ClearTech Case Study:

# Greenpark Dairy Farm, Lincoln, Canterbury

## Summary

**Greenpark dairy farm is located 7km south east of Lincoln on the Canterbury Plains, South Island and 3.3km north of Lake Ellesmere.**

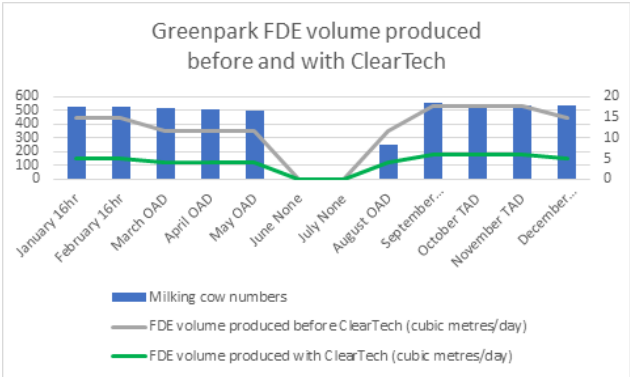
Milking 540 cows through a 40 bale herringbone shed with a backing gate circular yard wash, the dairy produces an average volume of 14,500 L FDE/day. With an enviro-saucer of 22,000L usable volume and an above ground Kliptank of 558,000L usable volume. Existing storage equates to 40 milking day's storage.

Farm owner, Tom Mason, was concerned about the risk of becoming non-compliant with their discharge consent for effluent applied to land if they were forced to irrigate effluent during wet spring conditions to avoid overflowing the holding pond.

ClearTech effluent treatment system was installed September 2019 to reduce the volume of effluent to be managed and therefore reduce the risk associated with irrigating at high risk times.

ClearTech recycles 66% of the volume of FDE produced as yard wash down water which:

- Reduced volume of FDE by 66%
- Incresed storage volume from 40 to 116 milking days
- Allowed greater flexibility in when to irrigate with increased storage capacity
- Delayed FDE irrigation start date into spring to allow for less demands around calving
- Reduced fresh water consumption by 2,885,700 litres per year




### Increased days of storage in existing pond

- Effluent volume production reduced by 66%
- Travelling irrigator runs reduced by 117 runs
- Travelling irrigator days reduced by 58 days
- Non-irrigation period extended from 60 to 79 days (83 days with shed roof diversion)
- Effluent irrigation start date now 19th Aug (23rd Aug with shed roof diversion)
- Freshwater consumption reduced by 2,885,700 litres per year

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# Farm Description

## Herd:

- 540 cows (F x J Cross)
- Calving Date:  1st August (mean 15th Aug)
- Dry Off Date: 25th May
- Milk solids: 233,741kg/year

## Shed and yards:

- 40 bale herring bone
- Shed: roof surface area 230sqm
- Yard: circular 27.5m diameter, 594sqm
- Side Yards: 220sqm
- Backing gate with circular yard wash (10L/sec, 4,320L per revolution)
- No rainwater diversion from shed roof or yards: Total: 1,044sqm

## Effluent infrastructure:

- Sand trap/wedge
- Enviro Saucer: 22 cubic meter (usable volume)
- Primary Kliptank holding pond: 558 cubic meters
- Secondary Kliptank holding pond: 267 cubic meters
- Travelling irrigator (7.5mm applications). Spare irrigator in reserve for maintenance
- No effluent irrigation between 1st June and 31st July

## Effluent Block:

| | | |
|---|---|---|
| • Area: 60.9ha | | |
| • Soil type 1: Deep silty loam over sandy loam  (Kaia13a.1) | High FDE Risk | 23.3ha |
| • Soil type 2: Deep silty loam over sandy loam  (Matpi_51.1) | High FDE Risk | 26.7ha |
| • Soil type 3: Deep sandy loam  (Wiku_1a.1) | Low FDE Risk | 10.9ha |

## Staff:

- Farm Manager
- Qty 2 Dairy Farm Assistants
- Roster: 6:1, 6:2

## Climate:

- 611mm precipitation per year

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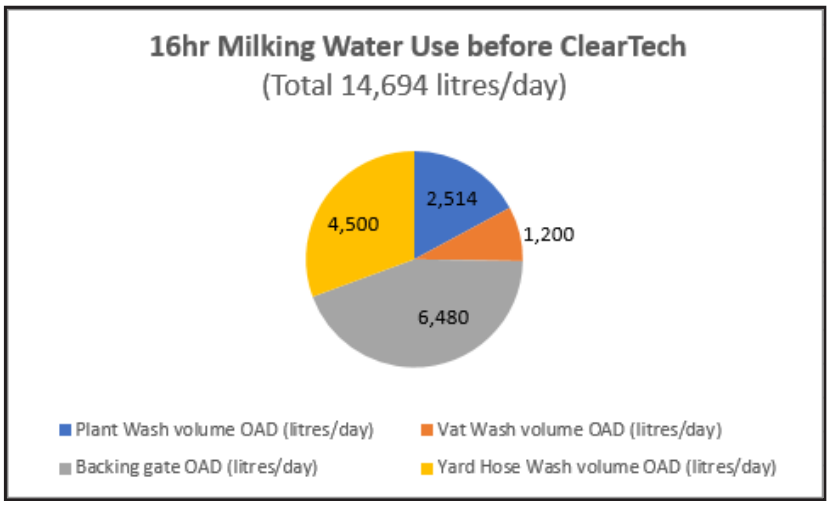
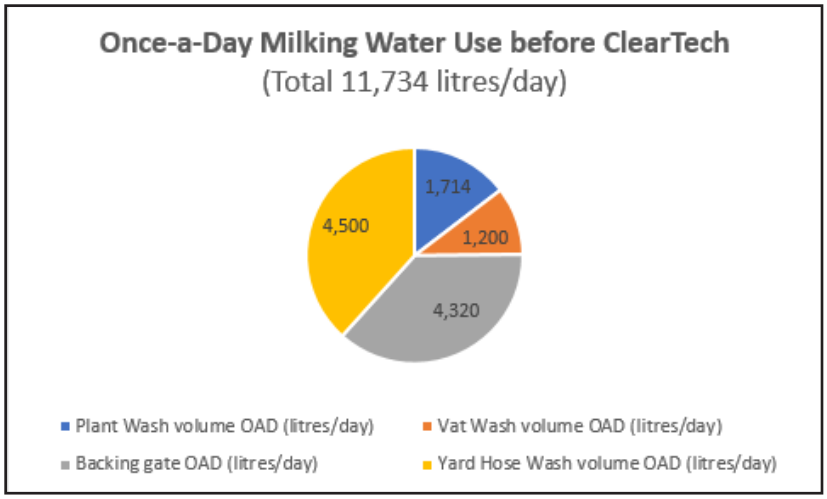
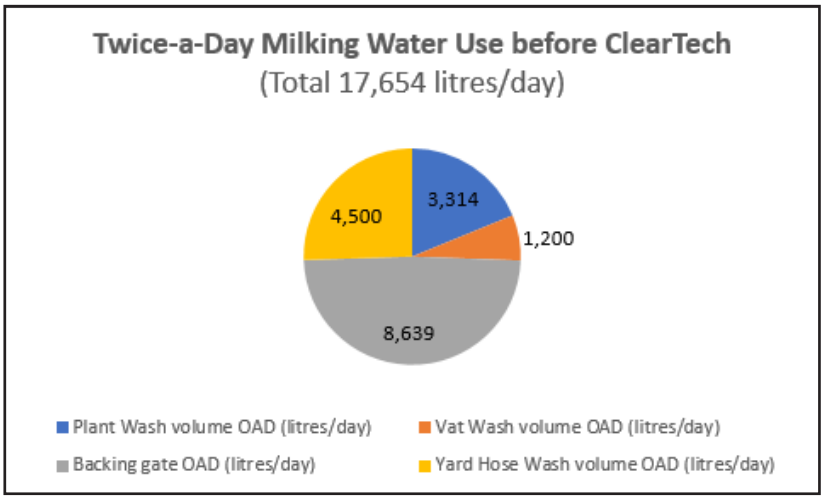
# Milking Water Use



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# Compliance Context

The farm's effluent management is subject to regulation by Environment Canterbury regional council under the Land and Water Regional Plan. In addition to the region wide rules, the farm is also subject to the Selwyn-Waihora sub regional chapter rules.

**5.36 The discharge of animal effluent or water containing animal effluent and other contaminants originating from:**

a) a stock holding area; or

b) a stock truck holding tank that does not meet one or more of the conditions of Rule 5.35; or

c) an animal effluent storage facility onto or into land where a contaminant may enter water

**is a restricted discretionary activity, provided the following conditions are met:**

1. The discharge of animal effluent or water containing animal effluent and other contaminants:
   a. is not within 20 m of a surface water body (other than a wetland constructed primarily to treat animal effluent), a bore used for water abstraction or the Coastal Marine Area; and
   b. does not occur beyond the boundary of the property on which the animal effluent is generated unless the written approval of the property owner where the discharge occurs has been obtained; and
   c. is not within a Community Drinking-water Protection Zone as set out in Schedule 1; and
   d. has backflow prevention installed if the animal effluent or water containing animal effluent is applied with irrigation water; and
   e. is not to contaminated or potentially contaminated land; and
2. The discharge is the subject of a Farm Environment Plan that has been prepared in accordance with Schedule 7 Part A.

**The exercise of discretion is restricted to the following matters:**

1. Measures to avoid, mitigate or remedy adverse effects on aquatic ecosystems and human or animal drinking-water; and
2. Effluent and water application rates and nutrient load; and
3. The effectiveness of methods to store effluent and application rates in times of adverse weather conditions, including frozen or saturated soil, or in cases of equipment failure; and
4. The proximity of any discharge site to, and actual or potential effects on, any identified site of significant indigenous biodiversity on biodiversity; and
5. The adequacy of design, construction, systems and management processes to minimise fugitive discharges from the system, including, but not limited to, mitigation in case of equipment failure or breakage; and
6. The quality of, compliance with, and auditing of the Farm Environment Plan.

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# Compliance Context

## Stock Holding Areas and Animal Effluent

**Note: Regional Rules** 5.31, 5.32, 5.33, 5.34, 5.35, 5.36 and 5.37 apply in the Selwyn Te Waihora sub-region. Rule 11.5.4 applies as an addition to Regional Rule 5.36.

**11.5.4 Within the Selwyn Te Waihora sub-region Regional Rule 5.36 includes the following additional matter of discretion:**

1. Any adverse effects on mahinga kai, wāhi tapu or wāhi taonga within the Cultural Landscape/ Values Management Area.

## Details for CRC200819

← Back to Consent Search

| | | | |
|---|---|---|---|
| **RMA Authorisation Number** | CRC200819 | **Client Name** | Canterbury Service Bulls Limited |
| **Consent Location** | Hudsons Road, GREENPARK | **State** | Issued - Active |
| **To** | to discharge contaminants onto land and into air | | |
| **Commencement Date** | 13 Aug 2019 | | |
| **Expiry Date** | 28 Aug 2042 | | |

7. The discharge application depth, including any irrigation water applied with the discharge or within 24 hours before or after the discharge:

a. Shall not exceed 24 millimetres per day; and

b. Shall not result in any runoff beyond the property boundary.

8. The discharge application depth, including any irrigation water applied with the discharge shall not result in effluent ponding on the land surface as a consequence of the exercise of this consent.

9.a. There shall be no discharge within 20 metres of any bore, surface water body or artificial watercourse.

b. There shall be no discharge such that the discharge is likely to run-off and enter any surface water body or any artificial watercourse.

c. There shall be no discharge into surface water as a consequence of the exercise of this consent.

10. There shall be no discharge onto frozen ground or snow-covered ground.

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# The Solution is Clear

## What is it?

The ClearTech system uses a coagulant and flocculation batch process to treat FDE producing approximately 66% Clarified Water (CW) that can be recycled as yard wash down water and 33% Treated Effluent (TE) that is pumped to the holding pond before irrigation.

As well as reducing the volume of effluent to be managed and therefore enabling Deferred Irrigation best management practice, further benefits include reduction in DRP and E-Coli in the treated effluent.

Whilst there is a range of benefits that the ClearTech unit brings to the farm, the key factor for Greenpark Dairy is the reduction in volume of TE that enables more flexibility in effluent irrigation.

## How does it work?

The 30,000L ClearTech clarification tank, control unit and coagulant reservoir tank was positioned next to the Enviro-saucer and Kliptank holding pond.

An additional 30,000 L storage tank was installed next to the milking shed to hold the clarified water before being pumped to the yard wash backing gate. The original 30,000L freshwater tank remains to supply freshwater to the milking parlour.

1. During each milking the FDE flows through the sand wedge and enters the enviro-saucer.

2. The ClearTech control unit then switches on the pump to fill the Clarification Tank with FDE.

3. Once filled, 25L of coagulant is injected into the Clarification Tank.

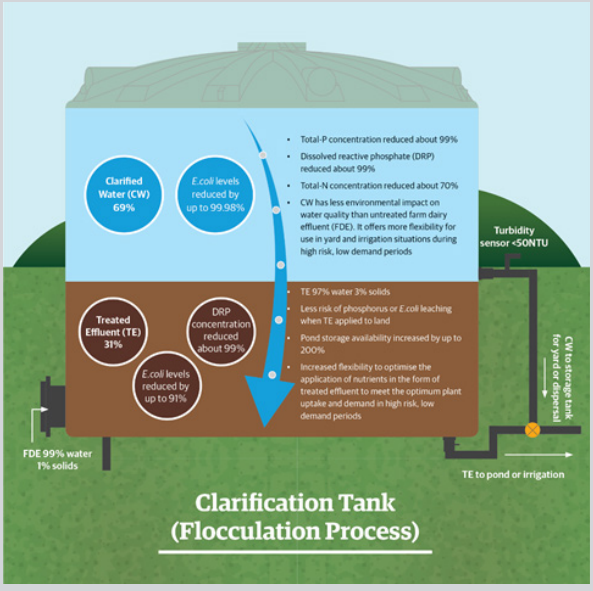
4. After a 10 minute dwell period, the NTU sensor detects how well the coagulation process is occurring. If required, more coagulant will be injected.

5. The coagulation/flocculation process will continue until the target NTU reading is achieved.

6. The top two thirds of the tank will now be clear, clarified water and is pumped out to the clarified water storage tank ready for reuse through the backing gate.

7. The Treated Effluent making up the lower third of the Clarification Tank is then pumped out to the holding pond.

8. The ClearTech unit is then ready to receive the next batch of FDE from the Enviro-saucer.




## The Solution - What Changed?

The farm was able to recycle 66% of the FDE volume as yard wash water thereby reducing effluent to storage by 66%.

Doing so meant inputs to DESC changed and storage volume/days increased meaning the farm manager was able to not irrigate until later in Spring, reduce risk by not having to apply during wet spring.

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# Costs and Benefits

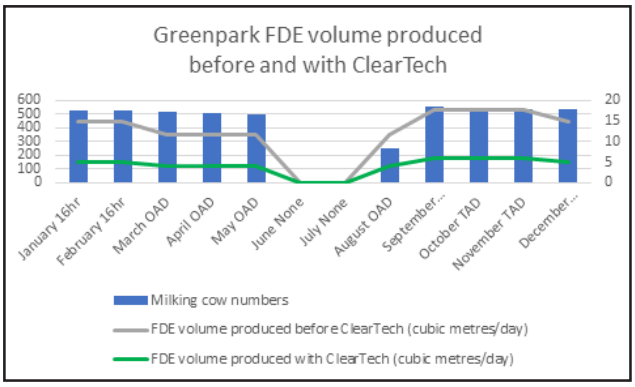
**Labour savings:** By reducing effluent to pump from the holding pond from 5,890 to 3,049 cubic metres, on average the number of irrigation runs could be reduced by 117 runs. At 2 hours labour per run at a cost of $20/hr, that is $4,662 per year saved on average.

**Freshwater Savings:** By recycling the clarified water through the backing gate and yard hoses, it is estimated that 2,885,700 litres per year of freshwater consumption can be avoided.

**Electricity, wear and tear savings from reduced pumping:** Volume reduction of effluent to pump to paddock - 5,890 – 3,049 = 2,841 cubic metres. At a rate of 10L/sec that's 79 hours of pumping saved per year. (Recycling water to the yard avoids pumping it out of the ground but extra pumping is required to move it from the ClearTech unit to the storage tank so these saving are cancelled out).

**Improvements in animal health** from better yard hygiene from more water available for wash down. Reduced mastitis meaning more milk production and reduced cost of anti-biotics.

**Reduced risk of fines/abatement notices** from effluent management non-compliance events.




**Coagulant costs:** Based on 5,890 cubic metres of FDE being treated per year, using 25 litres per 30,000 litre batch, 4,908 litres of coagulant is used per year. At $1.13/L, total cost = $5,546 /year.

NB. The above coagulant usage and costs are approximate and based on the 'mean effluent volume produced per year' by the Dairy Effluent Storage Calculator and excludes dumped tanks whilst the system configuration was being fined tuned. The rate of coagulant usage will vary over the milking season in line with the volume of FDE produced.

In the future, with the availability of telemetry data from the control unit, it is anticipated that reports will be more accurate on volumes of FDE treated by the system and freshwater saved.

**CONTACT**
If you would like to find out more about ClearTech for your farm dairy effluent treatment please contact your Ravensdown agri manager or phone 0800 100 123.

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