

IN THE MATTER OF THE

Resource Management Act 1991

AND

IN THE MATTER OF AN

Application by
Landcorp Farming Ltd
(CRC081037)
for a water permit to take and use
water from the Eyre River
Groundwater Allocation Zone.

DECISION OF THE HEARING COMMISSIONER

Heard on 26 May 2010 at the Offices of the Canterbury Regional Council,
Kilmore Street, Christchurch.

INDEPENDENT HEARING COMMISSIONER

Mr Alan Withy, Independent Commissioner.

APPEARANCES

The Applicant (Landcorp Farming Ltd)

Mr David Poulsen (Hydrogeologist)

Council Officers

Dr Philip Burge (Investigating Officer)

Mr Matthew Smith (Hydrogeologist)

Ms Johanna Christensen (Consents Hearings Officer)

Date of decision 30 July 2010

DECISION

On behalf of the Canterbury Regional Council, pursuant to sections 104 and 108 Resource Management Act 1991, the Commissioner has determined as follows:

1. That resource consent **application CRC081037** by Landcorp Farming Ltd to take and use groundwater in the Eyre River Groundwater Allocation Zone **is granted** subject to conditions.
2. The duration of the consent is **for ten years** from the date of this consent.
3. Subject to the **conditions** in Annexure 1.

Glossary of Terms and Abbreviations:

Act:	means the Resource Management Act 1991 unless specified otherwise.
AEE:	means an Assessment of Environmental Effects.
Council:	means the Canterbury Regional Council.
CRC:	means the Canterbury Regional Council.
ECan:	means the Canterbury Regional Council.
GWAZ:	means a Ground Water Allocation Zone.
IO:	means the Investigating Officer in terms of Section 42A of the Act.
NZMS:	means the New Zealand Map Series.
PNRRP:	means the Proposed Natural Resources Regional Plan.
RMA:	means the Resource Management Act 1991.
RO:	means the Reporting Officer in terms of Section 42A of the Act.
RoR:	means a formal right of reply exercised on behalf of the Applicant.
RPS:	means the Canterbury Regional Policy Statement.
TRP:	means the Transitional Regional Plan.

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This is the decision of Independent Commissioner Alan Withy appointed by the Canterbury Regional Council (“CRC”) to hear and determine the application by Landcorp Farming Ltd at Eyreton. Authority was delegated from CRC by Mr Donald Fraser, Consents Hearings Officer, Team Leader.

1. The application

This application to take and use groundwater was notified on 15 November 2008 and 94 potentially affected parties were advised.

In correspondence between the applicant and CRC Officers, further information was sought and the application amended.

The application as amended seeks consent to:

... take and use groundwater at a maximum rate of 122.7 litres per second and at a volume not exceeding 10,600 cubic metres per day, and not exceeding 1,060,000 cubic metres between 1 July and the following 30 June in any year.¹

Water is proposed to be used for the irrigation of crops and pasture for grazing stock, including dairy milking cows, on the 200 hectares of the applicant’s property in Dodds Road, Eyreton, shown on plan CRC081037.

The application is for a new ‘take’, and duration of ten years is sought for the activity.

2. Submissions

Twenty submissions were received within the statutory timeframe, and another submission received late was admitted under s37. One submission was “*neither in support nor opposition*” to the application, and the other twenty opposed the application. Six of the submitters in opposition asked to be heard and attended the hearing.

3. Statutory provisions

The provisions of the Proposed Natural Resources Regional Plan (PNRRP), the Regional Policy Statement (RPS), and the Transitional Regional Plan (TRP) are relevant to consideration of this application, as are RMA ss104, 104B and 108.

¹ Application for Consent, SKM consultants.

4. Appearances and evidence

Mr Poulsen of SKM presented the application for Landcorp Farming Ltd and described it as an application for resource consent to “*enable irrigation of the current dryland portion of Eyrewell Station*”.

He asserted that the effects of the proposal would be minor with adequate mitigation measures. He submitted that it was scientifically established to his satisfaction that the shallow and deep groundwater systems “*do not interact*”.²

He indicated that the Applicant would accept conditions requiring monitoring of both water levels and water quality.

Dr Burge, Investigating Officer for CRC described in his pre-circulated report:

- a) Background
- b) Notification and submissions
- c) Legal and planning provisions
- d) Comments on the AEE provided
- e) Details of Council policy relevant to the application
- f) Part 2 of the RMA
- g) Comments on the decision to be made

He assessed the actual and potential effects of the proposal under the following headings:

- i. Adverse effect of take on surrounding groundwater users
- ii. Cumulative effect of take on other groundwater users
- iii. Adverse effect of inefficient take on other groundwater users
- iv. Adverse effect of take on other users from seawater intrusion
- v. Adverse effect of take on aquifer stability
- vi. Adverse effect from cross-connection on groundwater quality

Dr Burge elaborated on his written report at the hearing and answered questions from the Commissioner.

He called Mr M Smith who described the Eyrewell Farm area as lying over a:

... groundwater system associated with the Eyre River ... comprising two aquifers that were 60 metres apart vertically ... it could take two years for effects to be experienced ... but in this situation the test results have a high degree of reliability”.³

² Poulsen. Oral evidence at the hearing.

³ Smith. Oral evidence at the hearing.

Dr Burge's conclusion was that water level and water quality concerns could be adequately dealt with, provided appropriate mitigation measures were implemented.

Submitters G Cox, R Jarman, C Lister, R Mainwaring, K Campbell, S Townsend, B Parker and O Machill presented or were represented at the hearing. They described numerous wells within two kilometres of the proposal and indicated concerns about the effects of the proposal on both them and the groundwater resources. Their concerns encompassed quantity and quality matters.

They questioned the separation of the shallow and deep aquifers that Dr Burge and Mr Poulsen accepted. Some asked for a demonstration of goodwill by the applicant with acceptance of responsibility for any future effects on nearby water supplies. No such offer was made by the applicant and the Commissioner considers it improper for him to impose such a condition.

5. Process

The applicant produced more information at the hearing than had been pre-circulated. It was apparent that there was general agreement between CRC officers and the applicant's consultant on the likely effects of the application. Both considered the proposal to constitute a 'discretionary activity'.

One difference between them at the beginning of the hearing was the possible long term effects of the proposal on the groundwater zone. Dr Burge was comfortable that the proposal had less than minor effects in every respect other than its possible effects on the quantity and quality of the water resource.

Both accepted from the bore logs and other evidence that there was a substantial separation between the shallow and deep aquifers. They both were in favour of consent being granted subject to suitable conditions.

The hearing was adjourned at 2.10pm on 26 May 2010 to allow negotiations on suitable conditions between the applicant, the RO and submitters. When the hearing was reconvened at 3.30pm Dr Burge indicated conditions were required covering:

- i. Groundwater sampling from a bore on an adjoining property to the south if the owner agreed, or if not, at the southern boundary of the site.
- ii. Regular reviews of farming practices.

Mr Poulsen responded by indicating:

- a. Acknowledgement of the concerns of neighbours.
- b. The scientific evidence showed clear separation of the shallow and deep aquifers.
- c. Acceptance of appropriate conditions requiring monitoring.

Submitters representatives indicated their continuing doubts that acceptable conditions could be developed.

The hearing was formally adjourned at 3.55pm on 26 May 2010 on the following basis:

- (a) Mr Poulsen to develop proposed conditions in consultation with Dr Burge.
- (b) Those conditions to be circulated to all submitters for comments.
- (c) The applicant to have a RoR on those comments.

The following Minute was circulated to the parties on 5 July 2010

1. *A Hearing was held and adjourned on 26 May 2010 at Environment Canterbury.*
2. *A revised proposal has been received by the applicant and is attached.*
3. *The conditions for the revised proposal have been negotiated with Council Officers.*
4. *The Council Officer supports the proposal as amended and subject to the conditions included. (Please see attached Memorandum from Dr Burge)*
5. *Submitters who wish to comment on the applicant's further information must file their comments in writing (Attention to: Johanna Christensen) within 10 working days of receipt of this information.*
6. *Once this information has been received the Council will circulate it to the parties and the applicant will have 5 working days to provide a final written Right of Reply.*

*Upon receipt of the Right of Reply the Commissioner will consider all the information provided and decide whether to close the hearing and issue a decision.*⁴

A response from submitters was received describing a meeting held between the following on 13 July 2010:

Mr. C. Lister, 579 Downs Road, ... hearing submitter.
Mr. P. Turvey, 737 Downs Road, ... hearing submitter.
Mr. R. Jarman, 787 Downs Road, ... hearing submitter.
Mr K. Campbell, 636 Downs Road, ... hearing submitter.
Mr. G. Cox, 742 Downs Road, ... hearing submitter.
Mr. R. Mainwaring, 622 Downs Road, ... hearing submitter.
Mr. S. Wendler, 2228 South Eyre Road, ... hearing submitter.
Mr. R. Rossitter, 2183 South Eyre Road, ...
*Mr & Mrs. S. Collins, 727 Downs Road, ...*⁵

⁴ Minute from the Commissioner dated 5 July 2010.

⁵ Letter from submitters including minutes of a meeting and test data.

The summary in that response (which was copied to the applicant and RO), reads:

As recognised in the report the area has a high number of lifestyle blocks surrounding the applicant's property. Agricultural activities in the area have already raised nitrate levels in the upper aquifer to a point above that which WDC recommends treatment equipment be installed. Any increased activity on the applicant's property which is immediately up-gradient to numerous domestic bores is going to make this situation worse.

*Having considered the proposed conditions and undertaken further research, the consensus of the group is that we are **opposed** to the application being granted, even with the current proposed conditions.*

*As a group and as individuals, we are open to further discussions in relation to this application if deemed necessary. Our priority is to maintain access to clean, safe drinking water for us and our families, and the current proposal does not safeguard that.*⁶

A final RoR was received from Mr Poulsen on 26 July and the hearing was formally closed on 27 July 2010. The ROR says in summary:

The applicant does not wish to reply to the individual points of the submitters' response, because all have been addressed in earlier documentation from this application and hearing. Rather, the following two points encapsulate the key issues raised:

Water quantity is not an issue of contention based on the current understanding of the hydrogeological setting as outlined during the hearing process, i.e. it has been demonstrated with a good level of confidence that the shallow aquifer is effectively separated from the deeper aquifer system from which water will be taken. The conceptual hydrogeology and the aquifer testing methodology (including perceived issues raised by submitters) have been reviewed by ECan Hydrogeologist Mr Matt Smith and myself and they are deemed fit for the purpose of this application.

Water quality issues have been addressed to the satisfaction of the ECan reporting officer Dr Phil Burge, ECan water quality scientist Dr Carl Hanson and myself. The proposed nitrate management conditions have been developed specifically for this site and require a suite of actions to minimise nutrient losses and monitor water quality in the shallow aquifer, as well as definitive actions to protect the stock and domestic supplies in the unlikely event that a worst case does eventuate. These conditions are among the more rigorous of those that have been developed for such applications in the Canterbury Plains, and as such, the applicant submits that they provide an appropriate level of water quality protection for the shallow aquifer in this case.

I note that the reporting officer Dr Burge has also reviewed the submitters' response to the proposed conditions. Having done so he does not consider that any further information has been presented that has not already been discussed in his Section 42A Report, memorandum, or at the hearing itself. As

⁶ Ibid.

*a result Mr Burge maintains that the applicant has suitably addressed the issues relating to water quality and he recommends that this application can be granted subject to the proposed conditions ...*⁷

6. Evaluation of effects

Any actual or potential effects on the environment: Following the template provided for in Section 104 the Commissioner considered the actual or potential effects on the environment of allowing the activity. Those have been broken down into the following sub-sets:

Cumulative effect of takes on other groundwater users: The Commissioner accepts the evidence of Dr Burge and Mr Poulsen that there is unlikely to be effects greater than minor on other groundwater users. Submitters indicated considerable anxiety about such effects, particularly in regard to the large number of relatively shallow bores used substantially for domestic purposes. Conditions were developed during adjournments of the hearing that gave some comfort to the submitters and appeared to reduce their total opposition to the proposal.

Adverse effect of the take on groundwater allocation: The evidence of Dr Burge was that the groundwater zone is not fully allocated and utilised to a lesser extent. There appears no reason under this heading to refuse consent.

Adverse effect of the take from seawater intrusion: There was no evidence that suggested this heading of effects to be relevant.

Adverse effect of takes on aquifer stability: There was no evidence that suggested this heading to be adverse to the proposal.

Adverse effect from cross connection on groundwater quality: The evidence established to the Commissioner's satisfaction that there was no reason to withhold consent for this reason.

Adverse effect of the take on surface water flows: There was no evidence under this heading that suggested the application should be declined.

Adverse effects of well interference/take on surrounding groundwater users: The evidence from neighbours was that there could be interference but the Commissioner on balance accepts the expert evidence of Dr Burge and Mr Poulsen that the risk is minimal and will be monitored.

Adverse effect of inefficient take on other groundwater users: The evidence was that the proposed conditions will ensure monitoring and if necessary mitigation of this risk.

⁷ RoR from SKM dated 26 July 2010.

Adverse effect of use of water on water quality: The evidence from neighbours was that there could be interference but the Commissioner on balance accepts the expert evidence of Dr Burge and Mr Poulsen that the risk is minimal, will be monitored and if necessary mitigated.

Adverse effect of the take on tangata whenua values: CRC had informed Te Runanga O Arowhenua in respect of the application upon receipt and again when the application was publicly notified. No submission was received from any tangata whenua party. The reporting officers stated in evidence that they were not aware of any impacts that the proposal may have on tangata whenua values given that any effects on surface water flows and water quality were assessed as minor. The Commissioner accepts that analysis.

In summary the Commissioner accepts that the effects on the environment and other water users are likely to be minor and can be adequately mitigated provided the conditions are observed. This is in spite of the submissions and evidence from neighbours. On balance this proposal can be regarded as compatible with sustainable management of the ground water resources as required by the RMA.

7. Objectives and Policies

There are objectives and policies in the operative RPS which are relevant to taking and using groundwater. The PNRRP contains much more focused policy provisions, but is not yet operative, so less weight can be given to it at this time. The application of Section 88A of the Act to this proposal means it has to be assessed under the objectives and policies applicable at the time of notification. No one challenged the status of the proposal as a discretionary activity under the relevant plan provisions.

The RPS states that;

*In considering a permit to take water, a consent authority should, as part of the requirements of section 104 of the Act, consider the need to ... provide for existing water permit holders to have priority for the term of their permits.*⁸

Policy WQN20 in the PNRRP specifies that any new well shall not have a direct cumulative interference effect of more than 20% on any other well within 2 km with an existing authorisation, unless that effect is mitigated. The evidence of the Council officers and the applicant's consultant satisfied the Commissioner that there was unlikely to be any interference that would be more than minor resulting from the proposed take, and that the proposed conditions will ensure that should such interference become an identified risk it can be mitigated. The proposed conditions are accepted as minimising the possible risk to an acceptable level in terms of the RMA and relevant plans.

⁸ RPS. Chapter 9, Policy 6.

Turning to assessment of any potential adverse effects of an inefficient take on other groundwater users, the RPS aims to promote efficiency of the use of water. This is supported by Objective WQN5 and Policy WQN17 in the PNRRP. Objective WQN5 seeks to;

*... achieve a high level of efficiency in terms of resource availability and the use of water.*⁹

Policy WQN17 sets out a range of criteria for the reasonable and efficient use of water including assessments of the rate and timing of abstractions, on-site physical factors, and irrigation application efficiency. The evidence presented in support of the application, and supported by the RO, was that the proposed take and use of water would be efficient.

Consideration also has to be given to potential adverse effects of the taking of water on water quality. This is addressed in general terms under Chapter 9, Objective 3 of the RPS, and under Chapter 4 (the water quality chapter) of the PNRRP. The RPS says people should:

*... gain benefits from the water quality in Canterbury water bodies while safeguarding: drinking water resources, life supporting capacity of water, Maori cultural values, preserving natural character, protecting habitat of trout and salmon.*¹⁰

Objective WQL2 in Chapter 4 of the PNRRP contains objectives relating to groundwater quality, and Policy WQL12 refers to the need to avoid potential contamination of community drinking water sources. The Commissioner accepts on the basis of expert evidence presented, that the proposal is compatible with the objectives and policies relevant to water quality.

8. Part 2, Resource Management Act

The purpose of the Act is to promote the sustainable management of natural and physical resources. This is defined as:

... managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while –

- (a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
- (b) Safeguarding the life - supporting capacity of air, water, soil, and ecosystems; and*

⁹ PNRRP. Objective WQN5.

¹⁰ RPS. Chapter 9, Objective 3.

*(c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment.*¹¹

The proposed taking and using of water proposed will enable the applicant, and indirectly the community, to provide for their social and economic well-being through increased agricultural production and increased security of water supplies supporting current levels of production. With reference to the Act, the Commissioner is satisfied that the proposed taking and using of water sought through this application will sustain the potential of groundwater resources to meet the reasonably foreseeable needs of future generations, will safeguard the life supporting capacity of water, and avoid or mitigate any adverse effects on the environment, subject to the conditions imposed on this application.

Other relevant matters under the Act that must be considered are;

(b) the efficient use and development of natural and physical resources;
(f) maintenance and enhancement of the quality of the environment; and
*(g) any finite characteristics of natural physical resources:*¹²

The Commissioner is satisfied that the proposal will represent an efficient use and development of the groundwater resource, and will not result in an unsustainable abstraction from groundwater in the area.

There was no evidence that the application would conflict with matters of significance to tangata whenua, and hence it is compatible with Sections 6 (b) and 7(a) of the Act.

9. Section 104 Resource Management Act

Section 104 states as follows:

When considering an application for a resource consent and any submissions received, the consent authority must, subject to Part 2, have regard to – any actual and potential effects on the environment of allowing the activity; and ... any relevant provisions of -

- (i) a national environmental standard;*
- (ii) other regulations;*
- (iii) a national policy statement;*
- (iv) a New Zealand coastal policy statement;*
- (v) a regional policy statement or proposed regional policy statement;*
- (vi) a plan or proposed plan; and*
- (c) any other matter the consent authority considers relevant and reasonably necessary to determine the application.*¹³

¹¹ RMA s5.

¹² RMA s7.

¹³ RMA s104(1).

The effects of the proposal on the environment have been assessed and found to be minor in respect of the receiving environment. The proposal is considered to be consistent with the objectives and policies of the RPS and the PNRRP, and also suitable for consent in terms of Section 104 of the Act.

10. Conditions

Section 108 of the RMA says:

*After considering an application for a resource consent for a ... discretionary activity ... a consent authority ... may grant or refuse the application; and ... if it grants the application, may impose conditions ...*¹⁴

The Commissioner has reviewed the conditions proposed by the applicant and supported by the RO. He has carefully done so in relation to the concerns raised by the submitters, and concludes that the proposal should be consented.

11. Duration

The applicant has requested 10 years for the duration of resource consent. Section 1.3.5 of Chapter 1 of the PNRRP calls for consideration of:

The nature and sensitivity of the affected environment, including:

- (i) the degree to which the sensitivity of the affected environment may become more sensitive over time; and*
- (ii) the risk of unforeseen adverse effects arising from the consented activity and;*
- (iii) the level of knowledge about the affected environment.*¹⁵

Recognising the nature of the environment and the guidelines provided by the RMA, the relevant plans and recent court decisions on groundwater takes in Canterbury, the Commissioner finds that a 10-year duration is appropriate for this consent.

¹⁴ RMA s108.

¹⁵ PNRRP Chapter 1.3.5.

12. Determination

The Commissioner determines that pursuant to Sections 104, 104D and 108 of the Resource Management Act 1991, this application is granted consent for a duration of 10 years on the specific terms and conditions as set out in Annexure 1 for CRC081038 (Landcorp Farming Ltd).

DATED the 30th day of July 2010

A handwritten signature in black ink, appearing to read "Alan Withy". The signature is cursive and somewhat stylized, with a large loop at the end.

Alan Withy,
Independent Commissioner.

ANNEXURE 1**Conditions for Landcorp Farming Limited Application
CRC081037 to Take and Use Water****Consent Duration: 10 Years**

- 1) *Water may be taken only from bore M35/11912, 300 millimetres diameter and 128 metres deep, at map reference NZMS 260 M35:57655-57737.*
- 2) *Water may be taken at a rate not exceeding 122.7 litres per second, with a volume not exceeding 10,600 cubic metres in any one day, and 1,060,000 cubic metres between 1 July and the following 30 June.*
- 3) *Water shall only be used for irrigation of crops and pasture for grazing stock, including milking dairy cows, on the area of land shown in attached plan CRC081037, which forms part of this consent.*
- 4) *The consent holder shall, before the first exercise of this consent, install an easily accessible straight pipe(s), 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.*
- 5) *The consent holder shall before the first exercise of this consent:*
 - (a)
 - (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 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 such as a data logger(s) that shall time stamp a pulse from the flow meter at least once every 60 minutes for all others, 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)(iii).*
 - (b) *The recording device(s) shall:*

- (i) be set to wrap the data from the measuring device(s) 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 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*
 - (iii) 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 device(s) shall be deliberately changed or deleted.*

- (c) The water meter and recording device(s) shall be accessible to the Canterbury Regional Council at all times for inspection and/or data retrieval.*

- (d) The water meter and recording device(s) shall be installed and maintained throughout the duration of the consent in accordance with the manufacturer's instructions.*

- (e) All practicable measures shall be taken to ensure that the water meter and recording device(s) are fully functional at all times.*

- 6) The Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager, shall be informed immediately on first exercise of this consent by the consent holder.*

- 7) 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, and demonstrating by means of a clear diagram, that:*
 - (a) The measuring and recording device(s) has been installed in accordance with the manufacturer's specifications; and*
 - (b) Data from the recording device(s) can be readily accessed and/or retrieved in accordance with clauses (b) and (c) of condition (5).*

- 8) *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.*
- 9)
- (a) *The irrigation system used in association with taking water in terms of this permit shall not be used to distribute effluent, fertiliser or any other added contaminant, unless:
 - (i) *a reduced pressure zone (RPZ) backflow preventer; OR*
 - (ii) *an air gap backflow preventer is installed within the pump outlet plumbing.**
 - (b) *The back flow prevention device must be designed and installed in accordance with Canterbury Regional Council guide "Fertigation, Backflow Preventers" E05/30 (June 2009).*
 - (c) *The backflow preventer must be installed downstream of the water meter.*
 - (d) *The injection point for the effluent, fertiliser or added contaminant must be located downstream of the backflow preventer device.*
 - (e)
 - (i) *a RPZ device installed in accordance with (a)(i) shall be tested within one month of its installation and every 12 months thereafter by a certified Approved Backflow Technician (ABT) or Independent Qualified Person (IQP) as defined in the Canterbury Regional Council guide E05/30;*
 - (ii) *the test report for the RPZ undertaken in accordance with (e)(i) shall be provided to the Canterbury Regional Council Attention: RMA Compliance and Enforcement Manager, within one month of each test;*
- OR
- (f)
 - (i) *An air gap device in accordance with (a)(ii) shall be photographed. The photograph shall clearly show the air gap system. A diagram showing the dimensions of the air gap and outlet pipe are to be included;*
 - (ii) *The information required in accordance with (f)(i) shall be provided to the Canterbury Regional Council Attention: RMA Compliance and Enforcement Manager, within two months of the installation of the device.*
 - (g) *A copy of:
 - (i) *the most recent test report required under (e)(ii); OR**

- (ii) *information required under (f)(ii); shall be located in the adjoining pump shed and be readily accessible.*

Advisory Note:

This condition does not authorise the distribution of effluent or fertiliser as this is subject to separate consent requirements pursuant to s15 of the RMA.

- 10) *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.*
- 11) *Prior to the first exercise of this consent, the consent holder shall:*
 - (a) *Select one of the three approved methods listed below:*
 - (i) *Overseer' (AgResearch)*
 - (ii) *The Soil Plant Atmosphere Model (SPASMO - HortResearch)*
 - (iii) *Any other method approved by the Canterbury Regional Council;*
 - (b) *Implement recording practices that will ensure records shall be maintained throughout the year of the farm management practices and associated data that will be used as input to the approved method.*
 - (c) *For the purpose of monitoring nitrate-nitrogen concentrations in shallow groundwater as detailed in condition (13)(a) of this consent:*
 - (i) *Install two monitoring bores on the down gradient boundary of the subject land, at or about map references NZMS 260 M35:5764-5716 ("monitoring bore A") and NZMS 260 M35:5681-5648 ("monitoring bore B"), as shown in attached Plan CRC081037;*
 - (ii) *Identify two bores, on neighbouring properties and screened at the shallowest water table, situated down hydraulic gradient of the subject land; and*
 - (iii) *Identify two bores, on neighbouring properties and screened at the shallowest water table, situated up hydraulic gradient of the of the subject land;*
 - (iv) *The monitoring bores specified in clause (c)(i) shall have minimum requirements of:*
 - a. *a maximum screen length of three metres;*

- b. *the screen shall be placed such that it intercepts the water table, or lies slightly below the water table, when samples are collected in accordance with condition (13);*
- c. *have a sufficient diameter to allow the bore to be purged and sampled according to the sampling procedure specified in condition (13)(b)*
- (v) *In the event that a monitoring bore specified by clause (c)(i) of this consent is dry for a period of more than six months, the monitoring bore shall be replaced with a deeper bore meeting the requirements of clause (c)(iv).*

Advisory Note: *For the purposes of this condition, the subject land means the area shown in Plan CRC081037.*

- (d) *Submit the approved method, recording practices, and location and classification of the monitoring bores, specified in clauses (a), (b) and (c) of this condition to the Canterbury Regional Council, attention RMA Compliance and Enforcement Manager.*

12)

- (a) *With the exception of the first period ending 30 June during which this consent is exercised, for each preceding 12 month period ending 30 June, calculate the nitrate-nitrogen concentration in the soil drainage water below the plant root zone and construct a nutrient budget for the subject land using the approved method specified in Condition (11)(a);*
- (b) *A record of the predicted and measured input data, the calculations and associated results from clause (a) of this condition shall be:*
 - (i) *certified as an accurate record by a suitably qualified person;*
 - (ii) *maintained for the subject land for the duration of the consent; and*
- (c) *The consent holder shall review the record specified in clause (b) of this condition and shall determine what practical changes to farm management practices used in the preceding twelve month period will result in lower nitrate leaching;*
- (d) *The consent holder shall provide to the Canterbury Regional Council, attention RMA Compliance and Enforcement Manager, a report detailing the record specified in clause (b) and the changes in farm management practices to be undertaken in accordance with clause (c) of this condition, by 30 September each year.*

13)

- (a) *Between the 1 September and 30 November of each year groundwater samples ("the Samples") shall be taken from each of the bores specified in Condition (11)(c) of this consent;*
 - (b) *The Samples shall be collected in accordance with the Canterbury Regional Council Collection of Groundwater Samples procedure attached as Appendix A of this consent;*
 - (c) *The Samples shall be analysed for nitrate-nitrogen by a laboratory that is certified for that method of analysis for nitrate-nitrogen.*
 - (d) *The results of the analysis detailed in clause (b) of this condition shall be provided to the Canterbury Regional Council, attention RMA Compliance and Enforcement Manager, by 30 January each year.*
 - (e) *If the results of the analysis undertaken in accordance with clause (b) of this condition indicates that nitrate-nitrogen concentration in groundwater has increased in excess of a concentration of 10.5 milligrams per litre (mg/L), then the applicant shall either:*
 - (i) *cease irrigation under this consent;*
 - (ii) *identify all down-gradient domestic supply bores within two kilometres of the subject land with a concentration of nitrate-nitrogen greater than 10.5 mg/L, and provide those bore owners affected with an uncontaminated water supply; or*
 - (iii) *provide scientific evidence that proves, to the satisfaction of the Canterbury Regional Council, that the increase is not due to the activity authorised by this consent.*
- 14) *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.*
- 15) *The lapsing date for the purposes of section 125 shall be 30 September 2015.*

Appendix A - Collection of Groundwater Quality Samples

Collection of Groundwater Quality Samples	EMG-G002-2
Approved by: Carl Hanson, Groundwater Quality	Date 09-03-2009
Scientist 	

PURPOSE AND SCOPE:

Collect groundwater samples that accurately represent the quality of the groundwater in the area surrounding a well screen.

Pertains to samples collected for general major element chemistry and indicator bacteria; includes major ions, nitrate, ammonia, iron, manganese, arsenic, volatile organic compounds (VOCs), and indicator bacteria (*E. coli* or faecal coliforms). Does not address sampling for pesticides, isotopes, or age dating.

RESPONSIBILITY:

Any personnel collecting groundwater quality samples for the groundwater quality team in Environment Canterbury's Investigations and Monitoring group.

PROCEDURE:

Identify well and sample collection point

- if the well has been sampled previously, bring a print-out of the Well Card to the field site and use it to ensure that the correct well is being sampled and that the correct sampling point is being used
- ensure that the water from the sample point does in fact come from the intended well
 - make sure the pump in the well is running
 - check the reticulation layout to make sure the sampling point is connected to the well and isolated from other water sources; for example:
 - if the well is connected to a ring main system, make sure the sampling point is isolated from the rest of the system
 - some water supplies are connected to a public supply or a rainwater supply in addition to the well; make sure the sample tap is isolated from any such alternate supplies
 - make sure there is no back-flow to the sampling point from storage tanks, dosing systems, garden hoses, etc.

Document site observations

- document site details according to procedure EMG-G003, *Site identification and documentation*.

Measure water level in well

- unless otherwise recorded on the well card or accompanying photos, the measuring point is the top rim of the well casing or the rim of an access hole in the well cap
- use a sterilized water level marker to measure the depth from the measuring point to the top of the standing water in the well
- record the measurement on the *Groundwater Quality Sampling Field Sheet*

Purge well and monitor field parameters in flow-cell prior to sample collection

- calculate well volume:
(well volume) = [(well depth) - (water level)] x pi x [(well casing diameter) / 2]²
- pump at least three well volumes of water from well taking care not to cause nuisance flooding; record purging time and pumping rate on *Groundwater Quality Sampling Field Sheet*
- set-up a sampling manifold to direct a reduced portion of the purge water (< 0.2 L/s) into a flow-cell containing the field meter probes. This water is isolated from the atmosphere, first entering the base of the flow-cell then gently circulating the probes before discharging out the top of the flow-cell
- monitor the water temperature, pH, conductivity, and dissolved oxygen using calibrated field meters. Purging continues until the meter values stabilise to within ±3%, or document otherwise; record final values on the *Groundwater Quality Sampling Field Sheet*
- if the well is known to have been running for a long time prior to arrival on site, full purging is not necessary, but document this, and still measure pH, conductivity, and dissolved oxygen as above

Collect samples**General**

- specific instructions for filling different bottles are listed below; check the list of required determinands with the lab to determine which bottles are needed
- the order in which the samples are collected is not important
- for all samples listed below, *except bacteria samples*: if filling the sample bottle directly from the sample tap is awkward (for example, if the tap is in an awkward location, or if the water comes out with excessive force), it is acceptable to collect water first in a clean glass or plastic container (for VOCs, this container must be made of glass), rinsed three times with water from the well, then to decant water from this container into the appropriate sample bottle, or in the case of field-filtered samples, to use a syringe to transfer the water from this container into the sample bottle
- document sampling point information on the *Groundwater Quality Sampling Field Sheet* (sampling point, sample point sterilisation, sample

source, well cap, well surroundings); ensure that this information does not contradict any information recorded elsewhere in the field notes

- document sample water appearance on the *Groundwater Quality Sampling Field Sheet* (clarity: clear or otherwise; colour: colourless or otherwise; odour: odourless or otherwise; for “otherwise”, use simple, general descriptive words – single words if possible)

Samples for bacteria

- bottle types
 - *E. coli*: Colilert bottle: 100 mL clear plastic with yellow lid, sterile, no preservative
 - faecal coliforms – 250 mL clear plastic with clear lid, sterile, no preservative
- **do not touch the inside of any sample bottle or lid**
- do not rinse bottles prior to sample collection; leave bottle closed during transport, open only when sample is being collected
- sterilise or disinfect sampling point
 - if sampling point is metal, sterilise by heating with a blow torch for 5-10 seconds
 - if sample point is plastic (or if torch cannot be used), sterilise by immersing the sample point in alcohol; pour some alcohol into a small container and hold the container up to the sample point such that the sample point is immersed in the alcohol for approximately 5 seconds; allow all alcohol to evaporate before collecting sample: wait for about 30 seconds, then run the tap for about ten seconds before collecting the sample
- put on clean pair of latex gloves
- if sampling for faecal coliforms and *E. coli*, fill faecal coliform bottle first, then decant into the *E. coli* bottle
- if sampling for *E. coli* only, fill the *E. coli* bottle directly from the sampling point
- fill the *E. coli* bottle to the 100 millilitre line marked on the bottle

Samples for major cations (calcium, magnesium, potassium, sodium, iron, manganese, and arsenic)

- bottle type: 125-mL white Nalgene plastic, acid-washed, acid-preserved
- do not rinse the sample bottle prior to sample collection
- filter the sample using a 0.45-micron syringe filter; rinse the syringe three times with water from the sample point prior to sample collection; re-fill the syringe as necessary to fill the sample bottle nearly completely
- if the sample is very turbid, collect water from the sample point into an into a clean glass or plastic container and let the water sit in the container for 2-3 minutes before sampling to allow some of the sediment to settle out; then fill the syringe from the container

Samples for major anions (alkalinity, chloride, sulphate, nitrate nitrogen), pH, conductivity, silica, bromide, fluoride, acidity, and turbidity

- bottle type: 500 mL clear plastic (PET), disposable, no preservative
- remove the cap and rinse the inside of the bottle and cap three times with water from the sample point prior to sample collection
- collect the sample into the sample bottle; the sample is not filtered in the field prior to collection
- remove air from the sample by squeezing the bottle gently as cap is put on, such that a small amount of water is leaking out as the cap is tightened

Samples for ammonia nitrogen and dissolved reactive phosphorus

- bottle type: 100 or 250 mL white HDPE plastic, acid-washed, no preservative
- remove the cap and rinse the inside of the bottle and cap three times with water from the sample point prior to sample collection
- collect the sample into the sample bottle; the sample is not filtered in the field prior to collection

Samples for nitrite nitrogen

- bottle type: 50 mL brown HDPE plastic, acid-washed, mercuric chloride preservative
- do not rinse the sample bottle prior to sample collection
- collect the sample into the sample bottle; the sample is not filtered in the field prior to collection

Samples for volatile organic compounds (VOCs)

- bottle type: 40 mL clear glass vial, plastic cap with Teflon septum, disposable, sodium bisulphate preservative
- do not rinse the vial prior to sample collection
- the sample is not filtered in the field prior to collection
- collect the sample directly from the tap into the sample bottle unless the force of water from the sample tap is too great; if this is the case, collect water from the sampling point into a clean glass container, rinsed three times with water from the sampling point, then decant water from the glass container into the sample vial without delay and document the procedure
- fill the vial to the top and secure the lid; ensure there are absolutely no air bubbles in the sample; if air bubbles are present, carefully remove the lid, top up the vial with a small amount of additional water from the sampling point, and replace the lid; repeat this procedure until no air bubbles are present

sample storage and transport

- label bottles using pre-printed labels from the Environment Canterbury laboratory (see procedure EMG-G004: *Sample tracking and record keeping*)

- store all samples in a chilly bin with an ice pack until delivery to lab
- samples collected in South Canterbury are brought to the Environment Canterbury office in Timaru; there they are packaged in a chilly bin or insulated container with an ice pack and sent by overnight courier to the Environment Canterbury lab in Christchurch
- deliver the *Groundwater Quality Sampling Field Sheets* to the lab with the samples (see procedure EMG-G004: *Sample tracking and record keeping*)

sample register

- complete *Groundwater Sample Register* sheet following procedure EMG-G004: *Sample tracking and record keeping*.

Site clean-up

- On completion of sampling all equipment that has been down the well should be cleaned and sterilized before departure from the site. All pumps, dip pipes and water level markers should be thoroughly sterilized with about a 1:100 dilution of *TriGene* - a concentrate disinfectant cleaner. This can be made by mixing 10 mL of *TriGene* with 1 L of distilled water and applied with a trigger spray pack. After sterilizing, all equipment should be thoroughly rinsed with clean water and transported in clean plastic bags to the next site.

SUPPORTING DOCUMENTATION:

Well Card

Groundwater Quality Sampling Field Sheet

Groundwater Sample Register

REFERENCES:

none

RECORDS:

Well Card – printed form from the Wells database, showing well construction details, site map, and other information

Groundwater Quality Sampling Field Sheet – submitted to laboratory with sample; returned by laboratory to Groundwater Quality Officer or Environmental Quality Officer with analytical results report; filed in marked ringbinder kept in office of Groundwater Quality Officer or Environmental Quality Officer who received the report.

Groundwater Sample Register – filed upon return to office in marked ringbinder kept in office of Groundwater Quality Officer or Environmental Quality Officer who collected the sample. Environmental Quality Officer (Timaru-based) periodically send photocopies to be stored in ring binder in Christchurch office.