers.

Please note that in accordance with Schedule 4 of the RMA, you may also be required to provide an assessment of whether or not the proposed activity is contrary to any of the relevant provisions of the following documents.

(a) Regional Policy Statement for Southland, 1997

(b) Southland Regional Policy Statement, 2017 (and any proposed/subsequent versions)

(c) Regional Water Plan for Southland, 2010

(d) Proposed Southland Water and Land Plan, 2018 (and any proposed/subsequent versions)

(e) National Policy Statement for Freshwater Management, 2014

(f) National Environmental Standard for Sources of Human Drinking Water, 2007

(g) Resource Management (Measurement and Reporting of Water Takes) Regulations, 2010

Staff are able to advise whether this is required, as it is dependant on the location, scale and complexity of your proposal. We invite you to come in for a pre-application meeting with Environment Southland consents staff to discuss this.

END OF FORM

RESOURCE CONSENT APPLICATION
ASSESSMENT OF ENVIRONMENTAL EFFECTS
(SCHEDULE 4 RMA)

JOB TITLE	WHITE WATERS DAIRY
JOB NUMBER	50500
	6 April 18

APPLICANT	White Waters Limited
APPLICATION	To renew discharge and water permits for an existing dairy farm. Land Use Consent for Effluent Storage
SITE ADDRESS	893 Kakapo Road, Te Anau
LEGAL DESCRIPTION	Section 2 SO 385807
MAP REFERENCE	NZTM 2000 1198265 E, 496595 N

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Prepared by



Karen Ladbrook
NZCE (Civil), MEngNZ
Environmental Engineer

Reviewed by



Jarred Martin
General Manager

White Waters AEE updated

1. SUMMARY

1.1. PROPOSED ACTIVITIES

White Waters Limited owns the subject property, which is used for dairy farming. The discharge and water permit expired on 26 June 2017.

The Applicant intends to renew the discharge permit, for a maximum of 599 dairy cows, milked through a 31 aside Herringbone shed. The applicant proposes to slightly amend the effluent application area.

In conjunction with renewing the above consents, the Applicant is seeking land use consent to construct additional effluent storage to meet the Farm Dairy Effluent Design Code of Practice (FDE COP) 90th percentile and comply with IPENZ Practice Note 21 - Dairy Effluent Pond Design and Construction 2013.

Effluent Storage

The additional storage is proposed to be an above-ground "Kliptank" effluent tank. The Kliptank is constructed from a series of HDPE Wall panels reinforced with galvanized wire rope. The tank is lined with a synthetic polypropylene liner.

This type of tank requires a Building Consent from Southland District Council and is subject to producer statements for both design and construction, that are issued by a Chartered Professional Engineer. The proposed tank site is shown on the Tank Site Map in Appendix A. The proposed tank is entirely above-ground. An updated Massey Dairy Effluent Storage Calculator (DESC) report has been included in Appendix B of this AEE. Plans for the proposed tank are included in Appendix C.

The current effluent system includes stone and sediment separation via the yard grating and pump sump. Raw effluent is gravity fed to a pump sump near the dairy shed and then pumped to a Hynds "Megapond" concrete storage tank located approximately in the centre of the farm.

The existing "Megapond" tank was constructed in approximately 2013 under the supervision of a Chartered Professional Engineer, (refer Appendix D). The tank is constructed from pre-stressed concrete panels jointed with a proprietary expanding sealant, (refer Appendix D drawings S01 and S03). The tank base is a minimum 125mm thick reinforced concrete slab poured in-situ, with a double-layer of polyethylene membrane and blinding sand under the slab (refer Appendix D, drawing S02). As the tank is concrete-lined a leak detection system is not required. The portion of the tank that is above ground level can be easily inspected for seal integrity and evidence of leakage at any time.

The intended life of both of these types of effluent storage tank is not less than 50 years (unless otherwise specified in the building consent application).

The Applicant will divert rainfall from the dairy shed and yard area to reduce effluent volumes.

The new effluent storage will be constructed approximately May 2018 however this is subject to supply availability and obtaining the required building consents, and may take until August 2018 if there are delays.

Discharge of Effluent to Land

Effluent is applied to land at depths not exceeding 5mm, using a slurry tanker. The total effluent application area is calculated to be 103.5 ha. The average annual effluent volume from the Massey DESC is 10,376m³. Assuming 80% utilization of the effluent area and even application across the area, results in an average application depth of 12.5mm/year across the utilized area. In practice, this would represent between two and three applications of 5mm over the course of the year to apply all effluent generated, (or a total of 10 to 15mm on any individual area). According to Massey DESC, there are approximately 200 irrigation days per year (on average).

The Applicant owns a "Joskin" slurry tanker (pictured below). This type of slurry wagon does not have nozzles, rather there is a deflector plate at the rear. Effluent exits the tank under pressure through a pipe and strikes the plate which causes it to spray out in a fan shape.



White Waters Slurry Wagon



Typical example of slurry wagon spreading

Application depth is primarily adjusted by altering the speed of the vehicle towing the slurry wagon, although the wetted width can be adjusted via the deflector plate and is affected by the pressure of the delivery pump. It is possible for almost any slurry tanker to achieve 5mm depth by simply travelling faster. Because they are driven or towed by a motorised vehicle, slurry tankers are less vulnerable to the risk of being stopped by uneven ground, or low pump pressure, (as can occur with travelling irrigators).

Best practice for slurry tanker application is to carry out several application rate tests at varying travel speeds and then develop an Application Depth Table that sets out the depth applied at various speeds. The Applicant proposes to undertake application rate testing within three months.

On slopes in excess of 11° (about 1 in 5, or 20%) use of a slurry tanker is impractical. In wet conditions, slurry tanker use is restricted to flatter areas because the risk of the vehicle sliding is greater. On heavier soils there may also be a risk of getting stuck and/or damaging the pasture cover and soil structure. This effectively self-limits slurry tanker use to suitable areas and conditions.

For low application depths, provided that there is no run-off of effluent, and there is a soil moisture deficit equal to or greater than the applied depth, the application rate of the land application system may exceed the expected infiltration rate of the soil. Because an Operator is required to be present to run the slurry tanker, effluent application can be continuously monitored and if ponding or runoff occurs, the application can immediately be adjusted, moved to another area or stopped. The Massey DESC accounts for soil moisture deficit and the White Waters DESC model does not program effluent irrigation on days where the deficit is likely to be less than 5mm.

Taking of Groundwater

The applicant proposes to continue to abstract groundwater from an existing bore at a maximum of 40 m³/day. The farm is also supplied with water from the Southland District Council's Kakapo Rural Water Supply at a rate of 15 m³/day. Average water use will vary throughout the year depending on the type and number of animals on the property.

The average volume required in the dairy shed is 42.5L/cow/day however there may be occasions when use is higher and up to 50L/cow/day. The consent application specifies the estimated maximum requirement; however it should be noted that the Massey DESC modelling tool has used average figures, in accordance with model user guidelines.

The peak daily and average annual water consumption requested is consistent with the water use figures quoted in Appendix L of the proposed Southland Water and Land Plan.

Grazing of replacement stock occurs year-round however the main dairy herd are wintered off-farm. There are no feed and/or wintering pads proposed.

Other Activities

There is a 5-bay implement shed at the southern end of the property (near the road frontage) that is used to house calves during the calving season. When used for calves the shed is to have a bark/chip or sawdust floor and there will be no discharge of animal effluent. This use is a permitted activity if solids are spread in accordance with Rule 38 of the proposed Water and Land Plan and Rule

The Applicant has established living quarters adjacent to the dairy shed. At present a portable toilet is used for black water, which is a permitted activity if disposed of at an approved dump station or via a consented wastewater network. The nearest such facilities are in Te Anau. A holding tank is to be installed for greywater, until a septic tank system has been installed to treat all domestic wastewater.

1.2. DESCRIPTION OF THE AFFECTED ENVIRONMENT

The farm is situated 14km northeast of Te Anau township in between the Upukeroa and Whitestone catchments. The farm consists of rolling hill country with terraces, ranging in elevation from 379m to 424m above mean sea level.

Total Farm Area (ha)	225
Effective Area (ha)	207
Bedrock/Hill Country	225 ha (100%)

The property is located within the Bedrock/Hill Country physiographic zone and contains several small streams, most of them feeding the Whitestone catchment with one stream contributing to the Upukeroa catchment. The Bedrock/Hill country zone is associated with overland flow in steeper areas, and artificial drainage in flatter areas, both of which can allow the loss of nitrogen, phosphorus, sediment and microbes to waterways.

The property is outside the coverage area of both Topoclimate and Smaps soil mapping systems. Site investigations to assess soil types and soil properties were undertaken. These built upon prior work undertaken during the previous consent application in 2012.

The dominant soil types on the property are assessed as Te Anau and Kakapo, with small areas of Otanomomo Soils. Te Anau soils have a Landscape Classification of "C" – Sloping land (>7°) or "D" – Well-drained flat land. Kakapo soils have a Landscape Classification of "C" – Sloping land (>7°) or "B" – Impeded drainage or low infiltration rate. Both variants of these soils occur on the Gold Creek Dairy property. The Otanomomo (peat) soils have a landscape classification of "A" – Artificial Drainage or coarse soil structure, however have been excluded from the effluent application area due to their poor nutrient-retaining capabilities.

	SOIL TYPE	CALCULATED INFILTRATION RATE	VULNERABILITY FACTORS		
			Structural Compaction	Nutrient Leaching	Waterlogging
	Te Anau	25 mm/hr	Very Low	Medium	Moderate
	Kakapo	15 mm/hr	Moderate	Severe	Slight
FDE Land Classification (% of effluent area)	Category C (sloping land >7°)				
Groundwater Nitrate Levels	100% pristine pre-european				

There are some areas of gently undulating and undulating Te Anau soil, which would normally receive a landscape classification of "D" – well-drained flat land, however due to the range of topography across the property, and the overall rolling profile, a conservative approach has been adopted and the entire property has been classified as high-risk for effluent application. The effluent application area slopes range from flat, 0% up to 20%. Any steeper areas are excluded.

The Te Anau soils on the property are a silt loam, with a measured saturated conductivity of 6mm/hr. The Kakapo soils are also a silt loam and have a measured saturated conductivity of 2mm/hr. Using Table 4 and Figure 2 of the FDE Code of practice, the estimated soil infiltration rate for the Te Anau soils is approximately 30mm/hr and the Kakapo soils is approximately 15mm/hr. Note that the watering time will be less than 1 minute when using a slurry tanker.

Photographs showing examples of topography across the effluent area are included in Appendix E.

Groundwater Nitrate levels across the entire property are mapped as "Pristine pre-European", which is consistent with the fairly low intensity of land use in the area.

Various waterways cross the farm and the Applicant has fenced most of the permanent waterways to prevent stock access. Further fencing will be carried out over the coming years.

The majority of the property (90%) is situated within the Whitestone catchment, which is a sub-catchment of the Waiau. Water quality management zones across the property are almost evenly split between Lowland Soft-bed and Hill Country.

Approximately 10% of the entire property is situated in the Upukerora catchment. Approximately 11% of the effluent area is within this catchment. This part of the Upukerora Catchment is primarily classified as Lowland soft bed however flows into Lake Te Anau which is classified as Natural State.

Catchment Area	Total Dairy Farm Area	Effluent Area
Whitestone River Catchment	203 ha (90%)	92 ha (89%)
Upukerora River catchment	23 ha (10%)	11.5 ha (11%)
Water Quality Management Zone	Total Dairy Farm Area	Effluent Area
Lowland Soft Bed	116.4 (51%)	55.5 ha (54%)
Hill Country	109.6 ha (49%)	48 ha (46%)

The nearest surface water quality sites available are the Whitestone River at Hillside Manapouri Road, approximately 22km downstream of the farm, and the Upukerora River at Te Anau Milford Road, approximately 9.3km downstream of the farm.

The Whitestone River site is of overall good quality and meets the National Objectives Framework Attribute status "A" for nutrient indicators. The site is not showing any discernible trend in water quality factors over the past 5, or past 10 years. This site is, however, in the worst 50% to 25% of upland sites for Nitrogen and Oxidised Nitrogen. This may be reflective of land use in the area which is primarily pastoral grazing. When compared to the Upukerora site, the Whitestone is of lower quality however the two catchments differ in overall land use, the Upukerora has a higher proportion of undeveloped land.

The Upukerora River site is of overall good quality and meets the National Objectives Framework Attribute status "A" for nutrient indicators. The site is not showing any discernible trend in water quality factors over the past 5, or past 10 years. Overall ecological status is good, with MCI scores generally above 110 (most recently 119) and percent EPT richness consistently above 50% (most recently 60%).

The overall high quality of the Upukerora Site reflects the overall low intensity of land use, as farming activities are mainly pastoral grazing and the catchment is dominated by undeveloped native bush. One of the problems with using this site is that a significant proportion of the upper catchment is covered by natural-state native forest in the Fiordland National Park, and hence is relatively immune to land use impacts. This adds a significant dilution factor to any impact that may arise from land use activities in the lower catchment.

Neither site is sufficiently close to the White Waters farm to show any discernible long-term change as a result of the dairy farming activity and associated discharge of effluent.

The property abstracts groundwater from the Te Anau groundwater zone. This unconfined aquifer comprises glacial moraine and associated fluvioglacial outwash materials, mainly very poorly sorted gravel materials in a weathered silt and clay matrix. The glacial moraine and outwash materials form a thick stratified unconfined aquifer system which exhibits low to very low permeability. The Te Anau groundwater zone is primarily recharged by rainfall infiltration with limited groundwater/surface water interaction occurring along the riparian margins of the major rivers.

Annual Recharge (m ³ /year)	255,800,000
Allocation Limit - Appendix L.5.1 SWLP (m ³ /year)	118,250,000
Amount Currently Allocated (m ³ /year)	3,522,316 (2.9% of allocation limit)

The closest water take to the discharge area is the farm's own well, (refer to location plan). The nearby Kakapo Rural Water Supply is 1.2km from the discharge area and abstracts water from a shallow well in gravels associated with the nearby Upukerora River. This supply is classified as stock-only and is not supplied for drinking water.

1.3. ALTERNATIVES

An alternative method of discharge of effluent would be to water, however industry research has proven that this method causes significant adverse effects and is not a suitable option. The discharge of effluent directly to water is also contrary to the objectives and policies of the Regional Plan Water, 2010 (RWP), Southland Water & Land Plan April 2018 (SWLP), and Te Tangi a Taurira (2008).

The discharge area could be amended to exclude the small area that is within the Upukerora catchment, however if good management practices are followed and ponding/runoff does not occur, there will not be any noticeable or measurable effect from using this area to apply effluent. The Applicant wishes to maintain flexibility within the application area so that the lower-risk areas can be reserved for when conditions are marginal and allow the greatest number of irrigation days possible. Based on the calculations outlined in Section 1.1, there will be very few occasions where the land in the Upukerora catchment would need to be used. If the Applicant chose to cease use of this area there would be no noticeable or measurable difference on nutrient levels or habitat in the Upukerora River or Lake Te Anau.

Alternative supplies of water include surface water and rainwater collection. Surface waters in the area have insufficient quantity to support a take of this size and are of variable quality which may compromise the ability to comply with food safety standards in the dairy shed. Rainwater collection is impractical due to the variable rainfall and the size of collection areas and storage that would be required to ensure continuity of supply.

The property is supplied from the Kakapo Rural Water supply, which takes water from the Whitestone River and was originally developed in the 1970's to supply stock water to the Lands and Survey, (now Landcorp) Farms. The supply is now owned by Southland District Council and continues to supply stock water to the area. The supply's limited capacity means that it is unable to supply sufficient quantity to support a dairy milking operation at this location, therefore the property also has a bore to supplement the reticulated supply.

2. PLANNING FRAMEWORK

Consents are required under the RWP and the SWLP.

- The use of land for dairy farming of cows that existed as at 3 June 2016 is a permitted activity under rule 20 of the SWLP.
- The construction, maintenance and use of a new agricultural effluent storage facility is a controlled activity under Rule 32B(b) of the SWLP.
- The use of land for an existing agricultural effluent storage facility is a permitted activity under Rule 32D of the SWLP.
- The discharge of farm dairy effluent is a restricted discretionary activity under rule 50(c) of the RWP.
- The discharge of agricultural effluent to land is a discretionary activity under rule 35(b) of the SWLP.
- The taking and using of groundwater is a discretionary activity under rule 23(d)(ii) of the RWP.
- The taking and using of no more than 86 m³ per day of groundwater is a permitted activity under rule 54(a) of the SWLP.

Overall, the proposed activities are consistent with the objectives and policies of the Regional Water Plan for Southland 2010 (RWP) and the proposed Southland Water and Land Plan 2016 (SWLP).

3. NOTIFICATION AND WRITTEN APPROVALS

As this application is for renewal of consents for the same activities that have previously been consented, and any environmental effects are not expected to increase, the Applicant requests that this application be processed as non-notified. No written approvals have been sought. Extensive consultation, including notification, was undertaken when the consents were originally granted in 2012.

4. ASSESSMENT OF EFFECTS ON THE ENVIRONMENT

The Applicant has an Environment Southland Farm Focus Activity Plan. This was prepared in July 2016 and is due to be reviewed July 2017. The Applicant intends to update and revise the Focus Plan to form the Farm's FEP and meet the requirements of Rule 20 and Appendix N of the proposed Southland Water & Land Plan.

Overall, given the mitigations proposed, adverse environmental effects associated with the proposed activity will be no more than minor. Specific mitigations associated with the ongoing discharge of effluent and taking of groundwater and construction of a new tank are addressed in the following sections.

4.1. USE OF LAND FOR EFFLUENT STORAGE

POTENTIAL EFFECTS	MITIGATION MEASURES	OVERALL EFFECTS
Inadequate storage volume or poor system performance because storage assessment was inadequate	RDAgriTech have significant local experience and familiarity with Southland conditions, and have calculated the required volume of storage to suit the property and farming system using the Massey DESC tool. The storage assessment complies with PN:21 and the FDE Design Standards and Code of Practice (2015).	Effects negligible
Contamination of surface or ground water caused by structural failure or leakage from the effluent storage	The new storage tank construction will be overseen by a Chartered Professional Engineer and the Building Consent Authority to ensure that it is structurally sound and constructed according to the plans and specifications supplied.	Effects negligible
	Construction monitoring of the new storage will be undertaken by the Chartered Professional Engineer, and will also be separately undertaken by Southland District Council Building Control.	
	The Chartered Professional Engineer will issue Producer Statements for design and construction of the new storage tank.	
	The tank site area complies with the buffer distances set out in Rule 32B(a) of the Southland Water & Land Plan.	
	The existing tank was completed in 2013, and is fully lined with concrete and two layers of polyethylene. No leaks were visible between the wall panels and the wall panels and seals all appeared intact when checked in 2017.	
	The existing tank construction was overseen by a Chartered Professional Engineer and the Building Consent Authority, to ensure that it is structurally sound and constructed according to the plans and specifications supplied, and records have been attached to this application.	
	The existing tank is mostly above-ground.	

Contamination of surface or ground water caused by inadequate capacity or inadequate design	The existing tank has been designed and verified by a Chartered Professional Engineer.	Effects negligible
	The proposed tank design complies with the required standard (relevant parts of IPENZ PN:21 and the Building Code)	
	Storage size has been calculated using the Massey DESC model and meets the minimum 90 th percentile for deferred storage required by the FDE Code of Practice.	

Overall, given the mitigations measured proposed, adverse environmental effects associated with the proposed activity will be no more than minor.

4.2. DISCHARGE OF EFFLUENT

POTENTIAL EFFECTS	MITIGATION MEASURES	OVERALL EFFECTS
Contamination of groundwater by deep drainage	The proposed disposal area is significantly larger than the required minimum for 150kg-N/year, so the soils will have sufficient capacity to hold N reserves and allow uptake by plants.	Effects no more than minor
	The average N loading rate as a result of effluent application is estimated as 41kg-N/ha/year.	
	The total effluent application depth across the effluent area is estimated to be 11mm/year.	
	Effluent will be applied at low depths (5mm per application or less).	
	Effluent will not be applied to land that has been grazed within the past 7 days.	
Contamination of surface water by direct drainage or overland flow	Effluent will be applied at a low depth that is less than the saturated conductivity of the soil so that ponding does not occur.	Effects less than minor
	No irrigation on slopes >20%. On slopes in excess of 11° (about 1 in 5, or 20%) use of a slurry tanker is impractical due to the weight and length of the machinery.	
	Soil moisture levels will be monitored using aquaflex tapes which have already been installed on the property.	
	The application depth will be no more than 5mm. If there is no run-off of effluent and there is a soil moisture deficit equal to or greater than the applied depth, the land application system may exceed the expected infiltration rate of the soil without causing adverse effects.	
	In wet conditions, use of the slurry tanker is restricted to drier, flatter areas to prevent the machine from sliding, becoming stuck, or damaging pasture/soils.	

	<p>Tanker Operator can continuously monitor discharge and stop if ponding or runoff is observed.</p> <p>An application rate test will be undertaken, and an application depth table developed, which will be carried in the vehicle to enable ready reference by the operator.</p> <p>Effluent will not be applied within 20 metres of a waterway.</p> <p>Critical source areas have been identified in the FEP, and irrigation of effluent on these areas will be avoided during wet conditions.</p>	
Contamination of surface or ground water by leakage or overflow from effluent storage or the effluent irrigation systems	<p>The existing storage tank design and construction was certified by a Chartered Professional Engineer and issued with a code of compliance certificate by the Building Consent Authority and meets appropriate standards.</p> <p>The new storage tank construction will be overseen by a Chartered Professional Engineer and the Building Consent Authority to ensure that it is structurally sound.</p> <p>The two storage tanks will be of sufficient size to enable deferred irrigation. The Massey DESC accounts for soil moisture deficit and the White Waters model does not program effluent irrigation on days where the deficit is likely to be less than 5mm</p> <p>The storage tanks have 5 days emergency storage to allow for equipment breakdowns.</p> <p>The stone trap will be cleaned out regularly and solids spread onto land.</p> <p>The Applicant will prepare an Effluent Management Plan, and this will form part of the Farm Environmental Plan.</p> <p>The effluent management plan will be based on the Dairy NZ "Staff Guide to Operating your Effluent Irrigation System" and will have system-specific information appended to it.</p> <p>The effluent system will be checked for leaks and faults weekly.</p> <p>The inlet to each tank has an air-gap to prevent siphoning of effluent in the event of a pipe failure.</p>	Effects negligible provided the system is adequately maintained and operated
Over application of Effluent or overflowing pond due to inadequate deferred storage	<p>Storage requirements have been modelled using the maximum number of cows (599). The Farm will operate at a lower herd number (approximately 470) until there is sufficient storage.</p> <p>The Applicant will monitor tank levels and if necessary take measures to reduce the tank level if storage becomes a problem before the new tank is implemented. For example, a second slurry tanker may be brought in to enable a higher volume of effluent to be applied each day.</p> <p>The Massey DESC is a theoretical modelling tool and is considered to provide an overall risk-based approach to storage sizing so is not necessarily reflective of shorter periods, or any single year.</p>	Effects less than minor

	The new effluent storage will be constructed approximately March 2018 however this is subject to supply availability and obtaining the required consents, and may take until August 2018 if there are delays. The new storage will be brought into service as soon as it has been signed off.	
Reduction in stream health indicators used by tangata whenua to assess stream health, and adverse effects on the life-supporting capability of waterways	Effluent is applied to land only, and is not discharged to water.	Effects less than minor
	Mitigation measures to prevent contamination of surface and ground waters will be implemented as described above.	
Contamination of drinking water sources	There are no registered drinking water supplies within 1km of the effluent area. The nearest bore is the farm bore. The Kakapo Rural Water Supply source is 1.2km from the discharge area and is a stock supply only and is not supplied for drinking water.	Effects negligible
	A 20m buffer around the Kakapo Water Supply reservoir has been established. Effluent will not be applied to this area.	
	There will be no application of effluent within 100m of any water bore.	
	Mitigation measures to protect surface water will be undertaken (as described above).	
	Mitigation measures to protect groundwater will be undertaken (as described above).	
Adverse effects on Natural State waters in the receiving environment	A small proportion (approximately 11%) of the application area is within the Upukerora catchment.	Effects negligible
	Based on average effluent volumes and 80% utilization of the consented area, the "Upukerora Zone" of the effluent area will receive a maximum of 2-3 applications of 5mm of effluent per year.	
	Effluent applications will be undertaken according to the Good Management Practices outlined in the FEP.	
	The effluent application area is significantly larger than the minimum required, and deferred storage will be implemented, so that sensitive areas such as this may be avoided when conditions are unsuitable.	
	The two storage tanks will be of sufficient size to enable deferred irrigation and include 5 days emergency storage.	
Unpleasant or offensive odours outside the property	The storage tanks are more than 50 metres from the nearest property boundary.	Effects less than minor
	Effluent will not be applied within 200 metres of any dwelling (other than a dwelling on the property).	
	Effluent will not be applied within 20 metres of any property boundary.	

Damage to soils as a result of the application of effluent	Animals will not be grazed on land where effluent is being applied, or has been applied with the past 28 days.	Effects less than minor
Build-up of nutrients in soils as a result of the application of effluent	The application area is larger than the minimum required to achieve a loading of 150kg-N/year.	Effects less than minor
Adverse effects on human health	Appropriate buffer distances from dwellings and other properties will be observed.	Effects negligible
	Mitigation measures to protect recreational surface waters and drinking water sources will be undertaken (as described above).	

Overall, given the mitigations measured proposed, adverse environmental effects associated with the proposed activity will be no more than minor.

4.3. TAKING OF GROUNDWATER

POTENTIAL EFFECTS	MITIGATION MEASURES	OVERALL EFFECTS
Reduced water quantity or altered flows in surface water bodies	Take is at least 200m from the nearest surface water body.	Effects negligible
	Rate of take will be less than 2L/s.	
	Storage is used to reduce the impact of peak demands.	
Reduced quantity of water in the aquifer affecting current and future aquifer flows	The primary allocation limit for this aquifer has not been exceeded. No supply issues or restrictions have been experienced from this aquifer.	Effects less than minor
	Rate of take will be no greater than 2L/s.	
	Storage is used to reduce the impact of peak demands.	
Reduced availability of water for other uses	The primary allocation limit for this aquifer has not been exceeded. No supply issues or restrictions have been experienced from this aquifer.	Effects less than minor
Use of the water is inefficient and is inconsistent with resource values and tangata whenua principles	Dairy shed water use has been estimated as averaging 42.5 L/cow/day and maximum 50L/cow/day which is within efficient use guidelines.	Effects negligible
	The total volume requested represents efficient use of water and is within the SWLP limit for dairy farm use of 140L/cow/day peak. The volume requested represents 0.02% of the allocation limit for the aquifer.	

Overall, given the mitigations measured proposed, adverse environmental effects associated with the proposed activity will be less than minor.

5. STATUTORY MATTERS

5.1. PART 2 OF THE RESOURCE MANAGEMENT ACT, 1991

This application is consistent with the purpose and the principles of the Act, as set out in Section 5. The activities will have no more than minor adverse effects on the ability of the receiving environment to meet the reasonably foreseeable needs of future generations, or on the life-supporting capacity of the land or any ecosystem associated with it. Proposed good management practices and mitigation measures will ensure that any potential adverse effects of the activities will be avoided, remedied or mitigated.

There are no matters of national importance, as outlined in Section 6 of the Act, that may be affected by the activities. The application is also consistent with Section 7 of the Act, with particular regard given to the maintenance of the quality of the environment. With regard to Section 8 of the Act, the proposed activities are not inconsistent with the principles of the Treaty of Waitangi.

5.2. NATIONAL ENVIRONMENTAL STANDARDS/NATIONAL POLICY STATEMENTS

There are no National Environmental Standards that apply to this application.

The consent application is consistent with Objective A1 of the National Policy Statement for Freshwater Management 2014, (NPSFM) as the effects associated with the discharge of effluent are anticipated to be less than minor.

The proposed mitigation measures show that the discharge of dairy effluent will assist in maintaining or improving water quality, which is consistent with Objective A2 of the NPSFM.

5.3. OPERATIVE REGIONAL POLICY STATEMENT (1997)

The following objectives and policies in the Regional Policy Statement are of relevance to this application:

Objectives 1.2, 1.4, 5.4 and 6.2 and Policies 5.8, 6.4, 8.4 & 12.4

The above seek to recognise the relationship and provide for the values of Maori and associations with water, land and air. Te Tangi a Taura has been considered when preparing this proposal.

Objective 2.2 and Policy 2.4

The proposal will not adversely affect any indigenous species. Reducing in the risk of nutrient loss to the waterways may lead to an increase in various aquatic species. There is some existing riparian planting in place.

Objectives 5.1 and 5.2 and Policy 5.5 and 6.6

The above seek to maintain existing water quality and enhance where practical. The irrigation of effluent onto land is not expected to enhance water quality, however proposed mitigation measures will ensure that water quality is, as a minimum, maintained.

Policy 5.4

The proposal is to discharge effluent to land, which is consistent with this policy.

Objectives 8.1 – 8.4 and Policy 8.1 and 8.5

The above seek to avoid contamination of soils and nutrient run-off and adverse effects on air quality. Provided that effluent is applied at the appropriate rate and depth, any adverse effects should be no more than minor.

5.4. PROPOSED SOUTHLAND REGIONAL POLICY STATEMENT (2012)

The following objectives and policies in the proposed Regional Policy Statement notified 23 May 2015 are of particular relevance to this application:

Objectives TW.1, TW.2 and Policy TW.3 and TW.4

The above objectives are met through Te Tangi a Taurira. Policy TW.3 requires that iwi management plans, such as Te Tangi a Taurira, be taken into account. The proposal is considered consistent with those policies and objectives contained within sections 3.5.1 and 3.5.11.

Objectives WQUAL.1 and 2 and Policies WQUAL.1, WQUAL.2, WQUAL.4, WQUAL.6, WQUAL.7

The proposed activity is consistent with water quality objectives and policies in maintaining, through management of discharges and land use, the existing surface and groundwater quality in the area. The applicant has outlined mitigations and good management practices for effluent, which will manage effects on water quality. The proposed activity meets the Council's preference for discharges to land.

Objectives RURAL.1 and RURAL.2 and Policies RURAL.1, RURAL.2 and RURAL.5

The application is largely consistent with objectives and policies for sustainable rural land use activities. The discharge will not give rise to more-than-minor effects on soil health.

Objective INF.1 and Policy INF.2

The effluent storage capacity has been assessed as insufficient however additional storage will be established. The existing storage tank has been visually inspected and all joints appear sound and no evidence of leakage was observed. The existing tank is approximately 5 years old and can be considered as "not leaking" and will ensure adverse effects on the environment are avoided, remedied, or mitigated.

Objective BIO.1, BIO.2, BIO.3 and Policies BIO.2, BIO.6, BIO.7 and BIO.8

The discharge of effluent is unlikely to cause adverse effects that would harm indigenous ecosystems and habitats.

Objective AQ.1 and Policies AQ.1, AQ.2, AQ.4 and AQ.5

Odour effects arising from the storage and discharge of effluent will be no more than minor, as all appropriate buffers will be observed.

5.5. REGIONAL PLANS

The Regional Water Plan for Southland, (RWP) and the Southland Water and Land Plan, (SWLP) are relevant to the application.

The objectives and policies that are relevant to this application have been grouped according to topic:

Water Quality

RWP Objective 2 and Policy 3

RWP Objectives 3, 4, 8 and Policies 4, 6, 7, 13 and 25

SWLP Objectives 1-4, 6, 8, 9, 13, 18 and Policies 6, 13-16

SWLP Objectives 1 and 2 promote the integrated management of land and water resources and recognition of water and land as an enabler of primary production, contributing to social and economic wellbeing. Objectives 3 and 4 recognise the relationship between Tangata Whenua and promote the protection of their values and interests. Overall the activities in this application represent sustainable management of land and water resources and the assessment of environmental effects recognises the relationships between land, surface and groundwater. Tangata Whenua values and interests relate mainly to protection of water quality and quantity, which are addressed in the assessment of environmental effects.

RWP Objective 2 and Policy 3 are concerned with maintaining water quality and RWP Objectives 3, 4 and 8, and Policy 4 with maintaining and enhancing water quality. The SWLP Objectives 6, 8 and 9 are also concerned with

managing and maintaining water quality. The activity is consistent with these Objectives through the use of good management practices to prevent contamination of water.

RWP Objective 8 and SWLP Objective 8 both require ground water quality to meet the Drinking Water Standards. It is not anticipated that the activity, if undertaken in accordance with the consent conditions and good management practices, will result in groundwater under the property exceeding the drinking water standards.

RWP Policies 7 and 13, and SWLP Policy 14 encourage discharges to land as a preference to discharges to water, where practicable and where effects are less adverse. The Applicant will continue to discharge effluent to land, and in accordance with Policy 6, has implemented mitigation measures and good management practices to reduce the risk of effluent entering water.

SWLP Policy 6 refers to the Bedrock/Hill Country physiographic zone. Artificial drainage and overland flow are the primary contaminant pathways within this physiographic zone. The activity is considered consistent with this policy as application depths will be managed according to the high soil risk category and effluent application is continuously monitored. There are existing riparian margins and all waterways are fenced, providing further mitigation of overland flow.

The SWLP Policies 13 to 16 are largely concerned with maintaining and improving water quality as well as managing land use, including farming activities and effluent management, such that adverse effects on water are avoided. The proposed application rates and depths are consistent with best practice and any runoff to surface water or leaching to groundwater will be avoided by ensuring that application rates and depths are matched to soil conditions.

Part of the property is within the Upukerora catchment, that contributes to the Natural State waters of Lake Te Anau, however the proportion of the property in this area is small, and the number of effluent applications per year will be low. Any nutrient loss originating from this area would add to the cumulative effect of other nutrient enrichment sources however in comparison to other sources, particularly the Te Anau township sewage discharge further downstream, the effects are negligible. If the Applicant chose to cease use of this area there would be no noticeable or measurable difference on nutrient levels or habitat in the Upukerora River or Lake Te Anau.

Cow numbers, and therefore the intensity of the farming activity, are not increasing therefore Policy 16 is not applicable.

Water Quantity

RWP Objectives 5,7, and 9 and Policies 21 and 22

SWLP Objectives 1-4, 7, 11 and 12 and Policies 20 - 22

RWP Objectives 5, 7, and 9 relate to sufficient water availability and efficient use, and sustainable abstraction. Policies 21 and 22 relate to the reasonable use of water and the installation of water measuring devices.

SWLP objectives 1-4 are discussed above. Objectives 7, 11 and 12 could be summarised as preventing over-allocation and promoting sustainable use of water resources

According to Appendix L of the SWLP and standard industry guidelines, the proposed volume of water is reasonable, and the Applicant already has a water meter in place. The abstraction rate is very low. The volume requested is reasonable for its' intended purpose and represents only 0.02% of the allocation limit for the aquifer.

Soil and Land Health

RWP Objectives 9A, 9B and 9C

RWP Policies 31A, 31C, 31D

SWLP Objective 13, 13A-B, and 18

RWP Objectives 9A, 9B, and 9C, and SWLP Objective 13 and 13A-B seek to manage discharges onto or into land so that adverse effects on soil resources, human health, habitats and ecosystems are maintained. This application will not increase effluent volumes, and the volume is well within the capacity of the effluent area to take up nutrients.

Policy 31A aims to match discharges onto land to risk, and Policy 31C is to manage discharges of contaminants onto land. The establishment of deferred storage capability is consistent with this Policy. The discharge area available has ample capacity to ensure that nitrogen loadings are not in excess of 150kg-N/year. The discharge area is buffered from watercourses, water abstraction points, property boundaries, and dwellings not on the property.

Policy 31D encourages the reuse of nutrients and water contained within the discharge. Matching the rate of application of effluent to the soil's ability to uptake nutrients and the ability to avoid irrigation when soils are at or above field capacity, will maximise the potential for the reuse of nutrients.

Agricultural Effluent Policies

RWP Policies 41, 42 and 43

SWLP Policy 17

RWP Policy 41 seeks to avoid adverse effects on water quality and minimise other adverse environmental effects by ensuring that agricultural effluent ponds, (or other storage) are appropriately located, designed and constructed.

RWP Policy 42 seeks to avoid adverse effects associated with the application farm dairy effluent to land by matching effluent management to risk.

RWP Policy 43 seeks to match consent duration and inspection and audit requirements to the level of risk of adverse environmental effects.

The SWLP Policy 17 is largely concerned with avoiding adverse effects on water arising from effluent management. This includes designing, constructing, locating, maintaining and operating systems appropriately, as well as avoiding overland flow and discharge of untreated effluent. The proposed application rates and depths are consistent with best practice and the size of the effluent area means that there is significant flexibility in effluent management, enabling irrigation to be managed such that the risk of overapplication or overland flow is minimized.

Overall the application is consistent with the above policies. The Applicant proposes to increase their deferred storage and expects that relevant consent condition/s will be included in the discharge permit. The risks of the activities applied for have been outlined in the assessment of environmental effects.

5.6. REGIONAL EFFLUENT LAND APPLICATION PLAN

The following objectives and policies in the Regional Effluent Land Application Plan are relevant to this application:

Objective 4.1.1 and Policies 4.2.1 and 4.2.2

The discharge is to land, and is being undertaken in a sustainable, manner and will be managed to safeguard the life supporting capacity of soil.

Objective 4.1.2 and Policy 4.2.3

The will be managed in a way to avoid or mitigate effects on water quality and to safeguard the life supporting capacity of water.

Objective 4.1.14 and Policy 4.2.9

The discharge will not affect amenity values as the minimum required buffers will be met or exceeded.

Policies 4.2.4 and 4.2.7

The Applicant has taken a precautionary approach and the potential effects of the activity, and the effectiveness of chosen mitigations are well understood. The Applicant has implemented good management practices and is developing a farm Environmental Plan.

5.7. OTHER STATUTORY DOCUMENTS

Te Tangi a Tauira

RWP Policy 1A requires that Te Tangi a Tauira is taken into account. SWLP Policies 1, 2 and 3 seek to strengthen the relationship of Ngai Tahu with the management of land and water resources through consultation, as well as consideration of relevant Iwi Management Plans and indicators of health.

This application is for renewal of existing consents. No additional adverse effects are anticipated and no specific consultation regarding this application has been undertaken with Ngai Tahu.

Te Tangi a Tauira is the Iwi Environmental Management Plan applicable to the Southland Region. The application for renewal of the consent has had regard to the policies and objectives within the Ngai Tahu ki Murihiku Natural Resource and Iwi Management Plan. The proposal is considered consistent with those policies and objectives contained within section 3.5.1, as they relate to the effluent discharge and section 3.5.14 as they relate to the taking of water.

Provided that the activity is carried out as described in this application and in accordance with the consent conditions, there will be no additional effects on any of the stream health indicators described in section 3.5.11 of Te Tangi a Tauira, (refer to page 150).

5.8. CONCLUSION AND CONSENT TERM

Overall, the activity is consistent with the principles of the RMA and of the relevant National and Local Planning documents that support it.

A period of 10 years is sought for the resource consent to discharge FDE and the associated taking of groundwater.

The term requested recognises the changeable nature of the environment and the level of certainty around the potential effects of the activity.

Policy 43 of the Regional Water Plan and Policies 40 and 41 of the SWLP set out the matters to be considered when determining the term of a discharge permit. These policies require the Council to match consent duration and inspection and audit requirements on resource consents to the level of risk of adverse environmental effects.

The explanation for this policy states that the duration of resource consents to apply farm dairy effluent to land will correspond to the level of environmental risk.

A 10 year consent term has been requested for the following reasons:

Whilst the activity should not have a more than minor effect on water quality, there is limited data available on the current state of the environment. The activity is within the recommended limit for the application of N to land, of 150kg-N/ha/year however there is still some level of uncertainty around the nature and extent of potential effects on water quality in the long term.

- The mitigation measures for the discharge activity will meet the current expected best-practice requirements.
- The Applicant will implement the good management practices outlined in the Farm Environmental Plan (FEP). These practices are already in place or will be implemented before 1 May 2019. The mitigation measures will be reviewed annually as requested by Council.
- A 10-year term will provide a fair balance between the need for security of investment in farm infrastructure and the changing state of the receiving environment.
- The 10-year term takes into account today's technology, current understanding of the effects of the discharge activity and the current regulatory environment.

APPENDIX A. PLANS AND MAPS

1. Farm & Infrastructure Map
2. Tank Site Map
3. Farm Map
4. Soil Type Map (showing discharge area)

White Waters

Farm & Infrastructure - North End

Legend

- CSA
- Effluent Discharge
- Open Drain
- shelter
- Tiled



Google Earth

Image © 2018 DigitalGlobe
© 2018 Google



700 m

White Waters

Farm & Infrastructure - South End

Legend

-  CSA
-  Effluent Discharge
-  Open Drain
-  shelter
-  Tiled

Storage Tanks

Monitoring Bore

Dairy Shed

Kakapo Rd

Google Earth

Image © 2018 DigitalGlobe
© 2018 Google

700 m

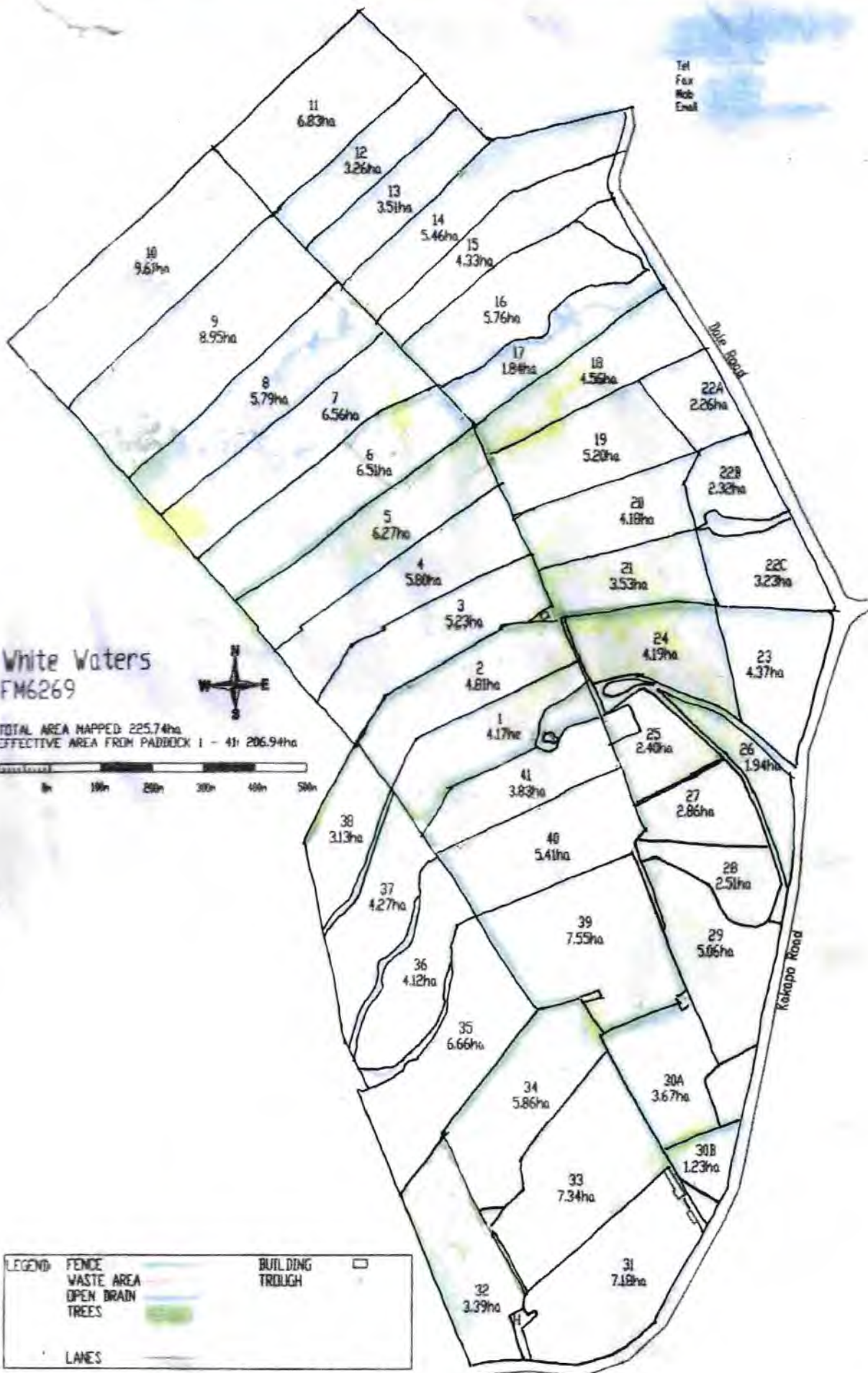




Client: White Waters Limited
Site: 893 Kakapo Road
Te Anau



Tel
Fax
Mob
Email



White Waters FM6269

TOTAL AREA MAPPED 225.74ha
EFFECTIVE AREA FROM Paddock 1 - 41: 206.94ha



LEGEND	
FENCE	
WASTE AREA	
OPEN DRAIN	
TREES	
LANES	
BUILDING	
TROUGH	

White Waters

Soil Types Map

Legend

- Effluent Discharge
- Kakapo
- Otanomomo
- Te Anau



APPENDIX B. MASSEY DESC POND SIZE CALCULATION REPORT

Dairy Effluent Storage Calculator

Summary Report

Regional authority: Environment Southland Regional Council
Authorised agent: RDAgritech - KL
Client: White Waters Limited
Program version: 1.48
Report date: Friday, 6 April 2018

General description:

Effluent Storage Tank Size Review for the Consent Limit of 599 cows.
 Milking season 20/08 - 31/05, twice-a-day milking, change to 16H as of 01/04 and OAD from 10/5.
 Water use is as advised by the Client, approximately 42.5L/c/day.
 Irrigation by slurry tanker at nominal 5mm depth per application of 12m³. Client advises average 10 loads per day
 Winter, 20 loads per day summer.
 Existing Storage Tank Dimensions are as per Building Consent documentation.
 Proposed new Tank dimensions are as per the Kliptank 2,026kL tank, however the Tasman Tanks 2000kL model is
 equivalent in dimensions, surface area and storage.

Climate

Rainfall site: Te Anau Downs
Mean annual rainfall: 1363 mm/year

Effluent Block

Area of low risk soil: 0.0 hectares
Minimum area of high risk soil: 52.0 hectares
Surplus area of high risk soil: 48.0 hectares

Wash Water

Yard wash:

- Milking season starts: 20 August
 - Milking season ends: 31 May

Month	Number of Cows	Hours in Yard	Wash Volume (cubic metres)
January	599	5.0	25.5
February	599	5.0	25.5
March	599	5.0	25.5
April	399	5.0	20.0
May	333	5.0	20.0
June	0	0.0	0.0
July	0	0.0	0.0
August	310	5.0	20.0
September	599	5.0	25.5
October	599	5.0	25.5
November	599	5.0	25.5
December	599	5.0	25.5

Irrigation

Winter-spring depth: 5 mm
Spring-autumn depth: 5 mm
Winter-spring volume: 120 cubic metres
Spring-autumn volume: 240 cubic metres
Irrigate all year? No

Don't irrigate start: 01 June
Don't irrigate end: 31 July

Catchments

Yard Area: 1112 square metres
Diverted? Yes
- **diversion start:** 01 June
- **diversion end:** 19 August
Shed Roof Area: 262 square metres
Diverted? Yes
Feedpad Area: 0 square metres
Covered? No
Diverted? No
Animal Shelter Area: 0 square metres
Covered? Yes
Diverted? No
Other Areas: 0 square metres

Storage

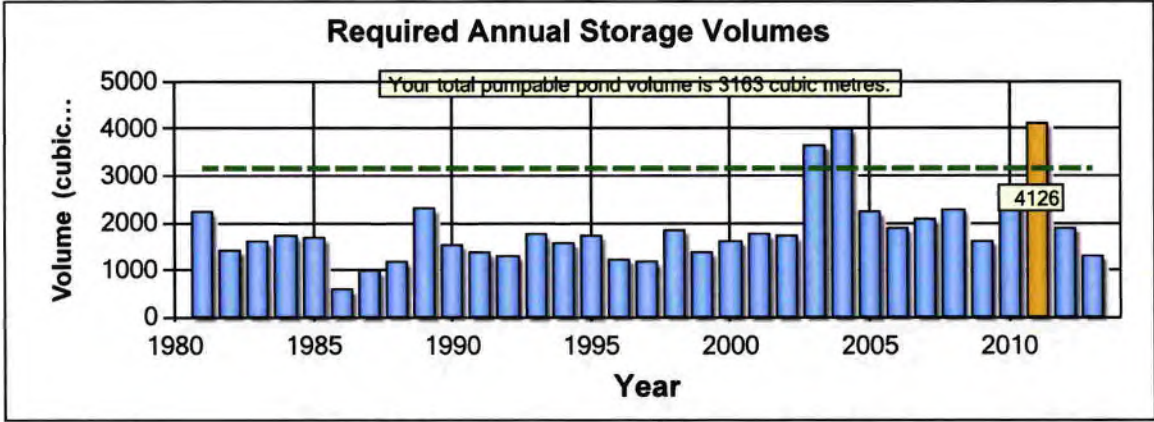
Pond/s present? No
Tank/s present? Yes
No. of tanks: 2 tank/s
Tank 1
- **total volume:** 1359 cubic metres
- **pumpable volume:** 1100 cubic metres
- **surface area:** 647 square metres
- **diameter:** 28.7 metres
- **total height:** 2.1 metres
- **pumped?** Yes
Tank 2
- **total volume:** 2292 cubic metres
- **pumpable volume:** 2063 cubic metres
- **surface area:** 1146 square metres
- **diameter:** 38.2 metres
- **total height:** 2.0 metres
- **pumped?** Yes
Emergency storage period: 5 days

Solids Separation

Solids separator/s present? No

Outputs

Maximum required storage pond volume: 4126 cubic metres
90 % probability storage pond volume: 2885 cubic metres
During the period from: 01 July 1980
To: 30 June 2013



APPENDIX C. PROPOSED NEW EFFLUENT TANK PLANS AND SPECIFICATIONS

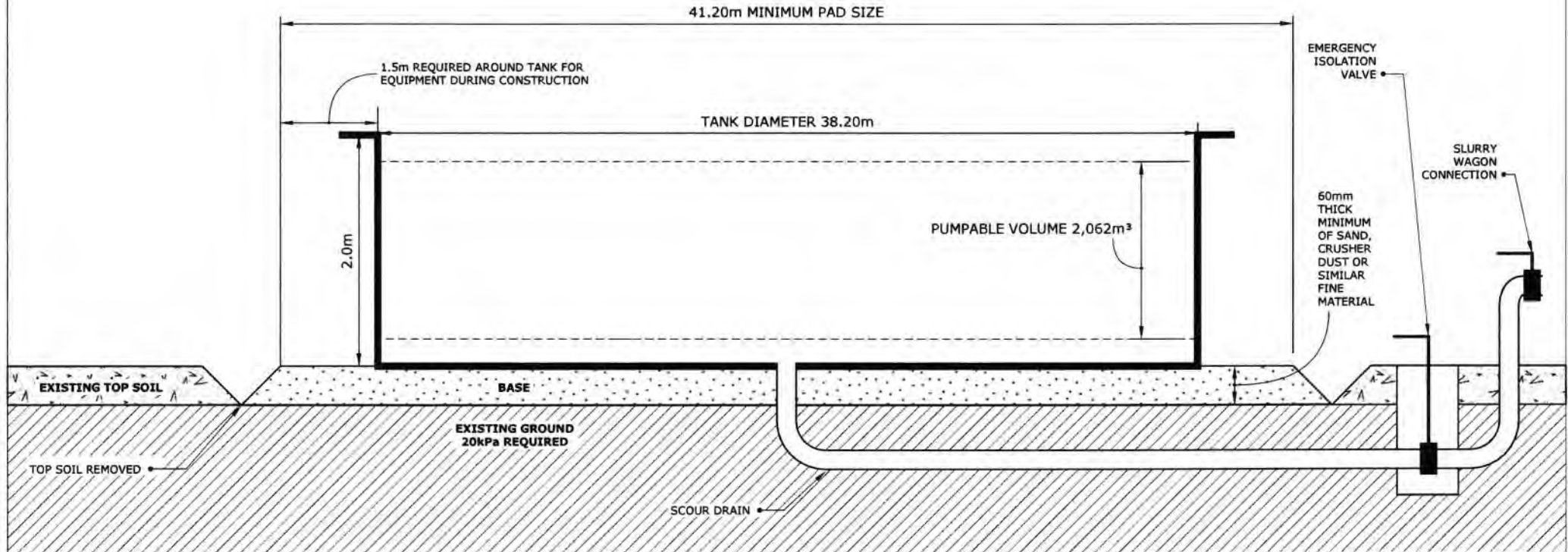
NOTES:

STRUCTURAL ELEMENTS OF TANK NOT SHOWN

INLETS, OUTLETS, OVERFLOWS AND VENTS NOT SHOWN

AFTER CONSTRUCTION GAP20-40 OR SIMILAR METAL MUST BE SPREAD
AROUND THE PERIMETER OF THE TANK TO PREVENT EROSION

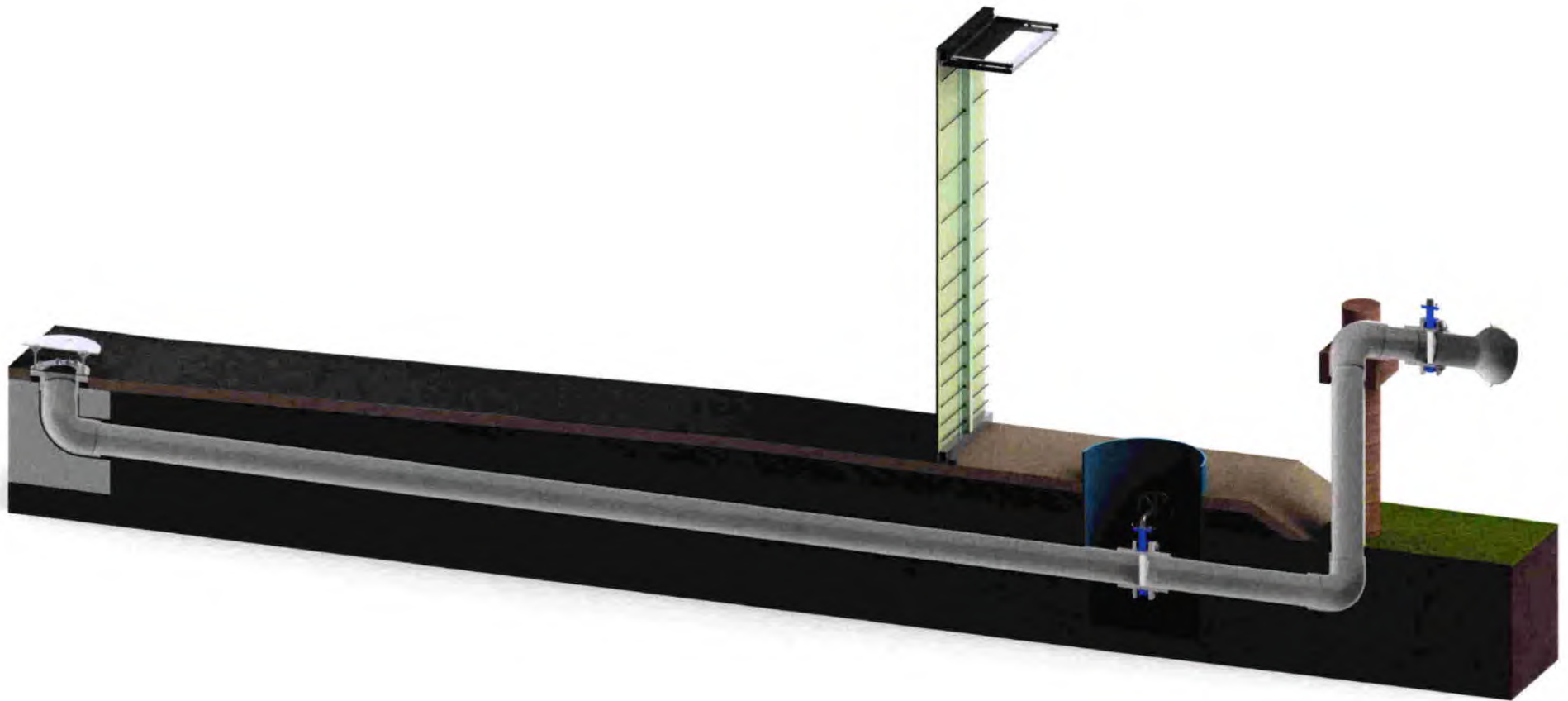
TANK CODE:	E1002N
SEGMENTS:	100
DIAMETER:	38.20m
HEIGHT:	2.0m
AREA:	1,146m ²
TOTAL VOLUME:	2,291m ³
PUMPABLE VOLUME:	2,062m ³



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DRAWING IS THE SOLE PROPERTY OF
KlipTank LTD ANY REPRODUCTION
IN PART OR AS A WHOLE
WITHOUT THE WRITTEN PERMISSION OF
KlipTank LTD IS PROHIBITED

Site: White Waters Limited, 893 Kakapo Road, Te Anau
Date: 26-03-2018
Scale: NOT TO SCALE
Author: Chris Dingle, KlipTank Ltd.





New Zealand Patent Number: 715505

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	NAME	SIGNATURE	DATE
DRAWN	P.B		24/01/18
CHK'D			
APP'VD			

TITLE:

Centre Drain
 to
 Slurry Tanker suction discharge



Home > Why Kliptank? > Tank Types > Kliptank > Above Ground > Specifications > Installation > Contact Us

KLIPTANK™ SPECIFICATIONS

The Kliptank patented above ground tanks are the perfect engineered storage solution in both covered and uncovered tanks.

Standard sizes

Up to 1,100m³ tanks with trussed roofs

Up to 4,000m³ uncovered tanks or with floating cover

Materials

- HDPE Vertical Panel sheet walls
- PVC Vertical Extrusion joiners
- HDPE bottom panels for tank base ring and prevent rodent damage to liner
- Galvanised Wire Rope fastened with stainless steel swages and brass turnbuckles
- 1.0mm Flexible Polypropylene liner as standard (Food Grade). Others available on request
- Aluminium top & bottom ring to ensure seismic ratings are met
- Aluminium Roof Trusses
- PVC Aqualon Ripstop UV inhibited roof cover designed to be vermin & insect proof



Roof Cover - PVC Aqualon Ripstock GRK
1000 UV inhibited, vermin and insect proof.



Swages and Turnbuckles used to connect wire rope

Legal

Engineers Producer Statements (PS1, PS3 and PS4) supplied for each tank.

Building Consent process undertaken by Kliptank on your behalf from Application to Code Compliance stage

Warranty

We offer a 15 Year Warranty on our Kliptank tank range and 20 years on the liner.

Site Prep

Minimal site prep is required as the Kliptank will happily sit on a prepared level surface with a sand base. Site preparation is the responsibility of the land owner and they can either do this themselves, or get a contractor to undertake this for them.

Specialist projects

Working with our engineers, we can adapt the Kliptank design to just about any size or height. Let us know your requirements.

APPENDIX D. FARM ENVIRONMENTAL PLAN

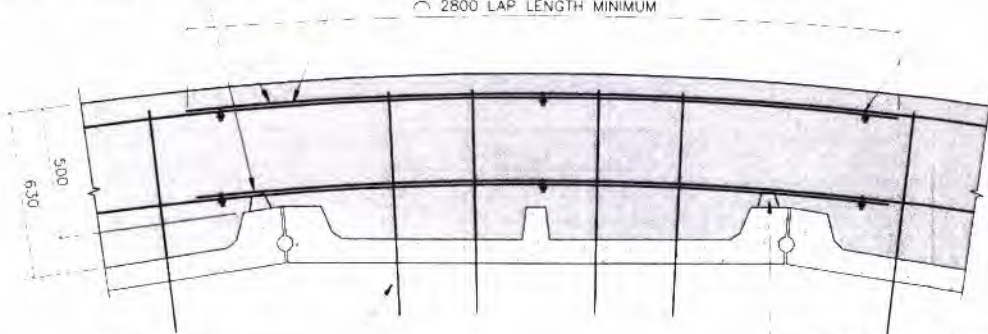
APPENDIX E. EXISTING EFFLUENT STORAGE CERTIFICATION

2-12.7 ϕ STRANDS, HOLD STRANDS IN PLACE BY TYING TO STARTER BARS AND SUPPORTING OFF PLASTIC CHAIRS AND SPACERS

REMOVE SAG IN STRAND BY HAND TIGHTENING MAINTAIN CLEARANCE TO PRECAST WALL UNITS AND FORMWORK

WIRE ROPE GRIPS (BULLDOG GRIPS) TO SUIT 13mm CABLE TIGHTEN TO HOLD STRAND IN PLACE (DO NOT OVER TIGHTEN)

2800 LAP LENGTH MINIMUM



4-HD16 STARTER BARS PER PANEL 1250 LONG, 150 LEG THROUGH SLEEVES IN PANEL

PLASTIC CHAIR AT EACH PANEL JOINT TO SUPPORT STRAND

PLAN - BASE RING BEAM REINFORCING

SCALE 1:20

661 MESH 50 TOP COVER

6
S03

2-12.7 ϕ STRANDS, HOLD STRANDS IN PLACE BY TYING TO STARTER BARS AND SUPPORTING OFF PLASTIC CHAIRS AND SPACERS

4-HD16 STARTER BARS PER PANEL 1500 LONG, 150 LEG THROUGH SLEEVES IN PANEL

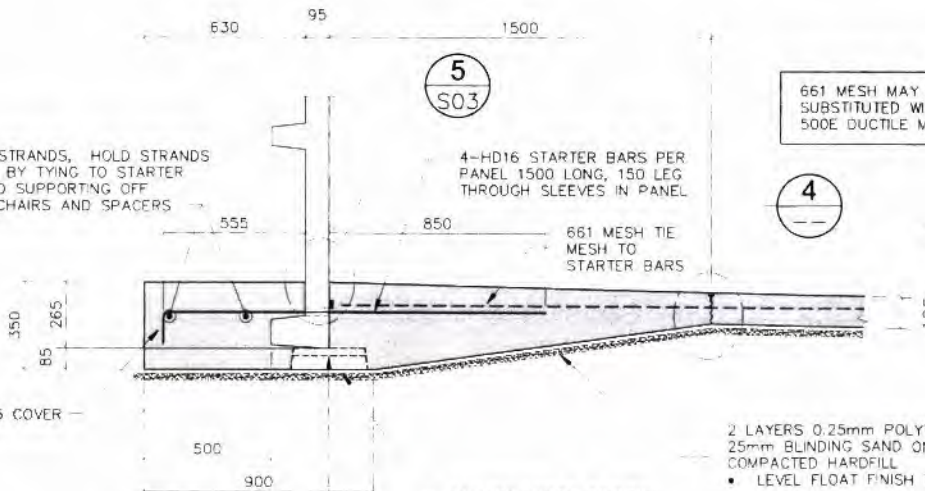
661 MESH MAY BE SUBSTITUTED WITH SE92 500E DUCTILE MESH

661 MESH TIE MESH TO STARTER BARS

661 MESH 50 TOP COVER

DETAIL 4
SCALE 1:20
SLAB TIED JOINT

CENTRAL ROD/SPIKE FOR POND PANEL SET OUT



2 LAYERS 0.25mm POLYTHENE ON 25mm BLINDING SAND ON COMPACTED HARDFILL
 • LEVEL FLOAT FINISH TO TOP OF BLINDING SAND

DRAINAGE SYSTEM BY OTHERS

CUT POLYTHENE AROUND FOOT BLOCK AND LAY UNDER PANEL AS SHOWN

HYNDS FOOTING BLOCK (~3800-2) TO BE PLACED UNDER JOINT BETWEEN PANELS
 PLASTIC SHIM UNDER PANELS AS REQUIRED

DETAIL 1
SCALE 1:20
BASE RING BEAM
S01

DETAIL 2
SCALE 1:20
SLAB CENTER
S01

NOTES:



1st Floor - 62 Deveron St - Invercargill
 Ph 03 214 0172 - Mbl 027 380 4362

REV #	REVISION DESCRIPTION	DATE	DRAWN
1	ISSUED FOR CONSTRUCTION	13/11/2012	JR

PO Box 58142, Botany, Auckland, 2163
 Tel: 09-274 0316
 Fax: 09-274 8393
 email: technicalservices@hynds.co.nz



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ISO 9001 CERTIFIED MANAGEMENT SYSTEM

PROJECT DESCRIPTION:

WHITE WATERS LTD (H VERNOOIJ)
 MEGAPOND 1500
 893 KAKAPO ROAD - TE ANAU
 SOUTHLAND DISTRICT COUNCIL

SERVICE DETAIL:

MEGAPOND
 1,500,000 LITRE EFFLEUNT TANK
 BASE RING BEAM AND SLAB DETAILS

REFERENCE/QUOTE NUMBER:

DRAWN: Coles Consulting DESIGN: Coles Consulting CHECKED:

SCALE: As Shown Note: Do not scale drawing if in doubt ASK!!! DATE: 13/11/2012

DRAWING NUMBER: 0112060 - S02 REVISION NUMBER: 1

BENDING SCHEDULE - SITE POURED CONCRETE ONLY							
BAR MARK	TYPE & SIZE	No of BARS	CHECK'D BY	SHAPE	CHECK'D BY	COVER	CHECK'D/CHECK'D BY
FLOOR SLAB & GROUND BEAM							
MESH	651 Mesh	651m ²		NB: m ² RATE SHOWN DOES NOT INCLUDE LAPS OR WASTAGE		50 Top	
STARTERS	HD16	184		1500		50	
STRANDS	12.7mm	2		98.0m		50	
MID HEIGHT RING BEAM							
STRANDS	12.7mm	3		97.0m		75	

NOTES:



1st Floor - 62 Deveron St - Invercargill
Ph 03 214 0172 - Mbl 027 380 4362

REVISIONS			
REV #	REVISION DESCRIPTION	DATE	DRAWN
1	ISSUED FOR CONSTRUCTION	13/11/2012	JR

PO Box 58142, Botany, Auckland, 2163
Tel: 09-274 0316
Fax: 09-274 8393
email: technicalservices@hynds.co.nz



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ISO 9001 CERTIFIED MANAGEMENT SYSTEM

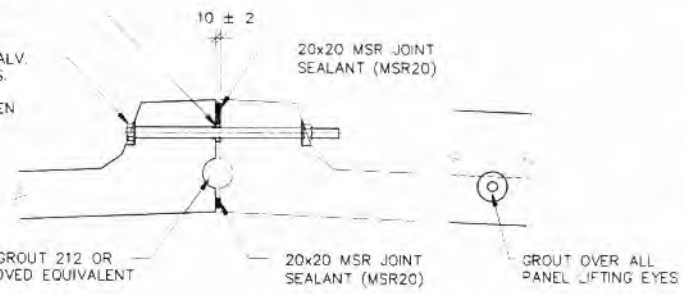
PROJECT DESCRIPTION:
WHITE WATERS LTD (H VERNOOIJ)
MEGAPOND 1500
893 KAKAPO ROAD - TE ANAU
SOUTHLAND DISTRICT COUNCIL

SERVICE DETAIL:
MEGAPOND
1,500,000 LITRE EFFLEUNT TANK
SAW CUT, SEALANT DETAILS AND
REINFORCING SCHEDULE

REFERENCE/QUOTE NUMBER:		
DRAWN:	DESIGN:	CHECKED:
Coles Consulting	Coles Consulting	
SCALE: As Shown	Note: Do not scale drawing if in doubt ASK!!!	DATE:
PAPER SIZE: A3		13/11/2012
DRAWING NUMBER:		REVISION NUMBER:
0112060 - S03		1

2-HYPOND SPACERS (T3800-3) AT TOP & BOTTOM BOLTS

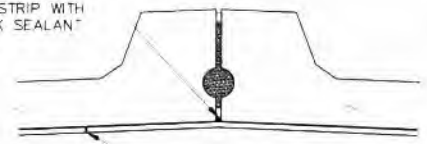
M20 x 450 LONG Gr 8.8 GALV. BOLT, NUT AND 2 WASHERS. TENSION BOLT TO PROVIDE 10mm ± 2mm GAP BETWEEN PANELS



WALL PANEL FASTENING AND SEALING DETAIL

SCALE 1:10

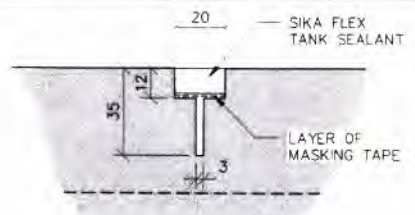
FILL CAVITY BEHIND SEALANT STRIP WITH SIKA TANK SEALANT



SWELLABLE SEALANT JOINT DETAIL

SCALE 1:10

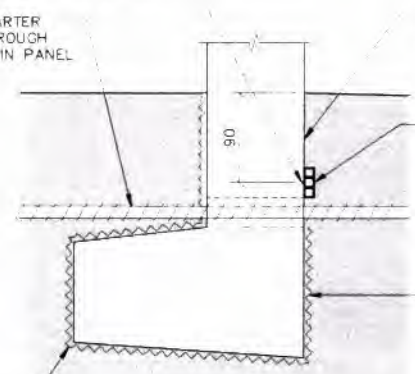
- SLAB SEALANT SEQUENCE**
- FIRST SAW CUT 3mm WIDE x 35mm DEEP (WITHIN 24 HOURS OF POURING SLAB)
 - SECOND SAW CUT 20mm WIDE x 12mm DEEP
 - COAT SIDES OF SECOND SAW CUT WITH PRIMER No 34
 - PLACE LAYER OF MASKING TAPE ON BASE OF SECOND SAW CUT
 - PRIME SIDES OF SAW CUT AS PER SIKA REQUIREMENTS (PRIMER No.3n)
 - FILL WITH 10mm SIKA FLEX TANK



DETAIL 6
SCALE 1:2
FLOOR SLAB SEALANT JOINT DETAIL

SEALANT LEVEL MARKED ON PANEL

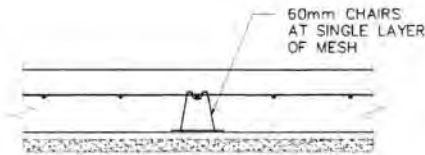
HD16 STARTER BARS THROUGH SLEEVES IN PANEL



DETAIL 5
SCALE 1:5
WALL - SLAB SEALANT JOINT DETAIL

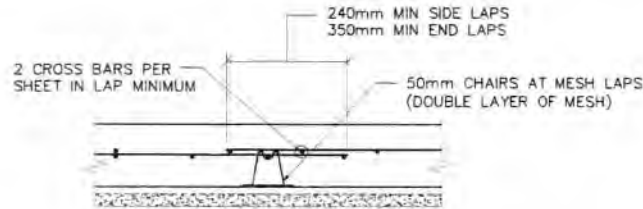
* RUGASOL BOTTOM OF PANEL AS SHOWN

* DENOTES WORK ACTIONED BY HYNDS DURING PRECAST MANUFACTURE



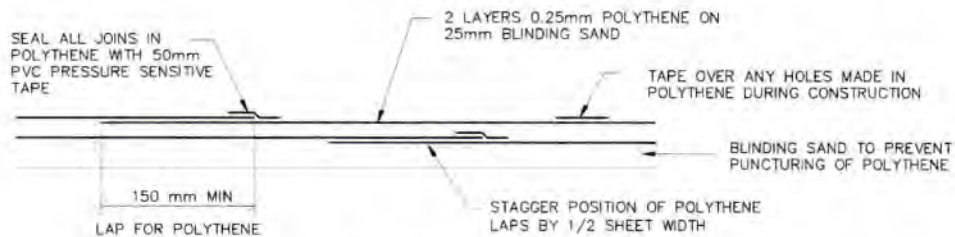
SINGLE LAYER MESH SUPPORT DETAIL

SCALE 1:10



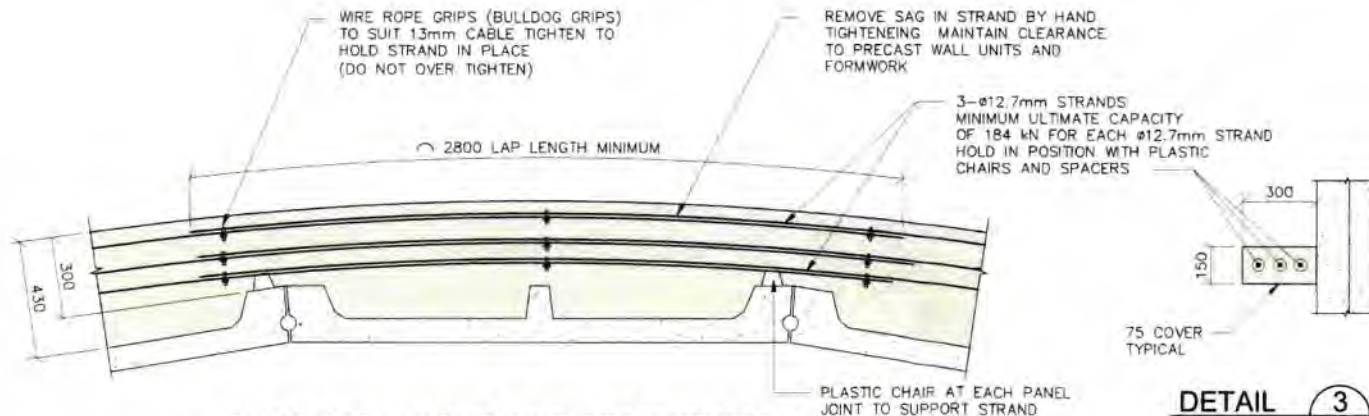
MESH LAP SUPPORT DETAIL

SCALE 1:10



POLYTHENE JOINING DETAIL

SCALE 1:5



PLAN - MID HEIGHT RING BEAM REINFORCING

SCALE 1:20

DETAIL

SCALE 1:20

MID HEIGHT RING BEAM

3

S01

NOTES:



1st Floor - 62 Deveron St - Invercargill
Ph 03 214 0172 - Mbl 027 380 4362

REVISIONS

REV #	REVISION DESCRIPTION	DATE	DRAWN
1	ISSUED FOR CONSTRUCTION	13/11/2012	JR

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Fax: 09-274 8393
email: technicalservices@hynds.co.nz



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ISO 9001 CERTIFIED MANAGEMENT SYSTEM

PROJECT DESCRIPTION:

WHITE WATERS LTD (H VERNOOIJ)
MEGAPOND 1500
893 KAKAPO ROAD - TE ANAU
SOUTHLAND DISTRICT COUNCIL

SERVICE DETAIL:

MEGAPOND
1,500,000 LITRE EFFLEUNT TANK
MID HEIGHT RING BEAM
AND MESH SUPPORT DETAILS

REFERENCE/QUOTE NUMBER:

DRAWN:	DESIGN:	CHECKED:
Coles Consulting	Coles Consulting	
SCALE: As Shown	Note: Do not scale drawing if in doubt ASK!!!	DATE: 13/11/2012
PAPER SIZE: A3		
DRAWING NUMBER: 0112060 - S04		REVISION NUMBER: 1

GENERAL NOTES

1. THE CONTRACTOR SHALL CONFIRM ALL DIMENSIONS AND LEVELS ON SITE PRIOR TO CONSTRUCTION.
2. ALL PROPRIETARY FITTINGS SHALL BE INSTALLED STRICTLY TO THE MANUFACTURERS SPECIFICATIONS.
3. ALL EXCAVATED MATERIAL SHALL BE DISPOSED OF OFF SITE UNLESS DIRECTED OTHERWISE. RETAIN SUFFICIENT EXCAVATED MATERIAL TO BACKFILL AROUND WALLS OF TANK AS SHOWN ON THE DRAWINGS, OR IMPORT FILL WHERE EXCAVATED MATERIAL IS NOT SUITABLE FOR RECOMPACTION.
4. ALL BACKFILL BENEATH SLABS AND FOUNDATION PADS SHALL BE AS PER THE SITE ENGINEERS DESIGN.
5. PROVIDE WATERPROOF MEMBRANE (DPM), 250 MICRONS THICK X 2 LAYERS, OVER 25mm MINIMUM OF BLINDING SAND OVER BACKFILL BENEATH ALL FOUNDATIONS AND SLABS. TAPE ALL JOINTS AS PER SHEET S04.
6. CONCRETE STRENGTH SHALL BE 35 MPa AT 28 DAYS WITH CEMENT CONTENT BETWEEN 350kg/m³ AND 400kg/m³. WATER CEMENT RATIO SHALL NOT EXCEED 0.45.
7. ALL STRUCTURAL CONCRETE SHALL BE READY MIX NORMAL CONCRETE.
8. BLINDING CONCRETE STRENGTH SHALL BE AS DIRECTED BY THE SITE ENGINEER.
9. REINFORCING LAP LENGTHS: 661 MESH - AS PER SHEET S04.
10. ALL FOOTING AND RING BEAM REINFORCING STEEL SHALL HAVE 75mm MINIMUM COVER, UNLESS NOTED OTHERWISE.
11. TT = TOP OF TOP STEEL; TB = BOTTOM OF TOP STEEL; BT = TOP OF BOTTOM STEEL; BB = BOTTOM OF BOTTOM STEEL.
12. BAR DESIGNATION: HD = GRADE 500E DEFORMED BARS; D = GRADE 300E DEFORMED BARS; R = GRADE 300E ROUND BARS; RB = GRADE 500 (REID BAR) DEFORMED BARS.
13. SHEAR KEY GROUTING - USE SIKA GROUT 212 OR APPROVED EQUIVALENT.
14. SURFACE FINISH (TO NZS 3114: 1987): FLOOR SLABS - U2 (WOOD OR BULL FLOAT) CONCEALED WORK (FOUNDATIONS) - F1 EXPOSED EDGES OF FOUNDATIONS - F4
15. MAXIMUM WATER TABLE HEIGHT HAS BEEN ASSUMED BELOW THE FLOOR SLAB OF THE TANK. CONTRACTOR TO CONFIRM ON SITE. CONSULT SITE ENGINEER WHERE WATER TABLE WILL BE ABOVE THE FLOOR LEVEL OF THE TANK.
16. 100 kPa MINIMUM SAFE SOIL BEARING CAPACITY REQUIRED BENEATH FOUNDATIONS AND SLABS. SOIL BEARING CAPACITY HAS BEEN ASSUMED AS UNIFORM OVER THE BUILDING SITE. CONTRACTOR TO CONFIRM BOTH REQUIREMENTS ON SITE. CONSULT SITE ENGINEER WHERE SOIL BEARING IS LESS THAN 100kPa OR NOT UNIFORM ACROSS THE BUILDING SITE.
17. CURE CONCRETE FLOOR SLAB BY CONTINUOUS WETTING OR PONDING FOR A PERIOD OF 14 DAYS.
18. SAW CUT JED JOINTS IN FLOOR SLAB AS SOON AS POSSIBLE BUT AT LEAST WITHIN 24 HOUR PERIOD AFTER CONCRETE HAS BEEN POURED.
19. ALL SEALANTS AND WATERSTOPS SHALL BE INSTALLED STRICTLY AS PER THE MANUFACTURERS SPECIFICATIONS.
20. ALLOW SIKATANK SEALANT 14 DAYS TO CURE BEFORE USING TANK FOR STORAGE OF DAIRY EFFLUENT.

DESIGN INFORMATION

1. THE FOUNDATION AND SLAB DESIGN DOES NOT COVER SEISMIC LIQUEFACTION, LATERAL SPREADING AND EXCESS PORE WATER PRESSURES CAUSED BY LIQUEFACTION AT SPECIFIC SITES. THIS MAY RESULT IN LOSS OF SOIL BEARING CAPACITY AND/OR UPLIFT OF THE POND IN HIGH SEISMIC EVENTS, RESULTING IN DAMAGE TO THE MEGAPOND.
2. MEGAPOND SUITABLE ONLY FOR AN IMPORTANCE LEVEL 1 STRUCTURE, AS DEFINED IN NZS 1170.5:2004.
3. THE MEGAPOND IS NOT TO BE CONSTRUCTED ON SLOPING SITES WITHOUT APPROVAL FROM THE SITE ENGINEER.
4. DESIGN LIFE OF THE STRUCTURE IS 50 YEARS.
5. SPECIFIC DESIGN IS REQUIRED FOR SUBSOIL CLASSES A & B (STRONG ROCK AND ROCK) WHERE SHEAR WAVE VELOCITY IS GREATER THAN 250m/s. SUBSOIL CLASSES AS DEFINED IN NZS 1170.5:2004.
6. SPECIFIC DESIGN IS REQUIRED WHERE HAZARD FACTOR (Z) IS GREATER THAN 0.36, AS DEFINED IN NZS 1170.5:2004.

NOTES:



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REVISIONS

REV #	REVISION DESCRIPTION	DATE	DRAWN
1	ISSUED FOR CONSTRUCTION	13/11/2012	JR

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Tel: 09-274 0316
Fax: 09-274 8393
email: technicalservices@hynds.co.nz



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ISO 9001 CERTIFIED MANAGEMENT SYSTEM

PROJECT DESCRIPTION:

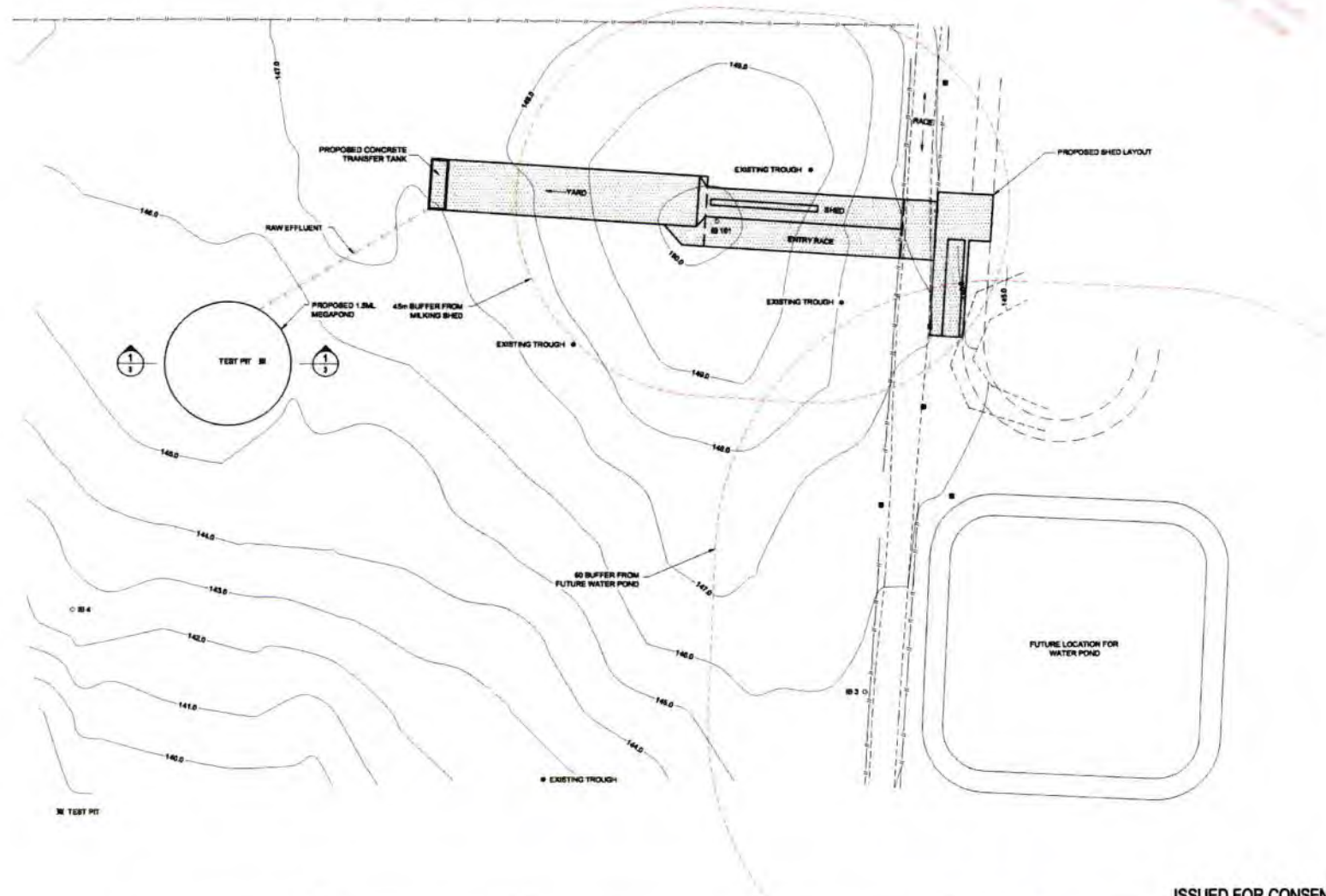
WHITE WATERS LTD (H VERNOOIJ)
MEGAPOND 1500
893 KAKAPO ROAD - TE ANAU
SOUTHLAND DISTRICT COUNCIL

SERVICE DETAIL:

MEGAPOND
1,500,000 LITRE EFFLEUNT TANK
NOTES

REFERENCE/QUOTE NUMBER:

DRAWN: Coles Consulting	DESIGN: Coles Consulting	CHECKED:
SCALE: As Shown	Note: Do not scale drawing if in doubt ASK!!!	DATE: 13/11/2012
PAPER SIZE: A3		
DRAWING NUMBER: 0112060 - S05	REVISION NUMBER: 1	



Coordinate Schedule

Northing	Easting	Level	Description
8084.08	4000.00	145.75	SB 2
7927.87	4094.89	145.45	SB 3
7848.89	3917.32	142.37	SB 4
8000.00	4000.00	150.00	SB 10*

ALL CO-ORDINATES AND LEVELS ARE ASSUMED AND IN NO WAY RELATE TO A GEODETIC DATUM

LEGEND

- FENCE LINE
- - - EXISTING TRACK
- POST

Revise	Amended	Approved	Author	Date

WHITE WATERS LTD



Invercargill Office
PO Box 847
Invercargill, NZ
Tel: 03 211 3350

**WHITE WATERS LTD
EFFLUENT SYSTEM UPGRADE
883 KAKAPO ROAD, TE ANAU**

SITE PLAN

Drawn	Checked	Approved	Revision No.
J. BURRIS	E. C. HARRISON	19/12/11	
Project No. VQ419.75	Scale A1 1:500 A3 1:1000	Drawing No. 7/808/556/5734	Sheet No. 2

ISSUED FOR CONSENT

GRAVEL EXTRACTION PLAN



ISSUED FOR CONSENT

NOTE: ALL BOUNDARIES SHOWN ARE APPROXIMATE ONLY.

Order	Description	Quantity	Unit

WHITE WATERS LTD



Invercargill Office
PO Box 647
Invercargill, NZ
Tel: 03 211 9990

Name:	J. BURKE	Design:	E. BURDICK	Revision Date:	21/12/2011
Project:	VQ118.75	Site:	N.T.S	Scale:	1

Project:
WHITE WATERS LTD
GRAVEL EXTRACTION CONSENT
853 KAKAPO ROAD, TE ANAU

Site:
GRAVEL EXTRACTION PLAN
SITE PLAN

Project No:
7/808/557/5734



Building Code Clause(s) Name

PRODUCER STATEMENT – PS4 – CONSTRUCTION REVIEW

(Guidance notes on the use of this form are printed on the reverse side)

ISSUED BY: Opus International Consultants Ltd
(Construction Review Firm)

TO: White Waters Ltd
(Owner/Developer)

TO BE SUPPLIED TO: Southland District Council
(Building Consent Authority)

IN RESPECT OF: Construction of Megapond 1500
(Description of Building Work)

AT: 893 Kakapo Road, Te Anau
(Address)

..... LOT DP SO

Opus International Consultants Ltd has been engaged by White Waters Ltd
(Construction Review Firm)

to provide CM1 CM2 CM3 CM4 CM5 *(Engineering Categories)* or OL1 OL2 OL3 OL4 *(Architectural Categories)*
observation or other services
(Extent of Engagement)

in respect of clause(s) B1/VM1 of the Building Code for the building work described in documents relating to Building Consent No. BLD/2012/48338/1 and those relating to Building Consent Amendment(s) Nos. issued during the course of the works. We have sighted these Building Consents and the conditions of attached to them.

Authorised instructions / variation(s) No. *(copies attached)*
or by the attached Schedule have been Issued during the course of the works.

On the basis of this these review(s) and information supplied by the contractor during the course of the works, I believe on reasonable grounds that All Part only of the building works have been completed in accordance with the relevant requirements of the Building Consents and Building Consent Amendments identified above, with respect to Clause(s) B1/VM1 of the Building Regulations.

I, Thomas Francis O'Boyle am: CPEng No. 1006767
(Name of Construction Review Professional) Reg Arch No. Name

I am a Member of: IPENZ NZIA and hold the following qualifications: BEng(Civil), MIPENZ

The Construction Review Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than \$200,000*.

The Construction Review Firm is a member of ACENZ: YES NO

SIGNED BY ON BEHALF OF Opus International Consultants Ltd

Date: 14-3-13 Signature: Thomas O'Boyle

Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Construction Review Firm only. The total maximum amount of damages payable arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise (including negligence), is limited to the sum of \$200,000.*

This form to accompany **Forms 6 or 8 of the Building (Form) Regulations 2004** for the issue of a Code Compliance Certificate.

GUIDANCE ON USE OF PRODUCER STATEMENTS

Producer statements were first introduced with the Building Act 1992. The producer statements were developed by a combined task committee consisting of members of the New Zealand Institute of Architects, Institution of Professional Engineers New Zealand, Association of Consulting Engineers New Zealand in consultation with the Building Officials Institute of New Zealand. The original suite of producer statements has been revised as at the date of this form as a result of enactment of the Building Act (2004) by these organisations to ensure standard use within the industry.

The producer statement system is intended to provide Building Consent Authorities (BCAs) with reasonable grounds for the issue of a Building Consent or a Code Compliance Certificate, without having to duplicate design or construction checking undertaken by others.

PS1 Design	Intended for the use by a suitably qualified independent design professional in circumstances where the BCA accepts a producer statement for establishing reasonable grounds to issue a Building Consent;
PS2 Design Review	Intended for use by a suitably qualified independent design professional where the BCA accepts an independent design professional's review as the basis for establishing reasonable grounds to issue a Building Consent;
PS3 Construction	Forms commonly used as a certificate of completion of building work are Schedule 6 of NZS 3910:2003 ¹ ; or Schedules E1/E2 of NZIA's SCC 2007 ²
PS 4 Construction Review	Intended for use by a suitably qualified independent design professional who undertakes construction monitoring of the building works where the BCA requests a producer statement prior to issuing a Code Compliance Certificate. This must be accompanied by a statement of completion of building work (Schedule 6).

The following guidelines are provided by ACENZ, IPENZ and NZIA to interpret the Producer Statement.

Competence of Design Professional

This statement is made by a Design Firm that has undertaken a contract of services for the services named, and is signed by a person authorised by that firm to verify the processes within the firm and competence of its designers.

A competent design professional will have a professional qualification and proven current competence through registration on a national competence-based register, either as a Chartered Professional Engineer (CPEng) or a Registered Architect.

Membership of a professional body, such as the Institution of Professional Engineers New Zealand (IPENZ) or the New Zealand Institute of Architects (NZIA) provides additional assurance of the designer's standing within the profession. If the design firm is a member of the Association of Consulting Engineers New Zealand (ACENZ), this provides additional assurance about the standing of the firm.

Persons or firms meeting these criteria satisfy the term "suitably qualified independent design professional".

* Professional Indemnity Insurance

As part of membership requirements, ACENZ requires all member firms to hold Professional Indemnity Insurance to a minimum level.

The PI insurance minimum stated on the front of this form reflects standard, small projects. If the parties deem this inappropriate for large projects the minimum may be up to \$500,000.

Professional Services during Construction Phase

There are several levels of service which a Design Firm may provide during the construction phase of a project (CM1-5)³ (OL1-OL4)². The Building Consent Authority is encouraged to require that the service to be provided by the Design Firm is appropriate for the project concerned.

Requirement to provide Producer Statement PS4

Building Consent Authorities should ensure that the applicant is aware of any requirement for producer statements for the construction phase of building work at the time the building consent is issued as no design professional should be expected to provide a producer statement unless such a requirement forms part of the Design Firm's engagement.

Attached Particulars

Attached particulars referred to in this producer statement refer to supplementary information appended to the producer statement.

Refer Also:

- 1 *Conditions of Contract for Building & Civil Engineering Construction NZS 3910: 2003*
- 2 *NZIA Standard Conditions of Contract SCC 2007 (1st edition)*
- 3 *Guideline on the Briefing & Engagement for Consulting Engineering Services (ACENZ/IPENZ 2004)*

www.acenz.org.nz
www.ipenz.org.nz
www.nzia.co.nz



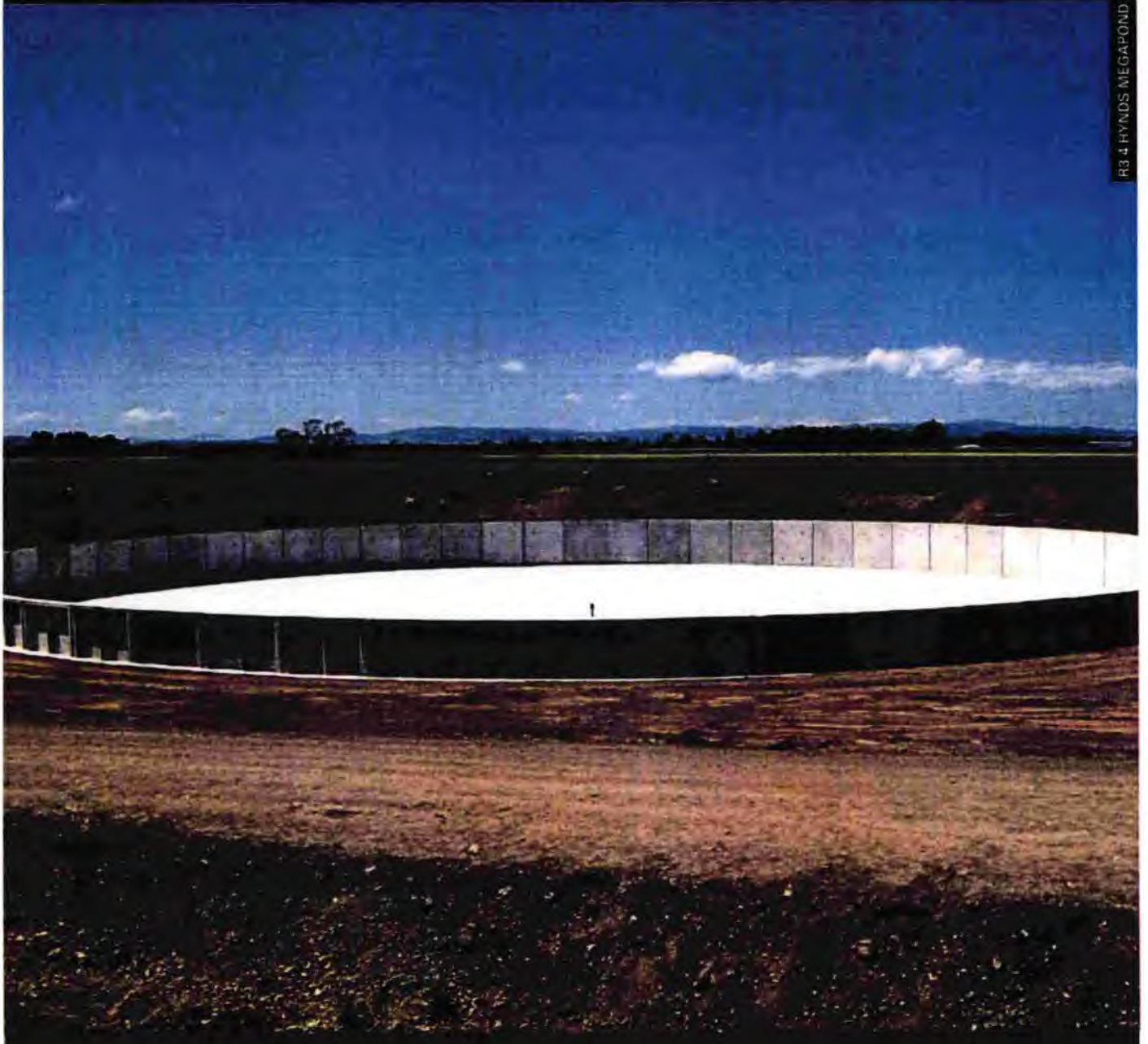
48338/1

893 KAKAPO

MEGAPOND EFFLUENT STORAGE

Storage up to 4 million litres Leak Free Precast Panel Construction

R3 4 HYNDS MEGAPOND



0800 WE PIPE (93 7473)
www.hynds.co.nz

HYNDS
RURAL

The Megapond is a unique, site assembled, precast effluent tank that comes in 5 standard sizes.

The Megapond panels with mass of approximately 1600 kgs each, are easily handled and installed using a suitable excavator.

Applications

- Dairy effluent storage

Features

- Standard panel height used for all sizes
- Easily transported, lifted & assembled
- Robust Polygon structure
- Flanged base resists uplift of structure
- Precast construction ensures consistency and quality, minimises in-situ work
- Leach free result
- Environmentally compliant

Megapond Installation

The Megapond installation is carried out by an experienced Contractor using the following key steps:

1. Excavation of the tank area to a minimum depth of approx 1500 mm below ground level (or deeper if in poor material) and shaping the floor to slope to the centre
2. Min 150 mm GAP 40 material placed and compacted to form the base to the floor and tank flange
3. Precast concrete panels installed and bolted together around the perimeter to form a large polygon
4. Steel reinforcement and mesh placed in the floor and flange
5. Concrete floor and flanged base cast, and floor joints cut at a very early age
6. Backfill placed and compacted in layers evenly around the perimeter of the tank to ground level
7. In-situ reinforced concrete beam cast just below ground level
8. Floor joints sealed and joints between panels grouted to form a watertight structure before the floor is flooded to complete the curing of the concrete floor

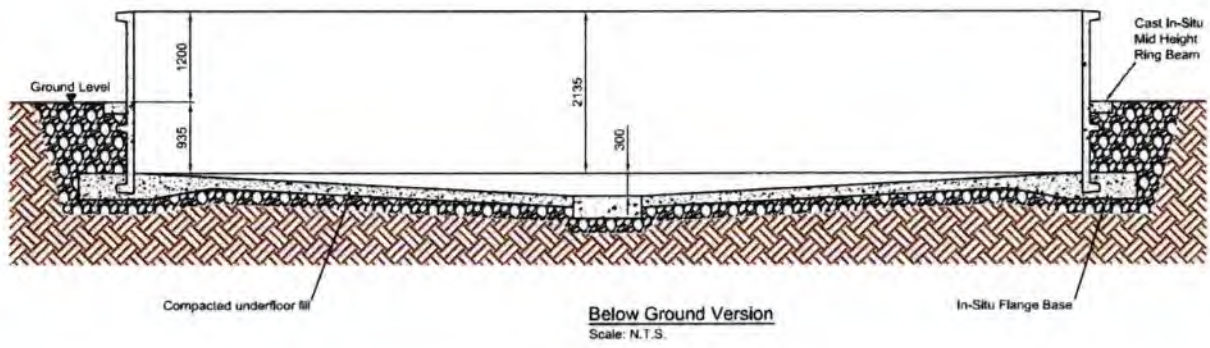
Product Code	Nominal Volume (Litres)	Diameter (Metres)	No. of panels
MEGAPOND500	500,000	17.3	28
MEGAPOND1M	1,000,000	23.6	38
MEGAPOND2M	2,000,000	33.8	54
MEGAPOND3M	3,000,000	41.3	66
MEGAPOND4M	4,000,000	47.6	76



FENCING

The Megapond is designed to be fitted with pool fencing panels that meet the NZ Pool Fencing Safety Act.

R3.4 Hynds Megapond



NORTHERN REGION

Whangarei	09 438 7305
Warkworth	09 425 9837
Albany	09 415 9259
Avondale	09 820 0122
Penrose	09 579 5605
Manukau	09 273 3053
Pukakoha	09 237 1274

CENTRAL REGION

Hamilton	07 847 3193
Tauranga	07 571 6955
Rotorua	07 348 9394
Te Kuiti	07 878 8326
Tsupo	07 378 9915

CAPITAL REGION

Hastings	06 879 8989
New Plymouth	06 759 8157
Palmerston Nth	06 357 2638
Masterton	06 377 4474
Kapiti	04 296 1125
Petone	04 568 0933
Kaiwharawhara	04 472 4172

SOUTH ISLAND REGION

Nelson	03 543 8330
Blenheim	03 579 1332
Amberley	03 314 8455
Christchurch	03 344 3500
Christchurch East	03 376 4185
Oamaru	03 434 3062
Cromwell	03 445 4760
Winton	03 236 6044
Invercargill	03 214 6470

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Building Code Clause(s) B1 / VM1

Project No. 0112060

PRODUCER STATEMENT – PS1 – DESIGN*(Guidance notes on the use of this form are printed on the reverse side)*ISSUED BY: Coles Consulting (2011) Limited*(Design Firm)*TO: White Waters Limited*(Owner/Developer)*TO BE SUPPLIED TO: Southland District Council*(Building Consent Authority)*IN RESPECT OF: Megapond 1500 (Design of concrete tank only. Excludes site selection, design of compacted hardfill foundation raft and water table depth assessment completed by others)*(Description of Building Work)*AT: 893 Kakapo Road, Te Anau*(Address)*

LOT

DP

SO

We have been engaged by the owner/developer referred to above to provide structural engineering design services in respect of the requirements of*(Extent of Engagement)*Clause(s) B1 / VM1 of the Building Code for All or Part only (as specified in the attachment to this statement), of the proposed building work.

The design carried out by us has been prepared in accordance with:

 Compliance Documents issued by Department of Building and Housing AS/NZS 1170, NZS 3101 and 3106*(verification method / acceptable solution)*

or

 Alternative solution as per the attached scheduleThe proposed building work covered by this producer statement is described on the drawings titled White Waters Ltd Megapond 1500, 893 Kakapo Road, Te Anau and numbered 0112060 - S01 to S05 together with the specification, and other documents set out in the schedule attached to this statement.

On behalf of the Design Firm, and subject to:

- (i) Site verification of the following design assumptions: Megapond tank is founded on 100kPa (minimum) allowable bearing capacity soils with water table below the base of the tank. Hardfill raft is constructed as per the Site Engineers design. Subsoil classes C to E soils only with seismic hazard factor (Z) less than 0.36 (Te Anau). Refer to Megapond drawings for details.
- (ii) All proprietary products meeting their performance specification requirements;

I believe on reasonable grounds the building, if constructed in accordance with the drawings, specifications, and other documents provided or listed in the attached schedule, will comply with the relevant provisions of the Building code.

I, Graeme W. Coles*(Name of Design Professional)*am: CPEng 166888

#

 Reg Arch

#

I am a member of: IPENZ NZIA and hold the following qualifications: BE Civil (Hons), MIPENZ (Structural)

The Design Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than \$200,000*.

The Design Firm is a member of ACENZ YES NOSIGNED BY Graeme W. ColesON BEHALF OF Coles Consulting (2011) Limited*(Design Firm)*Date 14 Nov. 2012

(signature)

Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Design Firm only. The total maximum amount of damages payable arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise (including negligence), is limited to the sum of \$200,000*.

This form is to accompany **Form 2 of the Building (Forms) Regulations 2004** for the application of a Building Consent.

PRODUCER STATEMENT PS1

1

May 2007

GUIDANCE ON USE OF PRODUCER STATEMENTS

Producer statements were first introduced with the Building Act 1992. The producer statements were developed by a combined task committee consisting of members of the New Zealand Institute of Architects, Institution of Professional Engineers New Zealand, Association of Consulting Engineers New Zealand in consultation with the Building Officials Institute of New Zealand. The original suite of producer statements has been revised at the date of this form as a result of enactment of the Building Act (2004) by these organisations to ensure standard use within the industry.

The producer statement system is intended to provide Building Consent Authorities (BCAs) with reasonable grounds for the issue of a Building Consent or a Code Compliance Certificate, without having to duplicate design or construction checking undertaken by others.

PS1 Design	Intended for use by a suitably qualified independent design professional in circumstances where the BCA accepts a producer statement for establishing reasonable grounds to issue a Building Consent.
PS2 Design Review	Intended for use by a suitably qualified independent design professional where the BCA accepts an independent design professional's review as the basis for establishing reasonable grounds to issue a Building Consent.
PS3 Construction	Forms commonly used as a certificate of completion of building work are Schedule 6 of NZS 3910:2003 ¹ or Schedules E1/E2 of NZIA's SCC 2007 ²
PS4 Construction Review	Intended for use by a suitably qualified independent design professional who undertakes construction monitoring of the building works where the BCA requests a producer statement prior to issuing a Code Compliance Certificate. This must be accompanied by a statement of completion of building work (Schedule 6).

The following guidelines are provided by ACENZ, IPENZ and NZIA to interpret the Producer Statement.

Competence of Design Professional

This statement is made by a Design Firm that has undertaken a contract of services for the services named, and is signed by a person authorised by that firm to verify the processes within the firm and competence of its designers.

A competent design professional will have a professional qualification and proven current competence through registration on a national competence-based register, either as a Chartered Professional Engineer (CPEng) or a Registered Architect.

Membership of a professional body, such as the Institution of Professional Engineers New Zealand (IPENZ) or the New Zealand Institute of Architects (NZIA), provides additional assurance of the designer's standing within the profession. If the design firm is a member of the Association of Consulting Engineers New Zealand (ACENZ), this provides additional assurance about the standing of the firm.

Persons or firms meeting these criteria satisfy the term "suitably qualified independent design professional".

* Professional Indemnity Insurance

As part of membership requirements, ACENZ requires all member firms to hold Professional Indemnity Insurance to a minimum level.

The PI insurance minimum stated on the front of this form reflects standard, small projects. If the parties deem this inappropriate for large projects the minimum may be up to \$500,000.

Professional Services during Construction Phase

There are several levels of service which a Design Firm may provide during the construction phase of a project (CM1-CM5)³ (OL1-OL4)². The Building Consent Authority is encouraged to require that the service to be provided by the Design Firm is appropriate for the project concerned.

Requirement to provide Producer Statement PS4

Building Consent Authorities should ensure that the applicant is aware of any requirement for producer statements for the construction phase of building work at the time the building consent is issued as no design professional should be expected to provide a producer statement unless such a requirement forms part of the Design Firm's engagement.

Attached Particulars

Attached particulars referred to in this producer statement refer to supplementary information appended to the producer statement.

Refer Also:

- ¹ *Conditions of Contract for Building & Civil Engineering Construction NZS 3910: 2003*
- ² *NZIA Standard Conditions of Contract SCC 2007 (1st edition)*
- ³ *Guideline on the Briefing & Engagement for Consulting Engineering Services (ACENZ/IPENZ 2004)*

www.acenz.org.nz
www.ipenz.org.nz
www.nzia.co.nz



White Waters HP 1500 – Construction Review



Foundation inspection 26/11/2012



Pre Pour Inspection – Flange footing 5/12/2012



Pre Pour Inspection – Panel jointing 5/12/2012



Pre Pour Inspection – Slab floor 5/12/2012

White Waters HP 1500 – Construction Review



Final inspection –15/02/2012



Final inspection – Control joints 15/02/2012

APPENDIX F. EXAMPLES OF EFFLUENT AREA TOPOGRAPHY



Gently undulating area approximately the middle of the farm. This area is likely to be predominantly Kakapo soils therefore is high risk for effluent application.



Gently undulating area, this is also approximately the middle of the farm although on a higher terrace and northeast of the previous image. This area is likely to be predominantly Te Anau soils, therefore would actually be low risk for effluent application (the entire property has been categorised as high risk). There is an abrupt transition to a steep slope beyond the crest that is positioned across the centre of this image.



Proceeding towards the northern third of the farm – more sloping areas are evident.



Near the far northern end of the farm and application area, (looking in a northerly direction). This area has more sloping land.



North-western corner of the application area. A mix of gently undulating transitioning to sloping land.



Typical example of sloping land that is excluded from the effluent application area. This particular area is located to the east of the effluent area, towards the north of the property.

FARM ENVIRONMENTAL MANAGEMENT PLAN

JOB TITLE	White Waters Dairy
ADDRESS	898 KAKAPO ROAD, TE ANAU
JOB NUMBER	50500
	6-April-18

Hans Vernooj
PO BOX 169
TE ANAU 9640

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Prepared by:



Gemma Scott
BASci, Environmental Management
Environmental Consultant

Reviewed by:



Karen Ladbrook
NZCE (Civil), MEngNZ
Environmental Engineer

1. SCOPE

This Farm Environmental Plan has been for White Waters Limited. The purpose of this Farm Environmental Plan is to:

- Document Good Management Practices that will be undertaken to minimise the environmental effects of dairy farming at O'Connor Dairy, in particular on water and soils.
- Demonstrate how the farm will achieve compliance with Resource Consent conditions and the rules of the proposed Southland Water and Land Plan.
- This management plan is designed to be consistent with the farm owner's values, and achievable for the farm manager to implement. This document will assist in keeping the farm manager focused on mitigating specific environmental risks and achieving long-term targets for improvement projects.

The plan includes the Good Management Practices that will be continued, or implemented over the next year, as well as some long-term targets for improvement projects

2. RESOURCE CONSENTS

Resource consents are required to:

- Discharge Effluent to the Land
- Take Groundwater

In addition to undertaking good environmental management practices, it is critical that the conditions of the resource consents are adhered to at all times.

In the event that a non-compliance occurs, or is suspected, Environment Southland should be contacted without delay. An incident reporting form is included in Appendix D, this should be used to document the circumstances that caused the non-compliance and the response/mitigations that were taken.

Copies of the Farm's Resource Consents are attached in Appendix A.

3. FARM MAPS

Various maps of the farm are included in order to identify and plan areas that require specific actions, and where Good Management Practices are recommended.

A subsurface drainage/tile network map has been developed which outlines where suspected and confirmed tiles are located. As tiles are identified or confirmed in future, they will be incorporated into the tile map.

4. GOOD MANAGEMENT PRACTICES

The White Waters farm comprises one physiographic zone, Bedrock/ Hill Country with an overland flow variant. The farm is located primarily in the Whitestone catchment, with a very small amount in the Upukerora catchment. The area is crossed by a network of branching waterways that flow to neighbouring lowland areas.

Good management practices will be undertaken to mitigate any environmental risk associated with the transport of nitrogen, phosphorous, microbes, and sediment to water bodies, which can commonly occur on this property via artificial drainage (open and tile drains), and lateral flow of phosphorous, microbes, and sediment to streams.

This property has an extensive tile drainage network linked to modified watercourses that drains excess water from productive land which means that the management of nutrient inputs and outputs is key to managing and mitigating environmental impacts.

A key concern in the Bedrock-Hill Country zone is contaminant loss to streams. Water quickly flows down-slope as overland flow to nearby streams following high or prolonged rainfall. Nitrogen, phosphorus, sediment and microbes are all carried with water, particularly during late autumn and winter. This zone generally experiences high rainfall zone due to its elevation, and in many areas a dense network of branching streams flows to neighbouring lowland areas.. A copy of Environment Southlands factsheets for the Bedrock/Hill Country physiographic zone is attached.

The following sections detail the good management practices planned to be undertaken on farm for the 1st June 2017 to 31st May 2018 period to mitigate the environmental risks associated with the property and its physiographic zones:

5. NUTRIENT MANAGEMENT

A Nutrient Budget is required in order to have a comprehensive view of nutrient balances across the farm and also to comply with the Southland Water & Land Plan. The Nutrient Budget should be prepared a Certified Nutrient Management Advisor. The Nutrient Budget must comply with the Overseer Best Practice Data Input Standards.

An annual review of the nutrient budget will be conducted to ensure it accurately reflects the farming system and this review will include:

- Data inputs that reflect the actual farming systems and practices in place; and
- Updated soil tests and fertiliser recommendations.

Good Management Practice:	Helps to Mitigate:	Target Date for completion (if relevant):	By When (or program update):
Fertiliser and Nutrients			
Prepare a Nutrient Budget based on actual farm inputs and management practices, and identify any opportunities to reduce losses or optimise nutrient balances.	Loss of nitrogen and phosphorus to water. Inefficient use of fertilisers.	Underway – to complete in 2018	Ongoing: Review annually Update 3-yearly
Fertiliser shall only be applied in optimum conditions, when soil moisture does not exceed field capacity and when soil temperatures are above 5 degrees. Environment Southland's "Whitestone Aquifer at Lynwood" soil monitoring network can be used to estimate soil moisture and temperature at the farm.	Fertiliser being spread outside of optimum conditions and not being taken up by pastures. Risk of losing fertiliser to Deep Drainage & Artificial Drainage	2018	Ongoing
Annual soil testing to determine soil nutrient levels and fertiliser requirements.	Inefficient use of fertiliser. Poor/inconsistent fertility.	2018	Ongoing - annual
Fertiliser application rates shall be based on soil and/or herbage tests results, and fertiliser recommendations made specifically for different nutrient blocks/crops.	Excessive application of fertiliser, above the agronomic requirements of the pasture/crop.	2017/18	Ongoing
Effluent irrigation is deferred when conditions are not suitable.	Risk of nitrogen losses to surface and ground water.	2017/2018	Ongoing

6. RIPARIAN MANAGEMENT

Riparian Management primarily addresses the risk of overland flow by filtering sediment and phosphorus, preventing erosion, and improving habitat. It also improves some aspects of artificial drainage.

Critical Source Areas (CSA): A CSA is a landscape feature like a gully, swale or a depression that accumulates overland flow from adjacent flats and slopes, and contributes a disproportionately large amount of nutrient or sediment to field tiles, artificial waterways and rivers.

An extensive tile drainage network throughout the property serves to drain excess soil water, minimising overland flow and erosion while making more useable and productive land.

Good Management Practice:	Helps to Mitigate:	Target Date for completion (if relevant):	By When (or progress update):
Riparian and Waterways			
Waterways are permanently or temporarily fenced with adequate buffers to ensure total stock exclusion.	Erosion, loss of sediment and nutrients via overland flow.	2019	Ongoing
All waterway crossings are either bridged or culverted throughout the property.	Erosion, loss of sediment and nutrients.	Current	Ongoing
Intermittently flowing, spring fed water ways are are fenced and left vegetated to stabilise soil structure, filter sediment and reduce phosphorus loss.	Erosion, loss of sediment and nutrients.	2022	Update annually
Use of ponds/sediment traps to trap any water and sediment movement and allow sediment to settle. An example of this can be seen in paddock 17.	Erosion, loss of sediment and nutrients.	Current	Ongoing
Some steep slopes have been retired from grazing and have been planted with hazelnut and blueberry orchards	Erosion, loss of sediment and nutrients.	Current	Ongoing
Open Drain cleaning is undertaken in a manner that minimises sediment losses by discussing systems and bank stability with contractors.	Erosion, loss of habitat for native flora and fauna.	Current	Ongoing

Weeds in Riparian Strips and within farm boundary are maintained.	Spread of unwanted and dominant plants	Current	Ongoing
Mark tile drain locations and outlets and record on the tile drain map, as these are found and when new drains are installed or existing drains replaced.	Loss of nutrients via direct drainage	Current	Ongoing

7. CULTIVATION MANAGEMENT

Cultivation management primarily addresses the risk of overland flow, although it can also improve aspects of artificial drainage.

Cultivation is recommended to be setback from waterways, critical source areas and sloping land. The buffer distances vary according to slope and are measured from the outer edge of the waterway bed (if present).

- 3m on slopes less than 4°
- 10m on slopes between 4° to 16°
- 20m on slopes between 16° to 20°

Good Management Practice:	Helps to Mitigate:	Target Date for completion (if relevant):	By When (or progress update):
Cultivation Management			
Tillage cultivation is minimised on farm. Direct drill is used to sow grass seed. Ploughing is generally avoided although may be selectively used where soil compaction has occurred.	Soil damage and erosion. Mitigating deep, lateral drainage.	Current	Ongoing
Avoid cutting silage from paddocks, to increase the organic material in soil.	Loss of organic material, air and water to be held within the soil	Current	Ongoing
Re-sow bare or damaged soil as soon as possible, vegetation and root systems assist with uptake of sediment and nutrients.	Contaminants lost via Overland Flow & Artificial Drainage	Current	Ongoing
Crop is limited to 30ha each year. Paddocks are sprayed in preparation, direct drilled followed by the harrows to level over the paddock, minimising the corrugation or pathway for overland flow to follow.	Soil damage and erosion. Mitigating deep, lateral drainage.	Current	Ongoing
Identify Critical Source Areas (low lying areas, swales) for management, e.g. fencing, leave vegetated.	Artificial Drainage, Deep drainage – leaching of contaminants	2018/19	Ongoing
Paddock selection for sowing crop considers slope and location of critical source areas.	Overland Flow	2018	Ongoing

8. EFFLUENT MANAGEMENT

Effectively managing the application of effluent to land addresses the risk of nutrient loss via deep drainage, lateral flow and artificial drainage. The most commonly encountered risk is overland flow caused by over-application or application of dairy shed effluent when soils moisture levels unsuitable. This can also cause effluent to drain through the soil and into tile drains, and can lead to excess amounts of nutrient to enter groundwater.

In general, the effluent system shall be operated according to the guideline “A Farmers Guide to Managing Farm Dairy Effluent – A good practice Guide for Land Application, Travelling Irrigator System”. Copies are available from Dairy NZ or online at <https://www.dairynz.co.nz/publications/environment/a-staff-guide-to-operating-your-effluent-irrigation-system-low-rate-system/>

Good Management Practice:	Helps to Mitigate:	Target Date for completion (if relevant):	By When (or progress update):
Effluent Management			
Complete upgrades and improvements to the dairy shed access lanes and drains to prevent overflow of effluent to unsealed ground.	Overland flow, ponding of effluent	As soon as possible	2018
Avoid applying effluent over or near critical source areas and tile drains. These areas include low-lying swales where contaminants can accumulate during wet periods and waterways.	Overland flow and direct drainage of effluent to water	Immediate	Ongoing
Use tile drain outlets to assist assessment of soil moisture conditions before applying effluent. if they have water flowing in it then no irrigation shall take place.	Avoid any effluent entering a waterway via Artificial Drainage	Immediate	Ongoing
Use on-farm soil moisture tapes to assist assessment of soil moisture.: <ul style="list-style-type: none"> • Soil Moisture in below field capacity • Soil Temperature is above 6 degrees and, • Visual inspections of soil conditions as per DairyNZ recommendations 	Avoid effluent entering waterways via Artificial Drainage, Overland Flow or over application. Mitigate excessive Nitrogen application leading to loss through overland flow and leaching	Current	Ongoing

Effluent Application does not exceed 5mm depth for each slurry tanker run and does not exceed 10mm depth per application on any area.	Artificial Drainage Overland Flow	Current	Ongoing
An alarm system on the effluent tanks monitors and warns of the risk of overflow due to high pond levels.	FDE being discharged to waterbodies.	Current	Ongoing
Ensure that staff understand the effluent system, discharge areas and risks and ensure that this Plan, the effluent map from Appendix G and the "Good Practice Guide for Land Application" from Dairy NZ are readily available to staff.	Over application, application when soils are near or at field capacity. Overland Flow and Artificial Drainage	2018	Ongoing
Any unauthorised discharge shall be reported to ES, and an incident report form used to identify the cause, so that lessons may be learnt and any required improvements to systems made. The Reporting form is included in the Appendices.	All	2018	Ongoing

9. WINTER GRAZING MANAGEMENT

This section details the good management practices that will be undertaken to minimise the discharge of nitrogen, phosphorus, sediment and microbiological contaminants to water through the use of land for intensive winter grazing. Refer to Appendix F for the winter grazing management map.

Good Management Practice:	Helps to Mitigate:	Target Date for completion (if relevant):	By When (or progress update):
Effluent Management			
Intensive winter grazing is restricted to 30ha, for replacement heifer cows and the shoulders of the milking season.	Soil disturbance and erosion, soil pugging, compaction and overland flow	Current	Ongoing
Dairy cows are wintered off the farm from June to mid-August.	Soil disturbance and erosion, soil pugging, compaction and overland flow	Current	Ongoing
Temporarily fence around critical source areas (CSA) keeping them vegetated when winter grazing occurs.	Contaminants entering waterways via overland flow and artificial drainage	Current	Ongoing
Maintaining a minimum buffer of 5 metres between winter grazing crop and any waterway.	Contaminants entering waterways via overland flow	Current	Ongoing
Grazing from the top of the paddock down and leaving a last bite strip to allow vegetation to filter runoff.	Contaminants entering waterways via overland flow	Current	Ongoing

10. GENERAL RECOMMENDATIONS

The recommendations below may complement the Good Management Practices that are already planned for the farm and list above:

Potential Future GMP	Commentary
Provide formal staff training in Effluent Management and keep records of training and instructions given.	White Waters farm has a relatively high staff turnover. Provision of training and detailed record-keeping will aid in retaining knowledge as well as reducing the risk of non-compliances due to confusion or lack of instruction.

11. ANNUAL REVIEW CHECKLIST

- Update any newly discovered subsurface drainage or tile networks.
- Review the good management practices that were undertaken in the previous 1 June to 31 May period.
- Update fertiliser use and continue to monitor soil testing.
- Consider any additional Good Management Practices to be implemented over the coming 1 June to 31 May period.
- Check that the nutrient budget accurately reflects the farming system, record to be available for review.

Unless there has been a material change in the land use associated with the farming activities, then a nutrient budget is only required to be prepared every three years.












Physiographic Zone Map and Information



polygonLayer

Override 1

Physiographic Zones

-  Alpine - No Variant
-  Bedrock/Hill
-  Country - Artificial Drainage
-  Bedrock/Hill
-  Country - No Variant
-  Bedrock/Hill
-  Country - Overland Flow
-  Central Plains - No Variant
-  Gleyed - No Variant
-  Gleyed - Overland Flow
-  Lignite - Marine Terraces - Artificial Drainage
-  Lignite - Marine Terraces - No Variant
-  Lignite - Marine Terraces - Overland Flow
-  Old Mataura - No Variant
-  Oxidising - Artificial Drainage
-  Oxidising - No Variant
-  Oxidising - Overland Flow
-  Peat Wetlands - No Variant
-  Riverine - No Variant
-  Riverine - Overland Flow
-  Urban Area

Physiographic zone: Bedrock/Hill Country

Southland's physiographic zones allow us to better understand why we have variations in water quality in different areas. We've divided Southland into nine different zones according to factors such as soil type, geology and topography. Through them we can target solutions to higher risk areas as opposed to a region-wide, generalised approach.

Understanding your zone

Each zone is different in the way contaminants build up and move through the soil, areas of groundwater, and into our streams and rivers. Physiographic zones allow us to target advice and management strategies to keep farm nutrients on the farm and out of waterways.

The Physiographics of Southland project was developed as part of *Water and Land 2020 & Beyond* so we can better understand:

- where our water comes from
- how water moves through the landscape
- why we have differences in water quality across the region

What does 'Bedrock/Hill Country' mean?

Land with bedrock or glacial till* found near the surface, located below 800m above sea level. There are no significant areas of groundwater.

*Glacial till is a mixture of rock debris and sediment that has been deposited by a glacier. It is relatively impermeable, allowing little water to get through.

Key features of the Bedrock/Hill Country zone

- Mostly rolling to steep land, up to 800 metres above sea level (below the tree line).
- Prominent landforms.
- Soil overlies bedrock or glacial till.
- Either previously or currently densely covered with native forest, tussock or plantation forestry.
- Found throughout Southland.

Water source and movement

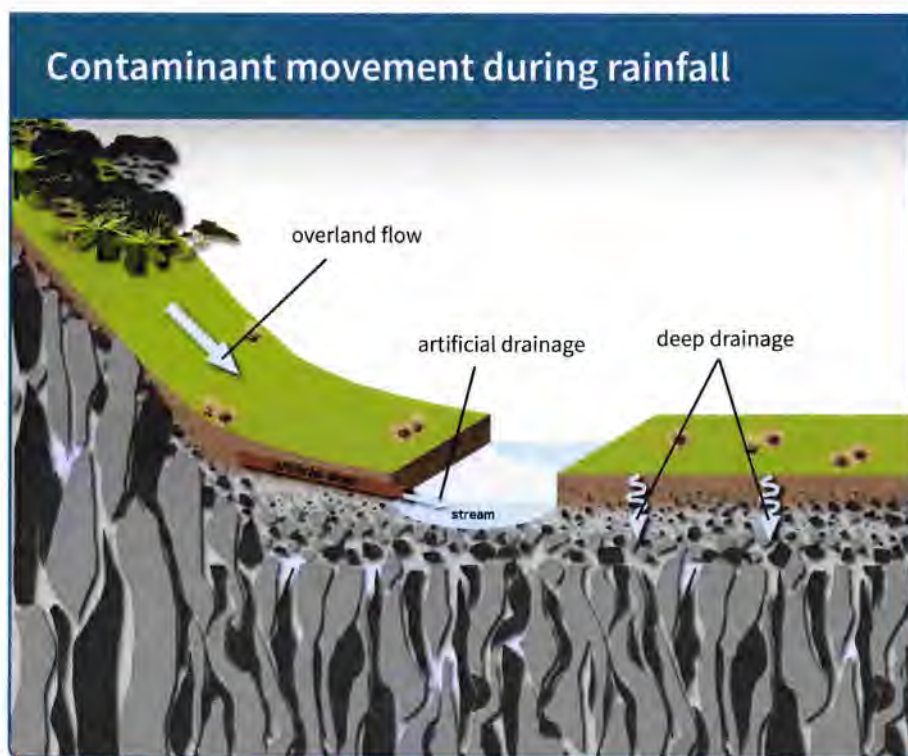
- High rainfall zone due to its elevation.
- Dense network of branching streams throughout the zone that flow to neighbouring lowland areas.
- No significant areas of groundwater.

Contaminant movement

Contaminant loss to streams is the main concern in this zone. Water quickly flows down-slope through wet soils and as overland flow to nearby streams following high or prolonged rainfall. Nitrogen, phosphorus, sediment and microbes are all carried with water, particularly during late autumn and winter.

In undeveloped areas Bedrock/Hill country streams can be a major source of recharge (top-up) water and dilution for lowland waterways and aquifers. However, in developed areas contaminants lost from Bedrock/Hill country streams contribute to the contamination loads in lowland streams in neighbouring zones.

Groundwater within the Bedrock/Hill Country zone is minimal and mainly found within rock fractures. Groundwater contaminants are typically not a concern for this zone.



▶ Contaminant flow pathways for the Bedrock/Hill Country zone include overland flow (runoff) in the steeper areas, and artificial drainage where soils are poorly drained and deep drainage in flatter areas.

What does this mean for water quality?

- ✓ Water from less developed areas of this zones provide a source of high quality water and dilution for downstream zones.
- ✓ Little nitrogen build-up in groundwater due to denitrification in the soil zone.
- ✗ Water flowing over highly developed hills carries potentially large amounts of contaminants (nitrogen, phosphorus, sediment and microbes) to nearby streams, particularly following heavy rainfall.
- ✗ Water flowing through artificial drainage carries potentially large amounts of contaminants (nitrogen, phosphorus, sediment and microbes) to nearby streams, particularly following heavy rainfall.

Improving Southland's water quality

The following good management practices are applicable to all physiographic zones in Southland:

- Capture nutrients, sediment and microbes in wetlands and sediment traps
- Nutrient management
- Riparian management
- Effluent management

Good management in the Bedrock/Hill Country zone

In addition to the above, good management in the Bedrock/Hill Country zone includes measures for reducing the effects of overland flow and artificial drainage.

Reduce the effects of overflow by:

- Protecting soil structure, particularly in gullies and near stream areas
- Managing critical source areas (CSA)
- Reducing Phosphorus use and loss

Reduce the effects of artificial drainage by:

- Protecting soil structure, particularly in gullies and near stream areas
- Reducing phosphorus use and loss
- Reducing the accumulation of surplus nitrogen in the soil, particularly during autumn and winter
- Avoiding preferential flow of effluent through drains
- Capturing contaminants at drainage outflows

Physiographic zones and the Southland Water and Land Plan

Environment Southland has developed a proposed Southland Water and Land Plan, using the science behind the physiographic zones to inform the plan and provide a tailored approach to particular issues that have been identified for each zone.

The main aim of the plan is to introduce new methods that help to halt any further decline in water quality by managing activities that we know adversely affect the quality of Southland's freshwater – such as land use intensification, wintering and stock in waterways. A key focus of the changes is to shift all land owners towards good management practices in ways that will give the best gains for maintaining water quality.

Further information

For more information about physiographic zones and good management practices contact Environment Southland. Phone 0800 76 88 45 or email service@es.govt.nz. You can also find out more about the Physiographics of Southland and your zone on our website, www.es.govt.nz.

What zone is your property in? View our map online: <http://bit.ly/waterandlandmaps>

The Bedrock/Hill Country zone refers to rolling to steep land with bedrock or glacial till found near the surface.

Soil Types and Effluent Area Map

White Waters

Soil Type and Effluent Area

Legend

- Effluent Discharge
- Kakapo
- Otanomomo
- Te Anau



Google Earth

Image © 2018 DigitalGlobe

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Effluent Operations and Maintenance Plan

Farm Dairy Effluent Storage

Your Farm Dairy Effluent (FDE) tanks are designed so that you can store effluent when conditions are not suitable for irrigation. They have been designed in accordance with the FDE code of Practice and IPENZ Practice Note 21. The size of your effluent storage is sufficient to achieve “deferred storage”, provided that you operate your farm and effluent system in accordance with the design parameters.

There are some important that you must do to ensure that you get the best out of your system and ensure that you can maintain sufficient storage.

Storage - Vital Statistics

Total Storage Volume	Hynds Tank 1,100 m ³ Kliptank 2,062 m ³
Maximum Cow Numbers & Water Use	599, 45L/cow/day
Effluent Sources:	Shed, yards
Irrigation Depth	5mm Winter, 10mm Summer
Irrigation Volume	120 m ³ /day Winter and 240 m ³ /day Summer
Non-irrigation Period	1 June – 31 July

** refer to your Tank Design Report for further detail*

Tank Maintenance - At a Glance:

- U Check the tank level before every milking.
- U Irrigate whenever conditions are suitable, do not wait until the tank is full.

Monthly Checks and Maintenance

- U Check that the high level alarm is working correctly.
- U Check that all walls are stable, no slumping, cracks or holes.
- U Check area surrounding the tank for any signs of leakage, for example: wet patches, overgrowth of grass, tanking.
- U Check that fencing and gates/access are safe and secure.
- U Check that inlet pipe/s are running freely and are not blocked.
- U Check that access ladders and ropes are safe and secure.
- U Note any smell – does the effluent smell bad?
- U Check for any solid crust or grass growth on the effluent surface.

Periodic Checks and Maintenance

- U Fully empty the tank and remove any solids buildup once per year.
- U When the tank is empty:
 - o Check that internal walls are stable, no slumping.
 - o Check that the liner has no damage or holes.
 - o Check that concrete is not cracked or damaged.

Maintaining Storage Capacity - Irrigation

Your tank design does not allow for deliberate storing of effluent in the tank.

Your storage tank should be irrigated from daily, or when conditions are suitable. Your tank should not be used to defer irrigation when irrigation potential is present.

The tank design allows for no irrigation during June and July, as irrigation potential is generally minimal during these months, however you may be able to irrigate during these months if conditions are suitable and this is permitted by your consent.

Three days emergency storage has been allowed for in the design, so that you can attend to and repair any irrigation system failures. It is important to ensure that irrigation is restored as soon as possible after a failure.

Your tank is designed to only store effluent from the sources stipulated in your effluent design and is not intended to store stormwater, solids or additional effluent from other sources. If you are considering adding new sources of effluent, contact RDAgritech so that your storage size can be reviewed to ensure that it will still meet requirements.

Ensure that the liner is inspected each time the tank is emptied.

High Rainfall Events and How They May Affect Your Storage Capacity

Your tank design allows for collection of rainfall from the yards and feedpad as well as the surface of the tank and weeping wall beds. If you maintain an appropriate irrigation schedule, (refer above) then there should not be any problems with maintaining storage capacity.

Due to the size of your catchment area, a single high-rainfall event can cause the tank level to rise rapidly. If soil moisture levels are also high, or soils are already saturated, you may not be able to irrigate to address this.

The best way to manage the effects of heavy rainfall is to irrigate at every opportunity and keep the tank as low as possible. If your tank is already high and a heavy rainfall event is forecast, plan ahead for any contingency measures that may be needed to manage tank levels.

Tank Liner

Your Kliptank is lined with a synthetic (HDPE) liner. Synthetic liners provide a robust, long-term seal of the base and sides of the tank, to ensure that effluent does not leak out. The tank liner is designed to withstand the loading from effluent even when the tank is full.

- Your tank is not designed to be cleaned out using machinery, (such as a digger). There is a very high risk of damage to the liner even with a highly skilled operator.
- Your tank liner is vulnerable to damage from any heavy and/or sharp-edged objects.
- When using a slurry tanker, only use the designated draw-off point.
- Your tank must only be used with the specified stirrer.

Your Hynds tank is lined with concrete.

- Your tank is not designed to be cleaned out using machinery, (such as a digger). Whilst concrete is very robust, damage to the tank wall panels could result if these are struck by the bucket.
- Your tank must only be used with the specified stirrer.

Tank Stirrers

Your tank design allows for the specified stirrer only. You must not alter the stirrer in any way without first consulting the tank supplier to ensure that the tank liner will not be damaged.

Emptying the Tank

Provided that you irrigate whenever conditions are suitable, you should get your tank empty at least once per year. You may need to agitate the last of the effluent and solids with a hose, to ensure that they can be drawn up through the pump hose.

Leakage or Failure

In the unlikely event that leakage or tank failure occurs:

- U Stop adding any more effluent to the tank (pump directly from sump or use the other tank, or alternative storage).
- U Contact the tank supplier or RDAgritech to arrange for inspection and investigation of the source of effluent. This is likely to require the tank to be emptied.
- U Contact Environment Southland, (refer to the contact details on your resource consent).

EFFLUENT INCIDENT REPORTING

Date		Time	
Reported by		Position (Person reporting)	
Reported to;		Position (Person reported to)	
Farm Address			
Location of Issue			

What Happened?	
Cause, Circumstance and Contributing Factors	
Measures that were in place to prevent this type of incident.	

Type of Incident(s)	
<input type="checkbox"/> Surface ponding; <input type="checkbox"/> Exceeding nutrient application rates; <input type="checkbox"/> Exceeding effluent application depths/rates	<input type="checkbox"/> Irrigating when soil conditions are too wet; <input type="checkbox"/> Discharge without using irrigator (e.g. pipe end discharge); <input type="checkbox"/> Sludge dumping where runoff is at high risk of entering water; <input type="checkbox"/> Discharge in breach of consent conditions or a plan rule;
Comments:	

Was the problem fixed?	<input type="checkbox"/> Yes	Are there any follow up actions or monitoring required?	<input type="checkbox"/> No
<input type="checkbox"/> NO. If No – when will it be fixed?		<input type="checkbox"/> Yes. If Yes – what are they?	

What measures are recommended to be implemented to prevent/minimise this type of incident occurring again?

Cause Analysis			
People	System	Management	External
<input type="checkbox"/> Complacency	<input type="checkbox"/> Failure	<input type="checkbox"/> Procedure	<input type="checkbox"/> Weather
<input type="checkbox"/> Lack of Knowledge	<input type="checkbox"/> Inadequate for purpose	<input type="checkbox"/> Unforeseeable circumstance	<input type="checkbox"/> Electrical
<input type="checkbox"/> Poor attitude	<input type="checkbox"/> Breakdown	<input type="checkbox"/> Poor Planning	<input type="checkbox"/> Provider
<input type="checkbox"/> Experience	<input type="checkbox"/> Knowledge	<input type="checkbox"/> Poor Communication	<input type="checkbox"/> Other
<input type="checkbox"/> Lack of supervision		<input type="checkbox"/> Poor practice	
<input type="checkbox"/> Poor Training		<input type="checkbox"/> Other	
		<input type="checkbox"/> Lack of Monitoring	

Cause (s) Identified	Explanation / Recommendations	Who responsible for Follow up.	Date to be followed up

Summary Comments

Signed

Date:

A staff guide to operating your effluent irrigation system

Travelling Irrigator



dairynz.co.nz

0800 4 DairyNZ (0800 4 324 7969)

DairyNZ 

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- New Zealand Dairies Ltd
- Sefton Lonsdale - RootZone Effluent & Engineering Ltd



For more information visit

dairynz.co.nz

DairyNZ
Corner Ruakura and Morrinsville Roads
Private Bag 3221
Hamilton 3240

Phone 0800 4 DairyNZ (0800 4 324 7969)

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Disclaimer

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Operating your effluent irrigation system

Understanding how to operate your effluent irrigation system properly is an essential task on farm. This booklet helps take farm staff through the important parts of operating and maintaining a travelling irrigator effluent system. The book can be used as a training guide for those who are new to travelling irrigator systems, or for staff who are new to the farm to introduce them to the farm's effluent practices and policies.

Contents

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Symbols



Throughout this booklet there are activities that you may wish to complete. Inside the back cover is a flip-out worksheet that has the space available for you to complete the small tasks. Once completed, you may wish to remove the worksheet and pin it up somewhere, as a guide for applying effluent on your farm.



This symbol means STOP IMMEDIATELY – throughout the book there are examples of problems that will arise on your farm related to effluent. In most cases if you see any of these issues you must STOP IMMEDIATELY and inform your manager or farm owner.



This symbol means WARNING – throughout the book there are examples of problems that will arise on your farm related to effluent. In most cases if you see any of these issues you must fix the immediate problem if you have permission or have been shown what is required to fix the problem. And then inform your manager or farm owner.



This symbol means CONTINUE – there are examples that show you conditions that are acceptable to continue irrigating effluent.

Our farm policy for effluent

We must ensure that:

1.	No effluent gets into waterways
2.	No effluent puddles in any paddocks
3.	The effluent system is checked daily (minimum)
4.	If there are problems with effluent, talk to the manager/farm owner
5.	Effluent irrigation events are checked and recorded against the Effluent Management Plan
6.	The Resource Consent is displayed in the shed
7.	The maximum application depth is not exceeded
8.	The maximum application rate is not exceeded
9.	Effluent is not applied if the soils are too wet

Potential hazards of effluent irrigation



Hoses and wires in paddocks whilst riding/driving farm vehicles



Rotating boom on irrigator



Falling into the effluent pond



Breaking the crust on the pond releasing gas



Crush warning



Electricity at the pump



No heavy lifting



Unstable pontoons

Why is effluent important?

Well managed and maintained effluent systems:

- Grow more grass for less cost
- Grow better tasting grass, therefore cows eat more
- Have fewer messy breakdowns
- Have cleaner water for the community
- Ensure regional council rules are met – no fines
- Obtain greater public acceptance.

What is effluent made up of?

- Wash down water
- Rain
- Faeces and urine
- Spilt milk
- Detergent
- Soil from feet.



What nutrients are in effluent?

- Nitrogen (N)
- Phosphorus (P)
- Potassium (K)
- Sulphur (S).

The value of the nutrients in effluent from 100 cows in an average New Zealand herd is **\$3000 PA**

What shouldn't be in effluent?



Chemicals



Rubbish/afterbirth



Reject milk

Before every milking checklist



1. Stormwater

Is the stormwater or wash water diversion in the correct position?



2. Stone trap

Is the sump/stone trap clear of rubbish/afterbirth?



3. Storage

Is there enough room in the storage pond or tank for another milking? (Refer to pg 5)



4. Irrigator

Check the effluent plan. Is the irrigator in the right place? Is there enough run length left for the milking?



5. Pump/stirrer

Do you need to turn the stirrer or pump on?



6. Yard

Wet the yard before cows come in



7. Be gentle

Reduce noise and be gentle with cows during milking



8. Turn hoses off

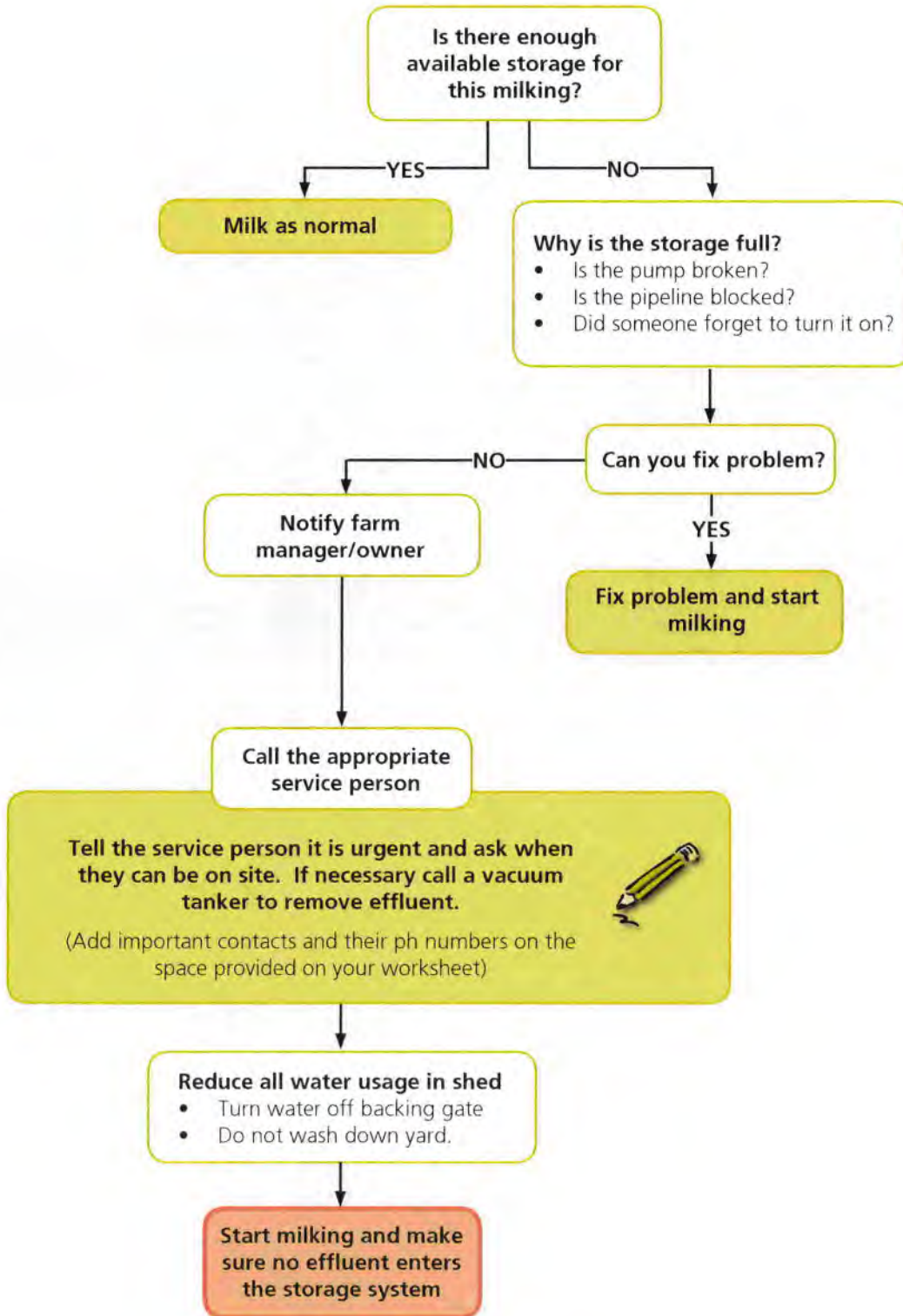
Use less water and turn off the hoses



9. Scrape the yard

After milking scrape yard with scraper before you hose down

Before every milking: check effluent storage



Before irrigating: is it too wet to irrigate?

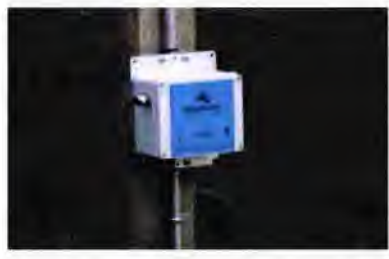


Using the irrigator

If measuring your soil moisture electronically



1. Check the soil moisture data logger or use a soil probe to get the soil moisture figure for the paddock being irrigated
2. Compare today's soil moisture figure against the farm's critical soil moisture figure. The critical soil moisture figure will be the number that decides whether you irrigate or not. Ask you manager/owner what the critical soil moisture figure is for your farm and write it in the space provided on your worksheet.



Check paddocks manually - look and listen. Do not irrigate if:



There is already water puddling on the ground/worms on surface.



You can hear/see water or wet mud under foot when you walk.

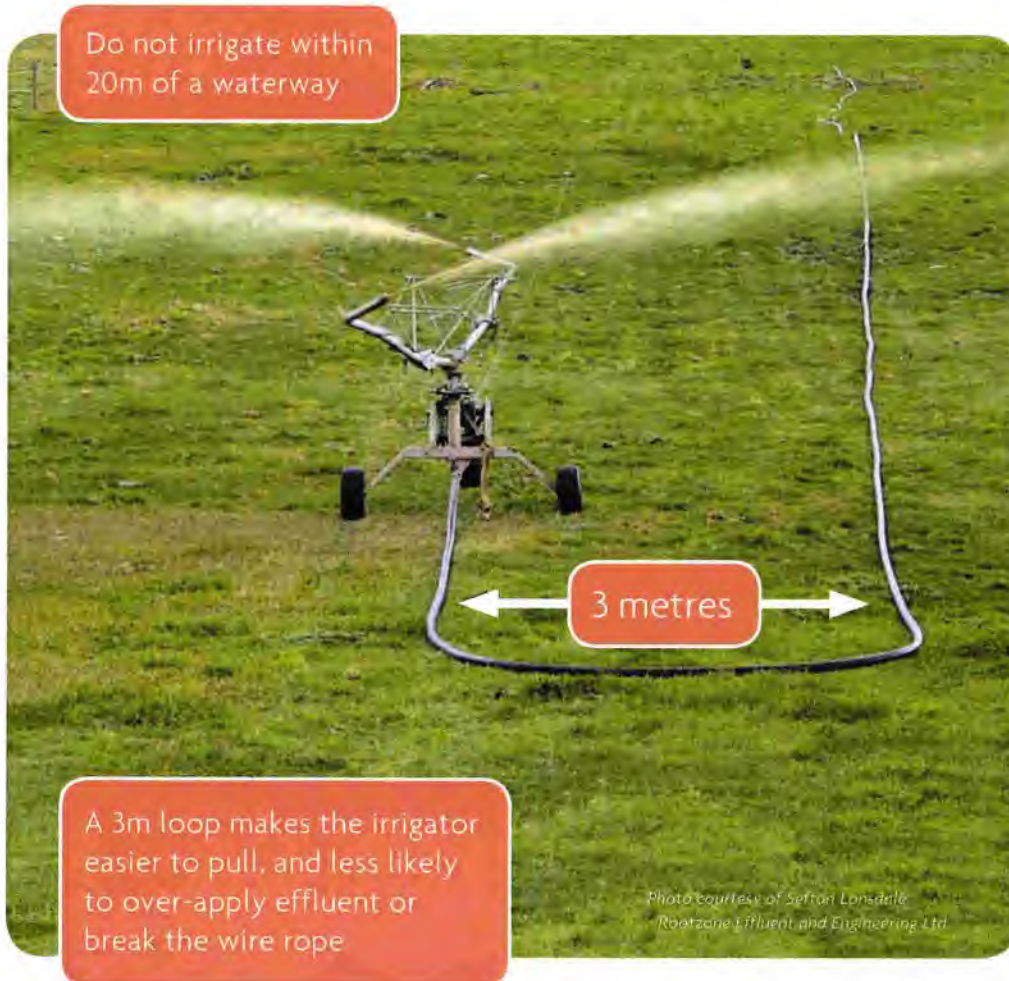


It has been raining a lot, snowing or the ground is frozen.



The soil makes a 'worm' when rolled, sticks to your thumb when rolled or free water appears when squeezed.

Before irrigating: hose layout for travelling irrigator



Cow and pasture considerations

- Apply effluent onto short pasture. If possible, graze the area 2-3 days before application
- Avoid grazing pasture within 10 days of spraying effluent, to reduce animal health risks and maximise pasture intake
- Avoid grazing springing or just calved cows on the effluent block - this will help avoid metabolic problems
- Avoid water troughs.



How to operate a travelling irrigator



1. Soil

Check the soil moisture. Is it too wet to irrigate?



2. Location

Check the irrigator is in the right location. Check run sheet. Make sure irrigator is away from waterways



3. Remove anchor

Remove the anchor from the post or ground



4. Gear/Brake

Take the irrigator out of gear and take the brake off



5. Wind wire

Wind wire rope slowly



6. Disconnect hose

Disconnect the drag hose from the irrigator



7. Attach

Reverse the bike/tractor towards the irrigator and hook onto the tow ball to move the irrigator to the new run



8. Move

Slowly move the irrigator to the new run. Turn boom lengthways and hang onto it at all times



9. Run the wire

Slowly run the wire rope down the length of the run. Do not go too fast or the rope will tangle



10. Secure anchor

Secure the anchor so it won't pull off/out



11. Hose

Disconnect the drag hose. Never pull more than 2 lengths (50m) at a time. Disconnect from the hydrant if necessary



12. Tow hose

Tie the rope around the pipe and connect to the tow bar. Tow the hose at the female end to avoid tearing the clips off



13. Connect hose

Lay the hose down the run within 3m of the wire to minimise drag. Re-connect the hose to the irrigator



14. Gear/brake

Put the irrigator back into gear (fast speed) and insert brake



15. Wind wire

Wind up the slack in the wire rope, and check the cut-off on the winch winder



16. Cover troughs

Cover any troughs



17. Record

Record run on the run sheet



18. Check irrigator

Is the irrigator moving forward at the fastest speed with the boom spinning? Is there any ponding?

Can you see a problem?

The following section illustrates the possible problems that may arise in all areas of effluent irrigation. Make yourself aware of these and the required actions of each problem.











STOP the irrigator immediately. Inform your manager or farm owner of the issue. It is important to stop the irrigator as the problems arising will have adverse affects on the farm and farm environment.









WARNING. If you have had prior experience or approval to fix the problem then do so. Inform your manager or farm owner of the issue or phone the appropriate service person.




With the irrigator?

<i>Can I see a problem?</i>		<i>What should I do?</i>
The irrigator pressure is too low, or the irrigator has stopped moving. This means the irrigator will apply too much effluent		STOP irrigating and tell your manager/ farm owner 
Irrigator is dirty and needs to be serviced		Tell your manager/ farm owner or call the appropriate service person 
No nozzle or broken nozzle will result in too much effluent being applied		STOP irrigating and tell your manager/ farm owner 
Worn bearings on the irrigator		Tell your manager/ farm owner or call the appropriate service person 

In the paddock?

Can I see a problem?		What should I do?
Effluent running off in to waterways, streams or rivers		STOP irrigating and tell your manager/ farm owner. Move the irrigator away from waterways 
A bad connection between hoses, foaming or puddling leaking from connection		STOP irrigating and reconnect. If parts need replacing tell your manager/ owner 
A leak in the pipe - effluent is pooling in and around the pipe in the paddock		STOP irrigating and fix the leak temporarily if possible, tell your manager/owner 

With ponding in the paddock?

Can I see a problem?		What should I do?
Small puddles or ponding after irrigation that don't disappear for a while		Tell your manager/ farm owner 
Large puddles, ponding or sludge remains for many hours and can be seen on pasture		STOP irrigating and tell your manager/ farm owner 

Can you see a problem?

Can you see a problem?

With the storage pond?

The following section shows the possible problems that may arise with the effluent storage pond. Make yourself aware of these and the required actions of each problem.

Keep the level of effluent in the storage pond as low as possible:

- To have storage space if you have a breakdown, bad weather or if you are too busy to irrigate
- Irrigate whenever the conditions are right, don't wait until the pond is full
- Check you have enough storage before every milking.



STOP what you are doing immediately. Inform your manager or farm owner of the issue. It is important to stop adding more effluent to the pond as the problems arising will have an adverse affect on the farm and farm environment.



WARNING, inform your manager or farm owner of the issue.

<i>Can I see a problem?</i>		<i>What should I do?</i>
Wet areas or greener areas around the pond may mean that the pond has a leak		Tell your manager/ farm owner and show them the wet/ greener area 
Grass or solid crust on the top of the pond means too many solids in the pond		Tell your manager/ farm owner 
Cracks in pond walls or the sides of the pond falling in		Tell your manager/ farm owner and show them where the problem is. Make sure there are no safety issues 

Can I see a problem?

What should I do?

Pond level too high or high level alarm goes off



DO NOT PUT ANYMORE EFFLUENT INTO THE POND. Tell your manager/farm owner or call the appropriate service person



The pond never fills up. This may indicate that there is a leak



Tell your manager/farm owner



Can you see a problem?

Troubleshooting

<i>Problem: Irrigator travels too slow</i>	
Possible causes	Fixes
Irrigator is set on a slow speed	Set irrigator to a faster speed
Nozzle sizes are too big, which will reduce the pressure at the end of the irrigator. This will decrease the number of rotations of the boom	Replace nozzles with new or smaller holes. Recommended size is 11mm and a cone shaped nozzle
The drag hose has been laid out wrong	Lay hose out properly
Not enough pressure is coming from pump to operate the irrigator properly	Service pump or get a bigger pump
Arms at end of boom are pointing too high	Lower arms at end of booms
Irrigator is travelling up hill	Run irrigator downhill, but not toward waterways
Drag hose diameter is too small	Replace with a larger diameter hose if the irrigator can pull it and is the pump is capable

<i>Problem: Irrigator travels too fast</i>	
Possible causes	Fixes
Arms at the end of the boom are pointing too low	Raise arms at the end of the boom
Set in wrong gear	Change the gearing

<i>Problem: Effluent ponding/puddles or runoff</i>	
Possible causes	Fixes
Application rate too high	Speed up the irrigator and check nozzles
Soils at saturation point	Pump to holding pond and irrigate later

<i>Problem: Blocked nozzles</i>	
Possible causes	Fixes
Effluent contains solids that cannot be pushed through nozzle like fibre, feed or rubbish	Unblock nozzles
	Use a stirrer to break up clumps of solids in sump/pond
	Install a grate over sump and put a rubbish bucket in the shed

Problem: Irrigator stalled

Possible causes	Fixes
Irrigator stuck on something	Check for problems remove any obstacles
Hose was laid out wrong	Fix hose and lay out as shown on pg 9
Pump broken	Call for pump service immediately
Irrigator broken	Pump to pond. Check wire, winch gearing, and irrigator components. Repair/replace as required

Problem: Effluent not spraying out of irrigator properly

Possible causes	Fixes
Not enough pressure from pump to operate irrigator properly	Call for pump service
Nozzles blocked	Clear out/replace nozzles if needed. Avoid solids entering
Nozzle sizes are too big, which will reduce the pressure at the end of the irrigator. This will decrease the number of rotations of the boom	Replace nozzles
Blockage at pump	Remove blockage
	Install a debris basket before sump or stone trap
Silting up of mainline	Keep stone trap clean. Flush line with water

Problem: Effluent spraying into waterway, bores, boundaries

Possible causes	Fixes
Irrigation run in the wrong place	Stop irrigating and move irrigator
	Check effluent management plan for correct run locations
	Mark run locations on fences

Problem: Hose blowout

Possible causes	Fixes
Poor or worn couplings	Replace couplings
Pipe kinked	Layout pipe correctly
Couplings installed wrong way around	Put couplings the right way around.

Can you see a problem?

Maintenance – monthly

At the shed



1. Empty weekly

Clean the effluent sumps and stone trap



2. Float switch

Check float switches are clear and working



3. Storage

Check level of storage ponds

At the irrigator



1. Grease

Grease all moving parts



2. Nozzles

Check nozzles are not blocked or damaged



3. Tyres

Check tyre pressure is firm



4. Battery

Battery of irrigator failsafe/monitor



5. Winch and wire

Winch and gearing is operating and wire rope is not frayed



6. Hoses and joints

Clean connections and check hoses have no cuts, splits or bulges

At the storage pond



1. Pipes

Check pipes are running in and out are not blocked



2. Walls

Check pond walls are stable



3. Leaks

No signs of leaks



4. Fence

Check fence is safe and secure



5. Smell

Does the pond smell bad?



Maintenance – 6 monthly

At the shed



1. Pump

Strip pump, oil and clean and check the pump seals/impeller



2. Pressure

Check the pressure at the pump, compare against ideal



3. Flush

Flush clean water through delivery line to clean out pipes and irrigator

At the irrigator



1. Wheel bearings

Check the wheel bearings



2. Pressure

Check pressure in the paddock, and compare against ideal



3. Rate & depth

Measure application rate and depth (see page 23)

Pipes, hoses and nozzles



1. Hydrants

Check the condition of the hydrants



2. Couplings

Check the condition of the couplings



3. Replace nozzles

Replace the nozzles once a year

Sump/stone trap



1. Rubbish

Collect any rubbish out of the sump and/or the stone trap



2. Prepare

If sump/stone trap is wide enough use front end loader, otherwise use a shovel and wheel barrow



3. Scoop

Slowly scoop out the contents taking care not to spill it. Use the low ratio on the tractor to avoid ripping up the entry

Maintenance – annually

At the storage pond



1. Desludge pond *(Recommendations do not apply to synthetically lined ponds, call a professional to desludge synthetically lined ponds)*

1. Remove the crust with excavation machinery – warning: gases may be released when crust is first broken so keep clear and away from pond edge
2. Stir the pond to mix the solids before emptying
3. Never empty the pond completely
4. Be careful to not damage the sides/bottom or the liner of the pond when emptying
5. Pond sludge has more nutrient value than normal effluent, so apply to bigger area at lower rate
6. Repair any damage to the pond before putting any effluent back in.



2. Grass edges

Control/spray the grass and the weeds around edge of the pond

Maintenance – spreading effluent solids

Spreading direct to pasture

Muck spreader/slurry tanker

1. Transfer sludge to a muck spreader or slurry tanker
2. Check effluent plan for disposal location
3. Add water to the sludge to make it easier to spread
4. Avoid danger zones e.g. waterways, bores, boundaries, creeks etc.



Tractor

1. Check the effluent plan for disposal location
2. Add some water to the sludge to make it easier to spread
3. Spread the load lightly across as larger area as possible
4. Do not dump in one spot.



Stockpiling/composting

1. Check sealed storage area is ready and that the liquid will drain safely into the effluent system or be collected
2. Carefully transport sludge to the storage area
3. Empty sludge onto pile
4. Check that there is no run off.



Monitoring

Understanding application depth

Application depth is how much volume is going on to your soil – usually referred to as depth (mm) – similar to the rainfall you collect in a rain gauge e.g. 20mm.

How much



Depth (mm)



Understanding application rate

Application rate is how fast it is going on – usually referred to as (mm/hr) similar to the intensity of rainfall e.g. 10mm in 1 hr.

How long



Drizzle



Downpour



Maximum application rate and depth for different soil types?



Maximum application rate and depth may be set by regional councils. Ask your manager/farm owner for this farm's maximum. It is not to be exceeded. If there are no figures from the council then the amount of effluent you can apply at one time, and the speed you can apply it at, is dependent on the soil type. Using the table below and having a discussion with your manager or farm owner, fill in the appropriate areas of the worksheet.

Soil type	Maximum application depth	Maximum application rate
Sand	15mm	32mm/hr
Loamy sand	18mm	32mm/hr
Sandy loam	22mm	20mm/hr
Fine sandy loam	24mm	17mm/hr
Silt loam	24mm	10mm/hr
Clay loam	18mm	13mm/hr

How to test application depth and rate

Test location

Test the application depth at the location which puts the pump under the greatest work load, e.g. at the greatest distance from the pump, or at the highest elevation above pump station.

Collection containers

When testing you can use either rectangle trays with straight sides, rectangle trays with sloped sides or standard round buckets. You will need about 20 of these. You must use a different calculation depending on the type of collection container.

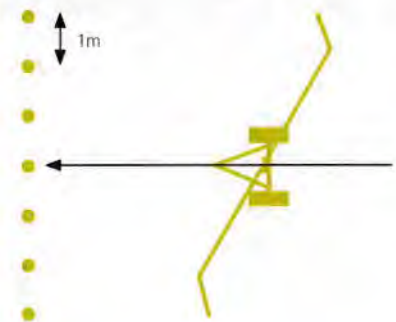


Step 1:

Containers

Before applying effluent, put containers in a line across the path of the applicator:

1. 1-2 metres apart
2. use enough containers across the spray width of the irrigator
3. put a stone in each container to stop it blowing over.



Step 2:

Run irrigator

Run the irrigator as normal:

1. record the actual amount of time that effluent is falling in the containers.

How long



Step 3:

Measure the depth of effluent in every 'wet' container.

For RECTANGLE TRAYS WITH STRAIGHT SIDES:

1. use a tape measure
2. remove the stone
3. measure how deep the effluent is in each container (mm)
4. write down depth for each container.

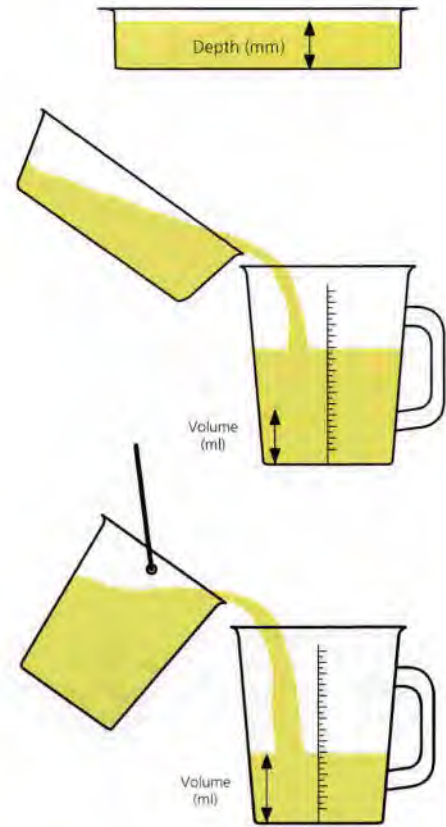
For RECTANGLE TRAYS WITH SLOPING SIDES:

1. remove stone
2. tip effluent into measuring jug record the volume (ml)
3. write down volume for each container.

For ROUND BUCKETS WITH SLOPING SIDES:

1. remove stone
2. tip effluent into measuring jug record the volume (ml)
3. write down volume for each container.

Tip: Make sure container is level (not on a slope) before you measure.



How to calculate application and depth rates

Rectangle trays with STRAIGHT sides

Record the depth from each container, e.g. on a sprinkler with a 40 m diameter wetted area, there may be 20-40 containers.

Container 1 Container 2 etc ...

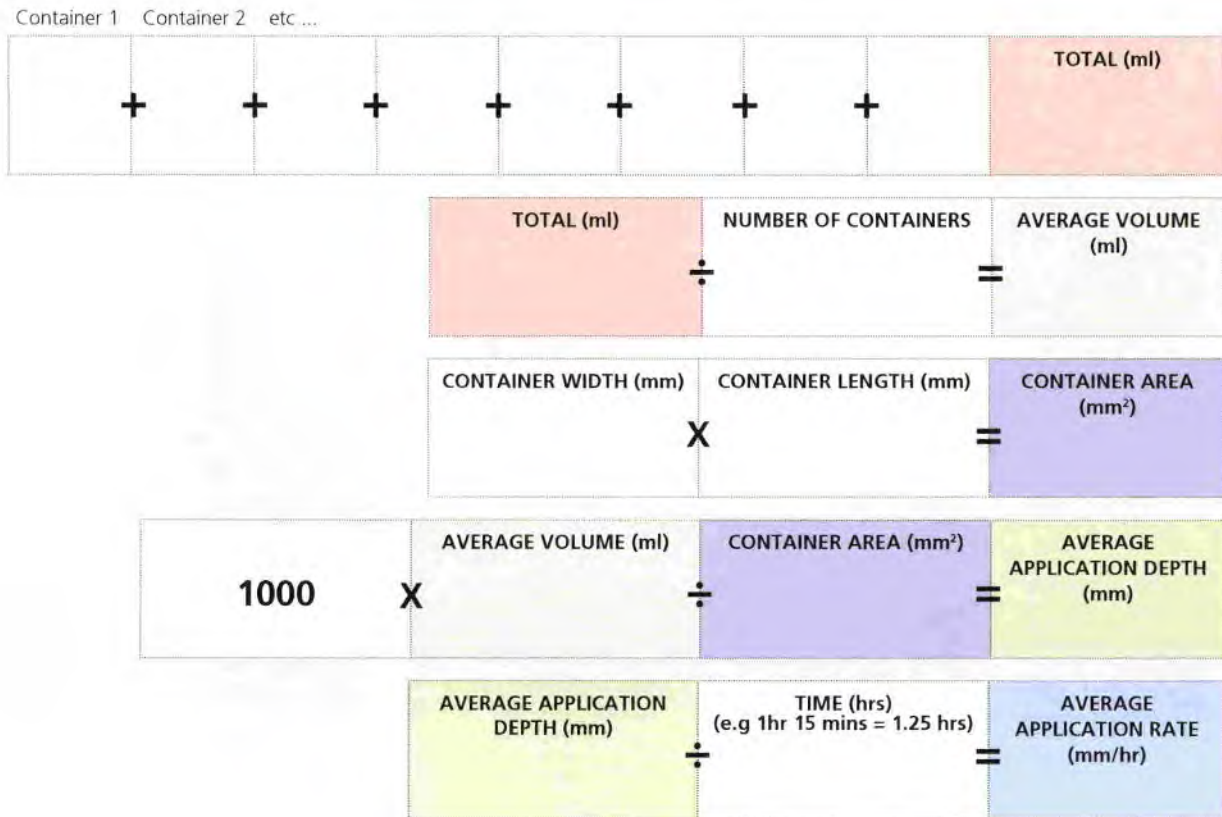
+	+	+	+	+	+	+	TOTAL (mm)
TOTAL (mm)		NUMBER OF CONTAINERS		÷		= AVERAGE APPLICATION DEPTH (mm)	
AVERAGE APPLICATION DEPTH (mm)		TIME (hrs) (e.g 1hr 15 mins = 1.25 hrs)		÷		= AVERAGE APPLICATION RATE (mm/hr)	

Note: Maximum application depth = The CONTAINER with the deepest measurement.

Tip: To convert seconds or minutes to decimal, divide by 60 e.g. 21 mins = 21 ÷ 60 = 0.35 hrs.

Rectangle trays with SLOPED sides

Record the depth from each container, e.g. on a sprinkler with a 40 m diameter wetted area, there may be 20-40 containers.



Note: Maximum application depth = The CONTAINER with the deepest measurement.

Tip: To convert seconds or minutes to decimal, divide by 60 e.g. 21 mins = 21 ÷ 60 = 0.35 hrs.

Round buckets with SLOPED sides

Record the depth from each container, e.g. on a sprinkler with a 40 m diameter wetted area, there may be 20-40 containers.

Container 1	+	Container 2	+	etc ...	+	+	+	+	+	+	TOTAL (ml)	
									÷	NUMBER OF CONTAINERS	=	AVERAGE VOLUME (ml)
									÷	2	=	CONTAINER RADIUS (mm)
3.14	X	CONTAINER RADIUS (mm)				X	CONTAINER RADIUS (mm)				=	CONTAINER AREA (mm ²)
1000	X	AVERAGE VOLUME (ml)				÷	CONTAINER AREA (mm ²)				=	AVERAGE APPLICATION DEPTH (mm)
									÷	TIME (hrs) (e.g 1hr 15 mins = 1.25 hrs)	=	AVERAGE APPLICATION RATE (mm/hr)

NOTE: Maximum application depth = The CONTAINER with the deepest measurement.

Tip: To convert seconds or minutes to decimal, divide by 60 e.g. 21 mins = 21 ÷ 60 = 0.35 hrs.

For assistance and advice on testing application depths and rates on pivot systems, please contact DairyNZ.

Worksheet



Important contacts

MANAGER _____

FARM OWNER _____

EFFLUENT SYSTEM SERVICE REPAIR _____

VACUUM TANKER _____

REGIONAL COUNCIL _____

Farm policy

- 1 No effluent gets into waterways
- 2 No effluent puddles in any paddocks
- 3 Effluent system is checked daily (minimum)
- 4 If there are problems with effluent, talk to the manager/farm owner
- 5 Effluent irrigation events are checked and recorded against the Effluent Management Plan
- 6 The resource consent is displayed in the shed

- 7 **Pg 22 The maximum application depth is not exceeded**
Our consented max application depth is.....mm
Based on our soil typeour maximum application depth is.....mm

- 8 **Pg 22 The maximum application rate is not exceeded**
Our consented max application rate is.....mm
Based on our soil typeour maximum application rate is.....mm

- 9 **Pg 6 Effluent is not applied if the soils are too wet**

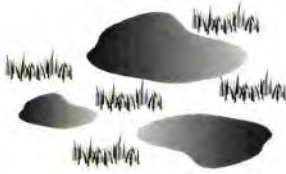
Irrigate < Less than Greater than > *Do not irrigate*

Write critical soil moisture figure here

Emergency



The pond is leaking



Puddles on grass



Burst pipes



Overflowing



Blockage

Emergency Numbers:

Farm manager/owner

.....

Regional council

.....

Effluent systems repairs

.....

Riparian & Waterways Map

White Waters

Riparian and Waterways

Legend

- CSA
- Effluent Discharge
- Open Drain
- Requires Fence (unfenced)
- Tile Drain
- Tile Outlet
- Waterway

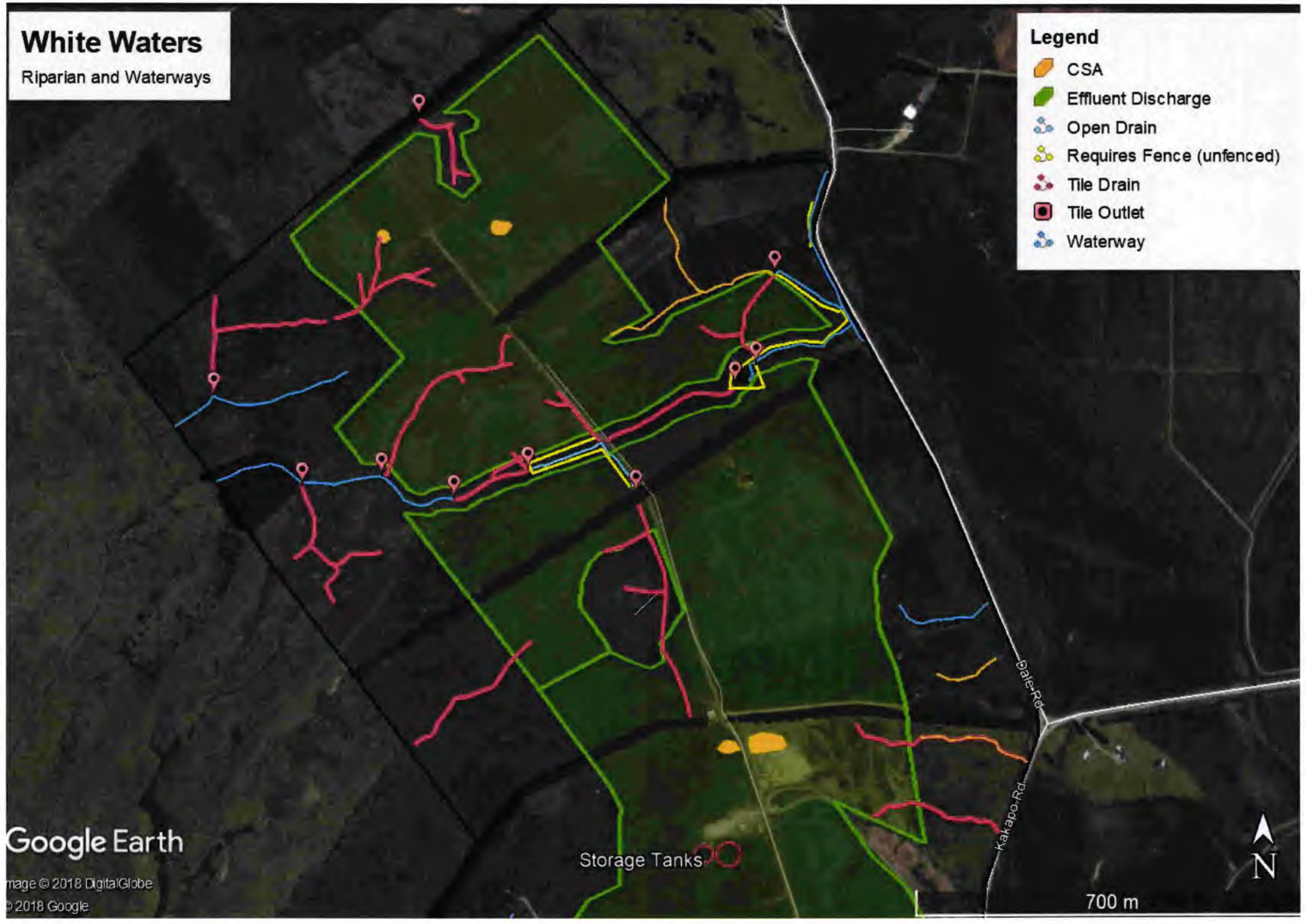
Google Earth

Image © 2018 DigitalGlobe
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Storage Tanks

Dale Rd.
Kakapo Rd.








700 m



White Waters

Riparian and Waterways

Legend

-  CSA
-  Effluent Discharge
-  Open Drain
-  Requires Fence (unfenced)
-  Tile Drain
-  Tile Outlet
-  Waterway

Storage Tanks

Kakapo Rd

Dairy Shed

Google Earth

Image © 2018 DigitalGlobe
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700 m

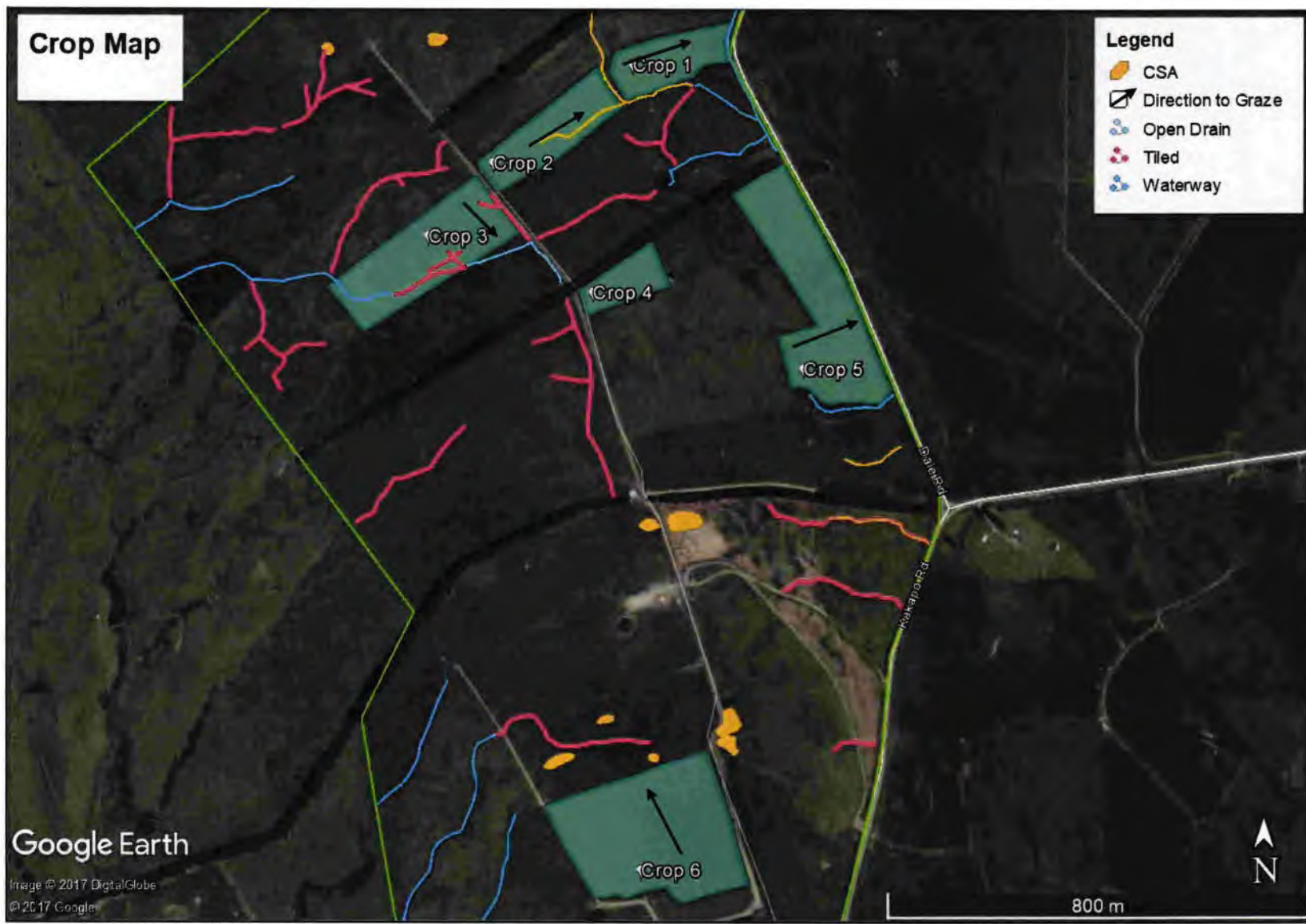


Winter Grazing and Cropping Map

Crop Map

Legend

- CSA
- Direction to Graze
- Open Drain
- Tiled
- Waterway



Google Earth

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