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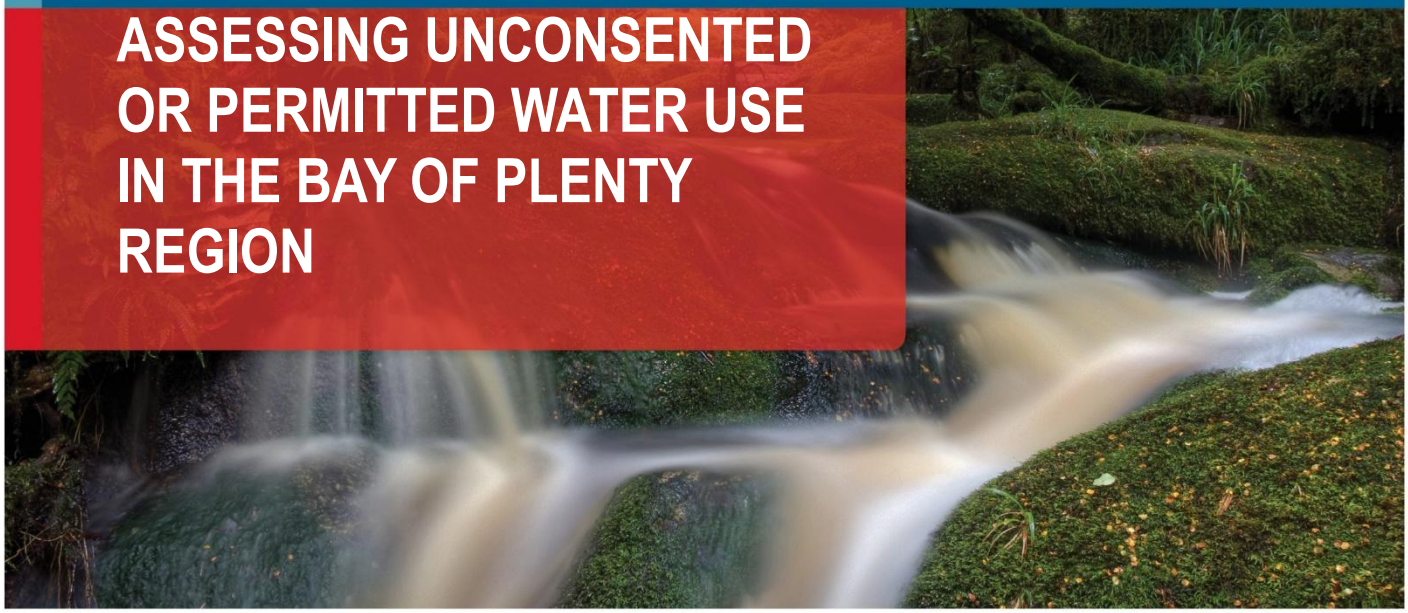
Water Management REPORT

ASSESSING UNCONSENTED OR PERMITTED WATER USE IN THE BAY OF PLENTY REGION



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PREPARED BY
Helen Rutter

www.aqualinc.com

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For more information regarding this document please contact

Helen Rutter
Senior Hydrogeologist
Aqualinc Research Limited
(03) 964 6521
h.rutter@aqualinc.co.nz

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EXECUTIVE SUMMARY

Resource management authorities such as Bay of Plenty Regional Council (BOPRC) have a responsibility to manage water resources, including allocation of these resources. The National Policy statement freshwater Management requires Councils to set and apply limits and to establish and operate a freshwater accounting system. The difficulty is that not all allocation can be quantified, as there is allocation permitted under the Resource Management Act (RMA) and the BOPRC's Regional Water and Land Plan (RWLP) that may be difficult to trace, or not required to be notified to the Regional Council. In some areas, this could represent a substantial proportion of the total takes. For example, Waikato Regional Council estimated that permitted takes could represent as much as 20% of the total surface water takes in the Region.

The RMA allows for water to be taken for reasonable domestic and stock water use provided that the use does not, or is not likely to have, an adverse effect on the environment. The RWLP rules allow small takes for any purpose such as dairy shed wash-down, horticultural spray makeup, irrigations of garden/small glasshouse operations, domestic and stock water needs. These rules allow:

Take and Use of Groundwater up to 35 m^3/day per property. (Rule 38)

Take and Use of Surface Water up to 15 m^3/day per property. (Rule 41)

It is noted that, in general, dairy farmers do not hold consents for dairy shed water use, but on many occasions, use exceeds the permitted activity provisions. This report estimates predicted dairy shed water use based on cow numbers.

This project aimed to model water use that had not been consented within the BOPRC, to assess whether the takes were likely to be surface water or groundwater, and to attribute the likely water use to surface water or groundwater catchments. It is noted that a case study undertaken in the Lower Kaituna, comparing a 'permitted take allowance model' and surveying 100 properties, found that the model over-estimated the total water used.

1 OVERVIEW

1.1 Introduction

Bay of Plenty Regional Council (BOPRC) requested Aqualinc Research Ltd (Aqualinc) to develop a GIS model to estimate likely water use from permitted, unconsented takes, within the Region. These estimates are needed to assist with meeting the requirements of National Policy statement freshwater Management (NPS-FM) (Policy CC1 and CC2). At present BOPRC are preparing for a plan change to the Regional Water and Land Plan (RWLP), and estimates of unconsented takes will enable them to more accurately determine the current allocation status of the surface water and groundwater resources. These takes are permitted under Section 14(3)(b) of the Resource Management Act, which permits water use for certain activities without the need to obtain a resource consent. This allows for water to be taken for reasonable domestic and stock water use provided that the use does not or is not likely to have an adverse effect on the environment.

This provision is qualitative rather than quantitative. The term 'reasonable' is not quantified. To estimate the potential volume of the water resources used under this provision, a volume needed to be determined for the model. This was done by using water use figures for domestic consumption and that of stock.

The current RWLP also has rules regarding permitted takes. These rules are quantitative, specifying the amount of water that can be taken without resource consent:

Rule 38 Permitted - Take and Use of Groundwater up to 35 m^3/day per property.

Rule 41 Permitted - Take and Use of Surface Water up to 15 m^3/day per property.

The intent of both RWLP rules is to allow small takes for any purpose such as dairy shed wash-down, horticultural spray makeup, irrigations of garden/small glasshouse operations, domestic and stock water needs. The RWLP rules do not exclude a use.

The approach taken in this project was to assess reasonable use of water through estimated water use figures for stock and human consumption, as well as for dairy wash down.

It should be noted that, while these are permitted limits, they may, and in some cases, certainly are, breached.

1.2 Model overview

The model has been based on the approach taken to estimate unconsented or permitted water use (BOPRC, 2014). This report aims to separate water use into groundwater and surface water, and also to improve the accuracy of assessment of water use. The BOPRC report stated it tallied all potential permitted takes exercised at their fullest and was an unrealistic estimate.

The approach adopted estimates the number of people per household from census data, and the number of households from the LINZ New Zealand street address dataset (AddressPoint), and uses typical water use per person to estimate domestic consumption. Each AddressPoint is also identified by surface water catchment and groundwater allocation zone (where it falls within a zone). For agricultural use, stock numbers were taken from AgriBase™ (2010) (dairy, beef, sheep, deer) or estimated from Land Cover Database (LCDB3) data, and attributed to surface water catchment and groundwater allocation zone. Water use was estimated by applying typical stock drinking water use from the Aquas and Aqualinc (2007) report, and adding an allowance for dairy shed wash-down. The water use has then been calculated by multiplying the activity and its water needs together.

The approach was to estimate water required to meet reasonable domestic and stock watering needs as allowed under the RMA (assuming no adverse environmental effects).

It is noted that a case study undertaken in the Lower Kaituna, comparing a 'permitted take allowance model' and surveying 100 properties, found that the model over-estimated the total water used. This

model assumed that all people and properties could take the full water allocation. This grossly over-estimated the permitted actual sue of water. The report recommended that, where surface water allocation was a concern, the model should be supported by actual data on water sources used, and the permitted provision used.

2 METHOD

2.1 Introduction

The aim of the approach was to develop a method for estimating potential water use by unconsented takes in the Bay of Plenty Region by the following users:

- Domestic water use in non-urban areas
- Typical stock drinking water for dairy, beef, sheep, deer, other large stock and other small stock
- Dairy shed wash down and milk cooling water

A previous study (BOPRC, May 2014) had estimated total unconsented/permitted water use by surface water catchment. This approach aimed to refine that study with more recent census data (2013 as opposed to 2006), and also to attempt to define which takes were likely to be from groundwater and which from surface water. In this way, a better estimate of the impact of small takes on groundwater and surface water allocation could be made.

2.2 Defining likely source of water

By their nature, there is little known about unconsented takes, and therefore various assumptions had to be made. The main assumptions were:

- Urban areas, and densely populated settlements, were likely to have a reticulated supply.
- If a property had a consent within 20m of an AddressPoint, or within the boundary of a rural property, then they were not likely to have an unconsented take.
- Existing wells were found to generally be located on specific geology types. These were used on a regional basis to determine whether there was likely to be a formation suitable for supplying water.
- Where a property was within 200m of a surface water course, it would be a possible source of water.
- Where a property (assumed to be without reticulated supply or a consent) was not within 200m of a water course, and was not on suitable geology, then the potential source of water was initially assigned to “Unknown”. These properties could be rainwater harvesting. After discussion with BOPRC staff, it was concluded that dairying could not rely on rain water harvesting, and that small, unmapped, surface water courses would not be a suitable source of water, so all dairying that fell within this category, was moved to a groundwater source.

2.2.1 Defining areas with a reticulated water supply

Water supply areas were provided by some of the territorial authorities. However, there were gaps in the data coverage (for example Tauranga), and this did not cover semi-rural areas and settlements which were likely to have a community supply. There were two possible approaches to defining areas where there would be no requirement for a unconsented (permitted) take.

- Use the LCDB (2008) data to define “Built up areas”.
- Using the AddressPoint data to define a density at which you could define the areas as being ‘built’ environment.

Two approaches were compared, and were found to be consistent with each other. The latter approach was used, as it enabled the exclusion of predominantly industrial areas.

2.2.2 Properties with a consent to take water

Properties that had a consent to take water had to be excluded from the calculations of unconsented takes.

The consents data were supplied as “Cold water” consents, however, it was found that a number of these consents were for geothermal water takes. As the groundwater “Purpose” field was freeform, there were a large number of descriptive uses. Consents were excluded if the “purpose” field included the following:

- Municipal, community, public
- Heat, geo, warm, thermal
- Process, fish, washing
- Hydro, turbine, operate
- Playing pool, divert, pipe

If a property had a consent to take water for irrigation, it was assumed that water was also available for domestic, stock water, and dairy shed use. If a domestic property was within 200m of a consent to take water, it was assumed that it would make use of this consent.

2.2.3 Geology

Existing wells and consents to take groundwater were assessed in terms of their location on certain lithological types. Shallow groundwater takes were found to be predominantly on gravel, sand, ignimbrite, pumice or peat. As a result, these were assumed to be lithologies that could support small unconsented takes. Many of these were outside of the areas with identified shallow aquifers with allocation limits.

2.2.4 Surface water

Where a property was within 200m of a surface water course either “RiverPolygons” or “RiverCentreLines” as provided by BOPRC, or where a surface water course crossed a rural property, it was assumed that this would be a potential supply course. It was decided that surface water would be used in preference to groundwater, as it is more accessible, so if both were available, the approach was to assign the water use to surface water in preference to groundwater.

2.2.5 Alternatives to surface or groundwater

Where there was no obviously available surface water, and a property was not located on suitable geology, the source of water was set to “Unknown”. In the case of domestic properties, it may be that they utilise rainwater off the roof. However, a number of rural areas were identified with either dairy stock, or on high producing grassland, that had no obvious source of water. In some cases, there was a well on the property, and they could be taking from deep groundwater. For others it was a result of the way that farms had been split across catchment boundaries. Others just had no obvious water source. As summarised earlier, where there was potential water use for dairying, it was assumed that there was a groundwater source, and that this was used.

2.3 Assessment of domestic use estimates

The approach taken to assessing domestic use was based on obtaining the average number of people per household, through using Statistics NZ Census 2013 Meshblock data, and applying the population per property to individual houses within each Meshblock area (based on AddressPoint data).

2.3.1 People per household

As per the previous report (BOPRC, 2014), the Census data (2013 now being available as opposed to 2006) was used to gain estimates of the average number of people living in a household within each catchment of the Bay of Plenty region. As the mesh blocks do not correspond to catchment boundaries and ArcMap was used to assess the proportion of each Meshblock within each catchment ArcMap. The combined data were then used to determine the population per household within each surface water catchment.

The assumption was then made that each AddressPoint point represents a household with a standard population size for that catchment.

2.3.2 Household water use estimates

The previous study had compared domestic use values used by the Bay of Plenty Regional Council's Guide to the On-Site Effluent Treatment Regional Plan (EBOP, 2006); Horizons Regional Council (HRC, 2006); Ministry of Health document on household water supply (MOH, 2006); and data provided by Western Bay of Plenty District Council and Tauranga City Council on water use within their districts. From this data a range of 180 litres/person/day to 300 litres/ person/day was identified as the most appropriate for use in the model. The table below shows the figures applied in the model.

Table 1: Domestic Water Use

Domestic water use	Average daily demand (ADD)	Peak daily demand (PDD)	Units
Per person (all ages)	180	300	litres/person/day (l/p/d)

2.4 Assessment of stock use estimates

As for the previous study, there are various aspects of water use that need to be considered for stock water use estimates. The approach is outlined in the following sub sections.

2.4.1 Water use requirements for various types of stock

Based on information from the previous report (BOPRC, 2014), the figures provided by Aquas (2007) for Horizons Regional Council were considered to be appropriate for application in the Bay of Plenty region. Both the Average Daily Demand (ADD) and Peak Daily Demand (PDD) figures were applied to provide an upper and a lower range of potential permitted water use.

Table 2 below lists the stock water use figures as applied in the model.

Table 2: Stock Water Use

Stock	Average daily demand (ADD)	Peak daily demand (PDD)	Units litres/head/day
Dairy cattle: Milking cow	45	70	l/h/d
Beef cattle: Mature beef cattle, herd replacement stock and bulls	30	55	l/h/d
Sheep: Ewes, hoggets and rams	3	4.5	l/h/d
Deer: Hinds and stags (all ages)	6	12	l/h/d
All other large stock	30	55	l/h/d
All other small stock	3	4.5	l/h/d

2.4.2 Livestock numbers in the Bay of Plenty

Livestock numbers were obtained from the AgriBase™ dataset provided by BOPRC, dated 2013. AgriBase™ data were compiled by grouping farm stock numbers according to land ownership. Therefore again stock numbers had to be spilt and apportioned between SW and GW catchments.

An issue with the data was found, in that there are several identical overlapping polygons in the data. This issue was followed up with AssureQuality. It was found that these are farms where the land all belongs to a single owner, but within the land parcel(s), there are multiple distinct farms. The only way to deal with this was to add up the data to get a complete picture of the total stocking on the land. There is not an easy process to do this within the GIS. Examination of the data suggested there were two main farms, and these were edited manually. The rest of the farms comprised less than 2% of the area, and were ignored.

Not all farms in the Region contribute to the AgriBase™ data set. In the absence of AgriBase™ data, LCDB data were used to identify high producing exotic grassland and low producing grassland and shrub land. Bay of Plenty land management staff suggested that it is reasonable to assume that high producing exotic grassland is dairy and low producing exotic grassland and shrub land is beef, deer or sheep. For these land areas, average stocking rates for dairy and beef were used in the calculations as in the previous study, that is, 2.83 head/ha for dairy and 2.6 head/ha for cattle beef.

Stock numbers in areas not covered by AgriBase™ have been calculated from an estimate of the land use area (high or low producing grassland), obtained from LCDB3 (2008 land use class).

As previously stated, the New Zealand Dairy Statistics suggest an average stocking rate of 2.83 cows/ha for dairy cows (LIC 2009). Fleming (2003) suggests a range of between 7 and 22 stocking units per hectare, equivalent to between 1.16 and 3.6 units for beef animals per hectare. BOPRC land management staff suggested that a figure of 15 stocking units or 2.6 beef animals/ha is appropriate for the Bay of Plenty region. These figures were used again in this approach.

2.5 Dairy shed wash-down/cooling water

As previously stated in the BOPRC (2014) report, dairy shed use of 70 litres/cow/day was considered reasonable (Aquas, 2007) and has been used again within the model. This is in addition to the drinking water requirements, as presented in Table 2.

3 MODEL DEVELOPMENT CALCULATIONS

3.1 Method

The following summarises approach taken, and lists some of the potential errors in the approach. The approach used for domestic and agricultural unconsented takes had to be different, as the population data could be based on point data (AddressPoint), but the agricultural data was polygon-based (AgriBase and LCDB3 datasets).

3.1.1 Livestock data

- Clip the LCDB3 data outside the AgriBase data, to fill in the gaps where there was no AgriBase data for the Region. Spatially join the two datasets to provide complete coverage for the Region.
- Delete any polygons that were not defined as high producing grassland, low producing grassland, or scrub.
- Attribute any LCDB polygons with stock numbers, based on 2.83 dairy cows per hectare (for high producing exotic grassland), or 2.6 beef cows per hectare (low producing grassland and shrub).
- Delete any polygons with no stock (or in the case of the attributed LCDB polygons, with stock numbers less than one).
- If there is a consent located within the polygon (as defined in Section 2.2.2), attribute the polygon as having a consent to take water. These land parcels were later excluded from the calculations of water use.
- If a surface water course crosses the land (based on surface water course data provided by BOPRC), attribute the polygon as having a surface water source available.
- If the land parcel intercepts a likely aquifer (as defined under Section 2.2.3), attribute the polygon as having a groundwater source available.
- Union the AgriBase/LCDB dataset with the surface water catchments and shallow groundwater catchments. Proportion the stock numbers for each property, based on the amount of area of that property within each catchment. (At this point, any polygons with estimated dairy numbers (based on the LCDB data: high producing grassland) less than 10 cows, were assumed not to be viable dairy units, and the dairy numbers associated with these were set to zero).
- Calculate permitted water use by applying the ADD and PDD estimates of use.
- Sum the water use by catchment:
  - Assume surface water would be used in preference to groundwater. Where surface water is ‘available’ sum the ADD, PDD and dairy shed use by surface water catchment
  - Otherwise, where an ‘aquifer’ was available, sum groundwater use by groundwater catchment.
  - Otherwise, where an ‘aquifer’ was available but the polygon was outside of a shallow groundwater allocation zone, sum groundwater use by surface water polygon.
  - Sum ‘unknown’ water use by surface water catchment. (For any of these polygons with dairy cows, ‘unknown’ was changed to groundwater use, on the basis that dairying would not rely on sources such as rood water for their operation).

- It is noted that, although several polygons on Matakana island can be associated with a surface water course, on the advice of BOPRC staff, dairy farms here are more likely to be using groundwater, and all dairy uses (with no consent) were attributed to groundwater takes.

3.1.2 Population data

- In order to obtain the population per household, clip the Meshblock data to surface water catchments and proportion the population (from the Census 2013 data associated with each Meshblock) according to the percentage of each Meshblock in each catchment.
- Attribute each AddressPoint point with:
    - Population per household
    - Whether there is a consented take (as defined in Section 2.2.2) within 200 m of the point
    - Whether there was a surface water course within 200m of the property
    - Whether the property was on an “aquifer” (Section 2.2.3)
    - Whether the property was within 200m of a likely reticulated water supply (see Section 2.2.1)
    - The surface water catchment
    - The shallow groundwater allocation zone
    - Calculate the water use per property
- Sum the water use by catchment by:
    - Assume surface water would be used in preference to groundwater. Where surface water is ‘available’ sum the ADD, PDD and dairy shed use by surface water catchment
    - Otherwise, where an ‘aquifer’ was available, sum groundwater use by groundwater catchment.
    - Otherwise, where an ‘aquifer’ was available but the polygon was outside of a shallow groundwater allocation zone, sum groundwater use by surface water polygon.
    - Sum ‘unknown’ water use by surface water catchment.

3.2 Potential errors

3.2.1 Other users of water

As with the previous report, this approach deals with the major land use practices and water uses occurring in the Bay of Plenty that are considered to be the major users of the permitted provisions (domestic, stock and dairy). There are other possible users of permitted water, including irrigation of sports grounds and small scale horticultural practices. There are also likely to be ‘illegal’ takes, for which no consent has been granted. It was not possible to take these into account in this study.

3.2.2 Errors introduced through the approach

There are various ways in which there will be errors introduced in this approach.

3.2.2.1 Assumptions within the method

Numerous assumptions are made within the method including:

- That each AddressPoint point represented an occupied dwelling. The Lower Kaituna study suggested this was not always the case.
- Surface water will be used in preference to groundwater. This may not be true, especially for domestic takes, where groundwater may be preferable in terms of quality. The Lower Kaituna survey suggested that this may be the case in that Catchment.
- Lithologies were selected that were likely to be able to provide groundwater, on the basis of the location of the existing wells and consents to take water. Variability in lithology would mean that, although a lithology may be suitable in one area, it may not be in another. On the opposite of this, there may be other lithologies that have not been selected, that would provide small supplies.
- The assumption was made that, if a property is within a certain distance of a consent to take water, a potential reticulated supply, or a surface water course, then it will obtain water from one of these. One issue is that there may be multiple properties within 200m of an existing consent, but in many cases it may be that only one of the properties will be using that consent. In support of the approach though, is that the Lower Kaituna study revealed that this may well be the case. The second issue is that the distance from any of these features to the property was chosen arbitrarily; further study could be carried out to determine what distance is generally acceptable for a property owner.

3.2.2.2 Multi-part polygons and overlapping polygons

The issue with overlapping polygons in the AgriBase data has already been raised, and small areas of overlapping polygons are likely to still be present in the dataset. This will result in a slight under-estimate of water use overall. Another issue is multi-part polygons, where separate units of land are all included within one land parcel. The issue lies in the fact that one part of the property may have, for example a surface water source, whereas another part of the property may not have that source available. Multi-part polygons have the potential to be a significant issue. Within ArcGIS, we could 'explode' these, but each part of the multi-part polygon would then have the same attributes, leading to an over-estimation of stock numbers. As such, it was better to leave them as multi-part polygons, as the total water use per stock unit would be correct, but it would possibly be attributed to the wrong source of water.

3.2.2.3 LCDB data outside of the AgriBase data

By clipping outside the AgriBase data, LCDB data were extracted along roads and other features that did not belong to a property. This will slightly over-estimate high producing grassland, for example, along roads. There is no easy way of preventing this, but the overall impact is not likely to be high.

3.2.2.4 Edge effects

The different data layers have polygons with different boundaries, and effects will be introduced at, for example, lakes and the coast.

4 RESULTS

The results are presented as surface water use, grouped by surface water catchment, and groundwater use grouped by shallow aquifer system. The final table gives groundwater use grouped by surface water catchment (where there is a potential groundwater take, but this does not fall within one of the defined groundwater catchments), and 'unknown' water source, grouped by surface water catchment. Given the approach taken, in that surface water is assumed to be utilised in preference to groundwater, the surface water takes account for the majority of water use.

Numerous assumptions have been made, including exclusion of properties where there may be an existing consent, and assumptions made about the distance to objects such as surface water courses. Based on the results from the Kaituna Valley, this approach is considered to be more realistic than looking at the full permitted water allocation, where the Kaituna Valley study found that most users did not use the full permitted allocation. It is possible that where, for example, there is a reasonable sized dairy herd, this would exceed the permitted use, and again this may present a more realistic estimate of the actual use.

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APPENDIX A Surface Water Use by Surface Water Catchment (volumes in litres/sec)

Greater Catchment	Primary Catchment	Secondary Catchment	Tertiary Catchment	Agric ADD[1]	Agric PDD[2]	Dairy Shed	Dom ADD	Dom PDD	Total ADD	Total PDD
Kaituna	Kaituna	Lake Rotoiti		0.84	1.36	0.81	0.15	0.25	1.79	2.41
Kaituna	Kaituna	Lake Rotoiti	Okawa Bay area	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Kaituna	Kaituna	Lake Rotorua		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kaituna	Kaituna	Lake Rotorua	Awahou	1.25	1.97	1.83	0.00	0.00	3.08	3.80
Kaituna	Kaituna	Lake Rotorua	Awahou Point area	0.05	0.08	0.08	0.00	0.00	0.13	0.16
Kaituna	Kaituna	Lake Rotorua	Hamurana area	0.60	0.95	0.85	0.02	0.04	1.48	1.84
Kaituna	Kaituna	Lake Rotorua	Hauraki	0.32	0.50	0.50	0.00	0.00	0.82	1.00
Kaituna	Kaituna	Lake Rotorua	Mokoia Island	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kaituna	Kaituna	Lake Rotorua	Ngongotaha	2.63	4.23	2.61	0.39	0.65	5.62	7.50
Kaituna	Kaituna	Lake Rotorua	Ngongotaha township area	0.01	0.01	0.01	0.00	0.00	0.02	0.03
Kaituna	Kaituna	Lake Rotorua	Pohue Bay area	0.01	0.02	0.02	0.01	0.02	0.04	0.05
Kaituna	Kaituna	Lake Rotorua	Puarenga	1.64	2.64	1.85	0.09	0.15	3.59	4.65
Kaituna	Kaituna	Lake Rotorua	Rotokawa area	0.75	1.25	0.46	0.02	0.03	1.22	1.73
Kaituna	Kaituna	Lake Rotorua	Rotorua city area	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kaituna	Kaituna	Lake Rotorua	Utuhina	0.60	1.02	0.13	0.01	0.02	0.74	1.17
Kaituna	Kaituna	Lake Rotorua	Waimehia area	0.74	1.18	1.01	0.00	0.00	1.75	2.19
Kaituna	Kaituna	Lake Rotorua	Waingaehe	0.33	0.58	0.05	0.00	0.00	0.38	0.63
Kaituna	Kaituna	Lake Rotorua	Waiowhiro area	0.31	0.50	0.28	0.05	0.09	0.64	0.86
Kaituna	Kaituna	Lake Rotorua	Waitawa area	0.52	0.83	0.70	0.01	0.01	1.23	1.55
Kaituna	Kaituna	Lake Rotorua	Waiteti	2.96	4.67	4.13	0.19	0.31	7.27	9.11
Kaituna	Kaituna	Lower Kaituna	Hururu	1.29	2.09	1.47	0.02	0.03	2.78	3.58
Kaituna	Kaituna	Lower Kaituna	Kopuaroa	2.90	4.55	4.21	0.25	0.41	7.35	9.17

[1] ADD: Average daily demand
[2] PDD: Peak daily demand

Greater Catchment	Primary Catchment	Secondary Catchment	Tertiary Catchment	Agric ADD	Agric PDD	Dairy Shed	Dom ADD	Dom PDD	Total ADD	Total PDD
Kaituna	Kaituna	Lower Kaituna	Lower Kaituna	4.06	6.36	6.05	0.33	0.54	10.43	12.95
Kaituna	Kaituna	Lower Kaituna	Ohineangaanga	1.27	2.15	0.84	0.06	0.10	2.18	3.10
Kaituna	Kaituna	Lower Kaituna	Papamoa	1.50	2.38	2.06	0.09	0.15	3.65	4.58
Kaituna	Kaituna	Lower Kaituna	Parawhenuamea	1.00	1.59	1.22	0.43	0.71	2.65	3.53
Kaituna	Kaituna	Lower Kaituna	Rangiuru Soiuth	0.17	0.27	0.24	0.11	0.19	0.52	0.70
Kaituna	Kaituna	Lower Kaituna	Raparapahoe	0.93	1.55	0.81	0.35	0.59	2.10	2.95
Kaituna	Kaituna	Lower Kaituna	Te Puke East	0.15	0.25	0.11	0.01	0.02	0.27	0.38
Kaituna	Kaituna	Lower Kaituna	Upper Kaituna	0.92	1.47	1.13	0.12	0.20	2.17	2.80
Kaituna	Kaituna	Lower Kaituna	Waiari	1.89	3.10	1.97	0.11	0.18	3.97	5.26
Kaituna	Kaituna	Mangorewa		5.40	8.71	6.19	0.24	0.40	11.84	15.30
Kaituna	Lake Rotokawau	Waimata		0.03	0.05	0.00	0.00	0.00	0.03	0.05
Kaituna	Maketu Estuary Coastal			0.14	0.23	0.23	0.00	0.00	0.37	0.45
Motu	Haparapara	Haparapara area		0.04	0.06	0.05	0.00	0.01	0.10	0.12
Motu	Haparapara	Waikakariki		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Motu	Hawai			0.14	0.24	0.15	0.01	0.02	0.31	0.41
Motu	Kereu			0.36	0.64	0.12	0.03	0.05	0.51	0.81
Motu	Motu	Mangaotane		0.41	0.67	0.17	0.00	0.00	0.58	0.85
Motu	Motu	Motu area		29.66	46.16	46.07	0.55	0.92	76.29	93.15
Motu	Motu	Rawea		0.82	1.36	0.68	0.06	0.09	1.55	2.13
Motu	Motu	Te Kahika		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Motu	Omarumutu Coastal			1.78	2.81	2.51	0.39	0.65	4.68	5.98
Motu	Pehitaiti Coastal			0.42	0.66	0.60	0.10	0.17	1.12	1.43
Motu	Pokohinu Coastal			0.39	0.64	0.44	0.21	0.35	1.04	1.43
Motu	Raukokore	Mangahaupapa		0.23	0.37	0.34	0.00	0.00	0.58	0.71
Motu	Raukokore	Raukokore area		0.19	0.32	0.11	0.01	0.01	0.31	0.45
Motu	Raukokore	Waikura		4.43	6.90	6.88	0.00	0.01	11.32	13.79
Motu	Tahurua Coastal			0.13	0.21	0.08	0.00	0.00	0.21	0.29

Greater Catchment	Primary Catchment	Secondary Catchment	Tertiary Catchment	Agric ADD	Agric PDD	Dairy Shed	Dom ADD	Dom PDD	Total ADD	Total PDD
Motu	Te Kaha Coastal			0.39	0.63	0.44	0.24	0.39	1.06	1.46
Motu	Tirohanga Coastal			1.05	1.72	1.11	0.12	0.20	2.29	3.04
Motu	Torere			0.29	0.47	0.40	0.17	0.29	0.87	1.15
Motu	Waiaua			1.57	2.49	2.12	0.15	0.25	3.84	4.87
Motu	Waikawa Coastal			0.40	0.69	0.23	0.15	0.25	0.78	1.17
Motu	Waiokaha Coastal			1.34	2.17	1.46	0.26	0.43	3.07	4.07
Motu	Whangaparaoa			6.90	11.32	7.32	0.11	0.19	14.34	18.84
Motu	Whituare Coastal			0.05	0.08	0.08	0.03	0.05	0.16	0.21
Ohiwa	Maraetotara Coastal			0.32	0.55	0.02	0.08	0.14	0.43	0.72
Ohiwa	Ohiwa	Kutarere area		0.99	1.63	0.96	0.27	0.46	2.22	3.04
Ohiwa	Ohiwa	Nukuhou		6.28	10.12	7.43	2.77	4.61	16.48	22.16
Ohiwa	Ohiwa	Wainui area		1.77	2.89	1.87	0.86	1.43	4.50	6.19
Ohiwa	Waiotahi			4.45	7.07	5.99	0.36	0.61	10.80	13.66
Pongakawa	Newdicks Coastal			0.08	0.13	0.13	0.00	0.00	0.21	0.26
Pongakawa	Ohinepanea Coastal			1.89	2.96	2.79	0.37	0.61	5.04	6.36
Pongakawa	Pukehina Beach Coastal			0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pongakawa	Pukehina Coastal			1.17	1.83	1.82	0.01	0.02	3.01	3.67
Pongakawa	Waihi Estuary	Kaikokopu	Kaikokopu area	3.18	4.97	4.75	0.16	0.27	8.09	9.99
Pongakawa	Waihi Estuary	Kaikokopu	Pokopoko	2.95	4.86	2.66	0.36	0.59	5.97	8.11
Pongakawa	Waihi Estuary	Pongakawa	Pongakawa area	5.68	9.01	7.58	0.49	0.81	13.74	17.40
Pongakawa	Waihi Estuary	Pongakawa	Wharere	4.47	7.10	6.05	0.52	0.86	11.05	14.01
Rangitaiki	Okaro			0.24	0.38	0.22	0.01	0.01	0.46	0.61
Rangitaiki	Okataina	Lake Okataina		0.10	0.18	0.01	0.00	0.00	0.11	0.19
Rangitaiki	Rangitaiki	Horomanga		4.16	6.49	6.39	0.60	1.01	11.16	13.88
Rangitaiki	Rangitaiki	Kaingaroa area		2.69	4.32	3.20	0.34	0.57	6.23	8.09
Rangitaiki	Rangitaiki	Lake Rerewhakaaitu		2.05	3.22	3.05	0.02	0.03	5.12	6.30
Rangitaiki	Rangitaiki	Mangamako area		8.38	13.12	12.55	1.86	3.09	22.78	28.76

Greater Catchment	Primary Catchment	Secondary Catchment	Tertiary Catchment	Agric ADD	Agric PDD	Dairy Shed	Dom ADD	Dom PDD	Total ADD	Total PDD
Rangitaiki	Rangitaiki	Mangatiti area		2.31	4.11	0.04	0.07	0.12	2.43	4.27
Rangitaiki	Rangitaiki	Otamatea		4.79	7.97	4.03	0.04	0.07	8.86	12.07
Rangitaiki	Rangitaiki	Pokairoa		1.92	3.10	2.32	0.05	0.08	4.29	5.50
Rangitaiki	Rangitaiki	Pouarua area		0.85	1.40	0.93	0.02	0.03	1.80	2.36
Rangitaiki	Rangitaiki	Waikowhewhe area		0.79	1.33	0.64	0.34	0.57	1.77	2.53
Rangitaiki	Rangitaiki	Wheao		0.63	1.05	0.55	0.18	0.31	1.36	1.90
Rangitaiki	Rotomahana	Lake Rotomahana		6.62	10.38	8.99	0.10	0.17	15.71	19.54
Rangitaiki	Tarawera	Lake Okareka		0.26	0.44	0.04	0.01	0.02	0.31	0.50
Rangitaiki	Tarawera	Lake Rotokakahi		0.13	0.22	0.00	0.00	0.00	0.13	0.22
Rangitaiki	Tarawera	Lake Tarawera		0.96	1.64	0.09	0.06	0.10	1.12	1.84
Rangitaiki	Tarawera	Lower Tarawera area		8.95	14.20	12.36	1.33	2.21	22.64	28.77
Rangitaiki	Tarawera	Mangate		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rangitaiki	Tarawera	Mangawhio		0.01	0.02	0.01	0.01	0.01	0.03	0.04
Rangitaiki	Tarawera	Mangawiki		1.16	1.88	1.32	0.43	0.72	2.90	3.91
Rangitaiki	Tarawera	Mt. Tarawera		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rangitaiki	Tarawera	Otakiri		0.46	0.76	0.41	0.05	0.08	0.91	1.25
Rangitaiki	Tarawera	Waiaute		0.12	0.20	0.15	0.01	0.01	0.28	0.36
Rangitaiki	Tarawera	Waikamihi		1.03	1.67	1.08	0.14	0.23	2.26	2.98
Rangitaiki	Tarawera	Waikanapiti		0.85	1.37	1.11	0.13	0.21	2.09	2.69
Rangitaiki	Tikitapu	Lake Tikitapu		0.02	0.03	0.00	0.00	0.00	0.02	0.03
Tauranga Harbour	Tauranga Harbour	Aongatete		0.92	1.46	1.22	0.28	0.47	2.42	3.15
Tauranga Harbour	Tauranga Harbour	Apata		0.41	0.69	0.23	0.31	0.52	0.95	1.45
Tauranga Harbour	Tauranga Harbour	Kaitemako		0.63	1.05	0.66	0.33	0.56	1.63	2.26
Tauranga Harbour	Tauranga Harbour	Katikati Streams		0.20	0.32	0.30	0.01	0.01	0.51	0.63
Tauranga Harbour	Tauranga Harbour	Kopurererua		1.75	2.90	1.67	1.20	2.00	4.61	6.57
Tauranga Harbour	Tauranga Harbour	Mangapapa/Opuiaki		0.50	0.79	0.55	0.11	0.18	1.16	1.52
Tauranga Harbour	Tauranga Harbour	Maungatawa area		0.43	0.71	0.43	0.32	0.54	1.18	1.67

Greater Catchment	Primary Catchment	Secondary Catchment	Tertiary Catchment	Agric ADD	Agric PDD	Dairy Shed	Dom ADD	Dom PDD	Total ADD	Total PDD
Tauranga Harbour	Tauranga Harbour	Omanawa		1.72	2.74	2.04	0.30	0.49	4.06	5.28
Tauranga Harbour	Tauranga Harbour	Otumoetai area		0.29	0.44	0.44	0.00	0.00	0.72	0.88
Tauranga Harbour	Tauranga Harbour	Oturu		0.21	0.35	0.20	0.13	0.21	0.54	0.77
Tauranga Harbour	Tauranga Harbour	Tahawai		0.41	0.68	0.41	0.24	0.39	1.06	1.49
Tauranga Harbour	Tauranga Harbour	Tauranga city area		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tauranga Harbour	Tauranga Harbour	Te Mania		0.48	0.78	0.49	0.21	0.35	1.18	1.62
Tauranga Harbour	Tauranga Harbour	Te Puna area		0.11	0.18	0.14	0.02	0.03	0.27	0.35
Tauranga Harbour	Tauranga Harbour	Te Puna		1.25	2.08	0.95	0.52	0.86	2.72	3.90
Tauranga Harbour	Tauranga Harbour	Te Rereatukahia		0.30	0.49	0.30	0.25	0.42	0.85	1.21
Tauranga Harbour	Tauranga Harbour	Tuapiro		1.05	1.75	0.97	0.14	0.23	2.16	2.95
Tauranga Harbour	Tauranga Harbour	Uretara		0.93	1.50	1.14	0.29	0.48	2.36	3.11
Tauranga Harbour	Tauranga Harbour	Waiau		1.30	2.10	1.59	0.11	0.19	3.00	3.88
Tauranga Harbour	Tauranga Harbour	Waihi Beach		0.93	1.52	1.05	0.09	0.15	2.07	2.72
Tauranga Harbour	Tauranga Harbour	Waimapu		4.56	7.52	4.27	2.97	4.95	11.80	16.74
Tauranga Harbour	Tauranga Harbour	Wainui		0.69	1.20	0.39	0.24	0.41	1.33	1.99
Tauranga Harbour	Tauranga Harbour	Waione		0.44	0.69	0.61	0.08	0.13	1.13	1.43
Tauranga Harbour	Tauranga Harbour	Waipapa		1.17	1.94	1.04	0.77	1.28	2.98	4.26
Tauranga Harbour	Tauranga Harbour	Wairoa		3.00	4.99	2.27	1.82	3.04	7.10	10.30
Tauranga Harbour	Tauranga Harbour	Wairoa	Ohourere	1.01	1.65	0.88	0.19	0.32	2.08	2.85
Tauranga Harbour	Tauranga Harbour	Waitao area		1.06	1.81	0.48	0.71	1.19	2.25	3.48
Tauranga Harbour	Tauranga Harbour	Waitekohe		0.45	0.76	0.36	0.09	0.16	0.90	1.27
Tauranga Harbour	Tauranga Harbour	Welcome Bay area		0.55	0.91	0.54	0.28	0.46	1.37	1.91
Tauranga Harbour	Tauranga Harbour	Whatakao		0.46	0.79	0.20	0.12	0.20	0.78	1.19
Waioeka	Waioeka	Apanui		1.94	3.13	2.21	0.07	0.12	4.22	5.46
Waioeka	Waioeka	Koranga		11.77	18.31	18.25	0.11	0.18	30.12	36.74
Waioeka	Waioeka	Kukumoa Creek		1.76	2.80	2.37	0.11	0.19	4.24	5.36
Waioeka	Waioeka	Mangaoira		0.00	0.00	0.00	0.00	0.00	0.00	0.00

Greater Catchment	Primary Catchment	Secondary Catchment	Tertiary Catchment	Agric ADD	Agric PDD	Dairy Shed	Dom ADD	Dom PDD	Total ADD	Total PDD
Waioeka	Waioeka	Omaukora		0.08	0.14	0.00	0.00	0.00	0.08	0.14
Waioeka	Waioeka	Opato		0.19	0.31	0.20	0.01	0.01	0.40	0.52
Waioeka	Waioeka	Otara		2.69	4.23	3.92	0.17	0.29	6.78	8.44
Waioeka	Waioeka	Otara	Pakahi	1.16	1.84	1.64	0.08	0.14	2.88	3.61
Waioeka	Waioeka	Otara	Te Waiti	0.07	0.11	0.08	0.01	0.01	0.16	0.20
Waioeka	Waioeka	Otara	Tutaetoko	0.11	0.18	0.13	0.05	0.08	0.29	0.39
Waioeka	Waioeka	Tataweka		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waioeka	Waioeka	Tauranga		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waioeka	Waioeka	Te Karaka Stream		0.93	1.46	1.38	0.04	0.07	2.35	2.90
Waioeka	Waioeka	Te Pato		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waioeka	Waioeka	Waiata		0.01	0.02	0.00	0.00	0.00	0.01	0.02
Waioeka	Waioeka	Waioeka area		1.81	2.88	2.38	0.11	0.19	4.30	5.45
Waioeka	Waioeka	Wairata		0.69	1.13	0.72	0.03	0.05	1.44	1.90
Waitahanui	Mimiha Coastal			2.11	3.52	1.70	0.37	0.62	4.19	5.85
Waitahanui	Ohinekoao Coastal			0.26	0.45	0.10	0.13	0.21	0.49	0.76
Waitahanui	Otamarakau Coastal			0.19	0.30	0.29	0.05	0.09	0.53	0.68
Waitahanui	Pikowai Coastal			1.00	1.71	0.49	0.31	0.51	1.79	2.71
Waitahanui	Rotoehu	Lake Rotoehu		0.81	1.27	1.11	0.07	0.12	2.00	2.50
Waitahanui	Rotoma	Lake Rotoma		0.33	0.55	0.03	0.09	0.15	0.45	0.74
Waitahanui	Ruataniwha Coastal			0.05	0.09	0.00	0.05	0.08	0.10	0.17
Waitahanui	Waitahanui			2.23	3.62	2.37	0.24	0.41	4.84	6.40
Whakatane	Whakatane	Kanihi		0.02	0.03	0.02	0.00	0.00	0.04	0.05
Whakatane	Whakatane	Ohane		0.13	0.21	0.19	0.00	0.00	0.32	0.40
Whakatane	Whakatane	Ohora		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Whakatane	Whakatane	Oromoeroa		3.50	5.57	4.77	1.68	2.79	9.95	13.13
Whakatane	Whakatane	Upper Whakatane		0.75	1.23	0.49	1.46	2.43	2.70	4.15
Whakatane	Whakatane	Waikare		0.04	0.07	0.04	0.00	0.00	0.07	0.10

Greater Catchment	Primary Catchment	Secondary Catchment	Tertiary Catchment	Agric ADD	Agric PDD	Dairy Shed	Dom ADD	Dom PDD	Total ADD	Total PDD
Whakatane	Whakatane	Waimana		7.56	12.14	9.54	3.37	5.61	20.47	27.29
Whakatane	Whakatane	Waimana	Tauranga	0.05	0.08	0.06	0.08	0.13	0.19	0.27
Whakatane	Whakatane	Waimana	Waiiti	0.04	0.07	0.07	0.01	0.01	0.12	0.15
Whakatane	Whakatane	Waioho		3.32	5.52	2.85	0.91	1.52	7.09	9.90
Whakatane	Whakatane	Whakatane Area		6.94	10.96	9.37	2.99	4.98	19.30	25.31
								Total (l/s)	**598.5**	**776.5**

APPENDIX B Groundwater Use by Shallow Aquifer System (volumes in litres/sec)

Shallow Aquifer	Agric ADD	Agric PDD	Dairy Shed	Dom ADD	Dom PDD	Total ADD	Total PDD
Aongatete	0.28	0.47	0.22	0.14	0.23	0.64	0.92
Apata	0.09	0.16	0.03	0.17	0.29	0.29	0.47
Awaiti Canal	4.60	7.29	6.41	2.15	3.58	13.16	17.28
Awakaponga	0.06	0.11	0.04	0.55	0.92	0.65	1.07
Edgecumbe Catchwater	0.15	0.24	0.20	0.33	0.55	0.68	0.99
Hauone	0.13	0.21	0.15	0.18	0.31	0.46	0.66
Kaikokopu-Pokopoko-Wharere	0.45	0.72	0.61	0.18	0.30	1.24	1.62
Kaitemako	0.05	0.08	0.02	0.23	0.39	0.30	0.49
Katikati Streams	0.05	0.08	0.06	0.03	0.04	0.13	0.18
Kope Orini 1	2.02	3.21	2.79	0.59	0.99	5.40	6.98
Kope Orini 2	0.06	0.10	0.10	0.20	0.34	0.36	0.53
Kope Orini 3	0.08	0.15	0.01	0.63	1.05	0.72	1.20
Kopurererua	0.48	0.81	0.39	1.51	2.52	2.39	3.72
Lower Kaituna (Hills)	0.34	0.56	0.32	1.04	1.74	1.71	2.62
Lower Kaituna (Plains)	0.87	1.40	1.07	1.01	1.68	2.94	4.15
Maketu	0.02	0.04	0.01	0.00	0.00	0.04	0.05
Mangamako area	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mangaone Stream	0.07	0.12	0.05	0.15	0.25	0.27	0.42
Mangapapa/Opuiaki	0.03	0.05	0.03	0.10	0.17	0.16	0.25
Mangate	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mangawhio	0.00	0.01	0.00	0.01	0.01	0.01	0.02
Mangorewa	0.54	0.90	0.48	0.20	0.34	1.23	1.72

Shallow Aquifer	Agric ADD	Agric PDD	Dairy Shed	Dom ADD	Dom PDD	Total ADD	Total PDD
Matakana Island	0.07	0.12	0.00	0.00	0.00	0.07	0.12
Maungatawa area	0.20	0.33	0.20	1.13	1.89	1.53	2.42
Mimiha	0.15	0.23	0.20	0.36	0.60	0.71	1.04
Newdicks	0.00	0.01	0.00	0.00	0.00	0.00	0.01
Ngakauroa Stream	0.10	0.17	0.05	0.51	0.85	0.66	1.08
Nursery Drain	0.02	0.03	0.01	0.19	0.32	0.22	0.36
Ohinekoao	0.00	0.00	0.00	0.02	0.03	0.02	0.04
Ohinepanea	0.01	0.02	0.02	0.01	0.02	0.04	0.05
Ohope-Ohiwa	0.81	1.45	0.26	0.21	0.35	1.29	2.06
Old Rangitaiki Canal	1.76	2.79	2.45	0.27	0.46	4.49	5.70
Omanawa	0.32	0.52	0.40	0.57	0.95	1.29	1.87
Ongare/Tanners Point	0.05	0.08	0.05	0.01	0.02	0.11	0.15
Opotiki	0.64	1.07	0.52	0.18	0.30	1.35	1.90
Oromoeroa Flats	0.00	0.00	0.00	0.37	0.62	0.38	0.63
Oromoeroa Hills	0.01	0.01	0.01	0.00	0.00	0.02	0.02
Otamarakau	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Otumoetai area	0.05	0.09	0.02	0.05	0.08	0.11	0.18
Oturu	0.04	0.06	0.04	0.01	0.02	0.09	0.12
Pikowai	0.08	0.13	0.07	0.06	0.10	0.21	0.30
Pongakawa	0.22	0.35	0.29	0.07	0.12	0.58	0.75
Pukehina	0.29	0.47	0.36	0.03	0.06	0.69	0.89
Pukehina Beach	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rangitaiki Dunes	0.51	0.81	0.67	0.14	0.24	1.32	1.72
Reids Central Canal	3.50	5.52	5.05	1.28	2.13	9.83	12.69
Rotoroa	0.05	0.07	0.07	0.12	0.20	0.24	0.34
Ruataniwha	0.02	0.03	0.03	0.03	0.05	0.09	0.12
Tahawai	0.03	0.05	0.03	0.02	0.04	0.08	0.11

Shallow Aquifer	Agric ADD	Agric PDD	Dairy Shed	Dom ADD	Dom PDD	Total ADD	Total PDD
Tarawera Dunes	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tauranga city area	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Te Mania	0.02	0.03	0.01	0.07	0.12	0.10	0.17
Te Puna area	0.07	0.11	0.07	0.04	0.07	0.18	0.24
Te Rahu 1	0.12	0.20	0.13	0.27	0.45	0.52	0.78
Te Rahu 2	0.56	0.91	0.62	0.66	1.11	1.84	2.63
Te Rereatukahia	0.01	0.02	0.00	0.02	0.03	0.03	0.05
Tirohanga	0.91	1.47	1.12	0.43	0.72	2.47	3.32
Tuapiro	0.03	0.05	0.03	0.00	0.00	0.06	0.08
Tumarau	0.01	0.01	0.00	0.12	0.21	0.13	0.22
Tumurenui	0.09	0.15	0.03	0.26	0.43	0.37	0.61
Upper Tarawera	0.02	0.03	0.03	0.07	0.11	0.12	0.18
Uretara	0.08	0.13	0.05	0.03	0.05	0.15	0.23
Waiau	0.12	0.19	0.14	0.03	0.05	0.29	0.38
Waiaute	0.17	0.26	0.25	0.01	0.02	0.43	0.54
Waihi Beach	0.14	0.21	0.21	0.03	0.04	0.37	0.46
Waikamihi Stream	0.08	0.14	0.08	0.12	0.20	0.29	0.42
Waikanapiti	0.03	0.05	0.03	0.05	0.08	0.11	0.16
Waikowhewhe area	0.01	0.01	0.01	0.14	0.24	0.16	0.26
Waimana East Flats	0.01	0.02	0.01	0.35	0.59	0.38	0.62
Waimana Hills	0.01	0.02	0.02	0.08	0.13	0.10	0.16
Waimana West Flats	0.01	0.02	0.00	0.05	0.08	0.06	0.10
Waimapu	0.24	0.42	0.14	1.57	2.62	1.96	3.18
Wainui	0.13	0.22	0.08	0.44	0.73	0.65	1.03
Waioho Canal	1.48	2.32	2.19	1.26	2.10	4.92	6.60
Waione	0.01	0.01	0.01	0.04	0.06	0.06	0.09
Waiotahi	0.04	0.07	0.00	0.06	0.10	0.10	0.17

Shallow Aquifer	Agric ADD	Agric PDD	Dairy Shed	Dom ADD	Dom PDD	Total ADD	Total PDD
Waipapa	0.23	0.40	0.10	0.64	1.07	0.98	1.58
Wairoa-Ngamawahine	0.05	0.09	0.04	0.12	0.21	0.22	0.34
Wairoa-Ohourere	0.10	0.17	0.12	0.03	0.05	0.26	0.34
Wairoa-Wairoa	0.57	0.97	0.46	1.20	2.00	2.23	3.42
Waitahanui	0.07	0.11	0.05	0.11	0.18	0.23	0.35
Waitao area	0.05	0.09	0.04	0.25	0.41	0.34	0.54
Welcome Bay area	0.31	0.55	0.07	0.38	0.63	0.76	1.25
Whakatane Dunes	0.06	0.11	0.00	0.01	0.01	0.07	0.13
Whakatane East	0.04	0.07	0.01	0.28	0.47	0.33	0.55
Whakatane West Hills	0.01	0.02	0.00	0.11	0.18	0.12	0.20
Whatakao	0.20	0.32	0.23	0.18	0.30	0.61	0.85
					Total (l/s)	**80.2**	**112.2**

APPENDIX C Groundwater and 'Unknown' Use by Surface Water Catchment (volumes in litres/day)

	Groundwater					Unknown						
Full Catchment[3]	Agric ADD	Agric PDD	Dairy Shed	Dom ADD	Dom PDD	Agric ADD	Agric PDD	Dairy Shed	Dom ADD	Dom PDD	Total ADD	Total PDD
Kaituna_Kaituna_Lake Rotoiti_	0.27	0.43	0.15	0.73	1.22	0.00	0.00	0.00	0.15	0.26	1.30	2.05
Kaituna_Kaituna_Lake Rotoiti_Okawa Bay area	0.00	0.00	0.00	0.07	0.12	0.00	0.00	0.00	0.00	0.00	0.07	0.12
Kaituna_Kaituna_Lake Rotorua_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kaituna_Kaituna_Lake Rotorua_Awahou	0.55	0.91	0.53	0.01	0.02	0.00	0.00	0.00	0.00	0.00	1.09	1.46
Kaituna_Kaituna_Lake Rotorua_Awahou Point area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kaituna_Kaituna_Lake Rotorua_Hamurana area	0.22	0.37	0.09	0.01	0.01	0.05	0.10	0.00	0.01	0.02	0.38	0.59
Kaituna_Kaituna_Lake Rotorua_Hauraki	0.87	1.40	1.03	0.02	0.03	0.03	0.05	0.00	0.00	0.00	1.94	2.50
Kaituna_Kaituna_Lake Rotorua_Mokoia Island	0.02	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.06
Kaituna_Kaituna_Lake Rotorua_Ngongotaha	0.57	0.91	0.71	0.22	0.37	0.06	0.11	0.00	0.13	0.21	1.69	2.31
Kaituna_Kaituna_Lake Rotorua_Ngongotaha township area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kaituna_Kaituna_Lake Rotorua_Pohue Bay area	0.09	0.16	0.02	0.28	0.47	0.00	0.00	0.00	0.26	0.44	0.66	1.10
Kaituna_Kaituna_Lake Rotorua_Puarenga	0.09	0.15	0.08	0.04	0.07	0.02	0.04	0.00	0.05	0.08	0.28	0.42
Kaituna_Kaituna_Lake Rotorua_Rotokawa area	0.18	0.29	0.13	0.04	0.06	0.00	0.00	0.00	0.19	0.31	0.54	0.80
Kaituna_Kaituna_Lake Rotorua_Rotorua city area	0.02	0.03	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.05	0.06
Kaituna_Kaituna_Lake Rotorua_Utuhina	0.10	0.16	0.08	0.00	0.00	0.12	0.22	0.00	0.16	0.27	0.45	0.72
Kaituna_Kaituna_Lake Rotorua_Waimehia area	0.25	0.44	0.11	0.16	0.26	0.04	0.06	0.00	0.04	0.07	0.59	0.93
Kaituna_Kaituna_Lake Rotorua_Waingaehe	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.03	0.05

[3] These are concatenated names of the Greater, Primary, Secondary and Tertiary catchments

	Groundwater					Unknown						
Full Catchment[3]	Agric ADD	Agric PDD	Dairy Shed	Dom ADD	Dom PDD	Agric ADD	Agric PDD	Dairy Shed	Dom ADD	Dom PDD	Total ADD	Total PDD
Kaituna_Kaituna_Lake Rotorua_Waiohewa	0.05	0.08	0.00	0.19	0.32	0.00	0.00	0.00	0.10	0.17	0.34	0.57
Kaituna_Kaituna_Lake Rotorua_Waiowhiro area	0.04	0.06	0.05	0.02	0.03	0.01	0.01	0.00	0.05	0.09	0.17	0.24
Kaituna_Kaituna_Lake Rotorua_Waitawa area	0.04	0.07	0.04	0.02	0.04	0.00	0.01	0.00	0.01	0.02	0.12	0.17
Kaituna_Kaituna_Lake Rotorua_Waiteti	1.16	1.90	1.12	0.48	0.80	0.05	0.09	0.00	0.27	0.45	3.08	4.36
Kaituna_Kaituna_Lower Kaituna_Hururu	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01
Kaituna_Kaituna_Lower Kaituna_Kopuaroa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.08	0.05	0.08
Kaituna_Kaituna_Lower Kaituna_Lower Kaituna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kaituna_Kaituna_Lower Kaituna_Ohineangaanga	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.03	0.04
Kaituna_Kaituna_Lower Kaituna_Papamoa	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.00	0.00	0.00	0.03	0.05
Kaituna_Kaituna_Lower Kaituna_Parawhenuamea	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kaituna_Kaituna_Lower Kaituna_Rangiuru Soiuth	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kaituna_Kaituna_Lower Kaituna_Raparapahoe	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.08	0.13	0.08	0.13
Kaituna_Kaituna_Lower Kaituna_Te Puke East	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kaituna_Kaituna_Lower Kaituna_Upper Kaituna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
Kaituna_Kaituna_Lower Kaituna_Waiari	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kaituna_Kaituna_Mangorewa_	0.00	0.00	0.00	0.00	0.00	0.03	0.06	0.00	0.00	0.00	0.03	0.06
Kaituna_Lake Rotokawau_Waimata_	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Kaituna_Maketu Estuary Coastal_ _	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Motu_Haparapara_Haparapara area_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Motu_Haparapara_Waikakariki_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Motu_Hawai_ _	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Motu_Kereu_ _	0.06	0.10	0.00	0.03	0.05	0.00	0.01	0.00	0.00	0.00	0.09	0.16
Motu_Motu_Mangaotane_	0.15	0.24	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.39	0.48

	Groundwater					Unknown						
Full Catchment[3]	Agric ADD	Agric PDD	Dairy Shed	Dom ADD	Dom PDD	Agric ADD	Agric PDD	Dairy Shed	Dom ADD	Dom PDD	Total ADD	Total PDD
Motu_Motu_Mangatutara_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Motu_Motu_Motu area_	0.09	0.14	0.14	0.09	0.15	0.00	0.00	0.00	0.04	0.07	0.36	0.50
Motu_Motu_Rawea_	0.03	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.07
Motu_Motu_Te Kahika_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Motu_Omarumutu Coastal_ _	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.00	0.02	0.03	0.04	0.07
Motu_Pehitaiti Coastal_ _	0.00	0.00	0.00	0.02	0.04	0.01	0.01	0.00	0.00	0.00	0.03	0.05
Motu_Pokohinu Coastal_ _	0.01	0.01	0.01	0.08	0.13	0.00	0.00	0.00	0.01	0.01	0.11	0.17
Motu_Raukokore_Mangahaupapa_	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.03
Motu_Raukokore_Raukokore area_	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Motu_Raukokore_Waikura_	0.03	0.04	0.04	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.07	0.09
Motu_Tahurua Coastal_ _	0.10	0.16	0.16	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.26	0.32
Motu_Te Kaha Coastal_ _	0.24	0.38	0.36	0.15	0.25	0.00	0.00	0.00	0.02	0.03	0.77	1.02
Motu_Tirohanga Coastal_ _	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.10	0.16	0.10	0.17
Motu_Torere_ _	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.02
Motu_Waiaua_ _	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.08	0.13	0.08	0.14
Motu_Waikawa Coastal_ _	0.01	0.01	0.01	0.15	0.25	0.00	0.00	0.00	0.00	0.01	0.17	0.28
Motu_Waiokaha Coastal_ _	0.54	0.89	0.13	0.24	0.40	0.00	0.00	0.00	0.00	0.01	0.92	1.43
Motu_Whangaparaoa_ _	0.01	0.01	0.00	0.05	0.08	0.01	0.02	0.00	0.02	0.03	0.09	0.15
Motu_Whituare Coastal_ _	0.03	0.05	0.00	0.05	0.08	0.00	0.00	0.00	0.01	0.01	0.08	0.15
Ohiwa_Maraetotara Coastal_ _	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Ohiwa_Ohiwa_Kutarere area_	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.00	0.34	0.57	0.37	0.62
Ohiwa_Ohiwa_Nukuhou_	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.20	0.34	0.21	0.35
Ohiwa_Ohiwa_Wainui area_	0.00	0.00	0.00	0.00	0.00	0.04	0.07	0.00	0.32	0.53	0.35	0.60
Ohiwa_Waiotahi Beach Coastal_ _	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.07	0.12	0.08	0.14
Ohiwa_Waiotahi_ _	0.00	0.00	0.00	0.00	0.00	0.16	0.30	0.00	0.17	0.28	0.33	0.58
Pongakawa_Newdicks Coastal_ _	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

	Groundwater					Unknown						
Full Catchment[3]	Agric ADD	Agric PDD	Dairy Shed	Dom ADD	Dom PDD	Agric ADD	Agric PDD	Dairy Shed	Dom ADD	Dom PDD	Total ADD	Total PDD
Pongakawa_Ohinepanea Coastal_ _	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.04	0.06	0.04	0.07
Pongakawa_Pukehina Beach Coastal_ _	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pongakawa_Pukehina Coastal_ _	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.03	0.05
Pongakawa_Waihi Estuary_Kaikokopu_Kaikokopu area	0.00	0.00	0.00	0.00	0.00	0.13	0.24	0.00	0.11	0.18	0.24	0.42
Pongakawa_Waihi Estuary_Kaikokopu_Pokopoko	0.00	0.00	0.00	0.00	0.00	0.07	0.13	0.00	0.21	0.36	0.28	0.49
Pongakawa_Waihi Estuary_Pongakawa_Pongakawa area	0.00	0.00	0.00	0.00	0.00	0.04	0.07	0.00	0.16	0.26	0.19	0.33
Pongakawa_Waihi Estuary_Pongakawa_Wharere	0.00	0.00	0.00	0.00	0.00	0.04	0.08	0.00	0.28	0.47	0.33	0.55
Rangitaiki_Okaro_ _	0.01	0.01	0.00	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.03	0.05
Rangitaiki_Okataina_Lake Okataina_	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03
Rangitaiki_Rangitaiki_Horomanga_	0.74	1.16	1.11	0.69	1.14	0.00	0.00	0.00	0.00	0.00	2.54	3.42
Rangitaiki_Rangitaiki_Kaingaroa area_	0.47	0.74	0.72	0.79	1.32	0.00	0.00	0.00	0.02	0.03	2.01	2.82
Rangitaiki_Rangitaiki_Lake Rerewhakaaitu_	0.72	1.12	1.11	0.30	0.51	0.00	0.00	0.00	0.20	0.33	2.33	3.06
Rangitaiki_Rangitaiki_Mangamako area_	0.39	0.61	0.58	0.80	1.34	0.00	0.00	0.00	0.04	0.06	1.80	2.58
Rangitaiki_Rangitaiki_Mangatiti area_	0.00	0.00	0.00	0.04	0.07	0.00	0.00	0.00	0.00	0.00	0.05	0.08
Rangitaiki_Rangitaiki_Otamatea_	0.02	0.03	0.02	0.11	0.19	0.00	0.00	0.00	0.00	0.00	0.14	0.23
Rangitaiki_Rangitaiki_Pokairoa_	0.87	1.36	1.34	0.28	0.46	0.00	0.00	0.00	0.04	0.07	2.53	3.23
Rangitaiki_Rangitaiki_Pouarua area_	0.02	0.04	0.03	0.03	0.05	0.00	0.00	0.00	0.00	0.00	0.09	0.12
Rangitaiki_Rangitaiki_Waikowhewhe area_	0.01	0.02	0.00	0.42	0.70	0.00	0.00	0.00	0.00	0.00	0.43	0.71
Rangitaiki_Rangitaiki_Wheao_	0.03	0.05	0.03	0.10	0.16	0.00	0.00	0.00	0.00	0.00	0.16	0.25
Rangitaiki_Rangitaiki_Whirinaki_	0.03	0.05	0.04	0.18	0.31	0.00	0.00	0.00	0.03	0.05	0.29	0.45
Rangitaiki_Rotomahana_Lake Rotomahana_	0.43	0.69	0.60	0.09	0.14	0.00	0.00	0.00	0.17	0.28	1.29	1.71
Rangitaiki_Tarawera_Lake Okareka_	0.03	0.05	0.00	0.05	0.09	0.00	0.00	0.00	0.01	0.01	0.09	0.15
Rangitaiki_Tarawera_Lake Rotokakahi_	0.12	0.19	0.04	0.02	0.03	0.00	0.00	0.00	0.00	0.00	0.17	0.26
Rangitaiki_Tarawera_Lake Tarawera_	0.10	0.16	0.05	0.03	0.06	0.03	0.06	0.00	0.06	0.10	0.28	0.43
Rangitaiki_Tarawera_Lower Tarawera area_	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.05	0.09	0.06	0.10

	Groundwater					Unknown						
Full Catchment[3]	Agric ADD	Agric PDD	Dairy Shed	Dom ADD	Dom PDD	Agric ADD	Agric PDD	Dairy Shed	Dom ADD	Dom PDD	Total ADD	Total PDD
Rangitaiki_Tarawera_Mangate_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rangitaiki_Tarawera_Mangawhio_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rangitaiki_Tarawera_Mangawiki_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.03	0.06
Rangitaiki_Tarawera_Mt. Tarawera_	0.03	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.05
Rangitaiki_Tarawera_Otakiri_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rangitaiki_Tarawera_Waiaute_	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.01	0.03
Rangitaiki_Tarawera_Waikamihi_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.22	0.13	0.22
Rangitaiki_Tarawera_Waikanapiti_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.03	0.04
Rangitaiki_Tikitapu_Lake Tikitapu_	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03
Tauranga Harbour_Tauranga Harbour_Aongatete_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
Tauranga Harbour_Tauranga Harbour_Apata_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.03	0.05
Tauranga Harbour_Tauranga Harbour_Kaitemako_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.03	0.04
Tauranga Harbour_Tauranga Harbour_Katikati Streams_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
Tauranga Harbour_Tauranga Harbour_Kopurererua_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tauranga Harbour_Tauranga Harbour_Mangapapa/Opuiaki_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tauranga Harbour_Tauranga Harbour_Maungatawa area_	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.01	0.01	0.02	0.03
Tauranga Harbour_Tauranga Harbour_Omanawa_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tauranga Harbour_Tauranga Harbour_Ongare/Tanners Point_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tauranga Harbour_Tauranga Harbour_Otumoetai area_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tauranga Harbour_Tauranga Harbour_Oturu_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.02	0.04
Tauranga Harbour_Tauranga Harbour_Tahawai_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tauranga Harbour_Tauranga	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.20	0.12	0.20

	Groundwater					Unknown						
Full Catchment[3]	Agric ADD	Agric PDD	Dairy Shed	Dom ADD	Dom PDD	Agric ADD	Agric PDD	Dairy Shed	Dom ADD	Dom PDD	Total ADD	Total PDD
Harbour_Tauranga city area_												
Tauranga Harbour_Tauranga Harbour_Te Mania_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.10	0.06	0.10
Tauranga Harbour_Tauranga Harbour_Te Puna area_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tauranga Harbour_Tauranga Harbour_Te Puna_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.23	0.14	0.24
Tauranga Harbour_Tauranga Harbour_Te Rereatukahia_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tauranga Harbour_Tauranga Harbour_Tuapiro_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.02
Tauranga Harbour_Tauranga Harbour_Uretara_	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.02	0.03	0.03	0.04
Tauranga Harbour_Tauranga Harbour_Waiau_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.03	0.06
Tauranga Harbour_Tauranga Harbour_Waihi Beach_	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.00	0.02	0.04	0.04	0.07
Tauranga Harbour_Tauranga Harbour_Waimapu_	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.04	0.07	0.05	0.08
Tauranga Harbour_Tauranga Harbour_Wainui_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
Tauranga Harbour_Tauranga Harbour_Waione_	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01
Tauranga Harbour_Tauranga Harbour_Waipapa_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tauranga Harbour_Tauranga Harbour_Wairoa_	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.08	0.13	0.09	0.15
Tauranga Harbour_Tauranga Harbour_Wairoa_Ngamawahine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.02	0.03
Tauranga Harbour_Tauranga Harbour_Wairoa_Ohourere	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.00	0.11	0.18	0.13	0.23
Tauranga Harbour_Tauranga Harbour_Waitao area_	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.07	0.12	0.07	0.12
Tauranga Harbour_Tauranga Harbour_Waitekohe_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.02	0.03

	Groundwater					Unknown						
Full Catchment[3]	Agric ADD	Agric PDD	Dairy Shed	Dom ADD	Dom PDD	Agric ADD	Agric PDD	Dairy Shed	Dom ADD	Dom PDD	Total ADD	Total PDD
Tauranga Harbour_Tauranga Harbour_Welcome Bay area_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.02
Tauranga Harbour_Tauranga Harbour_Whatakao_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waioeka_Waioeka_Apanui_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waioeka_Waioeka_Koranga_	0.01	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.04	0.05
Waioeka_Waioeka_Kukumoa Creek_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.13	0.08	0.13
Waioeka_Waioeka_Mangaoira_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waioeka_Waioeka_Omaukora_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waioeka_Waioeka_Opato_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waioeka_Waioeka_Otara_	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.03	0.05	0.03	0.05
Waioeka_Waioeka_Otara_Pakahi	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waioeka_Waioeka_Otara_Te Waiti	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waioeka_Waioeka_Otara_Tutaetoko	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waioeka_Waioeka_Tataweka_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waioeka_Waioeka_Tauranga_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waioeka_Waioeka_Te Karaka Stream_	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.09	0.15	0.10	0.16
Waioeka_Waioeka_Te Pato_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waioeka_Waioeka_Waiata_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waioeka_Waioeka_Waioeka area_	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.01
Waioeka_Waioeka_Wairata_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waitahanui_Hauone Coastal_ _	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.07	0.04	0.07
Waitahanui_Mimiha Coastal_ _	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.09	0.05	0.09
Waitahanui_Ohinekoao Coastal_ _	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.02
Waitahanui_Otamarakau Coastal_ _	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
Waitahanui_Pikowai Coastal_ _	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.06	0.04	0.06
Waitahanui_Rotoehu_Lake Rotoehu_	0.00	0.00	0.00	0.08	0.14	0.00	0.00	0.00	0.04	0.06	0.12	0.20

	Groundwater					Unknown						
Full Catchment[3]	Agric ADD	Agric PDD	Dairy Shed	Dom ADD	Dom PDD	Agric ADD	Agric PDD	Dairy Shed	Dom ADD	Dom PDD	Total ADD	Total PDD
Waitahanui_Rotoma_Lake Rotoma_	0.01	0.01	0.01	0.06	0.10	0.01	0.01	0.00	0.17	0.28	0.25	0.41
Waitahanui_Ruataniwha Coastal_ _	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waitahanui_Waitahanui_ _	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.00	0.19	0.31	0.21	0.36
Whakatane_Whakatane_Kanihi_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Whakatane_Whakatane_Ohane_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Whakatane_Whakatane_Ohora_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Whakatane_Whakatane_Oromoeroa_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.02	0.04
Whakatane_Whakatane_Upper Whakatane_	0.02	0.03	0.03	0.01	0.02	0.00	0.00	0.00	0.10	0.16	0.16	0.25
Whakatane_Whakatane_Waikare_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Whakatane_Whakatane_Waimana_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.09	0.06	0.10
Whakatane_Whakatane_Waimana_Tauranga	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
Whakatane_Whakatane_Waimana_Waiiti	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
Whakatane_Whakatane_Waioho_	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.02
Whakatane_Whakatane_Whakatane Area_	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.00	0.10	0.16	0.12	0.21
										Total (l/s)	**36.1**	**52.4**