IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER Variation 1 to the Land and Water Regional Plan

STATEMENT OF EVIDENCE OF HILARY KAY LOUGH
QUALIFICATIONS AND EXPERIENCE

1. My name is Hilary Kay Lough. I am a Director of the environmental engineering firm Pattle Delamore Partners Ltd (PDP), where my focus is on groundwater projects. I have been working at PDP since October 2004.

2. I hold the qualifications of Bachelor of Engineering (Honours) in Civil Engineering and a Masters of Engineering in Civil Engineering, both from the University of Canterbury. My master’s project was focused on groundwater-surface water interaction and my thesis project was carried out in collaboration with Environment Canterbury (ECan) and PDP.

3. My work experience relevant to this application includes a variety of groundwater-related work at sites throughout New Zealand; acting as a reviewer of journal articles on groundwater-surface water interaction for international publications; providing ECan consents and groundwater section with technical advice on groundwater issues; predictive hydrogeological modelling, contaminant transport modelling and the analysis and interpretation of pumping test data and surface water and groundwater level and quality monitoring data.

SCOPE OF EVIDENCE

4. Synlait Milk Limited (Synlait) operate a milk processing plant located approximately 7 km south-west of Dunsandel Township. The plant currently has the capacity to process approximately 2.8 million litres of milk per day. A third spray dryer is currently under construction and will increase capacity to 3.7 million litres of milk per day. To enable the processing of this milk, Synlait abstracts groundwater and discharges wastewater to land. The plant is located within the Selwyn-Waihora zone as described in the Canterbury Land and Water Regional Plan (LWRP).
5. Variation 1 to the LWRP related to the Selwyn-Waihora Zone proposes water restriction rules (in times of low river flow and groundwater levels) and claw back of groundwater allocations which do not differentiate between industrial use and normal farming operations. Differentiation is warranted in a number of Variation 1 provisions for activities that result in an overall non-consumptive effect on the groundwater resource, such as the Synlait Milk Processing Plant.

6. Furthermore, Variation 1 also proposes a nitrogen loss limit from industrial processes detailed in Table 11(i), but at present this does not account for the nitrogen loss from all consented industrial discharges associated with the Synlait Milk Processing Plant.

7. In my evidence I will:
   
a. describe the groundwater abstraction and wastewater discharge consents held by Synlait;
   b. present the net drainage effect of Synlait on the underlying aquifer to show that the Synlait plant operation achieves a net aquifer gain;
   c. estimate the consented nitrogen load lost to the aquifer from the Synlait operation for the purpose of identifying all relevant nitrogen losses to be included in Table 11(i) (if that table is to be retained);
   d. discuss and recommend changes to aspects of Variation 1 that relate to Synlait’s activities.

SITE DESCRIPTION

8. The Dunsandel Synlait milk processing plant is located approximately 7 km south-west of Dunsandel Township. The plant currently operates two dryers with the ability to process approximately 2.8 million litres of milk daily. Groundwater is used to process the milk and two wastewater streams are produced. One of these is derived from the water evaporated from the milk and the other is associated with running the plant. These streams are irrigated to the surrounding farmland. Figure 1, Appendix A, shows the location of the Synlait milk
processing plant and identifies the two farms, Dunsandel Dairies 1 (DD1) and Dunsandel Dairies 2 (DD2).

DESCRIPTION OF CONSENTED GROUNDWATER TAKE AND WASTEWATER DISCHARGE

9. Synlait have two water permits which allow the abstraction of groundwater for use in either the milk processing plant or for irrigation of DD1 or DD2.

10. Consent CRC012487.6 (refer to Appendix B for details) allows an annual groundwater abstraction of 2,533,650 m³ for use in either the Synlait Plant or irrigation of DD1. This consent expires in 2035.

11. Consent CRC071922.4 (refer to Appendix B for details) allows an annual groundwater abstraction of 1,518,500 m³, of which 161,533 m³ may be taken for dairy plant purposes from 1 May to 30 September each year. The remaining volume can be used for irrigation of DD2. This consent expires in 2036.

12. The irrigation of wastewater to land is authorised by consent CRC084322.1 (refer to Appendix B for details). The consent limits the daily (10,489 m³) and annual (2,325,460 m³) volumes applied as well as application rates, return periods and nutrient applications (200 Kg/ha of nitrogen annually). The discharge of wastewater must occur over the DD1 and/or DD2 properties shown in Figure 1, Appendix A. The discharge can occur on up to 608 hectares of land. This consent expires in 2026.

13. Consent CRC084323 (refer to Appendix B for details) restricts sludge application via a volume application limit and a nitrogen loading rate. The consent states that the nitrogen loading rate from the sludge application must not exceed 150 kg/ha/yr. This consent expires in 2026.
DESCRIPTION OF WASTEWATER QUALITY

14. The generation of wastewater is dependent on the volume of milk processed into various milk products. There are two distinct wastewater streams, treated wastewater, consisting of wastewater from the plant processes and clean wastewater, consisting of untreated cooling water and condensate water as a by-product of the evaporation process.

15. Synlait treat wastewater generated by plant processes (not clean wastewater) with a DAF (dissolved air flotation) unit. The DAF unit removes approximately 50% of the nitrogen concentration as well as other contaminants from the wastewater. The removed nutrients and contaminants form a sludge which is then collected and disposed of.

16. The wastewater has been sampled on a weekly frequency. The results from the July 2012 to June 2014 period indicate that the nitrogen concentration of the clean wastewater is relatively low at 9.4 mg/L. Total nitrogen concentrations in the treated wastewater (discharge from the DAF unit) average 60 mg/L. For comparison, the nitrogen concentration in dairy shed effluent is typically around 200 mg/L.

17. The treated and clean wastewater is irrigated to pasture subject to consent restrictions. The application of wastewater to land is good management practice that satisfies a significant proportion of the farm’s irrigation demand and provides further treatment of the wastewater.

18. Consent CRC084322.1 restricts the nitrogen application rate to 200 kg/ha. Synlait will continue to irrigate wastewater subject to these restrictions. The effect of this wastewater application has been consented by Environment Canterbury. As will be described later in my evidence, the nitrogen in this wastewater has been considered as part of Variation 1 to the LWRP.
CURRENT AND FUTURE WATER USE AND WASTEWATER GENERATED

19. Synlait have provided me with bore water use and wastewater production data for the 2012/2013 year and the 2013/2014 year. This production data is presented in Table 1. Prior to this, Dryer 2 was not operating at full capacity and therefore, the 2012-2014 period best represents water use of the current plant operation.

20. Table 1 shows that the volume of treated and clean wastewater produced exceeds the volume of groundwater abstracted. This additional water is produced as a by-product of the evaporation process (which evaporates the water content out of the milk). Therefore, the volume of water irrigated will exceed the volume of water abstracted, which provides a positive net recharge effect to groundwater.

21. The ratio of wastewater produced to groundwater abstracted varies throughout the year. The greatest ratio (1.7 to 1.9) is produced when Synlait is processing milk into either whole milk powder or skim milk powder. At other times of the year Synlait maximise production of value added products such as infant formula. The ratio of wastewater produced to groundwater abstracted is lower for the production of infant formula.

<table>
<thead>
<tr>
<th>Table 1: Annual water volumes abstracted and produced</th>
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<tbody>
<tr>
<td>Groundwater abstracted (m³)</td>
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<tr>
<td>July 2012 – June 2013</td>
</tr>
<tr>
<td>July 2013 – June 2014</td>
</tr>
</tbody>
</table>

¹ consented annual wastewater volume is 2,325,460 m³

NET AQUIFER GAIN OR LOSS FOR AN IRRIGATED FARMING OPERATION AND THE CURRENT SYNLAIT MILK PROCESSING OPERATION

22. Given that the Synlait plant irrigates more water than it abstracts, there is an overall recharge effect to groundwater compared to a similar agricultural irrigation operation without access to wastewater.
To determine the difference between the Synlait operation and a similar irrigated farm operation, we have created a soil moisture balance (SMB) model to estimate the net groundwater use.

23. The SMB model includes 40 years of data to ensure that a range of climate conditions are modelled (1973 - 2013). A single season spans from 1 July to 30 June (which is consistent with Synlait’s consent conditions).

24. We found that whilst the Synlait operation abstracts more water, it also generates a greater drainage depth. The net aquifer gain or loss (drainage less abstraction) represents whether the water use is effectively an abstraction or a recharge. We found that the Synlait operation resulted in a net aquifer gain of approximately 237,000 m³ per year, whilst an irrigated agricultural operation would generally result in a net aquifer loss.

25. The Synlait plant operation can achieve a net aquifer gain because the volume of water irrigated is greater than the volume of water abstracted (see Table 1). This can be achieved because additional water is created through the milk evaporation process. Overall this net aquifer gain will ultimately result in a positive effect on stream and river flows.

DISCUSSION OF RELEVANT VARIATION 1 POLICIES AND RULES

26. Variation 1 of the Land and Water Regional Plan contains some policies and rules that seek to claw back groundwater usage and allocations that are described in resource consents. This particularly occurs in:

   a. **Policy 11.4.22** and **Rule 11.5.37** which in certain circumstances requires 50% of allocated water to be surrendered when a consent transfer occurs.

   b. **Policy 11.4.23**, which requires replacement consents to only be issued for volumes that reflect demonstrated use, thereby
halting plans for future expansions such as Synlait’s intention to increase its number of dryers.

27. However, where the water is being used for planned industrial expansions and the water used in that activity is returned to the aquifer there seems little benefit is achieved by restricting groundwater use for that purpose.

28. I also consider that amendments to other provisions of Variation 1 so as to enable takes that are effectively non-consumptive due to a related discharge would be warranted. It would make sense for the plan to recognise and provide for groundwater abstractions that will have no net depletion effect on the overall resource.

29. The legal submissions presented by Synlait describe the specific wording changes that will help to improve on the clauses in the plan.

REVIEW OF INDUSTRIAL NITROGEN LOAD IN TABLE 11(i) OF VARIATION 1

30. Table 11(i) of Variation 1 proposes a nitrogen load limit for industrial and trade processes of 106 tonnes annually. For comparison, the nitrogen load limit for farming activities is 4830 tonnes annually. Therefore, the industrial nitrogen load limit is relatively small considering its strategic importance.

31. The section 42a report recommends the removal of the industrial or trade processes nitrogen limit of 106 tonnes/year from Table 11(i). I agree with the recommendation of the section 42a report, however, if this recommendation is not adopted then Table 11(i) must be amended to account for the nitrogen loss from all consented industrial discharges.

32. The limit of 106 tonnes is based on a report by Loe (2013). I understand that his report was commissioned by ECan to “provide revised estimates of nitrogen and phosphorus discharge from the 10 main point source discharges in the Selwyn-Waihora and the Little Rakaia Nutrient Management Zones”.
33. Of the 106 tonnes, 42 tonnes is attributed to Synlait. Loe (2013) presents his analysis in Appendix 1 Table 8. In summary Loe accounts for nitrogen losses to the aquifer for only activities consented by CRC084332.1 (irrigation of wastewater to land) and therefore would not appear to include any nitrogen losses associated with the application of sludge which is permitted by consent CRC084323. The nitrogen losses associated with the consented sludge application need to be included in Table 11(i) and I will detail an appropriate allowance for this in the following paragraphs.

34. To ensure that my estimation of nitrogen loss from the sludge application is consistent with the nitrogen losses in Table 11(i), I have employed the same methodology used to estimate the nitrogen losses presented in Table 11(i). This methodology is outlined in Loe (2013).

35. The assessment of effects for CRC084323 is detailed in Beca (2007). Beca predicted that two dryers would produce 5809 m³ of sludge. Beca (2007) estimates the total nitrogen concentration of the sludge at 15 kg/m³. Therefore the total annual nitrogen load in the sludge is approximately 87 tonnes based on Beca’s predictions. If this sludge was applied at the maximum consented rate of 150 kg/ha, it would cover an area of 580 ha. This is less than the consented area of 1824 ha because the consented area allows for rotation of the sludge application.

36. Loe (2013) states that “The nitrogen leaching rates for the underlying land use are taken from the report Selwyn Te Waihora Nutrient Benchmarking, (Agribusiness Group, 2012), where results are presented of OVERSEER analysis of the major farming types in the Selwyn-Waihora NMAZ.” The relevant table from this report is Table 2. Loe also states that “N applied at 200 kg/ha/yr is assumed to leach at rate for irrigated dairy land use”. This Table presents a nitrogen leaching of 69 kg/ha/yr and a range of 65 to 80 kg/ha/yr of nitrogen loss for irrigated dairy on light soils. The Landcare Research online portal - S Maps shows that the sludge application area is located over light soils.
37. The nitrogen load of the sludge application is 150 kg/ha/yr. Therefore I have assumed that the nitrogen losses to the aquifer are 52 kg/ha/yr (3/4 of 69 kg/ha/yr stated above). If the sludge is applied to an area of 580 ha then the total nitrogen loss to the aquifer as a result of sludge application will be 30 tonnes annually.

38. If Table 11(i) is retained, then the nitrogen loss from the consented sludge application (30 tonnes) should be added to Synlait’s nitrogen loss number of 42 tonnes giving a total nitrogen loss of 72 tonnes.

39. If Table 11(i) is not retained, then appropriate provision will need to be made for industrial and trade discharges within the zone. Synlait are suggesting amendments to the wording of Rule 11.5.25 in the section 42a report that will allow for the wastewater discharge from an activity to be classed as discretionary where the resulting combined nitrogen loss will be less than the current total nitrogen loss authorised by resource consents held for an industrial and trade process enterprise, such as Synlait’s Dunsandel operation. At present, Rule 11.5.25 allows for flexibility only for farming activities to manage their total nitrogen loss to be less than that currently authorised. It should also provide for industrial and trade process enterprises where there will be no net increase in nitrogen loss as a result of the discharge.

ADDITIONAL ASPECTS RELEVANT TO SYNLAIT MILK SUPPLY FARMS

40. Synlait have raised concerns in their submission about a number of aspects of Variation 1 that could impact on their supply farms. These include matters related to the control of bore interference effects and the method of calculating annual volumes.

41. Rule 11.5.36 states that if Rule 11.5.33 is not met, a water take is prohibited. Condition 7 of that rule requires that bore interference effects are acceptable, as determined via Schedule 12. Schedule 12 describes the method by which well interference effects should be assessed. An “acceptable” effect is based on a set threshold of 20% of the available drawdown in a well at times of low water levels. This is a threshold used to identify a potential adverse effect but does not in itself present an adverse effect, particularly if the well has a large
available drawdown. It is used as a basis for decision making such as whether written approvals or mitigation be required. Exceedance of this threshold should not therefore warrant the classification of a prohibited activity and Synlait are seeking that Variation 1 be amended to reflect this.

42. Policy 11.4.23 requires that water can only be reallocated at a rate and volume that reflects demonstrated use. The section 42a report recommends this be amended to ‘reasonable use’ and linked to Schedule 10, which is the reasonable use test in the LWRP. However condition 6 of Rule 11.5.32 requires the annual volume to be calculated in accordance with Method 1 of Schedule 10 for consent renewals, which is based on past use. If this condition is not met, the activity is prohibited under Rule 11.5.36. The Officer’s report states that it is an essential part of the solution for addressing over allocation that annual volumes are based on Method 1 in Schedule 10 which takes account of records of past use, though moderated to meet demand conditions in dry years. However, for many consents that are coming up for renewal, there will be limited data as water metering has only recently been required. If the data does not cover natural variability in farming operations, such as rotational cropping systems, farms will be unduly restricted based on their limited records of past use. To avoid this situation, rule 11.5.32 and 11.5.33 should allow for other methods in Schedule 10 to be used.

CONCLUSION

43. I conclude that the Synlait milk processing operation at Dunsandel should not be subject to the same groundwater abstraction restrictions proposed in Variation 1 as an irrigated farming operation because:

- An irrigated farming operation typically produces a net groundwater loss because groundwater abstraction exceeds drainage whilst the Synlait milk processing operation produces a net groundwater gain. This gain can be achieved because the evaporation process produces condensate water and will result in a net positive effect on groundwater levels;
The Synlait milk processing operation is an essential industrial activity for many farming operations.

44. I agree with the recommendation of the section 42a report regarding the removal of the industrial or trade processes nitrogen limit of 106 tonnes/year from Table 11(i), but appropriate provisions are still required for industrial and trade discharges. If Table 11(i) is retained then I believe that the nitrogen loss limit must account for the nitrogen losses associated with the consented sludge application in addition to those already accounted for Synlait’s wastewater application.

Hilary Lough
August 2014

References


Beca. 2007: Synlait Dairy Plant Stage 2 Expansion Assessment of Effects of Discharges to Land. Beca Infrastructure Limited

Appendix A

Figures
FIGURE 1: SITE LOCATION

- Synlait Factory
- DD1 Farm
- DD2 Farm
- Synlait Property
- SH1

SCALE: 1:30,211 (A3)
Appendix B

Consents
The discharge shall be only: sludge from the Dissolved Air Floatation treatment plant located at the dairy plant adjacent to Heslerton Road, Dunsandel, which shall be only discharged onto or into land at sites as shown on Plan CRC084323 attached to and forming part of this consent, provided that all references in this consent to “sludge” shall be restricted to undiluted sludge.

2. The volume of sludge discharged shall not exceed 60 cubic metres in any period of 24 consecutive hours.

3. The application rate shall not exceed one millimetre and 10 cubic metres per hectare.

4. Sludge shall be applied onto or into land within 24 hours following the acid dosed dissolved air flotation (DAF) separation process, or otherwise as soon as practicable during/following extreme climatic events as provided for in condition (14)(f) of this resource consent.

5. The areal loading rate of nitrogen from the discharge shall not exceed 150 kilograms per hectare in any period of 12 consecutive months.

6. The areal loading rate of phosphorus from the discharge shall not exceed 50 kilograms per hectare in any period of 12 consecutive months.

7. The areal loading rate of five day total biochemical oxygen demand from the discharge shall not exceed 1,500 kilograms per hectare in any period of 12 consecutive months.

8. The return interval for sludge application shall be a minimum of twelve consecutive months.

9. Sludge shall not be applied onto or into land deeper than 75 millimetres from the surface, or within:
   a. 50 metres of property boundaries;
   b. 50 metres of any drain, water race or natural watercourse;
   c. 100 metres of any dwelling, cowshed or other building;
   d. 100 metres from any bore;
10 Application of the sludge shall be conducted in a manner that ensures:
   a. Compaction of the soil is minimised and natural infiltration capacity of the soil is maintained.
   b. No ponding of the sludge occurs.
   c. No odour which results in offensive or objectionable effects on the environment beyond the boundary of the property on which the sludge is discharged.
   d. There is no spray drift from the sludge application to any other irrigated area, to adjacent land, dwelling or watercourse.

11 Subject to condition (12) below, representative samples of sludge shall be taken on a monthly basis for at least 12 months from the first exercise of this resource consent. A representative sample shall consist of five one litre grab sub-samples taken from the DAF sludge transfer line hourly over five hours and composited in a laboratory. The composite sample shall be analysed for pH, BOD, total nitrogen and total phosphorous. The results of the analysis shall be forwarded to the Canterbury Regional Council as part of the annual monitoring report prepared in accordance with condition (18), or upon request by the Council.

12 If after 12 months, three consecutive monthly samples deviate by no more than 20 percent in total nitrogen content, then quarterly sampling may be undertaken. If successive quarterly samples deviate by more than 20 percent in total nitrogen content, monthly sampling shall be undertaken as above.

13 The consent holder shall maintain a record of:
   a. volume of sludge delivered as stock food;
   b. sludge spreading contractor's name;
   c. date and time of disposal;
   d. disposal site identification;
   e. volume of sludge delivered;
   f. application rates;
   g. weather conditions; and
   h. rotation period between successive applications (if applicable).

14 Within six months of the granting of this consent but before the first exercise of this consent, the consent holder shall prepare and forward to the Canterbury Regional Council an Operations and Management Manual for the disposal of sludge to land. Disposal shall be undertaken in accordance with this manual, which shall be updated if additional properties are added to the consent or at other times as appropriate, and a copy of the updated version forwarded to the Canterbury Regional Council within 15 workings days of any changes being made. The manual shall include, but is not limited to:
   a. a brief overview of sludge collection and disposal; and
   b. detailed site plans for each property listed for this consent, identifying the sludge disposal areas and the location of surface water courses (including surface and sub-surface drains), wells and major soil types; and
   c. key operational matters, including daily, weekly and monthly maintenance checks; and
   d. monitoring and recording requirements/procedures necessary to ensure compliance with the conditions of this consent; and
   e. the means of receiving and dealing with any complaints; and
   f. a contingency plan for management of the sludge discharge during periods when the application within 48 hours in terms of condition (5) is rendered
impracticable or inoperable by extreme climatic events.

15 Records of maintenance, complaints, malfunctions and breakdowns shall be kept and compiled to form part of the Annual Environmental Report (refer to condition (18) following) which shall made available to the Canterbury Regional Council on request.

16 Once a year during August, or as otherwise agreed with the Canterbury Regional Council, the consent holder shall collect representative soil samples from each of the properties that have received sludge on more than one occasion in accordance with the sampling details below. These samples shall be analysed for:
   a. pH; total carbon; total nitrogen; anaerobically mineralisable nitrogen: nitrate-nitrogen; Olsen P (available phosphorus); exchangeable sodium; exchangeable calcium; exchangeable potassium; exchangeable magnesium; cation exchange capacity; base saturation.
   b. Samples are to be collected to a depth of 150 millimetres. At least five samples are required for each major soil type on each property and may be pooled prior to analysis to provide one result for each soil type for each property. Where possible, the same sampling locations should be used each year.
   c. The results of the analysis shall be forwarded to the Canterbury Regional Council as part of the annual monitoring report prepared in accordance with condition (18).

17 a. All sampling required under this consent shall be undertaken by a competent person using the most appropriate scientifically recognised and current methods.
   b. All samples taken shall be analysed using the most appropriate scientifically recognised and current method by a laboratory that is accredited for that method of analysis by a nationally recognised accreditation authority such as International Accreditation New Zealand (‘IANZ’); or, where there is no laboratory in New Zealand with accreditation for such a method by a laboratory that has accreditation for similar analyses.
   c. For the purposes of clause (b) of this condition, accreditation must be by IANZ or an equivalent accreditation organisation that has a Mutual Recognition Arrangement with IANZ.

18 By 1 September each year, the consent holder shall provide to the Canterbury Regional Council an Annual Environmental Report reviewing the application of sludge to land over the 12 month period ending 30 June. This report shall include as a minimum:
   a. A summary of the records maintained in accordance with condition (12); and
   b. A summary of compliance with the conditions of this consent including the nitrogen loading rate of the sludge applications for each land area during the previous 12 month period; and
   c. Analysis of all of the monitoring results to date including interpretation of the results by an appropriately qualified and experienced scientist; and
   d. Recommendations on the monitoring programme for the next year; and
   e. Proposals for mitigating any adverse effects that are found to be occurring.
   f. A record of the nature and dates of any complaints received during the previous 12 month period and any action taken in responses.

19 There shall be no odour emission resulting from the discharge that is offensive or objectionable to such an extent that it has an adverse effect on the environment beyond the boundary of the property on which the consent is exercised.

20 The consent holder shall log all odour complaints received. The log shall include the following:
   a. Date and time;
<table>
<thead>
<tr>
<th></th>
<th>Nature and location of the complaint;</th>
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<tr>
<td>c.</td>
<td>Complainant's details;</td>
</tr>
<tr>
<td>d.</td>
<td>Weather information;</td>
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<tr>
<td>e.</td>
<td>Details of key operating parameters at the time of the complaint; and</td>
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<tr>
<td>f.</td>
<td>Remedial action taken to prevent further incidents. Complaints shall be reported to the Canterbury Regional Council as soon as practicable and the log of odour complaints shall be made available to the Canterbury Regional Council on request.</td>
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21  The consent holder shall provide a copy of this resource consent to every person who exercises this consent, and shall explain the conditions in order to ensure they are complied with.

22  The Canterbury Regional Council may, once per year, on any one of the last five working days of June or December, serve notice of its intention to review the conditions of this consent for the purposes of:
   a. Dealing with any adverse effect on the environment which may arise from the exercise of this consent and which it is appropriate to deal with at a later stage; or
   b. Requiring the adoption of the best practicable option to remove or reduce any adverse effect on the environment.

23  The lapsing date for the purposes of Section 125 shall be 31 March 2014.

24  This consent shall not be exercised concurrently with consent CRC063185.

25  Interpretation:
   For the purposes of this consent, the following definitions shall apply:
   “Waste stream”: Contaminant A or B, or their combined total,
   “Extreme Climatic Event”: means snow and frozen ground conditions and:
   a. “Frozen ground” means the earth temperature at five centimetre soil depth is less than zero degrees Celsius for a period of 12 hours or longer in the preceding 24 hours; and
   b. “Snow covered ground” means 80 percent of the discharge area is covered in snow with an average depth of 10 centimetres for more than 48 hours.
The discharge shall be only:

a. Treated wastewater and stormwater (Contaminant A), and/or
b. Untreated cooling water and condensate (Contaminant B)

from the dairy processing plant located adjacent to Heslerton Road, Dunsandel.

The discharge shall occur on up to 608 hectares of land as shown on Plan CRC084322.1, which forms part of this consent. Contaminant A, Contaminant B and dairy shed effluent (DSE) may be irrigated onto any area of land under Pivot 4, subject to the irrigation return period constraints described in condition (10).

The total volume of the discharge shall not exceed 10,489 cubic metres per day.

The total volume of the discharge shall not exceed 2,325,460 cubic metres per annum.

The discharge shall not occur within 20 metres of any bore or water race.

The rate of waste stream irrigation shall not exceed 31 millimetres per day (310 cubic metres per hectare per day).

When the soil Profile Available Water (PAW) in the waste stream irrigation area exceeds field capacity:

a. Contaminant A application shall be restricted to pivots 1, 2, 3, 4 and 5, and shall be irrigated at the current minimum rate able to be applied for each of these pivots:
   i. Pivot 1 – 4.3 millimetres;
ii. Pivot 2 – 4.3 millimetres;
iii. Pivot 3 – 5.3 millimetres;
iv. Pivot 4 – 10.2 millimetres;
v. Pivot 5 – 5.0 millimetres; and

b. Contaminant B shall be discharged onto and/or into land at the alternate irrigation area (‘alternate area’) in order to avoid significant surface ponding and to minimise soil drainage from the waste stream irrigation area.

10 The return interval for Contaminant A irrigation shall be no less than seven days with a rolling average application rate over any consecutive 28 day period of no greater than 5.0 millimetres per day. Contaminant A and Contaminant B shall be applied separately.

11 The annual waste stream irrigation application depth shall not exceed 550 millimetres.

12 The areal loading rate of nitrogen from the discharge of Contaminant A or Contaminant A and DSE combined (where these two waste streams are applied to the same area of land) or Contaminant A, DSE and Dairy Solids combined (where these wastes are applied to the same area of land) shall not exceed:
   a. 65 kilograms per hectare in any period of three consecutive months between 1 November and 31 March; and
   b. 50 kilograms per hectare in any period of three consecutive months between 1 April to 31 October; and
   c. 200 kilograms per hectare in any period of 12 consecutive months.

   Note (1) The discharge of DSE and Dairy Solids is authorised under consents CRC060465.2, CRC080203 and CRC084348.1.

   Note: (2) For the purpose of determining compliance with conditions 12(a) and 12(b), the areal nitrogen loading rate from DSE or DSE and Dairy Solids combined shall be calculated using the volume of DSE applied to the land over the specified time period and the concentration of nitrogen in Farm Dairy Effluent contained in the most recent Dairy New Zealand Publication “Dairy NZ Facts and Figures”.

   Note: (3) For the purpose of determining compliance with Condition 12(c) the annual average concentration of nitrogen in DSE and Dairy solids shall be determined from the analysis of four representative samples of filtered DSE and Dairy Solids for total nitrogen during the production season, and this shall be used to determine the nitrogen load from DSE and Dairy Solids.

13 The areal phosphorus loading rate from the discharge of Contaminant A or Contaminant A and DSE combined (where these two waste streams are applied to the same area of land) or Contaminant A and DSE and Dairy Solids combined (where these wastes are applied to the same area of land) shall not exceed:
   (a) 20 kilograms per hectare in any period of three consecutive months; and
   (b) 50 kilograms per hectare in any twelve consecutive months.

14 The areal loading rate of five day total biochemical oxygen demand from the discharge of Contaminant A shall not exceed 500 kilograms per hectare in any period of 24 consecutive hours.

15 The consent holder shall maintain, and operate all structures and relevant equipment associated with the discharge to ensure compliance with the conditions of this consent.

16 During the period of operation of the waste stream irrigation system the consent holder shall record the instantaneous rate and daily volume application of:
   a. Total waste stream discharges onto land; and
   b. Contaminant A; and
c. Contaminant B and separately the condensate and cooling water in Contaminant B.

17 The consent holder shall, at not less than seven day intervals, take a representative sample of Contaminant A after treatment and prior to discharge, and have the sample analysed, and the results reported in milligrams per litre for the following:
   a. total biochemical oxygen demand (five day);
   b. total nitrogen;
   c. nitrate-nitrite nitrogen;
   d. total phosphorus;
   e. total suspended solids.

18 The consent holder shall, at not less than 30 day intervals, take a representative 24 hour sample of Contaminant A, after treatment and prior to discharge, and have the sample analysed and results reported for the following:
   a. pH [pH units];
   b. total phosphorus [milligrams per litre];
   c. dissolved reactive phosphorus [milligrams per litre];
   d. total nitrogen [milligrams per litre];
   e. nitrate-nitrite nitrogen [milligrams per litre];
   f. sodium [milligrams per litre];
   g. calcium [milligrams per litre];
   h. potassium [milligrams per litre];
   i. magnesium [milligrams per litre];
   j. sodium absorption ratio.

19 Within six months of the granting of this consent, but before the consent is first exercised, the consent holder shall prepare and forward to the Canterbury Regional Council an Operational Environmental Management Plan (“OEMP”) for the operation of the waste stream irrigation area. The management plan shall include, but not be limited to:
   a. Monitoring and reporting of soil moisture, and management of the waste stream and irrigation waste application rates;
   b. Monitoring and management of soil fertility on the waste stream irrigation area;
   c. Monitoring and management of soil structure;
   d. Detailed monitoring and reporting of the nutrient budget for the operation of the waste stream irrigation area;
   e. A detailed stock grazing management plan;
   f. Contingency measures for the management of the waste stream discharge during periods when the application within 24 hours in accordance with condition (29) is rendered impracticable or inoperable by extreme climatic events or soil moisture levels that are at or likely to exceed field capacity. This shall include the ability to discharge Contaminant B into the stormwater infiltration basin, provided that at all times such discharge shall not occur when the available infiltration basin capacity is less than 50 percent of the total volume, and/or to a dedicated ‘high-rate irrigation area (alternate area)’ and/or a rapid infiltration basin maintained for the purpose of discharging Contaminant B into land;
   g. A management plan detailing a daily rotational cycle for the use of nitric acid for cleaning purposes of plant and equipment within the milk processing plant.

20 The OEMP shall be reviewed by the consent holder at least once annually for the purpose of addressing any issues relating to compliance with the conditions of this consent. The current plan shall be forwarded to the Canterbury Regional Council prior to 31st May in any year.

21 a. Before this consent is exercised for the first time, and thereafter once a year
during August (or as otherwise agreed in consultation with the Canterbury Regional Council), the consent holder shall collect a minimum of eight representative soil samples (including both Chertsey and Eyre soils) from the property that is irrigated with the waste stream and one sample that is a non-irrigated control in accordance with the sampling details below. These samples shall be analysed for: pH; total carbon; total nitrogen; anaerobically mineralisable nitrogen; nitrate nitrogen; Olsen P (available phosphorus); exchangeable sodium; exchangeable calcium; exchangeable potassium; exchangeable magnesium; cation exchange capacity; and base saturation.

b. Samples shall be collected within a depth of 150 millimetres. Samples may be pooled prior to analysis to provide one result for each soil type for the waste stream irrigation area. As far as is practicable the same sampling locations shall be used each year. In addition to the annual sampling set out above the consent holder shall undertake interim two-monthly sampling at each site for: major cations; pH; and the calculation for exchangeable sodium percentage.

c. The results of the analysis shall be forwarded to the Canterbury Regional Council as part the annual environmental report prepared in accordance with condition (33).

| 22 | Sufficient, but at least two control monitoring bores shall be established on or near the up-gradient boundaries, in terms of groundwater flow, of the waste stream irrigation area to characterise the chemistry of groundwater that flows under the waste stream irrigation area. Three further monitoring bores shall be established down-gradient of the waste stream irrigation area. The exact location and depth of the monitoring bores shall be determined in consultation with the Canterbury Regional Council. |
| 23 | The monitoring bores described in condition (22) shall be constructed of PVC with a minimum internal diameter of 50 millimetres, with a screen at least three metres long spanning the likely range of water table elevations so as to allow full hydraulic connection to the aquifer and prevent the ingress of surface water, to allow effective monitoring to take place. |
| 24 | Water samples shall be taken concurrently and within a 48-hour period, at a depth of 0.2 metres below the groundwater surface, from each monitoring bore established in accordance with condition (22) no later than one month after the bore has been established. Thereafter water samples shall be taken from each bore concurrently and within a 48-hour period, at least once during the months of October, January, April and July for the duration of this consent. |
| 25 | Water samples taken from all monitoring bores shall be analysed and reported for the following determinands:
  a. nitrate-nitrogen [milligrams per litre];
  b. E. Coli [colony forming units per 100 millilitres];
  c. total dissolved solids [milligrams per litre];
  d. dissolved reactive phosphorus [milligrams per litre];
  e. soluble sodium [milligrams per litre];
  f. soluble chloride [milligrams per litre]. |
| 26 | a. The consent holder shall use their best endeavours to obtain permission to collect water samples from the owners of a representative selection of at least three domestic down-gradient wells located within 1500 metres of the southeastern boundary of the property on which the waste stream irrigation system is located.  
  b. The locations of the wells selected in accordance with clause (a) shall be forwarded to the Canterbury Regional Council.  
  c. Water samples shall be taken from these wells in accordance with the frequency set out in condition (24) and analysed for the determinands listed in |
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| **27** | a. The effects of the consented activity on groundwater nitrate concentration at the down-gradient boundary of the waste stream irrigation area shall be assessed annually by comparing the 36 month (three year) running mean of three-monthly groundwater nitrate-nitrogen concentrations determined for water samples collected at 0.2 metres below the groundwater surface at the down-gradient and up-gradient monitoring wells, in accordance with condition (24).  
   
   b. If the concentration of any determinand, excluding E coli, listed in condition (25) for any down-gradient domestic monitoring well exceeds the guideline value for aesthetic determinands or the maximum acceptable value (MAV) as contained in the Drinking Water Standards for New Zealand (2005), for nitrate-nitrogen, as a result of the discharges authorised by this consent, then the consent holder shall, at the request of an affected well owner, provide an alternative potable water supply to domestic users for those wells deemed not to comply with the standards. |
| **28** | (a) With the exception of the ‘alternate area’, no significant ponding of the discharge shall occur as a result of the exercise of this consent.  
   
   “Significant ponding “means when wastewater remains on the ground surface over an area greater than 50 square metres 24 hours after irrigation ceases.  
   
   (b) No surface runoff of the discharge shall occur as a result of the exercise of this consent. |
| **29** | Contaminant A shall be irrigated onto land within 24 hours after treatment, or a greater period of time if Contaminant A is adequately aerated during storage, to prevent offensive odour at or beyond the site boundary during storage and irrigation. During periods when the irrigation of Contaminant A and Contaminant B are rendered impracticable or inoperable by extreme climatic events or a soil moisture level equal to or greater than field capacity, the alternative arrangements provided for Contaminant B in condition 19(f) of this consent shall apply. |
| **30** | There shall be no odour emission resulting from the treatment and waste stream irrigation system that is offensive or objectionable to such an extent that it has an adverse effect on the environment beyond the boundary of the property on which the consent is exercised. |
| **31** | The consent holder shall take all practicable measures to prevent the drift of aerosols beyond the boundary of the property on which this consent is exercised. |
| **32** | The consent holder shall log all odour complaints received. The log shall include the following:  
   
   a. Date and time;  
   
   b. Nature and location of the complaint;  
   
   c. Complainant's details;  
   
   d. Weather information;  
   
   e. Details of key operating parameters at the time of the complaint; and  
   
   f. Remedial action taken to prevent further incidents.  
   
   Complaints shall be reported to the Canterbury Regional Council as soon as practicable and the log of odour complaints shall be made available to the Canterbury Regional Council on request. |
| **33** | a. The consent holder shall, no later than 1 September of each year, provide an |
Annual Environmental Report to the Canterbury Regional Council setting out a summary of results (with analyses) and comments as appropriate on all waste stream discharge quality, and on soil and groundwater monitoring undertaken in relation to this consent over the previous processing season (from 1 July to 30 June inclusive).
b. The report shall include an analysis of the results to date (with input from an appropriately qualified and experienced scientist), recommendations on the monitoring programme for the next year and proposals for mitigating any adverse effects found to be occurring.

34 a. All sampling required under this consent shall be undertaken by a competent person using the most appropriate scientifically recognised and current methods.
b. All samples taken shall be analysed using the most appropriate scientifically recognised and current method by a laboratory that is accredited for that method of analysis by a nationally recognised accreditation authority such as International Accreditation New Zealand ('IANZ'); or, where there is no laboratory in New Zealand with accreditation for such a method, by a laboratory that has accreditation for similar analyses.
c. For the purposes of clause (b) of this condition, accreditation must be by IANZ, or an equivalent accreditation organisation that has a Mutual Recognition Arrangement with IANZ.

35 The consent holder shall manage the waste stream irrigation so that, to the extent practicable, any discharge onto land that has no absorption capacity as a result of extreme climatic events is avoided and is managed in accordance with a contingency plan, as provided for in condition (19)(f) of this resource consent.

36 Livestock shall not be permitted to graze on the land subject to this consent from the 10 June to the 20 July in any year during that period when the average soil moisture level exceeds 75 percent of field capacity in any period of seven consecutive days.

37 The Canterbury Regional Council may, once per year, on any one of the last five working days of June or December, serve notice of its intention to review the conditions of this consent for the purposes of:
   a. dealing with any adverse effect on the environment which may arise from the exercise of this consent and which it is appropriate to deal with at a later stage; or
   b. Requiring the adoption of the best practicable option to remove or reduce any adverse effect on the environment.

38 The lapsing date for the purposes of Section 125 shall be 31 March 2014.

39 This consent shall not be exercised concurrently with consent CRC061126.

40 For the purposes of interpretation of condition (3) onwards the following definitions shall apply:
   Interpretation:
   “Waste Stream”: Contaminant A or B, or their combined total,
   “Extreme Climatic Event”: means snow and frozen ground conditions and:
   “Frozen ground” means the earth temperature at five centimetre soil depth is less than zero degrees Celsius for a period of 12 hours or longer in the preceding 24 hours; and
   “Snow covered ground” means 80 percent of the discharge area is covered in snow with an average depth of 10 centimetres for more than 48 hours.
   “Down-groundwater-gradient”: means down gradient in terms of unconfined water table slope or potentiometric surface of the uppermost (saturated) groundwater layer.
### Conditions:

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<tr>
<td>1</td>
<td>Water may only be taken from bores L36/1929, 300 millimetres diameter and 77.8 metres deep, at map reference NZMS 260 L36:42561-23104, and L36/2050, 300 millimetres diameter and 76.9 metres deep, at map reference NZMS 260 L36:41763-22633, and bore L36/2216, 300 millimetres diameter and 76.4 metres deep, at map reference NZMS 260 L36:40535-22495.</td>
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| 2  | a. Water may be taken at a rate not exceeding 65 litres per second from bore L36/1929, 60 litres per second from bore L36/2050; and 41 litres per second from bore L36/2216; with a combined rate not exceeding 166 litres per second and a combined volume not exceeding 14,342 cubic metres in any 24 hour period and 1,518,500 cubic metres between 1 July and the following 30 June.  
b. Water may be taken for the use of the dairy plant outside the irrigation season.  
c. The volume of water used for dairy plant purposes shall not exceed 161,553 cubic metres from 1 May to 30 September inclusive each year. |
| 3  | The depth at which water is drawn into the bores shall not be less than 60 metres below ground level. |
| 4  | Water shall only be used for:  
a. Irrigation of crops and pasture for grazing stock, as described in the application, on the area of land shown in attached Plan CRC071922.4; and  
b. For use in the dairy plant for milk processing as described in the application. |
| 5  | The consent holder shall, before the first exercise of this consent, install easily accessible straight pipes, with no fittings or obstructions that may create turbulent flow conditions, of a length at least 15 times the diameter of the pipe, as part of the pump outlet plumbing or within the mainline distribution system. |
| 6  | The consent holder shall within six months of the first exercise of this consent: |
a. install water meters that have an international accreditation or equivalent New Zealand calibration endorsement, and have pulse output, suitable for use with electronic recording devices, which will measure the rate and the volume of water taken to within an accuracy of plus or minus five percent as part of the pump outlet plumbing, or within the mainline distribution system, at locations that will ensure the total take of water is measured; and

b. install tamper-proof electronic recording devices such as data loggers that shall time stamp a pulse from the flow meter at least once every 60 minutes, and have the capacity to hold at least one season’s data of water taken as specified in clauses (b)(i) and (b)(ii), or which is telemetered, as specified in clause (b).

   i. The recording devices shall:

   a. be set to wrap the data from the measuring devices such that the oldest data will be automatically overwritten by the newest data (i.e. cyclic recording); or
   b. store the entire season’s data in each 12 month period from 1 July to 30 June in the following year, which the consent holder shall then download and store in a commonly used format and provide to the Canterbury Regional Council upon request in a form and to a standard specified in writing by the Canterbury Regional Council; or
   c. shall be connected to a telemetry system which collects and stores all of the data continuously with an independent network provider who will make that data available in a commonly used format at all times to the Canterbury Regional Council and the consent holder. No data in the recording devices shall be deliberately changed or deleted.

a. The water meter and recording devices shall be accessible to the Canterbury Regional Council at all times for inspection and/or data retrieval.

b. The water meter and recording devices shall be installed and maintained throughout the duration of the consent in accordance with the manufacturer’s instructions.

c. All practicable measures shall be taken to ensure that the water meter and recording devices are fully functional at all times.

7 The consent holder shall by 1 December 2008, measure and record separately water taken for use within the dairy plant from that taken and used for irrigation.

8 Within one month of the installation of the measuring or recording devices, or any subsequent replacement measuring or recording devices, and at five-yearly intervals thereafter, and at any time when requested by the Canterbury Regional Council, the consent holder shall provide a certificate to the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager, signed by a suitably qualified person certifying, and demonstrating by means of a clear diagram, that:

   a. The measuring and recording devices has been installed in accordance with the manufacturers specifications; and
   b. Data from the recording devices can be readily accessed and/or retrieved in accordance with clauses (b) and (c) of Condition (6).

9 The taking of water in terms of this permit shall cease for a period of up to 48 hours, on notice from the Canterbury Regional Council, to allow measurement of natural groundwater levels.

10 a. If the irrigation system used to distribute water taken in terms of this permit is used to distribute effluent, fertiliser or any other added contaminant, a backflow preventer manufactured in accordance with AS 2845.1 (1998) or the American Society of Sanitary Engineers standards shall be installed within the pump outlet plumbing or within the mainline, to prevent the backflow of water into the bore.
b. The backflow preventer shall be tested to the standard set out in AS 2845.3 (1993) or an equivalent method within one month of its installation and annually thereafter by a suitably qualified person. A test report shall be provided to the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager, within two weeks of each inspection.

11 The consent holder shall take all practicable steps to:
   a. Ensure that the volume of water used for irrigation does not exceed that required for the soil to reach field capacity; and
   b. Avoid leakage from pipes and structures; and
   c. Avoid the use of water onto non-productive land such as impermeable surfaces and river or stream riparian strips.

12 a. Within two years of Stage 2 of the Synlait dairy plant beginning to process dairy products, the consent holder shall arrange for a suitable qualified and experienced person to carry out an audit of the use of water in the dairy plant during December or January, in accordance with industry best practice such as that detailed in Auckland Regional Council technical publication number 82 "Industrial Water Audit Guidelines", or any subsequent replacement or equivalent publication.
   b. The audit carried out in accordance with this condition shall:
      i. monitor total water use;
      ii. identify areas of processes where water could be used more efficiently; and
      iii. recommend any practicable measures that could be implemented to reduce water use as identified in (ii).
   c. A copy of the audit, and a timeline for implementing any measures identified in (b)(iii), shall be provided to the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Section, within 20 working days of completion of the audit.
   d. The audit carried out in accordance with this condition shall be repeated every five years for the duration of this consent, and may be integrated with the audit of Stage 1 of the Synlait dairy plant, provided that the first audit of both Stages together occurs no later than five years following the commencement of this consent.

13 The Canterbury Regional Council may, once per year, on any of the last five working days of May or November serve notice of its intention to review the conditions of this consent for the purposes of dealing with any adverse effect on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage, such as reviewing the rate and volume, including the annual volume, at which water is taken for use in the dairy plant, where it has been shown that significant wastage of water is occurring, such as may be highlighted by audits of the use of water.

14 The lapsing date for the purposes of section 125 in terms of the use of water for dairy plant purposes shall be 30 September 2013.

15 This resource consent shall not be exercised concurrently with CRC012487.8 or any subsequent replacement consent, in the area indicated on attached Plan CRC071922.4.
Water may be taken only from bore L36/1533, 300 millimetres diameter and 77.08 metres deep, at map reference NZMS 260 L36:39888-23952, bore L36/2015, 300 millimetres diameter and 77.1 metres deep, at map reference NZMS 260 L36:40370-23687 and from bore L36/1727, 300 millimetres diameter and 77.7 metres deep, at map reference NZMS 260 L36:40908-23006.

Water may be taken:

a. From bore L36/1533 at a rate not exceeding 90 litres per second, with a volume not exceeding 5,486 cubic metres per day; and

b. From bore L36/2015 at a rate not exceeding 90 litres per second, with a volume not exceeding 6,735 cubic metres per day; and

c. From bore L36/1727 at a rate not exceeding 40 litres per second, with a volume not exceeding 2,592 cubic metres per day.

Annual volume

(a) Before 30 June 2015, the annual volume taken between the 1st July and the following 30th June (except that for the 2011/2012 season the Annual Volume limit shall apply between 25 July 2012 and 30 June 2012) shall not exceed 2,533,650 cubic metres (2011 Annual Volume), except that the 2011 Annual Volume may be exceeded if no part of the annual volume has been transferred to another site and the consent holder;

(i) Measures the actual volume of water used for irrigation per irrigation
season as required by condition 9;

(ii) Takes representative daily individual soil moisture data samples, being:

(A) Data from a minimum of one sensor in the top quarter of the crop rooting zone on the property irrigated under this consent; and

(B) Data from a minimum of 5 sites containing representative irrigation systems and soil types within the Rakaia Selwyn Groundwater Zone (where for each site, there is a minimum of two sensors with one in the top quarter of crop rooting zone and the other at the bottom of the crop rooting zone).

except that if data from 5 sites cannot be obtained under this condition 3(a)(ii)(B), then the consent holder shall install one additional soil moisture sensor at the bottom of the crop rooting zone on the property irrigated under this consent; and

(iii) Collects representative daily rainfall data through the use of local weather station data from a minimum of 2 weather stations within the Rakaia Selwyn Groundwater Allocation Zone; and

(iv) Provides to the Canterbury Regional Council a completed Notification Form (attached to this consent) prior to the 2011 Annual Volume being exceeded.

(b) After 30 June 2015 the annual volume taken between the 1st July and the following 30th June shall not exceed:

(i) the annual volume specified in the Notice of Acceptance (defined in condition 4(b)) (Revised Annual Volume); or

(ii) the 2011 Annual Volume if notice of a revised annual volume is not received and accepted in accordance with condition 4.

4 Revised Annual Volume<>

(a) The consent holder may, before 1 September 2015, give notice to the Canterbury Regional Council of a Revised Annual Volume based on the data collected pursuant to Condition 3(a)(i) to (iii) above and calculated by a suitably
qualified person (Certifier) using:

(i) The following criteria:

a. An irrigation application efficiency of 80%;

b. A system capacity to meet peak demand between 4.0 and 6.5 millimetres per day;

c. A nominal irrigation season from 1 September to 30 April;

d. Demand conditions that occur in 9 out of 10 years; and

e. A landuse of intensive pasture production; and

(ii) The schedule WQN9 methodology from the operative Canterbury Natural Resources Regional Plan or Irricalc methodology or a functional equivalent that is verifiable and, in the case where a modeled approach is used, where there is sufficient data available to calibrate the model for that specific location; except that

(iii) An application efficiency of less than 80% will be acceptable to derive the annual volume in the following circumstances:

a. Where there are beneficial effects such as energy savings, or prevention of wind erosion, or recharge to groundwater, surface water or wetlands that would not be achieved otherwise;

b. Where onsite physical constraints including farm layout, the presence of shelter belts, roads and utility infrastructure, and the presence of rivers, streams and drains make it difficult to achieve 80% irrigation application efficiency.

provided that such notice also includes:

(iv) A minimum of three (3) irrigation seasons of monitoring data collected under conditions 3(a)(i) to (iii);

(v) A record of the volume of water taken under any other authorization and used for irrigation on the area marked on plan CRC012487.6;

(vi) A certificate signed by the Certifier which details the calculations done and
certifies that the annual volume is in accordance with this condition;

(b) Upon receiving notice and supporting information under this condition, the Canterbury Regional Council shall advise the consent holder within twenty (20) working days as to whether it accepts the revised annual volume (Notice of Acceptance), with such advice not being unreasonably withheld.

(c) Upon the Notice of Acceptance of the revised annual volume being issued by the Canterbury Regional Council, the annual volume taken shall not exceed the Revised Annual Volume for the remainder of the resource consent.

Advisory notes:

1. Water taken and used under different authorisations shall be considered evidence of water demand on the property for the purposes of condition 3; and

2. If system capacity is limited to less than 4 millimetres (calculated on the basis of the maximum volume that can be pumped per day divided by the area irrigated) then system capacity will be taken into account when calculating a revised annual volume.

3. The Canterbury Regional Council shall record the Notice of Acceptance in its consents database.

5 Water shall only be used for spray irrigation of crops and pasture, as described in the application on the area of land shown in attached plan CRC012487.6, and for use in the dairy plant for milk processing.

6 The consent holder shall take all practicable steps to:
   a. Ensure that the volume of water used for irrigation does not exceed that required for the soil to reach field capacity; and
   a. Avoid leakage from pipes and structures; and

   (c) Avoid the use of water onto non-productive land such as impermeable surfaces and river or stream riparian strips.

7 Water shall only be used for irrigation on the area of land shown in attached plan CRC012487.6, which forms part of this consent, and dairy shed washdown.

8 DELETED
The consent holder shall:

(a) On or before the 30th September 2011:

(i) install a water meter(s) that has an international accreditation or equivalent New Zealand calibration endorsement, and has pulse output, suitable for use with an electronic recording device, which will measure the rate and the volume of water taken to within an accuracy of plus or minus five percent as part of the pump(s) outlet plumbing, or within the mainline distribution system, at a location(s) that will ensure the total take of water is measured; and

(ii) install a tamper-proof electronic recording device(s) such as a data logger that records or logs the pulse totals at between 4 and 10 times per hour, and has the capacity to hold at least one season’s water use data as specified in clauses (b)(i) and (b)(ii), or which is telemetered, as specified in clause (b)(iii).

(b) Ensure the recording devices(s) can:

(i) be set to wrap the data from the measuring device such that the oldest data will be automatically overwritten by the newest data (i.e. cyclic recording); and

(ii) store the entire season’s data in each 12 month period from 1st July to 30th June in the following year; or

(iii) be connected to a telemetry system which collects and stores all of the data continuously with an independent network provider who will make the data available in a commonly used format at all times to the Canterbury Regional Council and the consent holder.

(c) Ensure that no data in the recording device(s) is deliberately changed or deleted.

(d) Ensure the water meter(s) and recording device(s) are accessible to the Canterbury Regional Council at all times for inspection and/or data retrieval.

(e) Ensure the water meter(s) and recording device(s) is installed, maintained and operated throughout the duration of the consent in accordance with the manufacturer’s instructions and with a minimum straight length of pipe upstream (before the meter) of ten times the diameter of pipe and a minimum straight length of pipe downstream (after the meter) of five times the diameter of pipe.

(f) Take all practicable measures to ensure that the water meter(s) and recording device(s) is fully functional at all times and continues to achieve the accuracy and standard stated in Condition (9)(a) and (b) respectively.

(g) Provide all water use data to the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager, once per year during the last five
working days of July, for the duration of this consent.

| **10** | The consent holder shall, on or before the 30th September 2011 install or make available an easily accessible straight pipe at a location that provides for the total water take, with no fittings or obstructions that may create turbulent flow conditions, of a length of at least 15 times the diameter of the pipe, as part of the pump outlet plumbing or within the mainline distribution system, to allow the Canterbury Regional Council to conduct independent flow measurements.

**Note:** Installation of an electromagnetic or acoustic meter in accordance with Condition (9)(e) above will not cause turbulence in the pipe work and will provide the required 15-times diameter pipe-length to comply with Condition (10). However, if a mechanical meter is installed an additional five-times diameter length of straight pipe will be required (before the meter) to avoid turbulence created by the meter and to comply with Condition (10).<>

| **11** | Within one month of the installation of the measuring or recording device(s), or any subsequent replacement measuring or recording device(s), and at five-yearly intervals thereafter, and at any time when requested by the Canterbury Regional Council, the consent holder shall provide a certificate to the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager, signed by a suitably qualified person certifying that:
  a. the water meter(s) is measuring the rate of take of water taken as specified in Condition (9); and
  b. the measuring and recording device(s) has been installed in accordance with the manufacturer’s specifications; and
  c. data from the recording device(s) can be readily accessed and/or retrieved in accordance with Condition (9); and
  d. the tamper-proof electronic recording device(s) is operating as specified.

| **12** | a. Within two years of the dairy plant beginning to process dairy products the consent holder shall arrange for a suitable qualified and experienced person to carry out an audit of the use of water in the dairy plant during December or January, in accordance with industry best practice such as that detailed in Auckland Regional Council technical publication number 82 “Industrial Water Audit Guidelines”, or any subsequent replacement or equivalent publication.
  b. The audit carried out in accordance with this condition shall (i) monitor total water use; (ii) identify areas or processes where water could be used more efficiently; and (iii) recommend any practicable measures that could be implemented to reduce water use as identified in (ii).
  c. A copy of the audit, and a timeline for implementing any measures identified in (b)(iii), shall be provided to the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Section, within 20 working days of completion of the audit.
  d. The audit carried out in accordance with this condition shall be repeated every five years for the duration of this consent.

| **13** | The Canterbury Regional Council may, once per year, on any of the last five working days of March or July, serve notice of its intention to review the conditions of this consent for the purposes of dealing with any adverse effect on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage.