

# Waimakariri Irrigation Limited

## Environmental Management Strategy

### 1.0 Introduction

#### 1.1 WIL Mission Statement

To be leaders in water management, providing reliable, economic and sustainable supply.

We envisage a future where farmers actively manage irrigation, applying precisely the water needed – when, where and how much. Enabling increased yields, optimal fertilizer use, reduced costs for energy, repairs and maintenance while at the same time achieving improved environmental outcomes.

#### 1.2 WIL Scheme Description

The Waimakariri Irrigation Ltd (WIL) Scheme (referred to in this document as the Scheme) is a shareholder owned cooperative company with consents to take water from the Waimakariri River. Water is drawn from the Waimakariri River at Browns Rock for distribution through open race channels to supply around 200 shareholders. Supplying farms covering approximately 30,000 ha within a command area of 78,000 ha between the Waimakariri and the Ashley River and between Oxford and Rangiora townships. It uses a combination of dedicated irrigation races and the pre-existing county stock water race system.

Figure 1 (Appendix A) shows the extent of the Scheme.

#### 1.3 Resource Consents

This Environmental Management Strategy (EMS) has been prepared to satisfy the requirements of WIL's consents CRC142754 (condition 10) and CRC166677 (condition 8).

The requirements for the EMS are as follows:

*By 1 July 2016 the consent holder shall prepare and implement an Environmental Management Strategy (EMS) for the irrigation scheme including, but not limited to, the following:*

- a. Implementation of industry articulated Good Management Practice (GMP).*
- b. Implementation of a monitoring programme for groundwater quality.*
- c. Implementation of a monitoring programme for groundwater levels.*
- d. Implementation of a programme by 1 July 2016 to install water meters:*
  - i. for all shareholders taking at a rate equal to or greater than 20 L/s; and*
  - ii. that enables a minimum of 90% of the total flow delivered to shareholders to be measured.*
- e. Preparation of an annual report on the quantity of water used in each period from 1 July to 30 June, commencing from 1 July 2016, based on the measurements from flow meters in d. above, and an estimate of water use for the remaining 10% of unmetered use based on comparative land use activities with those shareholders that are metered.*

- f. *Independent certification of the accuracy of the water meters when first installed and at 5 yearly intervals thereafter.*
- g. *Information on:*
  - i. *The actual area irrigated each year and the irrigation methods that are used;*
  - ii. *A record of any change in the area of land irrigated or irrigation method compared with the twelve months prior, including:*
    - a. *The location(s) of any change in area of land irrigated; and*
    - b. *The method of irrigation used to service the increased area.*
    - c. *The use of active soil moisture management.*
  - iii. *A summary of land use serviced under both irrigation and associated dryland activities split into metered and unmetered water use.*
  - iv. *A summary of annual water use between 1 July to the following 30 June for those water users specified in clauses a. and b. compared to a WIL scheme water use model that represents efficient water use.*
  - v. *measures implemented to address inefficient users based on recommendations from the report from the previous year.*
- h. *An assessment of farm water use efficiency with reference to the Irrigation NZ GMP guidelines.*
- i. *Implementation of active and managed irrigation scheduling.*
- j. *Measures to ensure that when water authorised by this consent is used on a property that also utilises a different irrigation water use consent that water used under this consent contributes to the overall efficient use of water on the property.*

*An annual report shall be provided to the Canterbury Regional Council, Attention: Regional Manager, RMA Monitoring and Compliance, by no later than 30 June every year (commencing 30 June 2017), describing the information in items a. – j. above, a description of any water use that has been identified as inefficient and the measures that will be taken to improve efficiency of those users.*

## 2.0 Implementation of Good Management Practice

Farm Environment Plans (FEPs) are the principal tool for the delivery of the good management practice (GMP) outcomes, combined with an auditing process that encourages implementation of GMP measures.

WIL are using two ECan approved FEP templates:

1. All properties larger than 20 ha will complete the WIL online FEP.
2. For properties less than 20 ha in size<sup>1</sup> the ECan developed 'Lifestyle Block Management Plan' (LBMP) is being used. Although discretion is being used if the property warrants a full FEP due to the intensification of land use.

### 2.1 WIL Online Template

- The FEP template that is being used is a joint venture between Opuha Water Ltd (OWL) and WIL and a third party technical provider. WIL and OWL jointly own the IP and each scheme have individual access to their program.
- It is an online version that has been approved by ECan for the delivery of the FEPs for the WIL scheme. All scheme FEPs must use this template to guarantee consistency.

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<sup>1</sup> This approach has been endorsed and approved by ECan (see correspondence with PDP and ECan April 2016) as a pragmatic implementation of consent conditions

- It is accessible through the WIL website <http://www.wil.co.nz>
- Each shareholder/farmer is given a unique username and password to be able to access and manage the FEP for themselves. It is a facilitated process controlled by the scheme environmental manager or contractor to firstly draft and then finalise the FEP. The final versions are held centrally and will be updated at each audit.
- Copies of all farm plans will be held on file including future iterations of plans to enable monitoring of progress made on individual farms and across the scheme area as a whole.

## 2.2 Lifestyle Block Management Plan (LBMP)

- This is an ECan developed template for small scale, low intensity properties that are required to complete a Farm Environment Plan.
- It is available through the ECan website <http://ecan.govt.nz/publications/Plans/Lifestyle-block-management-plan-Mar2015.pdf> or on request from WIL

WIL have set themselves a target of having all shareholder farms operating at GMP by 1 September 2020. The implementation of this progression towards GMP will be set out and monitored through the FEPs.

## 3.0 Groundwater Monitoring

WIL has an established ECan-approved groundwater monitoring programme, as documented below.

### 3.1 Monitoring of Groundwater Level Effects

Groundwater level changes resulting from Scheme activities will be caused by changes in groundwater recharge due to irrigation usage and groundwater recharge trials.

WIL will monitor the following water inputs:

- The flow taken into the Scheme at Browns Rock;
- The flow used for artificial recharge trials.

This data will provide an indication of the input to the groundwater resource created by the Scheme.

The response of the groundwater system to these new inputs can be observed from measurements of groundwater levels in monitoring bores. Bores that have a historical record of monitoring by ECan will be used to assess Scheme impacts. At the present time, the monitoring network is for the boreholes listed in the following table and shown in Figure 2 (Appendix A). Changes may need to be made to this list depending on the availability and suitability of boreholes. If changes to the bore monitoring network are required they will be made with an aim to maintaining the same distribution of monitoring points as listed below.

Borehole Number	Sampling Frequency	Depth (m)
L35/0051	Monthly	75.9
M34/0306	Monthly	10.3
M35/0008	Monthly	14.6
M35/0017	Monthly	12.9
M35/0026	Monthly	16.8
M35/0058	Monthly	11.0
M35/0143	Monthly	29.0
M35/0174	Monthly	45.7

M35/0222	Monthly	13.7
M35/0312	Monthly	9.1
M35/0637	Monthly	10.7
M35/4757	Monthly	21.7

The frequency of water level measurements in these boreholes will be the same as that used by Environment Canterbury to identify seasonal trends in groundwater level fluctuations.

### 3.2 Monitoring of Groundwater Quality Effects

The main groundwater quality parameters of concern related to irrigation development arise from increased concentrations of nitrate-nitrogen and E. coli concentrations. In addition, there is a contrast in chloride concentrations between existing groundwater quality and Waimakariri River water. Chloride is particularly mobile in the subsurface environment and therefore may prove to be a useful indicator of any effect arising from the application of irrigation water from the Scheme.

Where feasible, the bores that are monitored are those which tie in with ECan's existing monitoring programme for this area. At present, one of the regularly sampled bores (M35/0132) is sampled by ECan.

In order to determine water quality impacts six monthly sampling is carried out prior to, or at the start of, the irrigation season (August-September) and towards the end of the irrigation season (April-May). This monitoring is timed to match the maximum variation with any impacts that may be caused by the Irrigation Scheme.

The groundwater quality sampling is undertaken for nitrate-nitrogen, E. coli, chloride, ammoniacal-N, pH and electrical conductivity.

Bore Number	Sampling Frequency	Depth (m)
L35/0349	Monthly	20.0
M35/0132	Monthly	20.4
M35/10179	Monthly	23.5
M35/0731	Twice a year	21.5
M35/0008	Twice a year	14.6
M35/2711	Twice a year	21.7
M35/4757	Twice a year	21.7
M35/4795	Twice a year	13.8
M35/5440	Twice a year	20.9
M35/5869	Twice a year	20.5
M35/6385	Twice a year	40.2
M35/6639	Twice a year	15.5

## 4.0 Water Meters

### 4.1 Installation

Between 2009 and 2016, 132 electronic flowmeters and telemetered dataloggers were installed on all takes greater than 20 L/s. To ensure water use efficiency, WIL now requires that flowmeters and telemetered dataloggers are fitted to all new installations regardless of flow or size.

Datacol host the telemetered dataloggers and record instantaneous, daily, weekly, monthly and annual flows from each individual site. By 1 September 2016, Datacol will have written a software

programme that will electronically combine individual flows to give a cumulative total for the scheme. This will verify that the scheme is capturing a minimum of 90% of the total flow to shareholders, as well as providing the data required to best estimate the water use for the remaining 10%.

## 4.2 Certification

By 1 September 2016, every flowmeter must have independent certification of the accuracy to within 5%:

1. Upon installation
2. At no less than five yearly intervals and typically to coincide with the 4 year audit cycle.

The programme of meter certification will be managed by WIL.

Each shareholder will be individually responsible for the maintenance and up keep of the flowmeter and datalogger to ensure that instantaneous, daily, weekly, monthly and annual flows are recorded.

## 5.0 Annual Water Use

The scheme will prepare an annual report on the quantity of water used in each period from 1 July to 30 June, commencing 1 July 2016.

As discussed above, Datacol is preparing software to electronically combine water use data from individual flowmeters to give a cumulative total for the scheme.

The WIL Scheme contains about 70 small blocks, which account for most of the unmetered flow (less than 10% of the total flow for the Scheme). By 1 September 2017, WIL is proposing to install flowmeters on 5 representative small properties. Flow data from these properties will allow for an estimate of the unmetered flow.

This information will be provided in the annual report, which is detailed in section 12 below.

## 6.0 Area Irrigated and Irrigation Methods

WIL will determine the following information from the FEPs:

- i. The actual area irrigated each year and the irrigation methods that are used;
- ii. A record of any change in the area of land irrigated or irrigation method compared with the twelve months prior, including:
  - a. The location(s) of any change in area of land irrigated; and
  - b. The method of irrigation used to service any increased area.
  - c. The use of active soil moisture management.
- iii. A summary of land use serviced under both irrigation and associated dryland activities split into metered and unmetered water use.
- iv. A summary of annual water use between 1 July to the following 30 June for shareholders using flow meters and those without, compared to a WIL scheme water use model that represents efficient water use.
- v. Measures implemented to address inefficient users based on recommendations from the report from the previous year.

This information will be provided in the annual report, which is detailed in section 12 below.

## 7.0 Assessment of Water Use Efficiency

An assessment of farm water use efficiency with reference to the Irrigation NZ GMP guidelines will occur for all shareholders through the FEP process.

WIL will rank the annual water use for all shareholders in terms of cubic metres per hectare. Annual water use from individual properties will be compared based on land use, soil type and rainfall.

Based on this internal ranking system, WIL will review the FEPs of the properties which have unusually high water use on a per hectare basis. WIL will also compare the annual volumes for these properties against Irricalc annual volumes.

It is worth noting that water use efficiency depends on the reliability of supply. This is why it is so important that WIL develops scheme storage. If approval for a scheme storage facility is not obtained only a lower level of efficiency will be possible.

## 8.0 Irrigation Scheduling

WIL recognise that active and managed irrigation scheduling plays a key role in the sustainable use of the water. WIL has been proactively trialling two separate irrigation scheduling decision support packages.

NIWA have been providing data from in-ground soil moisture probes and using their virtual climate network to give farmers specific information on soil moisture conditions and forecast weather to base decisions on. They have 7 sites across the area and the data is available via a website to log into.

Regen are a commercial company specialising in decision support hardware and software. They provide a customised service using both site specific in-ground soil moisture monitors and above ground in-situ climate monitoring equipment. They use this information to provide the farmer with more specific recommendations to irrigate to.

These trials have been very successful and the Regen products are now in the market place with NIWA looking to commercialise their service. WIL are actively promoting the use of these services amongst others and the use of in-ground soil moisture monitors. There a number of farmers that have been using other decision support service, for instance Hydroservices, and that have in ground and telemetered soil moisture probes.

All shareholders will adopt justifiable irrigation (JI) by 1 September 2020.

## 9.0 Use of WIL Water in Combination with Other Irrigation Consents

WIL will endeavour to obtain flowmeter records for shareholders with other irrigation consents. This information will be included in the assessment of water use efficiency.

Shareholders will ensure that when WIL water is used on a property that also utilises a different irrigation water use consent that WIL water contributes to the overall efficient use of water on the property.

This will be assessed through the FEP process.

## 10.0 Reporting

WIL will prepare an annual report describing all the information required by this Environmental Management Strategy, including a description of any water use that has been identified as inefficient and the measures that will be taken to improve efficiency of those users.

This report shall be provided to the Canterbury Regional Council, Attention: RMA Compliance and Enforcement Manager, by the 30 June each year.

## Appendix A: Figures



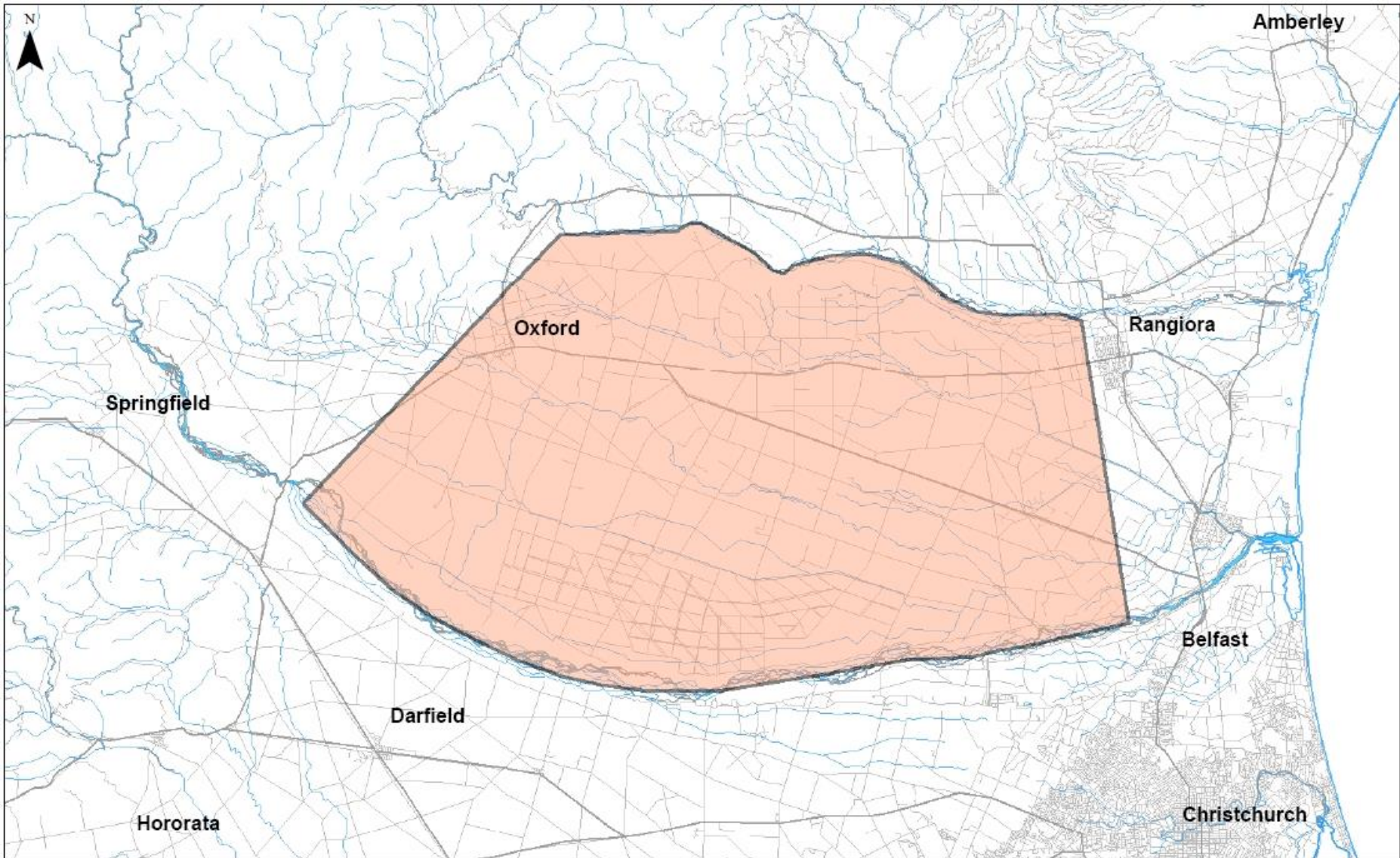


Figure 1: Waimakariri Irrigation Scheme

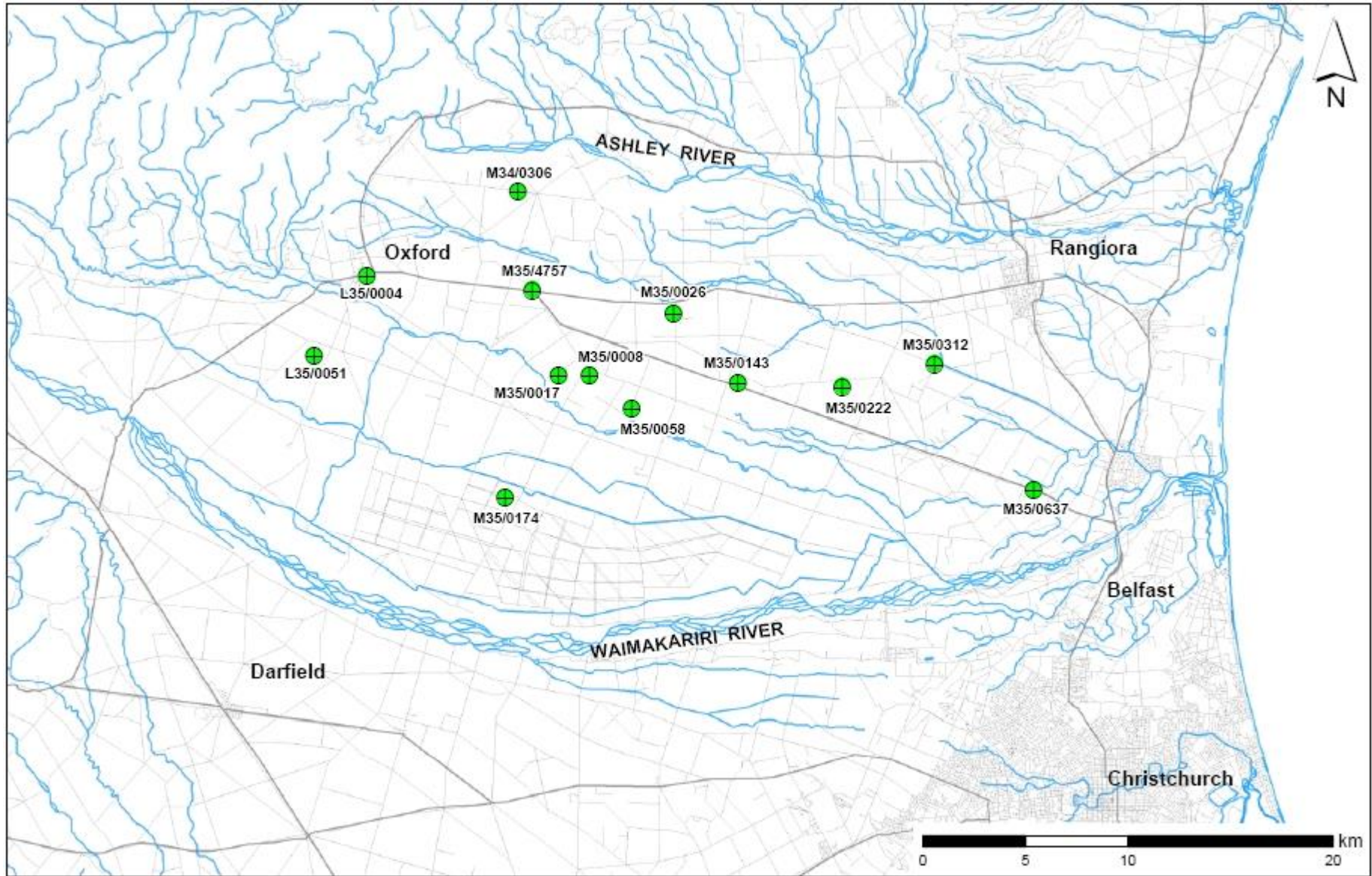


Figure 2: Location of Water Level Monitoring Bores

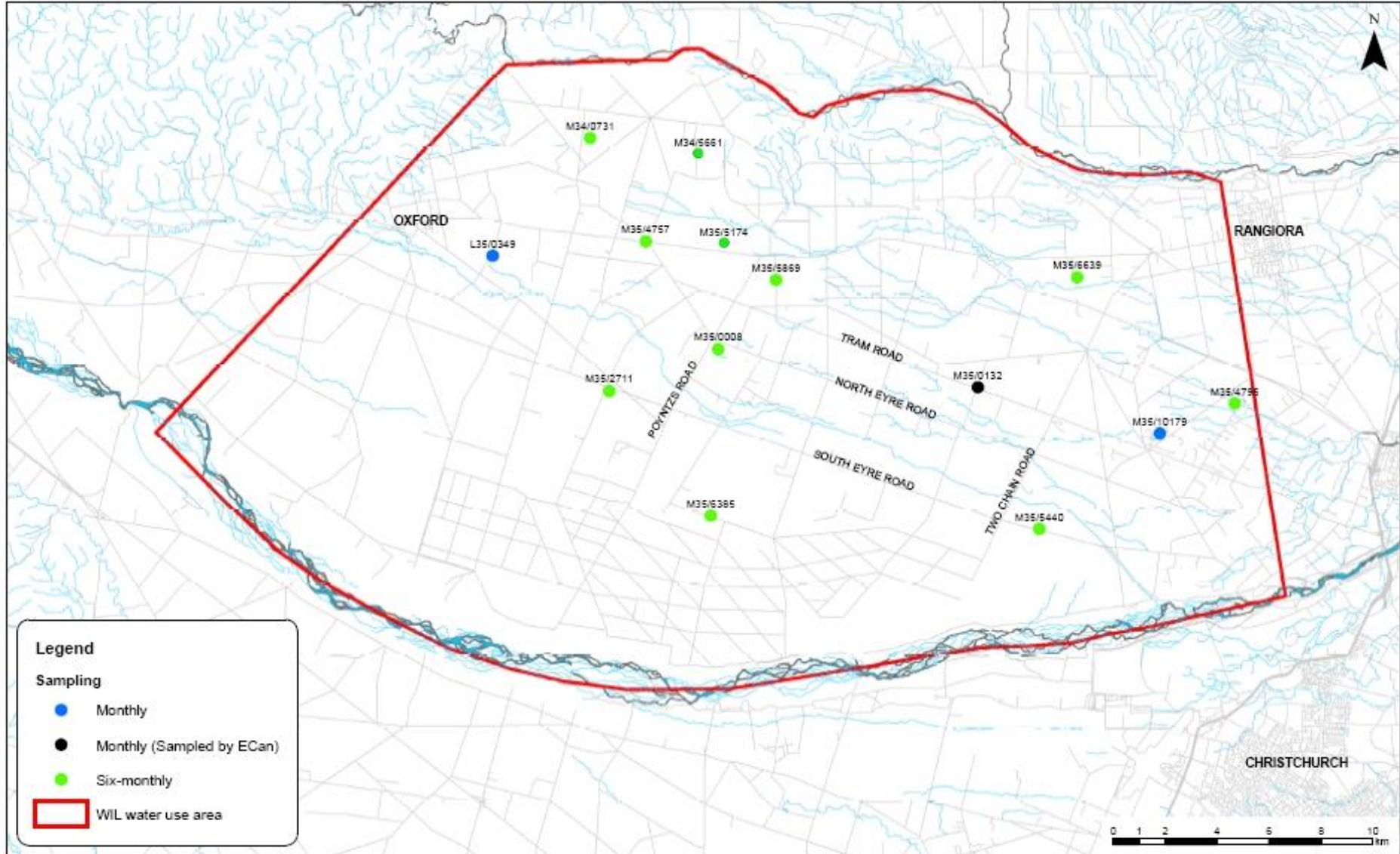


Figure 3: Location of Water Quality Monitoring Bores