Irrigation Water
Compliance Monitoring Programme
Annual Report
2014-2015

Technical Report 2015-85

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Executive summary

This is the 12th Annual Report issued by the Taranaki Regional Council (the Council) to report on compliance monitoring programmes for resource consents authorising the abstraction of freshwater for irrigation purposes in Taranaki. This report for the period July 2014–June 2015 encompasses the data collected for compliance monitoring for resource consents for pasture irrigation, horticultural and golf course irrigation; as per the recommendations from the previous report. Every year the Council prepares a monitoring programme for all irrigation water permits.

Water is a public resource and the authorisation to take it is granted through resource consent. Associated with that permission is a public expectation that the water will be used efficiently, an expectation that can be better met if the actual amounts of water taken are accurately measured and recorded. Maintaining environmentally appropriate residual flows in streams and rivers to protect aquatic habitat is of primary concern to the Council when assessing water take applications. Monitoring of compliance with consent conditions is then required to ensure that any significant adverse effects as a result of authorised water takes are avoided.

At 30 June 2015, a total of 78 resource consents to take and use freshwater for irrigation purposes were registered in the Council's databases. Of that number, 58 were for pasture irrigation, 10 for horticultural activities and 10 for recreational purposes (golf clubs). Sixty-five consents authorised abstractions from surface water (83%) while 13 (17%) utilised groundwater sources.

Other water takes for general farm and water supply purposes have also been granted by the Council. These takes are discussed in Appendix II of this report.

The 2014-2015 monitoring programme for irrigation water permits comprised three primary components; liaison with consent holders, site inspections and data gathering and the review and assessment of data for compliance. It was a busy season for the Council's hydrological unit, as the weather conditions meant the demand for irrigation was high. Most irrigation had commenced by the middle of December 2014.

Over the five month summer irrigation period, rainfall was between 62% and 106% of normal which meant that rivers were running well below mean flows for the entire period. The low stream flows necessitated close and frequent monitoring by the Council to ensure ecological flows were maintained in those waterways being used to supply water for irrigation. During the period under review compliance with residual flow conditions for surface water abstractions sites was assessed by the Council on a total of 72 separate occasions across 26 waterways.

The Council also carried out compliance monitoring inspections at 71 sites during the 2014-2015 irrigation season. The inspections included visual checks of the intake structures, screens, staff gauges, fencing around the pump sheds, downloading of data and stream gaugings.

All irrigators had ceased taking water by mid March 2015.

As happens each year, consent holder performance was assessed based on compliance with their authorised abstraction rates/volumes, maintenance of minimum residual flows, provision of abstraction records and all other general conditions of their consent(s).

The Council entered a total of four incidents over the course of the 2014-2015 period in relation to irrigation consents. These incidents were reported to Council and staff implemented appropriate responses as they were identified.

During the 2014-2015 year, 57% of exercised irrigation consents in Taranaki achieved a high level of environmental performance and compliance with their consents, while 6% require improvement in their compliance performance. For reference, in the 2014-2015 year, 75% of consent holders in Taranaki monitored through tailored compliance monitoring programmes achieved a high level of environmental performance and compliance with their consents, while another 22% demonstrated a good level of environmental performance and compliance with their consents.

In addition to the conditions of resource consents for water abstractions, The Resource Management (Measurement and Reporting of Water Takes) Regulations 2010 place further legislative requirements on holders of consents for water abstractions greater than five litres per second. These include specific requirements for the installation of water measuring devices, verification of the accuracy of water measuring devices and data reporting. The Regulations allow for a staged implementation of the requirements, dependent on abstraction rate. All abstractions are to be compliant with the Regulations by 10 November 2016. The Council will be actively monitoring the implementation of the Regulations during forthcoming monitoring periods.

This report includes recommendations for the 2015-2016 year.

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1. Introduction

1.1 Compliance monitoring programme reports and the Resource Management Act 1991

1.1.1 Introduction

This report is for the period July 2014-June 2015 by the Taranaki Regional Council (the Council) describing the monitoring programmes for resource consents authorising the abstraction of freshwater for irrigation purposes in Taranaki.

This report covers the data collected for compliance monitoring for resource consents for pasture irrigation, horticultural and golf courses; as per the recommendations from the previous report. This is the 12th annual report to be prepared by the Council to report on compliance monitoring programmes for irrigation water in Taranaki.

Irrigation in this report does not refer to any effluent (wastewater) application; it applies to the use of freshwater to supply dry soils with enough moisture for assisting in growing pasture. In pasture production, irrigation is mainly used to replace precipitation during periods of drought and to fulfil crop water requirements.

1.1.2 Structure of this report

Section 1 of this report is a background section. It sets out general information about compliance monitoring under the RMA and the Council's obligations and general approach to monitoring sites though annual programmes, the resource consents held by pasture irrigators to take and use freshwater, the nature of the monitoring programme in place for the period under review, and a description of the activities and operations conducted in the consent holder's site/catchment.

Section 2 presents the results of monitoring during the period under review, including scientific and technical data.

Section 3 discusses the results, their interpretations, and their significance for the environment.

Section 4 presents recommendations to be implemented in the 2015-2016 monitoring year.

A glossary of common abbreviations and scientific terms, and a bibliography, are presented at the end of the report.

1.1.3 The Resource Management Act 1991 and monitoring

The Resource Management Act (RMA) primarily addresses environmental 'effects' which are defined as positive or adverse, temporary or permanent, past, present or future, or cumulative. Effects may arise in relation to:

(a) the neighbourhood or the wider community around an activity, and may include cultural and social-economic effects;
(b) physical effects on the locality, including landscape, amenity and visual effects;

(c) ecosystems, including effects on plants, animals, or habitats, whether aquatic or terrestrial;
(d) natural and physical resources having special significance (for example recreational, cultural, or aesthetic); (and)
(e) risks to the neighbourhood or environment.

In its management of freshwater, the Council must:

- Sustain the potential of freshwater resources to meet the reasonably foreseeable needs of future generations;
- Safeguard the life-supporting capacity of freshwater and freshwater ecosystems;
- Avoid, remedy or mitigate any adverse effects of activities on the environment.

1.1.4 Regional Freshwater Plan

Section 14(1)(a) of the RMA stipulates that no person may take, use, dam, or divert any water unless the activity is expressly allowed for by a resource consent, or a rule in a regional plan, or meets criteria set out in Section 14(3) of the RMA.

The Regional Freshwater Plan for Taranaki (RFWP) became operative on 8 October 2001. It is a statutory document which outlines the Council's policy with respect to activities in relation to freshwater under the RMA.

Rule 15 of the RFWP provides for the abstraction of up to 50 cubic metres per day (m^3/day) of surface water at a maximum rate of 1.5 litres per second (L/s) as a permitted activity for each certificate of title. The same provision applies for groundwater under Rule 48 pf the RFWP. The permitted allocations *(as of right entitlements)* allow for reasonable domestic and stock water needs without the need for a resource consent, provided that other conditions of the permitted rules are satisfied.

However, most irrigation abstractions demand significantly more water than the daily permitted allocation and consequently require resource consents. Appendix I gives an example of a typical set of conditions for a consent to take and use surface water for irrigation purposes.

Following the trend from previous years, there has been increased interest in pasture irrigation on dairy farms in Taranaki. Sources of water are rivers and streams, as these are the easiest and most economical options, but groundwater abstractions have become a possible alternative to supplement surface water use for irrigation.

1.1.5 Evaluation of environmental and administrative performance

Besides discussing the various details of the performance and extent of compliance by the consent holder/s during the period under review, this report also assigns a rating for their environmental and administrative performance.

Environmental performance is concerned with actual or likely effects on the receiving environment from the activities during the monitoring year. **Administrative performance** is concerned with the Company's approach to demonstrating consent compliance in site operations and management including the timely provision of

information to Council (such as contingency plans and water take data) in accordance with consent conditions.

Events that were beyond the control of the consent holder and unforeseeable (that is a defence under the provisions of the RMA can be established) may be excluded with regard to the performance rating applied. For example loss of data due to a flood destroying deployed field equipment.

The categories used by the Council for this monitoring period, and their interpretation, are as follows:

Environmental Performance

- **High:** No or inconsequential (short-term duration, less than minor in severity) breaches of consent or regional plan parameters resulting from the activity; no adverse effects of significance noted or likely in the receiving environment .The Council did not record any verified unauthorised incidents involving significant environmental impacts and was not obliged to issue any abatement notices or infringement notices in relation to such impacts.

- **Good:** Likely or actual adverse effects of activities on the receiving environment were negligible or minor at most. There were some such issues noted during monitoring, from self reports, or in response to unauthorised incident reports, but these items were not critical, and follow-up inspections showed they have been dealt with. These minor issues were resolved positively, co-operatively, and quickly. The Council was not obliged to issue any abatement notices or infringement notices in relation to the minor non-compliant effects; however abatement notices may have been issued to mitigate an identified potential for an environmental effect to occur.

  For example:

  - High suspended solid values recorded in discharge samples, however the discharge was to land or to receiving waters that were in high flow at the time;
  - Strong odour beyond boundary but no residential properties or other recipient nearby.

- **Improvement required:** Likely or actual adverse effects of activities on the receiving environment were more than minor, but not substantial. There were some issues noted during monitoring, from self reports, or in response to unauthorised incident reports. Cumulative adverse effects of a persistent minor non-compliant activity could elevate a minor issue to this level. Abatement notices and infringement notices may have been issued in respect of effects.

- **Poor:** Likely or actual adverse effects of activities on the receiving environment were significant. There were some items noted during monitoring, from self reports, or in response to unauthorised incident reports. Cumulative adverse effects of a persistent moderate non-compliant activity could elevate an 'improvement required' issue to this level. Typically there were grounds for either a prosecution or an infringement notice in respect of effects.

Administrative performance

- **High:** The administrative requirements of the resource consents were met, or any failure to do this had trivial consequences and were addressed promptly and co-operatively.

- **Good:** Perhaps some administrative requirements of the resource consents were not met at a particular time, however this was addressed without repeated interventions from the Council staff. Alternatively adequate reason was provided for matters such as the no or late provision of information, interpretation of 'best practical option' for avoiding potential effects, etc.

- **Improvement required:** Repeated interventions to meet the administrative requirements of the resource consents were made by Council staff. These matters took some time to resolve, or remained unresolved at the end of the period under review. The Council may have issued an abatement notice to attain compliance.

- **Poor**: Material failings to meet the administrative requirements of the resource consents. Significant intervention by the Council was required. Typically there were grounds for an infringement notice.

For reference, in the 2014-2015 year, 75% of consent holders in Taranaki monitored through tailored compliance monitoring programmes achieved a high level o f environmental performance and compliance with their consents, while another 22% demonstrated a good level of environmental performance and compliance with their consents.

1.1.6 Regional freshwater allocation

At 30 June 2015, there were a total of 78 resource consents to take and use freshwater for irrigation purposes. Fifty-eight consents were for pasture irrigation, 10 for horticultural activities and 10 for recreational purposes (Figure 1).

The breakdown of freshwater allocation in the region indicates that other uses[1] represent 73% of all consented water takes; pasture irrigation represents 20% of the total consented water abstractions. Other types of irrigation (golf courses and for horticultural purposes) add up to only 7% (Figure 2).

[1] Includes: Aquaculture, Building Construction/Drainage/Flood Control, Chemical Processing/Manufacturing, Dairy Farm, Dairy Processing/Manufacturing, Dry Stock Farm, Hydrocarbon Exploration/Servicing Facilities, Landfills, Local Authorities, Meat and By-Product Processing, Petrochemical Processing, Piggery Farms, Poultry Farms, Power Generation – HydroPower Generation & Thermal, Quarries, Recreation/Tourism/Cultural, Road/Bridge Construction or Maintenance, Sewage Treatment, Swimming Pools, Timber Treatment or Sawmills, Water Supply or Treatment.

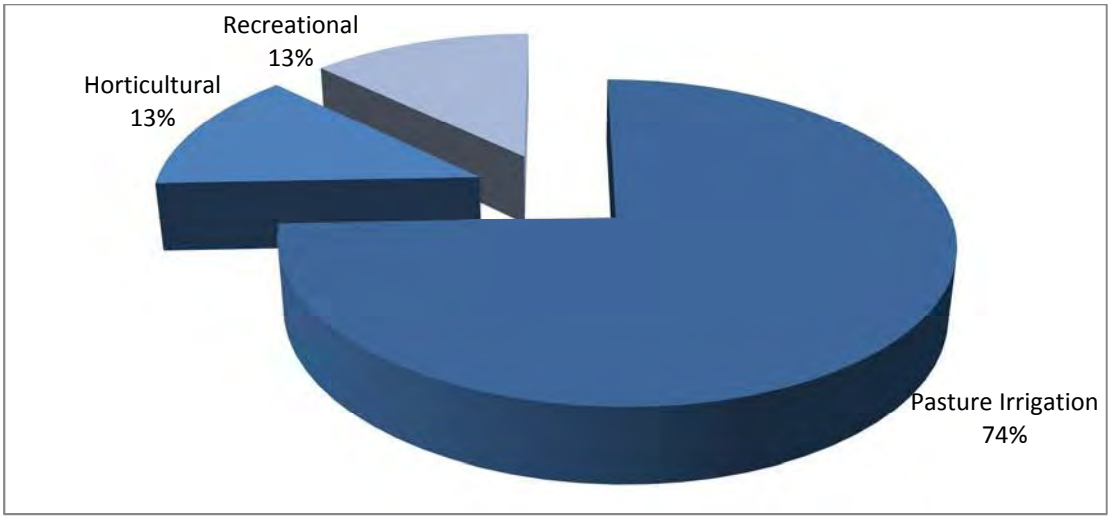

Figure 1 Percentage of water irrigation allocation per activity in the Taranaki Region

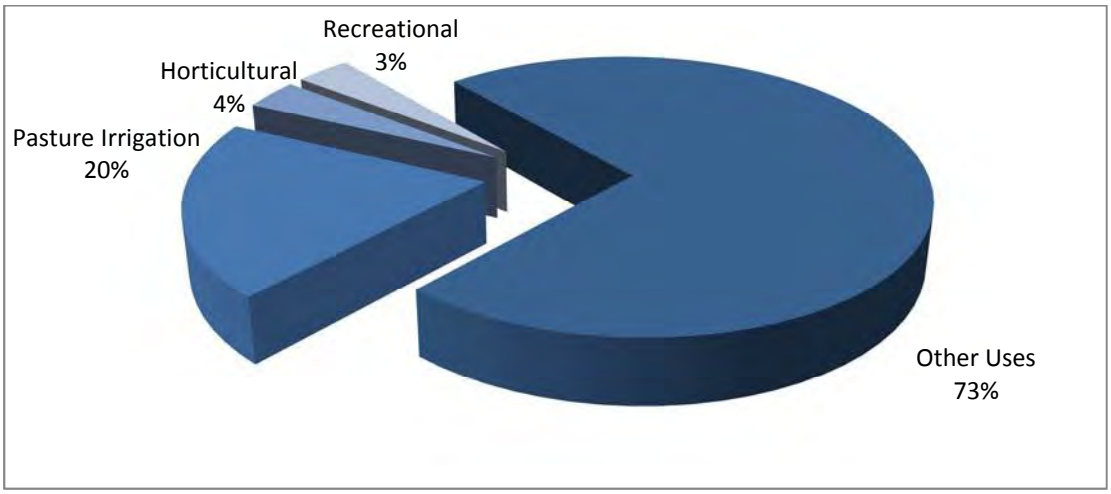

Figure 2 Total consented water abstractions – distributed by activity 2014-2015

Surface water is the predominant source for pasture irrigation, accounting for 50 of the 58 consented water abstractions (86%). The remaining 8 consents (14%) authorise abstractions from groundwater (Figure 3).

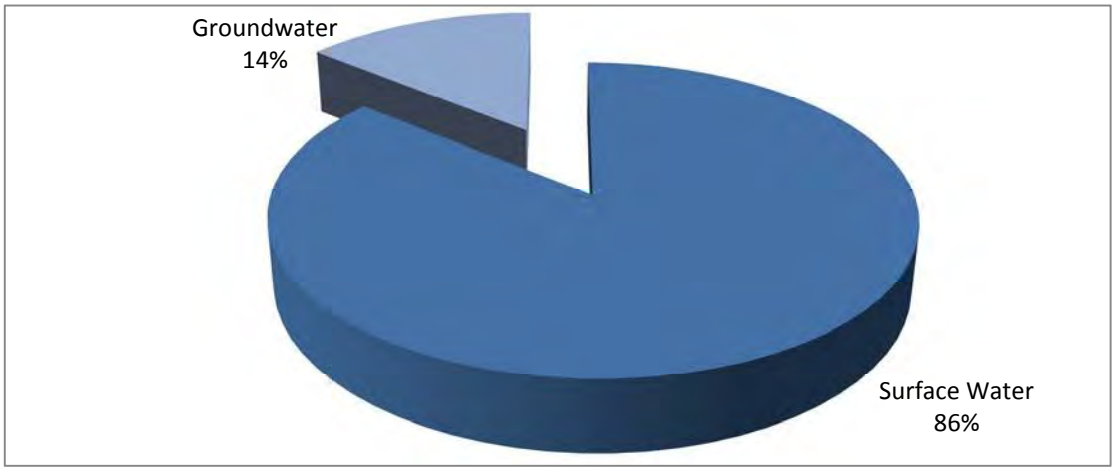

Figure 3 Source of water for irrigation in Taranaki during the 2014-2015 period

Typically, groundwater abstractions are used as supplementary irrigation water supply. The relatively low yields from Taranaki's aquifers are rarely sufficient to supply an entire irrigation system. In addition, the capital and running costs of groundwater supply bores often make them uneconomic for use as a primary source of water for irrigation supply.

Table 1 lists all the irrigation water consents issued by the Council to 30 June 2015 classified by source and usage.

Table 1 Total consents granted for irrigation water in Taranaki to 30 June 2015

Consent	Consent Holder	Source	Usage
0017-3	Manaia Golf Club	Surface Water	Recreational
0124-5	Kaitake Golf Club Inc	Surface Water	Recreational
0132-3	Hawera Golf Club Inc	Surface Water	Recreational
0164-2	JR & DM Baker	Surface Water	Pasture Irrigation
0184-3	Inglewood Golf Club Inc	Surface Water	Recreational
0189-4	AI & KJ Williams	Surface Water	Pasture Irrigation
0270-3	Westown Golf Club Inc	Surface Water	Recreational
0278-4	NRGE Farms Limited/Oceanview Trust	Surface Water	Pasture Irrigation
0464-3	Oakura Farms Limited	Surface Water	Horticultural
0647-3	IG Cassie	Surface Water	Horticultural
0714-2	GD & HM McCallum	Groundwater	Pasture Irrigation
0721-3	MD Aiken Family Trust	Groundwater	Horticultural
0880-3	IHC New Zealand Inc (NORTH TARANAKI)	Surface Water	Horticultural
1193-3	Vickers B & NM & Church G & CG	Surface Water	Horticultural
1223-3	EO & CP Lander	Surface Water	Horticultural
1721-3	Manukorihi Golf Club Inc	Surface Water	Recreational
1877-3	Te Ngutu Golf Club Incorporated	Surface Water	Recreational
1879-3	Wairau Nurseries	Surface Water	Horticultural
2138-3	Riverside Farms Taranaki Ltd	Surface Water	Pasture Irrigation
3171-3	Taranaki Greenhouses Limited	Groundwater	Horticultural
3312-3	GH Lance	Groundwater	Horticultural
3859-2	Living Light 2000 Limited	Groundwater	Horticultural
4450-2	Waitara Golf Club Inc	Surface Water	Recreational
4494-2	CT & JM McDonald	Surface Water	Pasture Irrigation
4783-2	Larsen Trusts Partnership	Surface Water	Pasture Irrigation
4993-2	J & EG Sanderson	Surface Water	Pasture Irrigation
4994-2	J & EG Sanderson	Surface Water	Pasture Irrigation
5128-2	Coastal Country Farms Limited	Surface Water	Pasture Irrigation
5568-1	Cornwall Park Farms Limited	Surface Water	Pasture Irrigation
5570-2	Kaihihi Trust	Surface Water	Pasture Irrigation
5571-1	Jimian Limited	Surface Water	Pasture Irrigation
5623-1	WD & SC Morrison	Surface Water	Pasture Irrigation

Consent	Consent Holder	Source	Usage
5636-1	Waiwira Trust	Surface Water	Pasture Irrigation
5696-1	Kokako Road Limited	Surface Water	Pasture Irrigation
5709-2	KCCG Sole Trust	Surface Water	Pasture Irrigation
5773-1	Goodin FJ & Sons Limited	Surface Water	Pasture Irrigation
5778-1	Mara Trust	Surface Water	Pasture Irrigation
5781-2	Waikaikai Farms Limited	Surface Water	Pasture Irrigation
5791-1	AL & LA Campbell	Surface Water	Pasture Irrigation
5797-1	Pihama Farms Limited	Surface Water	Pasture Irrigation
5807-1	Dickie Roger Family Trust	Surface Water	Pasture Irrigation
5827-2	Walker & McLean Partnership	Surface Water	Pasture Irrigation
5829-1	Julian RM & MC Family Trust	Surface Water	Pasture Irrigation
5840-2	Gibbs G Trust	Surface Water	Pasture Irrigation
5863-2	Geary AR Trust (A R Geary)	Surface Water	Pasture Irrigation
5876-1	GA & RJ Dorn	Surface Water	Pasture Irrigation
5878-1	Woollaston Family Trust Partnership	Surface Water	Pasture Irrigation
5879-1	BR & RG Harvey Family Trust	Groundwater	Pasture Irrigation
5887-1	A & EN Barkla	Surface Water	Pasture Irrigation
5896-1	Kohi Investments Limited	Surface Water	Pasture Irrigation
5898-2	David Pease Family Trust	Surface Water	Pasture Irrigation
5950-1	WD & SC Morrison	Groundwater	Pasture Irrigation
5973-2	Crosbig Trusts Partnership	Surface Water	Pasture Irrigation
6026-1	JR & DM Baker	Groundwater	Pasture Irrigation
6159-1	Pinehill Land Company Limited	Surface Water	Pasture Irrigation
6193-1	RA & SM Geary Trusts Partnership	Groundwater	Pasture Irrigation
6292-1	New Plymouth Golf Club Inc	Surface Water	Recreational
6429-1	Leatherleaf Limited	Surface Water	Pasture Irrigation
6430-1	Fonic Farms	Surface Water	Pasture Irrigation
6486-1	GM & PJ Rutten Family Trust Partnership	Groundwater	Pasture Irrigation
6628-1	Hamblyn Family Trusts	Surface Water	Pasture Irrigation
7270-1	Ian Mantey Family Trust & Sally Mantey Family Trust	Surface Water	Pasture Irrigation
7346-1	Spenceview Farms	Surface Water	Pasture Irrigation
7372-1	Pukeone Partnership	Surface Water	Pasture Irrigation
7527-1	Pukeone Partnership	Surface Water	Pasture Irrigation
7528-1	Kereone Farms Limited	Surface Water	Pasture Irrigation
7626-1	NW & DM King	Surface Water	Pasture Irrigation
7733-2	Hawken Family Trust	Surface Water	Pasture Irrigation
7768-1	Carter AJ Limited	Surface Water	Pasture Irrigation
7781-1	D Krumm	Surface Water	Pasture Irrigation
7866-1	Stratford Golf Club Inc	Groundwater	Recreational

Consent	Consent Holder	Source	Usage
7895-1	Ohawe Farm	Surface Water	Pasture Irrigation
7981-1	Taranaki Community Rugby Trust	Surface Water	Pasture Irrigation
9561-1	Kereone Farms Limited	Groundwater	Pasture Irrigation
9577-1	SB & J May Family Trust	Surface Water	Pasture Irrigation
9597-1	T & V Gibson Limited	Surface Water	Pasture Irrigation
9608-1	D Wilson	Groundwater	Pasture Irrigation
9936-1	GSJ Trust	Surface Water	Pasture Irrigation

1.1.7 Irrigation zones

A regional study commissioned for the Council in 2002 (Rout, 2003) identified eight irrigation zones based mainly on climate. The zones were characterised by different parameters in terms of system management and financial return. Each zone, and the location of all current irrigation consents are illustrated in Figure 4.

The modelling exercise identified zones with the most potential for pasture irrigation requirements were Normanby (*Zone 2*), Inaha (*Zone 3*), Hawera (*Zone 4*) and Opunake (*Zone 5*). The water demand modelled for Taranaki's eight irrigation zones are given in Table 2 below.

Table 2 Irrigation zones – modelled water demand (after Rout, 2003)

Zone Nº	Take rate (L/s / Ha)	Daily volume (m^3/Ha)	Annual volume (m^3/Ha)	Application depth (mm)
1	0.40	31	2,200	44
2	0.51	40	4,840	44
3	0.58	46	6,400	32
4	0.67	53	5,120	32
5	0.63	50	4,200	30
6	0.63	50	3,600	30
7	0.53	42	4,000	50
8	0.46	37	3,960	44

As illustrated in Figure 4, most of the pasture irrigation in Taranaki takes place within a 10 km wide belt of coastal land stretching from Oakura to Waitotara, with the rest of the sites located between Inglewood and Eltham.

The geographical patterns for the development of irrigation in the coastal region are influenced by a combination of meteorological, topographical and soil conditions. Coastal areas generally have lower rainfall rates, a higher density of small streams, more exposure to drying winds and have lighter and more freely-draining soils than in other parts of the province.

Irrigation in Taranaki dairy farms usually occurs over a 3 to 6 month period depending on location and climatic conditions. Irrigation typically commences in mid October-November and ends in late March-early April, with water use peaking in January and February.

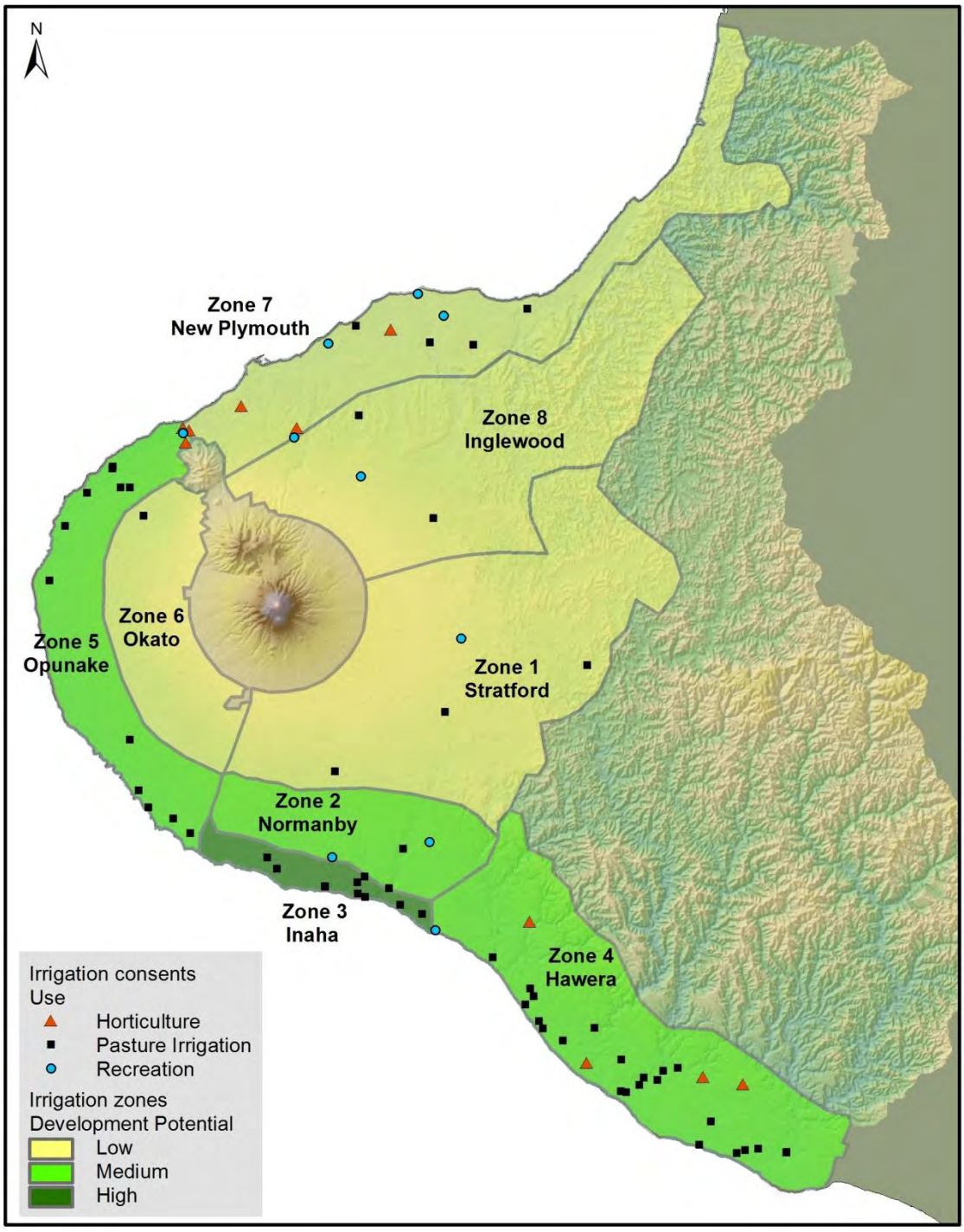

Figure 4 Pasture irrigation zones and locations of consented irrigation takes in Taranaki

1.1.8 Irrigation systems

In general there are two types of irrigation methods; surface and pressurised. The majority of irrigation systems currently in operation in the province fall in to the pressurised category. Pressurised systems can be further differentiated based on the method of operation and equipment used. A summary of the systems encountered in the region and some of their advantages and disadvantages are summarised below:

K-line and long-lateral types – Impact sprinklers mounted on moveable laterals (Photograph 1).

Advantages:

- low capital cost;
- are simple in construction and are relatively easy to operate;
- easily adapted to existing farm layouts and topography;
- allows low application rates;
- low operating pressures;
- K-lines particularly suited to windy conditions due to sprinkler cowling; and
- consists of flexible hoses line designed to ease irrigation applications.

Disadvantages:

- high maintenance; and
- high labour input to shift *(drag and drop).*

Photo 1 Mosaic of pictures depicting long-lateral and k-line type irrigation

Centre pivot type – spray nozzles mounted on a movable lateral (Photograph 2)

Advantages:

- large circulating area;
- allows versatility in application rates and return periods;
- low operating pressures;
- low maintenance;
- low labour input;
- frequently desirable on steep, rocky, or uneven soils;
- most are provided with automatic controls and metering equipment; and
- widely used both in New Zealand and worldwide.

Disadvantages:

- high capital cost; and
- not ideal where energy supply may be unreliable or expensive.

Photo 2 Mosaic of pictures depicting centre pivot

Travelling irrigators-spray nozzles mounted on fixed or rotating boom ***(rotary boom, fixed boom, gun irrigator, effluent irrigator)*** **(Photograph 3)**

Advantages:

- low capital cost;
- may cover a large irrigation area;
- simple operation; and
- allows some control with application rates.

Disadvantages:

- poor performance in windy conditions;
- uneven application, particularly at end of runs;
- not suited to irregular farm layout *(boom irrigators only)*; and
- high operating pressures *(hard hose gun irrigators only).*

Photo 3 Mosaic of pictures depicting travelling irrigator systems

The predominant system used in Taranaki is the impact sprinklers which account for 74%, while 10% of irrigation systems operate with centre pivots. Only 3% use travelling irrigators.

1.1.9 Environmental effects of exercising water permits

Environmental effects of water abstraction can include a loss of aquatic habitat and biodiversity, and impacts on cultural, recreational and aesthetic values of waterbodies. In an effort to reduce such impacts, the Council encourages the efficient use of water through technical irrigation system design, and maintenance and management practices that help with the achievement of high irrigation efficiencies.

Surface water abstractions
Expected periods of peak irrigation water demand normally coincide with periods of low flows in rivers and streams. During these periods, the Council closely monitors river flows and the exercise of water permits.

The majority of surface water permits for irrigation require the abstraction to cease when the flow in the abstracted waterway reaches, or falls below, a specified level (minimum flow). Policy 6.1.5 of the RFWP states that at least two-thirds of habitat within a rivers or streams at is to be retained at mean annual low flow (MALF) levels. This figure has been derived for protection of habitat requirements for brown trout, and is considered conservative for native species.

For many smaller waterways, two-thirds habitat roughly equates to two-thirds MALF, however, the cut-off flow level on many irrigation abstraction consents is in practice generally set at MALF. It is the responsibility of the consent holder to ensure compliance with consent conditions at all times.

In certain coastal streams, and under certain flow conditions, tidal movements can result in the migration of saline water upstream from the coastal margin. The abstraction and application of saline or brackish water to land can have adverse effects on pumping and irrigation equipment, crops and soils.

Groundwater abstractions
The abstraction of groundwater for use in irrigation supply has the potential to lower groundwater levels in the vicinity of the pumping bore. The potential effects of any groundwater abstraction are thoroughly assessed by the Council during the processing of a resource consent application for a groundwater take.

Groundwater levels in coastal bores should be maintained above mean sea level to avoid the risk of sea water intrusion into freshwater aquifers. Water with elevated salinity is generally unsuitable for irrigation. Elevated levels of sodium, chloride, sulphate, and hardness resulting from sea water contamination can affect the taste and corrosiveness of water and can cause scale (Cameron & White, 2004). Irrigation with saline water reduces the ability of the plant's roots to take up water. In between irrigation cycles, as the soil moisture decreases, the salts in the soil concentrate to several times the initial value in irrigation water.

Fortunately in Taranaki, the risk of saltwater intrusion is minor due to the limited number of high yielding coastal bores. In any case, the Council does monitors water quality at five coastal sites as part of the irrigation consent compliance monitoring programmes to assess any changes in groundwater composition as a result of abstraction.

Nutrient loading
Irrigated pasture typically supports higher stock numbers compared with non-irrigated pasture and consequently a higher nutrient (nitrate) loading per hectare. This is particularly the case in areas where the underlying soils are sandy and free-draining. Irrigation schemes in Zones 2, 3 and 4 occur in areas where groundwater is known to be at risk of nitrate contamination (TRC 1998, 2005). In these zones, careful management of irrigation water and fertiliser application regimes is required to minimise the risk of groundwater and surface water contamination with nitrates.

The implementation of riparian management plans, fencing and planting of riparian margins can further reduce the potential for any nutrient rich runoff from irrigated pasture entering surface water systems.

1.1.10 Stream flow measurements

Compliance with consent conditions set to safeguard the intrinsic values of Taranaki's streams is based on recognising that the taking of water is only allowed when there is water available above the minimum flow set out in the consent. If flows drop below this level, then irrigation is to cease until there is adequate water to allow for irrigation to recommence. To determine compliance the Council undertakes stream flow measurements by indirect and direct methods at control points usually upstream and/or downstream of abstraction points. These methods involve the measurements of velocity and cross-sectional areas which are used together to determine the flow rate.

1.2 Irrigation water permits to June 2015

There were a total of 78 consents for the abstraction of freshwater for use in irrigation active across Taranaki as of 30 June 2015.

During the period under review, one new consent was granted, two existing consents were renewed, five had variations made to consent conditions and one consent was surrendered (Table 3).

Table 3 New, renewed, varied and surrendered consents during 2014-2015

Status	Consent	Consent Holder	Catchment	Stream/River
New	7981-1	Taranaki Rugby Community Trust	Inaha	Inaha
Renewed	0124-5	Kaitake Golf Club Inc	Waimoku	Unnamed trib
	2138-3	Riverside Taranaki Farms Ltd	Waingongoro	Waingongoro
Varied	5973-2	Crosbig Trusts Partnership	Otahi 2	Otahi 2
	6628-1	Hamblyn Family Trusts	Waitara	Waitara
	7346-1	Spenceview Farms	Kaikura	Kaikura
	7527-1	Pukeone Partnership	Waitotara	Waitotara
	75281	Kereone Farms Limited	Waitotara	Waitotara
Surrendered	1253-3	KA & RD Southall	Waitara	Ngatoro

1.3 Climatological data and irrigation requirements

The Council provides live on-site data on soil moisture, precipitation and temperature via its website. Eight sites along the southern coastline provide climatological information about the most intensively developed irrigation zones.

Rainfall has a direct impact not only on river and stream flows but on the amount of water for recharge reaching the province's aquifers, which also contribute baseflow to surface water systems. Rainfall recharge is critical to maintain groundwater levels and thus the potential to supply water in the zones where there is more pressure on surface water resources.

During the period of 1 November 2014 to 31 March 2015, rainfall percentages for the region ranged between 62% and 106% of 'normal' rainfall volumes (Figure 5). The irrigation season began as early as October for farmers between Waitotara and Patea, as there was as little as 44% of normal rainfall recorded in October, which is historically known as the wettest month of the year. November and December recorded near normal rainfall conditions, which meant that coastal and northern irrigators didn't begin irrigation until December or early January. The demand for irrigation was at its highest in January, as rainfall was between only 2% and 28% of normal. This also caused rivers to drop below MALF, which is not usually expected til late February or early March. There was a slight reprieve in early February with some welcome rain dousing the region. However, this did not last long and by mid February things were starting to dry up again and the demand for irrigation went up. In early March rain arrived and helped ease the pressure on the water use and by mid March irrigation was wrapping up for the season for many irrigators.

Accurate interpretation of climatological data is paramount for the planning, scheduling and operation of efficient irrigation systems. Precipitation and evapotranspiration data are fundamental to carrying out reliable water budget calculations and calculations of crop (pasture) water requirements. Crop water requirements can be defined as the depth of water needed to offset the loss of water through evapotranspiration. In other words, for any period of time, the net irrigation requirement is the amount of water which is not effectively provided by rainfall.

The calculated amounts of irrigation water to be efficiently applied to pasture, should also account for the water that is lost while transporting it from its source to the pasture root zone. Some of the losses that need to be estimated are those which occur due to leakage from pipelines, and evaporation from droplets sprayed through the air. To compensate for these losses, additional water must be pumped than that required to be stored in the pasture root zone. The gross irrigation requirement then, is the total amount that must be pumped which takes into consideration the irrigation efficiency.

The third variable that should be accounted for when planning and operating irrigation systems is the soil moisture. Some of the water that is required by the pasture may already be held in the soil, so it is critical to quantify it. There is no extra value in applying more water than the soil can hold, this only results in unnecessary costs and wastage. The only reliable way of knowing how much irrigated water can be stored in the soil at the time of irrigation is by measuring the soil moisture.

By measuring the soil moisture the irrigator can be more certain that:

- only the amount of water required by the plant is applied;
- leaching of nutrients is minimised;
- pasture growth and quality is maximised;
- the environmental impacts are minimised; and
- costs are reduced.

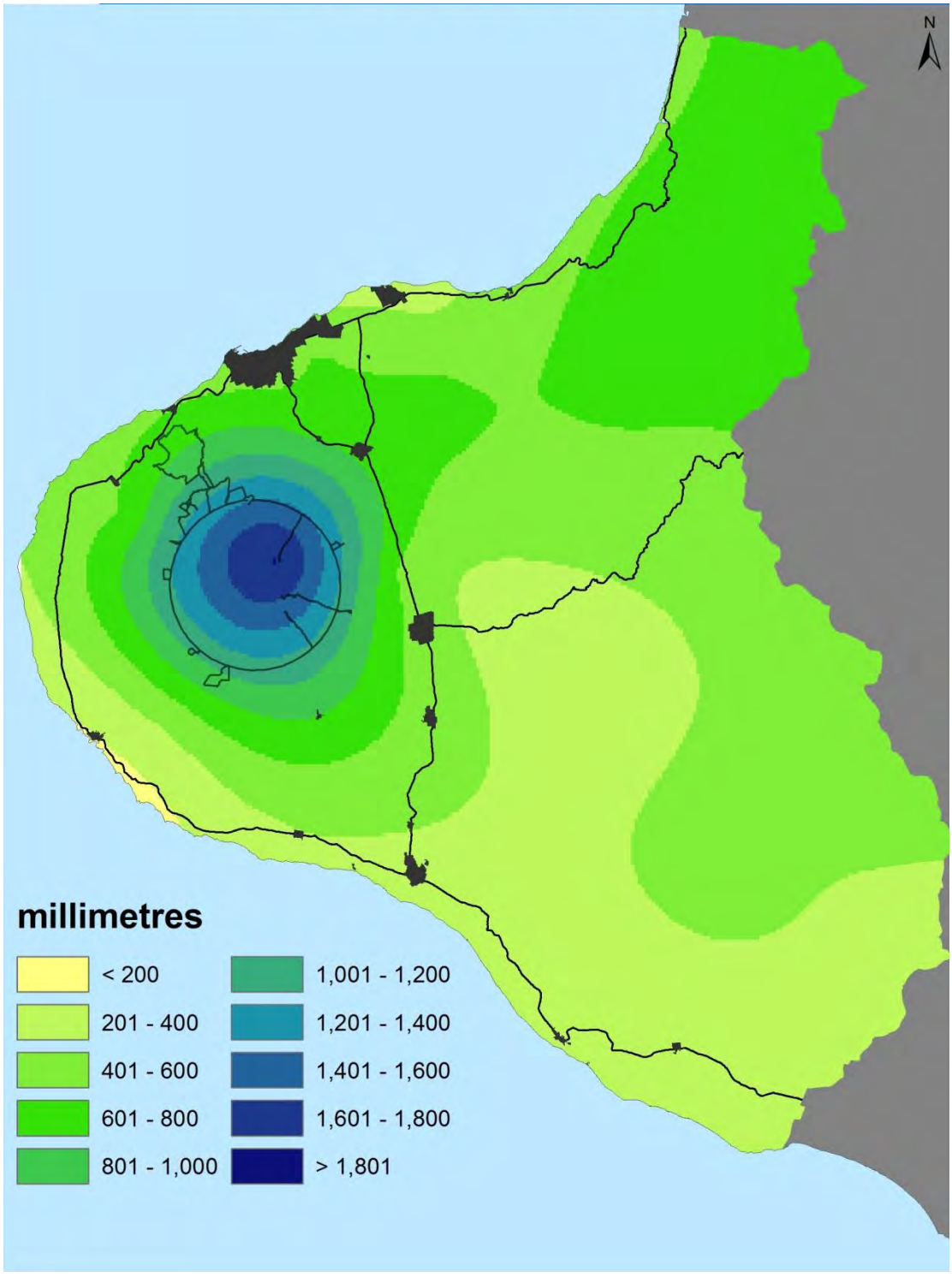

Figure 5 Distribution map of the total rainfall recorded from 1 November 2014 to 31 March 2015

1.3.1 Droughts in Taranaki

Droughts are a normal, recurrent feature of climate. This phenomenon occurs almost everywhere though it features vary from region to region. Defining drought is difficult as it depends on need, physical differences in regions, and varying disciplinary perspectives. In the most general sense, drought originates from a deficiency of precipitation over an extended period of time, resulting in damage to crops and resultant loss of yields.
Climate change scenarios suggest that Taranaki may experience more sever weather extremes in the form of dry spells as well as heavy rainfall events. The most severe droughts in Taranaki have been in 1969-1970, 1977-1978 and 2007-2008. Changes in drought risk for the Taranaki region indicate a slight increase in the southern coast of the region. Developing climatology assessments of drought for a region provides a greater understanding of its characteristics and the probability of recurrence at various levels of severity. Information of this type is extremely beneficial in the development of response and mitigation strategies and preparedness plans.

1.4 Monitoring programme

1.4.1 Introduction

Section 35 of the RMA sets out obligations upon the Council to gather information, monitor, and conduct research on the exercise of resource consents, and the effects arising, within the Taranaki region and report upon these.

The Council may therefore make and record measurements of physical and chemical parameters, take samples for analysis, carry out surveys and inspections, conduct investigations, and seek information from consent holders.

Every year the Council undertakes monitoring programmes for all pasture irrigation water permits. The programmes list all of the work that the Council could undertake during the forthcoming monitoring period and the cost of the activities to the consent holder. Because irrigation is climate dependent, the level of monitoring varies from year to year, as do associated costs. Increased monitoring is generally required during drier years. Automated monitoring systems can reduce ongoing monitoring costs for consent holders, but do require higher capital outlay.

The 2014-2015 monitoring programme for irrigation water permits comprised three primary components; liaison with consent holders, site inspections and data gathering and the review and assessment of data for compliance.

1.4.2 Programme liaison and management

There is generally a significant investment of time and resources by the Council in:

- ongoing liaison with resource consent holders over consent conditions and their interpretation and application;
- in discussion over monitoring requirements;
- preparation for any reviews;
- renewals;
- new consents;

- advice on the Council's environmental management strategies and content of regional plans and;
- consultation on associated matters.

1.4.3 Site inspections

During the period under review, the Council endeavoured to inspect all the water take compliance monitoring programmes in place. Additionally, the "not-otherwise monitored" activities comprising of golf clubs, horticultural irrigation schemes and stock and dairy shed takes were also inspected.

The 2014-2015 pasture irrigation monitoring programmes provided for an annual inspection of each pasture irrigation abstraction site to assess/evaluate compliance with consent conditions. Council staff were able to visit 100% of the active consents during the 2014-2015 monitoring period.

Site inspections are focused on assessing the overall set-up of the intake structures, a visual inspection and assessment of screenings, fences, staff gauges, flowmeters, datalogger devices and planting of riparian vegetation are carried out in line with consent conditions.

Monitoring programmes for surface water abstraction include checking compliance with the residual flow conditions of the consent. Residual flow conditions set minimum environmental flows to be maintained during pumping in the waterways downstream from the abstraction point. Compliance with the residual flow conditions is assessed through hydrological flow gaugings which are carried out during low flow conditions in summer. The results of residual flow monitoring are summarised in Section 2.4 and Table 6.

Observance of allocated maximum daily volume and flow rates are assessed by direct measurement where dataloggers were fitted to the intake of the irrigation system, recording all the abstraction data, or indirectly through calculations based on abstraction data submitted by the consent holder.

For sites where no datalogger is fitted, assessments of water takes for the 2014-2015 year were carried out by a combination of data obtained from the consent holder's records and information derived from previous calibration checks of the pump discharge rates.

1.4.4 Measuring and reporting of water takes

A special condition of all irrigation water abstraction permits requires the consent holder to keep a record of abstraction. The information is important to the Council to help manage the resource more sustainably and assess compliance. Likewise, the information is useful to users for the management of inputs to their operations, identifying energy savings, identifying leakages in their systems and making water efficiency gains[2].

[2] Water Programme of Action Ministry for the Environment

The rates and volumes of water abstraction are measured using water meters. If a water meter is not installed following manufacturer's instructions and specifications, the data is not reliable as large errors may occur. The error produced by a valve installed immediately upstream of the flowmeter can be as much as 50% and errors produced by sharp bends upstream of the water meter can amount to up to 20% of the measured flow. Photograph 4 shows an example of a good installation of a flowmeter, while Photograph 5 shows an example of a poor installation of a flowmeter.

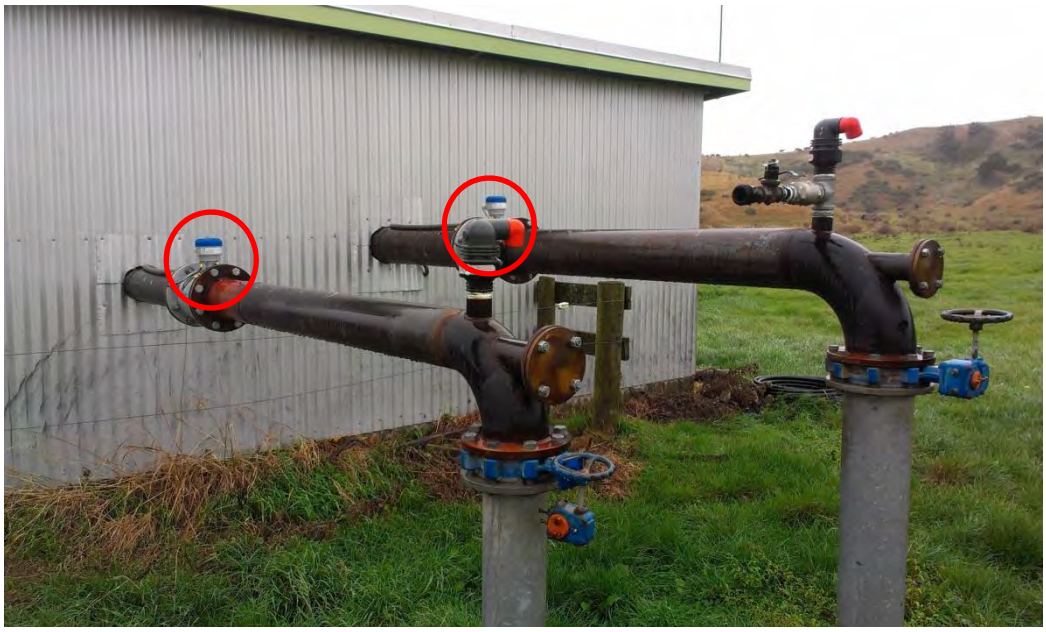

Photo 4 Good installation of a flowmeter

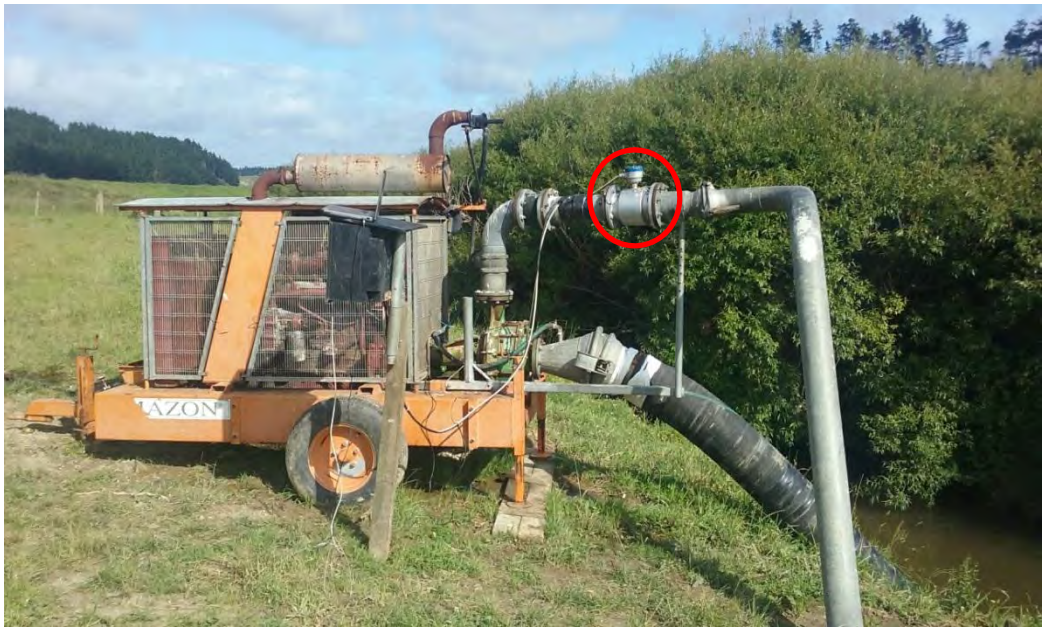

Photo 5 Poor installation of a flowmeter

The Resource Management (Measurement and Reporting of Water Takes) Regulations 2010 place further legislative requirements on holders of consents for water abstractions greater than 5 L/s, unless the taking of the water is for non-consumptive purposes. These regulations will apply directly to existing consents without review of

individual consents. The regulations will help improve the management of fresh water in Taranaki by ensuring accurate measurement of water takes. The regulations require:

- All water permits allowing the take of 5 L/s or more to collect and report records to a set minimum requirement[3];
- Measurement at the point where water is taken from a river, lake or groundwater system (unless otherwise approved by the Council to be in another location);
- Continuous records of daily volumes to be collected using an appropriate flowmeter with the data transferred to the Council on at least an annual basis;
- The flowmeter to meet an accuracy standard, and should be properly installed and calibrated independently every five years; and
- The consent holder to be responsible for recording and transferring the data to the Council.

All abstractions are to be compliant with the Regulations by 10 November 2016. The Council will be actively monitoring and enforcing the implementation of the Regulations during forthcoming monitoring periods.

The Council may also apply more stringent requirement on consent holders, such as the ability to require measurement of water takes below 5 L/s or further requirements for measurement over the minimum standards specified by the regulations.

The Council reminds consent holders in late May/early June that their abstraction records are to be provided for the year ending 30 June by no later than 31 July of that year. The daily irrigation record should include:

- date/time when the pump was operated;
- water meter reading at start and end of day; and
- number of hours the pump was operated.

These records can be kept manually or electronically using an approved datalogger.

Consent holders who had fitted an approved datalogger on their intake system in time to record water usage during 2014-2015 irrigation season, were not required to submit annual hard copy records to the Council. Data logged on the dataloggers were downloaded in the field by Council staff, or were automatically transmitted through the radio or cellphone network to the Council.

By the end of 2014-2015 irrigation season, 56 dataloggers had been installed to electronically record abstraction data in relation to water takes for irrigation purposes, three of which were shared by multiple consent holders as their takes are within the same areas. This is an increase of four from the 2013-2014 season.

Over the course of the 2014-2015 monitoring year, all of the dataloggers were checked and downloaded.

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[3] Refer to the document Resource Management (Measuring and Reporting of Water Takes) Regulations 2010. REF 2010/267.

All abstraction data gathered as part of the monitoring programme is reviewed and then stored in the Council's hydrometric database. All records are available to the public on request.

2. Results

During the 2014-2015 monitoring period, 44 of the 58 current consents to take and use water for pasture irrigation were exercised. Fourteen consents were not exercised, with five of those not yet operational.

The results of the monitoring carried out by the Council over the course of the 2014-2015 monitoring period are outlined below in sections 2.1 to 2.7 and are summarised in Tables 4 to 8.

2.1 Site inspections

During 2014-2015 irrigation season, the Council carried out compliance monitoring inspections at 71 sites, compared to 73 inspections carried out for the 2013-2014 irrigation season.

The assessment of efficient use of water has proven to be a difficult task to carry out as most of the irrigation events take place at night when inspections are not conducted (unless there is an obvious waste of water). Assessments of losses for deep percolation, drifting or ponding need to be evaluated at the on-farm level and can easily be missed when only one inspection per year is carried out.

2.2 Non–exercised consents

Fifty-six of the 78 resource consents granted to date for water abstractions for irrigation purposes were exercised during the 2014-2015monitoring period. The remaining 22 consents were not exercised during 2014-2015 year (Table 4).

Table 4 Consents non-exercised during 2014-2015

Consent	Consent Holder
0184-3	Inglewood Golf Club Inc
0278-4	NRGE Farms Limited/Oceanview Trust
0464-3	Oakura Farms Limited
0647-3	IG Cassie
0721-3	MD Aiken Family Trust
1193-3	Vickers B & NM & Church G & CG
1879-3	Wairau Nurseries
3859-2	Living Light 2000 Limited
4783-2	Larsen Trusts Partnership
5571-1	Jimian Limited
5696-1	Kokako Road Limited
5973-2	Crosbig Trusts Partnership
6159-1	Pinehill Land Company Limited
6193-1	Cradles Farm Trust No 2
6486-1	GM & PJ Rutten Family Trust Partnership
7270-1	Ian Mantey Family Trust & Sally Mantey Family Trust

Consent	Consent Holder
7626-1	NW & DM King[4]
7733-2	Hawken Family Trust[4]
7768-1	Carter AJ Limited
7866-1	Stratford Golf Club Inc[4]
7981-1	Taranaki Community Rugby Trust[4]
9936-1	GSJ Trust[4]

2.3 Residual flow compliance

During the period under review, compliance with residual flow conditions for surface water abstraction sites was assessed 72 times in 22 waterways. Table 6 lists the consents assessed for residual flow compliance and the dates of the monitoring.

The periods when the stream gaugings activities take place coincide with the periods of low flows. Of the 72 gaugings, flow volumes were measured below residual flow requirements on 26 occasions. In these instances, irrigators taking water from the respective water bodies were required to stop taking until further notice. All irrigators ceased taking water following notification by the Council.

Photo 6 shows a stream gauging activity taking place downstream of one of the consented water takes.

Table 5 Stream gaugings carried out for residual flow compliance

Consent	River	Site	Flow (L/s)	Date
6429-1	Unnamed trib	Hauroto Rd	6	24/07/2014
6429-1	Hauroto	Hauroto Rd	7	24/07/2014
7346-1	Kaikura	Below 7346	239	27/08/2014
5896-1	Kokako	Above Reservoir	69	12/09/2014
5896-1	Kokako	Kokako Road	57[5]	12/09/2014
7372-1	Waiau 2	Above 7372	199	01/10/2014
5827-2 & 5840-2	Waiokura	Winks Rd	216	08/01/2015
4783-2	Wairoa	Kohi Beach Farm	185	12/01/2015
5807-2	Wairoa	D/s Dam	31[5]	12/01/2015
1190-3 & 5709-2	Kapoaiaia	Lighthouse	302	13/01/2015
5876-1	Punehu	SH45	385	14/01/2015
5570-2	Mangatete 2	Saunders Rd	172[5]	14/01/2015
4494-2 & 5636-1	Mangaroa	D/s of 5636	50	15/01/2015
5896-1	Kokako	Kokako Rd	57[5]	15/01/2015
6430-1	Tangahoe	Below Railway Bridge	976	15/01/2015

[4] Currently nothing set up to irrigate
[5] Measured flow was below residual flow cut-off.

Consent	River	Site	Flow (L/s)	Date
5696-1, 5623-1, 7527-1 & 7528-1	Whenuakura	Nicholson Rd	2261	16/01/2015
5973-2	Otahi 2	Ihaia Rd	105[6]	21/01/2015
5778-1	Kaihihi	SH45	257[5]	23/01/2015
5128-2 & 5773-1	Kaihihi	Coast	306[5]	23/01/2015
1190-3 & 5709-2	Kapoaiaia	Lighthouse	235	23/01/2015
5570-2	Mangatete 2	Saunders Rd	123[6]	23/01/2015
5898-2	Waihi 5	Denby Rd	57	26/01/2015
5887-1	Inaha	Lower Inaha Rd	223	26/01/2015
6628-1	Waitara	Bertrand Rd	7804	27/01/2015
7372-1	Waiau 2	Above 7372	131	27/01/2015
7346-1	Kaikura	Below 7346	54[5]	27/01/2015
5827-2 & 5840-2	Waiokura	Winks Rd	162	27/01/2015
5797-1	Oeo	5797	122[6]	27/01/2015
5791-1	Ouri	SH45	198[5]	27/01/2015
5829-1	Taungatara	SH45	528	27/01/2015
5878-2	Makuri	Toko Rd	123[6]	27/01/2015
2138-3	Waingongoro	SH45	1197[6]	28/01/2015
5807-2	Wairoa	D/s Dam	211	29/01/2015
4783-2 & 5807-2	Wairoa	U/s Dam	238	29/01/2015
4783-2	Wairoa	Kohi Beah Farm	178	29/01/2015
6430-1	Tangahoe	Below Railway Bridge	768[5]	29/01/2015
7346-1	Kaikura	Below 7346	84	30/01/2015
5898-2	Waihi 5	Denby Rd	42[5]	09/02/2015
5887-1	Inaha	Lower Inaha Rd	256	09/02/2015
5896-1	Kokako	Kokako Road	60	09/02/2015
5797-1	Oeo	5797	164	10/02/2015
5791-1	Ouri	SH45	217	10/02/2015
5829-1	Taungatara	SH45	873	10/02/2015
6430-1	Tangahoe	Below Railway Bridge	847[6]	12/02/2015
5128-2 & 5773-1	Kaihihi	Coast	682	12/02/2015
5778-1	Kaihihi	SH45	595	12/02/2015
5570-2	Mangatete 2	Saunders Rd	272	12/02/2015
6628-1	Waitara	Bertrand Rd	8231	12/02/2015
5898-2	Waihi 5	Denby Rd	31[6]	16/02/2015
5887-1	Inaha	Lower Inaha Rd	216	16/02/2015
5696-1, 5623-1, 7527-1 & 7528-1	Whenuakura	Nicholson Rd	1912	17/02/2015

[6] Measured flow was below residual flow cut-off but consent holder not irrigating.

Consent	River	Site	Flow (L/s)	Date
5778-1	Kaihihi	SH45	392	20/02/2015
5128-2 & 5773-1	Kaihihi	Coast	430	20/02/2015
5570-2	Mangatete 2	Saunders Rd	186	20/02/2015
5827-2 & 5840-2	Waiokura	Winks Rd	130	20/02/2015
5791-1	Ouri	SH45	178[6]	20/02/2015
5973-2	Otahi 2	Ihaia Rd	69[6]	20/02/2015
4494-2 & 5636-1	Mangaroa	D/s of 5636	37	23/02/2015
5898-2	Waihi 5	Denby Rd	37[6]	24/02/2015
7346-1	Kaikura	Below 7346	114	23/02/2015
5887-1	Inaha	Lower Inaha Rd	223	25/02/2015
2138-3	Waingongoro	SH45	1063[6]	25/02/2015
5570-2	Mangatete 2	Saunders Rd	132[6]	27/02/2015
5128-2 & 5773-1	Kaihihi	Coast	338	27/02/2015
5778-1	Kaihihi	SH45	322	27/02/2015
4783-2	Wairoa	Kohi Beach Farm	198	03/03/2015
5807-2	Wairoa	D/s Dam	77	03/03/2015
5878-2	Makuri	Toko Rd	110[6]	03/03/2015
2138-3	Waingongoro	SH45	904[6]	03/03/2015
5887-1	Inaha	Lower Inaha Rd	156[6]	03/03/2015
6430-1	Tangahoe	Below Railway Bridge	842[6]	11/03/2015
5896-1	Kokako	Kokako Road	81	13/03/2015

Photo 6 Stream gauging by Council staff

2.4 Compliance with abstraction rate and volumetric limits

Compliance with abstraction rate and volume is assessed for all consent holders that exercised their consent. Compliance with abstraction rate limits was determined either by direct measurement or by calculating from records submitted by the consent holder.

Of the consents for which data was received, 84% were within compliance for flow-rate allocation. Non-compliance with consent conditions for abstraction rate and volume is discussed further in Section 3.

During the monitored period three consent holders did not submit records to the Council on time; details on these consents are reported under Section 2.6.

Table 7 displays the information for consents that were found to be in breach of the allocated flow-rate or volumetric amount at any time during the exercising of the consent during the 2014-2015 review period. These consent holders were advised of their breaches and that they needed to ensure this did not occur in the following season, otherwise enforcement action would follow. It is considered that a consent breaches abstraction limits when the exceedance is greater than 5% of the consented limit.

Table 6 Consents breached for exceeding allocation limits during 2014-2015

Consent	Consent Holder	Source	Breach
0017-3	Manaia Golf Club	Surface Water	Rate
4450-2	Waitara Golf Club Inc	Surface Water	Volume
5128-2	Coastal Country Farms Limited	Surface Water	Rate and volume
5570-2	Kaihihi Trust	Surface Water	Rate and volume
5709-2	KCCG Sole Trust	Surface Water	Rate
5773-1	Goodin FJ & Sons Limited	Surface Water	Rate and volume
5778-1	Mara Trust	Surface Water	Rate and volume
7346-1	Spenceview Farms	Surface Water	Rate
9561-1	Kereone Farms Limited	Groundwater	Rate

2.5 Record keeping compliance

Abstraction records were received on time from 53 of the 56 consent holders who exercised their permits during the 2014-2015 period (Table 8). Written notifications and telephone calls received advising the non-exercising of consents were also taken as provision of records. Consent holders who have dataloggers fitted to their intake systems are exempted from providing data to the Council as the data is downloaded by Council's staff as part of the annual inspection.

Table 7 Consents for which data was not received by the Council as at 31 July 2015 for the 2014-2015 irrigation season

Consent	Consent Holder	Received?
5568-1	Cornwall Park Farms Limited	Yes – 16/06/2015
5829-1	Julian RM & MC Family Trust	Yes – 18/09/2015
5896-1	Kohi Investments	No

Eleven dataloggers and/or flowmeters were found to have malfunctioned during the 2014-2015 season (Table 9), meaning records were not available for those takes. As these malfunctions were outside the control of the consent holder, no enforcement action was taken, but the dataloggers and/or flowmeters had to be repaired prior to commencement of irrigation for the next season. Further information regarding follow-up investigations and enforcement proceedings by the Council in relation to the non-supply of abstraction records is included in section 2.8.

Table 8 Consents which had malfunctioning dataloggers in the 2014-2015 irrigation season

Consent	Consent Holder	Malfunction
0164-2	JR & DM Baker	Datalogger
0270-2	Westown Golf Club Inc	Datalogger
3312-3	GH Lance	Datalogger
4993-2	J & EG Sanderson	Flowmeter
4994-2	J & EG Sanderson	Flowmeter
5778-1	Mara Trust	Flowmeter
5797-1	Pihama Farms Limited	Flowmeter
5878-2	Woollaston Family Trust Partnership	Datalogger
5896-1	Kohi Investments	Flowmeter
6026-1	JR & DM Baker	Datalogger
6292-1	New Plymouth Golf Club Inc	Datalogger

2.6 Groundwater quality results

During the period under review, groundwater samples were obtained from a total of five coastal sites to assess salinity levels in aquifers being pumped. The results indicate groundwater salinities in the range expected in coastal areas. Further sampling of these bores during forthcoming monitoring periods will allow changes in groundwater salinity levels to be detected.

The results of the sampling carried out are presented below in Table 5.

Table 9 Groundwater quality results

Consent	Site code	Chloride (g/m^3)	Conductivity (mS/m)	pH	Sodium (g/m^3)
0714-2	GND1149	27.1	27.8	7.5	29.6
	GND1150	27.8	35.6	7.4	29.7
5950-1	GND1203	35.6	30.6	9.0	60.0
6026-1	GND1233	25.4	38.2	8.3	37.1
9561-1	GND2108	46.8	45.7	8.1	25.1

Consent	Site code	Chloride (g/m^3)	Conductivity (mS/m)	pH	Sodium (g/m^3)
	GND2109	35.7	37.1	8.2	25.2
9608-1	GND2354	91.8	83.2	7.7	180
	GND2355	118	92.2	8.7	194

2.7 Irrigation water usage 2014-2015

Water use for irrigation is based on consent holder abstraction records. The following general comments can be made from the processed irrigation data:

- Of the non-exercised consents during 2014-2015, 23% of the irrigation systems were not yet operational. Seventeen consents were not exercised even though the irrigation systems were in place.
- There were nine breaches for exceeding limits on allocated rates and volumes compared to 2013-2014 where there were 11 breaches.
- Records were received from 95% of the consent holders that exercised their consent in the 2014-2015 season.
- All but two golf club's exercised their water rights during the 2014-2015 season.
- One new consent for pasture irrigation was granted during the period under review.

2.8 Investigations, interventions, and incidents

The monitoring programme for the year was based on what was considered to be an appropriate level of monitoring, review of data, and liaison with the consent holder. During the year matters may arise which require additional activity by the Council, for example provision of advice and information, or investigation of potential or actual courses of non-compliance or failure to maintain good practices. A pro-active approach that in the first instance avoids issues occurring is favoured.

The Council operates and maintains a register of all complaints or reported and discovered excursions from acceptable limits and practices, including non-compliance with consents, which may damage the environment. The Incident Register (IR) includes events where the Company concerned has itself notified the Council. The register contains details of any investigation and corrective action taken.

Complaints may be alleged to be associated with a particular site. If there is potentially an issue of legal liability, the Council must be able to prove by investigation that the identified company is indeed the source of the incident (or that the allegation cannot be proven).

In the 2014-2015 period, there were four incidents recorded by the Council that were associated with consent holder activities. All of these related to breaching one or more of their consent conditions. These incidents were reported to Council and staff implemented appropriate responses as they were identified. The incidents are listed in Table 10.

Table 10 Consent found to be in breach and the incidents registered

Consent	Consent Holder	Reason incident lodged	Outcome
0017-3	Manaia Golf Club	Breached rate on multiple occasions	Consent holder was still under an infringement notice from 2013-2014, which was extended for this event. Council staff worked with the Golf Club to find the best course of action and it resulted in the Golf Course getting a change in consent conditions to take more water.
5568-1	Cornwall Park Farms Limited	No data received for the 2014-2015 irrigation season. Also flowmeter is not verified.	14 Day letter issued. Council accepted circumstances. Flowmeter to be verified before irrigation can commence.
5709-2	KCCG Sole	Continual rate breaches	Consent holder was under an abatement notice from 2013-2014. This notice was extended. Consent holder is getting a new Flow Meter installed and is to be verified before consent can be exercised.
9597-1	T & V Gibson	Consent holder was irrigating without a datalogger, which is what the consent required.	14 Day letter issued. Consent holder arranged for Council staff to install a datalogger.

3. Discussion

In drafting and reviewing conditions on water take permits and in implementing monitoring programmes, the Council assesses the "effects on the environment" as much as it is appropriate for each water take source. Monitoring programmes are therefore not only based on existing permit conditions, but also on the obligations of the RMA to assess the effects on the environment from the exercising of consents.

Improving the efficiency of water use is a key outcome by the Water Programme of Action. Water is a public resource and the permission to take is granted through a resource consent. Associated with that permission is a public expectation that can be better met if the actual amounts of water taken are accurately monitored. Measuring actual water used is part of demonstrating and measuring progress towards more efficient water use.

3.1 Discussion of site performance

Each year the Council assesses consent holder performances based on compliance with allocated abstraction rates and maximum daily volumes, protection of minimum residual flows, and the provision of abstraction records.

The examination of the data supplied to the Council, revealed that nine of 56 consent holder's (16%) who exercised their consents during the 2014-2015 year breached their limits for rate and/or volume of water abstracted.

Most resource consents for water takes issued by the Council have specific conditions about the installation of a water meter device. A reliable and accurate flowmeter is crucial to providing good information to the consent holder and the Council alike.

There have been several cases whereby the Council has identified poorly installed and operated water meters.

To comply with Council requirements, the water meter should:

- Have an accuracy of +/- 5% under field conditions, with calibration certified;
- Be simple to operate and read;
- Be tamper-proof and sealed;
- Be capable of continuous measurements in cubic meters;
- Include a pulse output that is compatible with the dataloggers recommended by the Council;
- Have sufficient pipe length for Council to use a strap-on meter for periodic checks. Pipe length should be at least 10 times the diameter before the meter and five times the diameter after the meter or manufacturer's specifications (Figure 7);
- A detailed plan of the installed meter and distances to any potential turbulence sources (e.g. elbows, bends, valves, etc) shall be submitted to the Council within 30 working days of the installation to certify that the flowmeter has been installed to the manufacturer's specifications;

It is important that the contractors hired for the installation of the flowmeter do so in accordance with the manufacturer's specifications. Good installations leave sufficient

straight length of pipe between gate valves, elbows, etc. and the flowmeter to ensure there is no turbulence in the water passing through the meter, which reduces accuracy.

3.2 Evaluation of performance

A tabular summary of the all the consent holder's compliance record for the year under review is set out in Table 11.

Table 11 Individual performance for all irrigation consent holders

Consent	Consent Holder	Compliance achieved?
0017-3	Manaia Golf Club	Improvement required (environmental)
0124-5	Kaitake Golf Club Inc	Good
0132-3	Hawera Golf Club Inc	High
0164-2	JR & DM Baker	Good
0184-3	Inglewood Golf Club Inc	High
0189-4	AI & KJ Williams	N/A
0270-2	Westown Golf Club Inc	Good
0278-4	NRGE Farms Limited/Oceanview Trust	N/A
0464-3	Oakura Farms Limited	N/A
0647-3	IG Cassie	N/A
0714-2	GD & HM McCallum	Good
0721-3	MD Aiken Family Trust	N/A
0880-3	IHC New Zealand Inc (NORTH TARANAKI)	High
1193-3	Vickers B & NM & Church G & CG	N/A
1223-3	EO & CP Lander	Good
1721-3	Manukorihi Golf Club Inc	High
1877-3	Te Ngutu Golf Club Incorporated	High
1879-3	Wairau Nurseries	N/A
2138-3	Riverside Farms Taranaki Ltd	High
3171-3	Taranaki Greenhouses Limited	High
3312-3	GH Lance	Good
3859-2	Living Light 2000 Limited	N/A
4450-2	Waitara Golf Club Inc	Good
4494-2	CT & JM McDonald	High
4783-2	Larsen Trusts Partnership	N/A
4993-2	J & EG Sanderson	Good
4994-2	J & EG Sanderson	Good
5128-2	Coastal Country Farms Limited	Good
5568-1	Cornwall Park Farms Limited	Improvement required (environmental)
5570-2	Kaihihi Trust	Good
5571-1	Jimian Limited	N/A

Consent	Consent Holder	Compliance achieved?
5623-1	WD & SC Morrison	High
5636-1	Waiwira Trust	High
5696-1	Kokako Road Limited	N/A
5709-2	KCCG Sole Trust	Improvement required (environmental)
5773-1	Goodin FJ & Sons Limited	Good
5778-1	Mara Trust	Good
5781-2	Waikaikai Farms Limited	High
5791-1	AL & LA Campbell	High
5797-1	Pihama Farms Limited	High
5807-1	Dickie Roger Family Trust	High
5827-2	Walker & McLean Partnership	High
5829-1	Julian RM & MC Family Trust	Good
5840-2	Gibbs G Trust	High
5863-2	Geary AR Trust (A R Geary)	High
5876-1	GA & RJ Dorn	High
5878-1	Woollaston Family Trust Partnership	High
5879-1	Hilldale Trust	High
5887-1	A & EN Barkla	High
5896-1	Kohi Investments Limited	Improvement required (environmental)
5898-2	David Pease Family Trust	High
5950-1	WD & SC Morrison	High
5973-1	DR & AJ Gibson	N/A
6026-1	JR & DM Baker	Good
6159-1	Pinehill Land Company Limited	N/A
6193-1	RA & SM Geary Family Trust Partnership	N/A
6292-1	New Plymouth Golf Club Inc	Good
6429-1	Leatherleaf Limited	High
6430-1	Ellingworth Margaret Trust	Good
6486-1	GM & PJ Rutten Family Trust Partnership	N/A
6628-1	Hamblyn Family Trusts	High
7270-1	Ian Mantey Family Trust & Sally Mantey Family Trust	N/A
7346-1	Spenceview Farms	Good
7372-1	Pukeone Partnership	High
7527-1	Pukeone Partnership	High
7528-1	Kereone Farms Limited	High
7626-1	NW & DM King	N/A
7733-2	Hawken Family Trust	N/A
7768-1	Carter AJ Limited	N/A

Consent	Consent Holder	Compliance achieved?
7781-1	D Krumm	N/A
7866-1	Stratford Golf Club Inc	N/A
7895-1	Ohawe Farm	High
7981-1	Taranaki Community Rugby Trust	N/A
9561-1	Kereone Farms Limited	High
9577-1	SB & J May Family Trust	High
9597-1	T & V Gibson Limited	Improvement required (environmental)
9608-1	DRE Wilson	High
9936-1	GSJ Trust	N/A

During the 2014-2015 year, 57% of exercised irrigation consents in Taranaki achieved a high level of environmental performance and compliance with their consents, while 6% require improvement in their compliance performance. For reference, 75% of consent holders in Taranaki monitored through tailored compliance monitoring programmes achieved a high level of environmental performance and compliance with their consents, while another 22% demonstrated a good level of environmental performance and compliance with their consents.

3.3 Recommendations from the 2014-2015 Annual Report

In the 2014-2015 Annual Report, it was recommended:

1. THAT monitoring and reporting of consented irrigation activities for the 2014-2015 year continue at the same level as in the 2013-2014 period.

2. THAT Council continues to liaise with consent holders who have dataloggers that are failing, so improvements in compliance at all time with consent conditions are achieved.

3. THAT the Council encourages consent holders that do not supply good quality records to install a datalogger and transfer data electronically to the Council database via telemetry.

4. THAT the Council requires all consent holders that take above 5 L/s to comply with the Measurement and Reporting of Water Takes Regulations 2010.

Recommendation 1 was implemented during the period under review.

With regards to recommendations 2, 3 and 4, the Council continues to work with consent holders to improve compliance with consent conditions and all relevant regulations.

3.4 Alterations to monitoring programmes for 2015-2016

In designing and implementing the monitoring programmes for air/water discharges in the region, the Council has taken into account the extent of information made available by previous authorities, its relevance under the Act, the obligations of the Act

in terms of monitoring emissions/discharges and effects, and subsequently reporting to the regional community. The Council also takes into account the scope of assessments required at the time of renewal of permits, and the need to maintain a sound understanding of industrial processes within Taranaki emitting to the atmosphere/discharging to the environment.

It is recommended that monitoring for 2015-2016 be carried out at the same level as during the 2014-2015 period.

4. Recommendations

1. THAT monitoring and reporting of consented irrigation activities for the 2015-2016 year continue at the same level as in the 2014-2015 period.

2. THAT Council continues to liaise with consent holders who have dataloggers that are failing, so improvements in compliance at all time with consent conditions are achieved.

3. THAT the Council encourages consent holders that do not supply good quality records to install a datalogger and transfer data electronically to the Council database via telemetry.

4. THAT the Council requires all consent holders that take above 5 L/s to comply with the Measurement and Reporting of Water Takes Regulations 2010. N.B 10 November 2016 is the deadline for compliance.

Glossary of common terms and abbreviations

The following abbreviations and terms may be used within this report:

g/m^3	Grams per cubic metre, and equivalent to milligrams per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures.
Incident	An event that is alleged or is found to have occurred that may have actual or potential environmental consequences or may involve non-compliance with a consent or rule in a regional plan. Registration of an incident by the Council does not automatically mean such an outcome had actually occurred.
Intervention	Action/s taken by Council to instruct or direct actions be taken to avoid or reduce the likelihood of an incident occurring.
Investigation	Action taken by Council to establish the circumstances/events surrounding an incident including any allegations of an incident.
L/s	Litres per second.
MALF	Mean annual low flow. How low the flow gets in a typical year. The lowest flow for each year is averaged across recorded years to estimate MALF.
mS/m	Millisiemens per metre.
m^3	Cubic metre (1,000 litres).
m^3/s	Cubic metres per second.
pH	A numerical system for measuring acidity in solutions, with 7 as neutral. Numbers lower than 7 are increasingly acidic and higher than 7 are increasingly alkaline. The scale is logarithmic i.e. a change of 1 represents a ten-fold change in strength. For example, a pH of 4 is ten times more acidic than a pH of 5.
Resource consent	Refer Section 87 of the RMA. Resource consents include land use consents (refer Sections 9 and 13 of the RMA), coastal permits (Sections 12, 14 and 15), water permits (Section 14) and discharge permits (Section 15).
RMA	*Resource Management Act* 1991 and including all subsequent amendments.

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Water meter guidelines. Environment Waikato Regional Council.

Appendix I

Example surface water abstraction permit for pasture irrigation

Water Permit

Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of Consent Holder:	Riverside Farms Taranaki Ltd 277 Whenuku Road RD 15 Hawera 4675
Decision Date:	16 July 2014
Commencement Date:	16 July 2014

Conditions of Consent

Consent Granted:	To take water from the Waingongoro River for pasture irrigation purposes
Expiry Date:	01 June 2029
Review Date(s):	June 2017, June 2023
Site Location:	277 Whenuku Road, Normanby
Legal Description:	Sec 56 Patea Dist Blk IV Hawera SD (Site of take)
Grid Reference (NZTM)	1705461E-5622950N
Catchment:	Waingongoro

For General, Standard and Special conditions
pertaining to this consent please see reverse side of this document

General condition

a. The consent holder shall pay to the Taranaki Regional Council all the administration, monitoring and supervision costs of this consent, fixed in accordance with section 36 of the Resource Management Act 1991.

Special conditions

1. The rate of taking shall not exceed 24 litres per second.

2. The taking of water authorised by this consent shall be managed to ensure that the flow in the Waingongoro River at the State Highway 45 recorder is not less than 1,490 litres per second litres per second. No taking shall occur when the flow is less than 1,490 litres per second litres per second.

3. Before exercising this consent the consent holder shall install, and thereafter maintain a water meter and a datalogger at the site of taking (or a nearby site in accordance with Regulation 10 of the *Resource Management (Measurement and Reporting of Water Takes) Regulations 2010*. The water meter and datalogger shall be tamper-proof and shall measure and record the rate and volume of water taken to an accuracy of ± 5%. Records of the date, the time and the rate and volume of water taken at intervals not exceeding 15 minutes, shall be made available to the Chief Executive, Taranaki Regional Council at all reasonable times.

   Note: Water meters and dataloggers must be installed, and regularly maintained, in accordance with manufacturer's specifications in order to ensure that they meet the required accuracy. Even with proper maintenance water meters and dataloggers have a limited lifespan.

4. The consent holder shall provide the Chief Executive, Taranaki Regional Council with a document from a suitably qualified person certifying that water measuring and recording equipment required by the conditions of this consent ('the equipment'):

   (a) has been installed and/or maintained in accordance with the manufacturer's specifications; and/or

   (b) has been tested and shown to be operating to an accuracy of ± 5%.

   The documentation shall be provided:

   (i) within 30 days of the installation of a water meter or datalogger;

   (ii) at other times when reasonable notice is given and the Chief Executive, Taranaki Regional Council has reasonable evidence that the equipment may not be functioning as required by this consent; and

   (iii) no less frequently than once every five years.

5. If any measuring or recording equipment breaks down, or for any reason is not operational, the consent holder shall advise the Chief Executive, Taranaki Regional Council immediately. Any repairs or maintenance to this equipment must be undertaken by a suitably qualified person.

6. The water meter and datalogger shall be accessible to Taranaki Regional Council officer's at all reasonable times for inspection and/or data retrieval. In addition the data logger shall be designed and installed so that the Taranaki Regional Council officers can readily verify that it is accurately recording the required information.

7. The records of water taken shall:

   (a) be in a format that, in the opinion of the Chief Executive, Taranaki Regional Council, is suitable for auditing;

   (b) specifically record the water taken as 'zero' when no water is taken; and

   (c) for each 12-month period ending on 30 June, be provided to the Chief Executive, Taranaki Regional Council within one month after end of that period.

8. The consent holder shall undertake and maintain fencing and riparian planting in accordance with the Riparian Management Plan for the property before 01 October 2015 along 1,800 metres of stream bank.

9. At all times the consent holder shall adopt the best practicable option to prevent or minimise any actual or likely adverse effect on the environment associated with the abstraction of water, including, but not limited to, the efficient and conservative use of water.

10. The intake shall be screened to avoid fish (in all stages of their life-cycle) entering the intake or being trapped against the screen, by ensuring that gaps in the screen are no bigger than 3 mm and the intake velocity is not greater than 0.30 metres per second.

11. This consent shall lapse on 30 September 2019, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.

12. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2017 and/or June 2023, for the purposes of:

   (a) ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time; and/or

   (b) to require any data collected in accordance with the conditions of this consent to be transmitted directly to the Taranaki Regional Council's computer system, in a format suitable for providing a 'real time' record over the internet.

Signed at Stratford on 16 July 2014

For and on behalf of
Taranaki Regional Council

_____

A D McLay
Director - Resource Management

Appendix II

Report on consented water permits for farm and general water supply purposes

Report on water permits for general farm and domestic supply

Introduction

This report is for water takes for general farm and domestic supply purposes that have been granted by the Council [water takes in excess of the permitted 1.5 litres per second or 50 cubic metres per day entitlement per property according to the Regional Fresh Water Plan for Taranaki, Rule 15], but have not been reported on previously as only water takes for irrigation had. This report discusses the consents active to 30 June 2015 and any compliance issues related to them.

These water takes are different to that for water irrigation, as these are used for general farm use and domestic supply and are used throughout the year unlike irrigation consents that are used for a small portion of the year. These consents generally have different consent conditions attached to them, to that of irrigation water, as the takes are generally of a minor nature and generally fall outside the Measurement and Reporting of Water Takes Regulations 2010.

Current water take consents

At 30 June 2015, there were a total of 26 current water take consents for general farm and domestic supply purposes. Of this eight were from surface water and 18 were from groundwater sources (Table 1).

Table 1 Total consents granted for dairy farm purposes to 30 June 2015

Consent	Consent Holder	Source
0095-2	Ashbrook Farms Limited	Surface Water
0865-3	Kathdan Trust Limited	Surface Water
1190-3	Pungarehu Farmers Group Water Scheme	Surface Water
1357-3	Oakura Farms Limited	Surface Water
5413-2	MJ Fahy	Groundwater
5990-1	ID & JA Armstrong	Surface Water
6133-1	DJ & ME McKenzie	Groundwater
6372-1	Naplin Trust	Groundwater
6380-1	Caiseal Trust Partnership	Groundwater
6903-1	Awatea Hawkes Bay Trust	Groundwater
7272-1	Belmont Dairies Limited	Groundwater
7304-1	Gwerder Brothers	Groundwater
7497-1	Te Rua O te Moko 2B Ahuwhenua Trust	Surface Water
7540-1	Rata View (2008) Limited	Groundwater
7608-1	MD Aiken Family Trust	Groundwater
7711-1	Pariroa Marae (The Trustees)	Groundwater
7783-1	Norwood Farm Partnership	Groundwater
7969-1	AB Middleton	Surface Water
9747-1	DP & JH Roper Family Trust Partnership	Groundwater
9886-1	Bredin NR Family Trust	Surface Water
9900-1	Kaipip Holdings Limited	Groundwater
9910-1	PKW Farms LP	Groundwater
9947-1	Ngatoro Poultry Limited	Groundwater
10029-1	Hernly Farms Limited	Groundwater
10113-1	PKW Farms LP	Groundwater
10120-1	SC & MJ O'Neill Family Trust	Groundwater

Results and discussion

During the year under review, the Council inspected all water take consents that have a compliance monitoring programme. This meant that some consents were not monitored due to the small nature of the takes as it was deemed unnecessary, and/or there were no enforceable consent conditions to monitor on the systems.
Of the consents that were inspected, they were checked to ensure that they were compliant with their resource consent conditions, which may include presence of a flowmeter, flowmeter tamperproof, adequately screened intakes, bores labelled and cased, pump sheds fenced off, water bodies fenced off, riparian margins planted.

Twenty two of the consents had an end of year site inspection, with eight of these being found to be non-compliant with their consent conditions. Table 2 list the consents inspected and whether they were compliant.

Table 2 Site inspections and compliance during 2014-2015

Consent	Consent Holder	Compliant	Reason non-compliant
0865-3	Kathdan Trust Limited	Yes	n/a
1190-3	Pungarehu Farmers Group Water Scheme	No	Volume breaches
5413-2	MJ Fahy	Yes	n/a
5990-1	ID & JA Armstrong	No	Volume breaches
6372-1	Naplin Trust	Yes	n/a
6380-1	Caiseal Trust Partnership	No	Volume breaches
6903-1	Awatea Hawkes Bay Trust	Yes	n/a
7272-1	Belmont Dairies Limited	Yes	n/a
7304-1	Gwerder Brothers	No	Volume and rate breaches
7497-1	Te Rua O te Moko 2B Ahuwhenua Trust	Yes	n/a
7608-1	MD Aiken Family Trust	Yes	n/a
7711-1	Pariroa Marae (The Trustees)	Yes	n/a
7783-1	Norwood Farm Partnership	Yes	n/a
7969-1	AB Middleton	Yes	n/a
9747-1	DP & JH Roper Family Trusts Partnership	No	Volume breaches
9886-1	Sona Chosta Limited	Yes	n/a
9900-1	Kaipi Holdings Limited	Yes	n/a
9910-1	PKW Farms LP	No	Volume breaches
9947-1	Ngatoro Poultry Limited	No	Rate breaches
10029-1	Hernly Farm Limited	Yes	n/a
10113-1	PKW Farm LP	Yes	n/a
10120-1	SC & MJ O'Neill Family Trust	No	No flowmeter or datalogger present

Due to the minor nature and first time offence of the majority of the non-compliances the Council staff liaised with the consent holders to address their non-compliances but also advised them that enforcement action would take place if they breached in the 2015-2016 monitoring period. This resulted in consents 6380-1 and 9747-1 applying for a change in consent conditions. Consent 7304-1 was issued an abatement notice as this was the second year in a row that they had breached their abstraction limits, and this resulted in the consent holder applying to increase their abstraction rate and daily volume.

Consent 10120-1 was only granted in June 2015, so at the inspection it was found that there were a number of non-compliances to address. Council staff have given advice to help the consent holder become compliant before they exercise their consent.

Summary

Of the 22 sites inspected, there was a 36% non-compliance rate, with a majority of these being for the breaching of the abstraction rate or volume. Therefore there will be a greater emphasis that the consent holders need to ensure they do not exceed their limits in future seasons, otherwise enforcement action will occur.

The Council will continue to monitor these water takes and any new consents that may be granted in the future, as although they are relatively minor in size, it is still important to manage the resources and assess if there are any adverse environmental effects arising from the consent being exercised.