Environmental Data Summaries

Air Quality, Meteorology, Rainfall, Hydrology and Water Temperature

Report to 31 December 2005

Environment Bay of Plenty

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Chapter 1: Introduction

While every care has been taken to ensure the results contained within this report are factual and accurate, it is important that users are aware of the limitations of the data. Due to the vast amount of data contained within this report it is possible that errors may be present or updates may have occurred since the production of this report. For this reason users of the data are advised to consult with the recording authority where appropriate. Data users are cautioned regarding the use of the information contained in this report for decisions that concern personal or public safety, or the conduct of business that involves monetary or operational consequences without first contacting the appropriate recording authority for the data.

Environment Bay of Plenty and its employees, while providing this information in good faith, accepts no responsibility for any loss, damage, injury in value to any person, service or otherwise resulting from its use.

The limitations of data are sometimes described in the relevant comment files attached to the calculated data summaries. These comments may not be the full extent of all comments relating to the data and users of the data should contact the recording authority responsible for the data.

1.1 Background

The data summaries concept was developed as part of the Hydrology Data Overview Report (Environment B.O.P, 1991). During the compilation of that report a number of users of hydrometric data were surveyed to determine their requirements. That feedback became the foundation for the data summaries contained in this report.

1.2 Natural Environment Regional Monitoring Network

Operation of the Natural Environment Regional Monitoring Network (NERMN) is an important function of Environment Bay of Plenty and many of the stations summarised in this report are part of that network.

Part IV, section 35(1) and 35(2a) of the Resource Management Act, (1991) directs Regional Councils to "gather such information, and or undertake or commission such research, and monitor the state of the whole or any part of the environment of its region or district to the extent that is appropriate, as is necessary to carry out effectively its functions under the Act".

A number of NERMN stations are operated by the National Institute of Water and Atmospheric Research Ltd (NIWA). The recording authority is acknowledged within the relevant data summary, and any questions related to the NIWA data should be directed to that authority.

The summaries contained within this report include both NERMN and non-NERMN stations.

1.3 Report Structure

This report summarises air quality, meteorological, rainfall, river flow, river level, lake level, groundwater level, and water temperature. The order of presentation provided in Chapter Three is shown in Table 1.3.

Table 1.3 Report Structure

Network:	Air Quality			
Sub-order:	Particulate	Carbon monoxide	Hydrogen sulphide	
Sub-sub-order:	Sites are presented in site number order so neighbouring sites (geographically) are presented on pages adjacent to each other.			
Network:	Meteorological			
Sub-order:	Wind speed	Wind direction	Air Temperature	
Sub-sub-order:	Sites are presented in site number order so neighbouring sites (geographically) are presented on pages adjacent to each other.			
Network:	Rainfall			
Sub-order:	Manual	Automatic		
Sub-sub-order:	Sites are presented in site number order so neighbouring sites (geographically) are presented on pages adjacent to each other.			
Network:	Flow Monitoring			
Sub-order:	River Flow			
Sub-sub-order:	Sites are presented in site number order so neighbouring sites (geographically) are presented on pages adjacent to each other.			
Network:	Water Level Monitoring			
Sub-order:	River Level	Lake Level	Groundwater Level	
Sub-sub-order:	Sites are presented in site number order so neighbouring sites (geographically) are presented on pages adjacent to each other.			
Network:	Water Temperature Monitoring			
Sub-order:	Water Temperature			
Sub-sub-order:	Sites are presented in site number order so neighbouring sites (geographically) are presented on pages adjacent to each other.			

Chapter 2: Methodology

The data contained in this report has been derived from a variety of instruments, methods and standards. The methods are described here in order that some understanding of the origin and limitations of the data may be achieved.

Environmental Data Services implements internal auditing procedures, with verification by external review. Approximately 97% of the Environment Bay of Plenty data contained in this report has undergone this auditing process. NIWA data has been audited using their registered auditing procedures. In each case the extent of auditing is detailed in the individual data summaries.

2.1 Monitoring Networks

The Environment Bay of Plenty Natural Environment Regional Monitoring network was not initiated until July 1990. Prior to this date there were in operation a number of groups of stations that represented hydrometric 'networks'.

2.1.1 Air quality monitoring stations

Environment Bay of Plenty air quality monitoring includes measurement of particulate matter less than 10 microns (PM_{10}), carbon monoxide (CO), hydrogen sulphide (H_2S), nitrogen oxide (NO) and sulphur dioxide (SO_2). Long term monitoring stations have been established in Tauranga, Rotorua, Pongakawa and Whakatane. In conjunction with the long-term stations, a portable caravan has been constructed to house PM_{10} and CO measurement instrumentation, which allows for short term impact and compliance monitoring at various locations throughout the Bay of Plenty.

A summary of the air quality stations provided in the report is provided in Table 3.1. The ‘ID No.’ given in that table refers to the reference location displayed on Figure 3.1.

2.1.2 Meteorological stations

Environment Bay of Plenty presently has seven meteorological stations monitoring wind and air temperature. Four of these stations have recently been installed as part of the air quality monitoring network and have limited data at this time. Of the other three, one is located at Edgecumbe in the Environment Bay of Plenty drainage works yard, another is located at the Pererika Street air quality monitoring station in Rotorua and a third at the Otumoetai air quality monitoring station in Tauranga. A fourth station was operational from May 1993 to June 1997 located at the Te Teko racecourse on the Rangitaiki Plains.

Wind record from three NIWA meteorological stations has also been included for completeness. These meteorological stations are located at Tauranga Airport, Rotorua Airport and Whakatane Airport.

A summary of the meteorological stations and the parameters they measure is given in Table 3.2. The 'ID No.' given in that table refers to the reference location displayed on Figure 3.2.

2.1.3 Rainfall monitoring stations

The rainfall monitoring networks operated by Environment Bay of Plenty are more widely distributed and have greater periods of record than other environmental parameters. The rainfall networks are subdivided into two types (manual and automatic) depending on the type of recording mechanism operated.

(a) Manual Raingauges

Daily manual raingauges are read once per day (usually between 0700 and 0900 hours) by voluntary raingauge readers. The data is generally reliable and in some cases the length of record is significant.

A summary of these raingauges is given in Table 3.3. The 'ID No.' given in that table refers to the reference location displayed on Figure 3.3.

(b) Automatic Raingauges

Automatic raingauges commonly record at intervals of 15 minutes and are therefore able to record intensities of short rainfall events. Data is stored electronically, which makes automatic raingauges ideal for remote locations.

A summary of these raingauges is given in Table 3.4. The 'ID No.' given in that table refers to the reference location displayed on Figure 3.4.

2.1.4 Flow monitoring stations

The flow monitoring network contains both Environment Bay of Plenty and NIWA stations. The operator of each station is acknowledged in the individual data summary details.

The river flow monitoring stations are normally derived from river level data and hence these stations also form part of the river level monitoring network (Section 2.1.5). In some cases summaries have not been carried out due to inadequate data quality, missing record, uncertified data, or insufficient length of record. A summary of river flow stations is given in Table 3.5.

2.1.5 River level monitoring stations

River level monitoring stations are operated as part of Environment Bay of Plenty's flood warning and monitoring function. Also included in this network are a number of stations that are operated to gather river level data for use in engineering design and other investigations. The designated purpose for each station is detailed in the individual station summary.

A summary of the river level monitoring stations is given in Table 3.6. The 'ID No.' given in that table refers to the reference location displayed on Figure 3.6.

2.1.6 Lake level monitoring stations

There are approximately 25 lakes within the Bay of Plenty region - excluding large ponds and lagoons. Of those, 12 are monitored by Environment Bay of Plenty as at December 2005.

Monitoring of Lake Rotorua and Lake Rotoiti has occurred at a number of stations operated by both NIWA and Environment Bay of Plenty. Datasets from the various stations have been combined to form a continuous dataset where appropriate.

A summary of lake level monitoring stations is given in Table 3.7. The 'ID No.' given in that table refers to the reference location displayed on Figure 3.7.

2.1.7 Groundwater level monitoring stations

The network of groundwater monitoring stations was not well developed until the late 1980's.

A summary of the groundwater level monitoring stations is given in Table 3.8. The 'ID No.' given in that table refers to the reference location displayed on Figure 3.8.

2.1.8 Water temperature monitoring stations

Automatic water temperature monitoring stations are generally used for scientific investigation and/or compliance monitoring purposes.

A summary of the water temperature monitoring stations is given in Table 3.9. The 'ID No.' given in that table refers to the reference location displayed on Figure 3.9.

2.2 Data Collection - (methods and instrumentation)

For detailed information regarding the topics of data collection in Section 2.2 refer to the EDS Air Monitoring Office Practice Manual (1999), EDS Office Practice Manual, (1998) and EDS Field Practice Manual, (1998).

2.2.1 Air quality data collection

In general, several instruments are installed at each air quality station for measurement of various parameters. Each parameter is described in detail in the following subsections. Table 2.2.1 details the equipment used and other relevant information.

Table 2.2.1 Air Quality Equipment

Parameter	Equipment	Range	Accuracy	Servicing
PM_{10}	TEOM	0 - 500μg/m³	±1.5μg/m³	Annual
PM_{10}	Partisol	Unlimited (dependant on pump performance)	±0.00001g	Annual
CO	ML9830	0-50ppm	0.1ppm or 1% of reading, which ever is greater	Annual
H_2S	MDA 7100	0 – 5000ppb	±5%	Annual

Environment Bay of Plenty uses two different PM_{10} measuring systems in its monitoring programme. The Tapered Element Oscillating Microbalance (TEOM) analysers provide continuous data. The Partisol analysers are manually operated and record only one data point for a 24-hour period.

(a) Continuous particulate data collection

Environment Bay of Plenty uses the TEOM Series 1400A ambient particulate monitor manufactured by Rupprecht and Patashnick. This instrument has a USEPA equivalency method designation EQPM-1090-079.

The TEOM Series 1400A PM10 monitor is a gravimetric instrument i.e. it draws ambient air through a filter at a constant flow rate, continuously 'weighing' the filter and calculating mass concentrations.

Measured values are transmitted as an analogue signal to a data logger. Two-second data from the instrument is averaged over a 10-minute period by the logger and stored in memory. These 10-minute averages are then used in the calculation of 24-hour averages, which can then be compared to MfE Ambient Air Quality guidelines.

(b) Manual particulate data collection

Environment Bay of Plenty uses the Partisol Model 2000, air sampler manufactured by Rupprecht and Patashnick. This instrument has a USEPA reference method designation RFPS-0694-098.

The Partisol Sampler is set up to collect particulate matter on a standard 47 mm filter for 24-hour periods from midnight to midnight. The filters used in this procedure are conditioned and weighed before exposure, and then conditioned and weighed again after exposure to determine the mass of particulate collected during the 24-hour exposure period. Weighing is undertaken on a semi-micro balance with a resolution of 0.00001g. The Partisol hardware stores the data relevant to each 24-hour collection period in its internal data logger for viewing and retrieval. Stored information includes the total volume of air passing through the filter, total collection time, average temperature and average pressure during the collection period.

(c) Carbon monoxide data collection

Environment Bay of Plenty uses a ML9830 Carbon Monoxide infrared analyser manufactured by Monitor Labs, USA. This instrument has a USEPA reference method designation RFCA-0992-088.

In the infrared analyser, broadband radiation is passed through a gas cell containing the air sample and the amount of light absorbed by carbon monoxide is compared against a reference beam.

As with the TEOM the data from the carbon monoxide instrument is collected and stored on a data logger.

(d) Hydrogen sulphide data collection

Environment Bay of Plenty initially used a MDA Scientific 7100 monitor manufactured by Zellweger Analytics, USA. This instrument has no USEPA reference or equivalency method designation.

Hydrogen sulphide (H_2S) was measured by the change in colour of a lead acetate impregnated tape (chemcassette). Ambient air passes through an external particulate filter and Teflon sampling line into the gas-sampling head. Sampled air passes through the tape, which changes colour. The rate of colour change is dependent on the concentration of the gas present. Gas concentrations are determined by the amount of light reflected from the surface of the tape. Averaged data was sent from the instrument to the data logger.

In 2005 the instrumentations was changed so that H_2S is measured by converting the H_2S to SO2 via a high temperature (275 to 1000 degrees Celsius) thermal oxidiser. An SO_2 analyser is then used to determine the concentration of the contaminant and report it as H_2S.

The SO_2 analyser uses UV fluorescence to determine the concentration of gas. Detail can be found in the ML9850B Sulphur Dioxide Analyser Operation and Service Manual.

2.2.2 Meteorological data collection

Several sensors are installed at each meteorological station for measurement of various parameters including, wind speed, wind direction, wind deviation, wind gust, relative humidity, and temperature. Table 2.2.2 details the equipment used and other relevant information.

Table 2.2.2 Meteorological Equipment

Equipment	Parameter	Range	Accuracy	Calibration & Servicing
Vector A101M	Wind Speed & Gusts	0.2 - 75 m/s	1% full range output (10-55m/s)	10 Hz per m/s ±2% Bi-annual service
Vector W200P	Wind Direction & Deviation	360°	±2°in wind >5m/s	Bi-annual service
Skye 2031	Air Temperature	-20 - 70°C	±0.2°C from 0 - 60°C	Bi-annual service
	Relative Humidity	0 – 100%	< 2% over full range	Rotronic standard Bi-annual service

2.2.3 Rainfall Data Collection

Rainfall has been measured and recorded using a variety of instruments. These instruments are detailed in Table 2.2.3.

Table 2.2.3 Raingauge Types

Name	Description	Recording Mechanism	Recording Frequency	Reading Accuracy
Marquis 600	Plastic manual gauge	Manual reader	Normally daily	To nearest 0.2mm[1]
Marquis 1000	Plastic manual gauge	Manual reader	Normally daily	To nearest 0.2mm[1]
Lambrecht	Siphoning raingauge	Ink trace on chart	Continuous	Varies
TB3	Tipping bucket	Data logger	15 minutes	0.5mm
OTA	Tipping bucket	Data logger	15 minutes	0.5mm
Note 1. Reading accuracy varies with the effectiveness of the individual raingauge reader				

2.2.4 Flow Data Collection

The predominant water level recording configurations for streams and rivers is the 'float-well' or 'pressure transducer' station as described in Section 2.2.5. Flow stations differ from level stations in that the level data needs to be converted to flow data. This conversion is carried out in two stages as described below:

(a) Flow gaugings

Discharge (*Q*) is calculated by measuring cross sectional area (*A*) and velocity (*V*) and applying Equation 1:

$$Q = A \times V \qquad (1)$$

Area measurements (width * mean depth) are calculated using a measuring tape and depth rod. Velocity measurements are determined using velocity (current) meters selected according to the conditions being measured.

Flow gaugings are generally based on 15 to 20 velocity profiles, 15 to 20 depth/width readings, and are normally accurate to within ±8%. This error is calculated in accordance with ISO 5168. Flow gaugings are carried out at all flow monitoring stations on a regular basis (normally monthly) in addition to special gaugings carried out during periods of high or low flows.

(b) Rating Curves

Flow stations record water level. To derive a continuous flow record it is necessary to measure stream flows at a range of stream levels. In this way it is possible to build a relationship (rating curve) between level and flow. The coordinates of the rating curve are stored in a computer so that continuous water level measurements can be converted into continuous water flow measurements.

Changes in rating curves occur as a result of changes in the relationship between water level and flow and are usually caused by channel erosion or deposition of bed material.

2.2.5 Water level data collection

There are two forms of water level recording system currently in use by Environment Bay of Plenty. The predominant water level recording configuration is the 'float-well' station (Figure 2.2.5). This system works on the basis of achieving an equivalent water level within a stilling well and uses a float and counterweight system connected to a recording instrument. In this way, accurate water level measurements can be made using electronic data loggers. Measurement accuracy using the float-well system is commonly ± 3 mm, but may vary depending on the structure design.

An alternative water level recording system consists of a pressure transducer connected to a data logger. Pressure transducers measure the pressure of water above a certain point and covert this to an equivalent depth of water. Measurement accuracy of pressure transducer installations is commonly ± 10 mm, but may vary depending on the equipment installed.

Recent improvements in technology and cost effectiveness have allowed the use of radar and ultrasonic sensors to measure the height of a water surface below a transducer. Measurement accuracy of ultrasonic and radar transducer installations is commonly ±10mm.

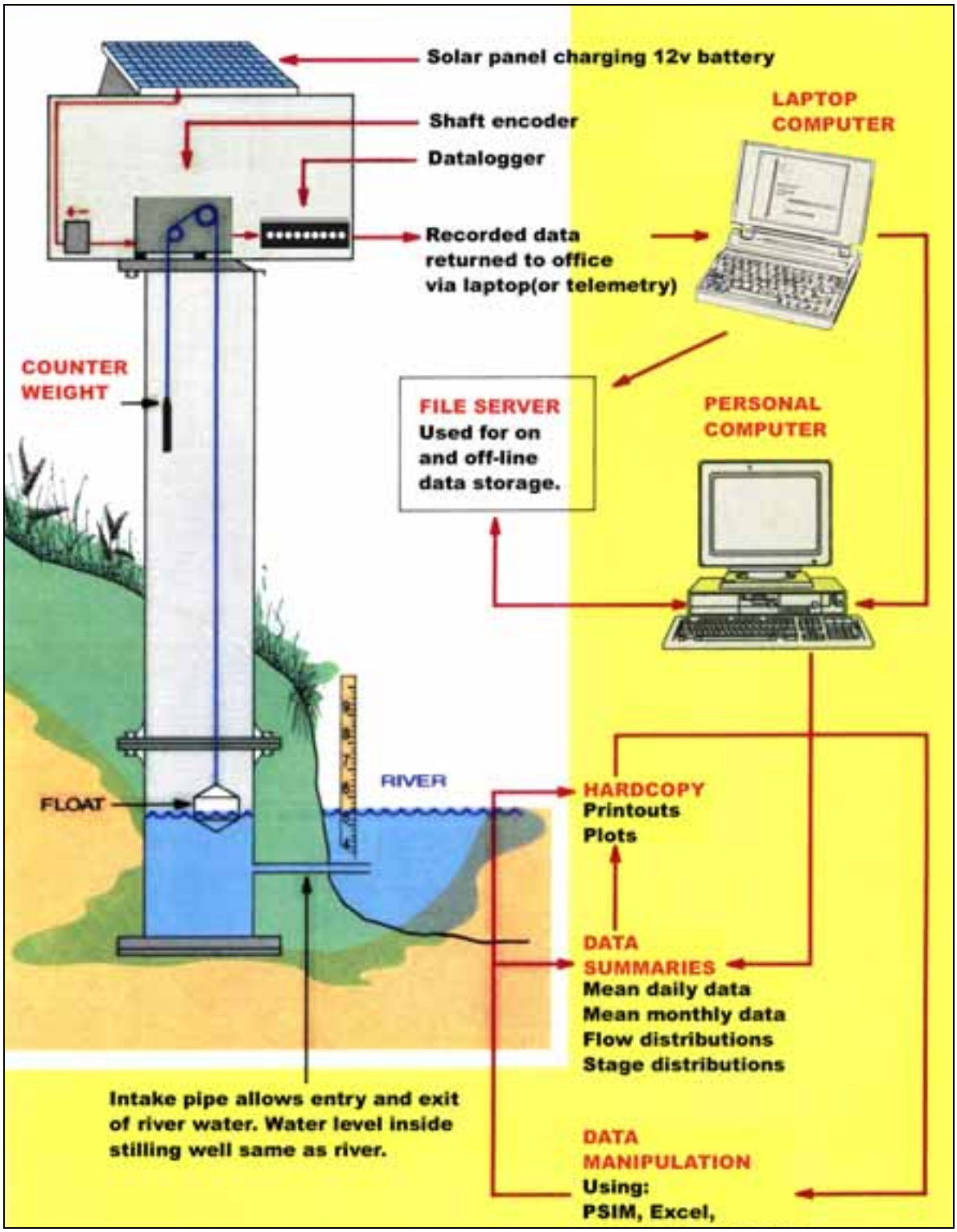


Figure 2.2.5 Typical Float-well Recording System

In earlier years Foxboro chart recorders were more prevalent. Foxboro recorders use a pressure bulb sensor, with accuracy being dependant upon the range of the instrument. Foxboro chart recorders were considered quite suitable for recording flood levels. By December 1995 all Foxboro recorders had been removed from Environment Bay of Plenty stations.

(a) River level

The float-well recording system is the preferred method for river level monitoring at Environment Bay of Plenty due to its high accuracy. Where channel morphology or station access prohibits the installation of a float-well structure, pressure transducers or radar are commonly used. At some river level stations pressure transducers are also used as backup sensors.

(b) Lake level

Lake level data collection is generally based on the float-well system with this being the common installation of the 1950's and 1960's. Problems have occurred when lake levels drop below the level of the lowest intake pipe for the stilling well. In these situations stilling wells have been lowered, or pressure transducers installed.

Pressure transducers have been used at various times since the mid 1980's. They were originally used as backup sensors, but as the reliability and accuracy of these instruments has improved they have been used as primary sensors.

Sampling intervals for lake levels have varied over the years. In the early years (pre. 1960) sampling intervals were often daily. In some cases records were kept for several years, stopped for several years, then restarted. The sampling interval since the 1960's has varied between 15 minutes, 30 minutes and 60 minutes. During periods when a chart recorder was used, the data was manually extracted from the charts at varying intervals ranging from hourly to daily.

(c) Groundwater level

In earlier years, the predominant recording configuration for measuring groundwater levels was based on the float-well system similar to that shown in Figure 2.2.5, except that the stilling well is replaced by a bore casing. In most cases the floats were made with reduced diameters so they would fit down the boreholes.

In the mid 1980's pressure transducers became available for measuring water levels and are now the preferred method of measurement. Pressure transducers have a diameter of approximately 40mm, which makes them ideal for use down boreholes; they are also very suitable for use in artesian bores. Pressure transducers are coupled to a data logger.

2.2.6 Water temperature data collection

The data collection stations contained in this report measure water temperatures in geothermal streams and the Tauranga Harbour. The equipment used at each station is determined by the temperatures to be measured as well as their desired accuracy. Each station summary describes the equipment used.

2.2.7 Data capture rates

The value of a dataset is determined by the quantity of its data values as well as by the quality of those data values. A measure of quantity is the data capture rate (%). The rates are a measure of the percent of record captured within the period summarised. A station with no missing record will have a data capture rate of 100%, while a station with 30% missing record will have a data capture rate of 70%. The data capture rates for the data summarised in this report are provided in the relevant sections of Chapter 3. In some cases, reasons for particularly low capture rates may be explained in the relevant comments pages within the data summary.

2.3 Data Processing

The method adopted by Environment Bay of Plenty for converting field data to computer-stored data is by use of the Tideda (Time Dependant Data) software. The Tideda is used to process, edit, store, display, and analyse data. Tideda processes fall into five general categories:

(a) **Data entry** from sources such as a keyboard, punch-tape reader, data logger memory, laptop and telemetry.

(b) **Data editing** processes which allow the user to correct, copy, delete, transform, or edit data.

(c) **Data manipulation** processes using '*PSIM*'.

(d) **Data analysis** processes to produce mean daily, weekly, monthly, and annual data. Distributions (% of time that a value is equalled or exceeded) are also produced using the *PDIST* process.

(e) **Data presentation** processes to display data as lists, tables and plots/charts.

2.3.1 Air quality data processing

(a) PM_{10} (continuous)

For continuous PM10 data 10 minute average data is recorded. Raw data (in ppm) is retrieved from the station.

Data is removed for the period of the station visit where the instrument is stopped for maintenance (i.e. filter change, inlet cleaning). Spikes are given special attention and commented where appropriate. A mass calibration is performed when the instrument is shifted and during the annual service visit.

(b) PM_{10} (24 hour)

The raw data for the Partisol 24 hour PM_{10} sampler is calculated from the difference between the pre- and post- weighing of the exposed 47mm filter.

The collected weight is calculated from subtracting the average of three pre weights from the average of three post weights. The collected weight is then divided by the volume of sampled air to determine the dust concentration.

No direct calibrations are required at the processing stage. Temperature, pressure and flow calibrations are carried out during the annual inspection. These are set to USEPA standards.

As part of the data quality assurance leak checks are performed on a 3 monthly basis.

(c) Carbon monoxide

Raw data (in ppm) is retrieved from the station. For carbon monoxide sensors, two sets of data are recorded, each having its own parameter number:

- 10 minute averages of carbon monoxide
- auto zero/span calibration data

Data is also adjusted based on the results of the zero/span calibrations.

(d) Hydrogen sulphide

Raw data is retrieved from the station. Calibrations are performed when the required and the difference between the zero and the span is compared for consistency. No adjustment is made to the data unless there is greater than 20% difference calculated between the expected zero-span difference and the measured zero-span difference.

A summary of the air quality station parameters and recording intervals can be seen in Table 2.3.1.

Table 2.3.1 Air quality station parameters and recording intervals

Parameter	Sensing	Recording
PM_{10} (continuous)	10 seconds	Records 10 minute average of the 10 second readings.
PM_{10} (manual)	24 hours	Collects 24 hour sample.
CO	10 seconds	Records 10 minute average of the 10 second readings.
H_2S	15 minutes	Records the 15 minute instrument average.

2.3.2 Units of measurements for air quality summaries

Air contaminant concentrations may be measured by volume or mass. Most analysers measure by volume. Volume measurements are determined as a ratio (ppm or ppb) and are therefore independent of temperature and pressure. Concentrations by mass ($\mu g/m^3$ or mg/m^3) refer to the weight of a gas or particulate contaminant in a cubic metre of air under standard conditions of temperature and pressure.

New Zealand Ambient Air Quality Guidelines use $\mu g/m^3$ for particulate matter and hydrogen sulphide measurements and mg/m^3 for carbon monoxide measurements.

The following units and conversions are used in this summary document.

(a) Particulate matter

The standard unit for PM_{10} (manual and continuous) is $\mu g/m^3$. The data from the instruments is in $\mu g/m^3$, therefore no further conversion is required.

(b) Carbon monoxide

The standard unit for CO is mg/m^3. The data from the instrument is in ppm, therefore a conversion has to be applied. The conversion factor is calculated using Equation 1.

$$PV = nRT$$

$$n = \frac{m}{M_r}$$

$$\therefore \quad \frac{m}{V} = \frac{PM_r}{RT} \qquad (1)$$

where:

P = atmospheric pressure (kPa)

V = volume that gas occupies (m^3)

R = universal gas constant (8.314 J/K mol)

T = temperature (K)

m = mass of gas (g)

M_r = relative molecular mass (28 for CO, 34 for H_2S) (g/mol)

For carbon monoxide the conversion factor from ppm to mg/m^3 is 1.25 at 0°C and 1 Atm pressure.

(c) Hydrogen sulphide

The standard unit for H_2S is μg/m^3. Data from the instrument is in ppb, therefore a conversion has to be applied. Calculation of the conversion factor is determined by Equation 1 with Mr = 34. The resulting factor for conversion from ppb to μg/m^3 is 1.52 at 0°C and 1 Atm. pressure.

The New Zealand Ambient Air Quality Guideline uses 0°C and 1 Atm. pressure as the standard temperature and pressure for calculating conversion factors. These temperature and pressure values have been used in this summary document.

2.3.3 Averaging standards for air quality summaries

The following Table 2.3.3 lists standards that have been used when calculating values for this report.

Table 2.3.3 Averaging times and periods used in this report.

Ambient Parameter	Averaging Time	Averaging Period
PM_{10}	Fixed	24 hour
CO	Fixed	1 hour
H_2S	Fixed	1 hour

Hourly average calculations in this report use the standard method of calculation using values (10 minute averages) recorded during the hour preceding the stated time.

For 24 hour values the averaging time is fixed between midnight and midnight and all 10 minute values in that period have been used.

Annual values have been calculated in the same way as 24 hour values. The interval over which the annual calculation was made will be listed with the calculated value.

2.3.4 Environmental performance indicators (EPI)

Environmental performance indicators (EPI) for air quality can be used to measure and report on the state of our air environment.

The air indicators selected (Table 2.3.4a) are 'state' indicators. State indicators provide a picture of the current state of the environment judged by comparing the monitoring results to MfE guideline values (Table 2.3.4b).

Table 2.3.4a Environmental Performance Indicators.

Category	Maximum Measured Value	Comment
Excellent	<10% of the guideline	Of little concern, if maximum values are less than a tenth of the guideline, average values are likely to be much less.
Good	10 – 33% of the guideline	Peak measurements in this range are unlikely to impact air quality.
Acceptable	33 – 66% of the guideline	A broad category, where maximum values might be of concern in some sensitive locations but generally at a level which does not warrant dramatic action.
Alert	66 – 100% of the guideline	A warning level, which can lead to exceedances if trends are not curbed.
Action	Exceeds the guideline	Exceedance of the guideline are a cause for concern and warrant action if they occur on a regular basis.

Table 2.3.4b Ministry for the Environment Guidelines

Contaminant	MfE Guideline value	
	Value	Averaging Time
Carbon monoxide	30mg/m^3	1-hour
PM_{10}[a]	50μg/m^3	24-hour
Hydrogen sulphide[b]	7μg/m^3	1-hour
a – proposed revised guideline value *b – value is based on an odour nuisance level*		

2.3.5 Meteorological data processing

Six meteorological stations are presently in operation. Raw data from the data logger is imported using HydroTel software, and transferred into Tideda. Table 2.3.5 describes the sensing frequency of the equipment and the process under which the data logger records a value against that parameter.

Table 2.3.5 Meteorological Station parameters and recording intervals

Parameter	Sensing	Recording
Wind speed	6 seconds	Records 10 minute average of the 6 second readings.
Wind gust	6 seconds	Records highest 6 second wind speed per 10 minutes.
Wind direction	6 seconds	Records 10 minute average of the 6 second readings. Data is reported in degrees true.
Wind deviation	6 seconds	Records a ten minute standard deviation using the 6 sec. wind direction values. Std. deviation based on Yamartino algorithm.
Relative humidity	6 seconds	Records 10 minute average of the 6 second readings.
Temperature	6 seconds	Records 10 minute average of the 6 second readings.

2.3.6 Rainfall data processing

(a) Manual raingauges

As most manual raingauges are read between 0700 and 0900 hours each morning it is common practice for New Zealand Meteorological Service rainfall readings to be recorded against the previous day i.e. against the day in which the majority of the 24 hours falls. For all Environment Bay of Plenty daily manual rainfall data the data is stored against the date and time of the reading and is not backdated to the previous day. Daily rainfall data is manually entered to a *Tideda* file as incremental data.

(b) Automatic raingauges

Automatic rainfall is processed according to the method of collection. Two forms of automatic, or intensity, gauges have been used by Environment Bay of Plenty and its predecessors.

(c) Lambrecht raingauges

Lambrecht raingauges are continuous chart recorders. It is possible therefore to collect rainfall intensity data from these instruments by 'digitising' or manually reading off the charts. By December 1995 no Lambrecht gauges were in use by Environment Bay of Plenty

(d) Tipping bucket raingauges

There are two brands of tipping bucket raingauges used by Environment Bay of Plenty. The OTA raingauge was the only brand of tipping bucket raingauge in use until 1995 when the TB3 raingauge became a suitable alternative to the OTA.

Tipping bucket raingauges are volumetric gauges, attached to data loggers, which are commonly recording at 15 minute intervals, therefore able to give 15 minute intensity data. They are also used to provide daily, monthly, and annual totals. Bothe the OTA and TB3 raingauges have a typical resolution of 0.5mm.

2.3.7 Flow data processing

River flow is derived from the water level record by use of a rating curve established through flow gauging and stage height relationships. Rating curve coordinates are stored in the Tideda station file, allowing the water level to be 'rated' to give continuous flow measurements.

2.3.8 Water level data processing

(a) River level

Stream and river level data has been collected via chart recorders, punch tape recorders, or electronic data loggers. The common sampling interval for water level data is 15 minutes. Data processing methods are dependant on the type of recording instrument used. Chart digitising, tape readers, telemetry and laptop downloading provide methods of transferring data from recorders to Tideda.

River levels are recorded in terms of the staff gauge at each station. The staff gauges are levelled in terms of Moturiki Datum and river levels can therefore be provided in a common datum (Moturiki Datum - millimetres above mean sea level).

(b) Lake level

The procedure for the processing of lake level data is very similar to that used for stream data and is dependant upon the type of recording station and equipment in use.

The sampling interval of lake levels has varied over time. In the early years lake levels were recorded daily at some stations. Continuous records began in the 1930's and after this time a 60 minute sampling interval was common. At some stations 60 minute punch tape recorders were replaced with chart recorders. Data extracted from chart recorders was of varying accuracy and frequency. In more recent years the chart recorders were replaced with data loggers and a 30 minute sampling interval has become the norm.

Lake levels are recorded in terms of the staff gauge at each station. The staff gauges are levelled in terms of Moturiki Datum and lake levels can therefore be provided in a common datum (Moturiki Datum - millimetres above mean sea level).

(c) Groundwater Level

The procedure for the processing of groundwater level data is very similar to that used for river level and lake level data and is dependant upon the type of recording station and equipment used. The common sampling interval for groundwater level data is 15 minutes.

The more common groundwater recorders used were the chart recorder, pressure transducer connected to a data logger, or float and counterweight connected to punch-tape recorder. In more recent years data loggers and pressure transducers have become the norm.

2.3.9 Water temperature data processing

The method of data capture of water temperature data is dependant upon the type of recording station and equipment used. Descriptions of the equipment and data loggers at each station are outlined with the presented data in Section 3. The common sampling interval for water temperature data is 15 minutes.

2.4 Data Analysis

2.4.1 Data parameters reported

The data parameters reported are defined as follows:

(a) **Mean value** is the mean value for the period of data summarised.

(a) **Median value** is the value, which is equalled or exceeded 50 % of the time.

(b) **Mean Summer value** is the mean value for the months of January and February, as well as December of the previous year.

(c) **Mean Autumn value** is the mean value for the months of March, April, and May.

(d) **Mean Winter value** is the mean value for the months of June, July, and August.

(e) **Mean Spring value** is the mean value for the months of September, October, and November.

(f) **Specific Mean flow** is calculated from the mean flow analysed for the period, divided by the catchments area above the flow measuring station. The flow is expressed in litres per second per square kilometre.

(g) **Mean annual minimum** is the mean of the individual minimum instantaneous values recorded for each year of the period of record summarised.

(h) **Minimum 7 day low value** is the lowest 7 day value measured for the period for the period of record analysed. A 7 day value is defined as the mean value for any 7 consecutive days.

(i) **Mean annual 7 day low value** is the mean of the individual 7 day low values calculated for each year of the period of record analysed. A 7 day value is defined as the mean value for any 7 consecutive days.

(j) **Annual 7 day low value of a 5 year return period** is the 7 day low value which has a 20 % probability of occurring in any one year. A 7 day value is defined as the mean value for any 7 consecutive days.

(k) **Annual 7 day low value of a 10 year return period** is the 7 day low value which has a 10 % probability of occurring in any one year. A 7 day value is defined as the mean value for any 7 consecutive days.

(l) **Mean annual peak value** is the mean of the annual maximum values for the period of record analysed.

(m) **Annual peak value of a 5 year return period** is the maximum value which has a 20 % probability of being exceeded in any one year.

(n) **Annual peak value of a 10 year return period** is the maximum value which has a 10 % probability of being exceeded in any one year.

(o) **Annual peak value of a 50 year return period** is the maximum value which has a 2 % probability of being exceeded in any one year.

(p) **Annual peak value of a 100 year return period** is the maximum value which has a 1 % probability of being exceeded in any one year.

(q) **Minimum value** is the minimum instantaneous recorded value for the period of record analysed.

(r) **Maximum value** is the maximum instantaneous value recorded for the period of record analysed.

(s) The value distributions provided indicate the value, which is equalled or exceeded for the given percentages of time. For example, the 90% value is that value which is equalled or exceeded 90% of the time for the period of record analysed.

2.4.2 Data analysis methodology

The software packages Tideda v4.1.10 and Microsoft Office Excel 2003 v11 were used to analyse the data record summarised in this report. The choice of software for data analysis was based on the respective strengths of the software. For example, Tideda was used where high speed processing of data was useful (e.g. distributions and frequency analysis), whereas Excel contains useful graphical and data tabulation facilities.

Tideda was used to calculate distribution data (flow and level), as well as maximum and minimum instantaneous data values.

Frequency analyses were predominantly derived using the FRED (Frequency Distribution) package within Tideda. This process selects a sample of data from the extrema, computes L-moments of the sample and then the parameters in a specified distribution formula so that it has the same lower order moments, then graphs and tabulates the distribution. Some of the analyses were developed by the Technical Services section of Environment Bay of Plenty for flood and infrastructure management using alternative packages.

Return periods are presented for up to twice the period of record. This means that a station with 15 years of record will have a 20 year return period flood figure, but no 50 year return period figure.

Excel was utilised to produce tabular and graphical presentation of the analysed data. Where flow plots are presented, flows are displayed in litres per second. Level plots are displayed in millimetres above mean sea level.

In the presentation plots, trends in the data are indicated using a 5 year moving average.

Chapter 3: Data Summaries

3.1 Air Quality Data Summaries

The air quality data summaries in this chapter are provided in the following sequences of 3 pages per station:

Page 1 Provides general information regarding the station, such as its location, instrument types, start of record, etc.

Page 2 Displays the data summary information

Page 3 Graphical presentation of a selection of parameters provided in Page 2.

The ID No. in Table 3.1 indicates the order in which individual station data summaries are provided in this report.

Table 3.1 Air Quality Monitoring Stations

ID Number	Page No.	Site	Parameter	Period of Audit	Data Capture Rate (%)
1	23	Otumoetai Road, Tauranga	PM_{10}	1998-2005	91
1	27	Otumoetai Road, Tauranga	CO	1998-2005	83
2	31	Pererika Street, Rotorua	PM_{10}	1998-2005	94
2	35	Pererika Street, Rotorua	CO	1998-2005	95
3	39	Arawa Street, Rotorua	H_2S	1998-2004	87
4	43	Ti Street, Rotorua	H_2S	1998-2004	81
5	47	Pongakawa	PM_{10}	1998-2005	98
6	51	Quay Street, Whakatane	PM_{10}	1998-2005	99


Air Quality Monitoring Sites
of the Bay of Plenty Region
Environment Bay of Plenty
REGIONAL COUNCIL
Bay of Plenty
Mayor Island
Waihi Beach
Katikati
Matakana Island
TAURANGA
Mount Maunganui
Motiti Island
Te Puke
Maketu
Otamarakau
Moutohora Island
Edgecumbe
Ohope
WHAKATANE
Opotiki
Cape Runaway
Waikaea Bay
Te Kaha
Ngongotaha
Mamaku
ROTORUA
Lake Rotorua
Kawerau
Taneatua
Murupara
Rerewhakaitu
Rangitaiki
Gisborne
Reference
air quality monitoring site
regional boundary
district boundaries
state highway
major road
town, locality
native forest
exotic forest
horticulture
pasture and cropping
other
Scale
Air Quality Monitoring Sites
1 Otumoetai Road, Tauranga
2 Pererika Street, Rotorua
3 Arawa Street, Rotorua
4 Ti Street, Rotorua
5 Pongakawa
6 Quay Street, Whakatane

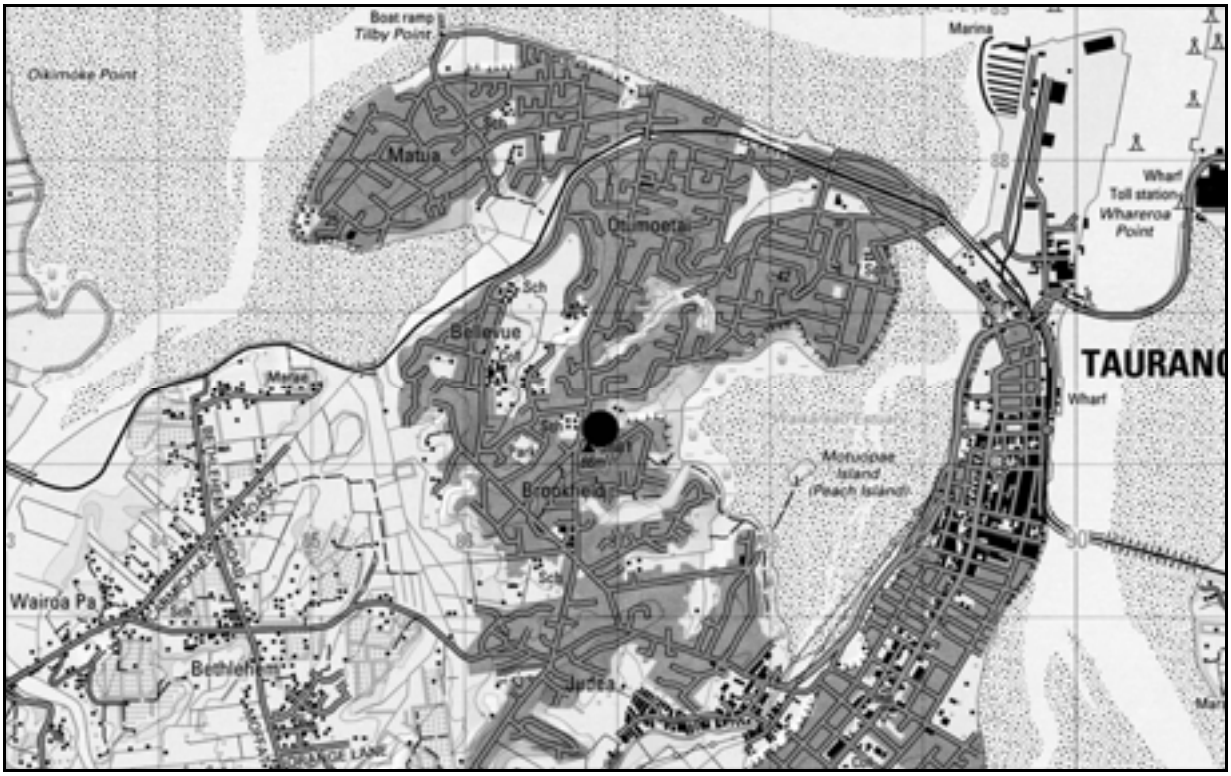
Environment Bay of Plenty
Particulate Matter Recording Station

Parameter	PM_{10}	Station	Otumoetai Road
Site Number	2161	NZMS 260 Reference	U14: 868 862
Recorder Type	TEOM	Altitude	63 metres
Start of Record	December 1997	Data Capture Rate	91%
Data Summary From	January 1998	To	December 2005
Data Audited From		To	

General Comments

The site was initially situated on the Telecom exchange building property, on corner of Darragh and Otumoetai Road, on 25 July 2003 the site was shifted across the road onto the Otumoetai Primary School sports field. The site was installed 05/11/97.

PM_{10} is measured by a TEOM with a PM_{10} size selective inlet. Measurements are calculated (10 minute average) from the mass concentration output. Instrument serial number is 97-0520



SITE LOCATION
PM10 at Otumoetai Road, Tauranga

Environment Bay of Plenty
PM_{10} Summary

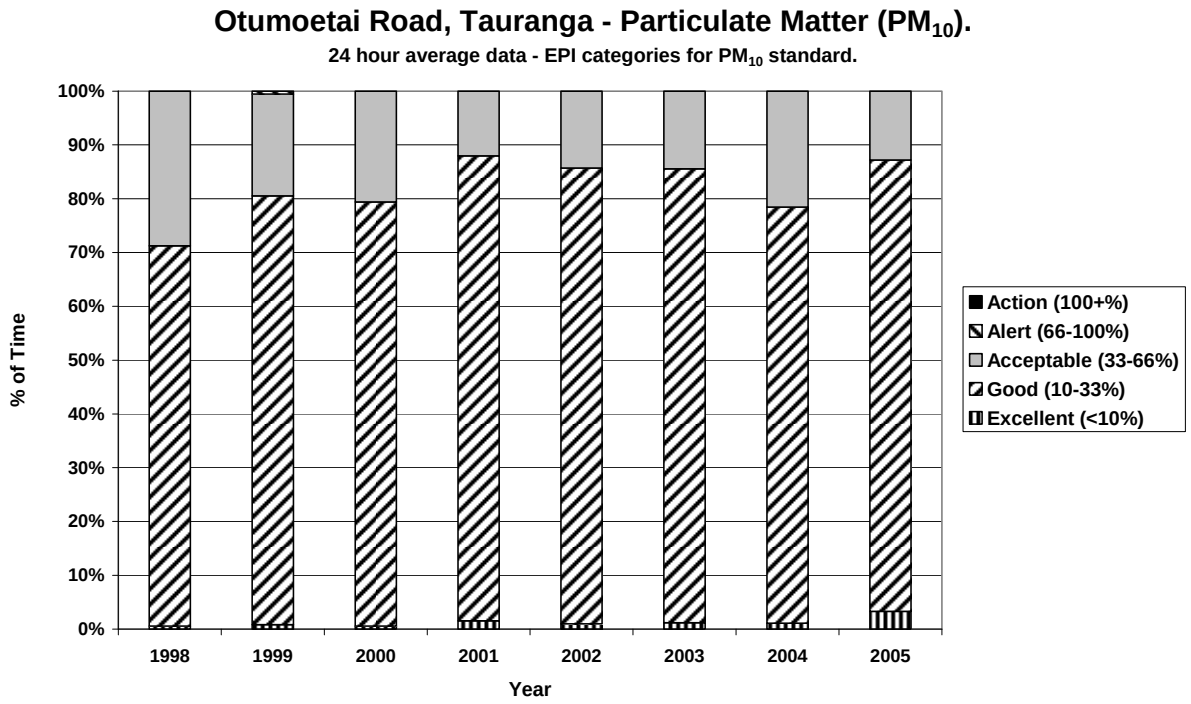
Date Compiled	March 2007	Site Number	2161
Compiled by	Glenn Ellery	Parameter	PM_{10}
Equipment Type	TEOM	Station	Otumoetai Road
NZMS 260 Reference	U14: 868 862		
Period of Summary	1998 to 2005	MfE guideline	50μg/m³ for 24hours

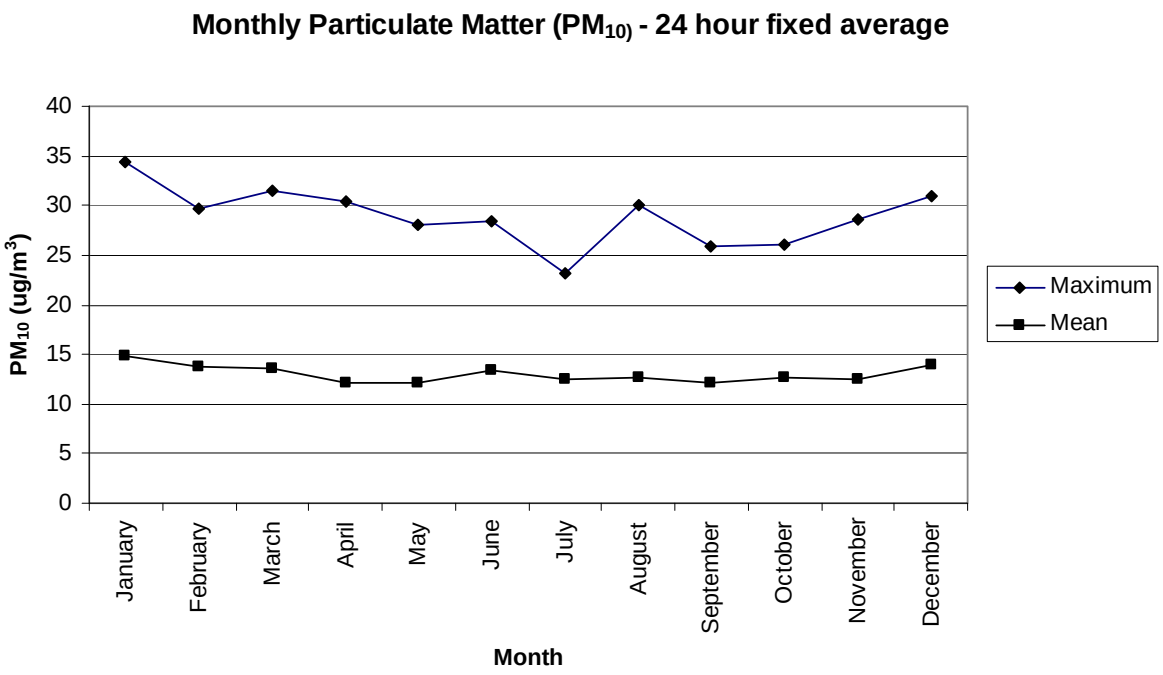
Statistical Summary (μg/m³)			
24 hour fixed average			
Mean PM_{10}	13.0	Mean Summer PM_{10}	13.9
Median PM_{10}	12.6	Mean Autumn PM_{10}	12.7
Maximum PM_{10}	34.4	Mean Winter PM_{10}	12.8
		Mean Spring PM_{10}	12.4

Monthly Statistics (μg/m³)												
24 hour fixed average												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	14.8	13.7	13.6	12.1	12.1	13.3	12.5	12.6	12.2	12.7	12.4	13.9
Max.	34.4	29.6	31.6	30.5	28.1	28.5	23.1	30.0	25.8	26.1	28.6	31.0

Annual Statistics (μg/m³)							
24 hour fixed average							
Year	Mean	Maximum	Date	Year	Mean	Maximum	Date
1998	14.4	28.4	24/03/1998	2002	12.6	23.6	26/03/2002
1999	13.4	34.1	05/01/1999	2003	12.4	23.7	29/06/2003
2000	13.2	25.8	09/02/2000	2004	13.4	28.8	22/04/2004
2001	12.0	24.4	27/08/2001	2005	12.1	23.8	06/02/2005

EPI - Indicator Comparisons		
Category	Percentage of MfE guideline	% of time in category
Action	100%+	0
Alert	66-100%	0
Acceptable	33-66%	18
Good	10-33%	81
Excellent	<10%	1





PM_{10} at Otumoetai

Environment Bay of Plenty
Carbon Monoxide Recording Station

Parameter	Carbon monoxide	Station	Otumoetai Road
Site Number	2160	NZMS 260 Reference	U14: 868 862
Recorder Type	ML 9830 analyser	Altitude	63 metres
Start of Record	December 1997	Data Capture Rate	83%
Data Summary From	January 1998	To	December 2005
Data Audited From		To	

General Comments

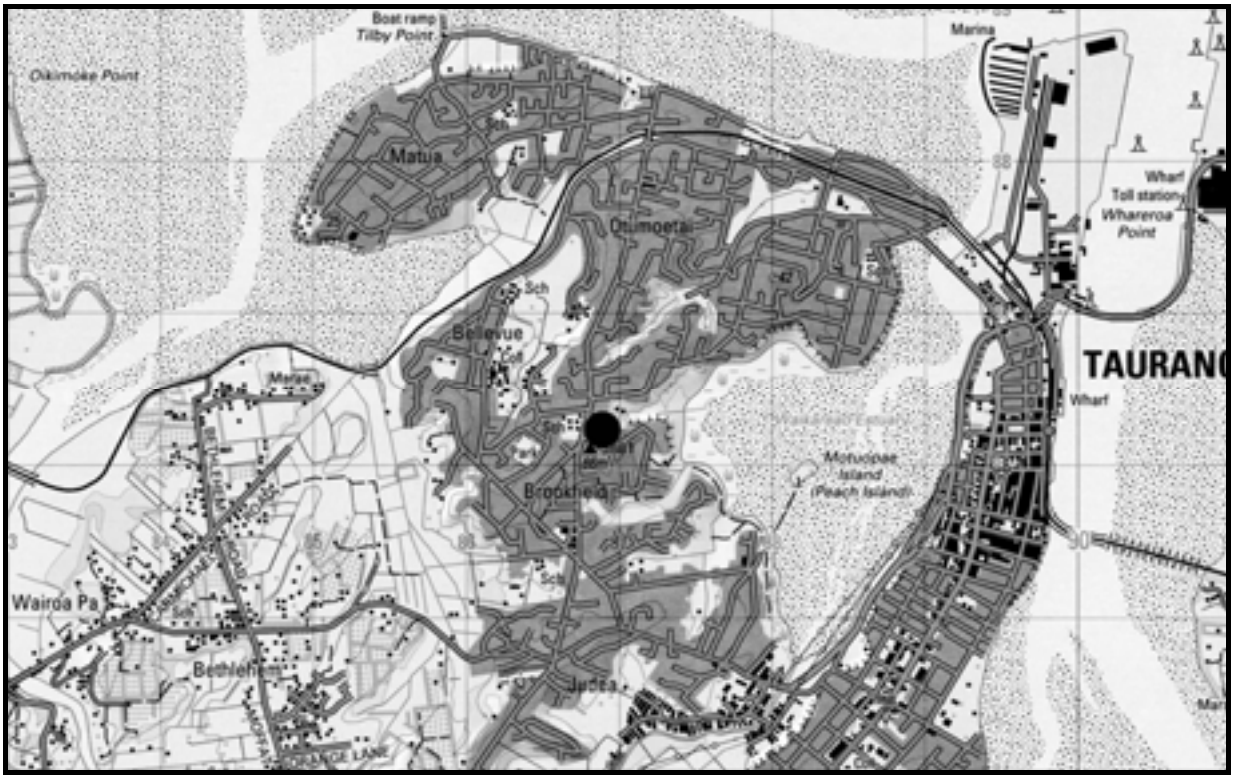
The site was initially situated on the Telecom exchange building property, on corner of Darragh and Otumoetai Road, in ?? the site was shifted across the road onto the Otumoetai Primary School sports field. The site was installed 05/11/97.

The carbon monoxide instrument is a Monitor Labs ML9830 carbon monoxide instrument serial number 97-0322 purchased from Ecotech, Australia. The instrument was installed on 03/12/97.

Missing record in September 1998 due to correlation wheel fault. Missing record from December 1998 to May 1999 due to instrument being used in portable caravan for 'peak site' monitoring.

Missing record from 27/7/00 105000 to 15/9/00 154000 due to an instrument fault. Initial detection that something was malfunctioning was during the inspection of the downloaded data on 1000815, manual span calibration showed a depressed level. Timed calibrations showed a negative drift. Fittings, tubing and valves were checked for leaks. Sample inlet was also checked for obstructions. Instrument was reset to sample measure. Instrument required system reset and appeared to stabilise. Instrument was returned to site on 15/9/00.

Missing record in September 2000 due to faulty infrared source in analyser. Infrared source replaced.



SITE LOCATION
Carbon Monoxide at Otumoetai Road

Environment Bay of Plenty
Carbon Monoxide Summary

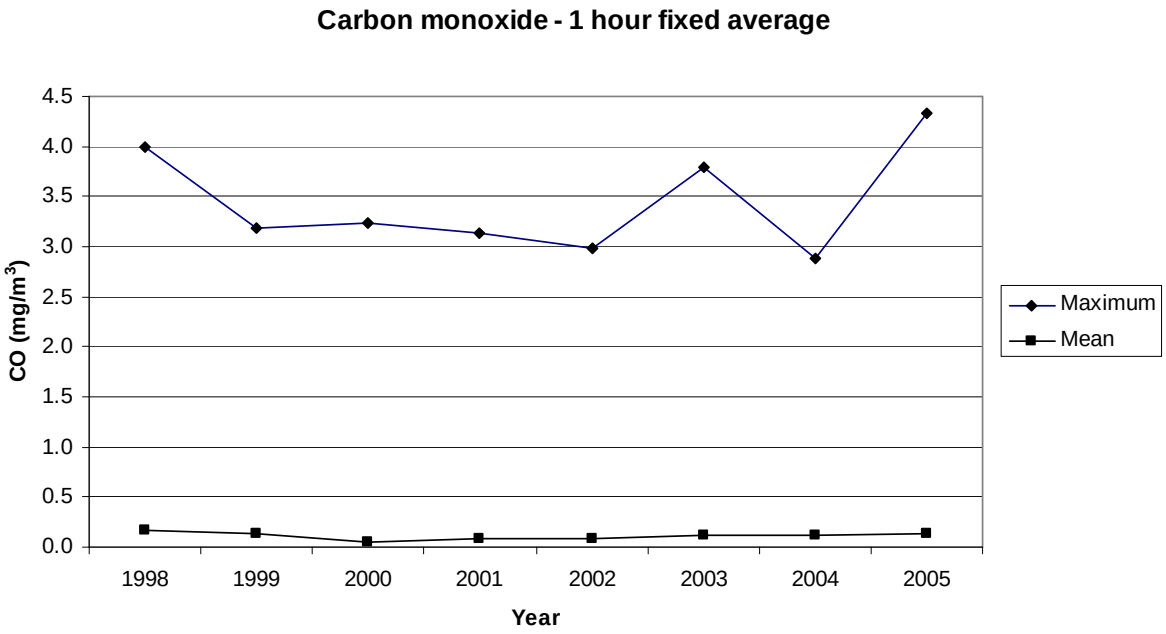
Date Compiled	March 2007	Site Number	2160
Compiled by	G R Ellery	Parameter	Carbon monoxide
Equipment Type	Infra-red analyser	Station	Otumoetai
NZMS 260 Reference	U14: 868 862		
Period of Summary	1998 to 2005	MfE guideline	30mg/m^3 for 1hour

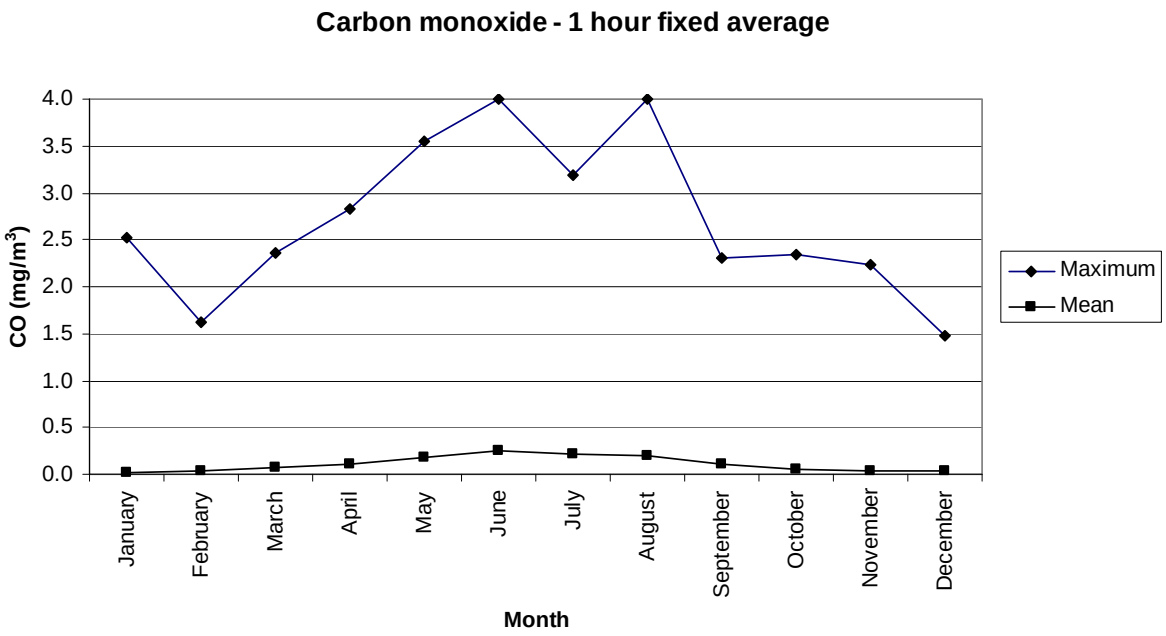
Statistical Summary (mg/m^3)			
1 hour fixed average			
Mean Annual Carbon Monoxide	0.11	Mean Summer Carbon Monoxide	0.04
Median Carbon Monoxide	0.02	Mean Autumn Carbon Monoxide	0.13
Maximum Carbon Monoxide	4.00	Mean Winter Carbon Monoxide	0.23
		Mean Spring Carbon Monoxide	0.07

Monthly Extremes (mg/m^3)												
1 hour fixed average												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	0.03	0.05	0.07	0.11	0.18	0.25	0.21	0.21	0.1	0.06	0.05	0.04
Max	2.52	1.62	2.36	2.83	3.55	4.00	3.18	4.00	2.31	2.34	2.23	1.49

Annual Statistics (mg/m^3)							
1 hour fixed average							
Year	Mean	Maximum	Date	Year	Mean	Maximum	Date
1998	0.17	4.00	05/06/1998	2002	0.09	2.99	31/05/2002
1999	0.14	3.18	07/07/1999	2003	0.12	3.80	24/06/2003
2000	0.06	3.23	21/06/2000	2004	0.11	2.88	15/06/2004
2001	0.09	3.13	12/06/2001	2005	0.13	4.32	05/08/2005

EPI - Indicator Comparisons		
Category	Percentage of MfE guideline	% of time in guideline category
Action	100%+	0
Alert	66-100%	0
Acceptable	33-66%	0
Good	10-33%	0.01
Excellent	<10%	99.99





Carbon Monoxide at Otumoetai

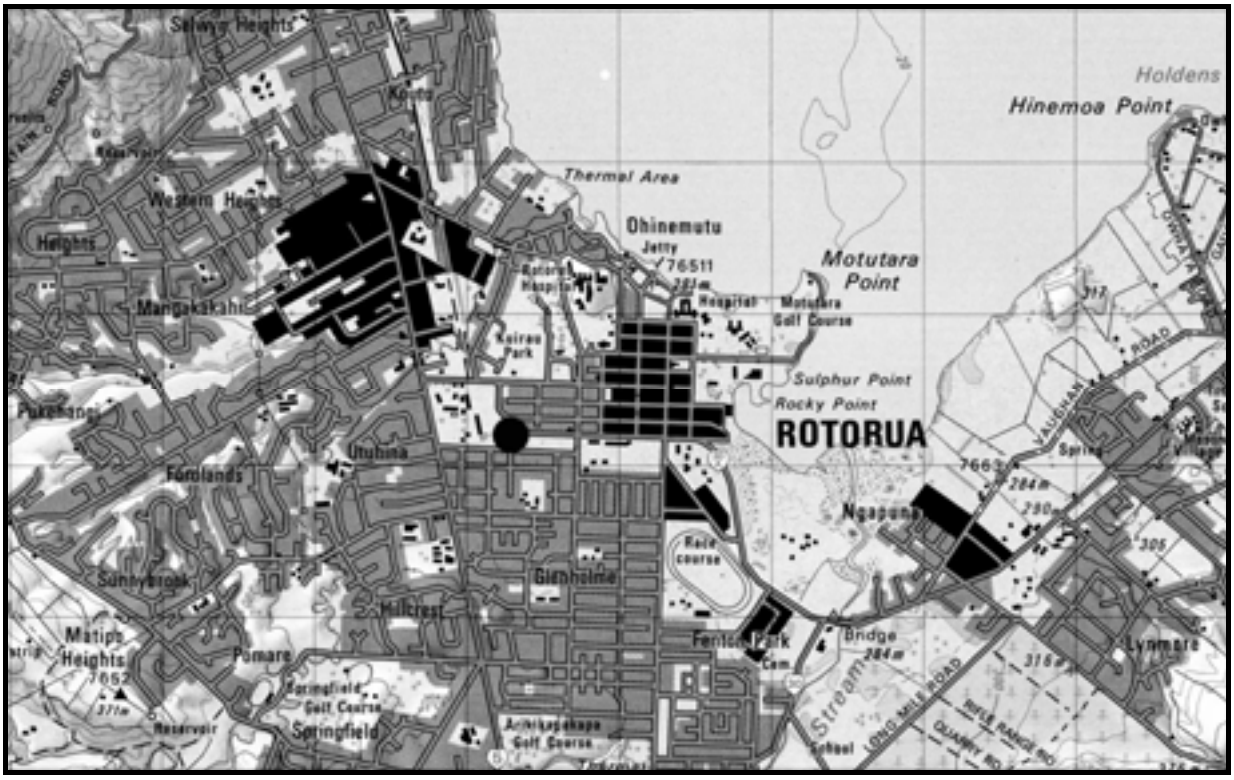
Environment Bay of Plenty
Particulate Matter Recording Station

Parameter	PM_{10}	Station	Pererika Street
Site Number	2166	NZMS 260 Reference	U16: 942 352
Recorder Type	TEOM	Altitude	262 metres
Start of Record	December 1997	Data Capture Rate	94%
Data Summary From	January 1998	To	December 2005
Data Audited From		To	

General Comments

The site is situated on the old Telecom depot property, Pererika Street. The shed was divided from the main shed with walls and a new roof. The room has an air conditioning unit, which was installed 30/10/97. The power supply was sourced from the adjacent Telecom Building.

PM_{10} is measured by a TEOM with a PM_{10} size selective inlet. Measurements are calculated (10 minute average) from the mass concentration output. Instrument serial number is 97-0520.



SITE LOCATION
PM_{10} at Pererika Street, Rotorua

Environment Bay of Plenty
PM_{10} Summary

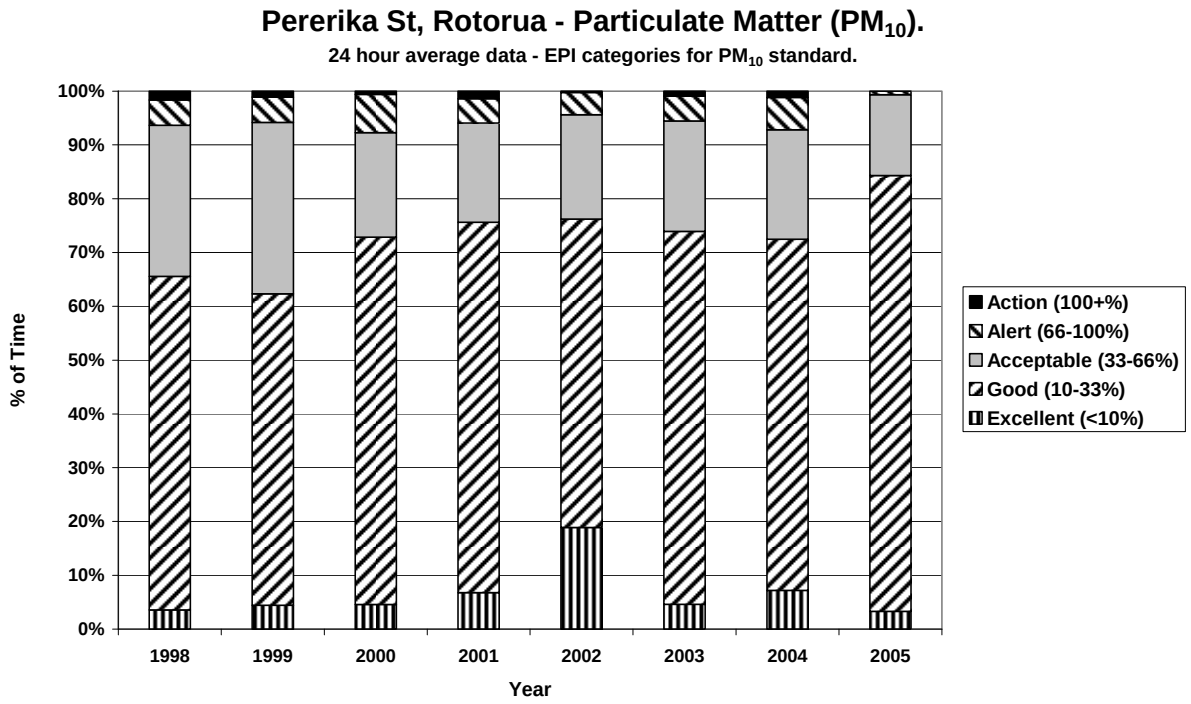
Date Compiled	March 2007	Site Number	2166
Compiled by	Glenn Ellery	Parameter	PM_{10}
Equipment Type	TEOM	Station	Pererika
NZMS 260 Reference	U16: 942 352		
Period of Summary	1998 to 2005	MfE guideline	50μg/m³ for 24hours

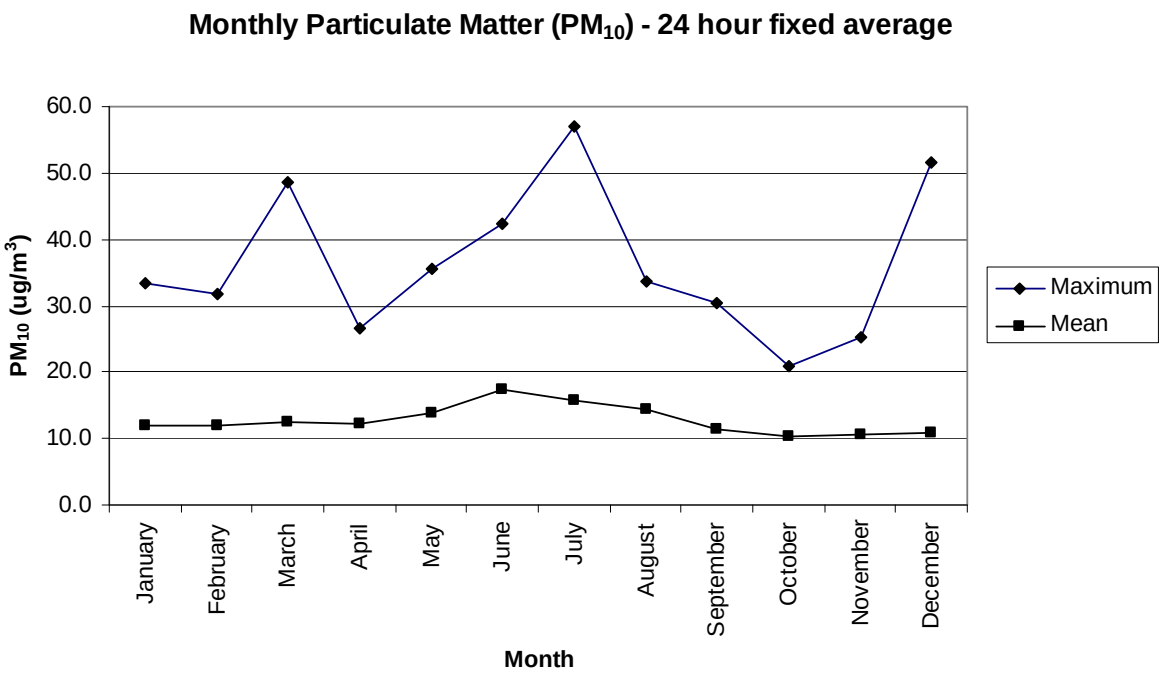
Statistical Summary (μg/m³)			
24 hour fixed average			
Mean PM_{10}	12.7	Mean Summer PM_{10}	11.4
Median PM_{10}	11.4	Mean Autumn PM_{10}	12.9
Maximum PM_{10}	57.1	Mean Winter PM_{10}	15.8
		Mean Spring PM_{10}	11.0

Monthly Statistics (μg/m³)												
24 hour fixed average												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	11.8	12.0	12.6	12.1	14.0	17.4	15.8	14.5	11.5	10.4	10.5	10.8
Max.	33.4	21.7	48.6	26.7	35.6	42.4	57.1	33.7	30.3	21.0	25.3	51.6

Annual Statistics (μg/m³)							
24 hour fixed average							
Year	Mean	Maximum	Date	Year	Mean	Maximum	Date
1998	14.0	51.6	16/12/1998	2002	13.0	48.6	08/03/2002
1999	13.8	40.9	01/07/1999	2003	12.8	57.1	15/07/2003
2000	12.2	35.9	19/06/2000	2004	12.0	40.0	26/06/2004
2001	11.8	38.2	07/06/2001	2005	12.0	37.7	02/07/2005

EPI - Indicator Comparisons		
Category	Percentage of MfE guideline	% of time in category
Action	100%+	1
Alert	66-100%	5
Acceptable	33-66%	22
Good	10-33%	66
Excellent	<10%	7





PM_{10} at Pererika Street

Environment Bay of Plenty
Carbon Monoxide Recording Station

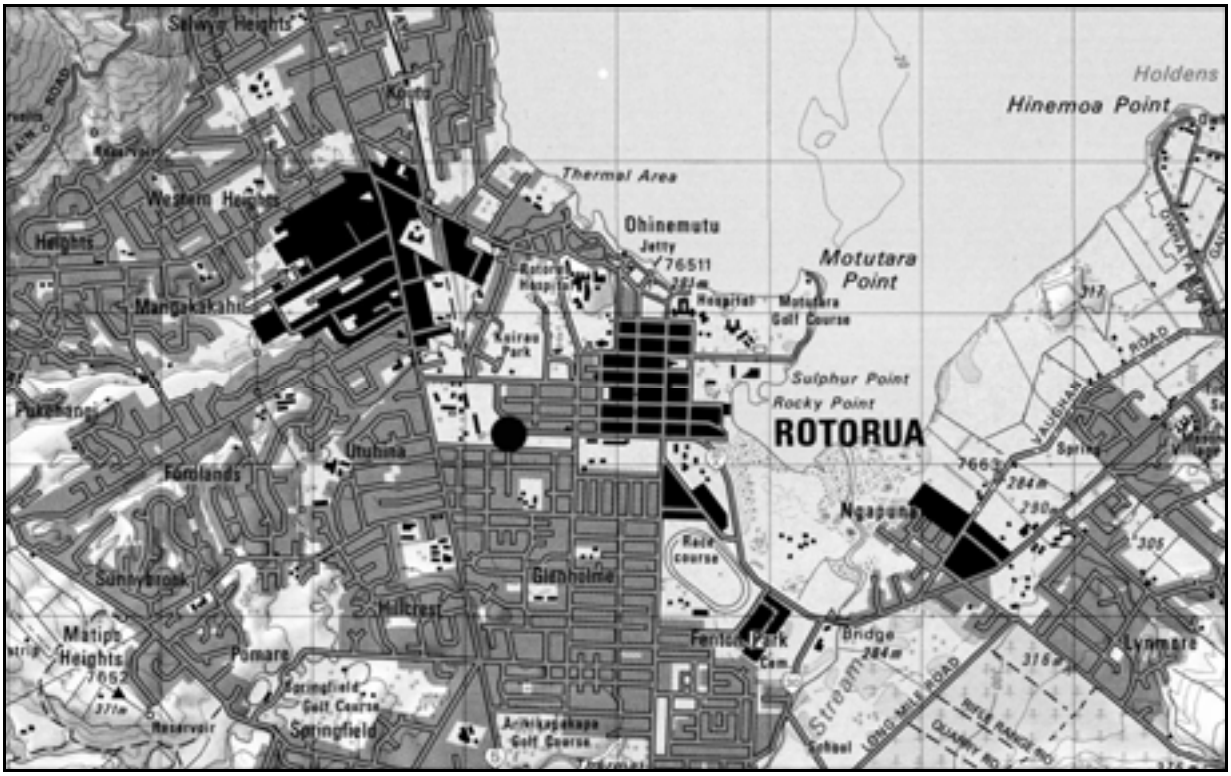
Parameter	Carbon monoxide	Station	Pererika Street
Site Number	2165	NZMS 260 Reference	U16: 942 352
Recorder Type	ML 9830	Altitude	262 metres
Start of Record	December 1997	Data Capture Rate	95%
Data Summary From	January 1998	To	December 2005
Data Audited From		To	

General Comments

The site is situated on the old Telecom works depot property, off Pererika Street. The shed was divided from the main shed with walls and a new roof this work was done by Brian Coppell, Mark Stringfellow and Shane Iremonger. The room has an air conditioning unit, which was installed 30/10/97. The power supply was sourced from the Telecom Building.

The carbon monoxide instrument is a Monitor Labs ML9830 carbon monoxide instrument serial number 97-0322 purchased from Ecotech, Australia. The instrument was purchased with the internal zero span valves to allow for automatic response checking of the instrument. The instrument was installed on 03/12/97.

Missing data in April 1998 and April/May 2000 are the result of component failure within the infrared analyser.



SITE LOCATION
Carbon Monoxide at Pererika St, Rotorua

Environment Bay of Plenty
Carbon Monoxide Summary

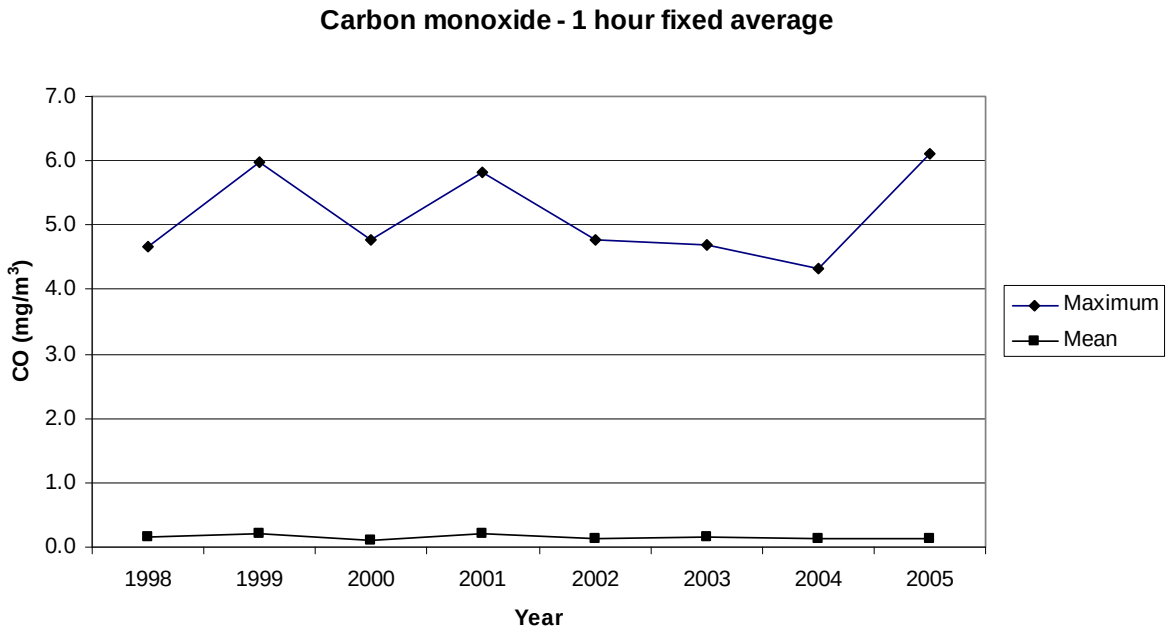
Date Compiled	March 2007	Site Number	2165
Compiled by	G R Ellery	Parameter	Carbon monoxide
Equipment Type	Infra-red analyser	Station	Otumoetai
NZMS 260 Reference	U16: 942 352		
Period of Summary	1998 to 2005	MfE guideline	30mg/m^3 for 1hour

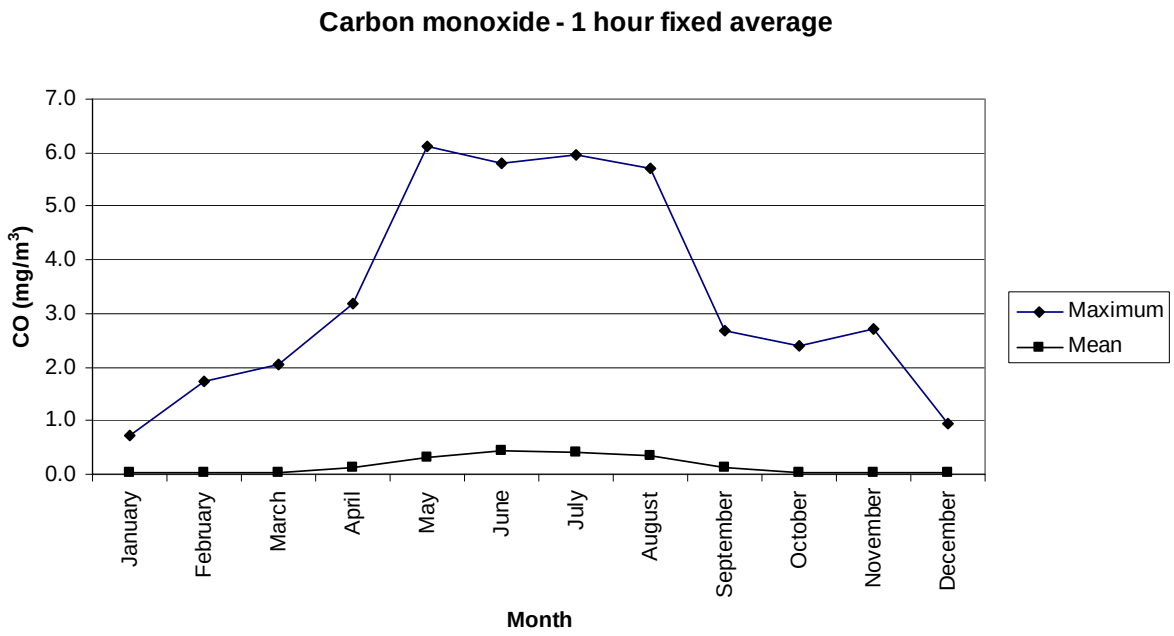
Statistical Summary (mg/m^3)			
1 hour fixed average			
Mean Annual Carbon Monoxide	0.15	Mean Summer Carbon Monoxide	0.02
Median Carbon Monoxide	0.01	Mean Autumn Carbon Monoxide	0.14
Maximum Carbon Monoxide	6.12	Mean Winter Carbon Monoxide	0.40
		Mean Spring Carbon Monoxide	0.07

Monthly Extremes (mg/m^3)												
1 hour fixed average												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	0.02	0.03	0.04	0.13	0.30	0.44	0.42	0.35	0.12	0.03	0.02	0.02
Max	0.71	1.73	2.03	3.19	6.12	5.81	5.97	5.71	2.68	2.40	2.72	0.94

Annual Statistics (mg/m3)							
1 hour fixed average							
Year	Mean	Maximum	Date	Year	Mean	Maximum	Date
1998	0.16	4.66	05/06/1998	2002	0.14	4.78	31/05/2002
1999	0.20	5.97	01/07/1999	2003	0.15	4.68	15/07/2003
2000	0.10	4.77	29/06/2000	2004	0.13	4.34	22/07/2004
2001	0.20	5.81	14/06/2001	2005	0.13	6.12	20/05/2005

EPI - Indicator Comparisons		
Category	Percentage of MfE guideline	% of time in guideline category
Action	100%+	0
Alert	66-100%	0
Acceptable	33-66%	0
Good	10-33%	0.5
Excellent	<10%	99.5





Carbon Monoxide at Pererika Street

Environment Bay of Plenty
Hydrogen Sulphide Recording Station

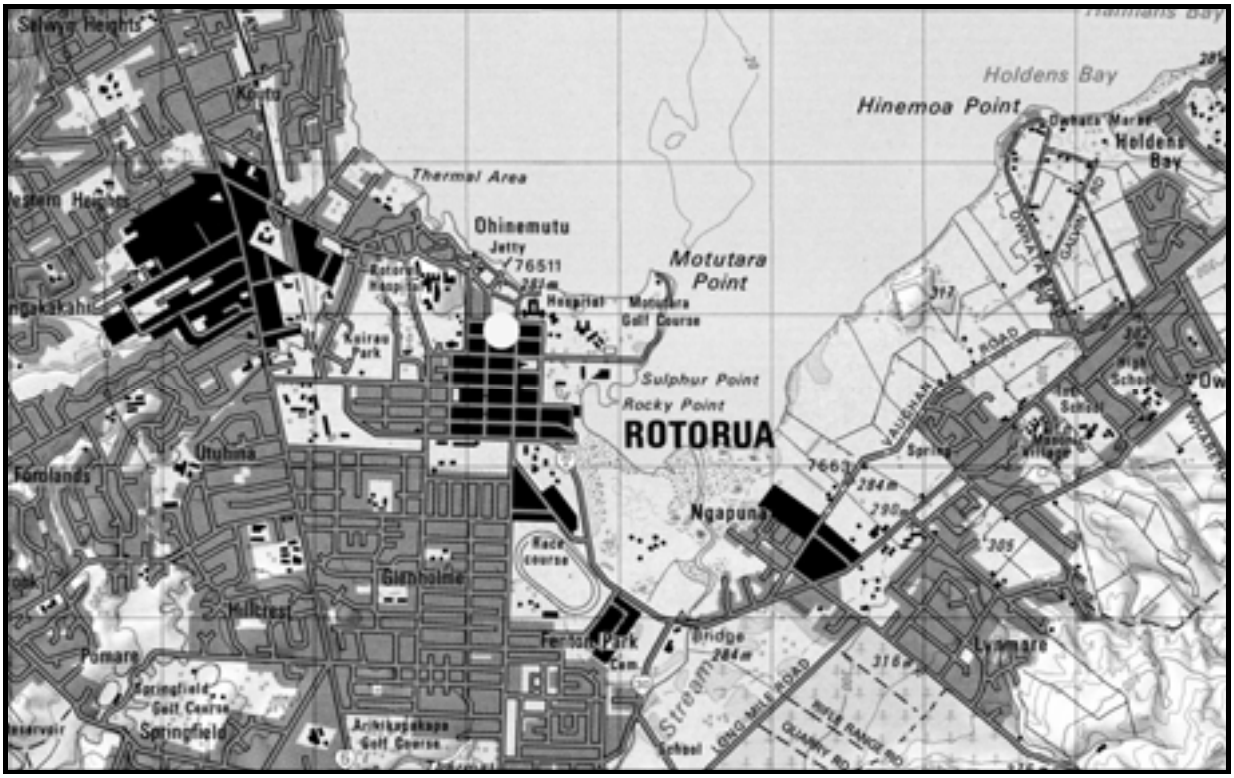
Parameter	Hydrogen Sulphide	Station	Arawa Street
Site Number	2158	NZMS 260 Reference	U16: 952 357
Recorder Type	Paper tape analyser	Altitude	310 metres
Start of Record	January 1998	Data Capture Rate	87%
Data Summary From	January 1998	To	December 2004
Data Audited From		To	

General Comments

MDA Scientific 7100 continuous toxic gas monitor serial number 5310.

A hydrides tape rated 2-5000ppb is used in this instrument. The instrument sampling is initiated by a 5volt trigger from the Campbell CR10 logger. It will then sample for 10 minutes or less depending on ambient H_2S concentrations. Data is logged from an analog output from the 7100 every 15 minutes. The values that are logged are averages derived by the 7100.

Site Closed 4 April 2005



SITE LOCATION
Hydrogen Sulphide at Arawa Street, Rotorua

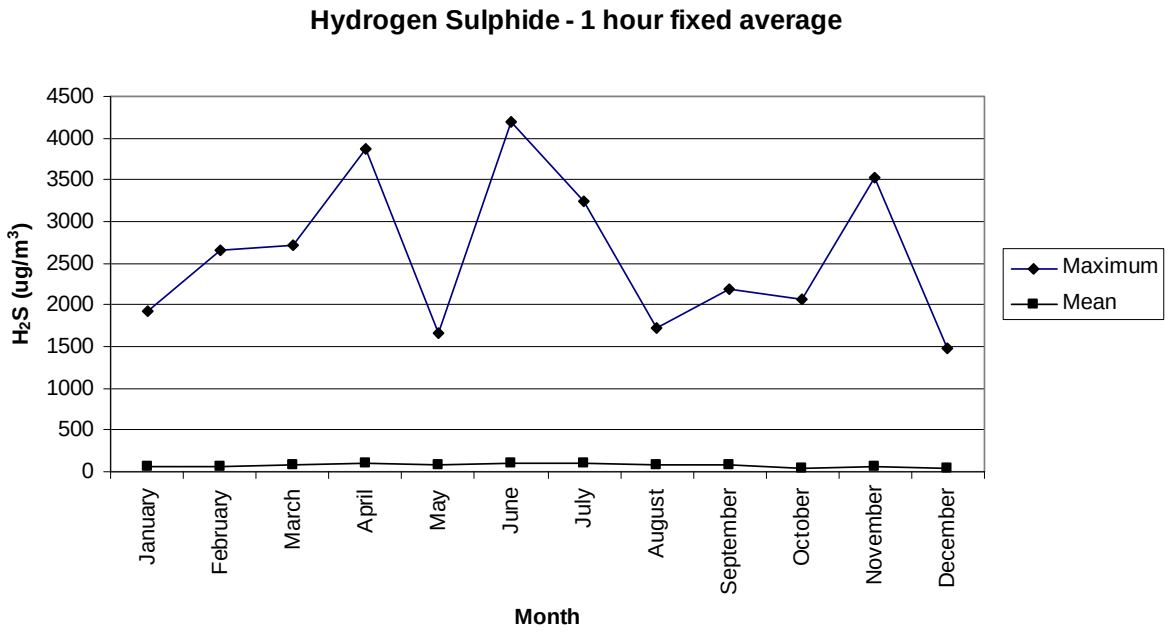
Environment Bay of Plenty
Hydrogen Sulphide Summary

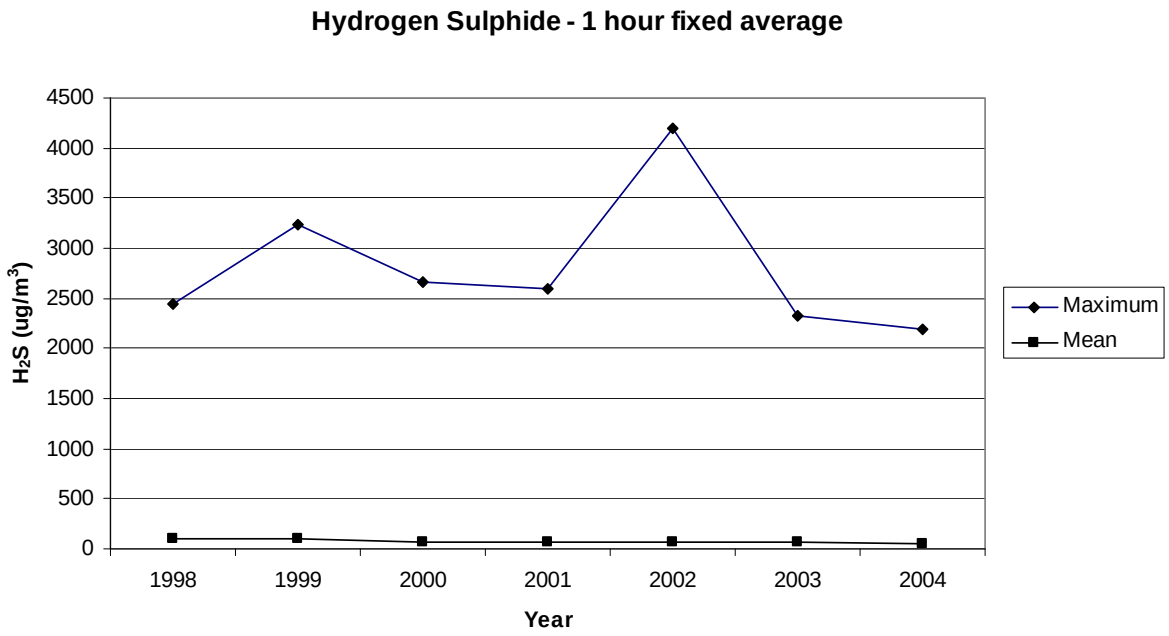
Date Compiled	March 2007	Site Number	2158
Compiled by	Glenn Ellery	Parameter	Hydrogen Sulphide
Equipment Type	Paper tape analyser	Station	Arawa Street, Rotorua
NZMS 260 Reference	U16: 952 357		
Period of Summary	1998 to 2005		

Statistical Summary (μg/m^3)			
1 hour fixed average			
Mean Hydrogen Sulphide	73	Mean Summer Hydrogen Sulphide	50
Median Hydrogen Sulphide	24	Mean Autumn Hydrogen Sulphide	81
Maximum Hydrogen Sulphide	4200	Mean Winter Hydrogen Sulphide	96
		Mean Spring Hydrogen Sulphide	65

Monthly Statistics (μg/m^3)												
1 hour fixed average												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	53	70	71	93	79	110	100	85	80	43	67	43
Max.	1927	2665	2719	3873	1670	4200	3238	1723	2188	2068	3526	1485

Annual Statistics (μg/m^3)							
1 hour fixed average							
Year	Mean	Maximum	Date	Year	Mean	Maximum	Date
1998	101	2437	20/02/1998	2002	63	4200	21/06/2002
1999	101	3238	1/07/1999	2003	60	2327	8/06/2003
2000	60	2665	9/02/2000	2004	42	2188	18/09/2004
2001	69	2602	17/07/2001				





Hydrogen Sulphide at Arawa Street, Rotorua

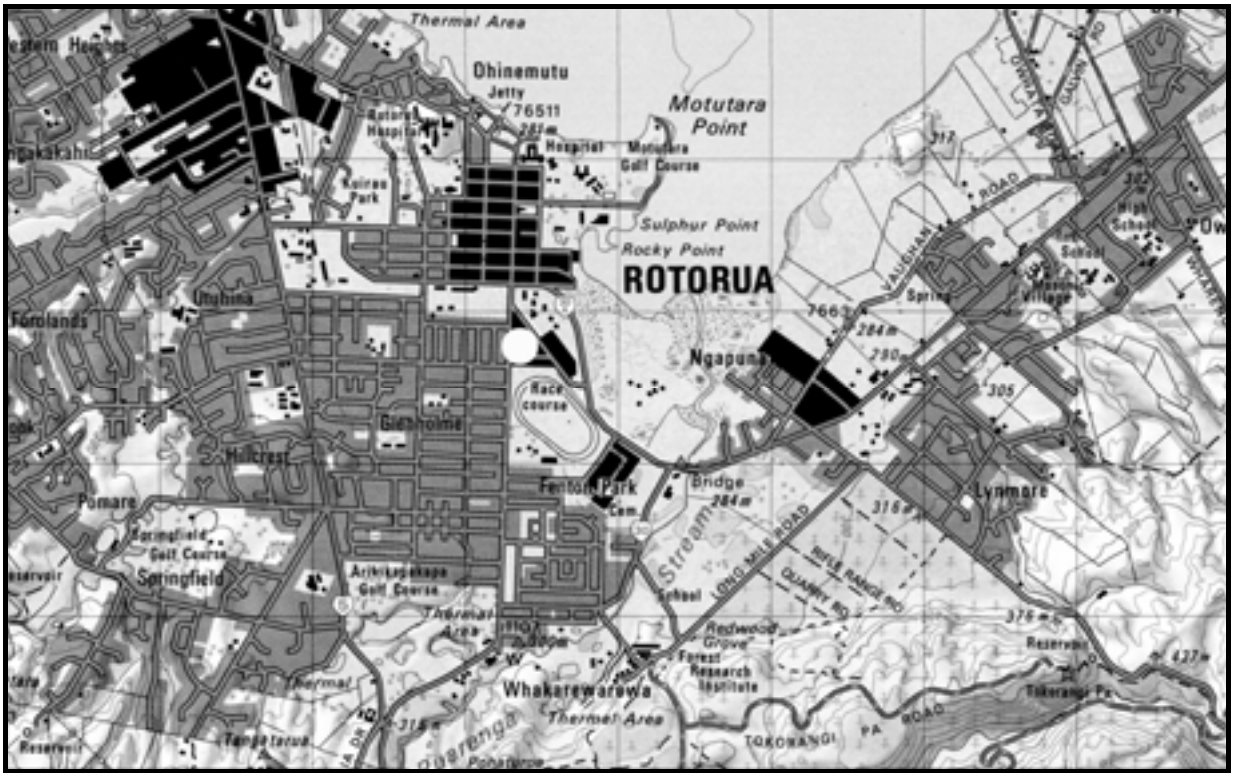
Environment Bay of Plenty
Hydrogen Sulphide Recording Station

Parameter	Hydrogen Sulphide	Station	Ti Street
Site Number	2156	NZMS 260 Reference	U16: 954 347
Recorder Type	Paper tape analyser	Altitude	300 metres
Start of Record	December 1997	Data Capture Rate	81%
Data Summary From	January 1998	To	December 2004
Data Audited From		To	

General Comments

MDA Scientific 7100 continuous toxic gas monitor serial number 5310.

A hydrides tape rated 2-5000ppb is used in this instrument. The instrument sampling is initiated by a 5volt trigger from the Campbell CR10 logger. It will then sample for 10 minutes or less depending on ambient H_2S concentrations. Data is logged from an analog output from the 7100 every 15 minutes. The values that are logged are averages derived by the 7100.
Site closed 3 April 2005



SITE LOCATION
Hydrogen Sulphide at Ti Street, Rotorua

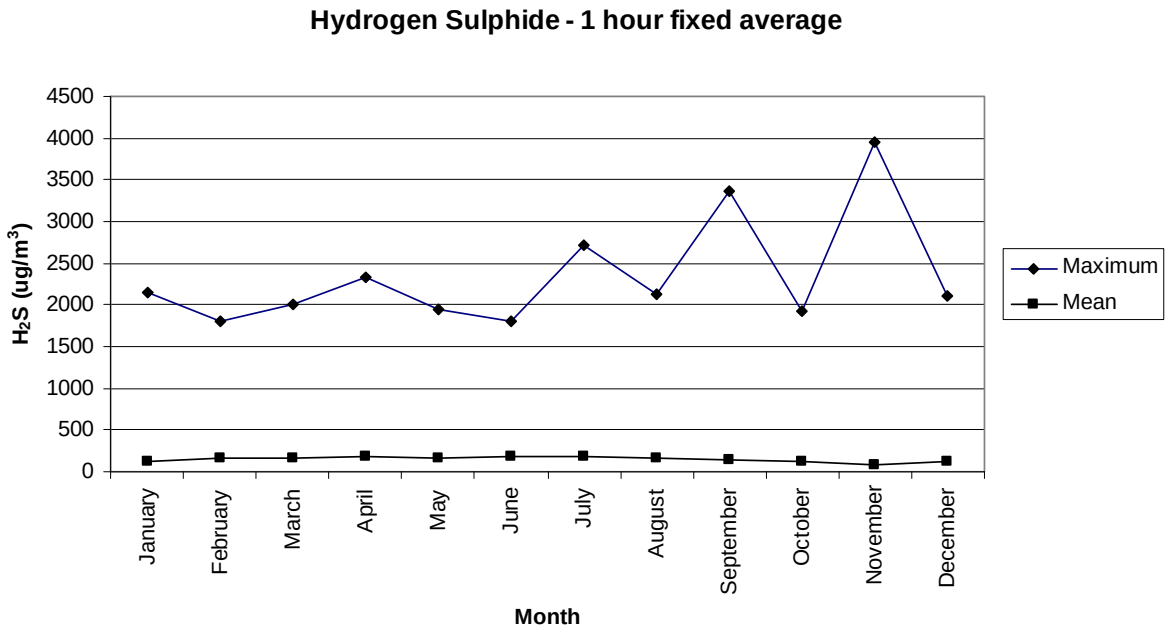
Environment Bay of Plenty
Hydrogen Sulphide Summary

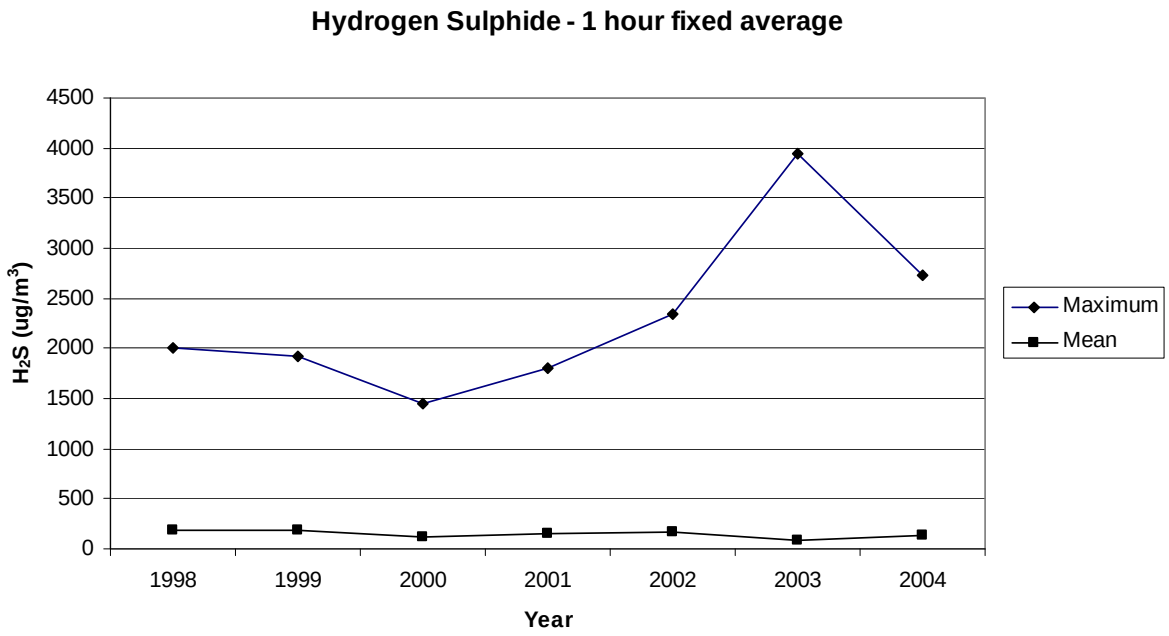
Date Compiled	March 2007	Site Number	2156
Compiled by	Glenn Ellery	Parameter	Hydrogen Sulphide
Equipment Type	Paper tape analyser	Station	Ti Street, Rotorua
NZMS 260 Reference	U16: 952 357		
Period of Summary	1998 to 2005		

Statistical Summary (μg/m^3)			
1 hour fixed average			
Mean Hydrogen Sulphide	146	Mean Summer Hydrogen Sulphide	130
Median Hydrogen Sulphide	63	Mean Autumn Hydrogen Sulphide	166
Maximum Hydrogen Sulphide	3952	Mean Winter Hydrogen Sulphide	182
		Mean Spring Hydrogen Sulphide	110

Monthly Statistics (μg/m^3)												
1 hour fixed average												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	118	156	160	175	160	190	181	161	133	116	90	116
Max.	2148	1804	2006	2337	1956	1797	2725	2122	3363	1919	3952	2099

Annual Statistics (μg/m^3)							
1 hour fixed average							
Year	Mean	Maximum	Date	Year	Mean	Maximum	Date
1998	183	2006	10/03/1998	2002	168	2337	21/04/2002
1999	189	1919	06/10/1999	2003	92	3952	28/11/2003
2000	111	1446	04/04/2000	2004	131	2725	02/07/2004
2001	154	1804	23/02/2001				





Hydrogen Sulphide at Ti Street, Rotorua

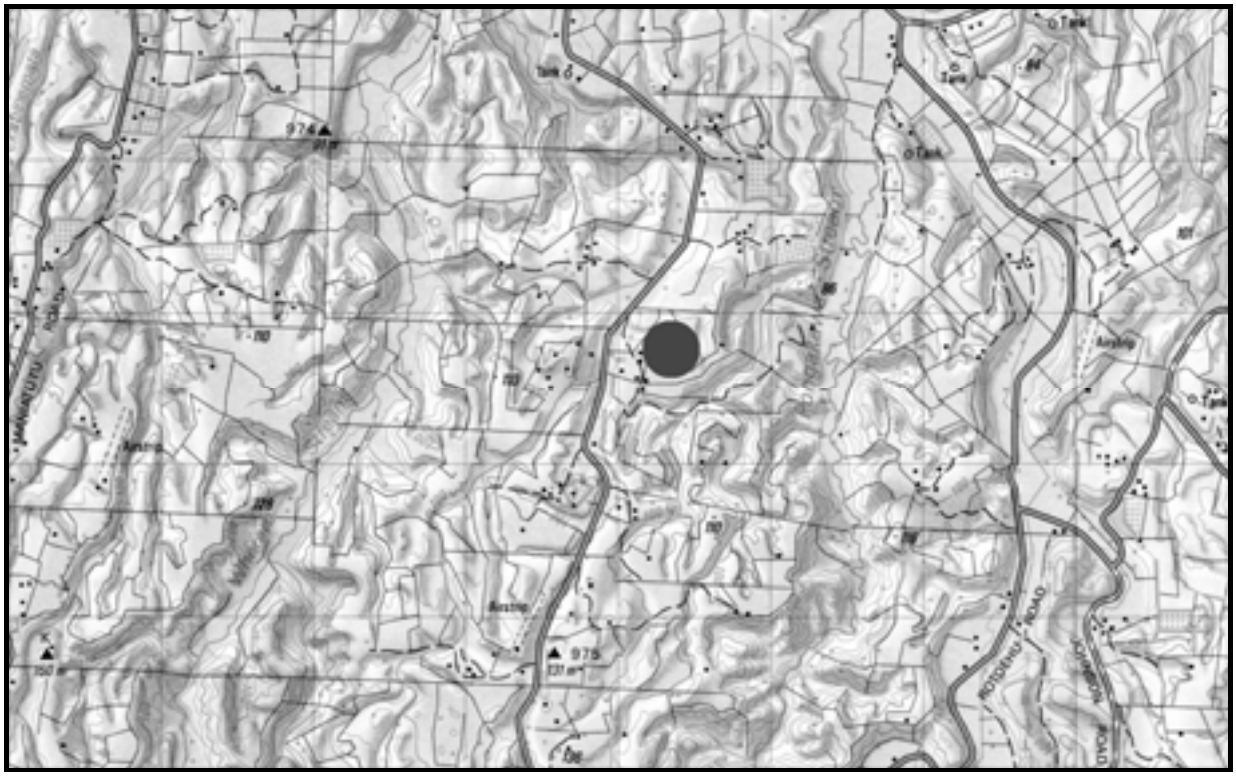
Environment Bay of Plenty
Particulate Matter Recording Station

Parameter	PM_{10}	Station	Pongakawa
Site Number	2174	NZMS 260 Reference	V15: 172 637
Recorder Type	Partisol	Altitude	102 metres
Start of Record	December 1997	Data Capture Rate	98%
Data Summary From	January 1998	To	December 2005
Data Audited From		To	

General Comments

Site consisted initially of a Partisol hub and satellite. Serial numbers 9704-77 and 9704-79 respectively. Units are mounted in a small shed, with sampling heads approximately 2 metres above the shed roof.
On the 31/05/99 a second satellite sampler was installed.

In 2004 a Sequential Partisol was installed and the existing hub and satellites removed.
Sampler is set to monitor on a six day cycle. Samples are for 24 hours.



SITE LOCATION
PM_{10} at Pongakawa Road

Environment Bay of Plenty
PM_{10} Summary

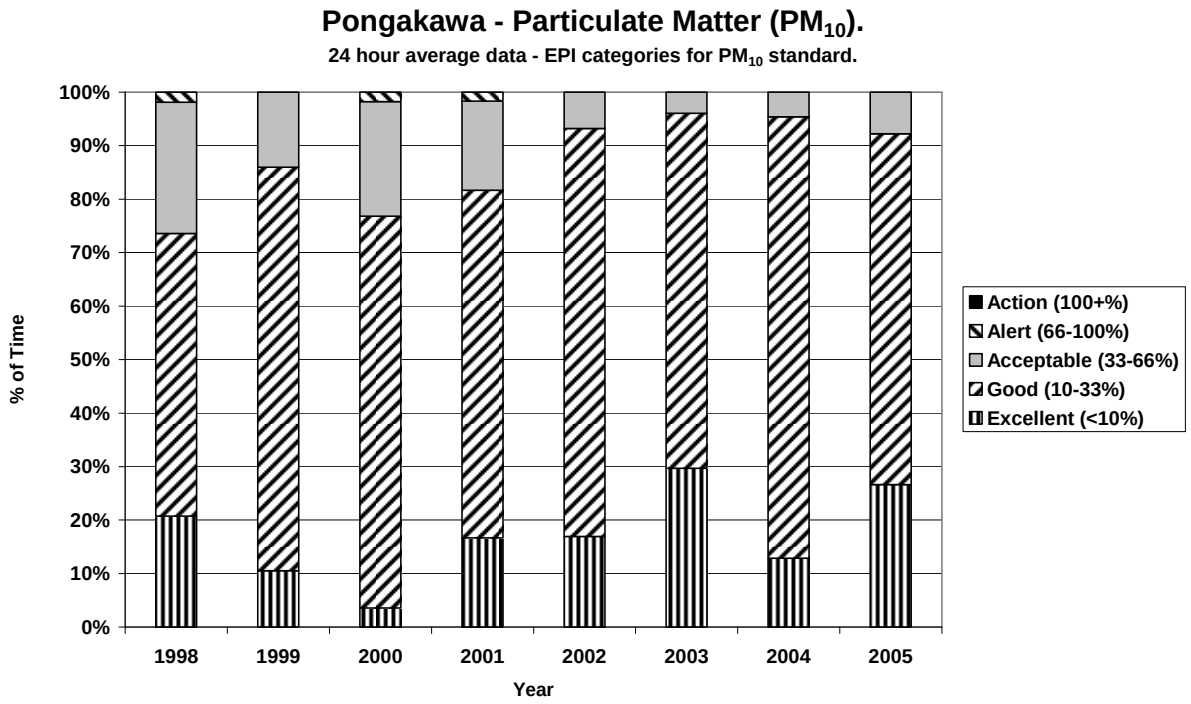
Date Compiled	March 2007	Site Number	2174
Compiled by	Glenn Ellery	Parameter	PM_{10}
Equipment Type	Partisol	Station	Pongakawa
NZMS 260 Reference	V15: 172 637		
Period of Summary	1998 to 2005	MfE guideline	50μg/m³ for 24hours

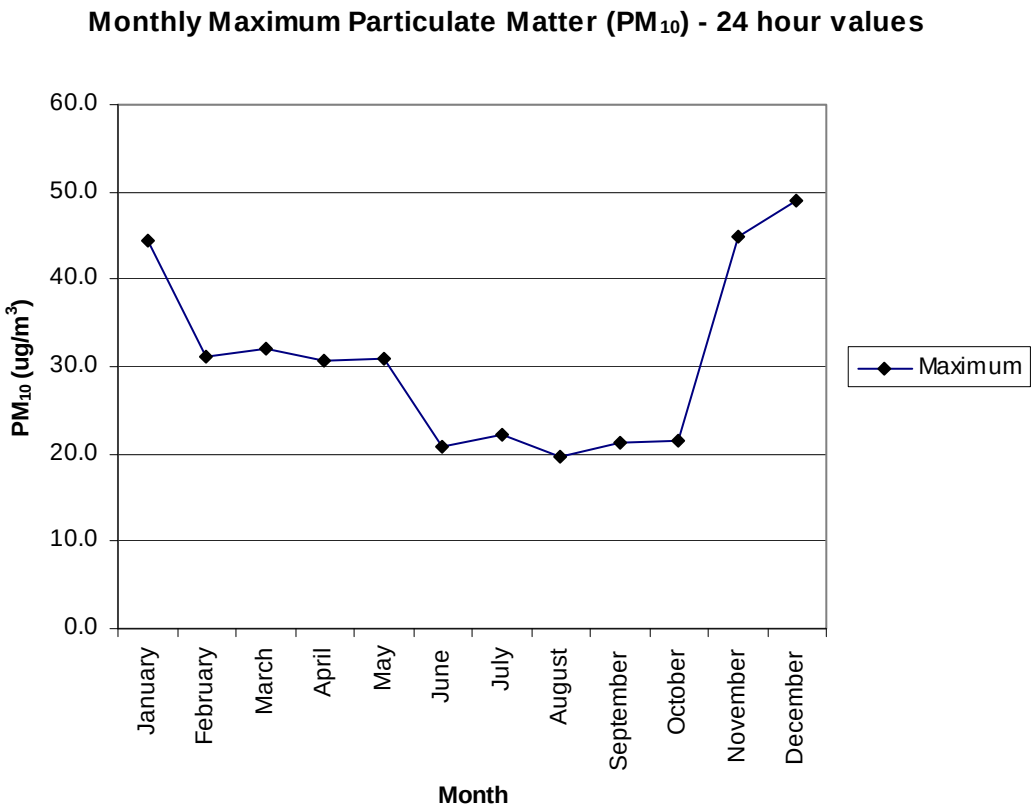
Statistical Summary (μg/m³)			
24 hour fixed			
Mean PM_{10}	10.6	Mean Summer PM_{10}	13.3
Median PM_{10}	9.6	Mean Autumn PM_{10}	10.1
Maximum PM_{10}	49.1	Mean Winter PM_{10}	6.7
		Mean Spring PM_{10}	10.9

Monthly Statistics (μg/m³)												
24 hour fixed												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max.	44.5	31.1	32.1	30.8	30.9	20.8	22.2	19.6	21.2	21.6	44.8	49.1

Annual Statistics (μg/m³)							
24 hour fixed							
Year	Mean	Maximum	Date	Year	Mean	Maximum	Date
1998	12.7	44.5	14/01/1998	2002	10.1	25.0	0/11/2002
1999	11.4	27.6	20/03/1999	2003	8.6	30.8	10/04/2003
2000	13.0	44.8	12/11/2000	2004	9.5	21.6	31/10/2004
2001	11.3	49.1	19/12/2001	2005	8.1	32.1	25/03/2005

EPI - Indicator Comparisons		
Category	Percentage of MfE guideline	% of time in category
Action	100%+	0
Alert	66-100%	1
Acceptable	33-66%	11
Good	10-33%	70
Excellent	<10%	18





PM_{10} at Pongakawa

Environment Bay of Plenty
Particulate Matter Recording Station

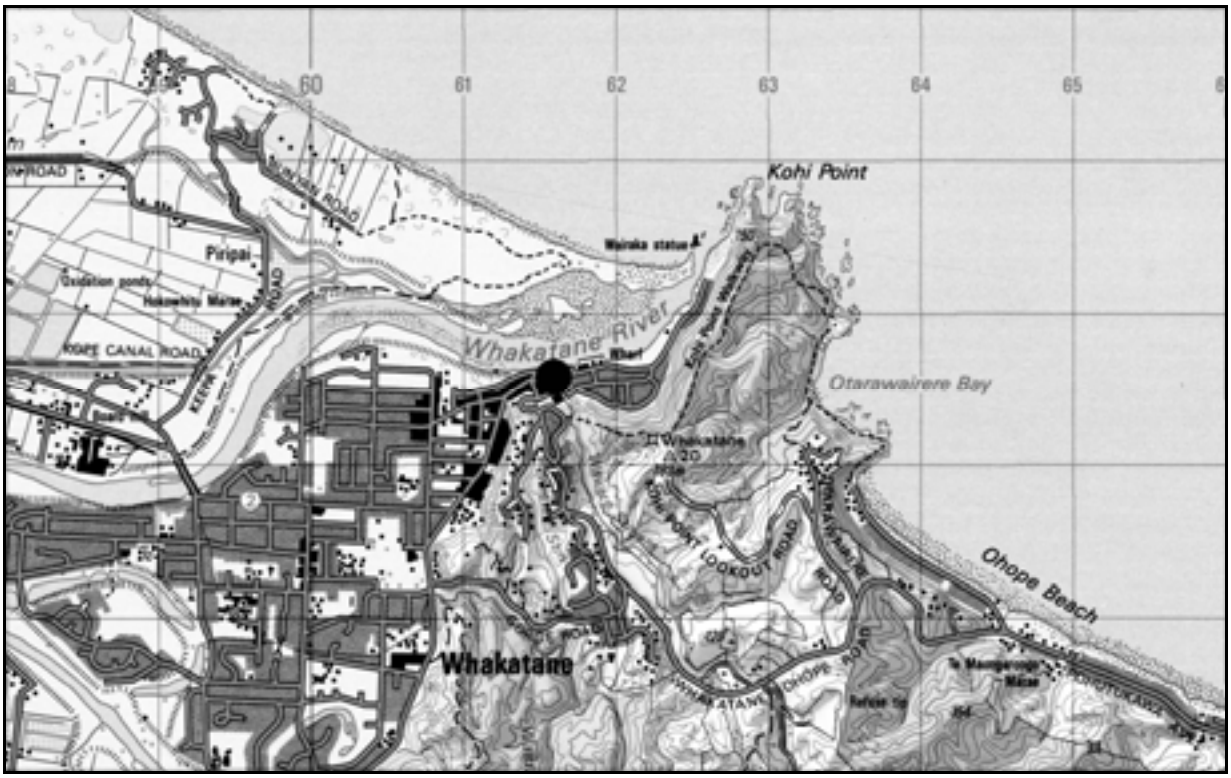
Parameter	PM_{10}	Station	Quay Street
Site Number	2176	NZMS 260 Reference	W15: 616 535
Recorder Type	Partisol	Altitude	10 metres
Start of Record	December 1997	Data Capture Rate	99%
Data Summary From	January 1998	To	December 2005
Data Audited From		To	

General Comments

Site is situated on the roof of the Regional Council headquarters in Whakatane.

Site consists of a Partisol hub. The unit is mounted on a frame, with the sampling head approximately 2.2 metres above the roof. On 12/07/99 site was moved from adjacent Catchment Building roof to the roof of the Environment Bay of Plenty building, approximately 60 metres to the east.

Sampler is set to monitor on a six day cycle. Samples are for 24 hours.



SITE LOCATION
PM_{10} at Quay Street Whakatane

Environment Bay of Plenty
PM_{10} Summary

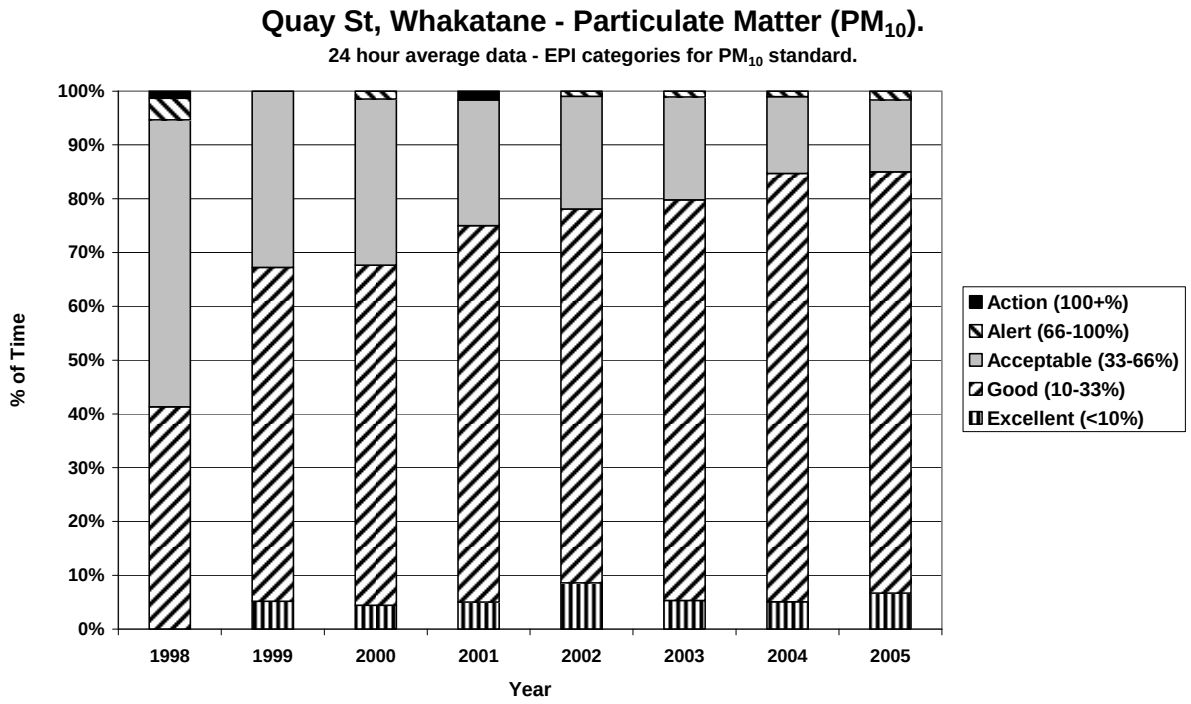
Date Compiled	March 2007	Site Number	2176
Compiled by	Glenn Ellery	Parameter	PM_{10}
Equipment Type	Partisol	Station	Quay Street
NZMS 260 Reference	W15: 616 535		
Period of Summary	1998 to 2005	MfE guideline	50μg/m³ for 24hours

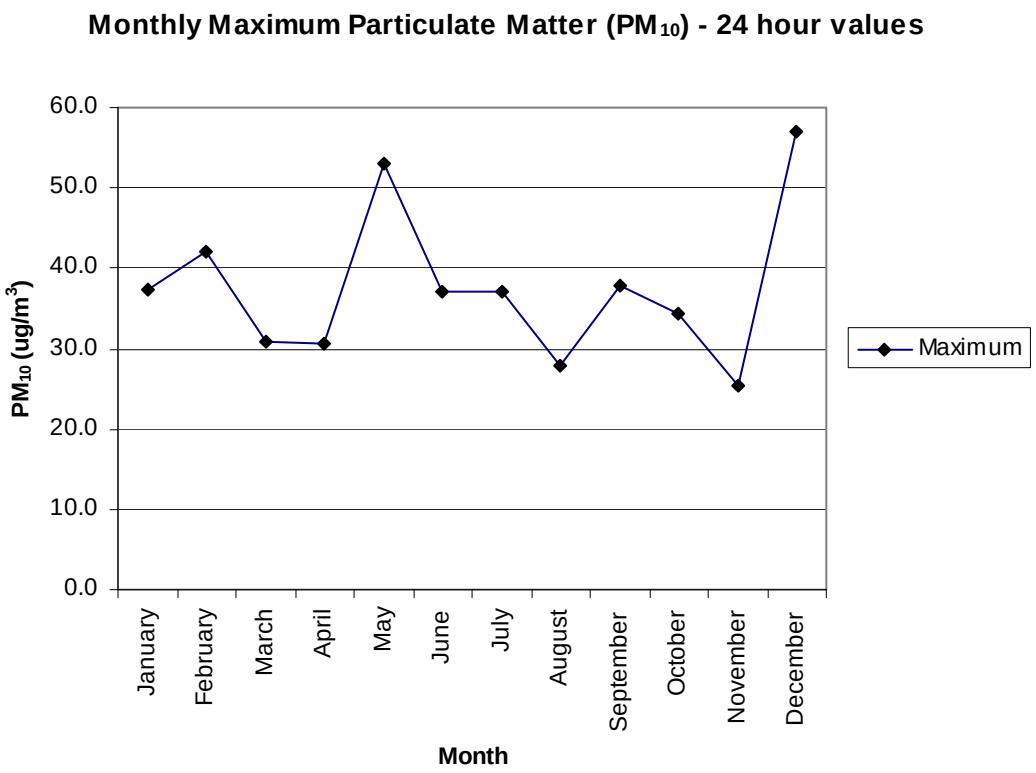
Statistical Summary (μg/m³)			
24 hour fixed			
Mean PM_{10}	14.1	Mean Summer PM_{10}	15.9
Median PM_{10}	13.2	Mean Autumn PM_{10}	13.8
Maximum PM_{10}	56.9	Mean Winter PM_{10}	13.2
		Mean Spring PM_{10}	12.8

Monthly Statistics (μg/m³)												
24 hour fixed												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max.	37.3	42.0	30.8	30.6	53.0	37.1	37.1	27.8	37.8	34.3	25.3	56.9

Annual Statistics (μg/m³)							
24 hour fixed							
Year	Mean	Maximum	Date	Year	Mean	Maximum	Date
1998	19.2	53.0	23/05/1998	2002	14.1	56.9	13/12/2002
1999	14.0	37.8	07/09/1999	2003	12.3	35.2	29/06/2003
2000	14.7	31.4	29/06/2000	2004	12.4	37.3	20/01/2004
2001	13.5	45.0	03/05/2001	2005	12.3	42.0	15/02/2005

EPI - Indicator Comparisons		
Category	Percentage of MfE guideline	% of time in category
Action	100%+	0
Alert	66-100%	1
Acceptable	33-66%	25
Good	10-33%	68
Excellent	<10%	5





PM_{10} at Quay Street Whakatane

3.2 Meteorological Data Summaries

The meteorological data summaries in this chapter are provided in the following sequences of 3 pages per site:

Page 1 Provides general information regarding the site, such as its location, instrument types, start of record, etc.

Page 2 Displays the data summary information

Page 3 Graphical presentation of a selection of parameters provided in Page 2.

The ID No. in Table 3.2 indicates the order in which individual site data summaries are provided in this report.

Table 3.2 Meteorological Monitoring Sites

ID Number	Page No.	Site	Period of Audit	Data Capture Rate (%)
1	57	Tauranga Aero AWS	1992-2005	-
2	61	Rotorua Aero AWS	1992-2005	-
3	65	Edgecumbe	1992-2005	98
4	69	Whakatane Aero AWS	1991-2005	-


Meteorological Monitoring Sites
of the Bay of Plenty Region
Environment Bay of Plenty
REGIONAL COUNCIL
Bay of Plenty
Mayor Island
Waihi Beach
Katikati
TAURANGA
Mount Maunganui
Matakana Island
Motiti Island
Te Puke
Maketu
Otamarakau
Edgecumbe
Opotiki
WHAKATANE
Ohope
Tauranga
Ngongotaha
Mamaku
ROTORUA
Kawerau
Taupo
Rerewhakaitu
Murupara
Ruatahuna
Gisborne
Te Kaha
Waihau Bay
Cape Runaway
Rangitaiki
Reference
meteorological monitoring site
regional boundary
district boundaries
state highway
major road
town, locality
native forest
exotic forest
horticulture
pasture and cropping
other
Scale
Meteorological Monitoring Sites
1 Tauranga at Airport
2 Rotorua at Airport
3 Edgecumbe at Edgecumbe
4 Rotorua at Airport

Environment Bay of Plenty
Meteorological Recording Station

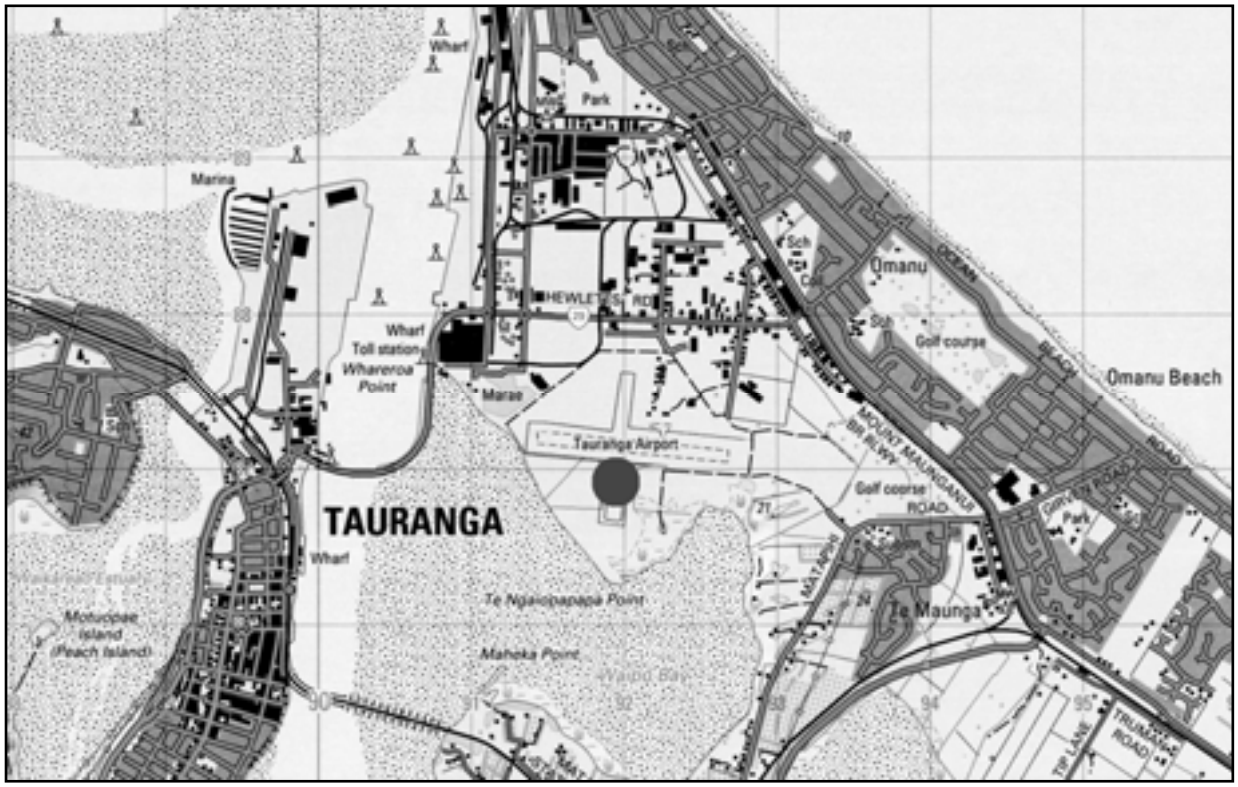
Parameter	Wind speed, Direction and Temperature	Climate Station	Tauranga Aero AWS
Site Number	B76624	Grid Reference	U14:921 874
Recorder Type	Wind vane, anemometer and dry bulb	Altitude	4 metres
Data Summary From	January 1992	To	December 2005
Data Audited From		To	

General Comments

Site is operated by the New Zealand Meteorological Service. Contact the NIWA Climate

Database administrator for further information.

Wind direction is measured in true degrees.



SITE LOCATION
Tauranga Aero AWS

Environment Bay of Plenty
Meteorological Summary

Date Complied	March 2007	Site Number	B76624
Compiled by	G R Ellery	Climate Station	Tauranga Aero AWS
Equipment Type	Vane, Anemometer, Dry bulb	Height Above Ground	10 metres
Metric Map Reference	U14: 921 874		
Altitude (metres)	4 metres	Period of Summary	1991 to 2005

Statistical Summary

Wind speed (kph)		Prevailing Direction (True)		Temperature (°C)	
Mean	13	Annual	West	Mean	14.7
Median	13	Summer	West	Median	14.8
Mean Summer	15	Autumn	Southwest	Mean Summer	18.7
Mean Autumn	12	Winter	Southwest	Mean Autumn	15.7
Mean Winter	13	Spring	West	Mean Winter	10.6
Mean Spring	15			Mean Spring	13.6
Maximum	59			Minimum	-0.4
				Maximum	30.0

Monthly Temperature Statistics (°C)

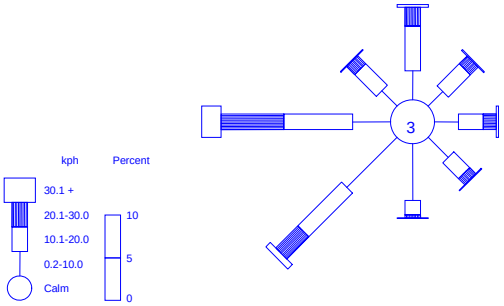
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum	6.0	8.0	5.4	3.3	2.2	-0.4	0.0	0.6	1.0	0.9	4.0	4.4
Median	19.3	19.8	18.1	15.7	13.8	11.4	10.8	11.0	12.4	14.3	15.8	18.0
Maximum	29.0	30.0	27.3	24.3	23.0	20.2	19.3	18.1	22.0	23.0	27.4	28.1
Mean	19.2	19.6	17.8	15.3	13.4	11.0	10.3	10.5	12.1	13.9	15.5	17.8

Annual Wind Speed and Direction Frequency

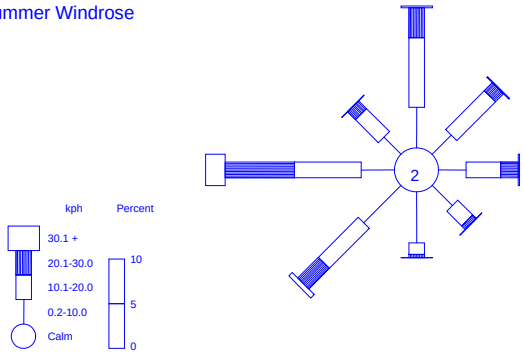
(% of time)

Direction (true)	0.2-10.0 kph	10.1-20.0 kph	20.1-30.0 kph	30.1 + kph	Total
N	3.4	5.2	2.2	0.3	11.2
NE	2.4	3.7	1.3	0.1	7.5
E	2.8	2.9	1.5	0.3	7.5
SE	3.3	2.6	1	0.1	7.1
S	6.7	1.7	0.4	0	8.7
SW	8.3	7.3	3.7	0.7	20
W	4.5	8.1	7.4	2.3	22.2
NW	2.5	3.6	1.3	0.1	7.6
Total	33.9	35.1	18.8	4	91.8

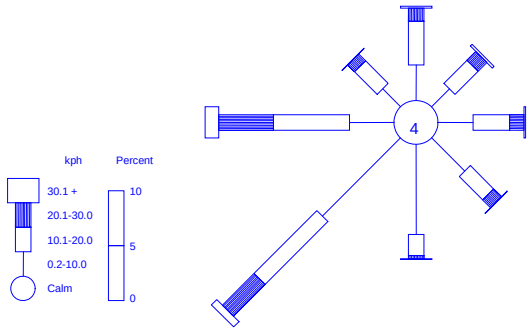
Annual Windrose



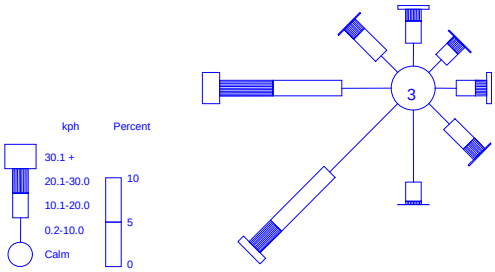
Summer Windrose



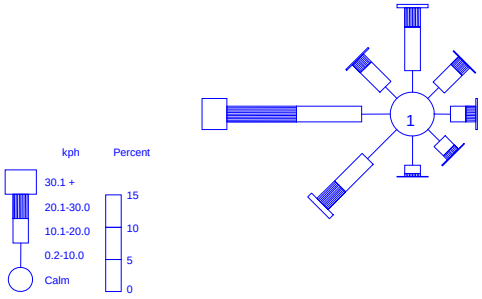
Autumn Windrose



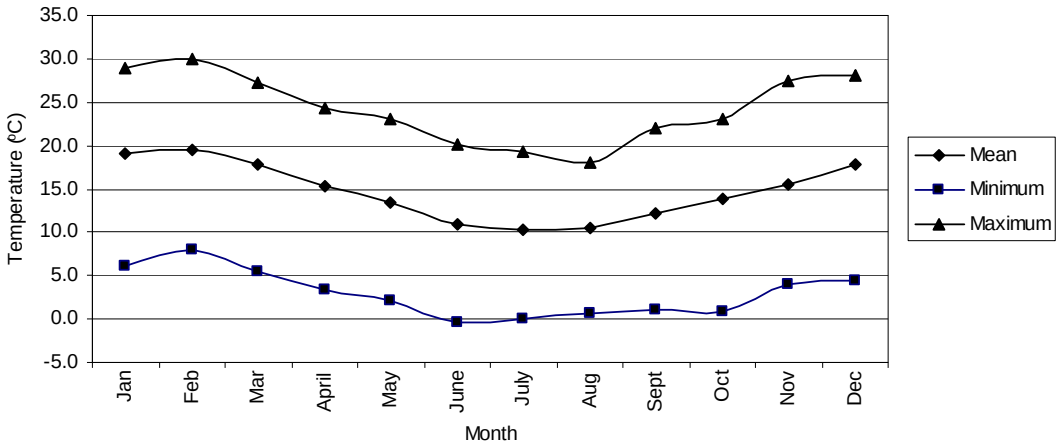
Winter Windrose



Spring Windrose



Monthly Mean, Minimum and Maximum Temperature



Climate Station at Tauranga Aero AWS

Environment Bay of Plenty
Meteorological Recording Station

Parameter	Wind speed, Direction and Temperature	Climate Station	Rotorua Aero AWS
Site Number	B86133	Grid Reference	U16: 009 388
Recorder Type	Wind vane, anemometer and dry bulb	Altitude	287 metres
Data Summary From	January 1992	To	December 2005
Data Audited From		To	

General Comments

Site is operated by the New Zealand Meteorological Service. Contact the NIWA Climate Database administrator for further information.

Wind direction is measured in true degrees.

SITE LOCATION
Rotorua Aero AWS

Environment Bay of Plenty
Meteorological Summary

Date Complied	March 2007	Site Number	B86133
Compiled by	G R Ellery	Climate Station	Rotorua Aero AWS
Equipment Type	Vane, Anemometer, Dry bulb	Height Above Ground	10 metres
Metric Map Reference	U16: 009 388		
Altitude (metres)	287 metres	Period of Summary	1992 to 2005

Statistical Summary

Wind speed (kph)		Prevailing Direction (True)		Temperature (°C)	
Mean	13	Annual	South	Mean	12.4
Median	11	Summer	Northeast	Median	12.5
Mean Summer	14	Autumn	South	Mean Summer	16.8
Mean Autumn	11	Winter	South	Mean Autumn	13.3
Mean Winter	12	Spring	West	Mean Winter	8.2
Mean Spring	14			Mean Spring	11.4
Maximum	70			Minimum	-5.0
				Maximum	29.0

Monthly Temperature Statistics (°C)

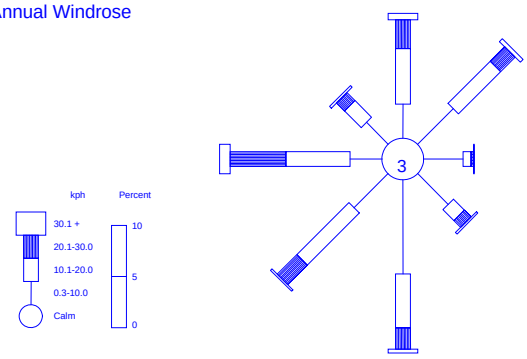
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum	2.9	2.1	0.5	-2.0	-2.0	-4.3	-4.0	-5.0	-2.0	-2.3	-1.0	-0.2
Median	17.1	17.7	16.0	13.5	11.7	9.4	8.7	8.8	10.2	12.1	13.8	16.0
Maximum	29.0	29.0	26.1	23.0	20.2	19.0	16.3	17.4	19.1	23.0	25.0	27.0
Mean	17.2	17.5	15.5	12.9	11.0	8.6	7.9	8.0	9.8	11.8	13.4	15.9

Annual Wind Speed and Direction Frequency

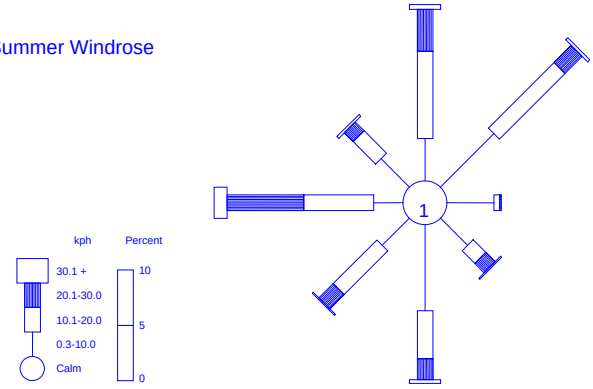
(% of time)

Direction (true)	0.2-10.0 kph	10.1-20.0 kph	20.1-30.0 kph	30.1 + kph	Total
N	3.3	5.4	2.8	0.6	12.2
NE	4.9	5.8	2	0.4	13.1
E	3.9	0.8	0.3	0	4.9
SE	4.2	1.5	0.9	0.2	6.9
S	9.2	5.3	2.1	0.4	16.9
SW	4.7	7.2	2.7	0.2	14.8
W	3.1	6.3	5.5	1	15.9
NW	3	2.3	1.1	0.2	6.7
Total	36.4	34.6	17.3	3.1	91.4

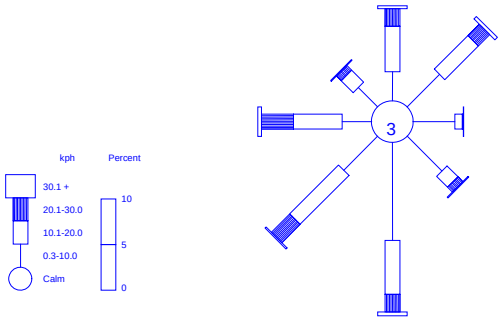
Annual Windrose



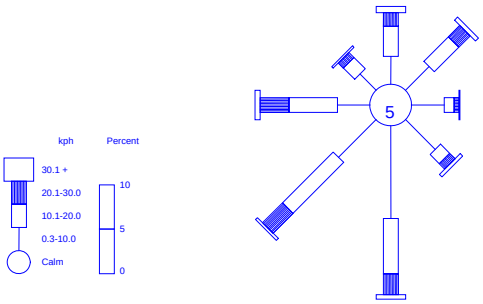
Summer Windrose



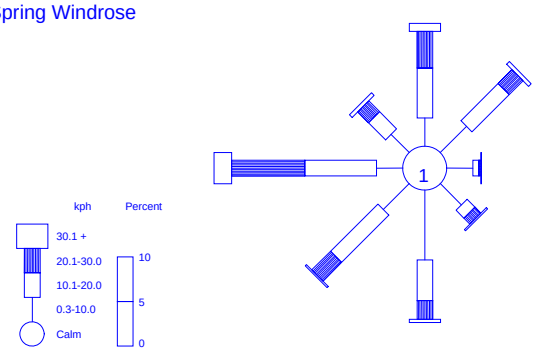
Autumn Windrose



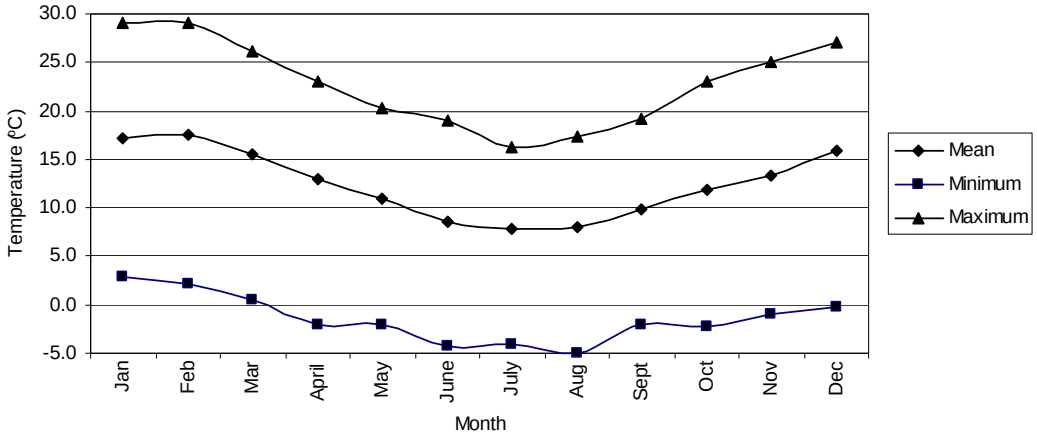
Winter Windrose



Spring Windrose



Monthly Mean, Minimum and Maximum Temperature



Climate Station at Rotorua Aero AWS

Environment Bay of Plenty
Meteorological Recording Station

Parameter	Wind speed, Direction and Temperature	Climate Station	Edgecumbe Meteorological
Site Number	2120, 2121 & 2125	Grid Reference	V15: 465 508
Recorder Type	Wind vane, anemometer and CS107 temperature sensor	Altitude	6 metres
Data Summary From	January 1992	To	December 2005
Data Audited From	January 1992	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network. Recorders are a Vector A101M anemometer and Vector W200P wind vane connected to a Campbell CR10 datalogger.

An iQuest DS4483 logger was installed in May 2004 to replace the Campbell CR10. The anemometer and vane are mounted on a 10 metre high pole at the Environment Bay of Plenty Edgecumbe depot. Both wind speed and direction are measured every 6 seconds with an average recorded every 10 minutes. The highest 6 second measurement in each 10 minute period is recorded as a wind gust against the 10 minute period in which it occurred. Wind speed and direction statistics presented are for 10 minute averages only. Please contact Environment Bay of Plenty for wind gust data. Wind direction is measured in true degrees.

SITE LOCATION
Edgecumbe Meteorological

Environment Bay of Plenty
Meteorological Summary

Date Complied	March 2007	Site Number	B76995
Compiled by	G R Ellery	Climate Station	Edgecumbe Meteorological
Equipment Type	Vane, Anemometer, CS107	Height Above Ground	10 metres
Metric Map Reference	W15: 546 568		
Altitude (metres)	6 metres	Period of Summary	1992 to 2005

Statistical Summary

Wind speed (kph)		Prevailing Direction (True)		Temperature (°C)	
Mean	10.2	Annual	South	Mean	14.8
Median	9.1	Summer	North	Median	15.1
Mean Summer	10.6	Autumn	South	Mean Summer	19.0
Mean Autumn	9.2	Winter	South	Mean Autumn	15.9
Mean Winter	9.5	Spring	South	Mean Winter	10.1
Mean Spring	11.1			Mean Spring	13.8
Maximum	58.2			Minimum	-2.1
				Maximum	33.6

Monthly Temperature Statistics (°C)

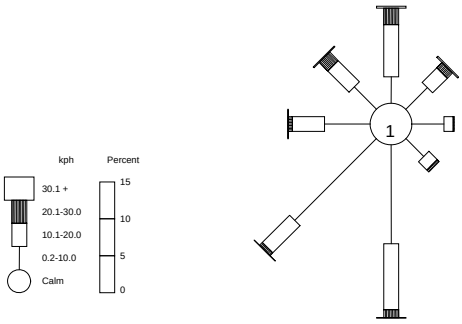
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum	6.6	5.8	6.3	0.5	-0.6	-2.1	-1.8	-0.9	-0.9	1.1	2.4	4.1
Median	19.9	20.3	18.7	16.1	13.6	10.8	10.1	10.4	12.7	14.8	16.2	18.8
Maximum	32.2	33.6	31.1	27.7	23.6	23.6	20.5	23.6	25.8	26.8	29.8	32.9
Mean	19.4	19.9	18.1	15.5	13.2	10.4	9.7	10.1	12.2	14.3	15.8	18.3

Annual Wind Speed and Direction Frequency

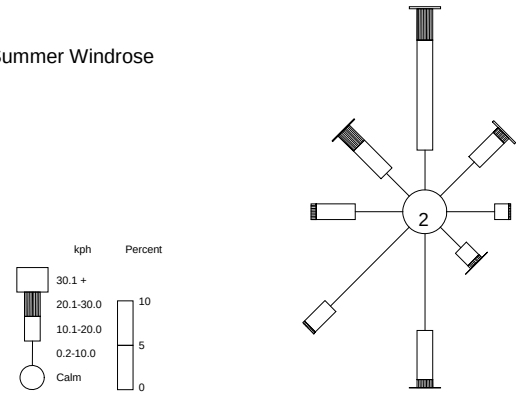
(% of time)

Direction (true)	0.2-10.0 kph	10.1-20.0 kph	20.1-30.0 kph	30.1 + kph	Total
N	3.5	7.1	2.2	0.3	13.1
NE	4.1	2.8	1	0.2	8.1
E	4.3	1.2	0.2	0	5.8
SE	3.4	1.6	0.4	0	5.4
S	13.4	8.9	1.1	0.1	23.4
SW	15.6	5.2	0.5	0	21.4
W	6.2	4.3	0.6	0	11.1
NW	4.3	4.1	1.6	0.2	10.1
Total	55	35.2	7.6	0.8	98.5

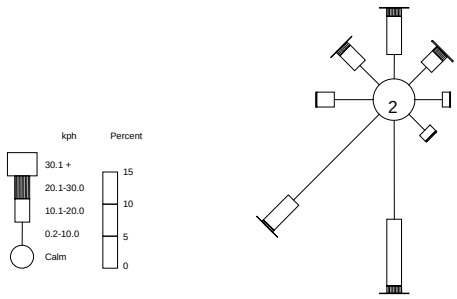
Annual Windrose



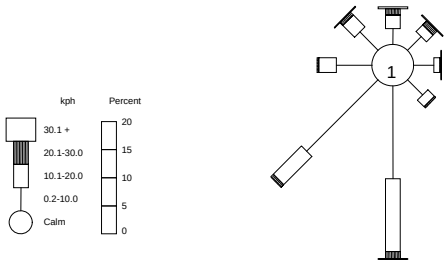
Summer Windrose



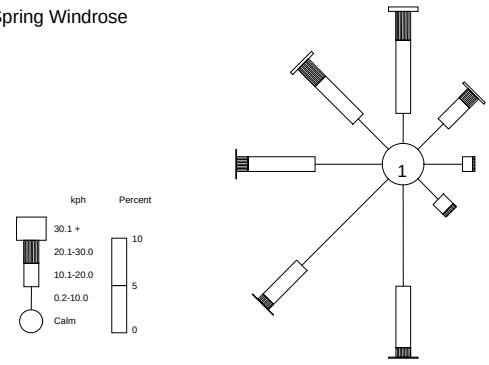
Autumn Windrose



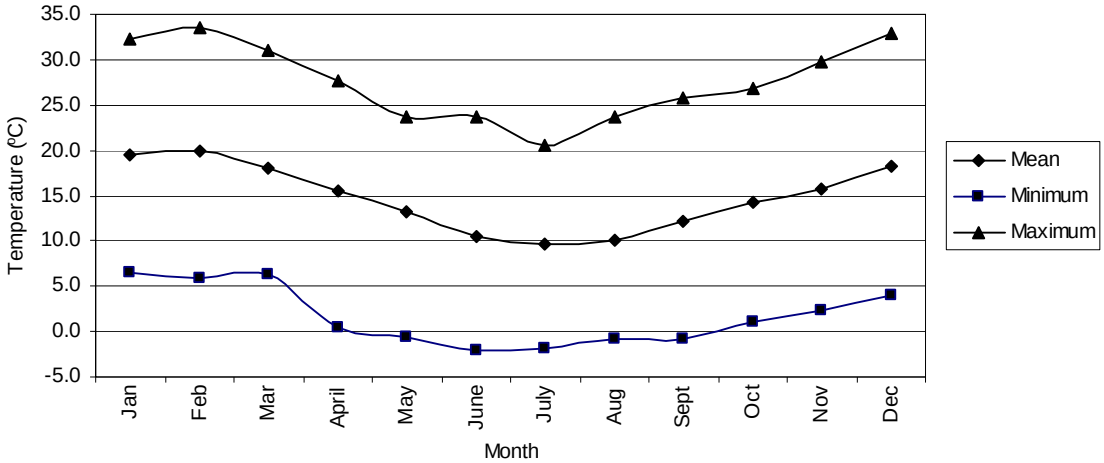
Winter Windrose



Spring Windrose



Monthly Mean, Minimum and Maximum Temperature



Climate Station at Edgecumbe Meteorological

Environment Bay of Plenty
Meteorological Recording Station

Parameter	Wind speed, Direction and Temperature	Climate Station	Whakatane Aero AWS
Site Number	B76995	Grid Reference	W15: 546 568
Recorder Type	Wind vane, anemometer and dry bulb	Altitude	4 metres
Data Summary From	January 1991	To	December 2005
Data Audited From		To	

General Comments

Site is operated by the New Zealand Meteorological Service. Contact the NIWA Climate Database administrator for further information.

Wind direction is measured in true degrees.

SITE LOCATION
Whakatane Aero AWS

Environment Bay of Plenty
Meteorological Summary

Date Complied	March 2007	Site Number	B76995
Compiled by	G R Ellery	Climate Station	Whakatane Aero AWS
Equipment Type	Vane, Anemometer, Dry bulb	Height Above Ground	10 metres
Metric Map Reference	W15: 546 568		
Altitude (metres)	4 metres	Period of Summary	1991 to 2005

Statistical Summary

Wind speed (kph)		Prevailing Direction (True)		Temperature (°C)	
Mean	10	Annual	South	Mean	13.9
Median	9	Summer	North	Median	14.3
Mean Summer	11	Autumn	Southwest	Mean Summer	18.4
Mean Autumn	9	Winter	Southwest	Mean Autumn	14.7
Mean Winter	9	Spring	West	Mean Winter	9.3
Mean Spring	11			Mean Spring	13.1
Maximum	48			Minimum	-3.2
				Maximum	31.0

Monthly Temperature Statistics (°C)

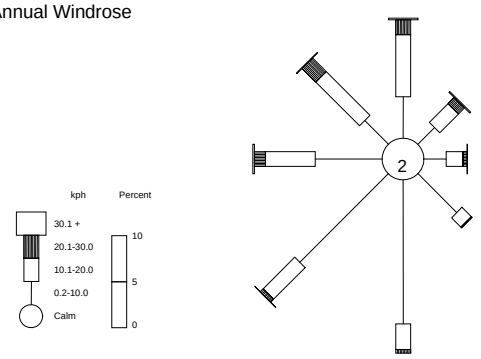
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum	4.8	3.8	1.5	0.1	-1.0	-3.2	-3.0	-2.5	-1.0	-1.2	1.0	3.6
Median	19.3	19.8	17.8	15.0	12.6	10.0	9.7	9.9	12.1	14.3	15.8	18.0
Maximum	30.1	31.0	27.2	24.2	23.0	19.0	19.0	19.3	24.0	26.0	30.0	28.4
Mean	18.9	19.2	17.1	14.3	12.1	9.4	9.0	9.4	11.4	13.6	15.2	17.5

Annual Wind Speed and Direction Frequency

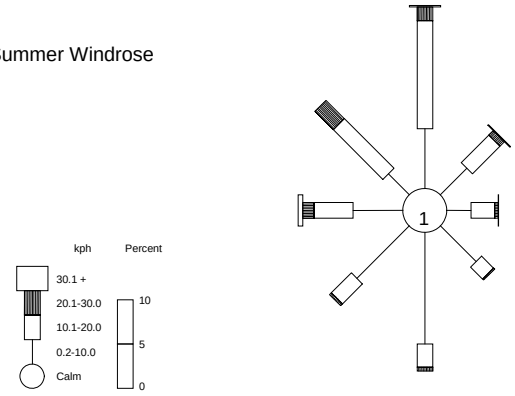
(% of time)

Direction (true)	0.2-10.0 kph	10.1-20.0 kph	20.1-30.0 kph	30.1 + kph	Total
N	4.5	6.7	1.6	0.2	13
NE	2.6	2.9	0.9	0.1	6.5
E	2.4	1.8	0.4	0.1	4.7
SE	6	1.4	0.1	0	7.5
S	15.7	2.8	0.4	0	18.8
SW	13.6	4.8	0.5	0	18.9
W	7.3	5.4	1.2	0.2	14
NW	3.6	6.7	2.1	0.1	12.5
Total	55.6	32.6	7.3	0.6	96.1

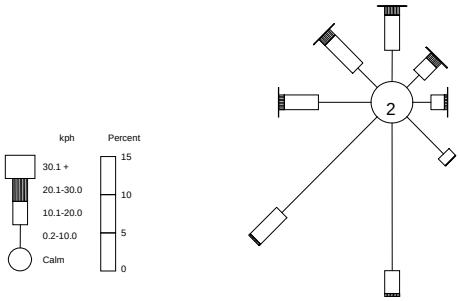
Annual Windrose



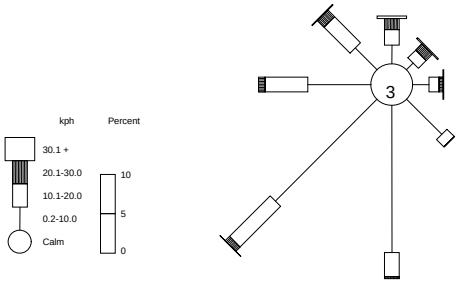
Summer Windrose



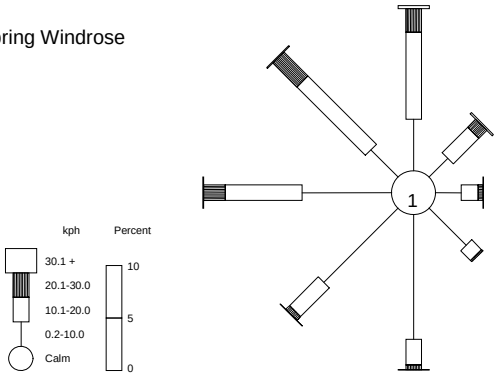
Autumn Windrose



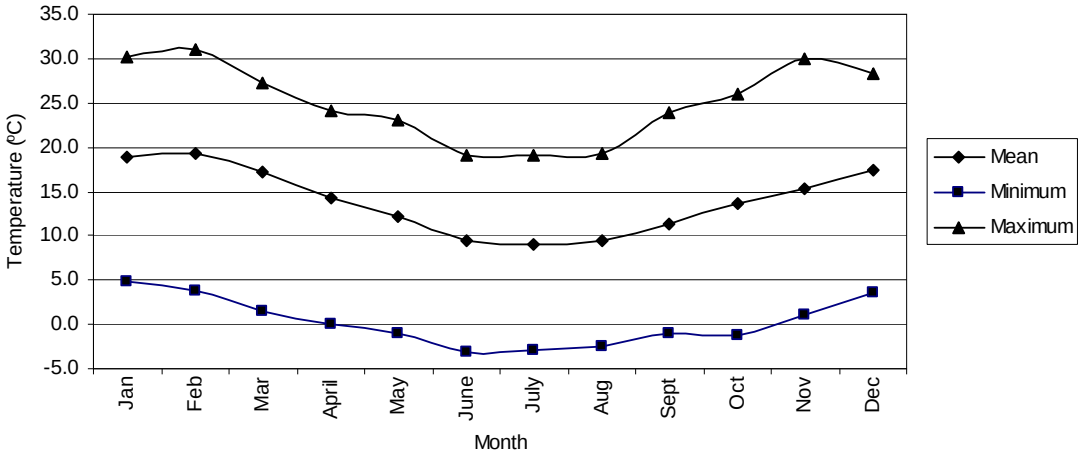
Winter Windrose



Spring Windrose



Monthly Mean, Minimum and Maximum Temperature



Climate Station at Whakatane Aero AWS

3.3 Manual Rainfall Data Summaries

The manual rainfall data summaries in this chapter are provided in the following sequences of 2 pages per station:

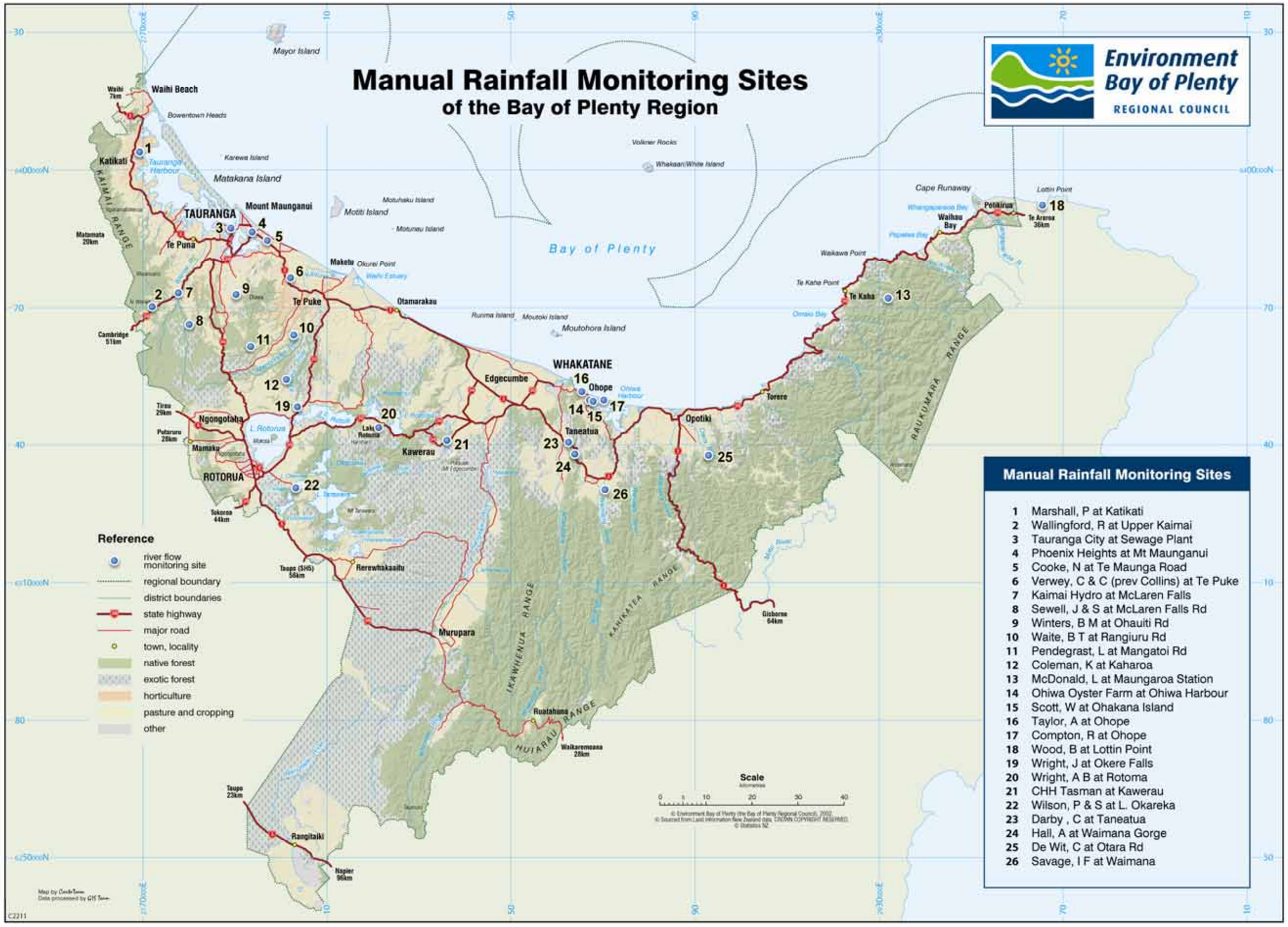
Page 1 Provides general information regarding the station, such as its location, instrument types, start of record, etc.

Page 2 Displays the data summary information. Within each summary additional rainfall depths have been included for a range of durations. The software package used to determine these values is the High Intensity Rainfall Design System (HIRDS) version 1.50b. This software has been written by the Climate Analysis and Application section of the National Institute of Water and Atmospheric Research Ltd. The application was written to provide estimates of rainfall depth and their standard errors which are calculated for a range of average reoccurrence intervals and storm durations for defined locations. For further information see Thompson (1993).

The ID No. in Table 3.3 indicates the order in which individual station data summaries are provided in this report.

Table 3.3 Manual Rainfall Monitoring Stations

ID Number	Page No.	Raingauge	Location	Period of Audit	Data Capture Rate (%)
1	75	Marshall, P	Katikati	1963-2005	100
2	77	Wallingford, R	Upper Kaimai	1995-2005	88
3	79	Tauranga City	Sewage Plant	1970-2005	100
4	81	Phoenix Heights	Mt Maunganui	2000-2005	100
5	83	Cooke, N	Te Maunga Road	1980-2002	98
6	85	Verwey, C & C	Te Puke	1980-2005	100
7	87	Kaimai Hydro	McLaren Falls	1968-1994	99
8	89	Sewell, J & S	McLaren Falls Rd	1968-1999	88
9	91	Winters, B M	Ohauiti Rd	1980-2005	98
10	93	Waite, B T	Rangiuru Rd	1980-2005	100
11	95	Pendegrast, L	Mangatoi Rd	1969-2005	89
12	97	Coleman, K	Kaharoa	1968-1986	77
13	99	McDonald, L	Maungaroa Station	1997-2005	100
14	101	Ohiwa Oyster Farm	Ohiwa Harbour	1992-2005	94
15	103	Scott, W	Ohakana Island	1984-2005	99
16	105	Taylor, A	Ohope	1978-2005	100
17	107	Compton, R	Ohope	1997-2005	94
18	109	Wood, B	Lottin Point	1964-2005	100
19	111	Wright, J	Okere Falls	1975-2005	97
20	113	Wright, A B	Rotoma	1964-2003	93
21	115	CHH Tasman	Kawerau	1955-2005	95
22	117	Wilson, P & S	L. Okareka	1966-2005	91
23	119	Darby, C	Taneatua	1962-2005	100
24	121	Hall, A	Waimana Gorge	1980-2000	100
25	123	De Wit, C	Otara Rd	1980-2002	97
26	125	Savage, I F	Waimana	1972-2005	100


Manual Rainfall Monitoring Sites
of the Bay of Plenty Region
Environment Bay of Plenty
REGIONAL COUNCIL
Bay of Plenty
Mayor Island
Waihi Beach
Bowentown Heads
Karewa Island
Matakana Island
Motiti Island
Volkner Rocks
Whakaari/White Island
Cape Runaway
Lottin Point
Waikawa Point
Te Kaha Point
Moutohora Island
Katikati
TAURANGA
Mount Maunganui
Te Puna
Te Puke
Maketu
Otamarakau
WHAKATANE
Ohope
Edgecumbe
Taneatua
Opotiki
Torere
Te Kaha
Potikirua
Waihau Bay
Te Araroa 36km
Ngongotaha
Mamaku
ROTORUA
Tokoroa 44km
Kawerau
Taupo (SH5) 58km
Rerewhakaaitu
Murupara
Ruatahuna
Waikaremoana 28km
Gisborne 64km
Taupo 23km
Rangitaiki
Napier 96km
Cambridge 51km
Matamata 20km
Tirau 29km
Putaruru 20km
KAIMAI RANGE
IKAWHENUA RANGE
KAHIKATEA RANGE
HUIARAU RANGE
RAUKUMARA RANGE
Reference
river flow monitoring site
regional boundary
district boundaries
state highway
major road
town, locality
native forest
exotic forest
horticulture
pasture and cropping
other
Scale
Manual Rainfall Monitoring Sites
1 Marshall, P at Katikati
2 Wallingford, R at Upper Kaimai
3 Tauranga City at Sewage Plant
4 Phoenix Heights at Mt Maunganui
5 Cooke, N at Te Maunga Road
6 Verwey, C & C (prev Collins) at Te Puke
7 Kaimai Hydro at McLaren Falls
8 Sewell, J & S at McLaren Falls Rd
9 Winters, B M at Ohauiti Rd
10 Waite, B T at Rangiuru Rd
11 Pendegrast, L at Mangatoi Rd
12 Coleman, K at Kaharoa
13 McDonald, L at Maungaroa Station
14 Ohiwa Oyster Farm at Ohiwa Harbour
15 Scott, W at Ohakana Island
16 Taylor, A at Ohope
17 Compton, R at Ohope
18 Wood, B at Lottin Point
19 Wright, J at Okere Falls
20 Wright, A B at Rotoma
21 CHH Tasman at Kawerau
22 Wilson, P & S at L. Okareka
23 Darby , C at Taneatua
24 Hall, A at Waimana Gorge
25 De Wit, C at Otara Rd
26 Savage, I F at Waimana

Environment Bay of Plenty
Manual Rainfall Recording Station

Raingauge	Marshall, P	Location	Katikati
Site Number	755903	Grid Reference	T13: 692 050
Recorder Type	Manual	Altitude	25 metres
Start of Record	1 January 1963	Data Capture Rate	100%
Data Summary From	1 January 1963	To	December 2005
Data Audited From	1 January 1963	To	December 2005

General Comments

Site was operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network. This site became part of the network on 25 September 1996.

Rainfall from January 1963 to July 1997 was recorded by Mr Harray, T. Gauge was read daily at 0900.

From 1 August 1997 to 31 January 2002 rainfall was recorded by Mr Marshall, P. Gauge was read daily at 0900.

Site closed 1 February 2002 as property was sold. Replacement site 754906 recorded by Mr Suckling, T of Katikati.

SITE LOCATION
Marshall, P. at Katikati

Environment Bay of Plenty
Manual Rainfall Summary

Date Complied	November 2006	Site Number	755903
Compiled by	Charl Naude	Raingauge	Marshall, P.
Metric Map Reference	T13: 692 050	Location	Katikati
Altitude	25 metres		
Catchment	Kauri Point	Period of Summary	1963 to 2005

Rainfall Totals (mm)

Mean Annual Rainfall	1595	Mean Summer Rainfall	343
		Summer Rainfall as % of Annual	22
		Mean Autumn Rainfall	418
		Autumn Rainfall as % of Annual	26
		Mean Winter Rainfall	479
Max. 24 hr fall (on 27/02/1966)	250	Winter Rainfall as % of Annual	30
Max 48 hr fall (on 20/03/1987)	302	Mean Spring Rainfall	354
Max 72 hr fall (on 19/03/1987)	313	Spring Rainfall as % of Annual	22

Rainfall Intensities (mm) (Depth-Duration Frequency)

EV1 Probability Weighted Moments (HIRDS Ver 1.50b)

Return Period (years)	2	5	10	20	50	100
Duration						
24 hours	108 (131)	142 (175)	173 (204)	205 (231)	251 (267)	
48 hours	142 (163)	179 (217)	211 (252)	245 (287)	290 (331)	
72 hours	155 (180)	193 (240)	226 (280)	259 (318)	302 (367)	

Monthly Statistics (mm)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	12	6	17	41	29	46	37	28	35	15	28	18	312
Median	97	121	134	121	139	160	145	144	114	98	109	109	1491
Mean	97	124	147	137	130	171	158	149	132	108	115	127	1595
Max	346	348	453	391	288	374	384	290	253	293	285	333	4038

Annual Summary

Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1978	1473	144	1986	1262	147	1994	1570	175
1979	1890	160	1987	1637	148	1995	1949	188
1980	1503	168	1988	1626	177	1996	2000	175
1981	1845	162	1989	1901	175	1997	1438	166
1982	936	135	1990	1635	167	1998	1705	175
1983	1484	150	1991	1239	178	1999	1438	167
1984	1375	151	1992	1767	163	2000	Incomplete Record	
1985	1746	166	1993	1134	160	2001	1618	169

Environment Bay of Plenty
Manual Rainfall Recording Station

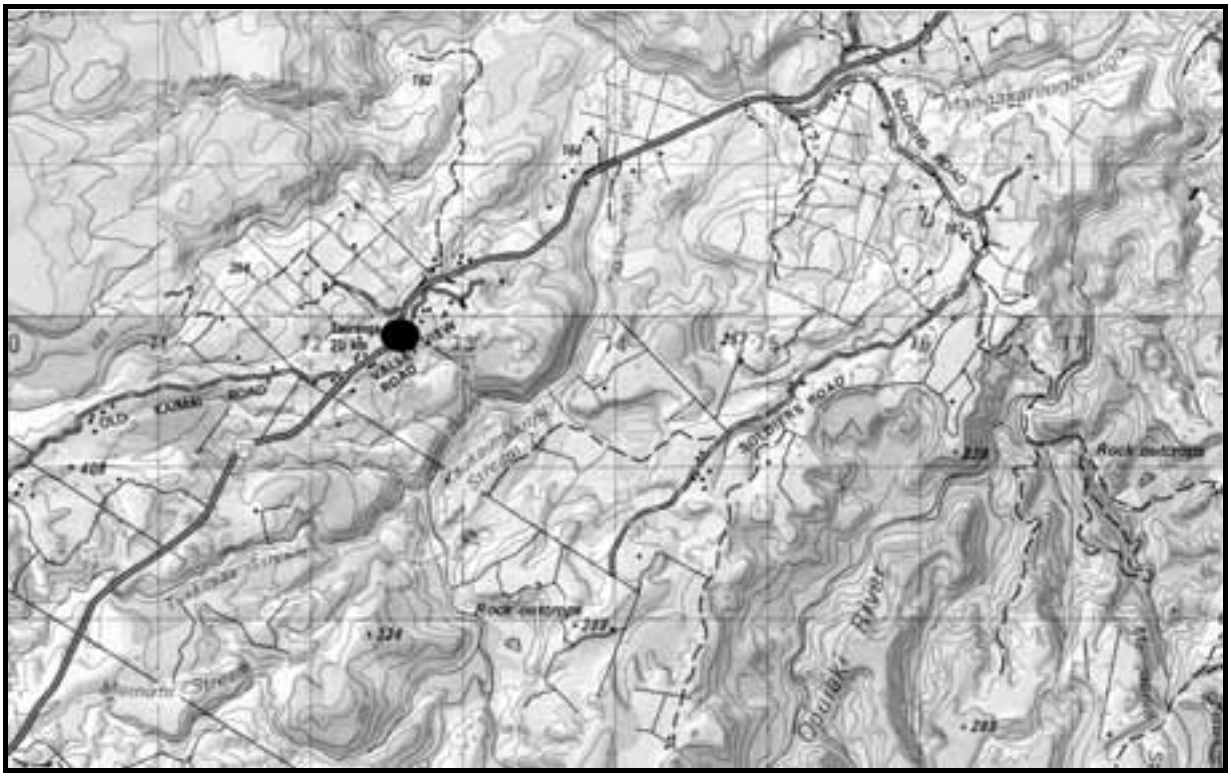
Raingauge	Wallingford, R.	Location	Upper Kaimai
Site Number	758905	Grid Reference	U15: 727 699
Recorder Type	Manual	Altitude	274 metres
Start of Record	July 1994	Data Capture Rate	88 %
Data Summary From	1 January 1995	To	December 2005
Data Audited From	12 July 1994	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Gauge is read daily at 0900.

Missing record from 1 January 2005 to 31 April 2005.



SITE LOCATION

Wallingford, R. at Upper Kaimai

Environment Bay of Plenty
Manual Rainfall Summary

Date Complied	November 2006	Site Number	758905
Compiled by	Charl Naude	Raingauge	Wallingford, R.
Metric Map Reference	U15: 727 699	Location	Upper Kaimai
Altitude	275 metres		
Catchment	Wairoa	Period of Summary	1995 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	2284	Mean Summer Rainfall	486
		Summer Rainfall as % of Annual	21
		Mean Autumn Rainfall	577
		Autumn Rainfall as % of Annual	25
		Mean Winter Rainfall	645
Max. 24 hr fall (on 30/04/1999)	200	Winter Rainfall as % of Annual	28
Max 48 hr fall (on 04/11/1999)	320	Mean Spring Rainfall	574
Max 72 hr fall (on 04/11/1999)	354	Spring Rainfall as % of Annual	25

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
24 hours	113 (188)	141 (251)	166 (292)			
48 hours	157 (234)	200 (311)	240 (362)			
72 hours	173 (259)	220 (345)	264 (402)			

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	49	17	24	80	154	93	67	100	92	90	105	92	963
Median	117	167	154	257	190	213	249	182	170	203	171	204	2277
Mean	118	169	133	224	215	225	230	188	197	174	202	209	2284
Max	211	461	235	442	380	409	491	297	331	236	610	441	4544

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990			1998	2431	186
1983			1991			1999	2263	163
1984			1992			2000	2105	184
1985			1993			2001	2421	219
1986			1994			2002	1776	226
1987			1995	2734	206	2003	2099	248
1988			1996	2397	199	2004	2756	221
1989			1997	1852	157	2005	Incomplete Record	

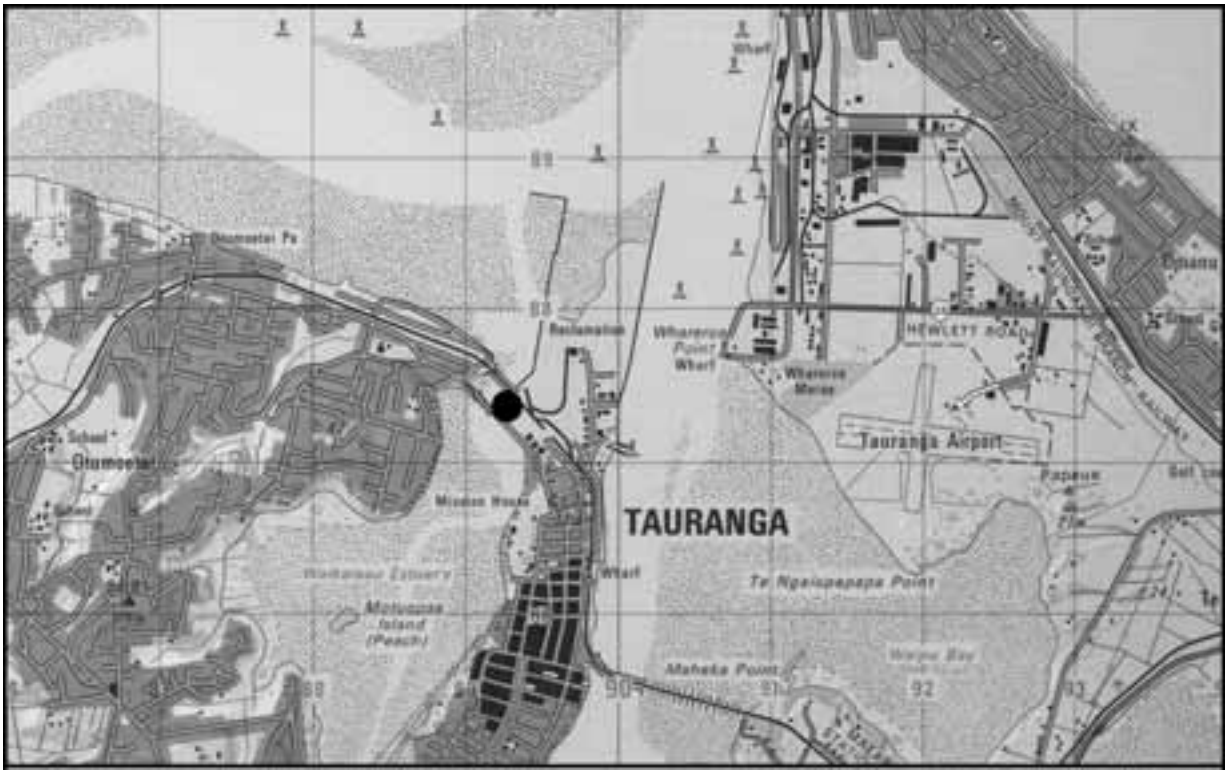
Environment Bay of Plenty
Manual Rainfall Recording Station

Raingauge	Tauranga City	Location	Seawage Plant
Site Number	766101	Grid Reference	U14: 892 872
Recorder Type	Manual	Altitude	5 metres
Start of Record	January 1970	Data Capture Rate	100 %
Data Summary From	January 1970	To	December 2005
Data Audited From	January 1970	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Gauge is read daily at 0900.



SITE LOCATION
Tauranga City at Sewage Plant

Environment Bay of Plenty
Manual Rainfall Summary

Date Complied	November 2006	Site Number	766101
Compiled by	Charl Naude	Raingauge	Tauranga City
Metric Map Reference	U14: 892 872	Location	Sewage Plant
Altitude	5 metres		
Catchment	Tauranga Harbour	Period of Summary	1970 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	1245	Mean Summer Rainfall	255
		Summer Rainfall as % of Annual	20
		Mean Autumn Rainfall	349
		Autumn Rainfall as % of Annual	28
		Mean Winter Rainfall	365
Max 24 hr fall (on 18/05/2005)	230	Winter Rainfall as % of Annual	29
Max 48 hr fall (on 19/03/1979)	270	Mean Spring Rainfall	277
Max 72 hr fall (on 19/03/1979)	304	Spring Rainfall as % of Annual	22

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
24 hours	93 (109)	124 (145)	155 (169)	192 (192)	251 (222)	
48 hours	118 (135)	161 (180)	202 (210)	248 (238)	315 (275)	
72 hours	126 (150)	171 (200)	216 (233)	269 (264)	352 (305)	

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	8	8	18	15	29	38	24	38	37	11	22	18	266
Median	57	72	93	95	85	121	127	111	89	85	78	82	1095
Mean	72	88	118	123	106	124	126	112	102	91	84	99	1245
Max	250	274	478	392	461	237	314	212	266	240	226	261	3611

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982	854	141	1990	1224	142	1998	1327	128
1983	1133	143	1991	1116	163	1999	1124	138
1984	1057	158	1992	1277	138	2000	1219	140
1985	1420	159	1993	861	134	2001	1560	161
1986	957	136	1994	1206	154	2002	862	158
1987	1193	132	1995	1690	179	2003	1116	161
1988	1164	163	1996	1478	163	2004	1441	169
1989	1342	153	1997	993	133	2005	1481	176

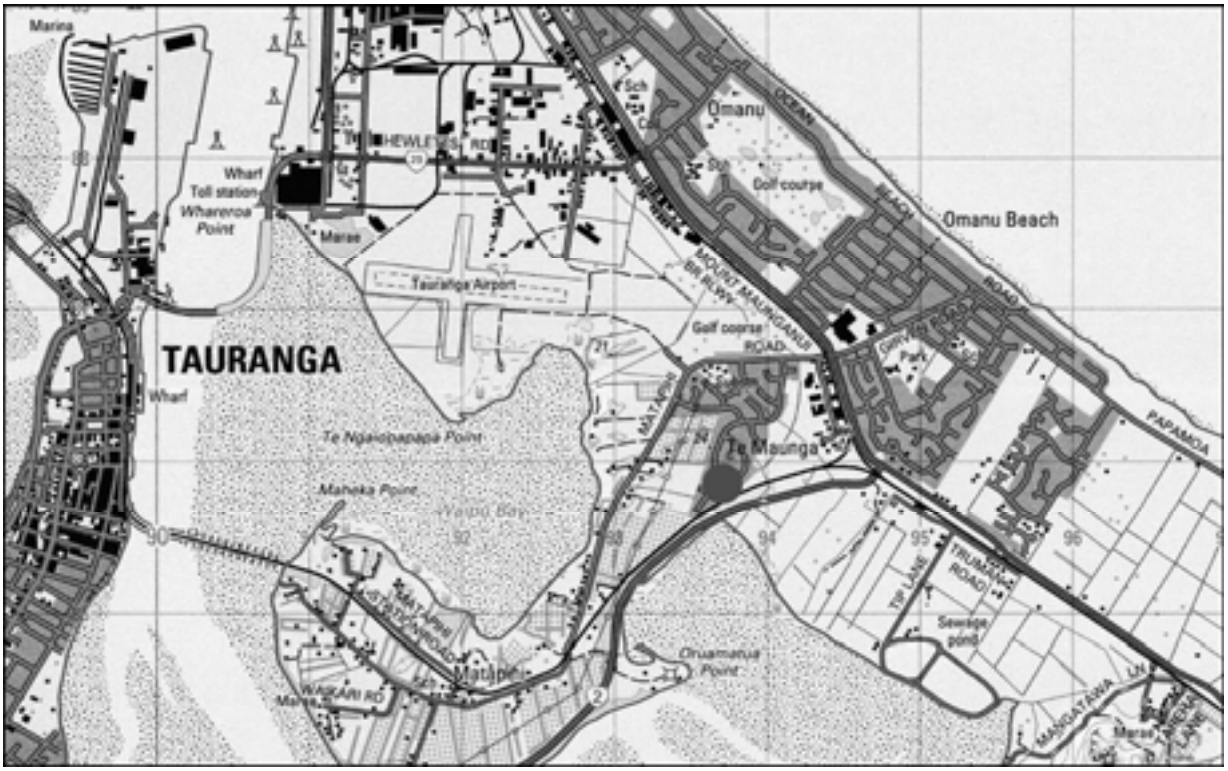
Environment Bay of Plenty
Manual Rainfall Recording Station

Raingauge	Phoenix Heights	Location	Mount Maunganui
Site Number	766205	Grid Reference	U14: 937 858
Recorder Type	Manual	Altitude	15 metres
Start of Record	May 1999	Data Capture Rate	100 %
Data Summary From	January 2000	To	December 2005
Data Audited From	May 1999	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Gauge is read daily at 0800.



SITE LOCATION
Phoenix Heights at Mount Maunganui

Environment Bay of Plenty
Manual Rainfall Summary

Date Complied	November 2006	Site Number	766205
Compiled by	Charl Naude	Raingauge	Phoenix Heights
Metric Map Reference	U14: 937 858	Location	Mount Maunganui
Altitude	15 metres		
Catchment	Tauranga Harbour	Period of Summary	2000 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	1260	Mean Summer Rainfall	318
		Summer Rainfall as % of Annual	25
		Mean Autumn Rainfall	398
		Autumn Rainfall as % of Annual	31
		Mean Winter Rainfall	278
Max 24 hr fall (on 18/05/2005)	237	Winter Rainfall as % of Annual	22
Max 48 hr fall (on 17/05/2005)	304	Mean Spring Rainfall	277
Max 72 hr fall (on 17/05/2005)	306	Spring Rainfall as % of Annual	22

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
24 hours	104 (105)	149 (140)	199 (163)			
48 hours	125 (130)	185 (173)	248 (202)			
72 hours	131 (144)	191 (192)	256 (224)			

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	19	10	19	19	65	55	45	58	76	61	41	58	526
Median	63	72	60	169	127	118	107	76	96	117	65	148	1218
Mean	58	107	70	157	174	102	99	93	91	113	67	129	1260
Max	105	237	131	294	497	123	181	189	99	203	115	246	2420

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990			1998		
1983			1991			1999		
1984			1992			2000	1202	135
1985			1993			2001	1470	170
1986			1994			2002	931	145
1987			1995			2003	1064	153
1988			1996			2004	1336	151
1989			1997			2005	1556	148

Environment Bay of Plenty
Manual Rainfall Recording Station

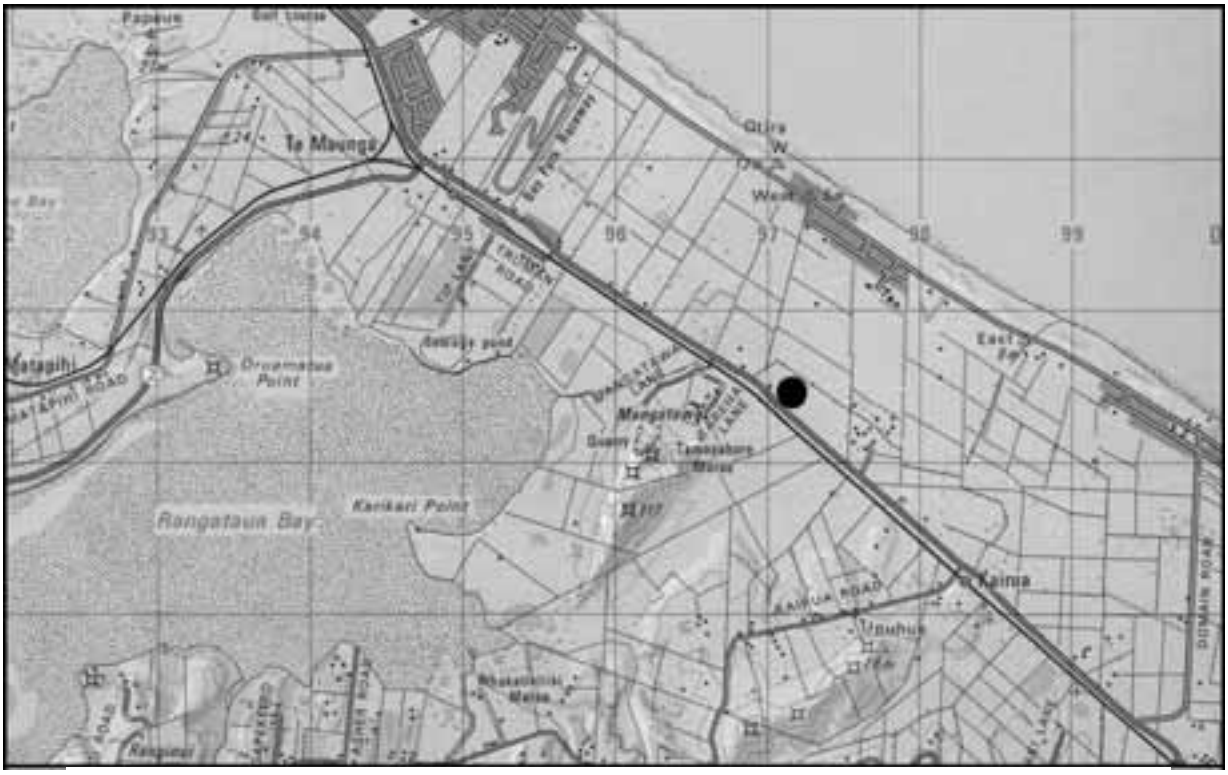
Raingauge	Cooke, N	Location	Te Maunga Road
Site Number	767201	Grid Reference	U14: 971 845
Recorder Type	Manual	Altitude	10 metres
Start of Record	January 1980	Data Capture Rate	98 %
Data Summary From	January 1980	To	December 2002
Data Audited From	January 1980	To	May 2003

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Network Monitoring Network.

Gauge is read daily at 0900.

Site closed May 2003.



SITE LOCATION
Cooke, N. at Te Maunga Road

Environment Bay of Plenty
Manual Rainfall Summary

Date Complied	November 2006	Site Number	767201
Compiled by	Charl Naude	Raingauge	Cooke, N.
Metric Map Reference	U14: 971 845	Location	Te Maunga Road
Altitude	10 metres		
Catchment	Tauranga Harbour	Period of Summary	1980 to 2002

Rainfall Totals (mm)

Mean Annual Rainfall	1281	Mean Summer Rainfall	278
		Summer Rainfall as % of Annual	22
		Mean Autumn Rainfall	337
		Autumn Rainfall as % of Annual	26
		Mean Winter Rainfall	379
Max. 24 hr fall (on 09/04/2000)	146	Winter Rainfall as % of Annual	30
Max 48 hr fall (on 20/03/1987)	172	Mean Spring Rainfall	286
Max 72 hr fall (on 19/03/1987)	174	Spring Rainfall as % of Annual	22

Rainfall Intensities (mm) (Depth-Duration Frequency)

EV1 Probability Weighted Moments (HIRDS Ver 1.50b)

Return Period (years)	2	5	10	20	50	100
Duration						
24 hours	86 (103)	108 (137)	127 (159)	144 (181)		
48 hours	106 (127)	132 (169)	153 (197)	172 (224)		
72 hours	115 (141)	141 (188)	159 (219)	175 (248)		

Monthly Statistics (mm)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	8	4	35	21	44	39	27	31	24	15	30	19	297
Median	80	78	95	129	87	119	130	121	87	94	89	72	1181
Mean	90	88	106	139	91	127	131	119	96	97	93	104	1281
Max	257	309	295	346	239	285	331	214	185	257	212	252	3182

Annual Summary

Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1979	Incomplete Record		1987	1225	115	1995	1818	168
1980	1363	142	1988	1298	148	1996	1565	149
1981	Incomplete Record		1989	1467	159	1997	1086	132
1982	1016	113	1990	1376	140	1998	1308	130
1983	Incomplete Record		1991	1177	156	1999	1112	119
1984	Incomplete Record		1992	1362	141	2000	1252	139
1985	1508	137	1993	862	125	2001	1644	166
1986	1084	123	1994	1198	143	2002	972	137

Environment Bay of Plenty
Manual Rainfall Recording Station

Raingauge	Verwey, C & C	Location	Te Puke
Site Number	767304	Grid Reference	U14: 021 764
Recorder Type	Manual	Altitude	15 metres
Start of Record	December 1979	Data Capture Rate	100 %
Data Summary From	January 1980	To	December 2005
Data Audited From	December 1979	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Rainfall from December 1979 to June 2002 was read by Collins, HM. Gauge was read daily at 0700.

Rainfall from 13 June 2002 is recorded by Verwey, C & C. Gauge is read daily at 0700.

SITE LOCATION
Verwey, C & C at Te Puke

Environment Bay of Plenty
Manual Rainfall Summary

Date Complied	November 2006	Site Number	767304
Compiled by	Charl Naude	Raingauge	Verwey, C & C
Metric Map Reference	U14: 021 764	Location	Te Puke
Altitude	15 metres		
Catchment	Kaituna	Period of Summary	1980 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	1428	Mean Summer Rainfall	380
		Summer Rainfall as % of Annual	22
		Mean Autumn Rainfall	377
		Autumn Rainfall as % of Annual	26
		Mean Winter Rainfall	420
Max 24 hr fall (on 09/04/2000)	173	Winter Rainfall as % of Annual	29
Max 48 hr fall (on 17/05/2005)	226	Mean Spring Rainfall	326
Max 72 hr fall (on 16/05/2005)	235	Spring Rainfall as % of Annual	23

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
24 hours	95 (107)	121 (143)	143 (167)	166 (189)	197 (219)	
48 hours	127 (133)	157 (177)	181 (207)	204 (235)	232 (271)	
72 hours	137 (148)	168 (197)	191 (229)	211 (260)	236 (301)	

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	12	15	18	26	51	57	24	49	47	16	26	17	358
Median	78	86	111	125	106	139	135	125	100	95	89	95	1284
Mean	93	100	120	139	116	145	146	125	108	116	102	118	1428
Max	319	285	333	369	412	345	357	285	230	303	223	284	3745

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982	1124	110	1990	1560	141	1998	1390	130
1983	1416	111	1991	1290	163	1999	1174	130
1984	1377	135	1992	1481	139	2000	1376	129
1985	1671	130	1993	933	132	2001	1724	162
1986	1198	117	1994	1288	155	2002	993	147
1987	1372	105	1995	1906	160	2003	1354	146
1988	1438	135	1996	1658	155	2004	1640	150
1989	1738	164	1997	1223	125	2005	1657	137

Environment Bay of Plenty
Manual Rainfall Recording Station

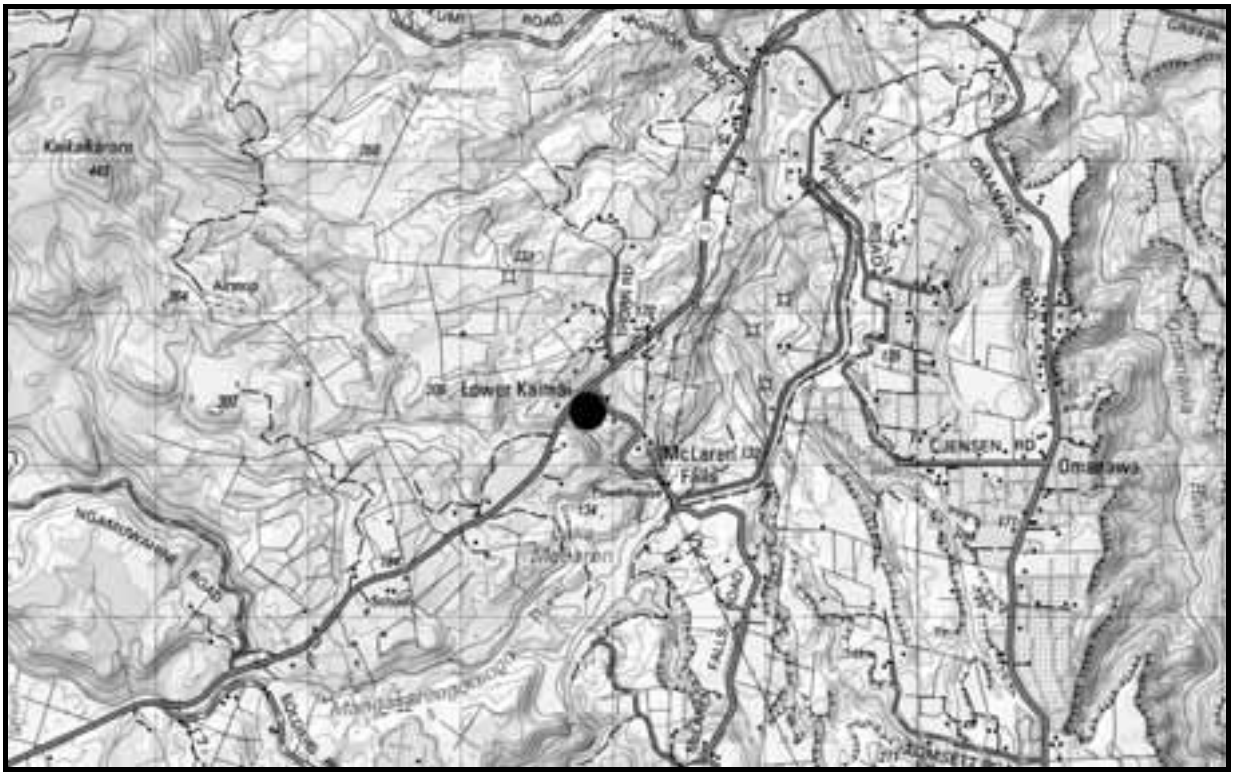
Raingauge	Kaimai Hydro	Location	McLaren Falls Road
Site Number	768002	NZMS 260 Reference	U14:778 733
Recorder Type	Manual	Altitude	95 metres
Start of Record	October 1967	Data Capture Rate	99%
Data Summary From	January 1968	To	December 1995
Data Audited From	October 1967	To	December 1995

General Comments

Site was operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Gauge was read daily at 0900.

Site was closed in September 1995 and gauge moved to Ruahihi Power Station.



SITE LOCATION
Kaimai Hydro at McLaren Falls Road

Environment Bay of Plenty
Manual Rainfall Summary

Date Compiled	April 2001	Site Number	768002
Compiled by	Leanne Bodle	Raingauge	Kaimai Hydro
NZMS 260 Reference	U14:778 733	Location	McLaren Falls Road
Altitude	95 metres		
Catchment	Wairoa	Period of Summary	1968 to 1994

Rainfall Totals (mm)

Mean Annual Rainfall	1919	Mean Summer Rainfall	385
		Summer Rainfall as % of Annual	21
		Mean Autumn Rainfall	484
		Autumn Rainfall as % of Annual	25
		Mean Winter Rainfall	564
Max. 24 hr. fall (on 13/08/1970)	179	Winter Rainfall as % of Annual	29
Max. 48 hr. fall (on 20/03/1987)	247	Mean Spring Rainfall	486
Max. 72 hr. fall (on 07/03/1972)	257	Spring Rainfall as % of Annual	25

Rainfall Intensities (mm) Depth-Duration Frequency

EV1 Probability Weighted Moments (HIRDS)

Return Period (years)	2	5	10	20	50	100
Duration						
24 hours	108 (171)	134 (227)	151 (265)	167 (301)		
48 hours	148 (212)	187 (282)	214 (329)	240 (373)		
72 hours	165 (235)	211 (313)	242 (364)	271 (414)		

Monthly Statistics (mm)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann.
Min.	14	11	25	40	34	87	46	34	65	26	45	20	1419
Median	98	115	134	149	139	186	165	188	157	147	133	141	1974
Mean	109	121	175	156	153	197	168	199	173	167	146	155	1919
Max.	329	361	526	287	300	371	316	426	349	518	349	299	2427

Annual Summary

Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1972	1967	188	1980	1638	176	1988	2064	150
1973	1584	183	1981	2167	179	1989	2299	141
1974	2197	182	1982	Incomplete Record		1990	2173	100
1975	1734	198	1983	1993	143	1991	1698	146
1976	2089	181	1984	1710	145	1992	1981	157
1977	1783	153	1985	1945	141	1993	1419	154
1978	1606	134	1986	1754	116	1994	1810	154
1979	2416	152	1987	1775	131	1995	Incomplete Record	

Environment Bay of Plenty
Manual Rainfall Recording Station

Raingauge	Sewell, J & S	Location	McLaren Falls Road
Site Number	768003	NZMS 260 Reference	U15:803 665
Recorder Type	Manual	Altitude	300 metres
Start of Record	January 1968	Data Capture Rate	88 %
Data Summary From	January 1968	To	December 1999
Data Audited From	January 1968	To	July 2000

General Comments

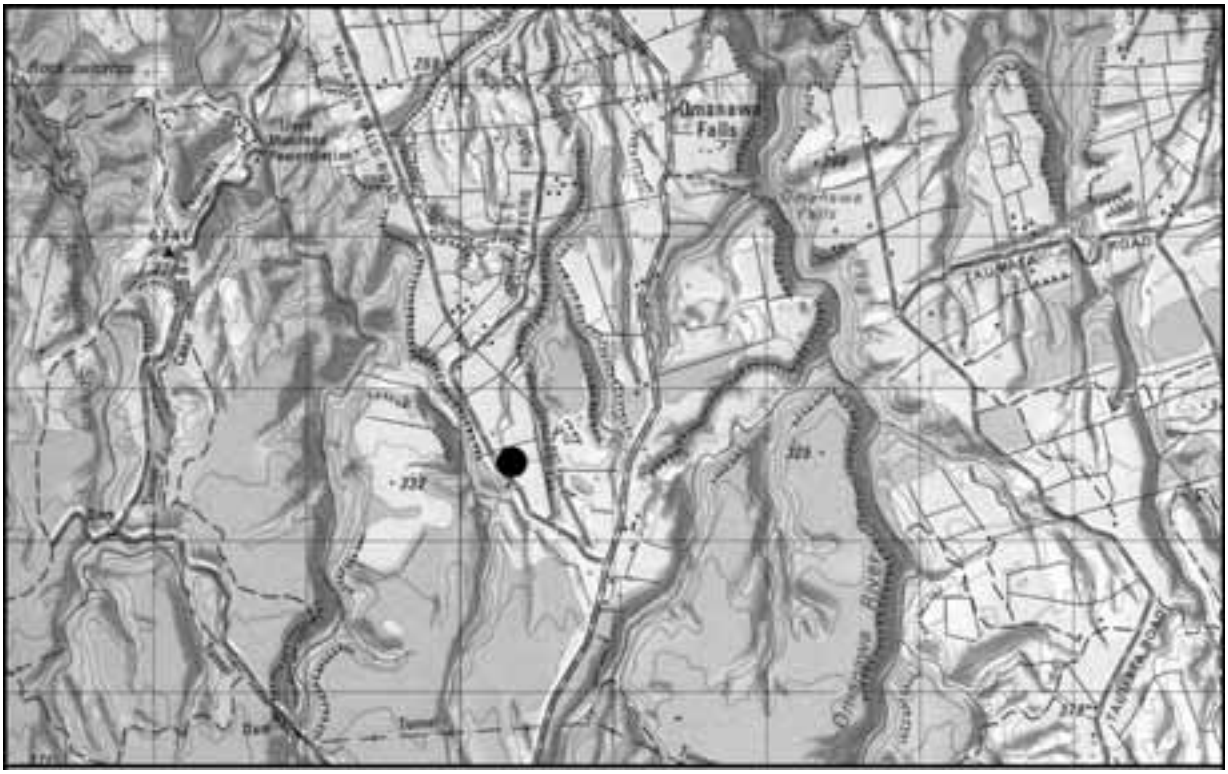
Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Rainfall from January 1968 to January 1976 was recorded by an unknown reader. Recording time varied between 0800 and 0900. No record exists between January 1976 and November 1979.

Taylor, H E was the raingauge reader from November 1979 to February 1994. Gauge was read daily at 0800.

From 1 February 1994 rainfall was recorded by Sewell, J & S Gauge was read daily at 0700.

Sewell, J & S stopped recording in July 2000. Site closed.



SITE LOCATION
Sewell, J & S at McLaren Falls Road

Environment Bay of Plenty
Manual Rainfall Summary

Date Compiled	April 2001	Site Number	768003
Compiled by	Leanne Bodle	Raingauge	Sewell, J & S
NZMS 260 Reference	U15: 803 665	Location	McLaren Falls Road
Altitude	300 metres		
Catchment	Wairoa	Period of Summary	1968 to 1999

Rainfall Totals (mm)			
Mean Annual Rainfall	2062	Mean Summer Rainfall	427
		Summer Rainfall as % of Annual	21
		Mean Autumn Rainfall	497
		Autumn Rainfall as % of Annual	24
		Mean Winter Rainfall	602
Max 24 hr fall (on 13/08/1970)	179	Winter Rainfall as % of Annual	29
Max 48 hr fall (on 20/03/1987)	243	Mean Spring Rainfall	536
Max 72 hr fall (on 02/01/1986)	277	Spring Rainfall as % of Annual	26

Rainfall Intensities (mm) Depth-Duration Frequency						
EV1 Probability Weighted Moments (HIRDS)						
Return Period (years)	2	5	10	20	50	100
Duration						
24 hours	110 (178)	152 (237)	179 (277)	205 (314)	239 (363)	
48 hours	149 (221)	192 (294)	221 (343)	248 (390)	284 (450)	
72 hours	163 (245)	213 (327)	246 (380)	278 (432)	319 (499)	

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann.
Min.	15	10	40	48	28	98	57	56	74	28	58	35	1520
Median	126	117	143	144	157	198	184	213	182	139	146	151	2080
Mean	135	118	169	169	159	205	179	218	189	178	169	174	2062
Max.	515	324	457	390	336	386	514	433	349	554	508	328	2493

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1977	Incomplete Record		1985	2213	148	1993	1573	145
1978	Incomplete Record		1986	1996	138	1994	1995	170
1979	Incomplete Record		1987	2003	152	1995	2482	220
1980	1520	192	1988	2332	172	1996	2229	204
1981	1944	168	1989	2319	174	1997	1766	180
1982	Incomplete Record		1990	2266	173	1998	2273	176
1983	2199	157	1991	1786	164	1999	2092	155
1984	1903	155	1992	2180	179	2000		

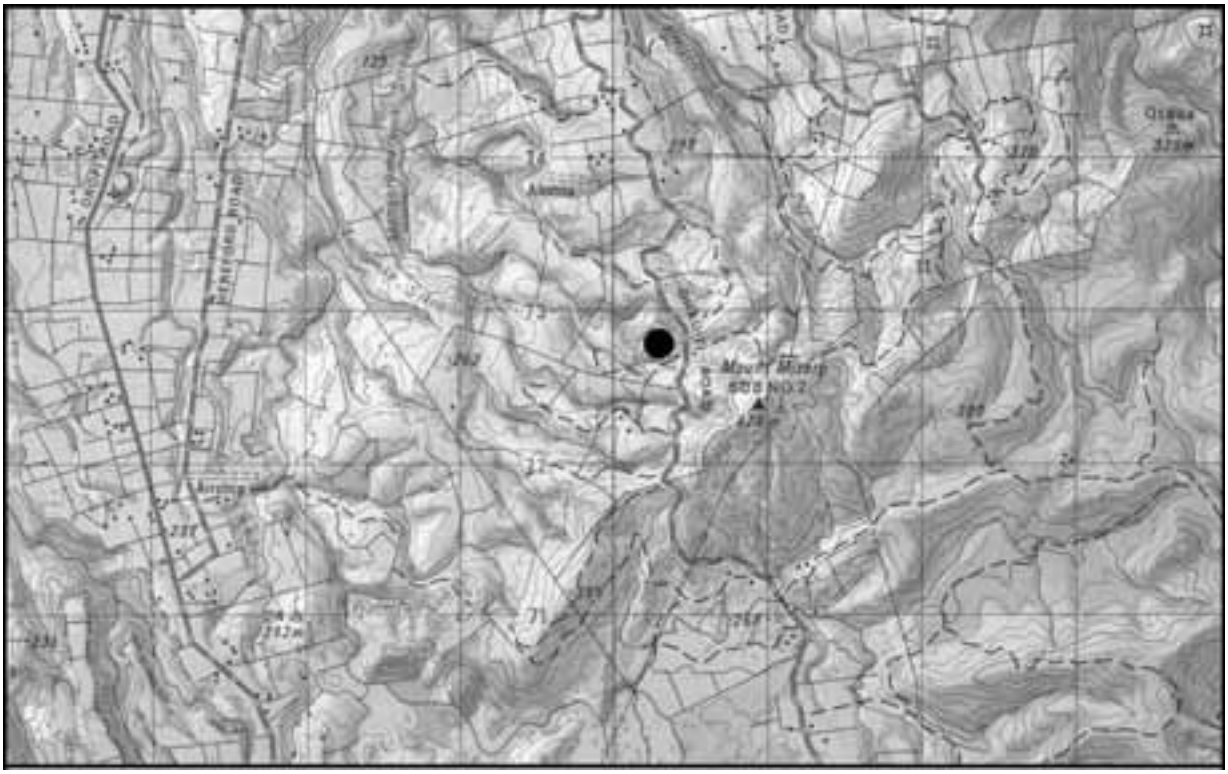
Environment Bay of Plenty
Manual Rainfall Recording Station

Raingauge	Winters, B M	Location	Ohauiti Road
Site Number	768103	Grid Reference	U14: 903 728
Recorder Type	Manual	Altitude	310 metres
Start of Record	January 1980	Data Capture Rate	98 %
Data Summary From	January 1980	To	December 2005
Data Audited From	January 1980	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Regional Monitoring Network.

Gauge is read daily at 0800.



SITE LOCATION
Winters, B M at Ohauiti Road

Environment Bay of Plenty
Manual Rainfall Summary

Date Complied	November 2006	Site Number	768103
Compiled by	Charl Naude	Raingauge	Winters, B M
Metric Map Reference	U14: 903 728	Location	Ohauiti Road
Altitude	310 metres		
Catchment	Tauranga Harbour	Period of Summary	1980 to 2005

Rainfall Totals (mm)

Mean Annual Rainfall	2096	Mean Summer Rainfall	471
		Summer Rainfall as % of Annual	23
		Mean Autumn Rainfall	502
		Autumn Rainfall as % of Annual	24
		Mean Winter Rainfall	580
Max 24 hr fall (on 09/01/2003)	217	Winter Rainfall as % of Annual	28
Max 48 hr fall (on 09/01/2003)	287	Mean Spring Rainfall	527
Max 72 hr fall (on 08/01/2003)	353	Spring Rainfall as % of Annual	26

Rainfall Intensities (mm) (Depth-Duration Frequency)

EV1 Probability Weighted Moments (HIRDS Ver 1.50b)

Return Period (years)	2	5	10	20	50	100
Duration						
24 hours	141 (139)	169 (185)	190 (216)	209 (245)	230 (283)	
48 hours	189 (172)	228 (230)	259 (267)	288 (304)	322 (351)	
72 hours	218 (191)	264 (255)	296 (297)	322 (337)	348 (389)	

Monthly Statistics (mm)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	7	21	12	29	48	67	9	49	64	34	54	22	416
Median	102	147	156	162	141	190	215	179	146	142	138	149	1866
Mean	137	164	154	180	168	200	200	181	177	184	169	181	2096
Max	458	389	465	502	410	443	577	424	534	561	516	424	5703

Annual Summary

Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982	1587	80	1990	2216	116	1998	2422	124
1983	2220	118	1991	1644	119	1999	2140	139
1984	1903	138	1992	1928	122	2000	1976	139
1985	2490	133	1993	1329	108	2001	2471	163
1986	1979	145	1994	1689	133	2002	1649	141
1987	2074	120	1995	2573	165	2003	2227	141
1988	2158	132	1996	2156	130	2004	2155	139
1989	2560	146	1997	1791	125	2005	2056	148

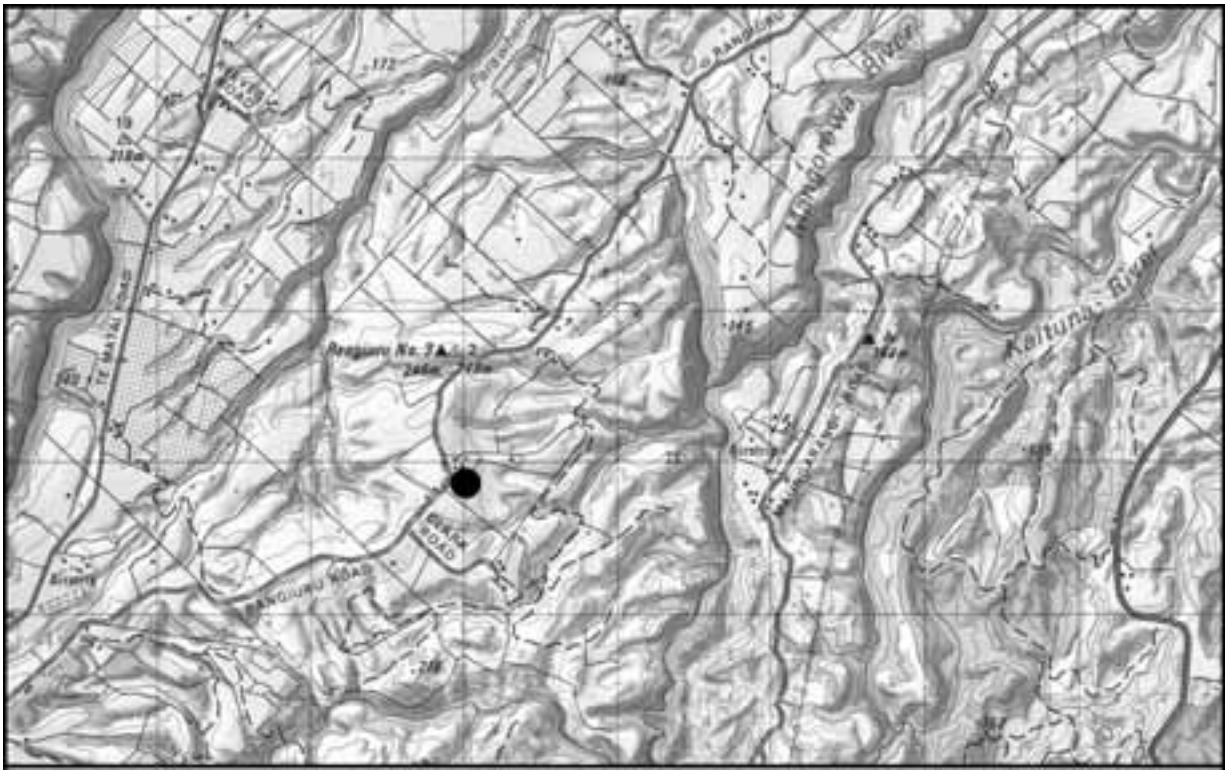
Environment Bay of Plenty
Manual Rainfall Recording Station

Raingauge	Waite, B T	Location	Rangiuru Road
Site Number	768307	Grid Reference	U15: 029 639
Recorder Type	Manual	Altitude	150 metres
Start of Record	January 1980	Data Capture Rate	100 %
Data Summary From	January 1980	To	December 2005
Data Audited From	January 1980	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Gauge is read daily at 0700.



SITE LOCATION
Waite, B T at Rangiuru Road

Environment Bay of Plenty
Manual Rainfall Summary

Date Complied	December 2006	Site Number	768307
Compiled by	Charl Naude	Raingauge	Waite, B T
Metric Map Reference	U15: 029 639	Location	Rangiuru Road
Altitude	150 metres		
Catchment	Mangorewa	Period of Summary	1980 to 2005

Rainfall Totals (mm)

Mean Annual Rainfall	2046	Mean Summer Rainfall	439
		Summer Rainfall as % of Annual	22
		Mean Autumn Rainfall	504
		Autumn Rainfall as % of Annual	25
		Mean Winter Rainfall	594
Max 24 hr fall (on 02/05/1999)	260	Winter Rainfall as % of Annual	29
Max 48 hr fall (on 01/05/1999)	364	Mean Spring Rainfall	494
Max 72 hr fall (on 30/04/1999)	364	Spring Rainfall as % of Annual	24

Rainfall Intensities (mm) (Depth-Duration Frequency)

EV1 Probability Weighted Moments (HIRDS Ver 1.50b)

Return Period (years)	2	5	10	20	50	100
Duration						
24 hours	131 (144)	161 (191)	188 (223)	215 (253)	252 (292)	
48 hours	166 (178)	201 (237)	238 (276)	282 (314)	356 (363)	
72 hours	182 (198)	224 (263)	264 (307)	309 (348)	375 (402)	

Monthly Statistics (mm)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	11	18	47	37	45	81	51	61	75	35	29	35	525
Median	115	133	173	179	126	190	197	202	151	121	143	162	1892
Mean	135	139	160	185	153	202	193	208	168	169	168	167	2046
Max	431	400	373	441	415	420	578	473	322	556	530	356	5294

Annual Summary

Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982	1534	141	1990	2291	163	1998	2231	154
1983	2108	147	1991	1709	168	1999	2243	157
1984	1738	159	1992	1973	171	2000	1856	165
1985	2262	161	1993	1417	173	2001	2547	185
1986	1823	159	1994	1838	173	2002	1350	167
1987	2005	144	1995	2648	196	2003	1989	180
1988	2356	176	1996	2108	175	2004	2470	178
1989	2562	191	1997	1665	163	2005	2102	178

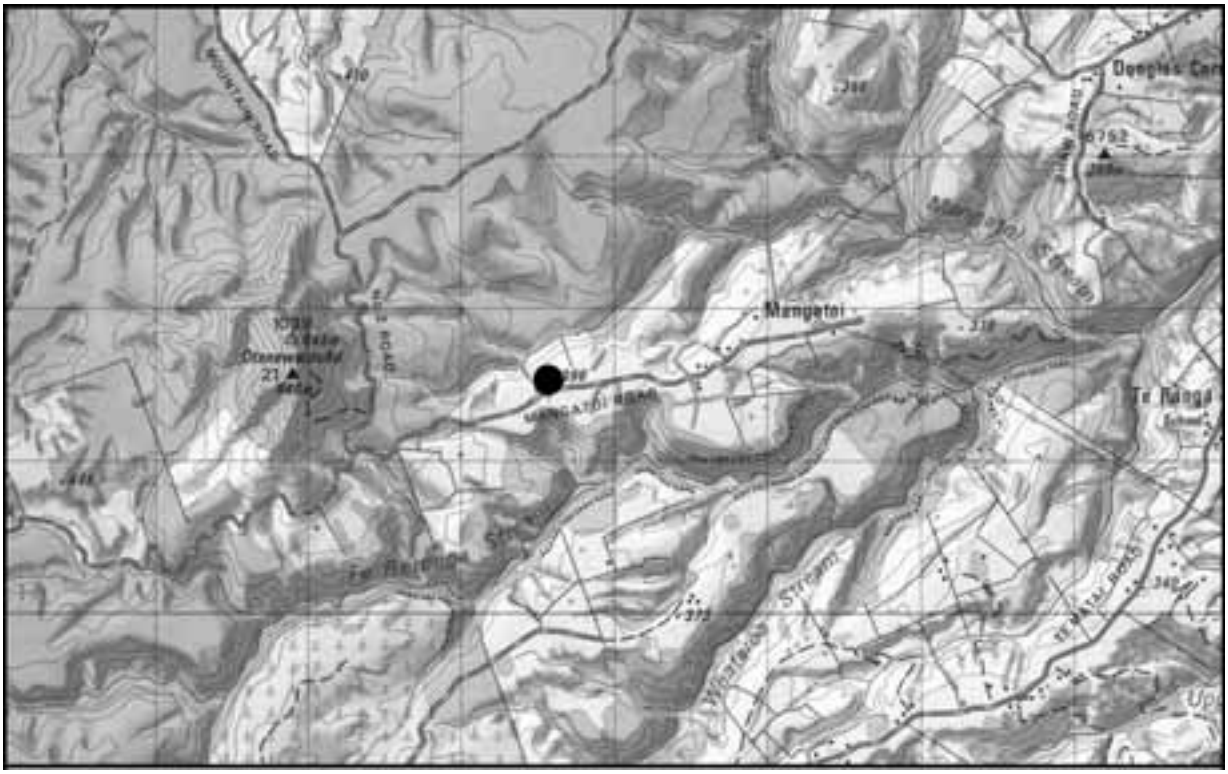
Environment Bay of Plenty
Manual Rainfall Recording Station

Raingauge	Pendergrast, L	Location	Mangatoi Road
Site Number	769203	Grid Reference	U15: 935 614
Recorder Type	Manual	Altitude	380 metres
Start of Record	August 1968	Data Capture Rate	89 %
Data Summary From	January 1969	To	December 2005
Data Audited From	August 1969	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Gauge is read daily at 0900.



SITE LOCATION
Pendergrast, J at Mangatoi Road

Environment Bay of Plenty
Manual Rainfall Summary

Date Complied	December 2006	Site Number	769203
Compiled by	Charl Naude	Raingauge	Pendergrast, J
Metric Map Reference	U15: 935 614	Location	Mangatoi Road
Altitude	380 metres		
Catchment	Waiari	Period of Summary	1969 to 2005

Rainfall Totals (mm)

Mean Annual Rainfall	2131	Mean Summer Rainfall	456
		Summer Rainfall as % of Annual	22
		Mean Autumn Rainfall	522
		Autumn Rainfall as % of Annual	25
		Mean Winter Rainfall	618
Max 24 hr fall (on 04/12/1983)	272	Winter Rainfall as % of Annual	28
Max 48 hr fall (on 06/12/1983)	353	Mean Spring Rainfall	539
Max 72 hr fall (on 06/12/1983)	392	Spring Rainfall as % of Annual	25

Rainfall Intensities (mm) (Depth-Duration Frequency)

EV1 Probability Weighted Moments (HIRDS Ver 1.50b)

Return Period (years)	2	5	10	20	50	100
Duration						
24 hours	119 (156)	148 (208)	173 (242)	197 (275)	227 (317)	
48 hours	159 (193)	203 (257)	239 (300)	273 (340)	316 (393)	
72 hours	185 (214)	236 (285)	276 (332)	314 (378)	359 (436)	

Monthly Statistics (mm)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	8	16	19	22	54	75	56	46	63	40	52	51	502
Median	122	129	163	166	147	226	196	183	149	166	136	171	1954
Mean	127	152	171	175	171	222	187	206	196	186	158	180	2131
Max	311	477	581	547	395	404	466	583	520	486	499	473	5742

Annual Summary

Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982	1400	111	1990	2073	151	1998	2194	153
1983	2108	139	1991	1737	159	1999	2189	159
1984	1760	156	1992	2053	160	2000	1963	152
1985	2034	145	1993	1563	184	2001	2100	171
1986	1976	150	1994	2015	163	2002	1448	152
1987	1762	127	1995	2777	174	2003	2180	168
1988	2096	144	1996	2213	166	2004	2369	168
1989	2103	163	1997	1653	134	2005	2200	152

Environment Bay of Plenty
Manual Rainfall Recording Station

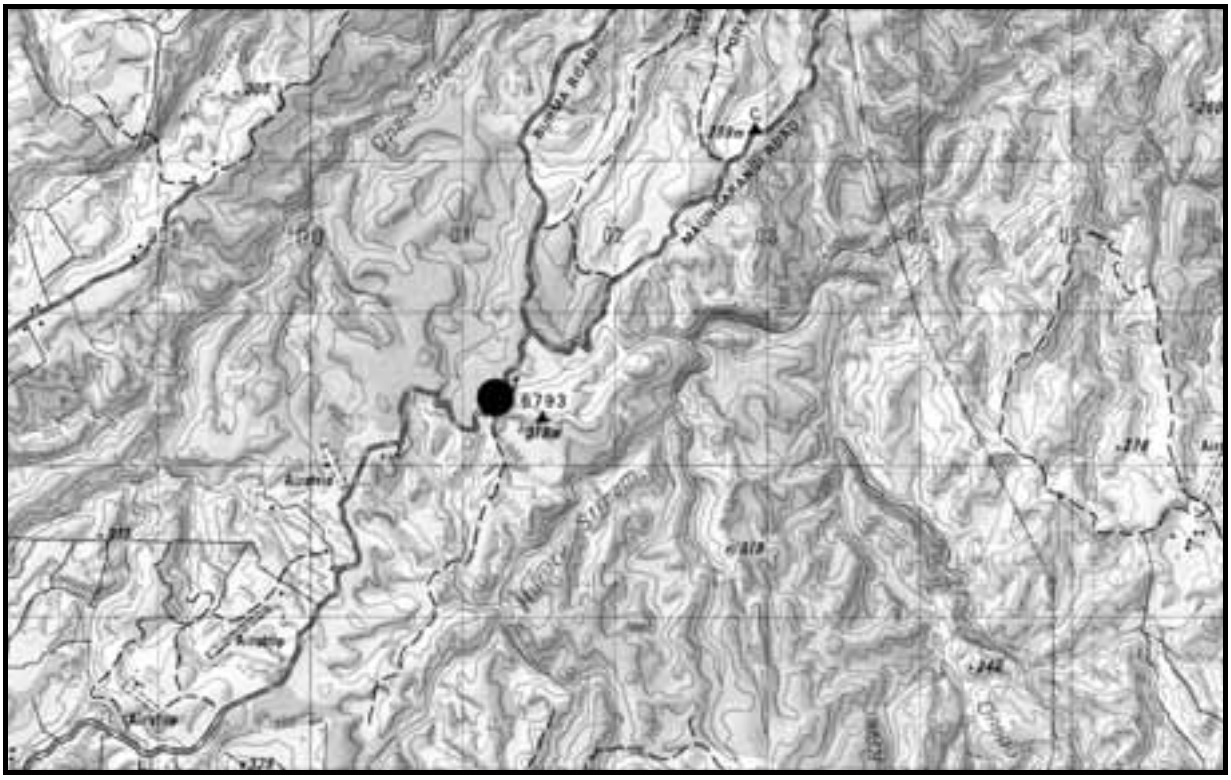
Raingauge	Coleman, K	Location	Kaharoa
Site Number	769302	NZMS 260 Reference	U15: 012 544
Recorder Type	Manual	Altitude	270 metres
Start of Record	January 1968	Data Capture Rate	77%
Data Summary From	January 1968	To	March 1986
Data Audited From		To	

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.
No rainfall was recorded between January 1976 and December 1979.

Gauge was read daily at 0900.

Site closed on 31 March 1986. No replacement.



SITE LOCATION
Coleman, K at Kaharoa

Environment Bay of Plenty
Manual Rainfall Summary

Date Compiled	April 2001	Site Number	769302
Compiled by	Leanne Bodle	Raingauge	Coleman, K
NZMS 260 Reference	U15: 012 544	Location	Kaharoa
Altitude	270 metres		
Catchment	Kaituna	Period of Summary	1968 to 1986

Rainfall Totals (mm)

Mean Annual Rainfall	2166	Mean Summer Rainfall	461
		Summer Rainfall as % of Annual	21
		Mean Autumn Rainfall	538
		Autumn Rainfall as % of Annual	25
		Mean Winter Rainfall	634
Max 24 hr fall (on 13/08/1970)	239	Winter Rainfall as % of Annual	29
Max 48 hr fall (on 13/08/1970)	279	Mean Spring Rainfall	533
Max 72 hr fall (on 16/04/1974)	295	Spring Rainfall as % of Annual	25

Rainfall Intensities (mm) Depth-Duration Frequency

EV1 Probability Weighted Moments (HIRDS)

Return Period (years)	2	5	10	20	50	100
Duration						
24 hours	121 (133)	163 (178)	190 (207)	216 (235)		
48 hours	163 (165)	216 (220)	251 (257)	284 (291)		
72 hours	186 (183)	249 (244)	291 (285)	331 (323)		

Monthly Statistics (mm)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann.
Min.	29	23	29	44	72	82	50	38	87	17	34	80	1502
Median	136	96	160	155	171	251	147	181	156	128	132	202	2239
Mean	154	118	188	191	159	258	145	231	203	180	150	189	2166
Max.	458	283	541	399	298	446	253	549	418	613	397	334	2863

Annual Summary

Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1962			1970	2494	150	1978	Incomplete Record	
1963			1971	1863	161	1979	Incomplete Record	
1964			1972	1911	114	1980	Incomplete Record	
1965			1973	1596	151	1981	Incomplete Record	
1966			1974	2330	159	1982	1502	110
1967			1975	Incomplete Record		1983	2239	115
1968	2309	180	1976	Incomplete Record		1984	1801	116
1969	2118	115	1977	Incomplete Record		1985	2269	110

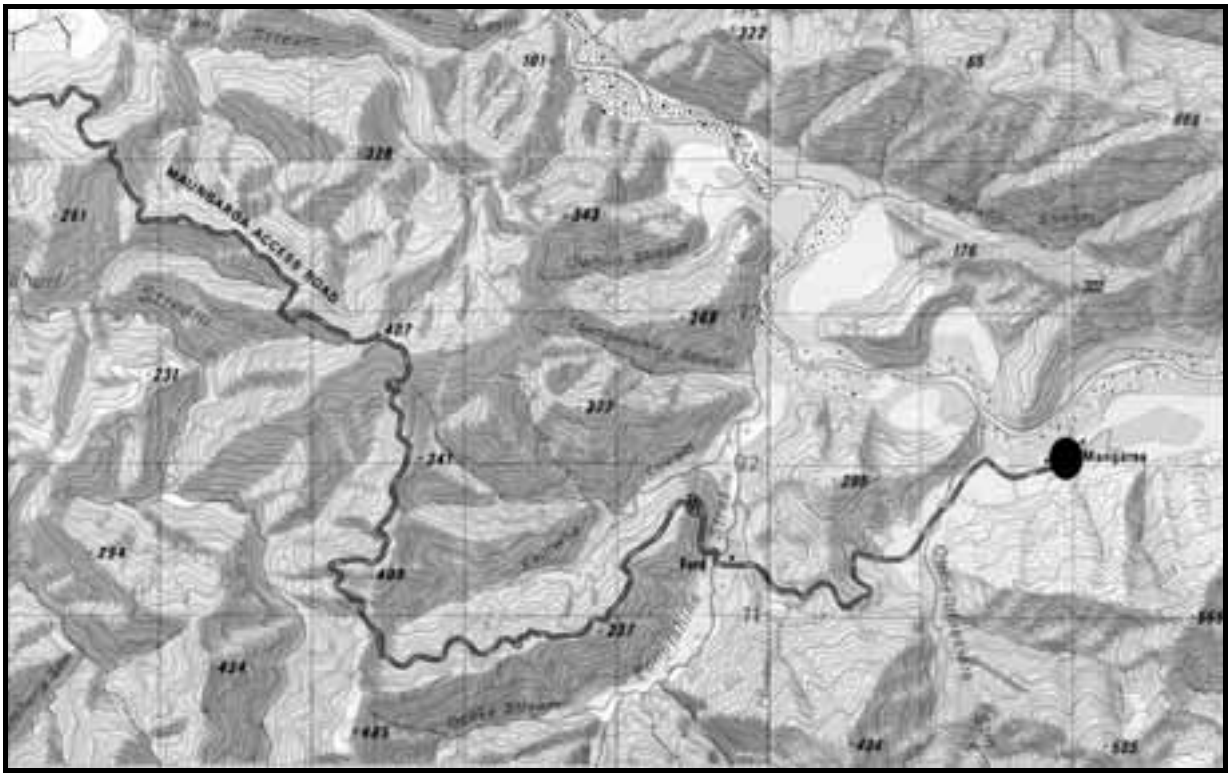
Environment Bay of Plenty
Manual Rainfall Recording Station

Raingauge	McDonald, L	Location	Maungaroa Station
Site Number	777701	Grid Reference	Y14: 320 720
Recorder Type	Manual	Altitude	60 metres
Start of Record	21 October 1996	Data Capture Rate	100 %
Data Summary From	January 1997	To	December 2005
Data Audited From	January 1997	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Gauge is read daily at 0800.



SITE LOCATION
McDonald, L at Maungaroa Station

Environment Bay of Plenty
Manual Rainfall Summary

Date Complied	December 2006	Site Number	777701
Compiled by	Charl Naude	Raingauge	McDonald, L
Metric Map Reference	Y14: 320 720	Location	Maungaroa Station
Altitude	60 metres		
Catchment	Kereu	Period of Summary	1997 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	2558	Mean Summer Rainfall	518
		Summer Rainfall as % of Annual	21
		Mean Autumn Rainfall	625
		Autumn Rainfall as % of Annual	24
		Mean Winter Rainfall	796
Max 24 hr fall (on 30/12/2004)	243	Winter Rainfall as % of Annual	31
Max 48 hr fall (on 07/12/2001)	296	Mean Spring Rainfall	62
Max 72 hr fall (on 07/12/2001)	354	Spring Rainfall as % of Annual	24

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
24 hours	150 (136)	198 (182)	239 (212)			
48 hours	236 (169)	280 (225)	301 (262)			
72 hours	269 (188)	331 (250)	362 (291)			

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	21	52	86	24	106	141	123	126	79	94	75	102	1029
Median	126	154	173	197	302	356	230	215	221	228	162	221	2585
Mean	117	164	165	208	247	301	278	217	219	206	196	240	2558
Max	220	371	268	403	403	466	620	355	384	326	526	598	4939

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990			1998	2936	153
1983			1991			1999	2861	170
1984			1992			2000	2232	169
1985			1993			2001	2971	200
1986			1994			2002	2397	184
1987			1995			2003	2642	198
1988			1996			2004	3258	201
1989			1997	1966	151	2005	1775	196

Environment Bay of Plenty
Manual Rainfall Recording Station

Raingauge	Oyster Farm	Location	Ohiwa
Site Number	779003	Grid Reference	W15: 671 497
Recorder Type	Manual	Altitude	5 metres
Start of Record	1 January 1992	Data Capture Rate	94 %
Data Summary From	1 January 1992	To	December 2005
Data Audited From	1 January 1992	To	December 2005

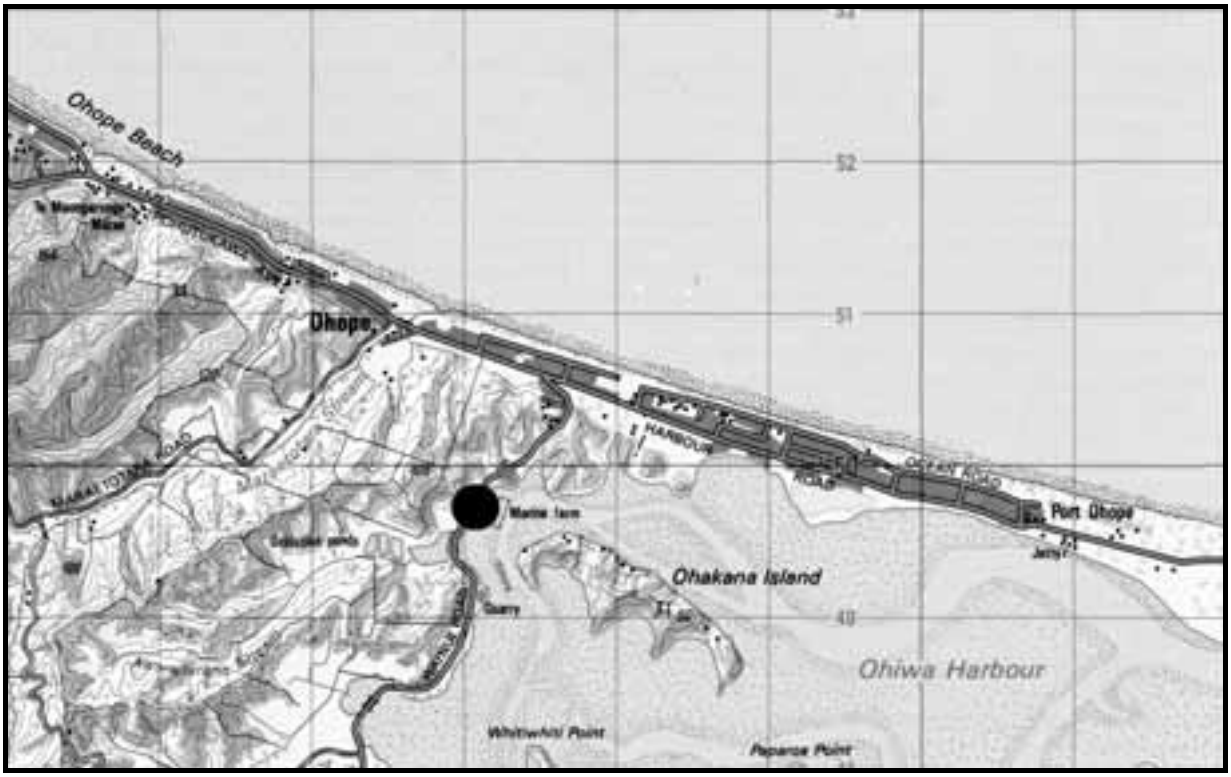
General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Monitoring Network.

Gauge is read daily at 0800.

Data for period 1 October 2002 to 30 April 2003 lost by raingauge reader due to flooding.

Data missing for period 1 November 2003 to 2 January 2004.



SITE LOCATION
Oyster Farm at Ohiwa

Environment Bay of Plenty
Manual Rainfall Summary

Date Complied	December 2006	Site Number	779003
Compiled by	Charl Naude	Raingauge	Oyster Farm
Metric Map Reference	W15 : 671 497	Location	Ohiwa
Altitude	5 metres		
Catchment	Ohiwa Harbour	Period of Summary	1992 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	1356	Mean Summer Rainfall	298
		Summer Rainfall as % of Annual	22
		Mean Autumn Rainfall	337
		Autumn Rainfall as % of Annual	25
		Mean Winter Rainfall	411
Max 24 hr fall (on 17/07/2004)	155	Winter Rainfall as % of Annual	30
Max 48 hr fall (on 16/07/2004)	265	Mean Spring Rainfall	313
Max 72 hr fall (on 15/07/2004)	295	Spring Rainfall as % of Annual	23

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
24 hours	74 (97)	90 (129)	109 (150)	138 (170)		
48 hours	94 (120)	122 (160)	156 (186)	204 (211)		
72 hours	105 (133)	132 (177)	169 (206)	226 (234)		

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	3	28	26	22	46	76	30	65	37	27	39	12	409
Median	76	79	76	114	108	140	126	123	103	105	90	95	1234
Mean	77	101	90	119	127	137	156	116	100	111	102	121	1356
Max	175	312	205	251	306	206	376	185	184	224	233	294	2949

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990			1998	1285	93
1983			1991			1999	1218	105
1984			1992	1244	93	2000	1285	109
1985			1993	997	86	2001	1852	123
1986			1994	1303	107	2002	Incomplete Record	
1987			1995	Incomplete Record		2003	Incomplete Record	
1988			1996	Incomplete Record		2004	1727	104
1989			1997	1099	91	2005	1312	103

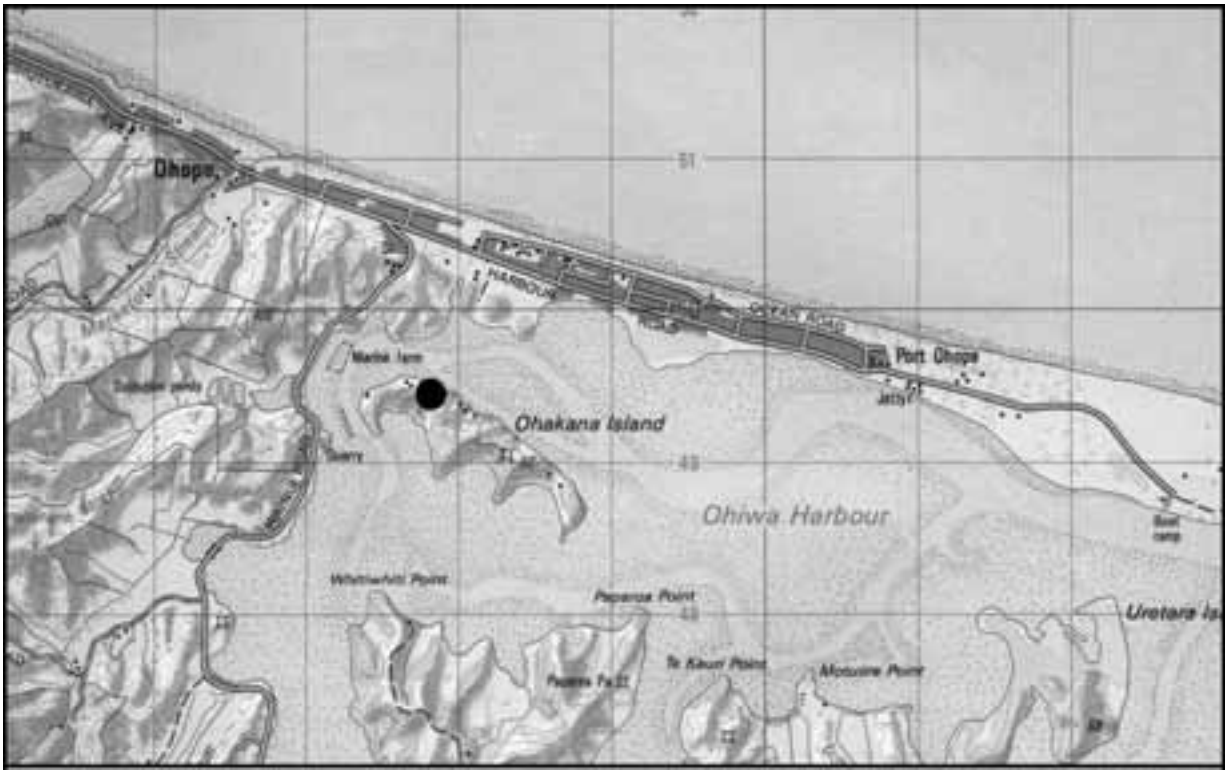
Environment Bay of Plenty
Manual Rainfall Recording Station

Raingauge	Scott, W	Location	Ohakana Island
Site Number	779004	Grid Reference	W15: 679 494
Recorder Type	Manual	Altitude	10 metres
Start of Record	October 1983	Data Capture Rate	99 %
Data Summary From	January 1984	To	December 2005
Data Audited From	October 1983	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Gauge is read daily at 0900.



SITE LOCATION
Scott, W at Ohakana Island

Environment Bay of Plenty
Manual Rainfall Summary

Date Complied	December 2006	Site Number	779004
Compiled by	Charl Naude	Raingauge	Scott, W
Metric Map Reference	W15: 679 494	Location	Ohakana Island
Altitude	10 metres		
Catchment	Ohiwa Harbour	Period of Summary	1984 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	1254	Mean Summer Rainfall	297
		Summer Rainfall as % of Annual	24
		Mean Autumn Rainfall	288
		Autumn Rainfall as % of Annual	23
		Mean Winter Rainfall	378
Max 24 hr fall (on 17/07/2004)	151	Winter Rainfall as % of Annual	30
Max 48 hr fall (on 16/07/2004)	243	Mean Spring Rainfall	290
Max 72 hr fall (on 15/07/2004)	272	Spring Rainfall as % of Annual	23

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
24 hours	85 (102)	108 (136)	126 (158)	142 (179)		
48 hours	104 (126)	134 (168)	160 (196)	188 (223)		
72 hours	111 (140)	139 (187)	167 (217)	199 (247)		

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	5	23	18	22	18	53	21	51	30	25	40	9	315
Median	94	75	87	88	96	122	122	101	75	95	72	90	1117
Mean	88	96	94	92	101	124	134	118	92	107	92	116	1254
Max	232	325	246	198	321	254	333	306	165	235	189	323	3127

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990	1167	94	1998	1130	95
1983			1991	1037	47	1999	1222	94
1984	1391	123	1992	1403	78	2000	1088	67
1985	1305	135	1993	860	64	2001	1650	108
1986	1267	113	1994	Incomplete Record		2002	958	100
1987	1033	107	1995	1397	98	2003	1237	127
1988	953	110	1996	1476	91	2004	1554	127
1989	1228	121	1997	1394	74	2005	1357	121

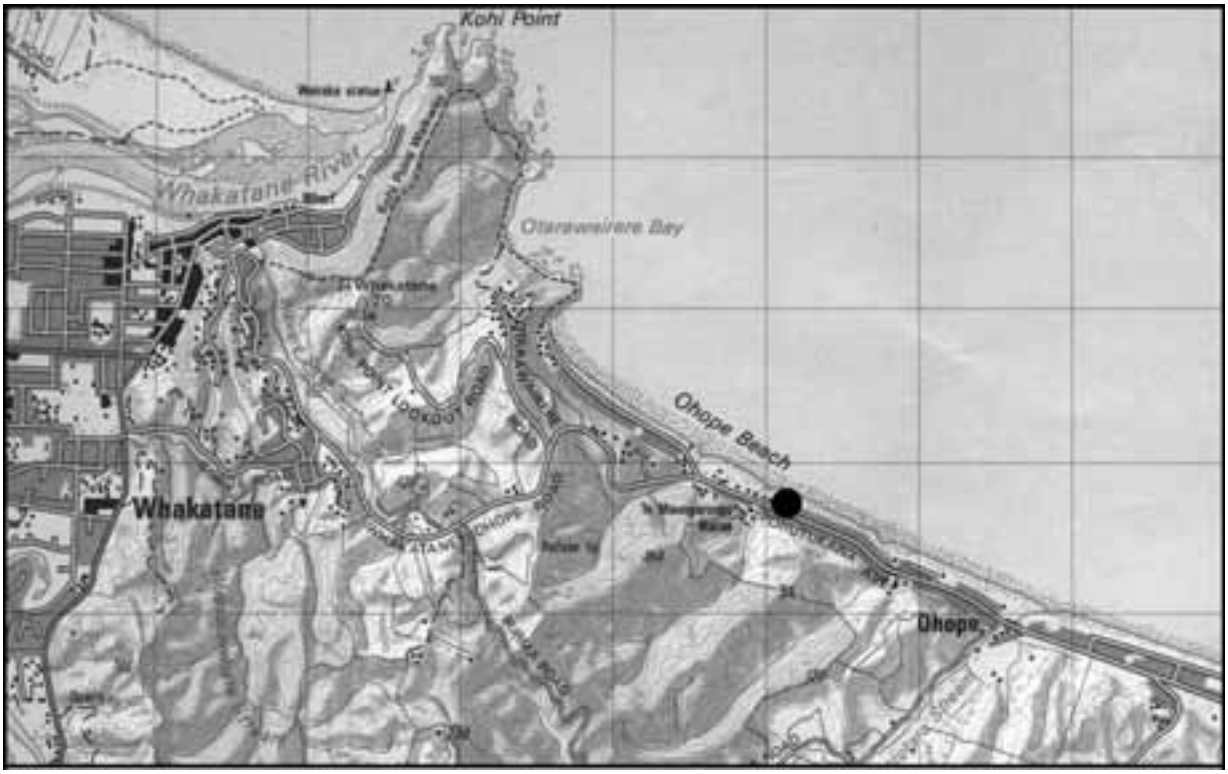
Environment Bay of Plenty
Manual Rainfall Recording Station

Raingauge	Taylor, W A	Location	Ohope
Site Number	779005	Grid Reference	W15: 666 510
Recorder Type	Manual	Altitude	5 metres
Start of Record	January 1978	Data Capture Rate	100 %
Data Summary From	January 1978	To	December 2005
Data Audited From	January 1978	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Gauge is read daily at 0900.



SITE LOCATION
Taylor, W A at Ohope

Environment Bay of Plenty
Manual Rainfall Summary

Date Complied	December 2005	Site Number	779005
Compiled by	Charl Naude	Raingauge	Taylor, W A
Metric Map Reference	W15: 666 510	Location	Ohope
Altitude	5 metres		
Catchment	Ohiwa Harbour	Period of Summary	1978 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	1283	Mean Summer Rainfall	286
		Summer Rainfall as % of Annual	22
		Mean Autumn Rainfall	312
		Autumn Rainfall as % of Annual	25
		Mean Winter Rainfall	385
Max 24 hr fall (on 17/07/2004)	167	Winter Rainfall as % of Annual	30
Max 48 hr fall (on 16/07/2004)	282	Mean Spring Rainfall	300
Max 72 hr fall (on 15/07/2004)	310	Spring Rainfall as % of Annual	23

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
24 hours	82 (97)	106 (129)	125 (150)	142 (170)	162 (197)	
48 hours	102 (120)	132 (160)	160 (186)	189 (211)	231 (244)	
72 hours	109 (133)	140 (177)	169 (206)	202 (234)	250 (271)	

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	5	21	32	22	21	53	21	47	35	25	38	9	329
Median	91	79	101	99	100	135	118	105	87	99	85	86	1184
Mean	82	95	106	103	102	138	135	110	99	106	95	111	1283
Max	232	342	420	227	302	267	380	216	165	221	226	339	3336

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982	842	123	1990	1178	84	1998	1311	122
1983	1001	117	1991	1155	74	1999	1304	138
1984	1391	123	1992	1497	141	2000	1250	126
1985	1305	125	1993	1016	125	2001	1822	141
1986	1265	112	1994	1378	146	2002	1004	119
1987	1033	107	1995	1576	158	2003	1298	134
1988	944	104	1996	1663	148	2004	1688	140
1989	1248	117	1997	1305	124	2005	1317	131

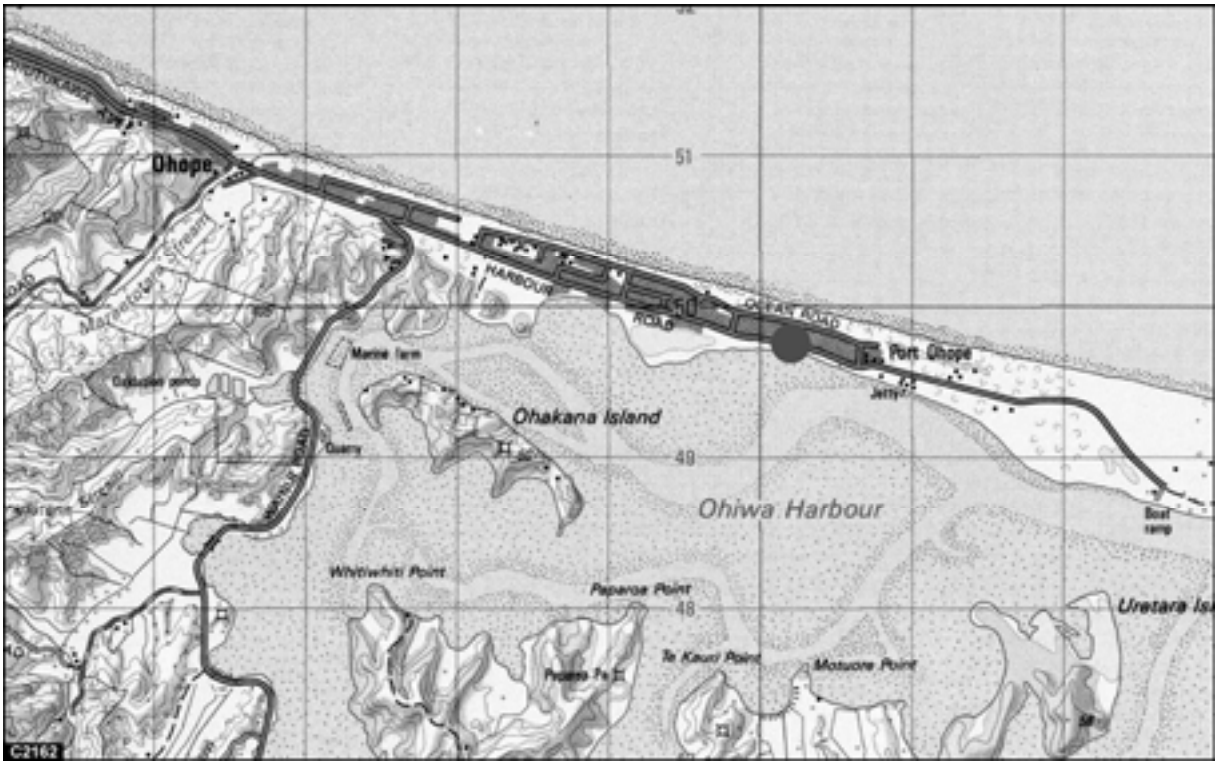
Environment Bay of Plenty
Manual Rainfall Recording Station

Raingauge	Compton, R	Location	Ohope
Site Number	779102	Grid Reference	W15: 7020 4976
Recorder Type	Manual	Altitude	5 metres
Start of Record	January 1997	Data Capture Rate	94 %
Data Summary From	January 1997	To	December 2005
Data Audited From	January 1997	To	December 2005

General Comments

Site operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Gauge is read daily at 0730.



SITE LOCATION
Compton, R at Ohope

Environment Bay of Plenty
Manual Rainfall Summary

Date Complied	December 2006	Site Number	779102
Compiled by	Charl Naude	Raingauge	Compton, R
Metric Map Reference	W15: 7020 4976	Location	Ohope
Altitude	5 metres		
Catchment	Ohiwa Harbour	Period of Summary	1997 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	1362	Mean Summer Rainfall	300
		Summer Rainfall as % of Annual	21
		Mean Autumn Rainfall	358
		Autumn Rainfall as % of Annual	26
		Mean Winter Rainfall	408
Max 24 hr fall (on 18/07/2004)	145	Winter Rainfall as % of Annual	29
Max 48 hr fall (on 17/07/2004)	255	Mean Spring Rainfall	336
Max 72 hr fall (on 16/07/2004)	289	Spring Rainfall as % of Annual	24

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
24 hours	72 (98)	84 (130)	101 (151)			
48 hours	100 (121)	129 (161)	168 (188)			
72 hours	112 (134)	142 (179)	183 (208)			

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	12	28	52	20	53	54	68	56	44	52	46	72	557
Median	116	59	91	90	146	159	125	87	80	109	88	109	1259
Mean	78	73	96	97	140	144	159	96	103	136	104	137	1362
Max	137	185	181	208	310	217	368	138	179	245	223	290	2680

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990			1998	1338	113
1983			1991			1999	1331	130
1984			1992			2000	Incomplete Record	
1985			1993			2001	Incomplete Record	
1986			1994			2002	Incomplete Record	
1987			1995			2003	Incomplete Record	
1988			1996			2004	1734	139
1989			1997	1555	118	2005	1303	127

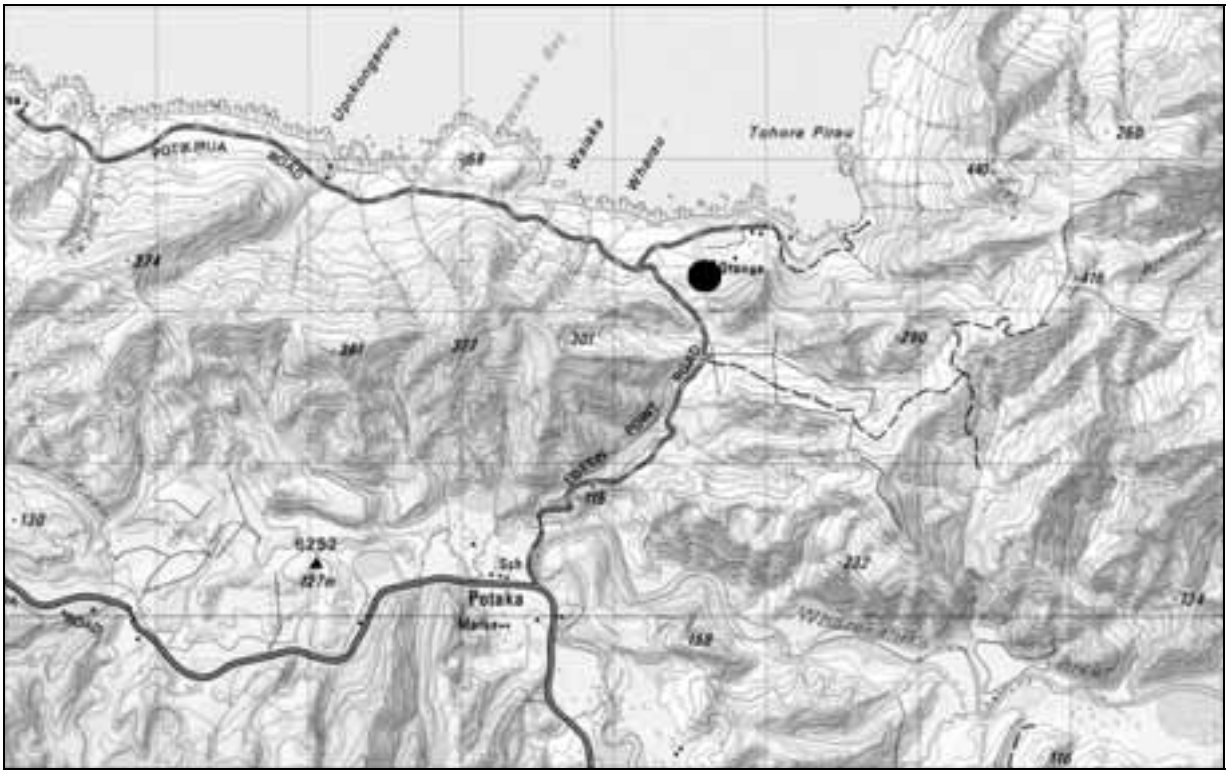
Environment Bay of Plenty
Manual Rainfall Recording Station

Raingauge	Wood, B	Location	Lottin Point
Site Number	785101	Grid Reference	Y14: 656 922
Recorder Type	Manual	Altitude	40 metres
Start of Record	January 1964	Data Capture Rate	99.8 %
Data Summary From	January 1964	To	December 2000
Data Audited From	January 1964	To	December 2000

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Gauge is read daily at 0800.



SITE LOCATION
Wood, B at Lottin Point

Environment Bay of Plenty
Manual Rainfall Summary

Date Complied	December 2005	Site Number	785101
Compiled by	Charl Naude	Raingauge	Wood, B
Metric Map Reference	Y14: 656 922	Location	Lottin Point
Altitude	40 metres		
Catchment	Wharekahika	Period of Summary	1964 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	1650	Mean Summer Rainfall	318
		Summer Rainfall as % of Annual	19
		Mean Autumn Rainfall	405
		Autumn Rainfall as % of Annual	25
		Mean Winter Rainfall	538
Max 24 hr fall (on 07/03/1988)	296	Winter Rainfall as % of Annual	32
Max 48 hr fall (on 07/03/1988)	417	Mean Spring Rainfall	392
Max 72 hr fall (on 06/03/1988)	519	Spring Rainfall as % of Annual	24

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
24 hours	106	137	170	207	269	
48 hours	142	187	229	275	342	
72 hours	159	207	255	307	392	

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	9	0	14	37	35	41	19	31	46	31	33	5	301
Median	101	69	125	114	131	176	173	172	138	102	111	89	1503
Mean	102	113	142	123	138	181	173	178	155	116	118	111	1650
Max	213	463	541	362	290	346	411	422	337	305	328	445	4462

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982	1404	86	1990	1437	79	1998	1719	108
1983	1298	93	1991	1150	101	1999	1792	108
1984	1748	92	1992	1733	116	2000	1330	120
1985	1524	93	1993	1277	90	2001	1976	129
1986	1563	92	1994	1755	123	2002	1361	115
1987	1837	98	1995	2069	116	2003	2183	133
1988	2026	74	1996	2278	122	2004	2014	125
1989	1757	88	1997	1306	101	2005	1455	117

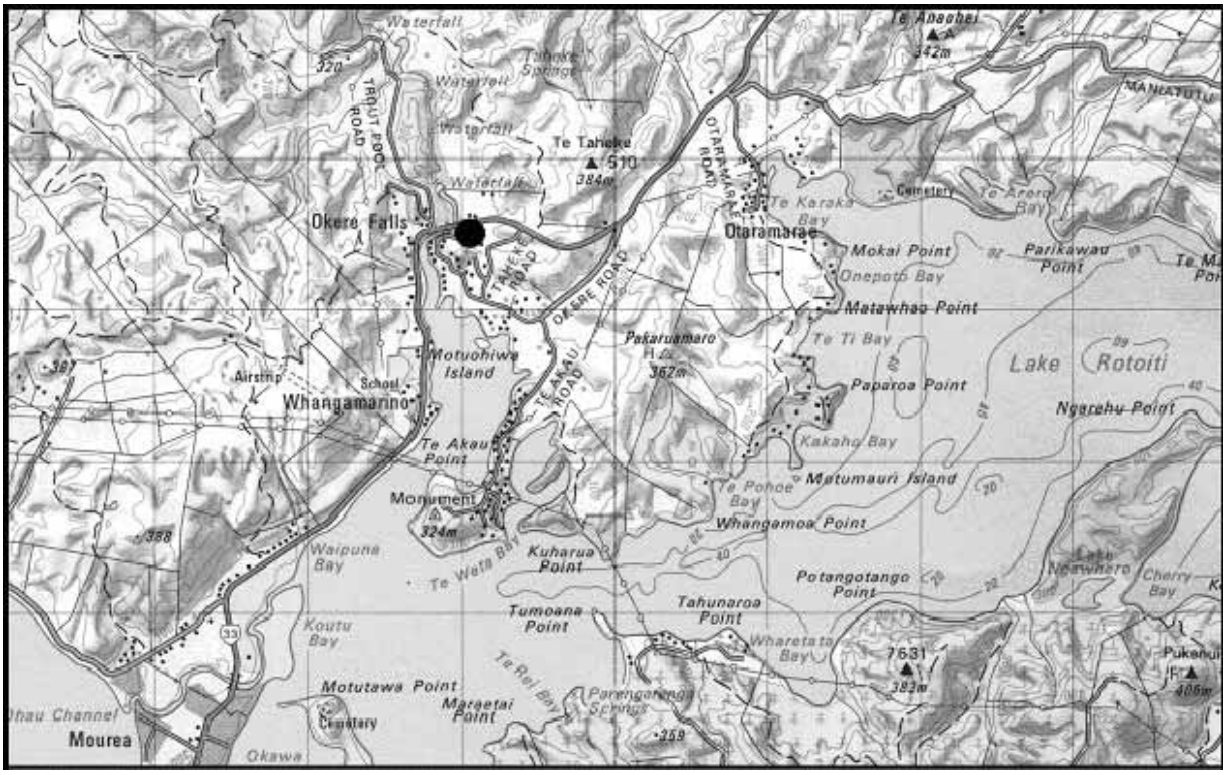
Environment Bay of Plenty
Manual Rainfall Recording Station

Raingauge	Wright, J H	Location	Okere Falls Road
Site Number	860303	Grid Reference	U15: 039 484
Recorder Type	Manual	Altitude	280 metres
Start of Record	September 1974	Data Capture Rate	97 %
Data Summary From	January 1975	To	December 2005
Data Audited From	September 1974	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Gauge is read daily at 0800.



SITE LOCATION
Wright, J H at Okere Falls Road

Environment Bay of Plenty
Manual Rainfall Summary

Date Complied	December 2006	Site Number	860303
Compiled by	Charl Naude	Raingauge	Wright, J H
Metric Map Reference	U15: 039 484	Location	Okere Falls Road
Altitude	280 metres		
Catchment	Kaituna	Period of Summary	1975 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	1927	Mean Summer Rainfall	422
		Summer Rainfall as % of Annual	22
		Mean Autumn Rainfall	460
		Autumn Rainfall as % of Annual	24
		Mean Winter Rainfall	562
Max 24 hr fall (on 28/02/2004)	199	Winter Rainfall as % of Annual	29
Max 48 hr fall (on 04/11/1999)	268	Mean Spring Rainfall	480
Max 72 hr fall (on 04/11/1999)	327	Spring Rainfall as % of Annual	25

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
24 hours	111 (116)	132 (154)	145 (180)	154 (204)	162 (236)	
48 hours	148 (144)	182 (191)	205 (223)	223 (253)	242 (292)	
72 hours	168 (159)	214 (212)	249 (247)	278 (281)	310 (324)	

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	3	15	18	13	37	89	46	51	67	27	38	37	441
Median	113	125	146	149	149	193	196	166	149	146	119	164	1815
Mean	117	146	148	155	154	193	193	172	160	170	151	168	1927
Max	389	419	502	413	429	390	544	389	305	523	605	355	5263

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982	1457	151	1990	2051	170	1998	2244	163
1983	2048	174	1991	1737	159	1999	2234	154
1984	1817	177	1992	1814	172	2000	1887	171
1985	2199	187	1993	1328	137	2001	2307	188
1986	1875	176	1994	1788	164	2002	1292	158
1987	1552	151	1995	2681	187	2003	1829	177
1988	2144	183	1996	2030	168	2004	2381	171
1989	2247	196	1997	1558	154	2005	2024	171

Environment Bay of Plenty
Manual Rainfall Recording Station

Raingauge	Wright, A B	Location	Lake Rotoma
Site Number	860503	Grid Reference	V15: 233 438
Recorder Type	Manual	Altitude	330 metres
Start of Record	July 1963	Data Capture Rate	93 %
Data Summary From	January 1964	To	November 2003
Data Audited From	January 1964	To	November 2003

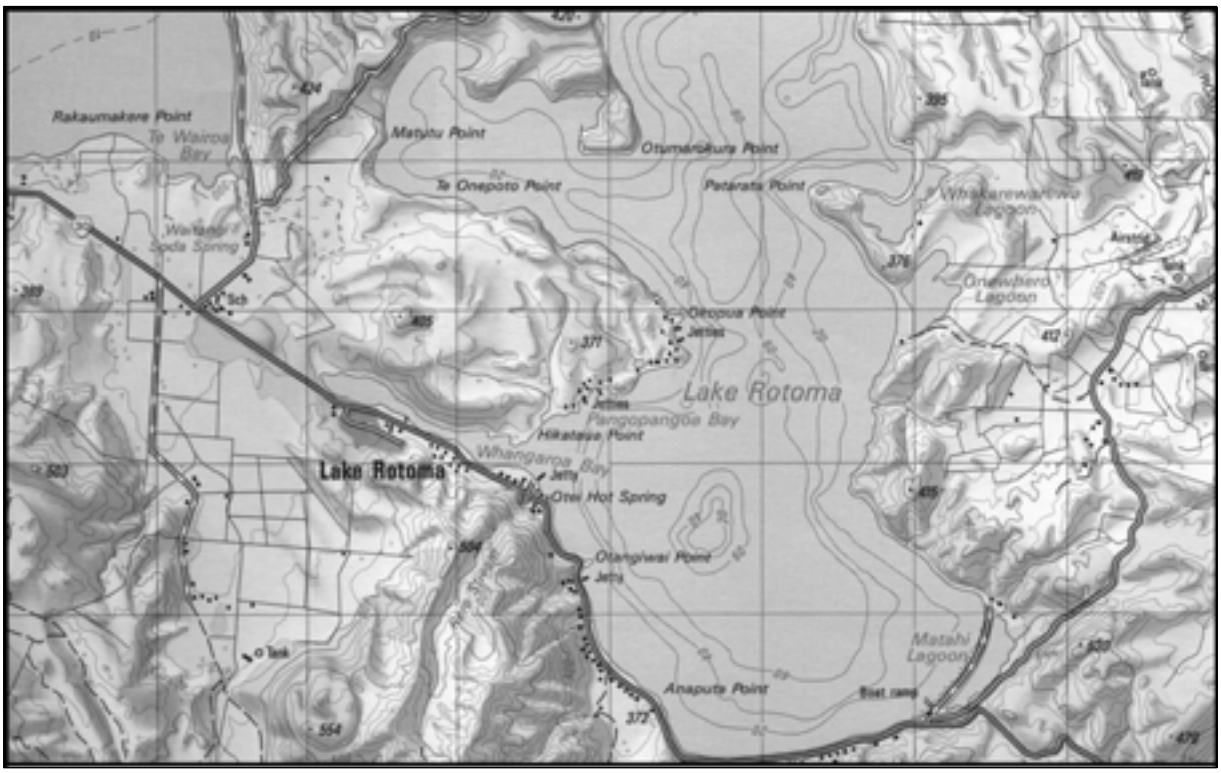
General Comments

Site was operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Gauge was read daily at 0800.

No rainfall data collected from December 2003 to November 2004.

Site closed 2 November 2004.



SITE LOCATION
Wright, A B at Lake Rotoma

Environment Bay of Plenty
Manual Rainfall Summary

Date Complied	December 2006	Site Number	860503
Compiled by	Charl Naude	Raingauge	Wright, A B
Metric Map Reference	V15: 233 438	Location	Lake Rotoma
Altitude	330 metres		
Catchment	Rotoma	Period of Summary	1964 to 2003

Rainfall Totals (mm)			
Mean Annual Rainfall	2131	Mean Summer Rainfall	460
		Summer Rainfall as % of Annual	22
		Mean Autumn Rainfall	515
		Autumn Rainfall as % of Annual	24
		Mean Winter Rainfall	637
Max 24 hr fall (on 02/02/1967)	248	Winter Rainfall as % of Annual	30
Max 48 hr fall (on 17/04/1974)	291	Mean Spring Rainfall	525
Max 72 hr fall (on 16/04/1974)	364	Spring Rainfall as % of Annual	25

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
24 hours	136 (185)	172 (247)	198 (288)	219 (327)	242 (377)	
48 hours	181 (230)	220 (306)	246 (357)	265 (405)	283 (468)	
72 hours	202 (255)	250 (340)	284 (396)	311 (449)	338 (519)	

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	1	25	23	33	45	54	31	38	51	28	46	16	391
Median	118	151	170	146	161	215	191	210	167	126	140	145	1940
Mean	130	158	180	171	162	211	207	215	198	161	166	172	2131
Max	399	401	632	453	499	455	673	546	571	449	511	451	6040

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1980	1973	200	1988	2059	141	1996	2136	139
1981	2447	171	1989	2565	171	1997	1594	122
1982	1593	129	1990	2387	145	1998	2403	140
1983	Incomplete Record		1991	1793	140	1999	2146	128
1984	2095	183	1992	1963	166	2000	1820	142
1985	2481	173	1993	1181	106	2001	2593	183
1986	1864	166	1994	1721	139	2002	1607	157
1987	1878	161	1995	2639	157	2003	Incomplete Record	

Environment Bay of Plenty
Manual Rainfall Recording Station

Raingauge	Carter Holt Harvey Tasman	Location	Kawerau
Site Number	860701	Grid Reference	V15:361 409
Recorder Type	Manual	Altitude	50 metres
Start of Record	March 1954	Data Capture Rate	95 %
Data Summary From	January 1954	To	December 2005
Data Audited From	March 1954	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Gauge is read daily at 0700.

SITE LOCATION
Carter Holt Harvey Tasman at Kawerau

Environment Bay of Plenty
Manual Rainfall Summary

Date Complied	July 2006	Site Number	860701
Compiled by	G R Ellery	Raingauge	Carter Holt Harvey Tasman
Metric Map Reference	V15: 361 409	Location	Kawerau
Altitude	50 metres		
Catchment	Tarawera	Period of Summary	1955 to 2005

Rainfall Totals (mm)

Mean Annual Rainfall	172	Mean Summer Rainfall	397
		Summer Rainfall as % of Annual	23
		Mean Autumn Rainfall	439
		Autumn Rainfall as % of Annual	25
		Mean Winter Rainfall	491
Max. 24 hr fall (on 13/08/1970)	211	Winter Rainfall as % of Annual	28
Max 48 hr fall (on 13/08/1970)	247	Mean Spring Rainfall	402
Max 72 hr fall (on	260	Spring Rainfall as % of Annual	24

Rainfall Intensities (mm) (Depth-Duration Frequency)

EV1 Probability Weighted Moments (HIRDS)

Return Period (years)	2	5	10	20	50	100
Duration						
24 hours	108 (156)	132 (208)	152 (242)	171 (275)	196 (317)	
48 hours	136 (193)	168 (258)	193 (300)	218 (341)	250 (394)	
72 hours	152 (215)	189 (286)	219 (333)	247 (378)	284 (437)	

Monthly Quartiles and Extremes (mm)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	1	8	24	7	32	22	38	36	35	13	31	13	949
Mean	108	136	144	136	159	170	161	160	147	145	110	153	1725
Max	348	473	475	342	509	391	379	451	332	465	376	400	2781

Annual Summary

Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982	1174	159	1990	1846	207	1998	Incomplete Record	
1983	Incomplete Record		1991	1411	200	1999	Incomplete Record	
1984	1482	172	1992	1650	194	2000	949	127
1985	Incomplete Record		1993	1039	172	2001	2024	186
1986	Incomplete Record		1994	1381	181	2002	1124	148
1987	1590	185	1995	2488	219	2003	1866	163
1988	1594	205	1996	Incomplete Record		2004	2369	164
1989	2019	212	1997	Incomplete Record		2005	1852	156

Environment Bay of Plenty
Manual Rainfall Recording Station

Raingauge	Wilson, P & S	Location	Lake Okareka
Site Number	861302	Grid Reference	U16: 034 310
Recorder Type	Manual	Altitude	360 metres
Start of Record	January 1966	Data Capture Rate	91 %
Data Summary From	January 1966	To	December 2005
Data Audited From	January 1966	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Rainfall from January 1966 to December 1970 was recorded by Beckett, J S. Gauge was read daily at 0800.

No record exists between December 1970 and March 1973 due to gauge reader leaving.

Rainfall from March 1973 to July 1990 was recorded by Turner, J. Gauge was read daily at 0900.

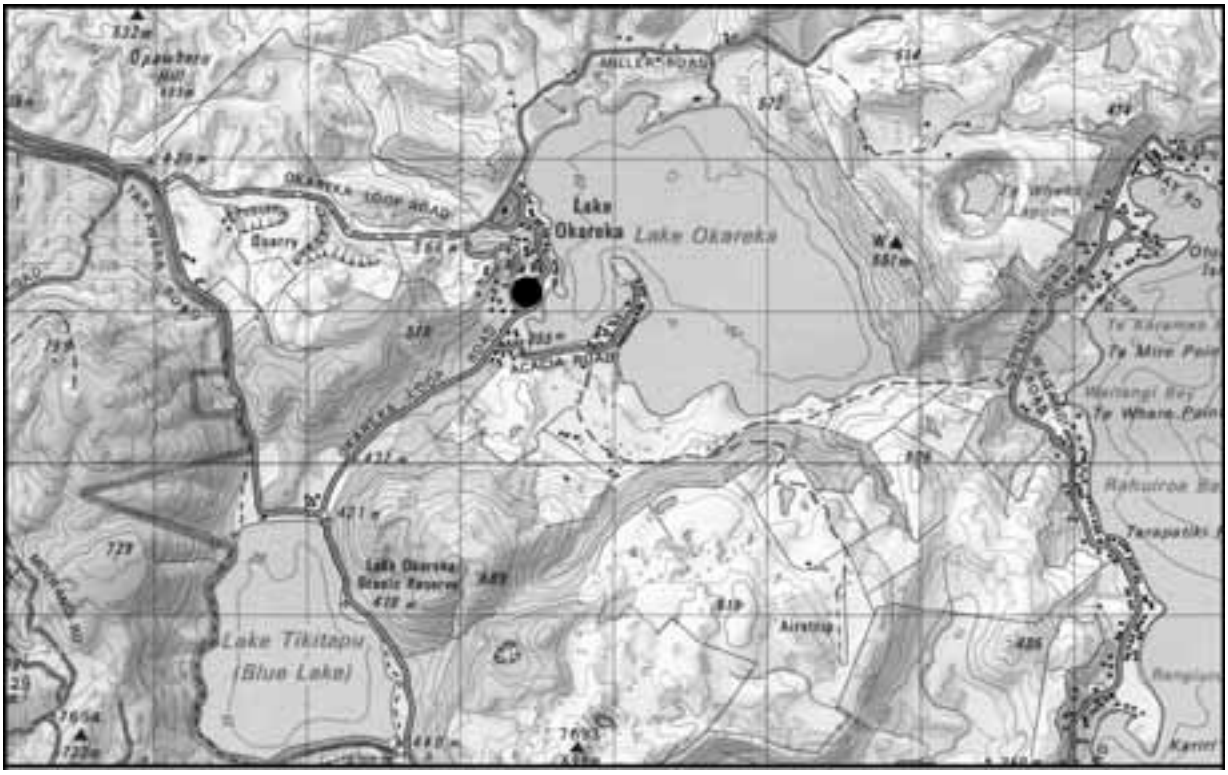
No record exists between July 1990 and June 1991 due to gauge reader leaving.

Rainfall from June 1991 to July 1996 was recorded by Mercer. Gauge was read daily at 0700.

Rainfall from August 1996 is recorded by Wilson, P & S. Gauge is read daily at 0800.

Rainfall data from 1 January 2005 to 31 March 2005 not used, as suspected to be inaccurate.

For the purposes of Data Summary, all data for this site was converted to be read at theoretical time of 0800.



SITE LOCATION
Wilson, P & S at Lake Okareka

Environment Bay of Plenty
Manual Rainfall Summary

Date Complied	December 2006	Site Number	861302
Compiled by	Charl Naude	Raingauge	Wilson, P & S
Metric Map Reference	U16: 034 310	Location	Lake Okareka
Altitude	360 metres		
Catchment	Lake Okareka	Period of Summary	1966 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	1529	Mean Summer Rainfall	352
		Summer Rainfall as % of Annual	23
		Mean Autumn Rainfall	367
		Autumn Rainfall as % of Annual	24
		Mean Winter Rainfall	439
Max 24 hr fall (on 22/01/1966)	155	Winter Rainfall as % of Annual	29
Max 48 hr fall (on 22/01/1966)	185	Mean Spring Rainfall	372
Max 72 hr fall (on 02/01/1986)	229	Spring Rainfall as % of Annual	24

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
24 hours	80 (121)	101 (162)	120 (188)	139 (214)	166 (247)	
48 hours	106 (151)	132 (201)	155 (234)	178 (265)	211 (307)	
72 hours	119 (167)	149 (222)	176 (259)	204 (294)	244 (340)	

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	10	4	5	31	39	47	17	32	54	8	47	55	349
Median	92	117	103	125	124	155	148	128	130	108	107	142	1479
Mean	98	115	112	122	132	152	143	137	138	122	113	145	1529
Max	336	295	353	274	317	263	290	267	261	332	260	290	3538

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982	1158	170	1990	Incomplete Record		1998	1489	122
1983	1399	173	1991	Incomplete Record		1999	1552	141
1984	1551	186	1992	1459	206	2000	1492	155
1985	1565	176	1993	1102	165	2001	1680	152
1986	1529	175	1994	1620	200	2002	1374	136
1987	1353	175	1995	2013	237	2003	1459	117
1988	1714	189	1996	Incomplete Record		2004	Incomplete Record	
1989	1780	188	1997	1443	118	2005	Incomplete Record	

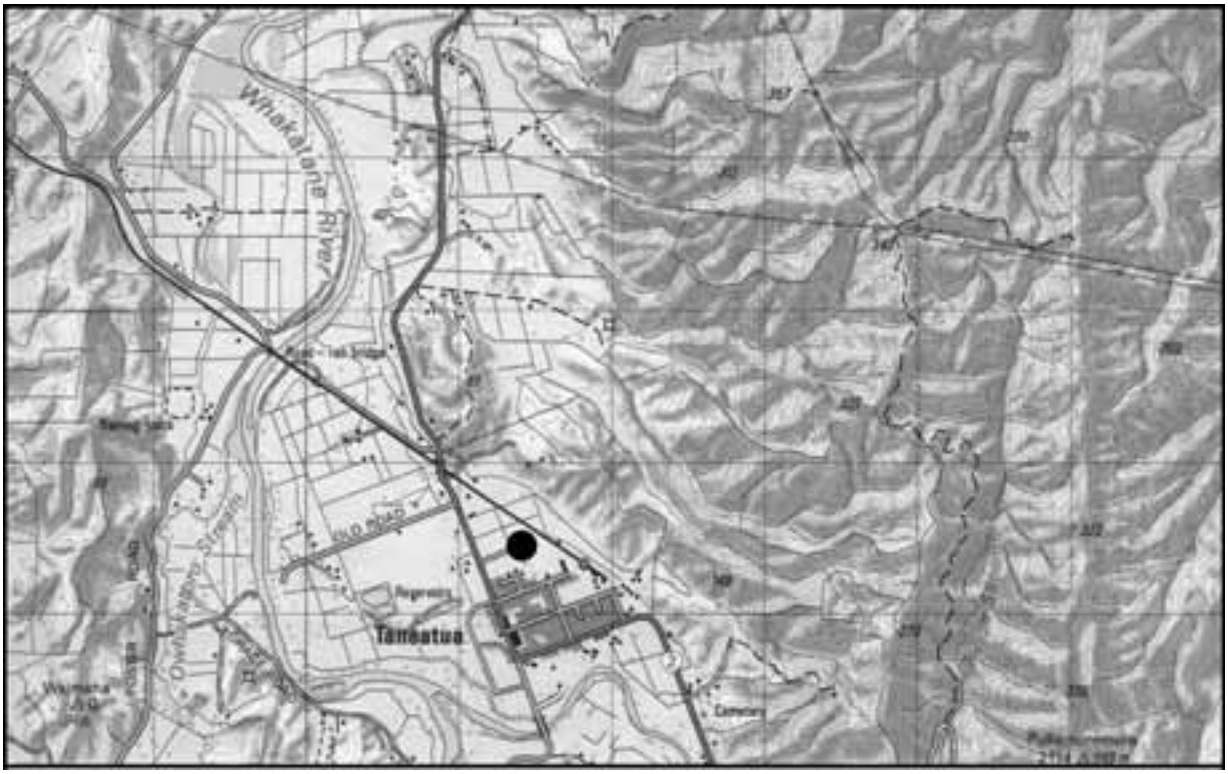
Environment Bay of Plenty
Manual Rainfall Recording Station

Raingauge	Darby, C	Location	Taneatua
Site Number	870005	Grid Reference	W15: 614 414
Recorder Type	Manual	Altitude	15 metres
Start of Record	May 1961	Data Capture Rate	100 %
Data Summary From	January 1962	To	December 2005
Data Audited From	May 1961	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Gauge is read daily at 0900.



SITE LOCATION
Darby, C at Taneatua

Environment Bay of Plenty
Manual Rainfall Summary

Date Complied	December 2006	Site Number	870005
Compiled by	Charl Naude	Raingauge	Darby, C
Metric Map Reference	W15: 614 414	Location	Taneatua
Altitude	15 metres		
Catchment	Waimana	Period of Summary	1962 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	1610	Mean Summer Rainfall	352
		Summer Rainfall as % of Annual	22
		Mean Autumn Rainfall	408
		Autumn Rainfall as % of Annual	25
		Mean Winter Rainfall	477
Max 24 hr fall (on 30/12/2004)	200	Winter Rainfall as % of Annual	30
Max 48 hr fall (on 16/07/2004)	332	Mean Spring Rainfall	375
Max 72 hr fall (on 15/07/2004)	366	Spring Rainfall as % of Annual	23

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
24 hours	108 (121)	131 (161)	148 (188)	163 (213)	180 (247)	
48 hours	141 (150)	172 (200)	198 (233)	224 (265)	258 (306)	
72 hours	154 (167)	189 (222)	219 (258)	248 (294)	286 (339)	

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	2	8	17	17	34	45	18	38	45	23	5	8	260
Median	90	101	117	125	123	160	147	153	120	98	98	113	1443
Mean	99	118	140	131	134	161	159	153	136	123	117	138	1610
Max	260	337	553	316	324	302	447	414	295	343	378	331	4298

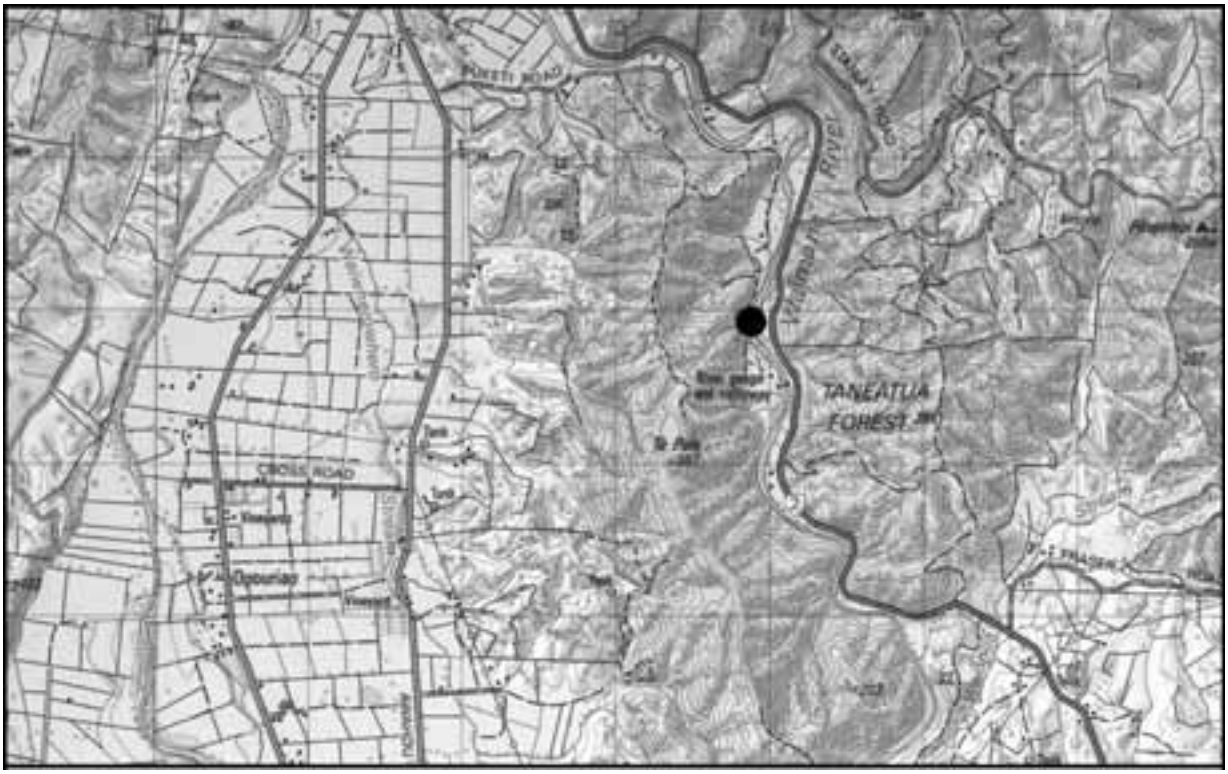
Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982	1053	97	1990	1321	96	1998	1874	111
1983	1306	115	1991	1323	114	1999	1770	90
1984	1343	127	1992	1670	126	2000	1455	90
1985	1728	124	1993	989	121	2001	2240	135
1986	1385	111	1994	1427	109	2002	1128	101
1987	1160	107	1995	1986	132	2003	1852	119
1988	1421	121	1996	1894	121	2004	2412	135
1989	1363	120	1997	1549	110	2005	1444	111

Environment Bay of Plenty
Manual Rainfall Recording Station

Raingauge	Hall, A R	Location	Waimana Gorge
Site Number	870006	NZMS 260 Reference	W16: 639 379
Recorder Type	Manual	Altitude	25 metres
Start of Record	May 1979	Data Capture Rate	100%
Data Summary From	January 1980	To	February 2000
Data Audited From	May 1979	To	February 2000

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.
Gauge was read daily at 0730.
Site closed in February 2000.



SITE LOCATION
Hall, A R at Waimana Gorge

Environment Bay of Plenty
Manual Rainfall Summary

Date Compiled	April 2001	Site Number	870006
Compiled by	Shane Iremonger	Raingauge	Hall, A R
NZMS 260 Reference	W16: 639 379	Location	Waimana Gorge
Altitude	25 metres		
Catchment	Waimana	Period of Summary	1980 to 2000

Rainfall Totals (mm)

Mean Annual Rainfall	1783	Mean Summer Rainfall	386
		Summer Rainfall as % of Annual	21
		Mean Autumn Rainfall	406
		Autumn Rainfall as % of Annual	23
		Mean Winter Rainfall	532
Max. 24 hr. fall (on 25/01/1986)	177	Winter Rainfall as % of Annual	30
Max. 48 hr. fall (on 09/12/1983)	196	Mean Spring Rainfall	459
Max. 72 hr. fall (on 08/12/1983)	244	Spring Rainfall as % of Annual	26

Rainfall Intensities (mm) Depth-Duration Frequency

EV1 Probability Weighted Moments (HIRDS)

Return Period (years)	2	5	10	20	50	100
Duration						
24 hours	118 (124)	152 (166)	174 (193)	176 (219)		
48 hours	148 (154)	190 (205)	217 (239)	243 (272)		
72 hours	162 (171)	204 (228)	231 (265)	258 (301)		

Monthly Statistics (mm)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann.
Min.	14	15	51	39	34	69	20	37	40	21	50	11	1223
Median	126	109	121	139	113	175	160	133	147	120	144	124	1821
Mean	125	107	144	144	118	191	178	163	154	143	162	154	1783
Max.	321	250	305	345	221	320	495	369	305	380	370	390	2247

Annual Summary

Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1980	1604	176	1988	2072	149	1996	1974	114
1981	2088	177	1989	1729	130	1997	1504	125
1982	1263	105	1990	1885	140	1998	1998	113
1983	1865	130	1991	1653	126	1999	1798	114
1984	1664	159	1992	1885	125	2000	Incomplete Record	
1985	2214	128	1993	1223	105	2001		
1986	1844	118	1994	1714	136	2002		
1987	1566	122	1995	2247	168	2003		

Environment Bay of Plenty
Manual Rainfall Recording Station

Raingauge	DeWit, C	**Location**	Otara Road
Site Number	870304	Grid Reference	X16: 932 375
Recorder Type	Manual	Altitude	60 metres
Start of Record	November 1979	Data Capture Rate	97 %
Data Summary From	January 1981	To	March 2002
Data Audited From	November 1979	To	March 2002

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Rainfall from November 1979 to May 2000 was recorded by Brown, M. Gauge read daily at 0800.

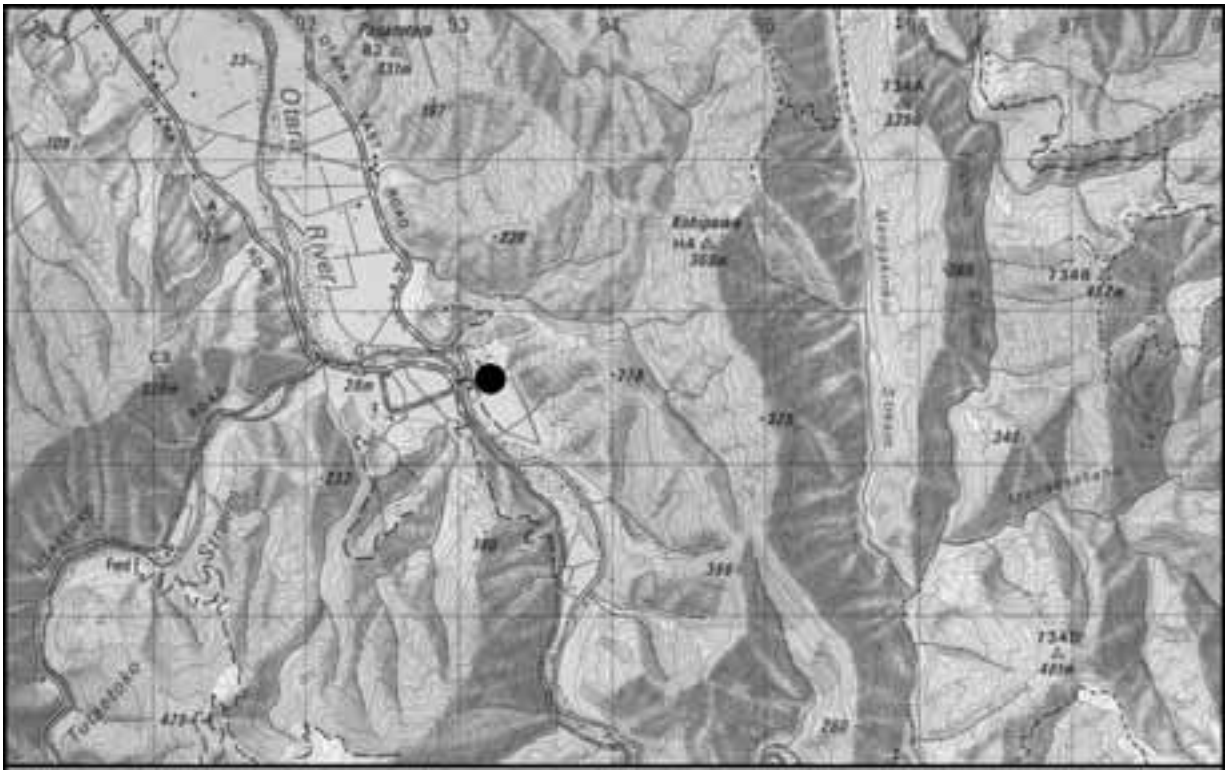
Rainfall from June 2000 to August 2000 was recorded by DeWit, C. Gauge read daily at 0800.

Site closed in August 2000.

Site reopened September 2000. Rainfall recorded by Edwardson, T until 31 May 2002.

Rainfall data from 1 April 2002 to 31 May 2002 not used, as suspected to be inaccurate.

Site closed 1 June 2002.



SITE LOCATION
DeWit, C at Otara Road

Environment Bay of Plenty
Manual Rainfall Summary

Date Complied	December 2006	Site Number	870304
Compiled by	Charl Naude	Raingauge	DeWit, C
Metric Map Reference	X16: 932 375	Location	Otara Road
Altitude	60 metres		
Catchment	Otara	Period of Summary	1980 to 2002

Rainfall Totals (mm)			
Mean Annual Rainfall	1876	Mean Summer Rainfall	396
		Summer Rainfall as % of Annual	21
		Mean Autumn Rainfall	445
		Autumn Rainfall as % of Annual	24
		Mean Winter Rainfall	547
Max 24 hr fall (on 21/04/1985)	195	Winter Rainfall as % of Annual	29
Max 48 hr fall (on 20/04/1985)	233	Mean Spring Rainfall	480
Max 72 hr fall (on 09/07/1998)	241	Spring Rainfall as % of Annual	26

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
24 hours	120 (148)	145 (197)	161 (230)	174 (261)		
48 hours	156 (184)	186 (244)	207 (285)	225 (323)		
72 hours	169 (204)	198 (271)	218 (316)	235 (359)		

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	9	23	37	34	0	87	14	62	69	63	69	31	497
Median	118	111	118	176	130	198	166	180	166	159	132	150	1805
Mean	125	114	144	160	136	191	167	186	156	157	170	169	1876
Max	345	245	330	362	283	384	457	380	304	294	357	385	4125

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1979	Incomplete Record		1987	1781	117	1995	2376	155
1980	Incomplete Record		1988	1546	114	1996	2194	125
1981	Incomplete Record		1989	2042	129	1997	1733	110
1982	1415	118	1990	2088	135	1998	2004	113
1983	1757	109	1991	1956	141	1999	126	
1984	1785	105	1992	1980	137	2000	Incomplete Record	
1985	1781	96	1993	1183	119	2001	1772	109
1986	2128	120	1994	1808	133	2002	Incomplete Record	

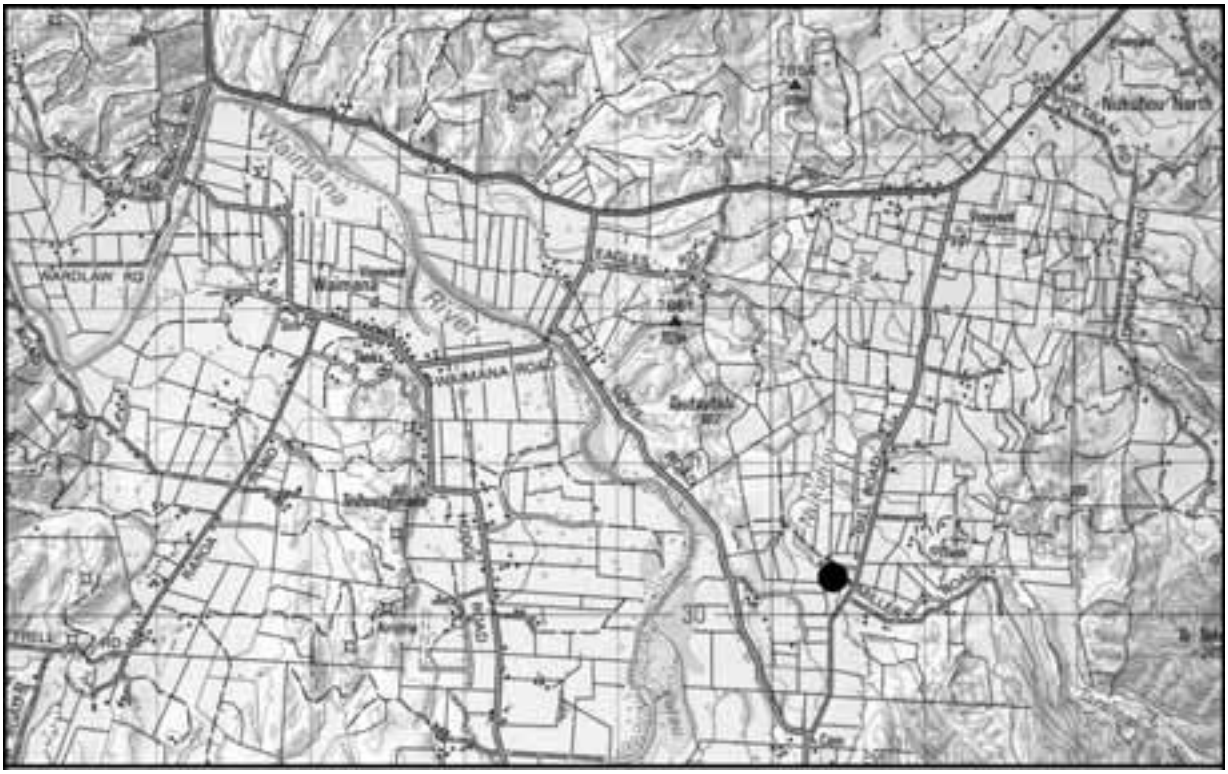
Environment Bay of Plenty
Manual Rainfall Recording Station

Raingauge	Savage, I F	Location	Waimana
Site Number	871102	Grid Reference	W16: 705 302
Recorder Type	Manual	Altitude	70 metres
Start of Record	January 1972	Data Capture Rate	100 %
Data Summary From	January 1972	To	December 2005
Data Audited From	January 1972	To	December 2005

General Comments

Site operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Gauge is read daily at 0800.



SITE LOCATION
Savage, I F at Waimana

Environment Bay of Plenty
Manual Rainfall Summary

Date Complied	December 2006	Site Number	871102
Compiled by	Charl Naude	Raingauge	Savage, I F
Metric Map Reference	W16: 705 302	Location	Waimana
Altitude	70 metres		
Catchment	Waimana	Period of Summary	1972 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	1584	Mean Summer Rainfall	349
		Summer Rainfall as % of Annual	22
		Mean Autumn Rainfall	389
		Autumn Rainfall as % of Annual	25
		Mean Winter Rainfall	453
Max 24 hr fall (on 18/07/2004)	163	Winter Rainfall as % of Annual	29
Max 48 hr fall (on 17/07/2004)	280	Mean Spring Rainfall	395
Max 72 hr fall (on 16/07/2004)	323	Spring Rainfall as % of Annual	25

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
24 hours	110 (123)	132 (164)	147 (191)	158 (216)	170 (250)	
48 hours	133 (152)	166 (203)	194 (236)	222 (268)	258 (310)	
72 hours	143 (169)	177 (225)	208 (262)	242 (298)	292 (344)	

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	6	15	44	30	33	63	12	34	45	19	29	27	357
Median	105	83	106	134	121	153	147	145	131	122	101	106	1454
Mean	105	108	130	136	121	153	153	143	133	134	130	138	1584
Max	287	444	444	351	270	298	495	318	269	328	410	328	4242

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982	1328	127	1990	1702	131	1998	1859	137
1983	1496	124	1991	1614	143	1999	1874	151
1984	1415	122	1992	1466	130	2000	1459	147
1985	1499	131	1993	1025	116	2001	2244	151
1986	1607	127	1994	1521	124	2002	1285	126
1987	1425	121	1995	2167	163	2003	1662	146
1988	1400	130	1996	1849	132	2004	2162	122
1989	1672	131	1997	1491	122	2005	1202	97

3.4 Automatic Rainfall Data Summaries

The automatic rainfall data summaries in this chapter are provided in the following sequences of 2 pages per station:

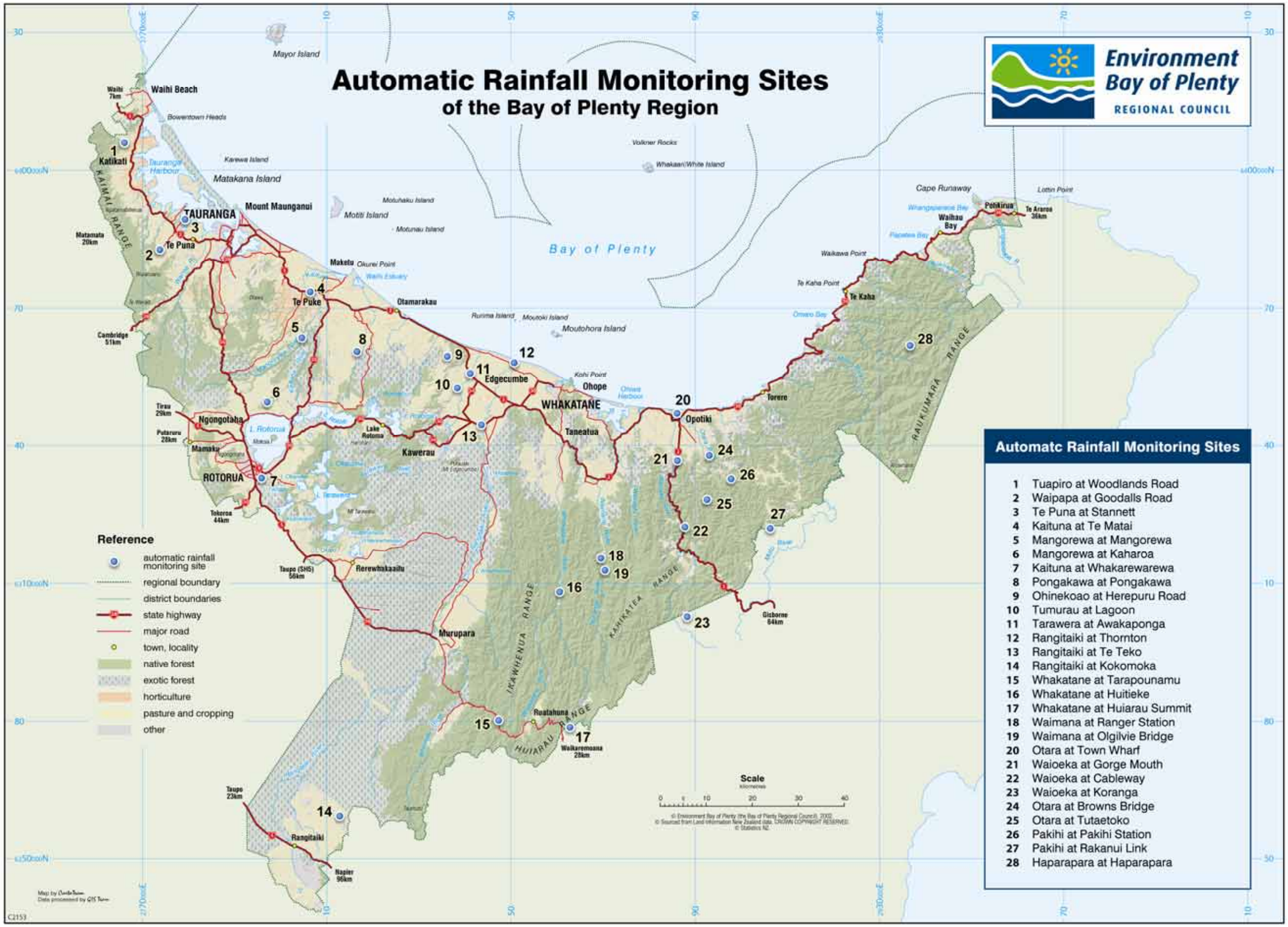
Page 1 Provides general information regarding the station, such as its location, instrument types, start of record, etc.

Page 2 Displays the data summary information. Within each summary additional rainfall depths have been included for a range of durations. The software package used to determine these values is the High Intensity Rainfall Design System (HIRDS) version 1.50b. This software has been written by the Climate Analysis and Application section of the National Institute of Water and Atmospheric Research Ltd. The application was written to provide estimates of rainfall depth and their standard errors which are calculated for a range of average reoccurrence intervals and storm durations for defined locations. For further information see Thompson (1993).

The ID No. in Table 3.4 indicates the order in which individual station data summaries are provided in this report.

Table 3.4 Automatic Rainfall Monitoring Stations

ID Number	Page No.	Raingauge	Location	Period of Audit	Data Capture Rate (%)
1	129	Tuapiro	Woodlands Rd.	1994-2005	98
2	131	Waipapa	Goodalls Rd.	1992-2005	99
3	133	Te Puna	Stannett	1991-2005	100
4	135	Kaituna	Te Matai	1990-2005	99
5	137	Mangorewa	Mangorewa	1986-2005	91
6	139	Mangorewa	Kaharoa	1986-2005	99
7	141	Kaituna	Whakarewarewa	1900-2005	100
8	143	Pongakawa	Pongakawa	1997-2005	100
9	145	Ohinekoao	Herepuru Rd.	2002-2005	100
10	147	Tumurau	Lagoon	2002-2005	100
11	149	Tarawera	Awakaponga	1990-2005	98
12	151	Rangitaiki	Thornton	1990-2005	100
13	153	Rangitaiki	Te Teko	1990-2005	100
14	155	Rangitaiki	Kokomoka	1996-2005	100
15	157	Whakatane	Tarapounamu	1990-2005	100
16	159	Whakatane	Huitieke	1979-2005	94
17	161	Whakatane	Huiarau Summit	1976-2005	99
18	163	Waimana	Ranger Station	1997-2005	100
19	165	Waimana	Olgilvie Bridge	1989-2005	89
20	167	Otara	Town Wharf	1997-2005	93
21	169	Waioeka	Gorge Mouth	1990-2005	100
22	171	Waioeka	Cableway	1990-2005	99
23	173	Waioeka	Koranga	1980-2005	81
24	175	Otara	Browns Bridge	1990-2005	100
25	177	Otara	Tutaetoko	1990-2005.	97
26	179	Pakihi	Pakihi Station	1976-2005	86
27	181	Pakihi	Rakanui Link	1992-2005	99
28	183	Haparapara	Haparapara	1997-2005	100


Automatic Rainfall Monitoring Sites
of the Bay of Plenty Region
Environment Bay of Plenty
REGIONAL COUNCIL
Bay of Plenty
Mayor Island
Waihi Beach
Bowentown Heads
Katikati
Tauranga Harbour
Karewa Island
Matakana Island
TAURANGA
Mount Maunganui
Motuhaku Island
Motiti Island
Motunau Island
Te Puna
Matamata 20km
KAIMAI RANGE
Maketu
Okurei Point
Waihi Estuary
Te Puke
Otamarakau
Cambridge 51km
Rurima Island
Moutoki Island
Moutohora Island
Edgecumbe
Kohi Point
Ohope
Ohiwa Harbour
WHAKATANE
Taneatua
Opotiki
Torere
Cape Runaway
Lottin Point
Whangaparaoa Bay
Waihau Bay
Potikirua
Te Araroa 36km
Waikawa Point
Te Kaha Point
Te Kaha
Omaio Bay
RAUKUMARA RANGE
Tirau 29km
Putaruru 28km
Ngongotaha
Mamaku
L. Rotorua
Lake Rotoma
Kawerau
ROTORUA
Tokoroa 44km
Taupo (SH5) 56km
Rerewhakaaitu
Murupara
IKAWHENUA RANGE
KAHIKATEA RANGE
Gisborne 64km
Ruatahuna
HUIARAU RANGE
Waikaremoana 28km
Taupo 23km
Rangitaiki
Napier 96km
Volkner Rocks
Whakaari/White Island
Reference
automatic rainfall monitoring site
regional boundary
district boundaries
state highway
major road
town, locality
native forest
exotic forest
horticulture
pasture and cropping
other
Scale
Automatc Rainfall Monitoring Sites
1 Tuapiro at Woodlands Road
2 Waipapa at Goodalls Road
3 Te Puna at Stannett
4 Kaituna at Te Matai
5 Mangorewa at Mangorewa
6 Mangorewa at Kaharoa
7 Kaituna at Whakarewarewa
8 Pongakawa at Pongakawa
9 Ohinekoao at Herepuru Road
10 Tumurau at Lagoon
11 Tarawera at Awakaponga
12 Rangitaiki at Thornton
13 Rangitaiki at Te Teko
14 Rangitaiki at Kokomoka
15 Whakatane at Tarapounamu
16 Whakatane at Huitieke
17 Whakatane at Huiarau Summit
18 Waimana at Ranger Station
19 Waimana at Olgilvie Bridge
20 Otara at Town Wharf
21 Waioeka at Gorge Mouth
22 Waioeka at Cableway
23 Waioeka at Koranga
24 Otara at Browns Bridge
25 Otara at Tutaetoko
26 Pakihi at Pakihi Station
27 Pakihi at Rakanui Link
28 Haparapara at Haparapara

Environment Bay of Plenty
Automatic Rainfall Recording Station

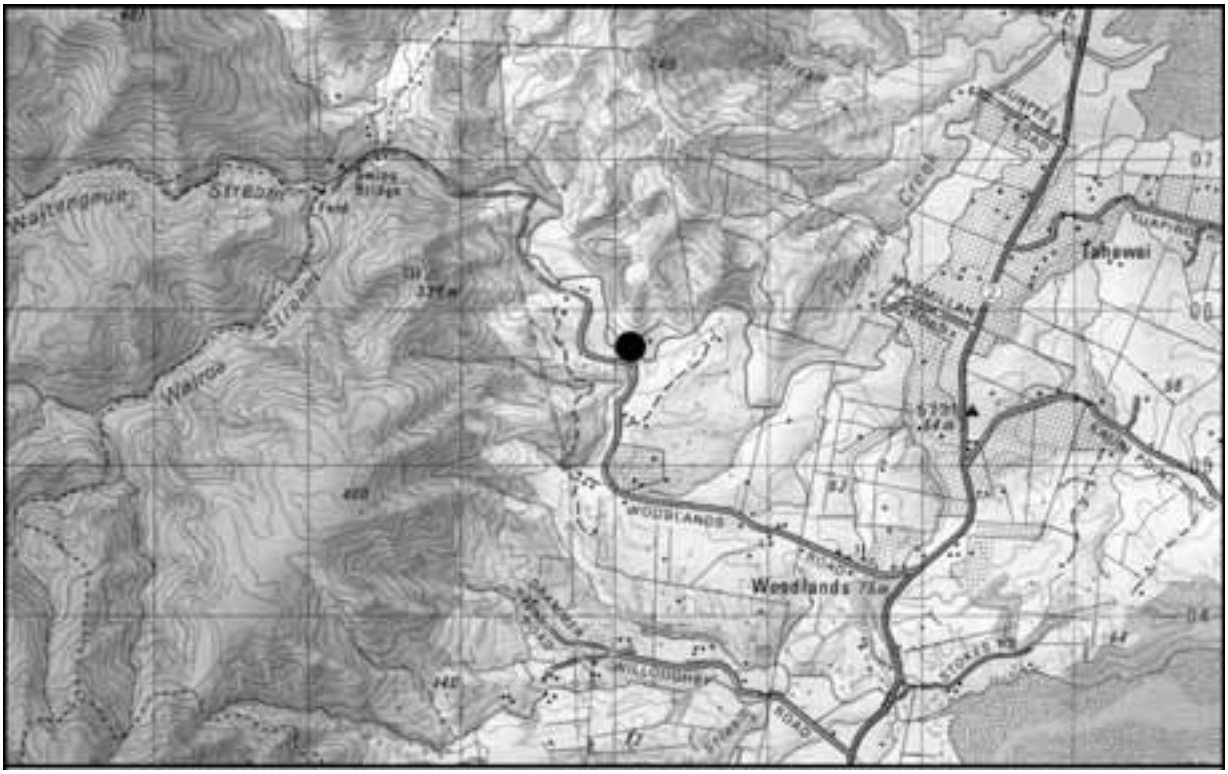
Raingauge	Tuapiro	Location	Woodlands Road
Site Number	755811	Grid Reference	T13: 661 057
Recorder Type	Tipping Bucket	Altitude	30 metres
Start of Record		Data Capture Rate	98%
Data Summary From	January 1994	To	December 2005
Data Audited From	May 1993	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

OTA tipping bucket shifted from top of aerial pole down to ground-level after recorder was destroyed during Cyclone Fergus.

Periods of missing or synthetic record may occur in this dataset. Users are advised to contact the recording authority for further details.



SITE LOCATION
Tuapiro at Woodlands Road

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	755811
Compiled by	G R Ellery	Raingauge	Tuapiro
Metric Map Reference	T13: 661 057	Location	Woodlands Road
Altitude	30 metres		
Catchment	Tauranga Harbour	Period of Summary	1994 to 2005

Rainfall Totals (mm)

Mean Annual Rainfall	1892	Mean Summer Rainfall	418
		Summer Rainfall as % of Annual	22
		Mean Autumn Rainfall	481
Max. 1 hr fall (on 25/03/2005)	75	Autumn Rainfall as % of Annual	25
Max. 12 hr fall (on 30/12/1996)	157	Mean Winter Rainfall	559
Max. 24 hr fall (on 3/12/1998)	189	Winter Rainfall as % of Annual	30
Max 48 hr fall (on 11/02/2001)	216	Mean Spring Rainfall	455
Max 72 hr fall (on 11/02/2001)	223	Spring Rainfall as % of Annual	24

Rainfall Intensities (mm) (Depth-Duration Frequency)

EV1 Probability Weighted Moments (HIRDS Ver 1.50b)

Return Period (years)	2	5	10	20	50	100
Duration						
1 hour	31 (34)	39 (48)	48 (56)	58 (64)		
12 hours	105 (108)	128 (143)	147 (167)	164 (190)		
24 hours	140 (146)	170 (194)	191 (226)	207 (257)		
48 hours	173 (181)	198 (240)	211 (280)	219 (318)		
72 hours	180 (200)	206 (267)	220 (311)	229 (353)		

Monthly Statistics (mm)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	25	22	10	32	84	77	68	92	68	74	48	25	625
Median	120	124	99	185	138	171	253	122	138	147	125	124	1746
Mean	111	166	134	188	156	167	232	156	155	145	156	148	1914
Max	211	470	300	435	296	251	431	287	336	231	358	359	3965

Annual Summary

Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990			1998	2128	141
1983			1991			1999	1648	148
1984			1992			2000	Incomplete Record	
1985			1993			2001	2007	198
1986			1994	1974	165	2002	1480	171
1987			1995	2266	191	2003	1790	182
1988			1996	Incomplete Record		2004	1840	178
1989			1997	Incomplete Record		2005	1888	183

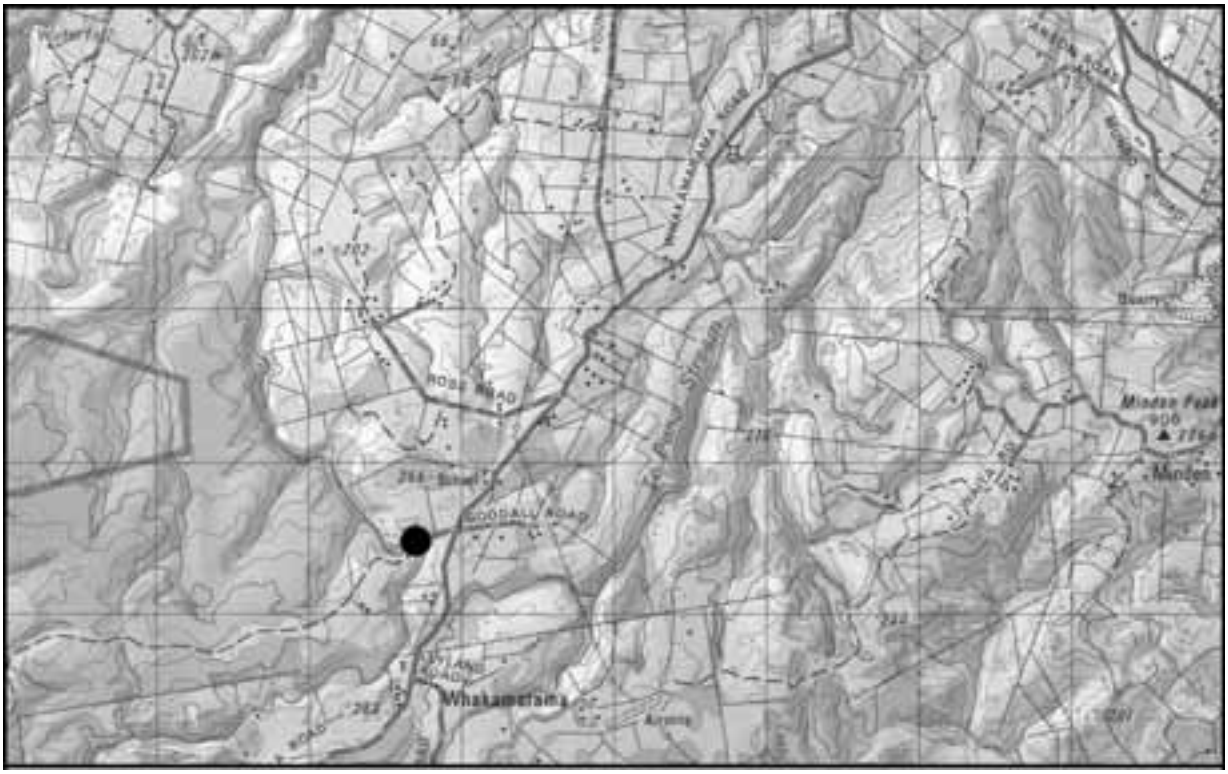
Environment Bay of Plenty
Automatic Rainfall Recording Station

Raingauge	Waipapa	Location	Goodall Road.
Site Number	757901	Grid Reference	U14:737 824
Recorder Type	Tipping bucket	Altitude	240 metres
Start of Record	November 1991	Data Capture Rate	99%
Data Summary From	January 1992	To	December 2005
Data Audited From	November 1991	To	December 2005

General Comments

OTA tipping bucket installed on roof of water tower by NIWA, Rotorua on 7 November 1991. Site was handed back from NIWA on 1 July 1992 and is now operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Periods of missing or synthetic record may occur in this dataset. Users are advised to contact the recording authority for further details.



SITE LOCATION
Waipapa at Goodall Road

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	G R Ellery	Site Number	757901
Compiled by	November 2006	Raingauge	Waipapa
Metric Map Reference	U14: 737 824	Location	Goodall Road.
Altitude	240 metres		
Catchment	Tauranga Harbour	Period of Summary	1992 to 2005

Rainfall Totals (mm)

Mean Annual Rainfall	2048	Mean Summer Rainfall	460
		Summer Rainfall as % of Annual	22
		Mean Autumn Rainfall	545
Max. 1 hr fall (on 29/04/2004)	55	Autumn Rainfall as % of Annual	27
Max. 12 hr fall (on 30/04/1999)	149	Mean Winter Rainfall	598
Max. 24 hr fall (on 28/04/2004)	188	Winter Rainfall as % of Annual	29
Max 48 hr fall (on 27/04/2004)	247	Mean Spring Rainfall	499
Max 72 hr fall (on 26/04/2004)	248	Spring Rainfall as % of Annual	24

Rainfall Intensities (mm) (Depth-Duration Frequency)

EV1 Probability Weighted Moments (HIRDS Ver 1.50b)

Return Period (years)	2	5	10	20	50	100
Duration						
1 hour	33 (43)	42 (59)	50 (70)	58 (80)		
12 hours	97 (128)	118 (171)	134 (199)	151 (226)		
24 hours	133 (166)	156 (221)	174 (257)	191 (292)		
48 hours	167 (205)	202 (274)	228 (319)	252 (362)		
72 hours	181 (228)	213 (303)	236 (353)	257 (401)		

Monthly Statistics (mm)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	25	18	14	28	119	88	60	95	84	76	58	30	695
Median	129	149	134	177	177	215	243	169	170	189	124	172	2048
Mean	114	170	134	205	203	204	216	173	171	182	146	183	2101
Max	244	474	341	460	359	309	477	281	319	341	462	458	4525

Annual Summary

Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990			1998	2324	164
1983			1991			1999	2102	165
1984			1992	Incomplete Record		2000	1909	170
1985			1993	1560	158	2001	2473	187
1986			1994	1937	189	2002	1676	174
1987			1995	Incomplete Record		2003	2135	183
1988			1996	Incomplete Record		2004	2426	181
1989			1997	1716	166	2005	2275	170

Environment Bay of Plenty
Automatic Rainfall Recording Station

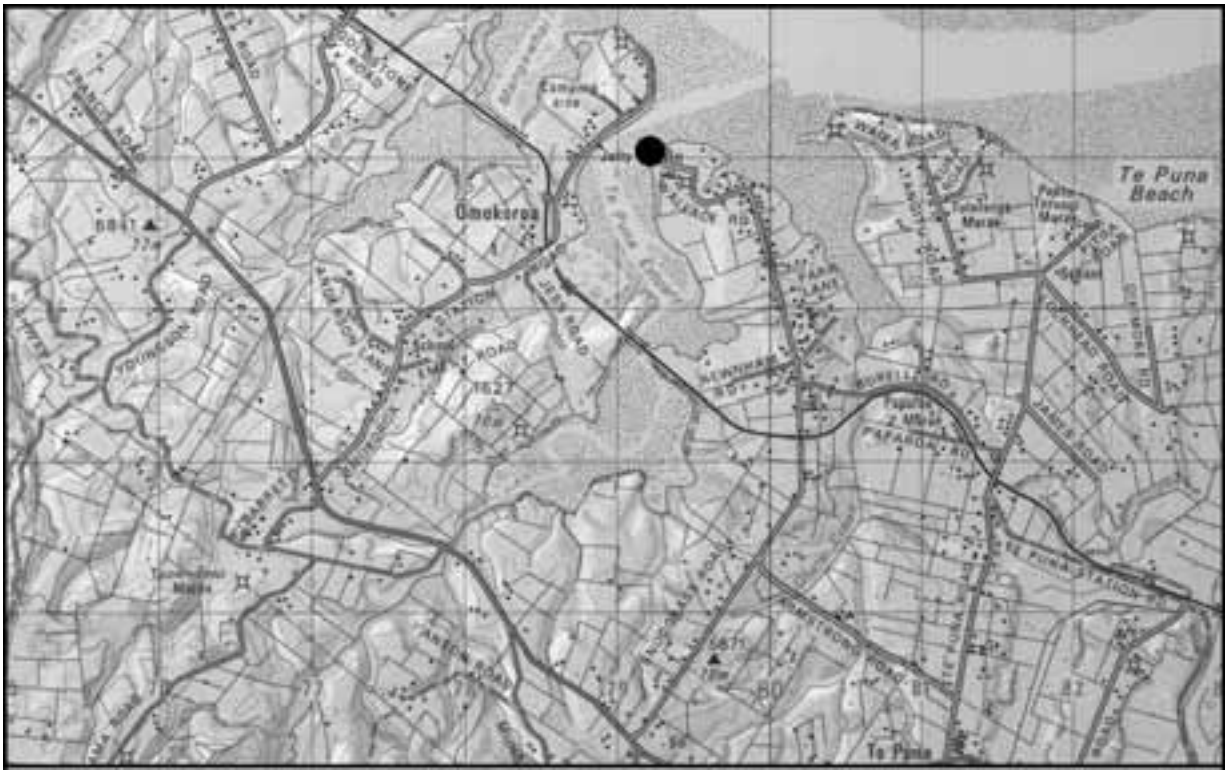
Raingauge	Te Puna	Location	Stannett
Site Number	766002	Grid Reference	U14:792 890
Recorder Type	Tipping bucket	Altitude	10 metres
Start of Record	September 1990	Data Capture Rate	100%
Data Summary From	January 1991	To	December 2005
Data Audited From	September 1990	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

OTA tipping bucket is located on the roof of the groundwater recorder hut.

Periods of missing or synthetic record may occur in this dataset. Users are advised to contact the recording authority for further details.



SITE LOCATION
Te Puna at Stannett

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	766002
Compiled by	G R Ellery	Raingauge	Te Puna
Metric Map Reference	U14:792 890	Location	Stannett
Altitude	10 metres		
Catchment	Tauranga Harbour	Period of Summary	1991 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	1330	Mean Summer Rainfall	300
		Summer Rainfall as % of Annual	23
		Mean Autumn Rainfall	355
Max. 1 hr fall (on 29/04/2004)	51	Autumn Rainfall as % of Annual	27
Max. 12 hr fall (on 9/04/2000)	133	Mean Winter Rainfall	381
Max. 24 hr fall (on 28/04/2004)	153	Winter Rainfall as % of Annual	29
Max 48 hr fall (on 27/04/2004)	202	Mean Spring Rainfall	292
Max 72 hr fall (on 26/04/2004])	208	Spring Rainfall as % of Annual	22

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
1 hour	32 (33)	40 (45)	45 (54)	50 (62)		
12 hours	83 (98)	102 (130)	115 (152)	126 (172)		
24 hours	101 (126)	123 (168)	139 (195)	153 (222)		
48 hours	120 (156)	147 (208)	166 (242)	182 (275)		
72 hours	124 (173)	153 (231)	175 (269)	195 (305)		

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	27	18	16	37	34	31	45	63	39	25	39	12	386
Median	78	111	74	132	96	128	154	100	104	86	79	102	1244
Mean	77	118	91	144	119	123	149	105	107	97	90	112	1332
Max	146	282	202	323	286	187	321	204	208	224	227	260	2870

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990			1998	1417	128
1983			1991	1138	141	1999	1186	127
1984			1992	1428	140	2000	1224	130
1985			1993	883	128	2001	1499	161
1986			1994	1355	149	2002	976	159
1987			1995	1679	165	2003	1394	166
1988			1996	1631	152	2004	1547	166
1989			1997	1082	130	2005	1508	156

Environment Bay of Plenty
Automatic Rainfall Recording Station

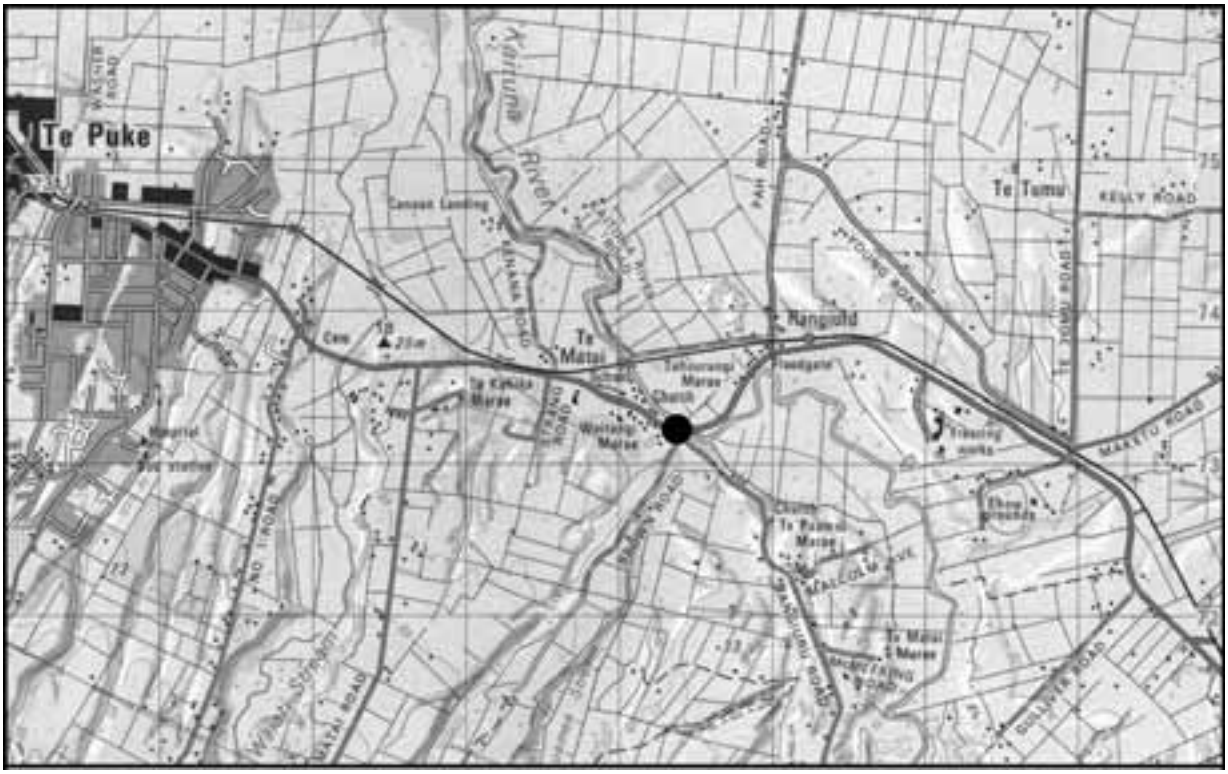
Raingauge	Kaituna	Location	Te Matai
Site Number	768301	Grid Reference	U14:060 736
Recorder Type	Tipping Bucket	Altitude	10 metres
Start of Record	July 1989	Data Capture Rate	99%
Data Summary From	January 1990	To	December 2005
Data Audited From	July 1989	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

From July 1989 to March 1990 rainfall was stored by a Jepsen Slave at varying intervals, commonly 4 hours. Jepsen Slave was replaced by an Aquitel Remote on 21 March 1990, recording at 15 minute intervals. OTA tipping bucket is installed on the roof of the water recorder tower.

Periods of missing or synthetic record may occur in this dataset. Users are advised to contact the recording authority for further details.



SITE LOCATION
Kaituna at Te Matai

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	768301
Compiled by	G R Ellery	Raingauge	Kaituna
Metric Map Reference	U14: 060 736	Location	Te Matai
Altitude	10 metres		
Catchment	Kaituna	Period of Summary	1990 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	1313	Mean Summer Rainfall	256
		Summer Rainfall as % of Annual	19
		Mean Autumn Rainfall	365
Max. 1 hr fall (on 27/06/1990)	69	Autumn Rainfall as % of Annual	28
Max. 12 hr fall (on 27/06/1990)	181	Mean Winter Rainfall	421
Max. 24 hr fall (on 17/05/2005)	231	Winter Rainfall as % of Annual	32
Max 48 hr fall (on 17/05/2005)	260	Mean Spring Rainfall	291
Max 72 hr fall (on 15/05/2005)	289	Spring Rainfall as % of Annual	22

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
1 hour	31 (29)	40 (40)	48 (48)	59 (55)		
12 hours	90 (92)	117 (122)	141 (142)	166 (162)		
24 hours	108 (119)	137 (158)	164 (184)	195 (209)		
48 hours	121 (147)	145 (196)	172 (229)	206 (260)		
72 hours	129 (163)	158 (218)	190 (253)	228 (288)		

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	24	14	9	32	31	35	41	50	44	39	28	13	360
Median	73	74	93	143	91	125	151	107	85	89	69	92	1193
Mean	73	89	100	144	120	132	164	122	100	109	82	98	1332
Max	179	247	200	407	417	269	344	319	212	262	188	266	3310

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990	Incomplete Record		1998	1236	109
1983			1991	1281	150	1999	1005	117
1984			1992	1465	138	2000	1219	127
1985			1993	928	132	2001	1551	145
1986			1994	1440	158	2002	930	126
1987			1995	1928	168	2003	1200	129
1988			1996	1367	146	2004	1444	145
1989			1997	1190	119	2005	1508	133

Environment Bay of Plenty
Automatic Rainfall Recording Station

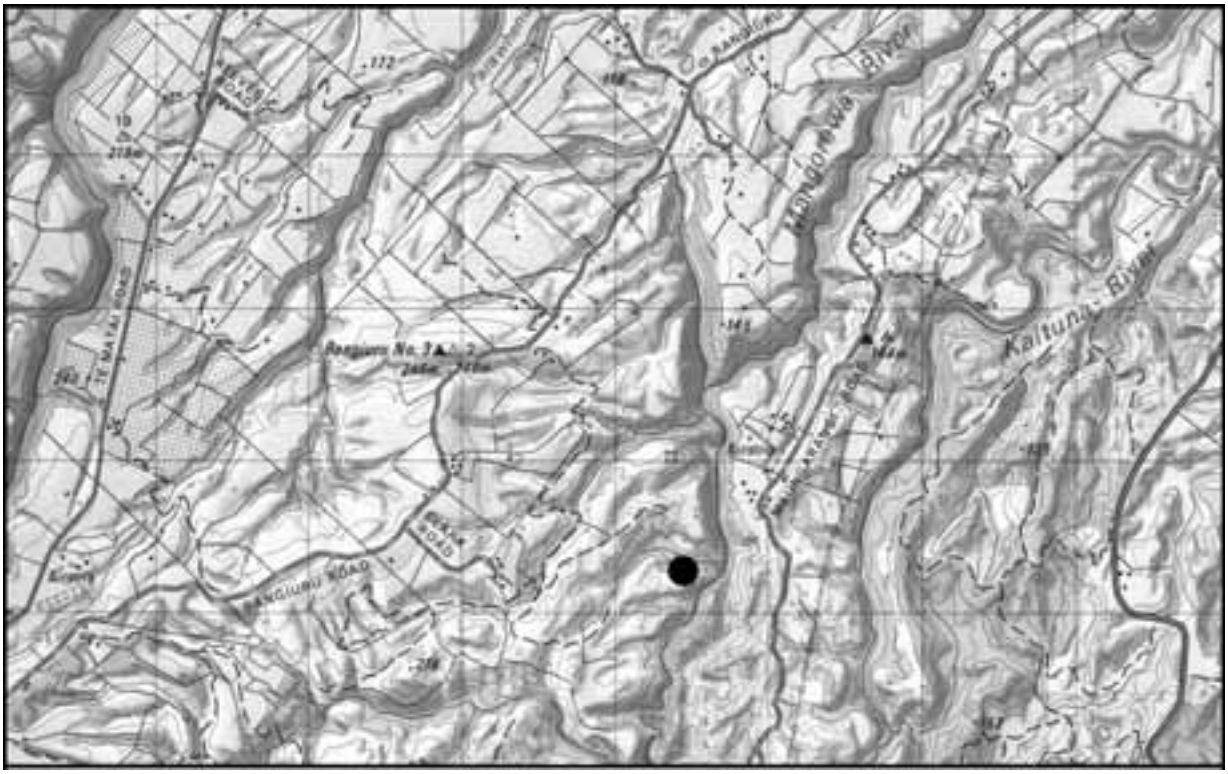
Raingauge	Mangorewa	Location	Mangorewa
Site Number	768310	Grid Reference	U15:043 633
Recorder Type	Tipping bucket	Altitude	100 metres
Start of Record	September 1985	Data Capture Rate	91%
Data Summary From	January 1986	To	December 2005
Data Audited From	September 1985	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Rainfall from September 1985 to September 1987 was from a manual gauge read daily at 0700. Rainfall from September 1987 to November 1990 was stored by a Jepsen Slave at varying intervals, commonly 4 hours. Jepsen Slave was replaced by a data logger on 22 November 1990, recording at 15 minute intervals. OTA tipping bucket is installed on the roof of the radio hut on the hill above the Mangorewa water recorder site.

Periods of missing or synthetic record may occur in this dataset. Users are advised to contact the recording authority for further details.



SITE LOCATION
Mangorewa at Mangorewa

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	768310
Compiled by	G R Ellery	Raingauge	Mangorewa
Metric Map Reference	U15: 043 633	Location	Mangorewa
Altitude	100 metres		
Catchment	Mangorewa	Period of Summary	1986 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	1814	Mean Summer Rainfall	355
		Summer Rainfall as % of Annual	20
		Mean Autumn Rainfall	438
Max. 1 hr fall (on 01/05/1999)	74	Autumn Rainfall as % of Annual	24
Max. 12 hr fall (on 01/05/1999)	219	Mean Winter Rainfall	476
Max. 24 hr fall (on 30/04/1999)	276	Winter Rainfall as % of Annual	26
Max 48 hr fall (on 30/04/1999)	283	Mean Spring Rainfall	430
Max 72 hr fall (on 29/04/1999)	283	Spring Rainfall as % of Annual	24

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
1 hour	32 (33)	47 (46)	60 (54)	73 (62)		
12 hours	103 (108)	141 (143)	173 (167)	204 (190)		
24 hours	137 (141)	180 (188)	214 (219)	245 (249)		
48 hours	158 (175)	201 (233)	235 (272)	267 (309)		
72 hours	179 (194)	223 (259)	258 (301)	290 (342)		

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	7	18	14	15	12	12	63	65	60	44	42	22	374
Median	94	99	103	151	150	143	169	139	146	148	85	97	1524
Mean	93	135	110	162	164	140	182	151	142	158	131	128	1696
Max	181	389	232	400	456	235	519	378	261	303	407	301	4062

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990	Incomplete Record		1998	1811	123
1983			1991	1345	146	1999	1849	138
1984			1992	Incomplete Record		2000	1571	135
1985			1993	Incomplete Record		2001	2217	152
1986	Incomplete Record		1994	Incomplete Record		2002	1130	130
1987	Incomplete Record		1995	2410	176	2003	1811	146
1988	Incomplete Record		1996	1791	149	2004	2146	144
1989	Incomplete Record		1997	Incomplete Record		2005	1871	148

Environment Bay of Plenty
Automatic Rainfall Recording Station

Raingauge	Mangorewa	Location	Kaharoa Link
Site Number	860205	Grid Reference	U15:971 493
Recorder Type	Tipping bucket	Altitude	420 metres
Start of Record	September 1985	Data Capture Rate	99%
Data Summary From	January 1986	To	December 2005
Data Audited From	September 1985	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Rainfall from September 1985 to July 1987 was from a manual gauge read daily.

Rainfall from July 1987 to September 1992 was measured by an OTA tipping bucket and stored by a Jepsen Slave at varying intervals, commonly 4 hours. Jepsen Slave was replaced by an Aquitel Remote on 3 September 1992, recording at 15 minute intervals. Raingauge moved from original site at the end of Hoko Road, on 14 August 1989. OTA tipping bucket is installed on the roof of the Environment Bay of Plenty radio link hut.

Periods of missing or synthetic record may occur in this dataset. Users are advised to contact the recording authority for further details.

SITE LOCATION
Mangorewa at Kaharoa Link

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	860205
Compiled by	G R Ellery	Raingauge	Mangorewa
Metric Map Reference	U14: 971 493	Location	Kaharoa Link
Altitude	420 metres		
Catchment	Kaituna	Period of Summary	1986 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	1794	Mean Summer Rainfall	410
		Summer Rainfall as % of Annual	23
		Mean Autumn Rainfall	447
Max. 1 hr fall (on 08/09/1989)	42	Autumn Rainfall as % of Annual	25
Max. 12 hr fall (on 1/05/1999)	247	Mean Winter Rainfall	489
Max. 24 hr fall (on 30/04/1999)	272	Winter Rainfall as % of Annual	27
Max 48 hr fall (on 30/04/1999)	282	Mean Spring Rainfall	432
Max 72 hr fall (on 13/02/1988)	288	Spring Rainfall as % of Annual	24

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
1 hour	24 (30)	33 (42)	41 (49)	48 (57)		
12 hours	92 (94)	116 (125)	139 (145)	163 (165)		
24 hours	126 (121)	156 (161)	184 (188)	214 (214)		
48 hours	154 (150)	192 (200)	227 (233)	265 (265)		
72 hours	173 (167)	217 (222)	253 (259)	287 (294)		

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	13	16	15	29	40	14	36	60	54	52	54	23	406
Median	97	115	121	134	145	171	191	174	121	126	103	162	1660
Mean	113	147	122	155	166	160	171	155	152	148	133	156	1778
Max	421	492	293	407	419	282	530	259	312	341	444	309	4509

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990	Incomplete Record		1998	2086	148
1983			1991	1519	170	1999	1961	152
1984			1992	Incomplete Record		2000	1742	149
1985			1993	1263	137	2001	2052	171
1986	1763	127	1994	1735	156	2002	1238	148
1987	1311	151	1995	2178	184	2003	1865	166
1988	2039	288	1996	1929	161	2004	2036	167
1989	2156	191	1997	1490	144	2005	1926	174

Environment Bay of Plenty
Automatic Rainfall Recording Station

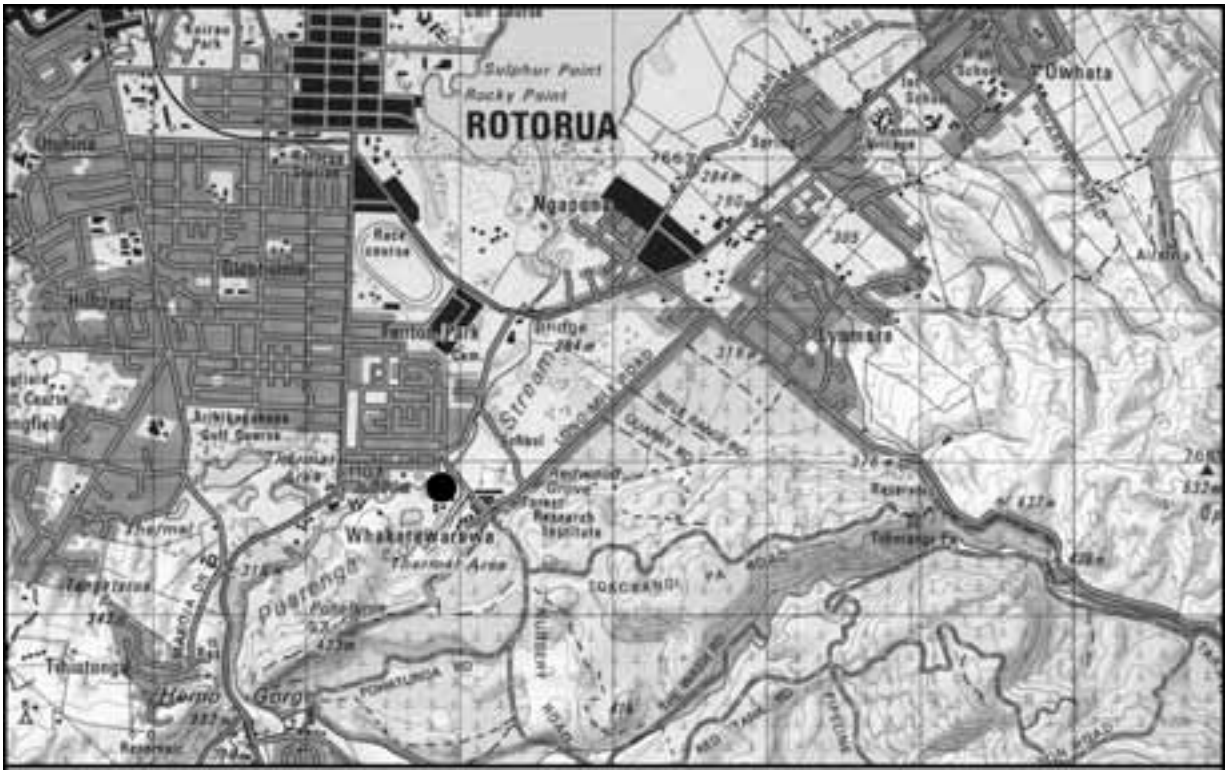
Raingauge	Kaituna	Location	Whakarewarewa
Site Number	861204	Grid Reference	U16:959 328
Recorder Type	Tipping Bucket	Altitude	300 metres
Start of Record	January 1900	Data Capture Rate	100%
Data Summary From	January 1900	To	December 2005
Data Audited From	January 1900	To	December 2005

General Comments

Periods of missing or synthetic record occur throughout the data set. Users are advised to contact the recording authority for further details.

Meteorological service record discontinued from 820131 240000 to 920908. Data for this period has been derived from nearby raingauges. Between 820131 080000 and 840101 080000 data has been derived from nearby NIWA, Rotorua raingauge (B86128) situated approximately 2.0 kilometres to the north west of Whakarewarewa. The two gauges have been correlated (76 rain days used) with correlation coefficient = 0.916 and standard error = 5mm.

New raingauge installed by Environment Bay of Plenty on 8/09/1992. This gauge was installed approximately 100 metres from the original Whakarewarewa site and is therefore considered an equal replacement for the original station. The new site consists of an OTA tipping bucket raingauge and data logger set to record at 15 minute intervals. A volumetric record of monthly totals is also collected.



SITE LOCATION
Kaituna at Whakarewarewa

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	861204
Compiled by	G R Ellery	Raingauge	Kaituna
Metric Map Reference	U16: 965 332	Location	Whakarewarewa
Altitude	300 metres		
Catchment	Kaituna	Period of Summary	1900 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	1428	Mean Summer Rainfall	337
		Summer Rainfall as % of Annual	23
		Mean Autumn Rainfall	354
Max. 1 hr fall (on 6/09/2002)	83	Autumn Rainfall as % of Annual	25
Max. 12 hr fall (on 1/05/1999)	165	Mean Winter Rainfall	396
Max. 24 hr fall (on 1/02/1967)	180	Winter Rainfall as % of Annual	28
Max 48 hr fall (on 1/12/1974)	227	Mean Spring Rainfall	348
Max 72 hr fall (on 15/04/1974)	238	Spring Rainfall as % of Annual	24

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
1 hour	26 (29)	35 (40)	45 (48)	60 (55)		
12 hours	70 (90)	92 (119)	116 (139)	144 (158)		
24 hours	86 (116)	108 (154)	127 (180)	145 (204)	172 (236)	193 (259)
48 hours	112 (144)	138 (191)	161 (223)	184 (253)	214 (292)	238 (322)
72 hours	127 (149_	156 (199)	180 (232)	203 (263)	232 (324)	253 (357)

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	1	2	7	13	0	30	14	16	23	24	15	12	157
Median	85	90	95	103	107	137	126	121	105	115	97	111	1292
Mean	102	110	104	118	128	139	128	126	119	124	106	120	1424
Max	345	329	393	494	455	329	363	300	312	330	271	345	4266

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982	995	214	1990	1525	264	1998	1522	153
1983	1418	197	1991	1273	252	1999	1291	140
1984	1116	160	1992	1406	248	2000	1285	133
1985	1467	202	1993	1076	147	2001	1430	151
1986	1356	234	1994	1379	135	2002	1155	142
1987	1336	210	1995	1791	172	2003	1282	163
1988	1511	237	1996	1548	156	2004	1454	155
1989	1646	280	1997	1369	145	2005	1349	163

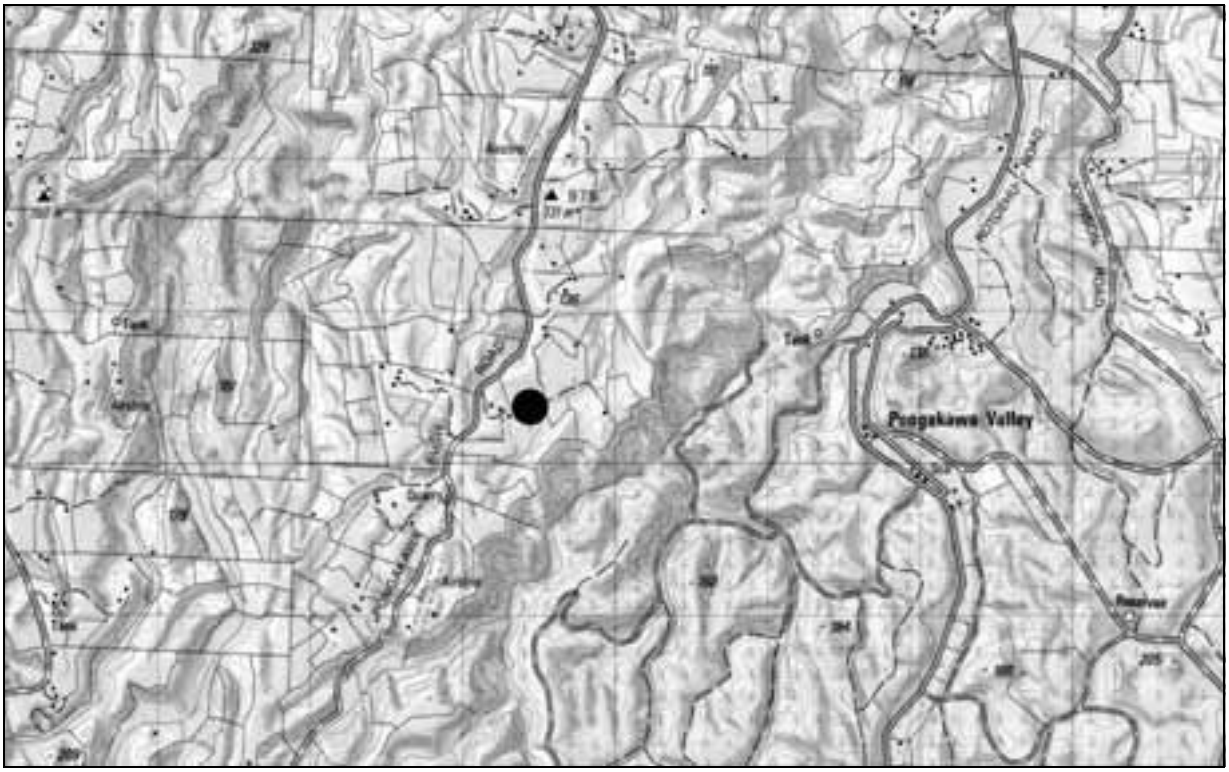
Environment Bay of Plenty
Automatic Rainfall Recording Station

Raingauge	Pongakawa	Location	Pongakawa
Site Number	769402	Grid Reference	V15: 164 603
Recorder Type	Tipping bucket	Altitude	55 metres
Start of Record	26 June 1996	Data Capture Rate	100%
Data Summary From	1 January 1997	To	31 December 2005
Data Audited From	26 June 1996	To	31 December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Periods of missing or synthetic record may occur in this dataset. Users are advised to contact the recording authority for further details.



SITE LOCATION
Pongakawa at Pongakawa

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	769402
Compiled by	G R Ellery	Raingauge	Pongakawa
Metric Map Reference	V15: 164 603	Location	Pongakawa
Altitude	55 metres		
Catchment	Pongakawa	Period of Summary	1997 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	1443	Mean Summer Rainfall	294
		Summer Rainfall as % of Annual	20
		Mean Autumn Rainfall	402
Max. 1 hr fall (on 06/04/2003)	44	Autumn Rainfall as % of Annual	28
Max. 12 hr fall (on 06/04/2003)	146	Mean Winter Rainfall	409
Max. 24 hr fall (on 05/04/2003)	155	Winter Rainfall as % of Annual	28
Max 48 hr fall (on 17/05/2005)	167	Mean Spring Rainfall	338
Max 72 hr fall (on 17/05/2005)	203	Spring Rainfall as % of Annual	23

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
1 hour	34 (33)	40 (45)	44 (53)			
12 hours	80 (103)	100 (137)	118 (159)			
24 hours	103 (134)	125 (178)	145 (207)			
48 hours	137 (166)	157 (221)	169 (257)			
72 hours	149 (184)	179 (245)	200 (285)			

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	26	0	14	17	52	68	46	43	63	41	30	64	464
Median	69	66	118	153	133	155	142	95	119	136	84	109	1379
Mean	71	97	110	128	161	151	158	97	120	129	89	130	1441
Max	145	302	186	214	339	223	392	157	196	243	184	268	2849

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990			1998	1504	134
1983			1991			1999	1394	149
1984			1992			2000	1113	135
1985			1993			2001	1775	166
1986			1994			2002	1084	133
1987			1995			2003	1475	143
1988			1996			2004	1807	157
1989			1997	1161	114	2005	1676	158

Environment Bay of Plenty
Automatic Rainfall Recording Station

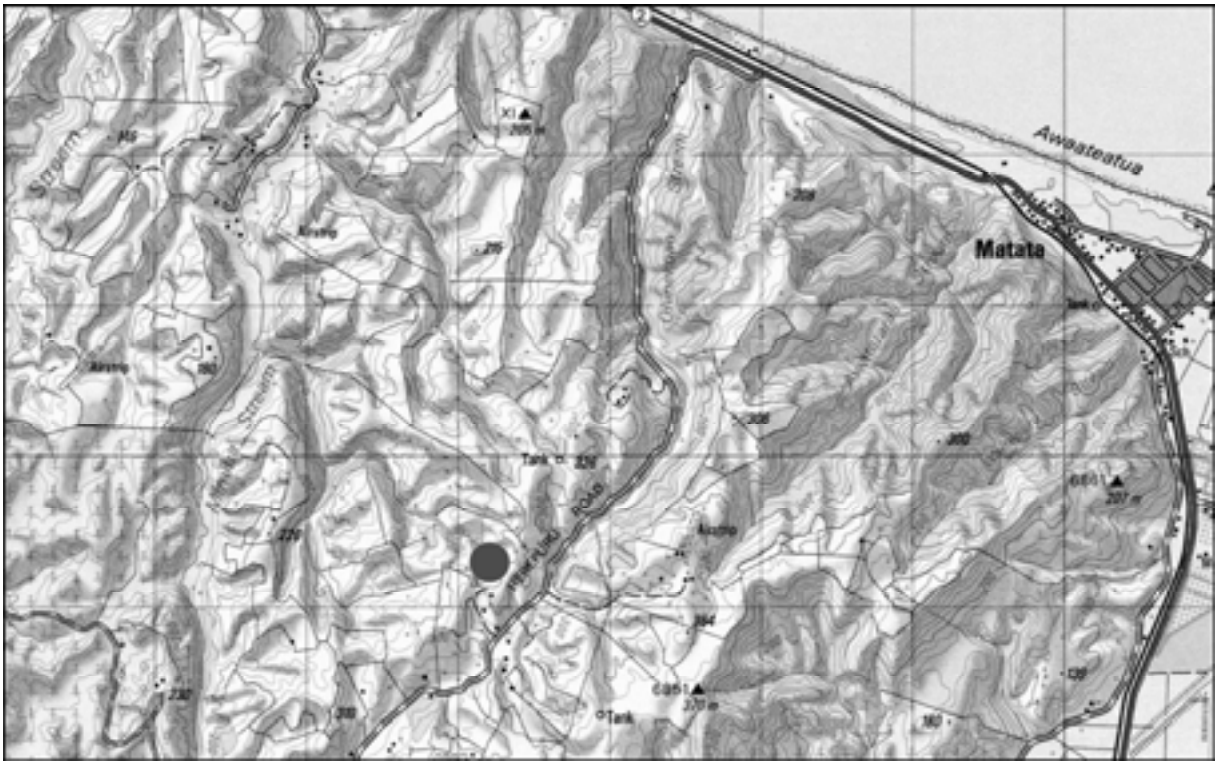
Raingauge	Ohinekoao	Location	Harris Saddle
Site Number	769705	Grid Reference	V15: 362 593
Recorder Type	Tipping Bucket	Altitude	310 metres
Start of Record	4 October 2001	Data Capture Rate	100%
Data Summary From	1 January 2002	To	31 December 2005
Data Audited From	4 October 2001	To	31 December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Periods of missing or synthetic record may occur in this dataset. Users are advised to contact the recording authority for further details.

Note that the data summary is for four years only, so no depth-duration frequency data are provided.



SITE LOCATION
Ohinekoao at Harris Saddle

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	769705
Compiled by	G R Ellery	Raingauge	Ohinekoao
Metric Map Reference	V15: 362 593	Location	Harris Saddle
Altitude	310 metres		
Catchment		Period of Summary	2002 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	1617	Mean Summer Rainfall	321
		Summer Rainfall as % of Annual	20
		Mean Autumn Rainfall	466
Max. 1 hr fall (on 18/05/2005)	44	Autumn Rainfall as % of Annual	29
Max. 12 hr fall (on 18/05/2005)	154	Mean Winter Rainfall	462
Max. 24 hr fall (on 18/05/2005)	262	Winter Rainfall as % of Annual	29
Max 48 hr fall (on 17/05/2005)	316	Mean Spring Rainfall	369
Max 72 hr fall (on 17/05/2005)	349	Spring Rainfall as % of Annual	22

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
1 hour						
12 hours						
24 hours						
48 hours						
72 hours						

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	0	80	22	25	64	106	49	85	81	61	36	0	609
Median	61	88	134	149	265	195	264	113	121	210	97	88	1785
Mean	60	155	95	132	236	156	196	107	112	175	82	80	1586
Max	141	300	144	220	544	215	329	124	159	271	121	211	2779

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990			1998		
1983			1991			1999		
1984			1992			2000		
1985			1993			2001		
1986			1994			2002	1287	128
1987			1995			2003	1290	140
1988			1996			2004	2043	151
1989			1997			2005	1850	146

Environment Bay of Plenty
Automatic Rainfall Recording Station

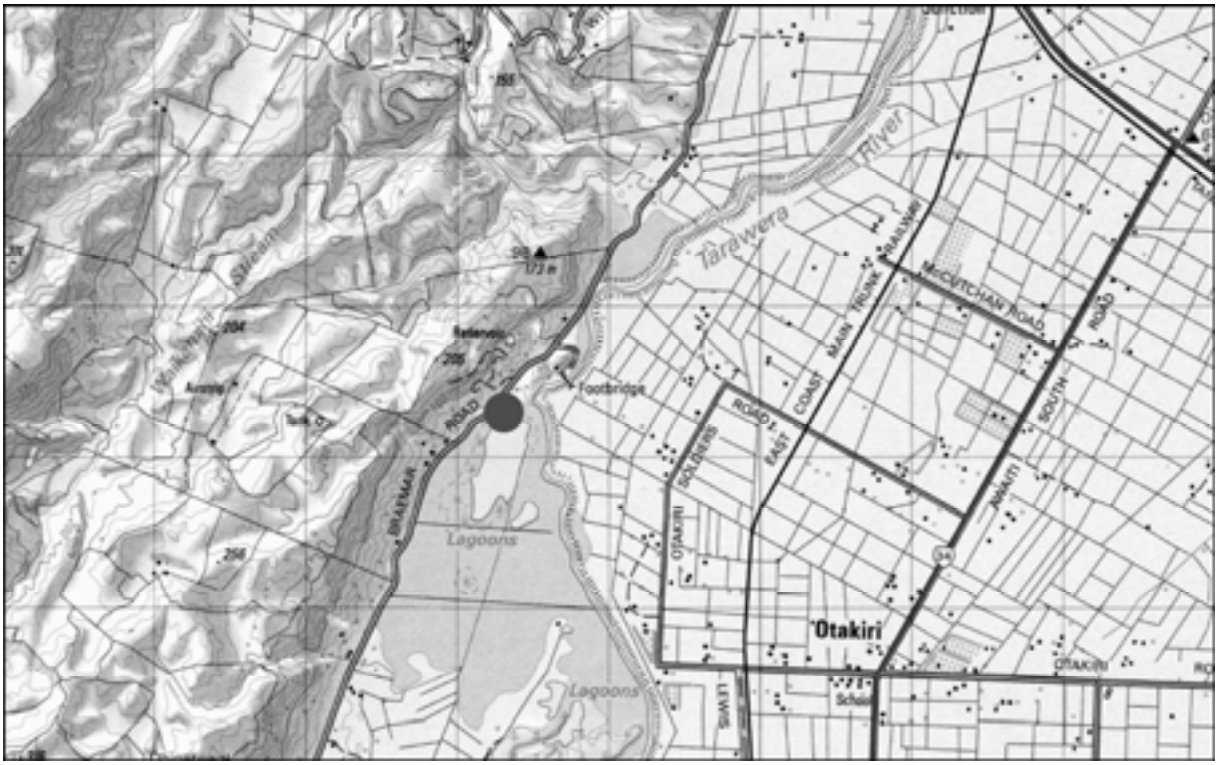
Raingauge	Tumurau	Location	Lagoon
Site Number	769704	Grid Reference	V15: 383 523
Recorder Type	Tipping Bucket	Altitude	15 metres
Start of Record	24 July 2001	Data Capture Rate	100%
Data Summary From	1 January 2002	To	31 December 2005
Data Audited From	24 July 2001	To	31 December 2005

General Comments

This site is operated by Environment Bay of Plenty for maintenance of the Tumurau wetland levels.

Periods of missing or synthetic record may occur in this dataset. Users are advised to contact the recording authority for further details.

Note that the data summary is for four years only, so no depth-duration frequency data are provided.



SITE LOCATION
Tumurau at Lagoon

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	769704
Compiled by	G R Ellery	Raingauge	Tumurau
Metric Map Reference	V15: 383 523	Location	Lagoon
Altitude	15 metres		
Catchment	Tarawera	Period of Summary	2002 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	1730	Mean Summer Rainfall	348
		Summer Rainfall as % of Annual	20
		Mean Autumn Rainfall	503
Max. 1 hr fall (on 18/05/2005)	71	Autumn Rainfall as % of Annual	29
Max. 12 hr fall (on 18/05/2005)	167	Mean Winter Rainfall	508
Max. 24 hr fall (on 17/05/2005)	279	Winter Rainfall as % of Annual	29
Max 48 hr fall (on 17/05/2005)	331	Mean Spring Rainfall	372
Max 72 hr fall (on 16/05/2005)	369	Spring Rainfall as % of Annual	22

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
1 hour						
12 hours						
24 hours						
48 hours						
72 hours						

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	0	63	15	27	59	151	45	69	78	66	37	0	610
Median	58	226	159	169	283	211	251	114	138	197	82	112	2000
Mean	54	172	105	135	258	202	193	110	121	181	68	104	1703
Max	113	359	161	202	558	240	336	166	183	285	103	235	2941

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990			1998		
1983			1991			1999		
1984			1992			2000		
1985			1993			2001		
1986			1994			2002	1220	126
1987			1995			2003	1665	145
1988			1996			2004	2144	161
1989			1997			2005	1890	146

Environment Bay of Plenty
Automatic Rainfall Recording Station

Raingauge	Tarawera	Location	Awakaponga
Site Number	769701	Grid Reference	V15:412 555
Recorder Type	Tipping bucket	Altitude	10 metres
Start of Record	August 1989	Data Capture Rate	98%
Data Summary From	January 1990	To	December 2005
Data Audited From	August 1989	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

OTA tipping bucket is installed on the roof of the water recorder tower.

Periods of missing or synthetic record may occur in this dataset. Users are advised to contact the recording authority for further details.

SITE LOCATION
Tarawera at Awakaponga

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	769701
Compiled by	G R Ellery	Raingauge	Tarawera
Metric Map Reference	V15: 412 555	Location	Awakaponga
Altitude	10 metres		
Catchment	Tarawera	Period of Summary	1990 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	1236	Mean Summer Rainfall	255
		Summer Rainfall as % of Annual	21
		Mean Autumn Rainfall	324
Max. 1 hr fall (on 18/05/2005)	95	Autumn Rainfall as % of Annual	26
Max. 12 hr fall (on 18/05/2005)	198	Mean Winter Rainfall	385
Max. 24 hr fall (on 17/05/2005)	307	Winter Rainfall as % of Annual	31
Max 48 hr fall (on 17/05/2005)	361	Mean Spring Rainfall	272
Max 72 hr fall (on 16/05/2005)	386	Spring Rainfall as % of Annual	22

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
1 hour	32 (31)	42 (43)	54 (51)	68 (58)		
12 hours	81 (84)	105 (112)	127 (131)	151 (148)		
24 hours	92 (107)	116 (143)	145 (167)	185 (189)		
48 hours	106 (133)	142 (177)	183 (207)	238 (235)		
72 hours	112 (148)	149 (197)	194 (229)	256 (260)		

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	19	11	28	1	20	36	30	54	36	44	26	8	313
Median	83	68	79	122	89	126	139	108	91	99	75	99	1178
Mean	77	83	82	114	127	114	152	116	88	92	93	97	1235
Max	171	238	175	221	544	207	310	236	180	172	239	240	2933

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990	1265	133	1998	1386	110
1983			1991	1160	123	1999	1298	125
1984			1992	Incomplete Record		2000	1297	127
1985			1993	638	93	2001	1552	142
1986			1994	1197	128	2002	812	118
1987			1995	Incomplete Record		2003	963	129
1988			1996	1470	135	2004	1678	146
1989			1997	1027	107	2005	1563	129

Environment Bay of Plenty
Automatic Rainfall Recording Station

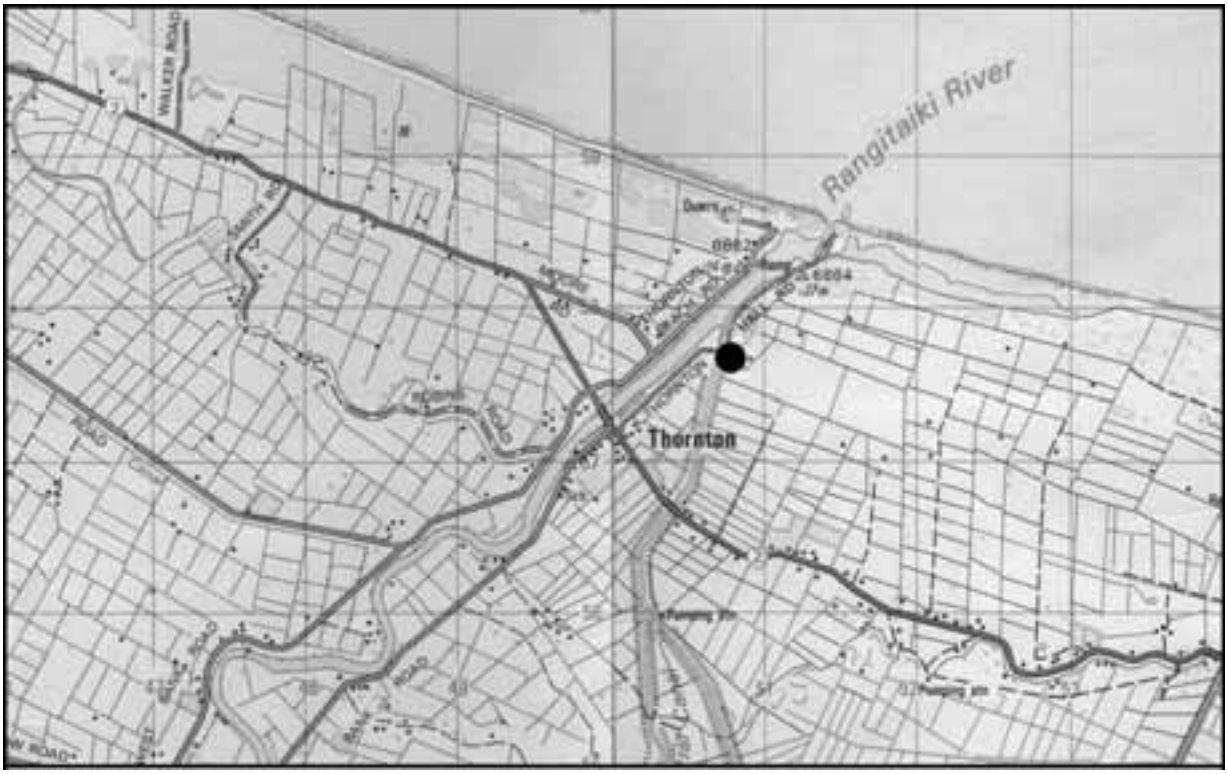
Raingauge	Rangitaiki	Location	Thornton
Site Number	769810	Grid Reference	W15:507 576
Recorder Type	Tipping bucket	Altitude	10 metres
Start of Record	September 1989	Data Capture Rate	100%
Data Summary From	January 1990	To	December 2005
Data Audited From	September 1989	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

OTA tipping bucket is installed on top of water level recorder.

Periods of missing or synthetic record may occur in this dataset. Users are advised to contact the recording authority for further details.



SITE LOCATION
Rangitaiki at Thornton

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	769810
Compiled by	G R Ellery	Raingauge	Rangitaiki
Metric Map Reference	W15: 507 576	Location	Thornton
Altitude	10 metres		
Catchment	Rangitaiki	Period of Summary	1990 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	1294	Mean Summer Rainfall	254
		Summer Rainfall as % of Annual	20
		Mean Autumn Rainfall	329
Max. 1 hr fall (on 14/05/2004)	65	Autumn Rainfall as % of Annual	25
Max. 12 hr fall (on 30/12/1996)	188	Mean Winter Rainfall	426
Max. 24 hr fall (on 29/12/1996)	220	Winter Rainfall as % of Annual	33
Max 48 hr fall (on 31/05/1997)	225	Mean Spring Rainfall	285
Max 72 hr fall (on 30/05/1997)	234	Spring Rainfall as % of Annual	22

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
1 hour	29 (27)	38 (37)	48 (43)	59 (50)		
12 hours	123 (73)	157 (97)	186 (113)	216 (128)		
24 hours	107 (93)	138 (124)	168 (144)	203 (164)		
48 hours	123 (115)	157 (154)	186 (179)	216 (203)		
72 hours	135 (128)	171 (170)	202 (199)	232 (226)		

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	2	11	15	5	11	38	17	53	28	37	23	7	247
Median	62	79	90	135	89	122	153	96	97	105	74	100	1202
Mean	65	83	93	125	110	144	161	118	94	111	81	109	1294
Max	204	307	244	281	335	432	332	306	168	223	201	423	3456

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990	1260	132	1998	1222	109
1983			1991	1113	121	1999	1028	119
1984			1992	1312	129	2000	1109	111
1985			1993	939	102	2001	1196	109
1986			1994	1373	119	2002	752	101
1987			1995	1785	148	2003	1226	129
1988			1996	2317	131	2004	1273	125
1989			1997	1541	120	2005	1267	117

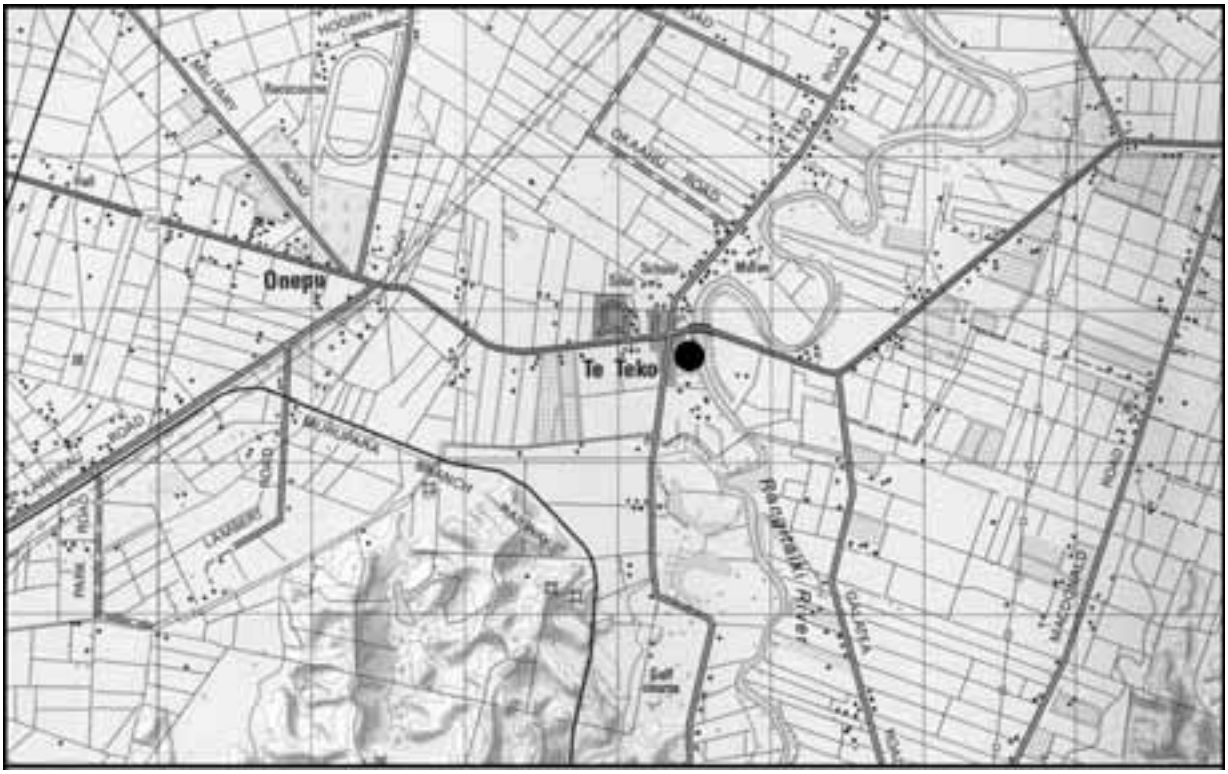
Environment Bay of Plenty
Automatic Rainfall Recording Station

Raingauge	Rangitaiki	Location	Te Teko
Site Number	860710	Grid Reference	V15:435 445
Recorder Type	Tipping bucket	Altitude	10 metres
Start of Record	September 1989	Data Capture Rate	100%
Data Summary From	January 1990	To	December 2005
Data Audited From	September 1989	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network. An OTA tipping bucket is installed on the roof of the water recorder tower.

Periods of missing or synthetic record may occur in this dataset. Users are advised to contact the recording authority for further details.



SITE LOCATION
Rangitaiki at Te Teko

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	860710
Compiled by	G R Ellery	Raingauge	Rangitaiki
Metric Map Reference	V15: 435 445	Location	Te Teko
Altitude	10 metres		
Catchment	Lower Rangitaiki	Period of Summary	1990 to 2005

Rainfall Totals (mm)

Mean Annual Rainfall	1237	Mean Summer Rainfall	266
		Summer Rainfall as % of Annual	22
		Mean Autumn Rainfall	322
Max. 1 hr fall (on 18/05/2005)	95	Autumn Rainfall as % of Annual	26
Max. 12 hr fall (on 18/05/2005)	157	Mean Winter Rainfall	378
Max. 24 hr fall (on 17/05/2005)	259	Winter Rainfall as % of Annual	31
Max 48 hr fall (on 17/05/2005)	310	Mean Spring Rainfall	270
Max 72 hr fall (on 16/05/2005)	336	Spring Rainfall as % of Annual	22

Rainfall Intensities (mm) (Depth-Duration Frequency)

EV1 Probability Weighted Moments (HIRDS Ver 1.50b)

Return Period (years)	2	5	10	20	50	100
Duration						
1 hour	31 (36)	44 (50)	58 (59)	73 (68)		
12 hours	86 (99)	110 (132)	130 (153)	151 (174)		
24 hours	104 (126)	133 (168)	163 (196)	197 (222)		
48 hours	121 (157)	160 (208)	201 (243)	252 (276)		
72 hours	126 (174)	168 (231)	214 (269)	273 (306)		

Monthly Statistics (mm)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	0	8	7	8	27	71	44	39	43	13	26	1	287
Median	64	80	77	153	85	126	141	102	91	88	62	79	1148
Mean	69	97	82	125	114	123	144	108	96	95	80	96	1229
Max	193	375	165	281	437	222	397	255	213	192	229	269	3228

Annual Summary

Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990	1236	128	1998	1313	114
1983			1991	1215	126	1999	1144	115
1984			1992	1304	123	2000	947	106
1985			1993	788	111	2001	1755	141
1986			1994	1196	131	2002	896	113
1987			1995	1591	146	2003	1137	131
1988			1996	1331	126	2004	1533	135
1989			1997	996	103	2005	1408	123

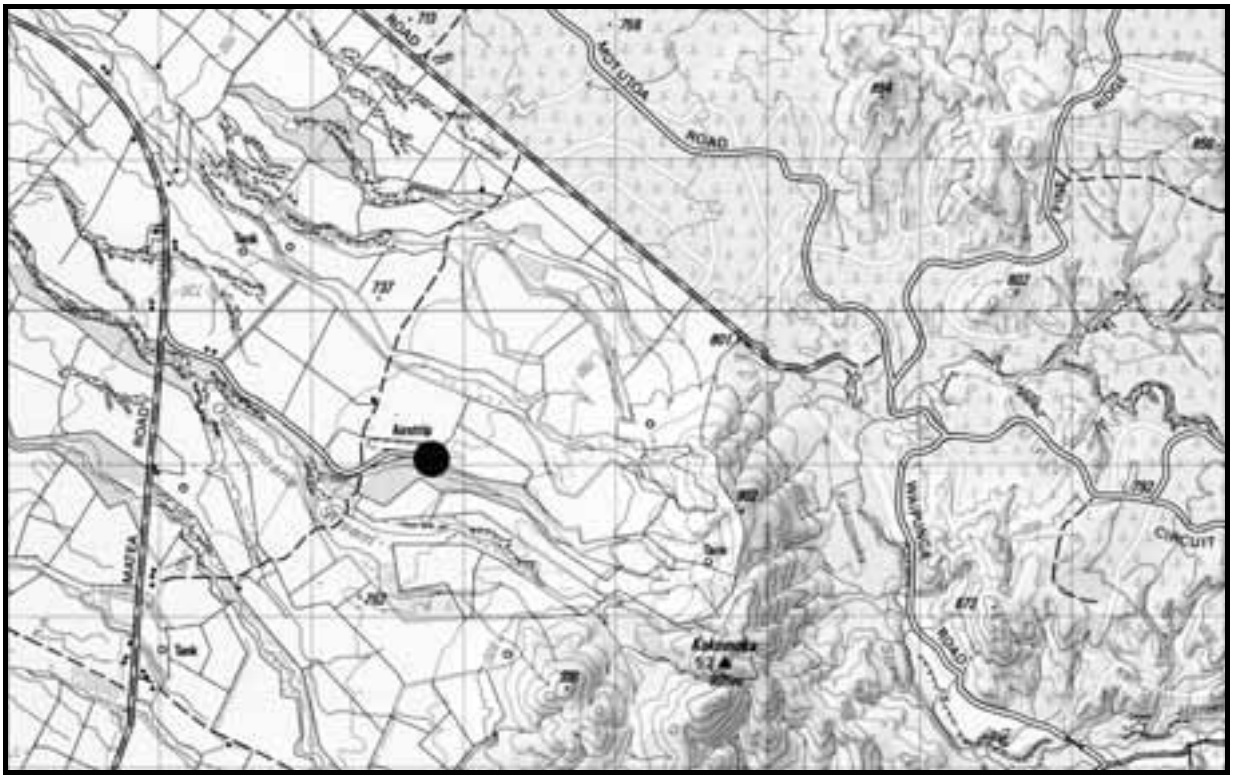
Environment Bay of Plenty
Automatic Rainfall Recording Station

Raingauge	Rangitaiki	Location	Kokomoka Road
Site Number	868410	Grid Reference	V18: 128 590
Recorder Type	Tipping Bucket	Altitude	780 metres
Start of Record	29 August 1995	Data Capture Rate	100%
Data Summary From	1 January 1996	To	31 December 2005
Data Audited From	29 August 1995	To	31 December 2005

General Comments

Site is operated by Environment Bay of Plenty as past of its Natural Environment Regional Monitoring Network.

Periods of missing or synthetic record may occur in this dataset. Users are advised to contact the recording authority for further details.



SITE LOCATION
Rangitaiki at Kokomoka Road

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	868410
Compiled by	G R Ellery	Raingauge	Rangitaiki
Metric Map Reference	V18: 158 590	Location	Kokomoka Road
Altitude	780 metres		
Catchment	Rangitaiki	Period of Summary	1996 to 2005

Rainfall Totals (mm)

Mean Annual Rainfall	1425	Mean Summer Rainfall	350
		Summer Rainfall as % of Annual	25
		Mean Autumn Rainfall	307
Max. 1 hr fall (on 9/04/1997)	38	Autumn Rainfall as % of Annual	22
Max. 12 hr fall (on 8/04/1997)	105	Mean Winter Rainfall	404
Max. 24 hr fall (on 8/04/1997)	108	Winter Rainfall as % of Annual	28
Max 48 hr fall (on 16/07/2004)	148	Mean Spring Rainfall	365
Max 72 hr fall (on 15/07/2004)	153	Spring Rainfall as % of Annual	26

Rainfall Intensities (mm) (Depth-Duration Frequency)

EV1 Probability Weighted Moments (HIRDS Ver 1.50b)

Return Period (years)	2	5	10	20	50	100
Duration						
1 hour	28 (23)	33 (32)	37 (39)			
12 hours	60 (70)	74 (93)	87 (109)			
24 hours	82 (93)	93 (124)	102 (145)			
48 hours	98 (116)	110 (154)	122 (180)			
72 hours	125 (129)	141 (171)	151 (199)			

Monthly Statistics (mm)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	54	20	30	30	73	51	69	59	31	61	47	64	589
Median	99	107	81	90	113	136	149	106	116	138	107	163	1405
Mean	101	102	91	95	118	140	158	103	121	127	118	149	1423
Max	231	258	177	153	166	231	344	140	236	205	220	224	2585

Annual Summary

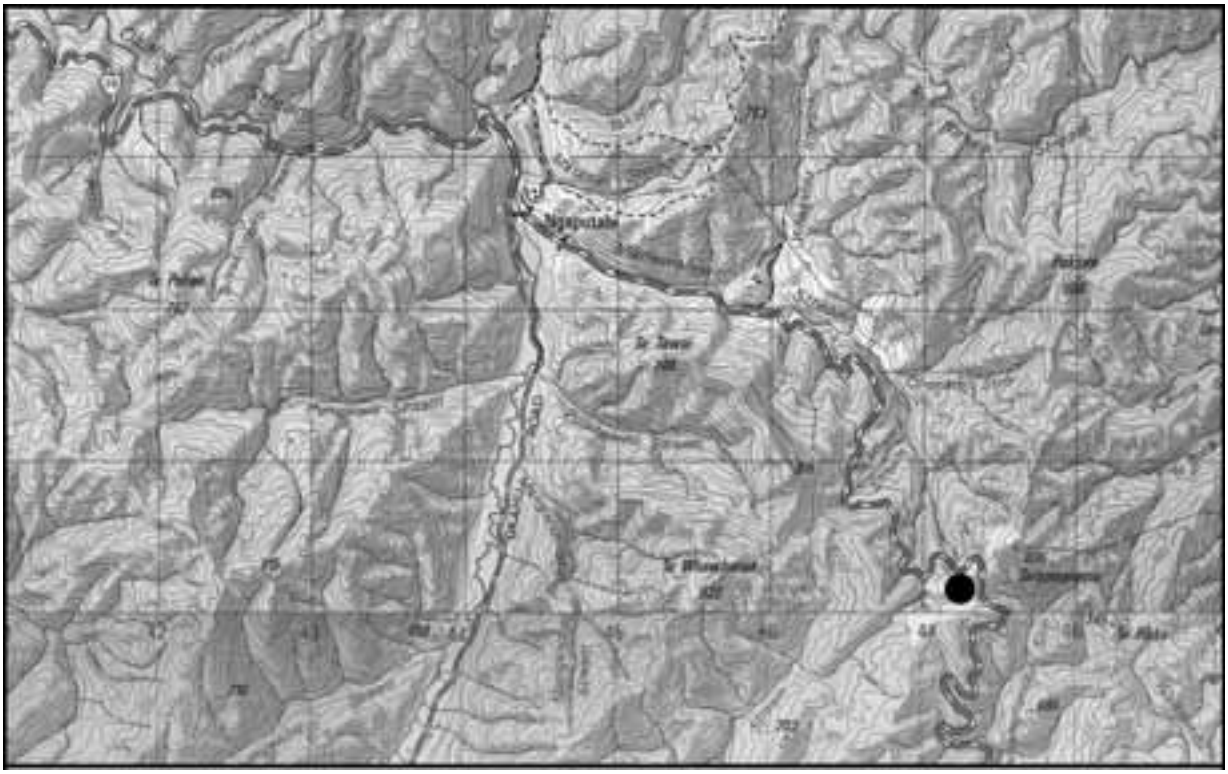
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990			1998	1511	181
1983			1991			1999	1394	173
1984			1992			2000	1315	168
1985			1993			2001	1389	188
1986			1994			2002	1338	183
1987			1995			2003	1434	177
1988			1996	1616	198	2004	1729	196
1989			1997	1285	174	2005	1237	179

Environment Bay of Plenty
Automatic Rainfall Recording Station

Raingauge	Tarapounamu	Location	Summit
Site Number	866801	Grid Reference	V17:473 803
Recorder Type	Tipping bucket	Altitude	750 metres
Start of Record	April 1989	Data Capture Rate	100%
Data Summary From	January 1990	To	December 2005
Data Audited From	April 1989	To	December 2005

General Comments

Station is jointly operated by Environment Bay of Plenty and NIWA, Rotorua.
OTA tipping bucket is installed on roof of recorder hut.



SITE LOCATION
Tarapounamu at Summit

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	866801
Compiled by	G R Ellery	Raingauge	Tarapounamu
Metric Map Reference	V17: 473 803	Location	Summit
Altitude	750 metres		
Catchment	Whakatane	Period of Summary	1990 to 2005

Rainfall Totals (mm)

Mean Annual Rainfall	1712	Mean Summer Rainfall	384
		Summer Rainfall as % of Annual	22
		Mean Autumn Rainfall	370
Max. 1 hr fall (on 19/01/1995)	39	Autumn Rainfall as % of Annual	22
Max. 12 hr fall (on 17/07/2004)	89	Mean Winter Rainfall	521
Max. 24 hr fall (on 16/07/2004)	151	Winter Rainfall as % of Annual	30
Max 48 hr fall (on 16/07/2004)	215	Mean Spring Rainfall	437
Max 72 hr fall (on 15/07/2004)	238	Spring Rainfall as % of Annual	26

Rainfall Intensities (mm) (Depth-Duration Frequency)

EV1 Probability Weighted Moments (HIRDS Ver 1.50b)

Return Period (years)	2	5	10	20	50	100
Duration						
1 hour	24 (23)	28 (31)	32 (37)	36 (42)		
12 hours	72 (82)	81 (110)	87 (128)	92 (145)		
24 hours	91 (113)	104 (150)	116 (175)	129 (198)		
48 hours	107 (140)	128(186)	148 (217)	172 (246)		
72 hours	120 (155)	141 (206)	164 (240)	192 (273)		

Monthly Statistics (mm)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	0	5	23	39	73	95	44	40	61	55	87	4	526
Median	93	123	99	135	140	199	163	148	140	152	154	170	1716
Mean	91	126	100	132	135	188	180	149	152	135	151	156	1695
Max	169	279	226	230	216	317	478	286	307	242	281	283	3314

Annual Summary

Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990	1732	187	1998	1851	152
1983			1991	1890	201	1999	1620	183
1984			1992	1725	214	2000	1446	175
1985			1993	1263	167	2001	1737	184
1986			1994	1645	205	2002	1584	201
1987			1995	2009	204	2003	1671	190
1988			1996	1690	196	2004	2158	218
1989			1997	1745	175	2005	1625	198

Environment Bay of Plenty
Automatic Rainfall Recording Station

Raingauge	Whakatane	Location	Huitieke Link
Site Number	873002	Grid Reference	W17:607 075
Recorder Type	Tipping bucket	Altitude	280 metres
Start of Record	April 1977	Data Capture Rate	94%
Data Summary From	January 1978	To	December 2005
Data Audited From	April 1977	To	December 2005

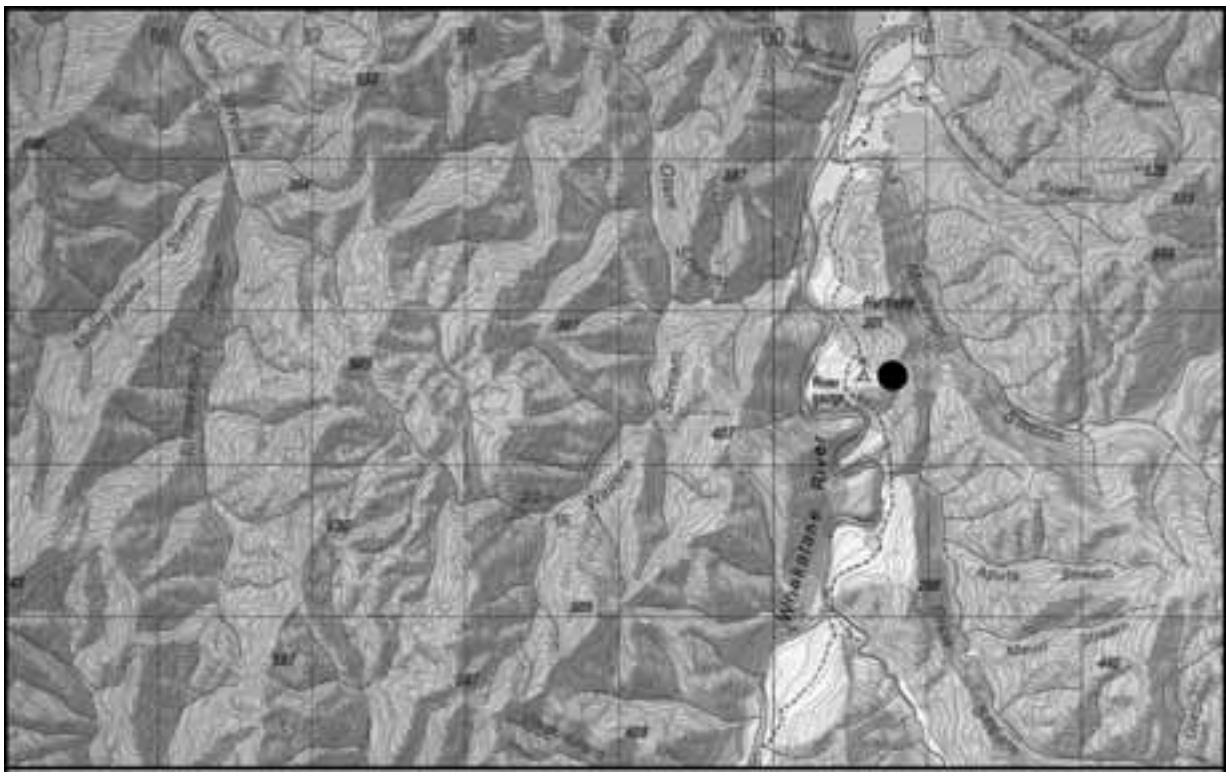
General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Rainfall from April 1977 to August 1987 was measured by an OTA tipping bucket and recorded as daily totals via a phone calling system.

Rainfall from August 1987 to June 1990 was measured by an OTA tipping bucket and recorded by a Jepsen Slave at varying intervals, commonly 4 hours. Jepsen Slave was replaced by an Aquitel Remote on 14 June 1990, recording at 15 minute intervals. OTA tipping bucket is installed on the roof of the radio hut on the hill above the water level recorder.

Periods of missing or synthetic record may occur in this dataset. Users are advised to contact the recording authority for further details.



SITE LOCATION
Whakatane at Huitieke Link

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	873002
Compiled by	G R Ellery	Raingauge	Whakatane
Metric Map Reference	W17: 607 075	Location	Huitieke
Altitude	280 metres		
Catchment	Whakatane	Period of Summary	1979 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	1572	Mean Summer Rainfall	360
		Summer Rainfall as % of Annual	23
		Mean Autumn Rainfall	351
Max. 1 hr fall (on 7/12/2001)	36	Autumn Rainfall as % of Annual	22
Max. 12 hr fall (on 6/04/2003)	132	Mean Winter Rainfall	478
Max. 24 hr fall (on 16/07/2004)	169	Winter Rainfall as % of Annual	30
Max 48 hr fall (on 16/07/2004)	231	Mean Spring Rainfall	435
Max 72 hr fall (on 15/07/2004)	301	Spring Rainfall as % of Annual	28

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
1 hour	19 (29)	26 (40)	31 (47)	34 (54)		
12 hours	74 (93)	94 (124)	108 (145)	120 (164)		
24 hours	107 (125)	125 (166)	138 (194)	150 (220)		
48 hours	132 (155)	159 (206)	182 (240)	205 (273)		
72 hours	144 (172)	176 (229)	207 (267)	242 (303)		

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	6	3	20	28	13	40	45	18	72	24	47	33	349
Median	83	122	110	113	120	174	145	151	156	151	120	171	1616
Mean	88	117	116	109	123	173	163	139	153	150	133	159	1623
Max	238	342	238	209	266	313	500	309	281	370	365	303	3734

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982	1064	167	1990	Incomplete Data		1998	1902	157
1983	1533	196	1991	1508	163	1999	1728	140
1984	1564	195	1992	Incomplete Data		2000	971	109
1985	Incomplete Data		1993	1110	121	2001	1929	153
1986	Incomplete Data		1994	Incomplete Data		2002	1237	135
1987	Incomplete Data		1995	Incomplete Data		2003	1656	139
1988	Incomplete Data		1996	Incomplete Data		2004	2229	169
1989	Incomplete Data		1997	Incomplete Data		2005	1504	166

Environment Bay of Plenty
Automatic Rainfall Recording Station

Raingauge	Whakatane	Location	Huiarau Summit
Site Number	876002	Grid Reference	W18:628 786
Recorder Type	Tipping bucket	Altitude	1170 metres
Start of Record	March 1975	Data Capture Rate	99%
Data Summary From	January 1976	To	December 2005
Data Audited From	March 1975	To	December 2005

General Comments

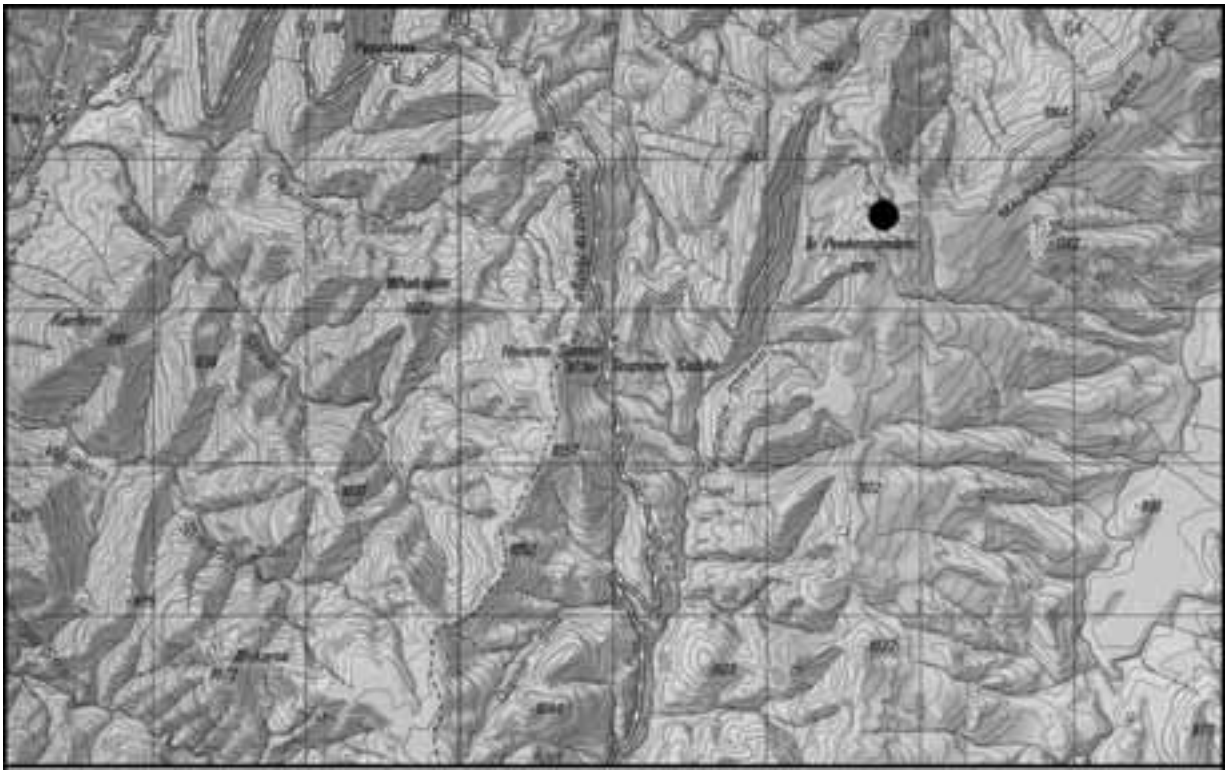
Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Rainfall from March 1975 to August 1987 was measured by an OTA tipping bucket and recorded as daily totals via a phone calling system. OTA tipping bucket is installed on the roof of the concrete recorder tank.

Rainfall from August 1987 to August 1991 was measured by an OTA tipping bucket and recorded by a Jepsen Slave at varying intervals, commonly 4 hours.

Jepsen Slave was replaced by an Aquitel Remote on 14 August 1991, recording at 15 minute intervals.

Periods of missing or synthetic record may occur in this dataset. Users are advised to contact the recording authority for further details.



SITE LOCATION
Huiarau at Summit

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	876002
Compiled by	G R Ellery	Raingauge	Whakatane
Metric Map Reference	W18: 628 786	Location	Huiarau Summit
Altitude	1170 metres		
Catchment	Whakatane	Period of Summary	1976 to 2005

Rainfall Totals (mm)

Mean Annual Rainfall	2500	Mean Summer Rainfall	529
		Summer Rainfall as % of Annual	21
		Mean Autumn Rainfall	607
Max. 1 hr fall (on 9/05/1988)	55	Autumn Rainfall as % of Annual	24
Max. 12 hr fall (on 19/04/1985)	121	Mean Winter Rainfall	703
Max. 24 hr fall (on 8/05/1988)	260	Winter Rainfall as % of Annual	28
Max 48 hr fall (on 18/04/1985)	316	Mean Spring Rainfall	616
Max 72 hr fall (on 17/04/1985)	338	Spring Rainfall as % of Annual	25

Rainfall Intensities (mm) (Depth-Duration Frequency)

EV1 Probability Weighted Moments (HIRDS Ver 1.50b)

Return Period (years)	2	5	10	20	50	100
Duration						
1 hour	16 (19)	26 (26)	35 (31)			
12 hours	77 (72)	101 (96)	124 (112)			
24 hours	111 (101)	141 (134)	172 (156)	208 (177)		
48 hours	144 (125)	176 (166)	210 (193)	248 (220)		
72 hours	165 (138)	199 (184)	232 (214)	268 (244)		

Monthly Statistics (mm)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	3	34	43	62	63	102	85	45	97	92	84	20	730
Median	122	158	174	169	206	245	212	194	201	193	203	219	2296
Mean	143	168	184	195	224	259	240	199	209	211	198	213	2443
Max	339	396	393	485	395	503	535	320	415	425	363	500	5069

Annual Summary

Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982	2138	273	1990	Incomplete Record		1998	2293	213
1983	2414	271	1991	2519	219	1999	2364	234
1984	3681	271	1992	2392	259	2000	2428	227
1985	3095	288	1993	1777	215	2001	2587	230
1986	1946	295	1994	Incomplete Record		2002	2628	230
1987	2324	251	1995	Incomplete Record		2003	2333	240
1988	2862	228	1996	2488	232	2004	2575	227
1989	2881	238	1997	2042	212	2005	2232	230

Environment Bay of Plenty
Automatic Rainfall Recording Station

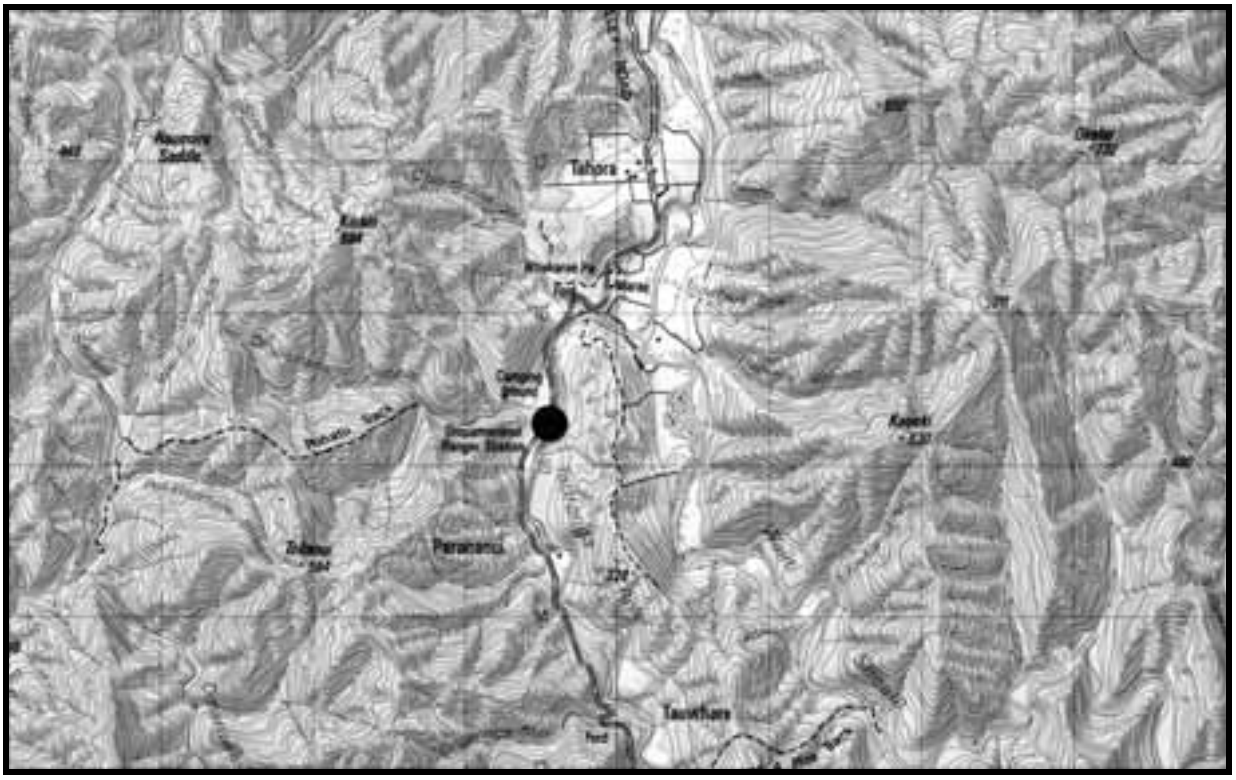
Raingauge	Waimana	Location	Ranger Station
Site Number	870201	Grid Reference	W16:696 153
Recorder Type	Tipping Bucket	Altitude	118 metres
Start of Record	April 1996	Data Capture Rate	100%
Data Summary From	January 1997	To	December 2005
Data Audited From	April 1996	To	December 2005

General Comments

This site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network and replaces the previous site Waimana at Ogilvie Bridge which was situated 2.5 kilometres further upstream and which closed on 1/04/1996.

Missing record from 2/07/1998 064500 to 7/07/1998 141500 due to site being destroyed by flood.

Periods of missing or synthetic record may occur in this dataset. Users are advised to contact the recording authority for further details.



SITE LOCATION
Waimana at Ranger Station

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	870201
Compiled by	G R Ellery	Raingauge	Waimana
Metric Map Reference	W16: 696 153	Location	Ranger Station
Altitude	118 metres		
Catchment	Waimana	Period of Summary	1997 to 2005

Rainfall Totals (mm)

Mean Annual Rainfall	2170	Mean Summer Rainfall	432
		Summer Rainfall as % of Annual	20
		Mean Autumn Rainfall	493
Max. 1 hr fall (on 6/04/2003)	47	Autumn Rainfall as % of Annual	23
Max. 12 hr fall (on 6/04/2003)	199	Mean Winter Rainfall	666
Max. 24 hr fall (on 1/07/1998)	239	Winter Rainfall as % of Annual	31
Max 48 hr fall (on 9/07/1998)	354	Mean Spring Rainfall	578
Max 72 hr fall (on 9/07/1998)	413	Spring Rainfall as % of Annual	27

Rainfall Intensities (mm) (Depth-Duration Frequency)

EV1 Probability Weighted Moments (HIRDS Ver 1.50b)

Return Period (years)	2	5	10	20	50	100
Duration						
1 hour	32 (33)	39 (45)	46 (54)			
12 hours	117 (108)	150 (144)	182 (168)			
24 hours	181 (145)	216 (193)	236 (224)			
48 hours	207 (179)	265 (239)	312 (278)			
72 hours	221 (199)	293 (265)	359 (309)			

Monthly Statistics (mm)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	0	13	22	15	94	122	63	69	129	104	54	17	702
Median	82	122	149	172	227	273	184	176	206	183	144	159	2077
Mean	82	156	139	159	192	245	262	154	221	187	172	180	2149
Max	165	392	269	249	293	343	840	240	414	340	519	362	4426

Annual Summary

Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990			1998	2846	158
1983			1991			1999	2391	163
1984			1992			2000	1947	165
1985			1993			2001	2324	172
1986			1994			2002	1808	158
1987			1995			2003	2034	167
1988			1996			2004	2774	183
1989			1997	1773	151	2005	1632	172

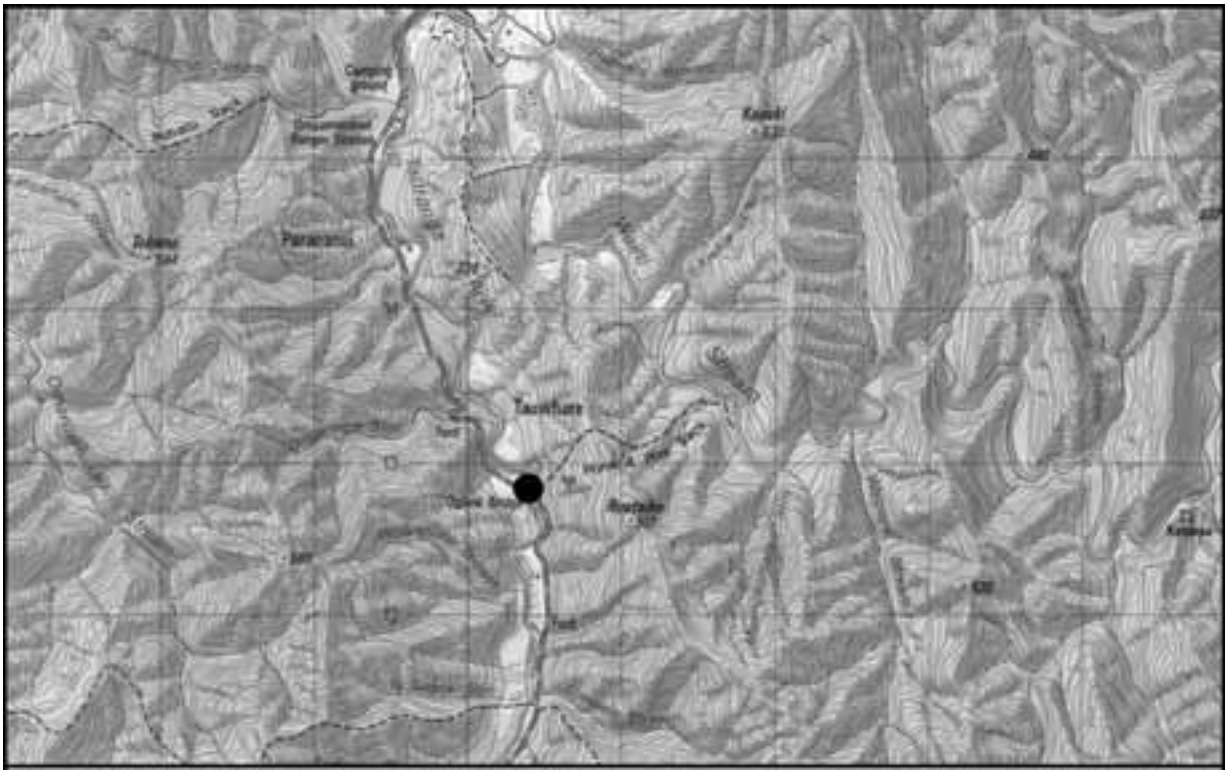
Environment Bay of Plenty
Automatic Rainfall Recording Station

Raingauge	Waimana	Location	Ogilvie Bridge
Site Number	873703	Grid Reference	W16:704 128
Recorder Type	Tipping bucket	Altitude	150 metres
Start of Record	August 1988	Data Capture Rate	89%
Data Summary From	January 1989	To	December 1995
Data Audited From	August 1988	To	April 1996

General Comments

Site was operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Rainfall from August 1987 to October 1991 was measured by an OTA tipping bucket and recorded by a Jepsen Slave at varying intervals, commonly 4 hours. Jepsen Slave was replaced by an Aquitel Remote on 1 October 1991, recording at 15 minute intervals. OTA tipping bucket was installed on the roof of the radio shed. Site has a Meteorological Service number B87313.



SITE LOCATION
Waimana at Ogilvie Bridge

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	873103
Compiled by	G R Ellery	Raingauge	Waimana
Metric Map Reference	W16: 704 128	Location	Olgivie Bridge
Altitude	150 metres		
Catchment	Waimana	Period of Summary	1989 to 1995

Rainfall Totals (mm)

Mean Annual Rainfall	2090	Mean Summer Rainfall	468
		Summer Rainfall as % of Annual	22
		Mean Autumn Rainfall	391
Max. 1 hr fall (on 24/01/1990)	52	Autumn Rainfall as % of Annual	19
Max. 12 hr fall (on 17/02/1991)	214	Mean Winter Rainfall	640
Max. 24 hr fall (on 17/02/1991)	253	Winter Rainfall as % of Annual	31
Max 48 hr fall (on 16/02/1991)	254	Mean Spring Rainfall	615
Max 72 hr fall (on 16/02/1991)	270	Spring Rainfall as % of Annual	29

Rainfall Intensities (mm) (Depth-Duration Frequency)

EV1 Probability Weighted Moments (HIRDS Ver 1.50b)

Return Period (years)	2	5	10	20	50	100
Duration						
1 hour	36 (32)	45 (44)	52 (52)			
12 hours	108 (108)	139 (144)	173 (168)			
24 hours	156 (146)	186 (194)	217 (226)			
48 hours	182 (181)	207 (241)	231 (280)			
72 hours	188 (200)	213 (267)	239 (311)			

Monthly Statistics (mm)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	18	59	34	50	52	101	33	43	97	110	82	19	698
Median	208	182	132	142	145	169	228	262	206	232	203	140	2249
Mean	163	177	135	135	119	206	196	233	197	224	195	135	2115
Max	248	375	247	338	206	380	340	434	321	378	319	287	3873

Annual Summary

Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990	2248	162	1998		
1983			1991	2055	162	1999		
1984			1992	1993	177	2000		
1985			1993	1526	163	2001		
1986			1994	2096	193	2002		
1987			1995	2621	184	2003		
1988			1996			2004		
1989	Incomplete Record		1997			2005		

Environment Bay of Plenty
Automatic Rainfall Recording Station

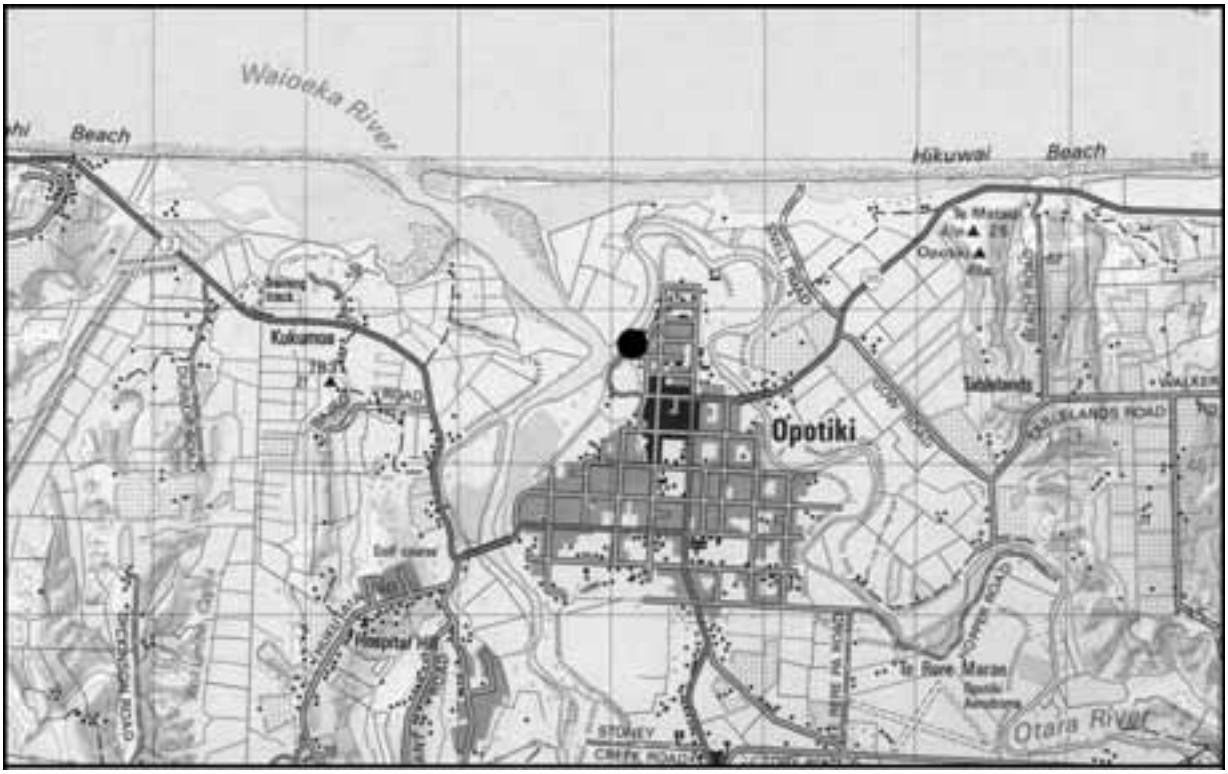
Raingauge	Otara	Location	Town Wharf
Site Number	872101	Grid Reference	W15:861 467
Recorder Type	Tipping Bucket	Altitude	20 metres
Start of Record	January 1996	Data Capture Rate	93%
Data Summary From	January 1997	To	December 2005
Data Audited From	June 1996	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

TB3 tipping bucket is on the roof of the Opotiki Coastguard building.

Periods of missing or synthetic record may occur in this dataset. Users are advised to contact the recording authority for further details.



SITE LOCATION
Otara at Town Wharf

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	872101
Compiled by	G R Ellery	Raingauge	Otara
Metric Map Reference	W15: 861 468	Location	Town Wharf
Altitude	20 metres		
Catchment	Otara	Period of Summary	1997 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	1175	Mean Summer Rainfall	281
		Summer Rainfall as % of Annual	24
		Mean Autumn Rainfall	298
Max. 1 hr fall (on 16/05/1996)	43	Autumn Rainfall as % of Annual	25
Max. 12 hr fall (on 2/06/1997)	119	Mean Winter Rainfall	390
Max. 24 hr fall (on 1/06/1997)	148	Winter Rainfall as % of Annual	33
Max 48 hr fall (on 16/07/2004)	176	Mean Spring Rainfall	241
Max 72 hr fall (on 15/07/2004)	217	Spring Rainfall as % of Annual	21

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
1 hour	29 (28)	36 (38)	41 (45)			
12 hours	75 (76)	93 (102)	109 (118)			
24 hours	93 (101)	116 (134)	136 (156)			
48 hours	104 (125)	133 (166)	160 (194)			
72 hours	116 (138)	149 (184)	182 (215)			

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	1	10	5	33	29	54	32	44	34	39	34	50	365
Median	70	63	95	84	85	146	133	106	80	81	68	87	1098
Mean	61	96	103	82	110	157	133	97	88	86	68	127	1208
Max	134	292	193	137	223	328	277	163	172	159	150	325	2553

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990			1998	1114	124
1983			1991			1999	1116	128
1984			1992			2000	1059	138
1985			1993			2001	1511	140
1986			1994			2002	959	108
1987			1995			2003	1190	135
1988			1996			2004	1492	132
1989			1997	Incomplete Record		2005	961	123

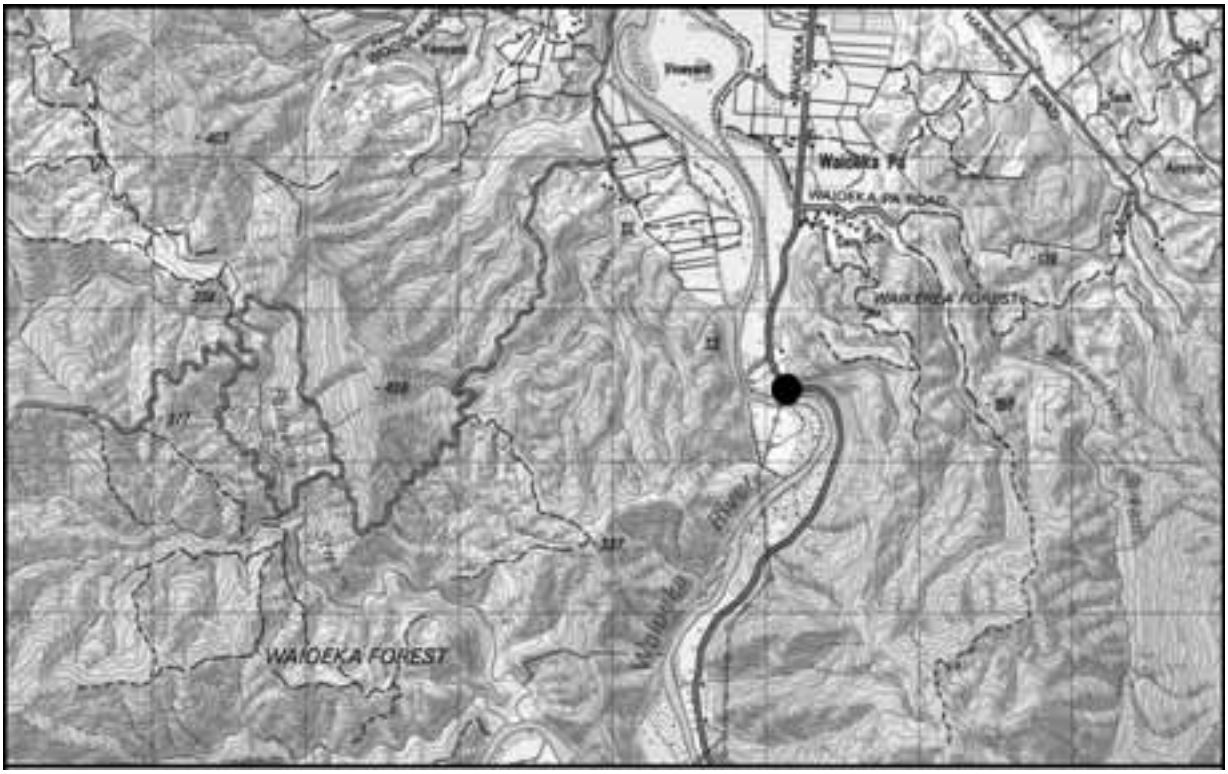
Environment Bay of Plenty
Automatic Rainfall Recording Station

Raingauge	Waioeka	Location	Mouth of Gorge
Site Number	781310	Grid Reference	W16: 862 365
Recorder Type	Tipping Bucket	Altitude	40 metres
Start of Record	December 1989	Data Capture Rate	100%
Data Summary From	January 1990	To	December 2005
Data Audited From	December 1989	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network. OTA tipping bucket is installed on the roof of the water level recorder hut.

Periods of missing or synthetic record may occur in this dataset. Users are advised to contact the recording authority for further details.



SITE LOCATION
Waioeka at Mouth of Gorge

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	781310
Compiled by	G R Ellery	Raingauge	Waioeka
Metric Map Reference	W16: 862 365	Location	Mouth of Gorge
Altitude	40 metres		
Catchment	Waioeka	Period of Summary	1990 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	1567	Mean Summer Rainfall	338
		Summer Rainfall as % of Annual	22
		Mean Autumn Rainfall	376
Max. 1 hr fall (on 23/03/1997)	38	Autumn Rainfall as % of Annual	24
Max. 12 hr fall (on 6/04/2003)	112	Mean Winter Rainfall	467
Max. 24 hr fall (on 16/02/2001)	144	Winter Rainfall as % of Annual	30
Max 48 hr fall (on 15/07/2004)	182	Mean Spring Rainfall	386
Max 72 hr fall (on 15/07/2004)	233	Spring Rainfall as % of Annual	25

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
1 hour	28 (35)	33 (49)	36 (58)	39 (66)		
12 hours	77 (107)	91 (143)	103 (166)	113 (189)		
24 hours	100 (143)	118 (190)	133 (222)	145 (252)		
48 hours	120 (177)	142 (236)	159 (275)	175 (312)		
72 hours	130 (197)	157 (262)	182 (305)	208 (346)		

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	14	22	43	19	48	73	12	57	52	58	41	31	470
Median	86	95	112	129	126	162	152	119	124	114	99	115	1433
Mean	91	111	116	128	129	166	159	140	130	135	123	139	1567
Max	221	329	236	274	244	340	335	264	336	334	236	319	3468

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990	1573	138	1998	1522	137
1983			1991	1740	153	1999	1334	140
1984			1992	1644	137	2000	1449	149
1985			1993	937	116	2001	1996	159
1986			1994	1436	146	2002	1352	141
1987			1995	1948	170	2003	1812	154
1988			1996	1843	152	2004	1864	153
1989			1997	1332	130	2005	1304	155

Environment Bay of Plenty
Automatic Rainfall Recording Station

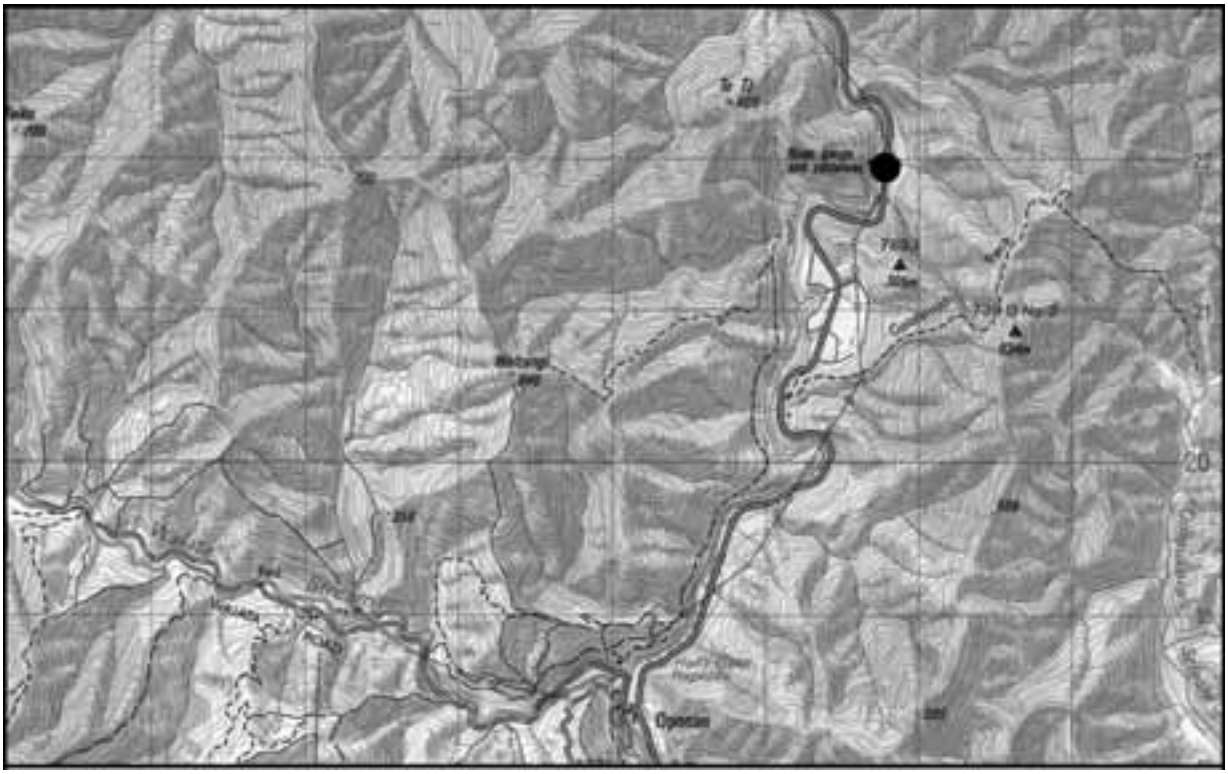
Raingauge	Waioeka	Location	Cableway
Site Number	872301	Grid Reference	W16:876 219
Recorder Type	Tipping bucket	Altitude	70 metres
Start of Record	December 1989	Data Capture Rate	99%
Data Summary From	January 1990	To	December 2005
Data Audited From	December 1989	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

OTA tipping bucket is installed on the roof of the water level recording tower.

Periods of missing or synthetic record may occur in this dataset. Users are advised to contact the recording authority for further details.



SITE LOCATION
Waioeka at Cableway

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	872301
Compiled by	G R Ellery	Raingauge	Waioeka
Metric Map Reference	W16: 876 219	Location	Cableway
Altitude	70 metres		
Catchment	Waioeka	Period of Summary	1990 to 2005

Rainfall Totals (mm)

Mean Annual Rainfall	2439	Mean Summer Rainfall	491
		Summer Rainfall as % of Annual	20
		Mean Autumn Rainfall	551
Max. 1 hr fall (on 22/05/1996)	45	Autumn Rainfall as % of Annual	23
Max. 12 hr fall (on 17/02/1991)	192	Mean Winter Rainfall	740
Max. 24 hr fall (on 17/02/1991)	263	Winter Rainfall as % of Annual	30
Max 48 hr fall (on 9/07/1998)	308	Mean Spring Rainfall	669
Max 72 hr fall (on 8/07/1998)	391	Spring Rainfall as % of Annual	27

Rainfall Intensities (mm) (Depth-Duration Frequency)

EV1 Probability Weighted Moments (HIRDS Ver 1.50b)

Return Period (years)	2	5	10	20	50	100
Duration						
1 hour	28 (34)	33 (47)	38 (56)	43 (64)		
12 hours	128 (118)	152 (157)	171 (183)	188 (208)		
24 hours	171 (160)	203 (213)	227 (248)	249 (282)		
48 hours	207 (198)	245 (264)	272 (308)	397 (349)		
72 hours	233 (220)	284 (293)	326 (341)	367 (387)		

Monthly Statistics (mm)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	0	14	30	41	52	112	20	72	101	81	75	1	599
Median	97	169	154	214	246	275	222	228	268	231	158	162	2424
Mean	120	181	156	184	207	258	245	233	235	235	202	178	2434
Max	266	400	299	298	367	456	814	487	395	517	489	401	5189

Annual Summary

Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990	Incomplete Record		1998	3066	149
1983			1991	2364	163	1999	2805	152
1984			1992	2124	140	2000	2200	150
1985			1993	1609	132	2001	2796	165
1986			1994	2203	159	2002	1988	155
1987			1995	Incomplete Record		2003	2782	176
1988			1996	Incomplete Record		2004	2895	169
1989			1997	Incomplete Record		2005	1636	148

Environment Bay of Plenty
Automatic Rainfall Recording Station

Raingauge	Waioeka	Location	Koranga
Site Number	874304	Grid Reference	W17:886 025
Recorder Type	Tipping bucket	Altitude	940 metres
Start of Record	August 1976	Data Capture Rate	81%
Data Summary From	January 1977	To	December 2005
Data Audited From	August 1976	To	December 2005

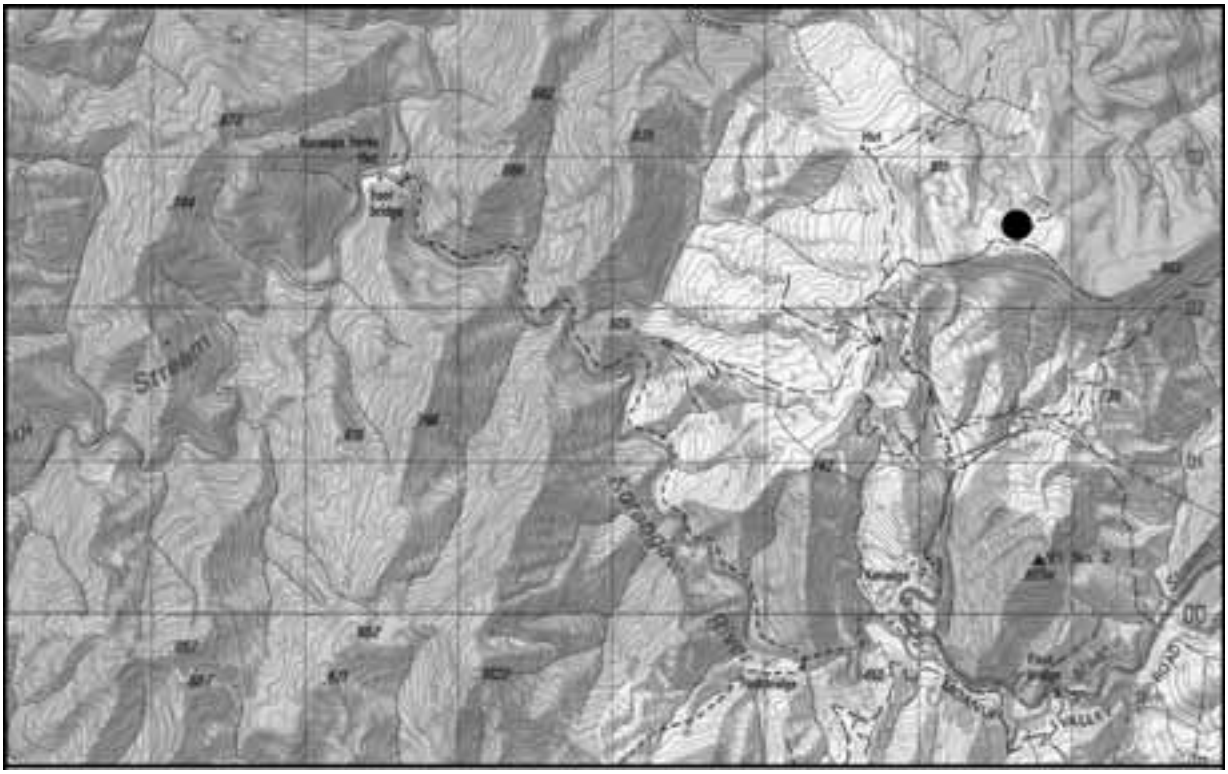
General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Rainfall from August 1976 to January 1990 is from a daily manual raingauge Meteorological Service number (B87431) located at NZMS 260 reference W17: 880 003.

An OTA tipping bucket connected to a data logger was installed on 11 January 1990. The OTA tipping bucket is located on top of a post adjacent to the recorder hut, approximately 1.5 metres above ground level.

Periods of missing or synthetic record may occur in this dataset. Users are advised to contact the recording authority for further details.



SITE LOCATION
Koranga at Koranga Station

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	874304
Compiled by	G R Ellery	Raingauge	Waioeka
Metric Map Reference	W17: 886 025	Location	Koranga
Altitude	940 metres		
Catchment	Waioeka	Period of Summary	1980 to 2005

Rainfall Totals (mm)

Mean Annual Rainfall	2148	Mean Summer Rainfall	474
		Summer Rainfall as % of Annual	22
		Mean Autumn Rainfall	479
Max. 1 hr fall (on 8/12/2001)	38	Autumn Rainfall as % of Annual	22
Max. 12 hr fall (on 17/02/1991)	192	Mean Winter Rainfall	628
Max. 24 hr fall (on 17/02/1991)	241	Winter Rainfall as % of Annual	29
Max 48 hr fall (on 9/07/1998)	279	Mean Spring Rainfall	587
Max 72 hr fall (on 8/07/1998)	345	Spring Rainfall as % of Annual	27

Rainfall Intensities (mm) (Depth-Duration Frequency)

EV1 Probability Weighted Moments (HIRDS Ver 1.50b)

Return Period (years)	2	5	10	20	50	100
Duration						
1 hour	22 (29)	30 (40)	35 (47)	39 (54)		
12 hours	98 (101)	128 (135)	151 (157)	172 (179)		
24 hours	143 (139)	176 (185)	201 (215)	224 (245)		
48 hours	172 (172)	203 (229)	228 (267)	251 (303)		
72 hours	204 (191)	244 (254)	273 (296)	297 (336)		

Monthly Statistics (mm)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	35	19	25	25	68	94	32	50	86	48	61	32	575
Median	137	137	133	138	216	250	172	170	200	198	163	185	2099
Mean	151	137	151	143	181	226	202	195	206	205	178	188	2163
Max	352	370	372	285	308	404	791	365	447	433	395	462	4984

Annual Summary

Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982	Incomplete Record		1990	2082	181	1998	Incomplete Record	
1983	Incomplete Record		1991	2225	188	1999	2358	178
1984	Incomplete Record		1992	2023	200	2000	2113	176
1985	Incomplete Record		1993	1531	168	2001	2289	199
1986	Incomplete Record		1994	2209	192	2002	1829	177
1987	Incomplete Record		1995	2516	205	2003	2440	189
1988	2342	205	1996	2431	180	2004	2518	188
1989	2262	213	1997	1792	160	2005	1747	184

Environment Bay of Plenty
Automatic Rainfall Recording Station

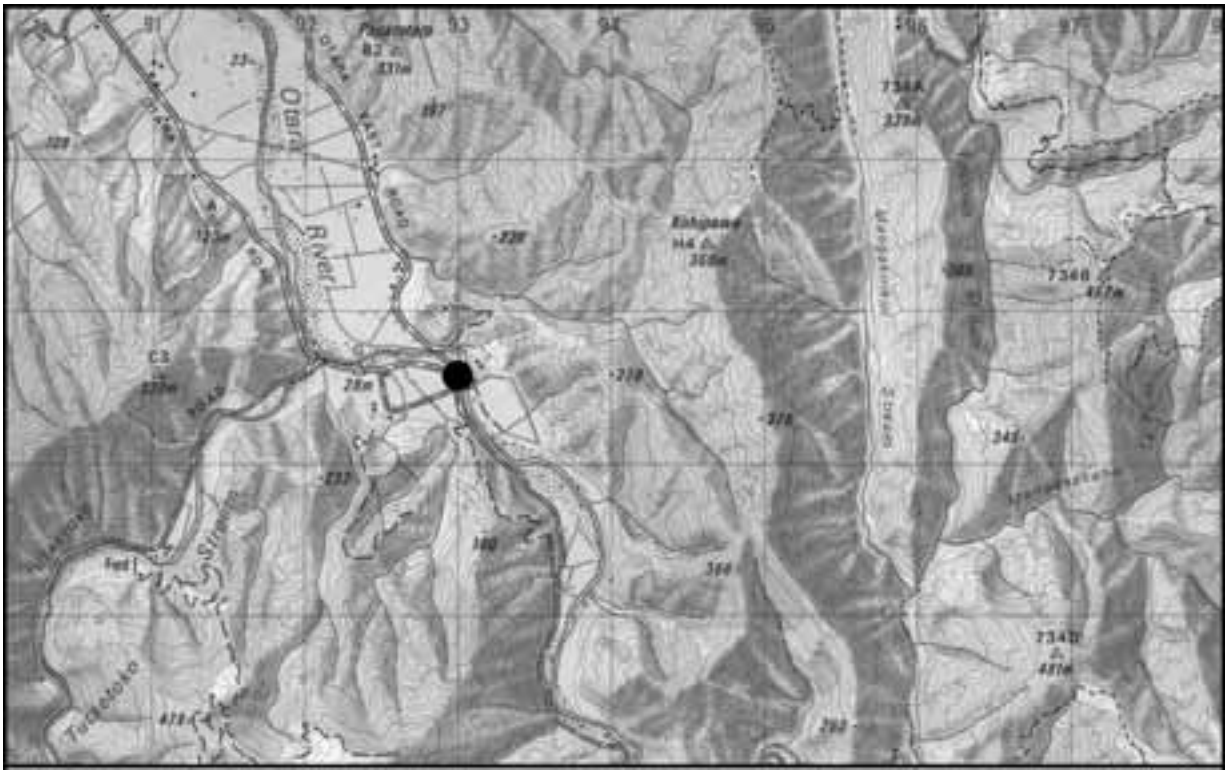
Raingauge	Otara	Location	Browns Bridge
Site Number	781410	Grid Reference	X16:930 376
Recorder Type	Tipping Bucket	Altitude	38 metres
Start of Record	December 1989	Data Capture Rate	100%
Data Summary From	January 1990	To	December 2005
Data Audited From	December 1989	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

The OTA tipping bucket is installed on the roof of the water level recorder.

Periods of missing or synthetic record may occur in this dataset. Users are advised to contact the recording authority for further details.



SITE LOCATION
Otara at Browns Bridge

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	781410
Compiled by	G R Ellery	Raingauge	Otara
Metric Map Reference	X16: 930 376	Location	Browns Bridge
Altitude	38 metres		
Catchment	Otara	Period of Summary	1990 to 2000

Rainfall Totals (mm)			
Mean Annual Rainfall	1601	Mean Summer Rainfall	333
		Summer Rainfall as % of Annual	21
		Mean Autumn Rainfall	402
Max. 1 hr fall (on 18/06/1997)	41	Autumn Rainfall as % of Annual	25
Max. 12 hr fall (on 21/05/1996)	119	Mean Winter Rainfall	486
Max. 24 hr fall (on 30/12/1996)	180	Winter Rainfall as % of Annual	30
Max 48 hr fall (on 15/07/2004)	187	Mean Spring Rainfall	382
Max 72 hr fall (on 8/07/1998)	206	Spring Rainfall as % of Annual	24

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
1 hour	30 (34)	35 (47)_	39 (56)	42 (64)		
12 hours	89 (103)	101(138)	110 (160)	117 (182)		
24 hours	115 (138)	134 (183)	148 (214)	162 (243)		
48 hours	139 (171)	160 (227)	174 (265)	185 (301)		
72 hours	149 (189)	174 (252)	192 (294)	206 (334)		

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	4	15	63	13	44	75	7	61	53	49	46	22	452
Median	79	101	106	160	116	172	182	137	135	122	109	108	1527
Mean	92	106	124	140	135	180	165	137	131	125	128	139	1602
Max	215	241	244	354	258	360	367	275	282	210	323	344	3473

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990	1615	141	1998	1578	122
1983			1991	1700	155	1999	1856	131
1984			1992	1625	140	2000	1623	138
1985			1993	952	117	2001	1890	146
1986			1994	1320	131	2002	1311	134
1987			1995	2002	173	2003	1560	148
1988			1996	1852	152	2004	1947	151
1989			1997	1448	125	2005	1339	172

Environment Bay of Plenty
Automatic Rainfall Recording Station

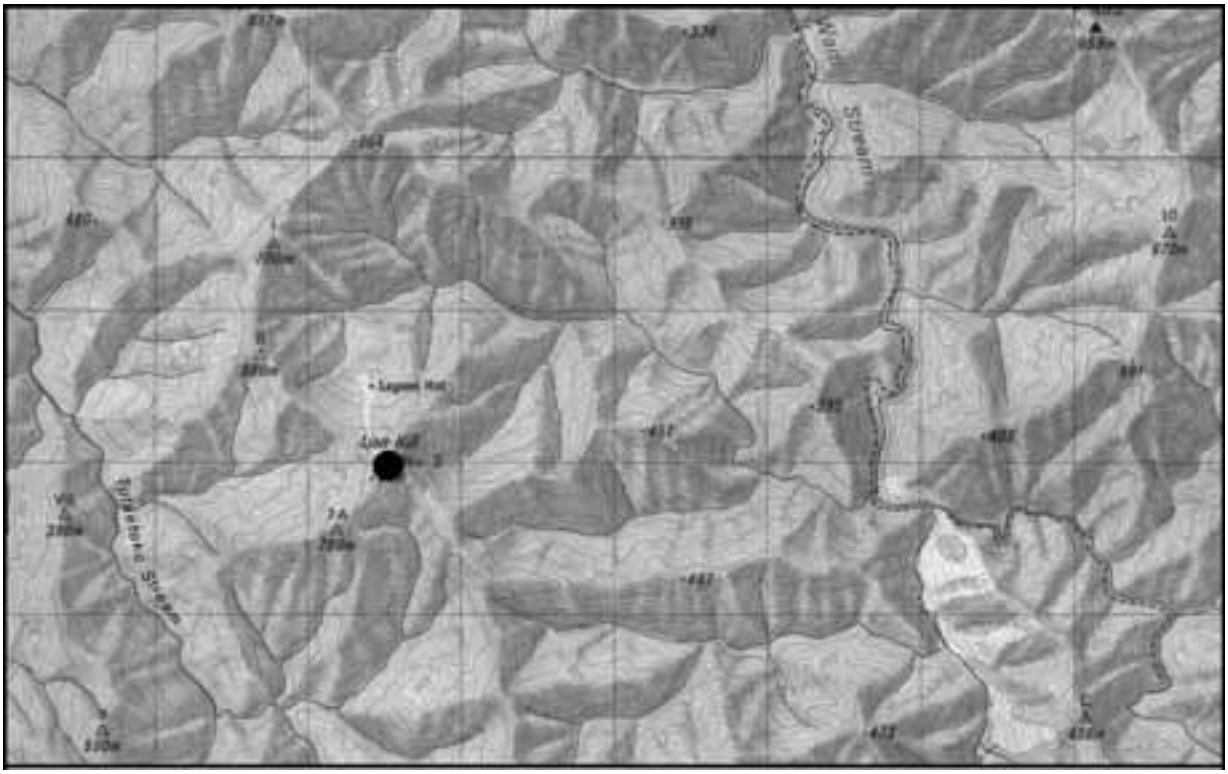
Raingauge	Otara	Location	Tutaetoko
Site Number	871302	Grid Reference	X16: 926 280
Recorder Type	Tipping Bucket	Altitude	790 metres
Start of Record	December 1989	Data Capture Rate	97%
Data Summary From	January 1990	To	December 2005
Data Audited From	January 1990	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

TB3 Tipping bucket is installed on a pole approximately 1 metre above ground level, 4 metres north west of the recorder hut.

Periods of missing or synthetic record may occur in this dataset. Users are advised to contact the recording authority for further details.



SITE LOCATION
Otara at Tutaetoko

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	871302
Compiled by	G R Ellery	Raingauge	Otara
Metric Map Reference	X16: 926 280	Location	Tutaetoko
Altitude	790 metres		
Catchment	Otara	Period of Summary	1990 to 2005

Rainfall Totals (mm)

Mean Annual Rainfall	2382	Mean Summer Rainfall	525
		Summer Rainfall as % of Annual	22
		Mean Autumn Rainfall	530
Max. 1 hr fall (on 23/03/1997)	38	Autumn Rainfall as % of Annual	22
Max. 12 hr fall (on 17/02/1991)	197	Mean Winter Rainfall	704
Max. 24 hr fall (on 17/02/1991)	264	Winter Rainfall as % of Annual	30
Max 48 hr fall (on 16/02/1991)	264	Mean Spring Rainfall	627
Max 72 hr fall (on 16/02/1191)	289	Spring Rainfall as % of Annual	26

Rainfall Intensities (mm) (Depth-Duration Frequency)

EV1 Probability Weighted Moments (HIRDS Ver 1.50b)

Return Period (years)	2	5	10	20	50	100
Duration						
1 hour	30 (36)	34 (50)	36 (59)	38 (68)		
12 hours	104 (120)	125 (160)	142 (186)	160 (212)		
24 hours	142 (162)	174 (215)	203 (251)	233 (285)		
48 hours	180 (200)	211 (267)	234 (311)	254 (353)		
72 hours	201 (222)	237 (296)	265 (345)	292 (391)		

Monthly Statistics (mm)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	44	31	65	17	38	97	23	68	113	119	80	35	730
Median	127	161	157	184	240	242	207	229	207	221	180	186	2341
Mean	152	178	164	168	194	227	233	239	216	219	194	201	2385
Max	301	368	262	380	308	381	615	466	434	365	443	460	4783

Annual Summary

Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990	Incomplete Record		1998	2650	179
1983			1991	2601	158	1999	2602	185
1984			1992	2607	159	2000	2453	196
1985			1993	1697	139	2001	2675	203
1986			1994	2478	185	2002	2027	197
1987			1995	Incomplete Record		2003	2576	219
1988			1996	2499	179	2004	2776	208
1989			1997	1815	172	2005	1895	208

Environment Bay of Plenty
Automatic Rainfall Recording Station

Raingauge	Pakihi	Location	Pakihi Station
Site Number	871410	Grid Reference	X16:979 325
Recorder Type	Tipping Bucket	Altitude	80 metres
Start of Record	March 1970	Data Capture Rate	86%
Data Summary From	January 1976	To	December 2005
Data Audited From	November 1989	To	December 2005

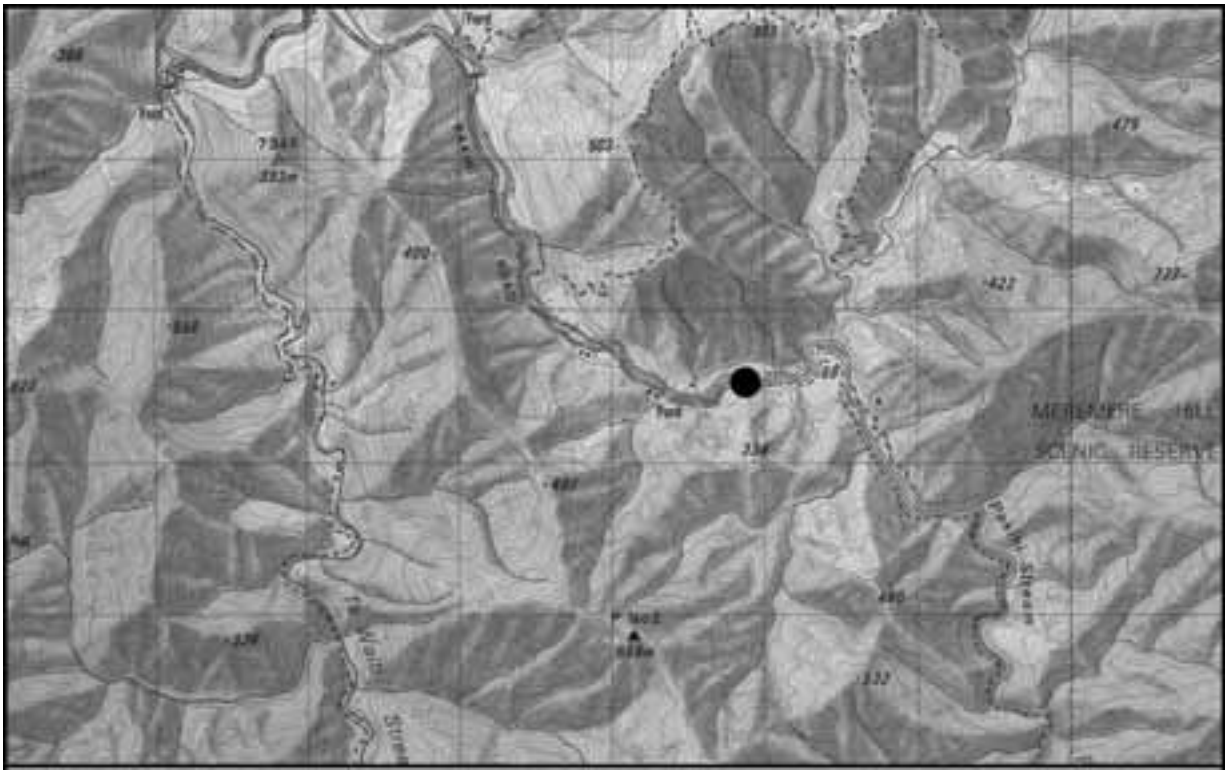
General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Rainfall from March 1970 to June 1986 is from Meteorological Service daily raingauges (B87141 and B87142). There is no record between October 1970 and March 1976, or June 1986 and March 1990.

An OTA tipping bucket and Aquitel Remote was installed on 1 November 1989, recording at 15 minute intervals. The OTA tipping bucket is installed on top of a pole supporting the swing bridge on the right bank of the Pakihi Stream.

Periods of missing or synthetic record may occur in this dataset. Users are advised to contact the recording authority for further details. Synthetic data is based on comparisons with the following sites: Manual daily reader (870304), Otara at Browns Bridge (781410) and Pakihi at Rakanui Link (872507).



SITE LOCATION
Pakihi at Pakihi Station

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	871410
Compiled by	G R Ellery	Raingauge	Pakihi
Metric Map Reference	X16:979 325	Location	Pakihi Station
Altitude	80 metres		
Catchment	Otara	Period of Summary	1976 t0 2005

Rainfall Totals (mm)

Mean Annual Rainfall	2229	Mean Summer Rainfall	482
		Summer Rainfall as % of Annual	22
		Mean Autumn Rainfall	563
Max. 1 hr fall (on 12/01/2002)	44	Autumn Rainfall as % of Annual	25
Max. 12 hr fall (on 22/01/1989)	159	Mean Winter Rainfall	599
Max. 24 hr fall (on 10/03/1979)	230	Winter Rainfall as % of Annual	27
Max 48 hr fall (on 11/11/1978))	368	Mean Spring Rainfall	590
Max 72 hr fall (on 10/11/1978)	371	Spring Rainfall as % of Annual	26

Rainfall Intensities (mm) (Depth-Duration Frequency)

EV1 Probability Weighted Moments (HIRDS Ver 1.50b)

Return Period (years)	2	5	10	20	50	100
Duration						
1 hour	24 (37)	34 (51)	41 (60)	46 (60)	51 (81)	
12 hours	106 (118)	130 (157)	145 (182)	158 (182)	171 (239)	
24 hours	148 (158)	182 (210)	204 (245)	227 (245)	254 (321)	
48 hours	188 (196)	236 (260)	276 (303)	314 (303)	364 (398)	
72 hours	203 (217)	253 (289)	295 (337)	338 (337)	395 (441)	

Monthly Statistics (mm)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	0	18	71	7	11	96	9	6	77	44	84	1	424
Median	121	139	148	204	172	213	183	163	202	169	173	180	2066
Mean	119	167	182	191	186	236	186	174	197	195	200	194	2226
Max	277	484	627	428	419	549	419	360	393	506	418	504	5384

Annual Summary

Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982	1815	141	1990	Incomplete Record		1998	Incomplete Record	
1983	2454	146	1991	2269	172	1999	2728	148
1984	2582	164	1992	2228	164	2000	2328	147
1985	2009	143	1993	1409	133	2001	2847	161
1986	Incomplete Record		1994	2157	165	2002	1989	147
1987	Incomplete Record		1995	2081	172	2003	2720	156
1988	Incomplete Record		1996	Incomplete Record		2004	2517	160
1989	Incomplete Record		1997	2006	145	2005	1628	153

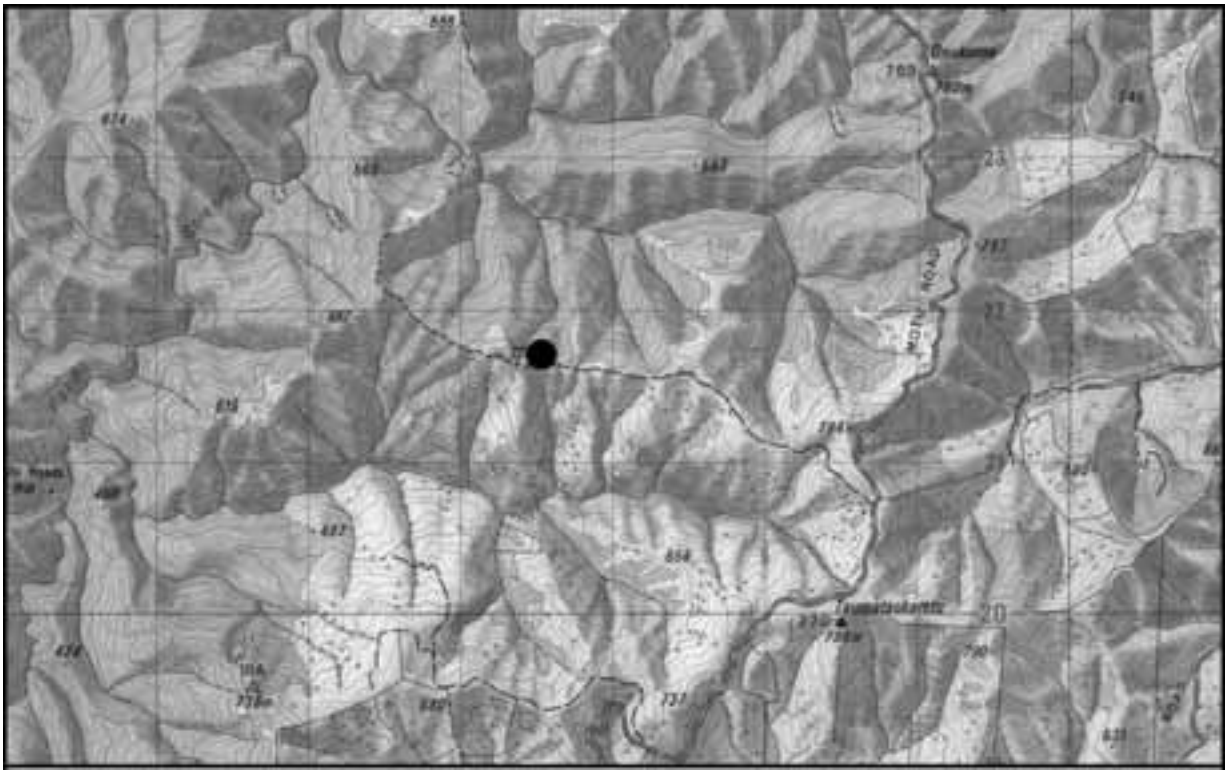
Environment Bay of Plenty
Automatic Rainfall Recording Station

Raingauge	Pakihi	Location	Rakanui
Site Number	872507	Grid Reference	X16:064 216
Recorder Type	Tipping bucket	Altitude	715 metres
Start of Record	May 1991	Data Capture Rate	99%
Data Summary From	January 1992	To	December 2005
Data Audited From	May 1991	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

Periods of missing or synthetic record may occur in this dataset. Users are advised to contact the recording authority for further details.



SITE LOCATION
Pakihi at Rakanui Link

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	872507
Compiled by	G R Ellery	Raingauge	Pakihi
Metric Map Reference	X16: 064 216	Location	Rakanui
Altitude	715 metres		
Catchment	Pakihi	Period of Summary	1992 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	2035	Mean Summer Rainfall	421
		Summer Rainfall as % of Annual	21
		Mean Autumn Rainfall	474
Max. 1 hr fall (on 13/012004)	34	Autumn Rainfall as % of Annual	23
Max. 12 hr fall (on 3/10/2003)	114	Mean Winter Rainfall	593
Max. 24 hr fall (on 30/03/1996)	134	Winter Rainfall as % of Annual	29
Max 48 hr fall (on 7/02/1996)	167	Mean Spring Rainfall	546
Max 72 hr fall (on 9/07/1998)	214	Spring Rainfall as % of Annual	27

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
1 hour	27 (28)	31 (38)	33 (45)	34 (51)		
12 hours	77 (92)	90 (122)	102 (142)	112 (161)		
24 hours	106 (126)	118 (168)	126 (195)	132 (222)		
48 hours	134 (156)	154 (208)	166 (242)	176 (275)		
72 hours	159 (173)	185 (230)	202 (268)	215 (305)		

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	12	31	58	26	79	101	19	57	80	104	97	45	709
Median	95	119	158	152	186	223	202	147	175	166	178	155	1956
Mean	89	140	153	137	180	236	197	158	184	192	172	176	2014
Max	176	293	269	234	267	382	452	298	434	364	257	431	3857

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990			1998	2228	177
1983			1991			1999	2229	196
1984			1992	1912	196	2000	2004	182
1985			1993	1283	164	2001	2115	206
1986			1994	1758	182	2002	1941	192
1987			1995	1830	190	2003	2488	224
1988			1996	2566	203	2004	2333	204
1989			1997	1855	177	2005	1949	210

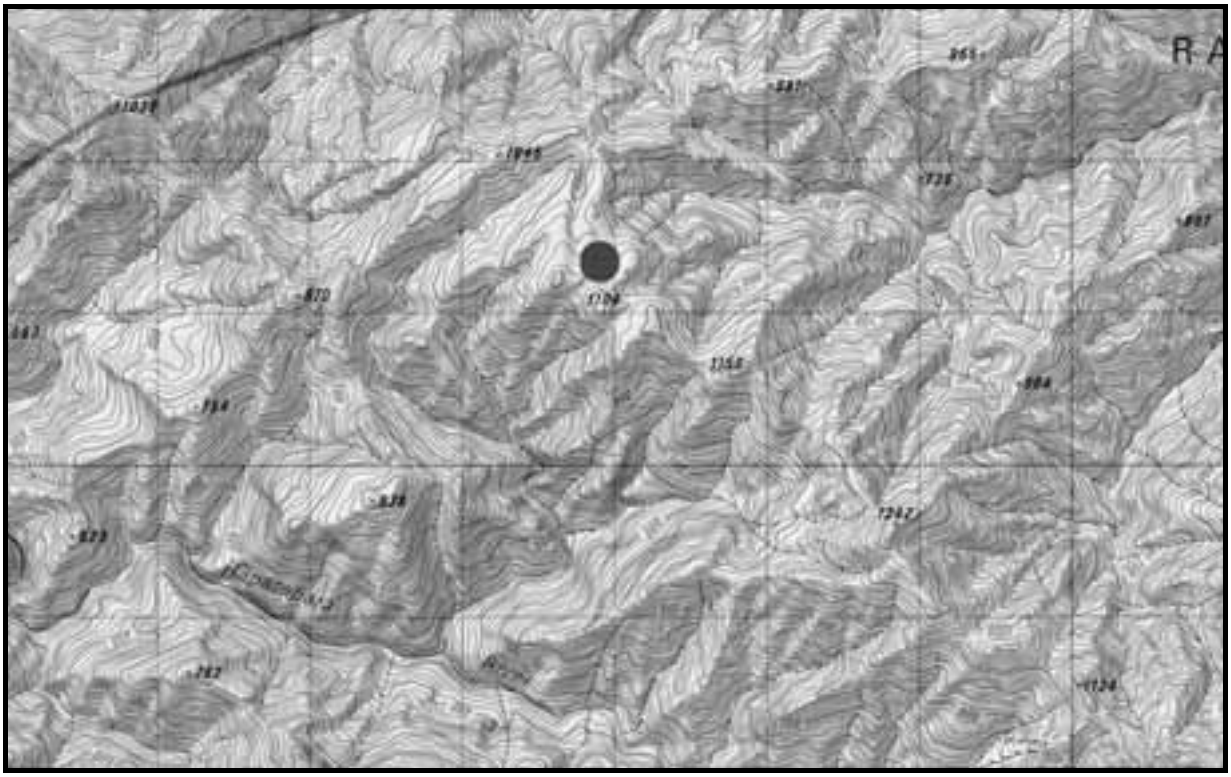
Environment Bay of Plenty
Automatic Rainfall Recording Station

Raingauge	Haparapara	Location	Haparapara
Site Number	778801	Grid Reference	Y15: 368 615
Recorder Type	Tipping Bucket	Altitude	1040 metres
Start of Record	20 June 1996	Data Capture Rate	100%
Data Summary From	1 January 1997	To	31 December 2005
Data Audited From	20 June 1996	To	31 December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environmental Monitoring Network.

Periods of missing or synthetic record may occur in this dataset. Users are advised to contact the recording authority for further details.



SITE LOCATION
Haparapara at Haparapara

Environment Bay of Plenty
Automatic Rainfall Summary

Date Complied	November 2006	Site Number	778801
Compiled by	G R Ellery	Raingauge	Haparapara
Metric Map Reference	Y15: 368 615	Location	Haparapara
Altitude	1040		
Catchment	Haparapara	Period of Summary	1997 to 2005

Rainfall Totals (mm)			
Mean Annual Rainfall	4400	Mean Summer Rainfall	812
		Summer Rainfall as % of Annual	18
		Mean Autumn Rainfall	1031
Max. 1 hr fall (on 30/12/1996)	42	Autumn Rainfall as % of Annual	23
Max. 12 hr fall (on 08/12/2001)	234	Mean Winter Rainfall	1364
Max. 24 hr fall (on 08/12/2001)	344	Winter Rainfall as % of Annual	31
Max 48 hr fall (on 07/12/2001)	570	Mean Spring Rainfall	1194
Max 72 hr fall (on 07/12/2001)	627	Spring Rainfall as % of Annual	27

Rainfall Intensities (mm) (Depth-Duration Frequency)						
EV1 Probability Weighted Moments (HIRDS Ver 1.50b)						
Return Period (years)	2	5	10	20	50	100
Duration						
1 hour	34 (44)	39 (61)	42 (72)			
12 hours	184 (128)	206 (170)	227 (198)			
24 hours	264 (174)	301 (231)	332 (269)			
48 hours	341 (215)	415 (287)	491 (334)			
72 hours	412 (239)	497 (318)	572 (370)			

Monthly Statistics (mm)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min	74	45	103	44	187	225	189	190	145	244	179	187	1812
Median	192	213	272	313	495	605	355	376	387	485	329	343	4365
Mean	183	242	259	299	463	540	479	338	403	454	339	393	4392
Max	332	572	450	539	704	858	1397	476	774	658	676	962	8398

Annual Summary								
Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days	Year	Total (mm)	Rain Days
1982			1990			1998	6178	208
1983			1991			1999	4572	202
1984			1992			2000	3408	193
1985			1993			2001	4701	217
1986			1994			2002	4054	206
1987			1995			2003	4889	212
1988			1996			2004	4909	213
1989			1997	3852	202	2005	3039	231

3.5 River Flow Data Summaries

The river flow data summaries in this chapter are provided in the following sequences of 4 pages per station:

Page 1 Provides general information regarding the station, such as its location, instrument types, start of record, etc.

Page 2 Lists station comments that should be read in conjunction with the results of the data summary. Note that these comments are an edited selection of the full set of comments. Contact the recording authority for a full set of comments if required.

Page 3 Displays the Summary information.

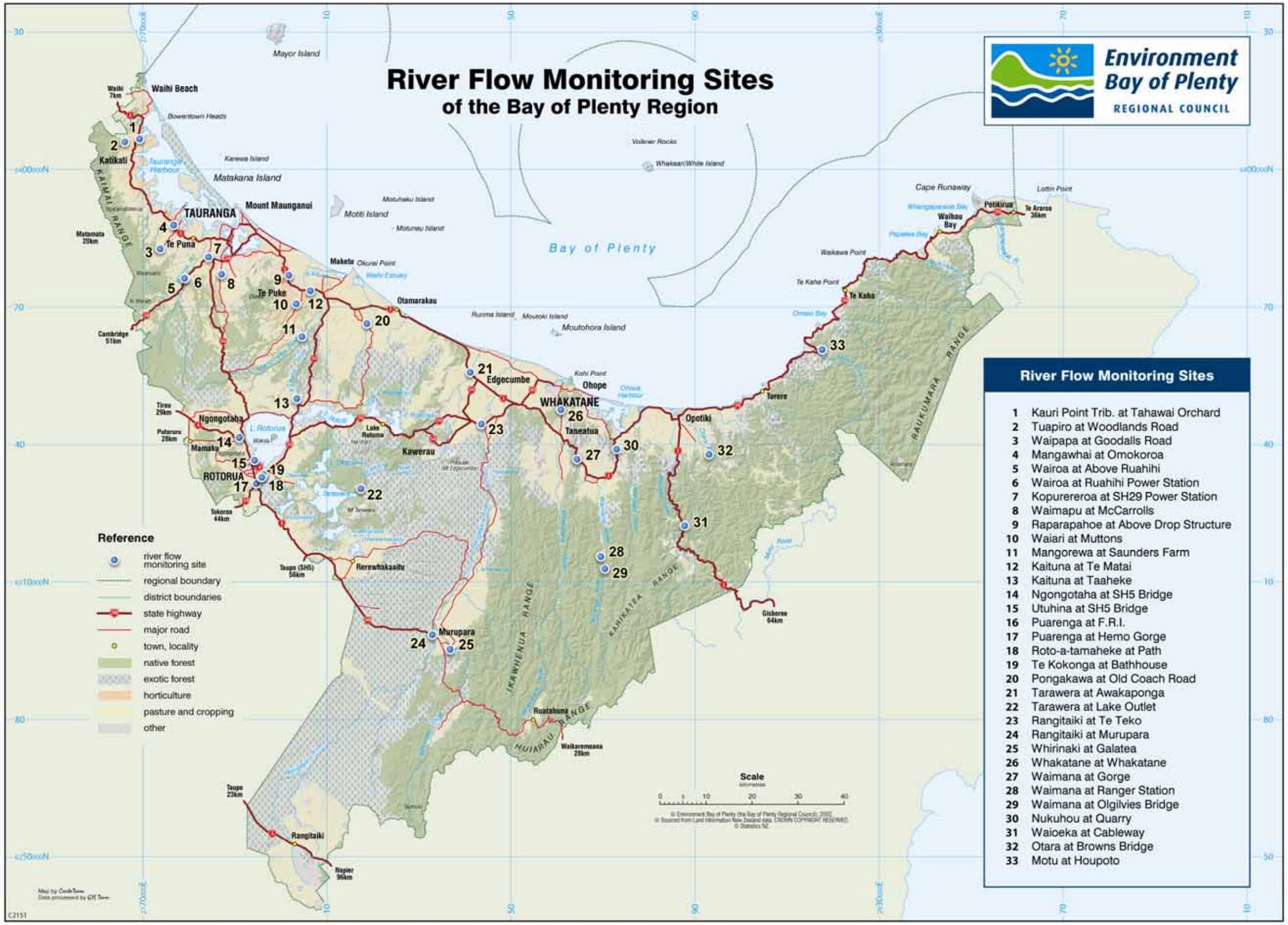
Page 4 Graphical presentation of a selection of parameters provided in Page 3.

The ID No. in Table 3.5 indicates the order in which individual station data summaries are provided in this report.

Table 3.5 River Flow Monitoring Stations

ID Number	Page No.	River	Site	Period of Audit	Data Capture Rate (%)
1	187	Kauri Point Trib	Tahawai Orchard	1991-1994	96
2	191	Tuapiro	Woodlands Road	1985-2005	98
3	195	Waipapa	Goodalls Road	1984-2005	98
4	199	Mangawhai	Omokoroa	1972-2005	100
5	203	Wairoa	Above Ruahihi	1991-2005	97
6	207	Wairoa	Ruahihi Power Station	1994-2005	95
7	211	Kopurereroa	S.H.29	1994-2005	99
8	215	Waimapu	McCarrolls	1991-2005	97
9	219	Raparapahoe	Above Drop Structure	1992-2005	96
10	223	Waiari	Muttons	1967-1994	96
11	227	Mangorewa	Saunders Farm	1968-2005	99
12	231	Kaituna	Te Matai	1956-2005	97
13	235	Kaituna	Taaheke	1906-2005	98
14	239	Ngongotaha	S.H.5 Bridge	1976-2005	100
15	243	Utuhina	S.H.5 Bridge	1968-1996	97
16	247	Puarenga	F.R.I	1976-1996	98
17	251	Puarenga	Hemo Gorge	1983-1996	100
18	255	Roto-a-tamaheke	Path	1985-2000	98
19	259	Te Kokonga	Bathhouse	1985-2000	95
20	263	Pongakawa	Old Coach Road	1998-2005	97
21	267	Tarawera	Awakaponga	1949-2005	99
22	271	Tarawera	Lake Outlet	1972-2005	100
23	275	Rangitaiki	Te Teko	1949-2005	100
24	279	Rangitaiki	Murupara	1949-2005	98
25	283	Whirinaki	Galatea	1953-2005	96
26	287	Whakatane	Whakatane	1957-2005	100
27	291	Waimana	Gorge	1951-1979	98
28	295	Waimana	Ranger Station	1996-2005	100
29	299	Waimana	Olgilvies Bridge	1969-1995	99
30	303	Nukuhou	Quarry	1991-2005	98

ID Number	Page No.	River	Site	Period of Audit	Data Capture Rate (%)
31	307	Waioeka	Cableway	1959-2005	95
32	311	Otara	Browns Bridge	1980-2005	90
33	315	Motu	Houpoto	1958-2005	99


River Flow Monitoring Sites
of the Bay of Plenty Region
Environment Bay of Plenty
REGIONAL COUNCIL
Bay of Plenty
Mayor Island
Waihi Beach
Bowentown Heads
Katikati
Tauranga Harbour
Matakana Island
Motuhaku Island
Motiti Island
Motunau Island
TAURANGA
Mount Maunganui
Te Puna
Matamata 20km
Cambridge 51km
Maketu
Okurei Point
Waihi Estuary
Te Puke
Otamarakau
Rurima Island
Moutoki Island
Moutohora Island
Volkner Rocks
Whakaari/White Island
Cape Runaway
Lottin Point
Waihau Bay
Potikirua
Te Araroa 36km
Waikawa Point
Te Kaha Point
Te Kaha
Omaio Bay
Kohi Point
Ohope
Ohiwa Harbour
Edgecumbe
WHAKATANE
Taneatua
Opotiki
Torere
Gisborne 64km
Tiroa 29km
Ngongotaha
Putaruru 28km
Mamaku
L. Rotorua
Lake Rotoma
Kawerau
ROTORUA
Tokoroa 44km
Taupo (SH5) 58km
Rerewhakaaitu
Murupara
Ruatahuna
Waikaremoana 28km
Taupo 23km
Rangitaiki
Napier 96km
KAIMAI RANGE
IKAWHENUA RANGE
KAHIKATEA RANGE
HUIARAU RANGE
RAUKUMARA RANGE
Reference
river flow monitoring site
regional boundary
district boundaries
state highway
major road
town, locality
native forest
exotic forest
horticulture
pasture and cropping
other
Scale
0 5 10 20 30 40
River Flow Monitoring Sites
1 Kauri Point Trib. at Tahawai Orchard
2 Tuapiro at Woodlands Road
3 Waipapa at Goodalls Road
4 Mangawhai at Omokoroa
5 Wairoa at Above Ruahihi
6 Wairoa at Ruahihi Power Station
7 Kopurereroa at SH29 Power Station
8 Waimapu at McCarrolls
9 Raparapahoe at Above Drop Structure
10 Waiari at Muttons
11 Mangorewa at Saunders Farm
12 Kaituna at Te Matai
13 Kaituna at Taaheke
14 Ngongotaha at SH5 Bridge
15 Utuhina at SH5 Bridge
16 Puarenga at F.R.I.
17 Puarenga at Hemo Gorge
18 Roto-a-tamaheke at Path
19 Te Kokonga at Bathhouse
20 Pongakawa at Old Coach Road
21 Tarawera at Awakaponga
22 Tarawera at Lake Outlet
23 Rangitaiki at Te Teko
24 Rangitaiki at Murupara
25 Whirinaki at Galatea
26 Whakatane at Whakatane
27 Waimana at Gorge
28 Waimana at Ranger Station
29 Waimana at Olgilvies Bridge
30 Nukuhou at Quarry
31 Waioeka at Cableway
32 Otara at Browns Bridge
33 Motu at Houpoto

Environment Bay of Plenty
River Flow Recording Station

River	Kauri Point Tributary	Site	Tahawai Orchard
Site Number	13309	Grid Reference	T13:693 066
Start of Record	May 1990	Data Capture Rate	96%
Data Summary From	January 1991	To	December 1994
Data Audited From	May 1990	To	December 1994

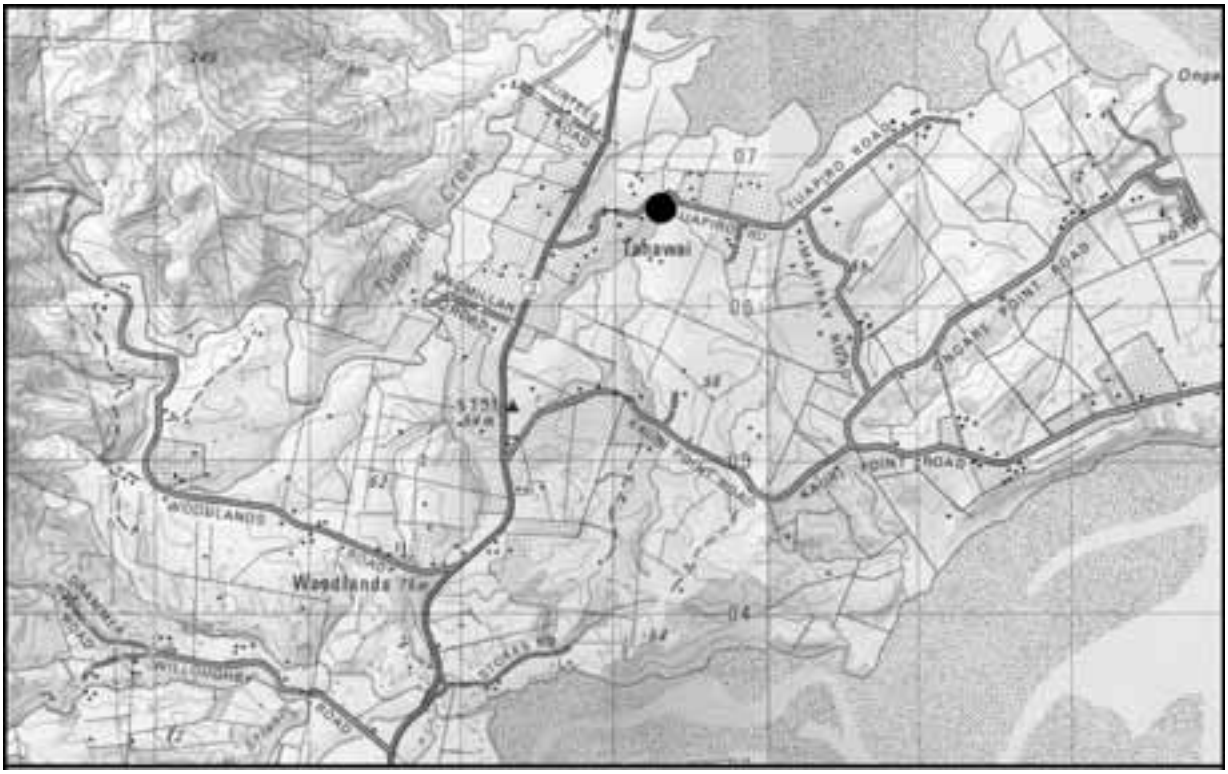
Equipment History Float/counterweight system with shaft encoder. 1mm resolution.

Comments on Stage/Discharge Ratings

Control is by insensitive artificial weir. Ratings available to convert stage (mm) to flow (l/s).

General Comments

Site was operated by Environment Bay of Plenty as part of its investigation of the Tauranga Harbour



SITE LOCATION
Kauri Point Tributary at Tahawai Orchard

Station Comments

Kauri Point Tributary at Tahawai Orchard. Site Number 13309, on River Number 133000.
The local recording authority is Environment Bay of Plenty
The control is by an artificial weir. Site installed as part of Environment Bay of Plenty investigations of the Tauranga harbour.

30/05/90 - Plywood weir and recording tower installed.

21/06/90 - Water found to be overtopping stopbank upstream of weir. Low bank raised slightly to force flow through weir.

02/08/90 - Low bank raised again slightly.

27/03/92 - Missing record from 920327 at 134600 to 920409 at 123000 due to recorder malfunction.

10/05/92 - Missing record from 920510 at 083000 to 920511 at 140000 due to recorder malfunction.

28/07/92 - Missing record from 920728 at 210000 to 920810 at 091500 due to recorder malfunction.

18/01/94 - Wooden retaining wall installed on the right bank between recorder and weir to stop erosion from cattle.

25/02/94 - Missing record from 940225 at 124500 to 940323 at 161500 due to tape not being able to be processed.

23/03/94 - Wooden retaining wall installed on the left bank, upstream of weir to stop erosion from cattle. Also missing record from 940225 131500 to 940323 150000 due to tape being ripped.

22/10/94 - Missing record from 941022 at 173000 to 941025 at 133000 due to recorder malfunction.

24/11/94 - Missing data from 941124 at 221500 to 941125 at 135800 due to recorder failure.

01/02/95 - Missing record from 950201 at 131500 to 950208 at 083000 due to recorder time error.

07/06/95 - Missing record from 950607 at 023000 to 950626 at 114500 due to battery voltage dropping too low.

25/07/95 - Site closed on 950725 141500, recorder and stilling well removed. Plywood weir considered to have been an insensitive weir structure. There are periods of missing record throughout the data set. In some cases gaps have been replaced with synthetic data derived from comparison with Tuapiro at Woodlands Road (13310) and rainfall records.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	June 2006	Site Number	13309
Compiled by	Glenn Ellery	River	Kauri Point Tributary
		Station	Tahawai Orchard
Metric Map Reference	T13:693 066		
Catchment Area (km^2)	2.6	Period of Summary	1991 to 1994

Statistical Summary

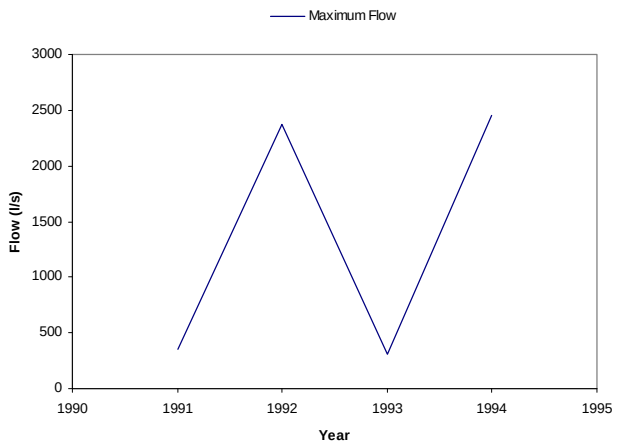
Flow (*l/s*)			
Minimum Flow	0.9	Maximum Flow	2456.5
Mean Annual Minimum Flow	1.8	Mean Annual Maximum Flow	1372.6
Mean Flow	46.3	Mean Summer Flow	28.2
Median Flow	27.6	Mean Autumn Flow	18.0
Mean Specific Flow (/km^2)	17.8	Mean Winter Flow	75.3
		Mean Spring Flow	61.6
Low Flow Distribution Fit	Gumbel	Peak Flow Distribution Fit	Gumbel
7 day Low Flow (Minimum)	2.1	Peak Flow (5 yr Return)	2300
7 Day Low Flow (Mean Annual)	2.7	Peak Flow (10 yr Return)	
7 day Low Flow (5 yr Return)	2.1	Peak Flow (20 yr Return)	
7 Day Low Flow (10 yr Return)		Peak Flow (50 yr Return)	
		Peak Flow (100 yr Return)	

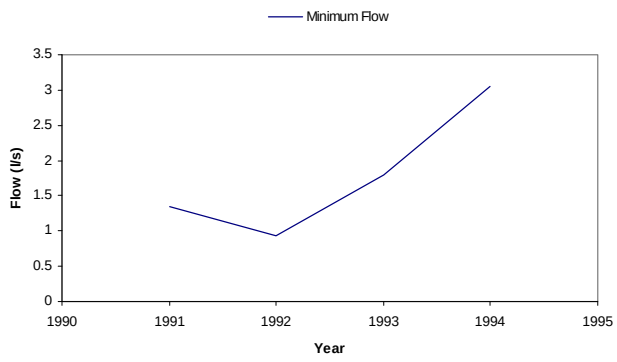
Annual Summaries

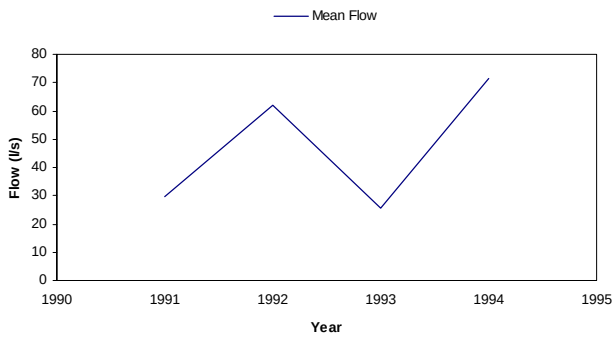
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993	1.8	25.6	310
1981				1994	3.1	71.5	2456
1982				1995			
1983				1996			
1984				1997			
1985				1998			
1986				1999			
1987				2000			
1988				2001			
1989				2002			
1990				2003			
1991	1.4	29.6	354	2004			
1992	0.9	61.6	2370	2005			

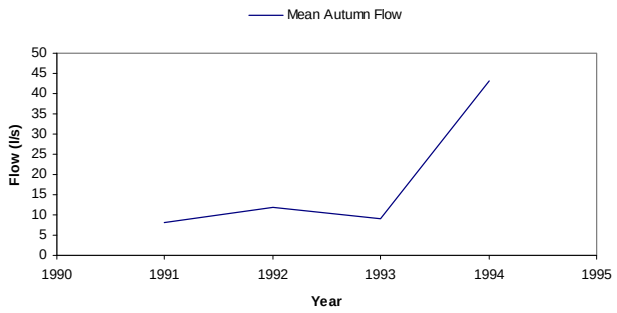
Flow Distribution

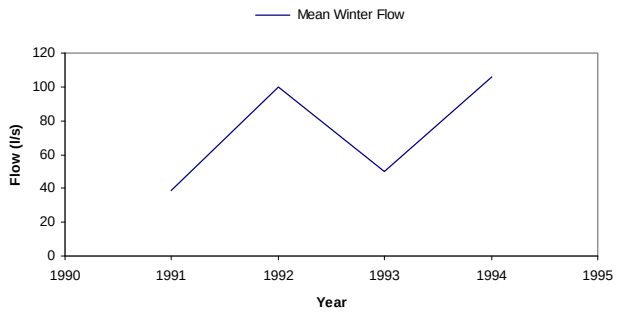
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	2457	294	227	195	164	144	130	120	113	108
10	103	99	94	90	87	84	82	79	76	75
20	73	71	69	67	65	63	61	60	58	56
30	54	53	52	50	48	47	46	45	43	42
40	40	39	37	36	35	33	32	31	30	29
50	28	26	25	24	23	22	21	20	19	18
60	17	16	15	14	13	12	12	11	11	10
70	9	9	9	8	8	8	7	7	7	6
80	6	6	6	5	5	5	5	5	4	4
90	4	4	4	3	3	3	3	2	2	2
100	1									

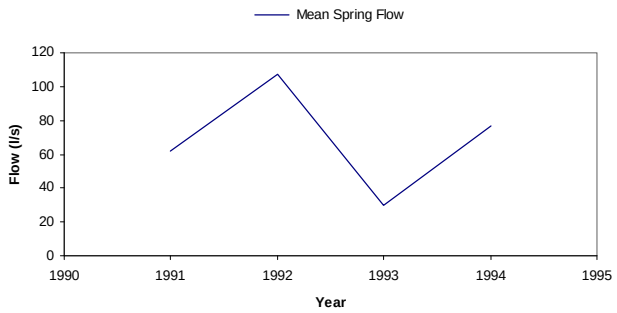


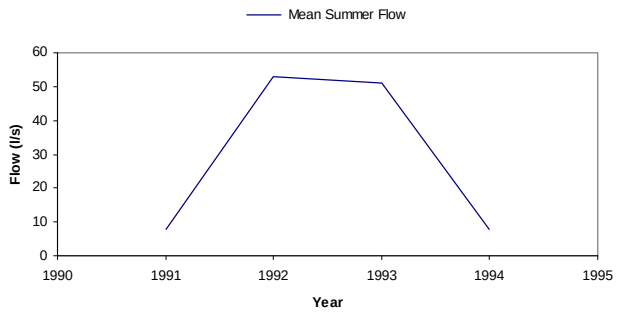












Kauri Point Tributary at Tahawai Orchard

Environment Bay of Plenty
River Flow Recording Station

River	Tuapiro	Site	Woodlands Road
Site Number	13310	Grid Reference	T13:661 057
Start of Record	February 1984	Data Capture Rate	98%
Data Summary From	January 1995	To	December 2005
Data Audited From	February 1984	To	December 2005

Equipment History

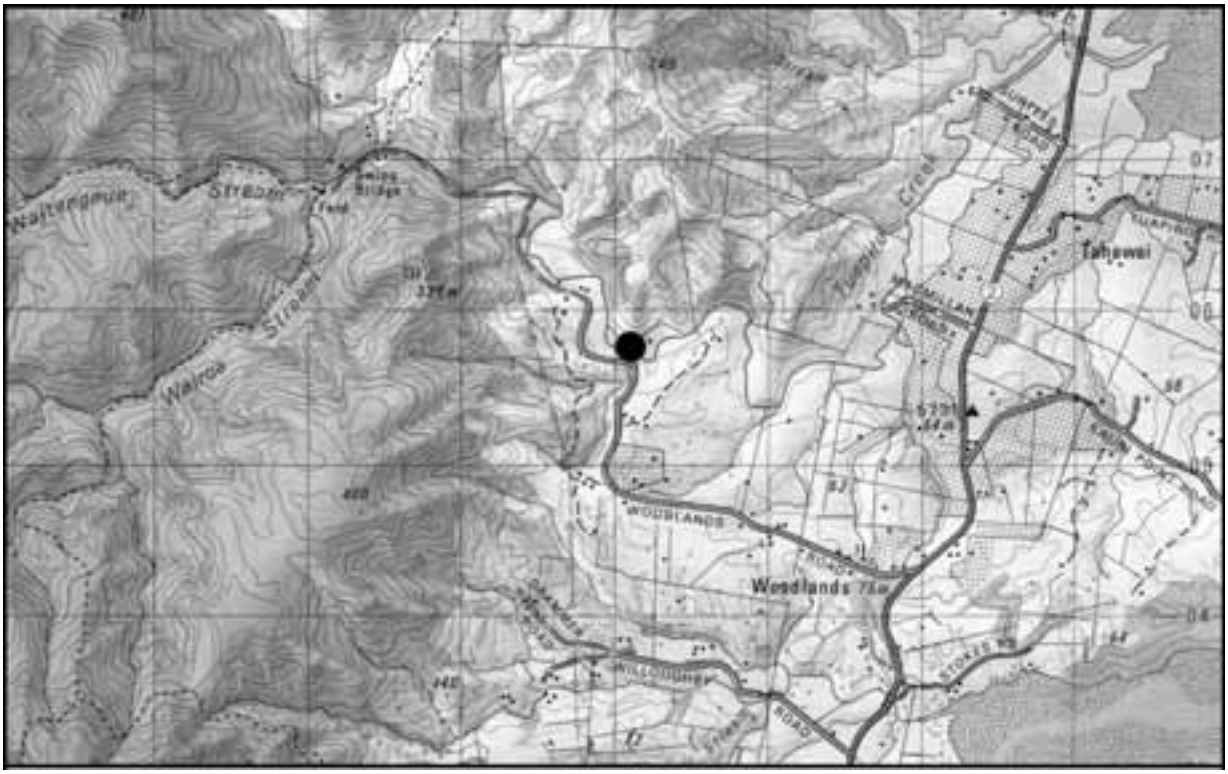
Float/counterweight system with shaft encoder. 1mm resolution.

Comments on Stage/Discharge Ratings

Control is by concrete ford. Stream overtops channel and floods surrounding paddocks at high flows. Ratings available to convert stage (mm) to flow (*l*/s).

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environmental Monitoring Network.



SITE LOCATION
Tuapiro at Woodlands Road

Station Comments

Tuapiro River at Woodlands Road. Site Number 13310, on River Number 133000.
The local recording authority is Environment Bay of Plenty.

The control is by a stable concrete ford, some movement in bottom end of ratings due to holes through ford filling up and clearing themselves. Spot gaugings carried out since 690318. L&S and recording tower installed 840202. Continuous water level records begin 840202 154500. Top of ford is approximately 0.94 metres on gauge. Bottom of culverts through ford at approximately 0.46 metres on gauge. Ramp corrections applied on numerous occasions since site installed due to debris collecting on ford during flood events.

02/02/84 - Records commenced on 840202 154500. Equipment is a 10 metre L&S digital recorder having a stage ratio of 1mm of stage/mm recorded and a time punch out of 15 minutes.

22/05/84 - Missing record from 840522 at 063000 to 840713 at 140000 due to L&S recorder jamming.

13/07/84 - Missing record from 840713 at 234500 to 840720 at 131500 due to float tape coming off roller.

02/06/86 - Missing record from 860602 at 074500 to 860709 at 124500 due to battery voltage dropping too low to record

11/01/88 - Missing record from 880111 at 120000 to 880125 at 130000 due to L&S recorder jamming.

02/11/89 - Missing record from 891102 at 213000 to 891107 at 123000 due to L&S recorder malfunctioning.

09/12/92 - Missing record from 921209 at 104500 to 921222 at 143000 due to battery voltage dropping too low to record.

13/09/95 - Missing record from 950913 at 063000 to 950920 at 140000 due to aquitel remote failure.

16/01/96 - Missing record from 960116 at 011500 to 960117 at 104500 due to aquitel remote having cold started.

24/01/96 - Missing record from 960124 at 174500 to 960131 at 100000 due to aquitel remote having crashed.

11/02/96 - Missing record from 960211 at 093000 to 960214 at 121500 due to aquitel remote having locked up.

12/03/96 - Missing record from 960312 at 044500 to 960314 at 131500 due to aquitel remote having crashed.

15/03/96 - Missing record from 960315 at 070000 to 960320 at 111500 due to aquitel remote having crashed.

30/12/96 - Missing record 961230 at 174500 to 970107 at 150000 due to upstream suspension bridge being destroyed in flood and washing onto recorder, demolishing recorder hut.

18/10/97 - Missing record from 971018 at 060000 to 971021 at 113000 due to aquitel failure.

27/07/98 - Missing record from 980727 at 151500 to 980729 at 113000 due to aquitel failure.

21/04/00 - Missing record from 1000421 at 114500 to 1000427 at 234500 due to rats chewing through power cables.

12/01/02 - Missing record from 1020112 53000 to 1020113 60000 due to deterioration of comms quality.

07/09/04 - Missing record from 20040907 093000 to 20040907 153000 due to communications problems (faulty GPRS unit).

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	June 2006	Site Number	13310
Compiled by	Glenn Ellery	River	Tuapiro
		Station	Woodlands Road
Metric Map Reference	T13:661 057		
Catchment Area (km²)	39.05	Period of Summary	1985 to 2005

Statistical Summary

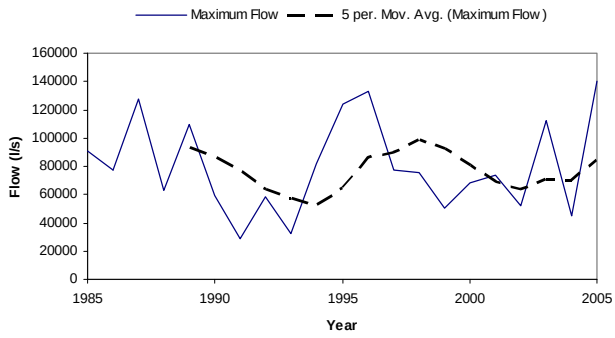
Flow (*l/s*)				
Minimum Flow	230	Maximum Flow		140618
Mean Annual Minimum Flow	373	Mean Annual Maximum Flow		79989
Mean Flow	1867	Mean Summer Flow		1575
Median Flow	1013	Mean Autumn Flow		1505
Mean Specific Flow (/km²)	48	Mean Winter Flow		2651
		Mean Spring Flow		1793
Low Flow Distribution Fit	GEV	Peak Flow Distribution Fit	Gumbel	GEV
7 day Low Flow (Minimum)	249	Peak Flow (5 yr Return)	105600	107300
7 Day Low Flow (Mean Annual)	375	Peak Flow (10 yr Return)	126400	126100
7 day Low Flow (5 yr Return)	331	Peak Flow (20 yr Return)	143400	143000
7 Day Low Flow (10 yr Return)	302	Peak Flow (50 yr Return)		
		Peak Flow (100 yr Return)		

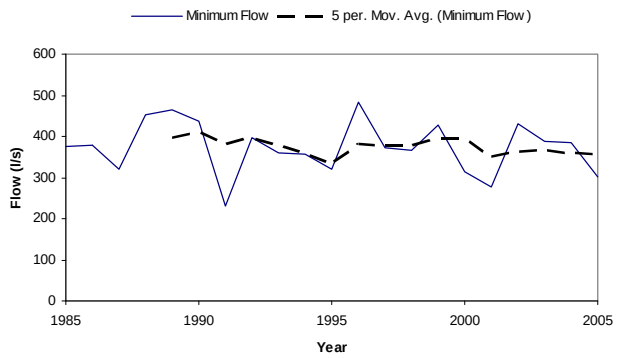
Annual Summaries

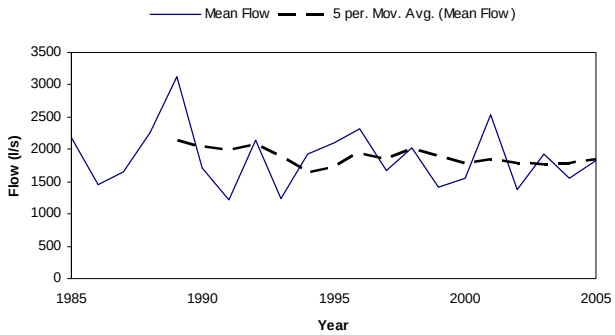
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993	359	1231	32114
1981				1994	356	1919	81351
1982				1995	320	2097	124385
1983				1996	482	2322	133137
1984				1997	372	1667	77722
1985	376	2182	90458	1998	366	2030	75831
1986	380	1447	77052	1999	427	1410	49903
1987	319	1652	127673	2000	315	1550	68514
1988	451	2264	62990	2001	276	2544	73528
1989	466	3129	109285	2002	430	1376	52092
1990	437	1710	59094	2003	389	1931	112552
1991	230	1222	28316	2004	385	1560	44546
1992	396	2141	58601	2005	303	1836	140618

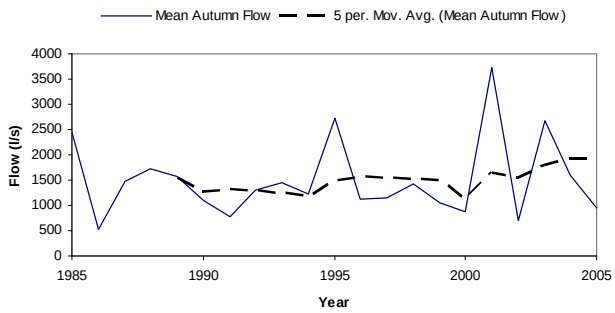
Flow Distribution

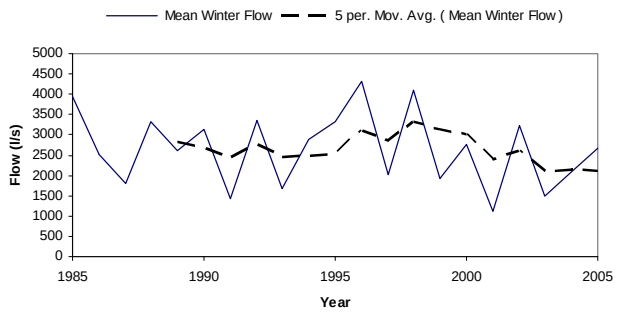
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	140618	14661	9424	7185	5963	5256	4773	4413	4151	3942
10	3759	3604	3453	3298	3129	2934	2743	2574	2437	2323
20	2219	2124	2042	1969	1900	1837	1776	1724	1675	1625
30	1581	1539	1500	1461	1423	1386	1352	1320	1289	1261
40	1233	1207	1182	1158	1134	1112	1092	1070	1051	1031
50	1013	994	978	960	943	926	910	895	881	866
60	851	837	825	811	798	785	772	760	748	735
70	722	710	699	686	673	659	646	633	621	610
80	598	586	573	559	546	533	521	511	499	487
90	475	464	451	438	425	413	399	379	352	323
100	230									

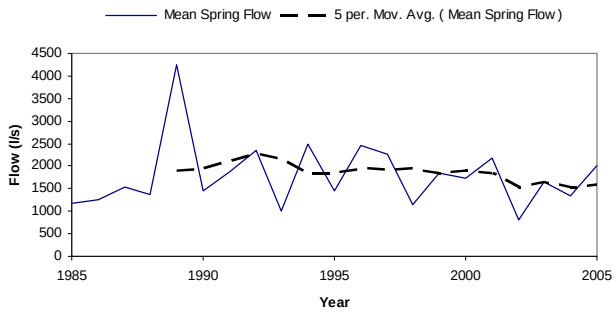


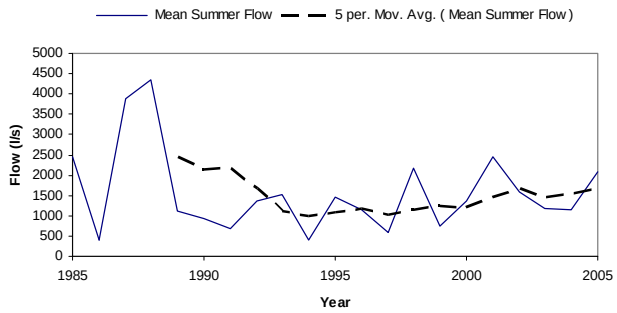












Tuapiro at Woodlands Road

Environment Bay of Plenty
River Flow Recording Station

River	Waipapa	Site	Goodalls Road
Site Number	13805	Grid Reference	U14:737 824
Start of Record	May 1983	Data Capture Rate	98%
Data Summary From	January 1984	To	December 2005
Data Audited From	May 1983	To	December 2005

Equipment History

Foxboro recorder installed on 25 May 1983. 28mm resolution.

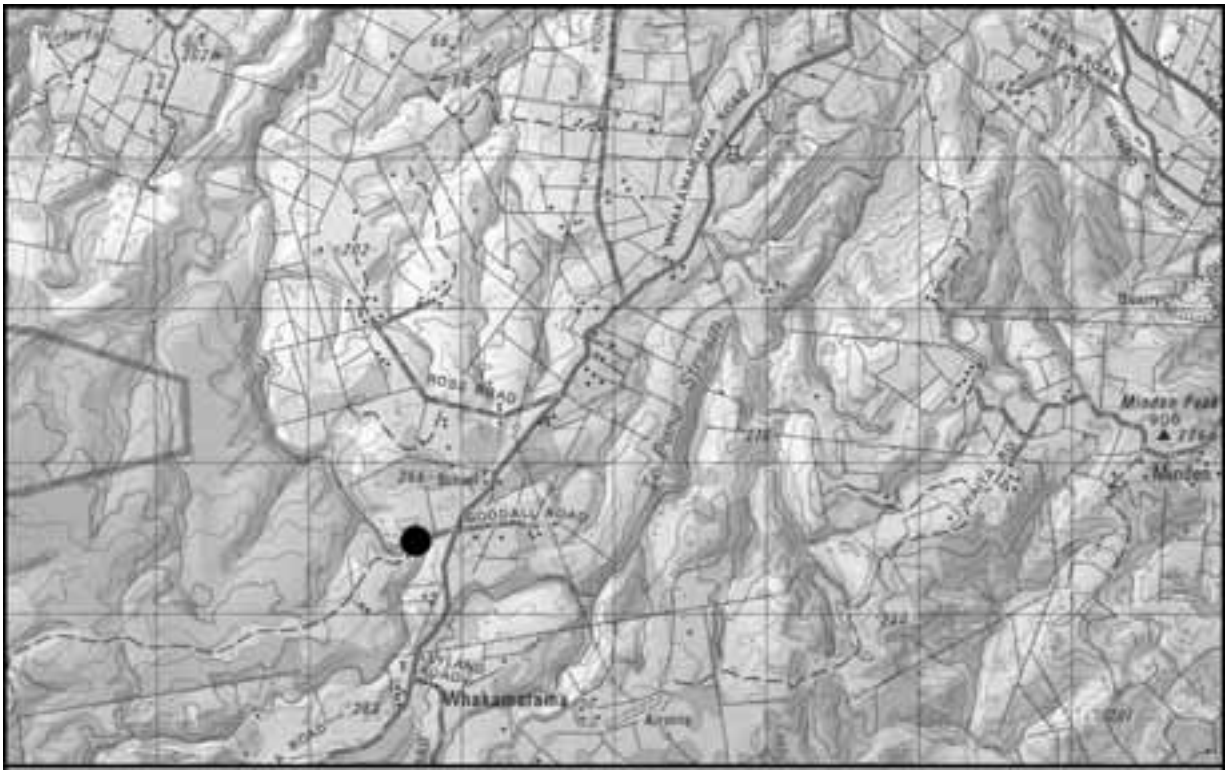
Float/counterweight system with shaft encoder installed 21 March 1984. 1mm resolution.

Comments on Stage/Discharge Ratings

Control is solid ignimbrite and concrete weir. Ratings available to convert stage (mm) to flow (l/s).

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environmental Monitoring Network. Site was operated by DSIR Rotorua between 18/12/87 and 01/07/92.



SITE LOCATION
Waipapa at Goodalls Road

Station Comments

Waipapa Stream at Goodall Road. Site Number 13805, on River Number 13800.
The local recording authority is Environment Bay of Plenty.

25/05/83 - 3 metre monthly Foxboro recorder installed on 830525 120000. Recorder has a time resolution of 281 minutes to 1mm recorded and a stage resolution of 28mm of stage to 1mm recorded.

21/03/84 - Missing record from 840321 131500 to 840406 143000 during which the Foxboro was removed and replaced by 100mm pulley L&S digital with a stage resolution of 1 mm and a recording interval of 15 minutes. A 4 metre long stainless steel cylinder and wooden recorder house installed on 840604.

22/05/84 - New concrete control installed on left bank of low flow channel.

01/06/84 - Due to a ripped tape no data was recorded for the period 840601 at 90000 to 840704 at 111300.

04/07/84 - Due to a recorder malfunction no data was recorded for the period 840704 at 111300 to 840720 at 121500

18/12/87 - Site handed over to Rotorua DSIR to operate. Site handed over to BOPRC to operate on 01/07/92.

19/10/93 - Concrete control extended on right bank. Water now flows through unconcreted gap in the middle of the stream until level gets above staff gauge reading 0.511, water then overtops concrete control.

10/04/95 - Missing record from 950410 at 220000 to 950419 at 123000.

07/06/95 - No data was recorded for the period 950607 at 41500 to 950607 at 164500 due battery failure.

28/06/98 - Missing record 960628 at 043000 to 960628 at 164500 due to battery failure.

14/09/98 - Missing record from 980914 at 051500 to 980917 at 030000 due to aquitel failure.

12/01/99 - Missing record from 990112 at 103000 to 990120 at 123000 due to power supply failure after solar panel being stolen.

28/08/00 - Missing record from 2000828 at 131500 to 2000905 at 114500 due to aquitel remote failure.

22/11/04 - Missing record from 20011122 at 173000 to 20011123 at 94500 due to aquitel remote being reset.

10/03/04 - Missing record from 20040310 at 154500 to 20040319 at 141500 due to incorrect data being removed.

10/04/04 - Missing record from 20040410 at 090000 to 20040422 at 141500 due to incorrect data being removed.

29/04/04 - Missing record from 20040429 at 020000 t0 20040501 at 034500 due to logger failure.

15/05/04 - Missing record from 20040515 014500 to 20040525 104500 due to Handar encoder failure.

16/07/04 - Missing record from 20040716 at 180000 to 20040721 at 104500 due to incorrect data being removed

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	May 2006	Site Number	13805
Compiled by	Glenn Ellery	River	Waipapa
		Station	Goodalls Road
Metric Map Reference	U14:737 824		
Catchment Area (km^2)	8.5	Period of Summary	1984 to 2005

Statistical Summary

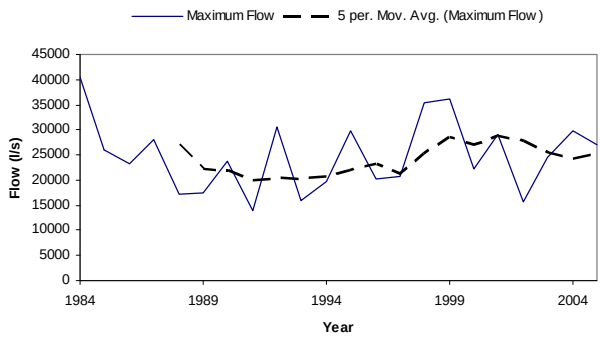
Flow (*l/s*)				
Minimum Flow	39	Maximum Flow		40361
Mean Annual Minimum Flow	59	Mean Annual Maximum Flow		24858
Mean Flow	485	Mean Summer Flow		406
Median Flow	236	Mean Autumn Flow		398
Mean Specific Flow (/km^2)	57	Mean Winter Flow		683
		Mean Spring Flow		508
Low Flow Distribution Fit	GEV	Peak Flow Distribution Fit	Gumbel	GEV
7 day Low Flow (Minimum)	40	Peak Flow (5 yr Return)	30400	30900
7 Day Low Flow (Mean Annual)	60	Peak Flow (10 yr Return)	34900	34800
7 day Low Flow (5 yr Return)	52	Peak Flow (20 yr Return)	39200	38200
7 Day Low Flow (10 yr Return)	47	Peak Flow (50 yr Return)		
		Peak Flow (100 yr Return)		

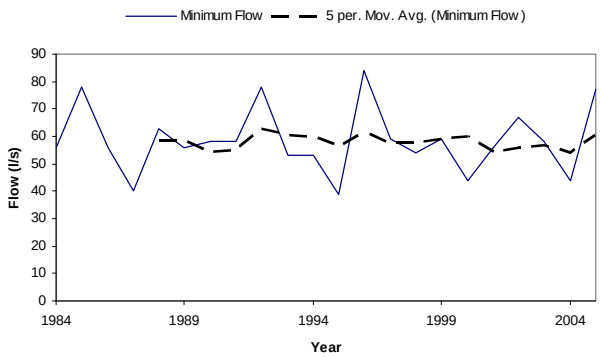
Annual Summaries

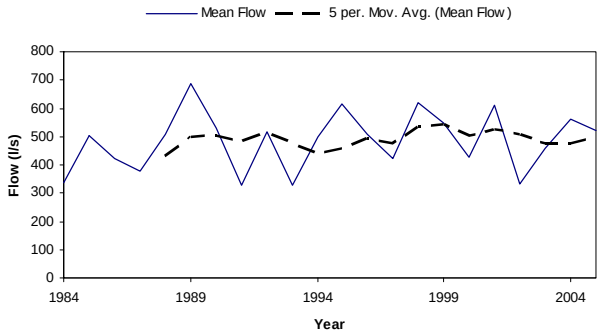
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993	53	327	15948
1981				1994	53	501	19745
1982				1995	39	615	29712
1983				1996	84	506	20317
1984	56	337	40361	1997	59	421	20701
1985	78	504	25972	1998	54	622	35503
1986	56	424	23187	1999	59	547	36096
1987	40	377	28055	2000	44	426	22280
1988	63	508	17174	2001	56	611	29144
1989	56	686	17385	2002	67	333	15665
1990	58	531	23786	2003	58	457	24453
1991	58	327	13813	2004	44	564	29813
1992	78	517	30627	2005	77	523	27148

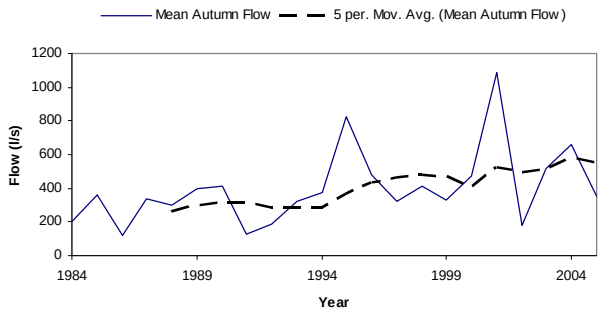
Flow Distribution

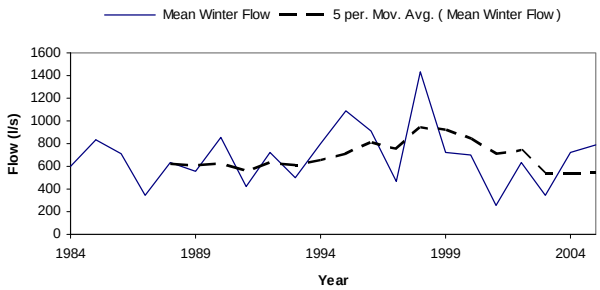
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	40361	4706	2781	2045	1700	1455	1270	1139	1041	964
10	897	842	798	761	722	686	652	622	595	570
20	550	530	513	498	484	472	460	448	437	424
30	410	396	383	372	361	351	342	332	324	316
40	307	299	292	284	276	269	261	255	248	242
50	236	230	224	220	215	210	206	202	197	194
60	190	186	183	179	176	172	169	166	163	159
70	156	152	149	147	143	140	137	134	131	127
80	124	121	118	114	111	108	104	101	98	94
90	91	87	84	80	77	74	70	67	62	56
100	39									

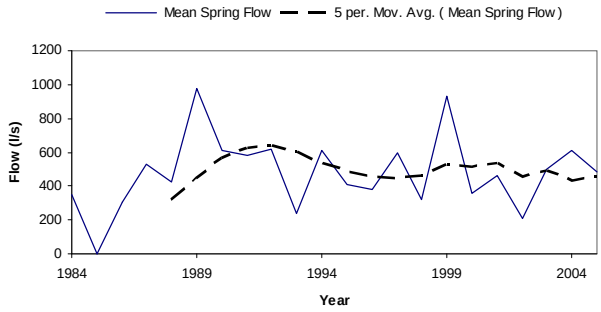


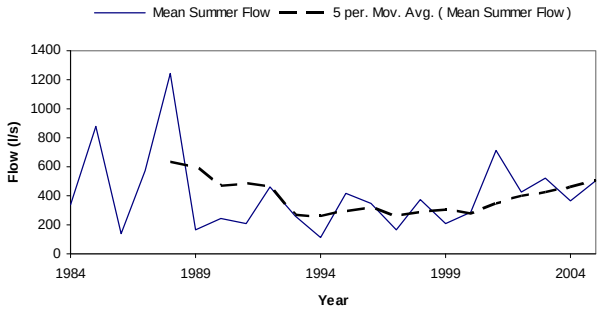












Waipapa at Goodalls

Environment Bay of Plenty
River Flow Recording Station

River	Mangawhai	Site	Omokoroa
Site Number	13901	Grid Reference	U14: 767 877
Start of Record	July 1972	Data Capture Rate	100%
Data Summary From	January 1972	To	December 2005
Data Audited From	January 1972	To	December 2005

Equipment History

23/03/71: 5 foot range weekly Lea chart recorder.
21/05/74: Backup 1.5 metre Foxboro chart recorder.
21/05/74: 15 minute F&P digital recorder.
26/09/93: 10 metre range encoder & WRIC data logger.

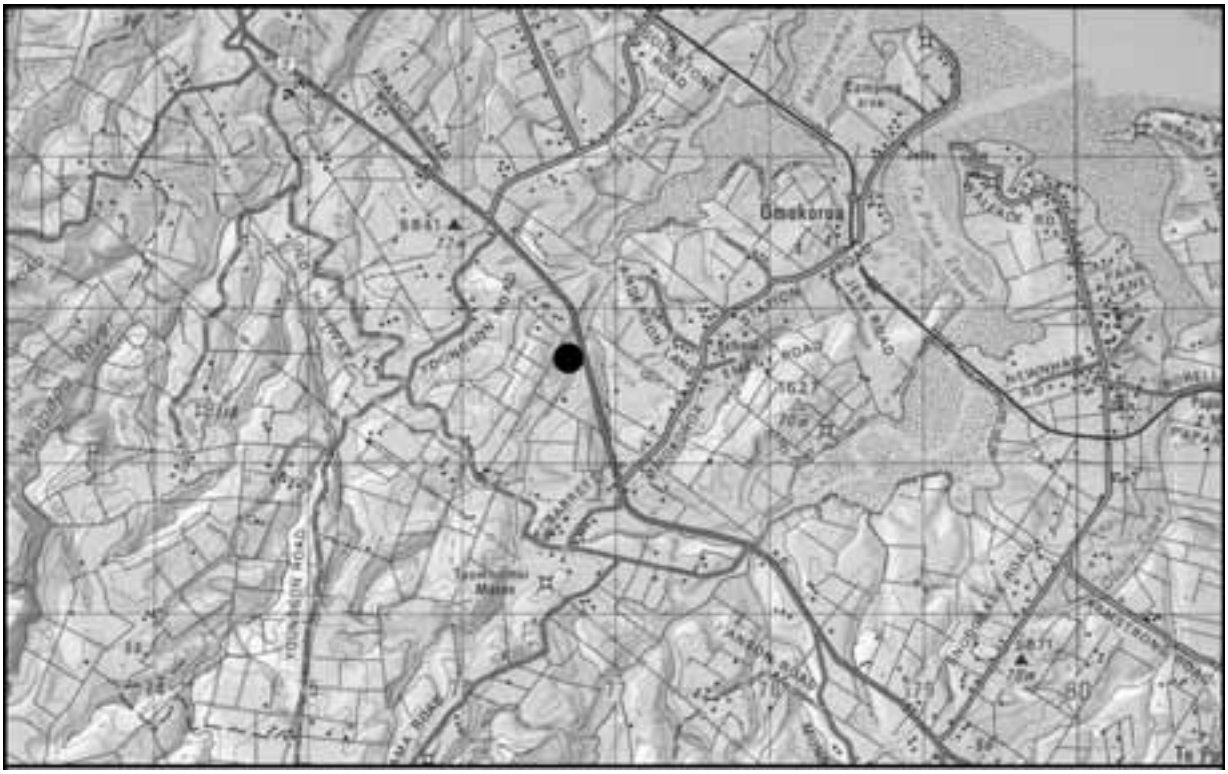
Comments on Stage/Discharge Ratings

Site control is by shallow V-plate on upstream end of the approach apron to a square box culvert. The upper end of the rating curves has been derived using the MWD culvert manual hydraulic formula. The maximum discharge obtained from these curves appears very large. This has caused debate over whether they are correct. Please see the operating authority for further information.

Ratings are available to convert Stage (mm) to Flow (l/s).

General Comments

Site is operated by NIWA, Rotorua. The site was established as a representative basin for the Tauranga Region.



NIWA
Taihoro Nukurangi

SITE LOCATION
Mangawhai at Omokoroa

Station Comments

Mangawhai River at Omokoroa. Site Number 13901, on River Number 139000.

The local recording authority is NIWA, Rotorua.

Control is by shallow v-plate on upstream end of the approach apron to a 1.5 metre square box culvert. The culvert becomes the control at an undefined level, although ratings indicate this occurs at approximately when culvert is full.

The site was established as a representative basin for the Tauranga region. The upper end of the rating curves for this site have been derived using the MWD culvert manual hydraulic formula. Some discussion has taken place over whether or not these curves are correct as the maximum discharge appears rather large. The storm which occurred on 720511 produced a maximum rainfall intensity of 122mm in two hours. This figure when used in other runoff formula give results consistent with the rating. As there is no evidence of the culvert blocking we have assumed this flow actually occurred.

23/02/71 - Gaugings earlier than 710223 have been filed without a stage value as staff gauge was not installed until this date. Minor stage variations when measuring flows under 50 litres/sec result in large percentage deviations between gauged and rated flows due to the control shape. This is apparent in much of the listed gaugings with deviations greater than 20%, especially those measurements made prior to metrication of the staff gauge on 730312.

23/03/71 - Stage data has been manually obtained from Lea charts by taking chart heights, their associated dates and times at points where the hydrograph gradient changes. This method has given a "straight line" look to much of the filed data.

06/07/71 - Although no supporting documentation can be found, the memory of a staff member confirmed the weir plate originally installed was removed as it was considered too insensitive. The new plate installed has a 172 degree "v", is 0.152 metre deep at the middle with a 0.209 metre horizontal edge on either side.

05/06/81 - Diurnal fluctuations in the stage record became apparent from 810605 due to the increased sensitivity using 0 mm compression. These fluctuations are a catchment characteristic which are recorded on both instruments.

25/02/88 - Data from 880222 174500 to 880225 12300 affected by upstream dams and pumping.

30/10/93 - Data from 931030 231500 to 931031 044500 affected by upstream dams and pumping.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	November 2006	Site Number	13901
Compiled by	G R Ellery	River	Mangawhai
		Station	Omokoroa
Metric Map Reference	U14: 767 877		
Catchment Area (km^2)	2.95	Period of Summary	1972 to 2005

Statistical Summary

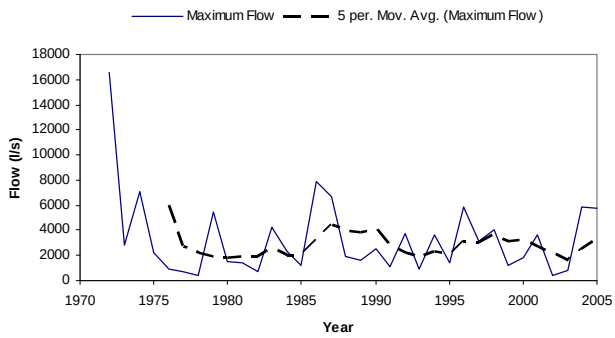
Flow (*l/s*)			
Minimum Flow	3	Maximum Flow	16540
Mean Annual Minimum Flow	9	Mean Annual Maximum Flow	3277
Mean Flow	69	Mean Summer Flow	42
Median Flow	40	Mean Autumn Flow	46
Mean Specific Flow (/km^2)	23	Mean Winter Flow	109
		Mean Spring Flow	77
Low Flow Distribution Fit	GEV	Peak Flow Distribution Fit	GEV
7 day Low Flow (Minimum)	4	Peak Flow (5 yr Return)	4705
7 Day Low Flow (Mean Annual)	9	Peak Flow (10 yr Return)	6722
7 day Low Flow (5 yr Return)	7	Peak Flow (20 yr Return)	9106
7 Day Low Flow (10 yr Return)	5	Peak Flow (50 yr Return)	13014
		Peak Flow (100 yr Return)	

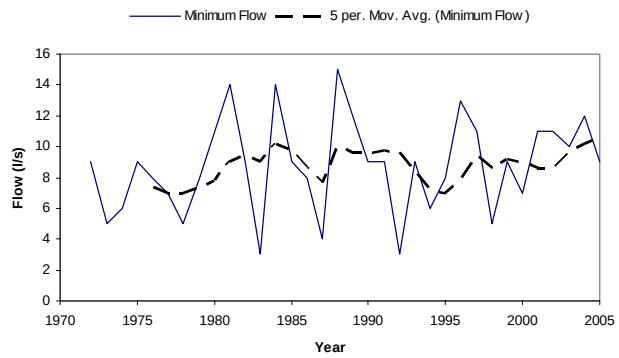
Annual Summaries

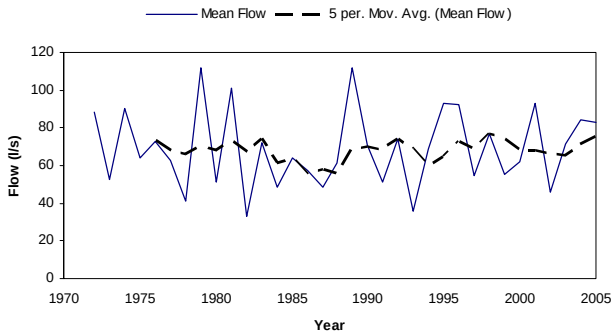
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	11	51	1508	1993	9	36	887
1981	14	101	1463	1994	6	69	3612
1982	9	33	687	1995	8	93	1401
1983	3	72	4202	1996	13	92	5908
1984	14	49	2348	1997	11	54	3114
1985	9	64	1206	1998	5	77	4008
1986	8	58	7857	1999	9	55	1222
1987	4	49	6661	2000	7	62	1784
1988	15	62	1934	2001	11	93	3621
1989	12	112	1623	2002	11	46	433
1990	9	71	2526	2003	10	71	809
1991	9	51	1071	2004	12	84	5821
1992	3	74	3735	2005	9	83	5803

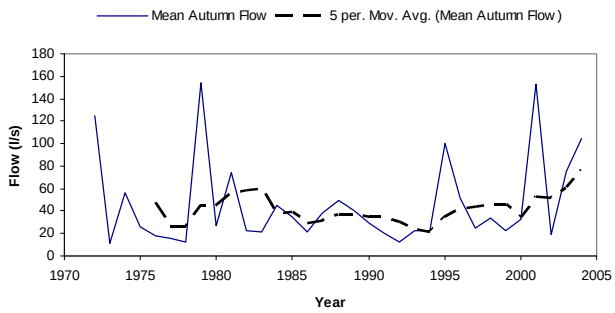
Flow Distribution

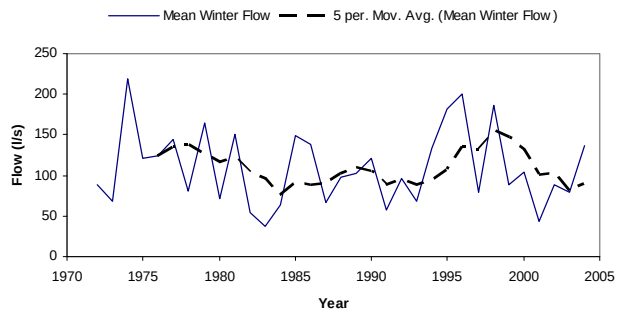
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	16540	435	305	253	221	200	183	171	161	152
10	146	140	134	129	124	120	115	111	107	103
20	100	97	93	90	88	85	83	80	78	75
30	73	70	68	67	64	62	60	58	57	55
40	54	52	51	49	48	47	45	44	43	41
50	40	39	38	37	36	35	34	33	33	32
60	31	30	29	29	28	27	27	26	25	25
70	24	23	23	22	21	21	20	19	19	18
80	18	17	17	16	15	15	14	14	13	13
90	12	12	11	11	10	10	9	8	7	6
100	3									

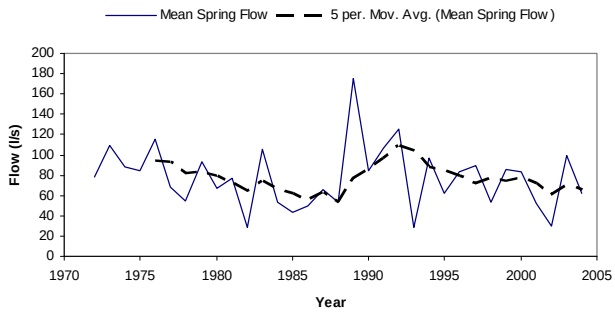


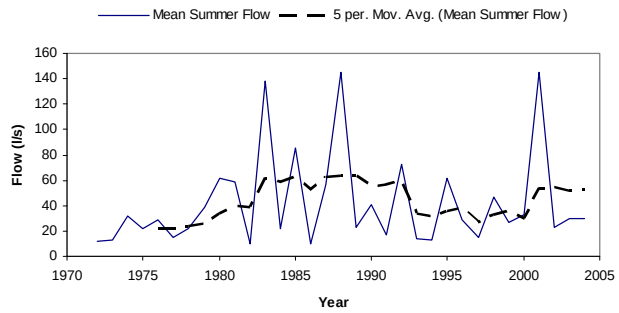












Mangawhai at Omokoroa

Environment Bay of Plenty
River Flow Recording Station

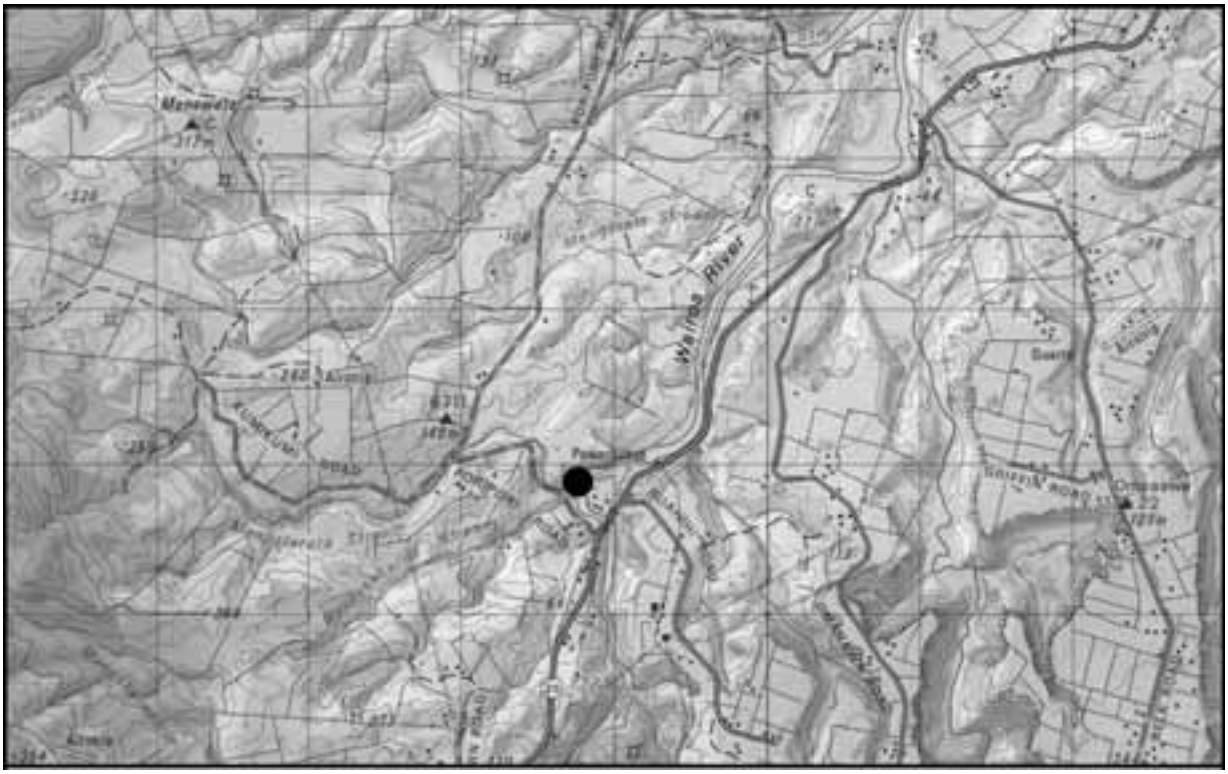
River	Wairoa	Site	Above Ruahihi
Site Number	14130	Grid Reference	U14:788 759
Start of Record	September 1990	Data Capture Rate	97%
Data Summary From	January 1991	To	December 2005
Data Audited From	September 1990	To	December 2005

Equipment History
Pressure transducer. 10mm resolution.

Comments on Stage/Discharge Ratings
Site control is by natural boulder rapid. The high stage rating (>4.5 metres area velocity curves. Therefore it is provisional at best, and high flow figures should be used with caution.

Ratings are available to convert Stage (mm) to Flow (l/s).

General Comments
When flow is combined with Wairoa at Power Station (14132), it gives a total flow for the Wairoa River downstream of the Ruahihi Power Station. Information is for use in Tauranga Harbour Investigations. Flow at this site is influenced by water released by Kaimai Hydropower. Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.



SITE LOCATION
Wairoa at Above Ruahihi

Station Comments

Wairoa River at Above Ruahihi. Site Number 14130, on River Number 141000.
The local recording authority is Environment Bay of Plenty
Flow past the site is influenced by water released from Lake McLaren by Kaimai Hydropower.

Gaugings are carried out by slackline except for gaugings below stage height 700mm. Gaugings below 700mm are wading gauging downstream of Ngutukakariki Tributary. Wading gauging sections have a very irregular x-section.

03/09/90 - Records commenced at 900903 111500. Instruments installed at site were a Kainga data logger recording at 15 minute interval with a 10 metre range pressure transducer with a stage resolution of +/-20mm.

08/02/91 - Missing record from 910208 at 090000 to 910212 at 141500 due to the WRIC datalogger malfunctioning.

11/04/91 - Missing record from 910411 at 104500 to 910417 at 143000 due to power supply failure.

05/10/91 - Missing record from 911005 at 090200 to 911010 at 113000 due to battery failure.

26/11/91 - Wading gaugings after 911126 are carried out approximately 500 metres below S.H. 29 Bridge. This includes the two side streams, Ngutukakariki and Mangataratara tributaries.

18/03/92 - Missing record from 920318 at 020100 to 920409 at 140000 due to low battery voltage.

29/09/92 - Missing record from 920929 at 91500 to 921023 at 160000 due to low battery voltage.

10/11/93 - Missing record from 931110 at 093000 to 931125 at 140000 due to short in power supply of datalogger.

28/11/93 - Missing record from 931128 at 011500 to 931213 at 103000 due to low battery voltage.

10/08/94 - Missing record from 940810 at 100000 to 940825 at 111500 due to datalogger failure.

12/09/94 - A close scrutiny of gauging cards revealed low quality gauging data as a result of poor gauging site selection. Consequently gaugings on the following dates have been deleted from Tideda records: 900903, 900918, 901101, 901213, 910304, 910411, 910513, 910605, 910611, 910725, 910809, 911126, 930408, 930629, 930915, 931006, 931026, 931110, 931213, 940506, 940603, 940912.

11/06/96 - Missing record 960611 at 170000 to 960612 at 100000 due to fault with logger.

07/08/97 - Missing record for the period 970807 at 1030000 to 970717 at 102400 due to transducer mount slipping.

01/01/98 - Data from 980101 at 0 to 1001116 at 163000 should be used with caution as the pressure transducer was overreading on peaks and had increased sensitivity at low stages. Analysis of stage data and calibrated releases of water by Trustpower identify an increasing over estimation of recorded stage as stage increases. Analysis of raw recorded readings versus external readings gave the following relationship;
ESG= 0.7789 x Raw recorded stage + 177mm (R2=0.9863). Stage values above 800mm were adjusted using this formulae to derive correct higher stage readings

16/07/98 - Missing record from 980716 at 034500 to 980609 at 114500 due to power supply failure.

05/05/99 - Missing record from 990505 at 161500 to 990615 at 113000 due to power supply failure.

21/07/00 - Missing record from 1000721 at 050000 to 1000811 at 123000 due to power supply failure.

12/10/04 - Missing record from 1041012 161500 to 1041012 231500 due to logger fault.

11/11/04 - Missing record from 1041111 163000 to 1041111 234500 due to logger fault.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	June 2006	Site Number	14130
Compiled by	Glenn Ellery	River	Wairoa
		Station	Above Ruahihi
Metric Map Reference	U14:788 759		
Catchment Area (km^2)	307.5	Period of Summary	1991 to 2005

Statistical Summary

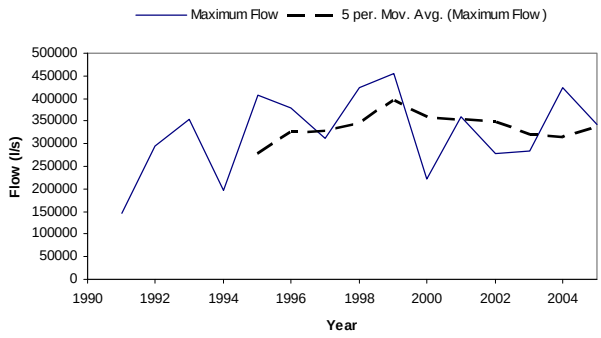
Flow (*l/s*)			
Minimum Flow	279	Maximum Flow	454790
Mean Annual Minimum Flow	403	Mean Annual Maximum Flow	325144
Mean Flow	3875	Mean Summer Flow	3189
Median Flow	698	Mean Autumn Flow	3215
Mean Specific Flow (/km^2)		Mean Winter Flow	5313
		Mean Spring Flow	3549
Low Flow Distribution Fit	GEV	Peak Flow Distribution Fit	GEV
7 day Low Flow (Minimum)	374	Peak Flow (5 yr Return)	409500
7 Day Low Flow (Mean Annual)	442	Peak Flow (10 yr Return)	439200
7 day Low Flow (5 yr Return)	413	Peak Flow (20 yr Return)	458700
7 Day Low Flow (10 yr Return)	395	Peak Flow (50 yr Return)	
		Peak Flow (100 yr Return)	

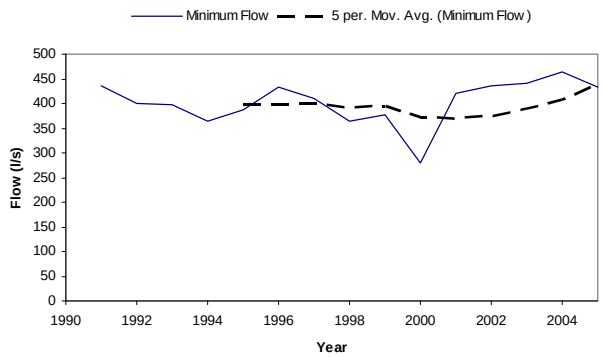
Annual Summaries

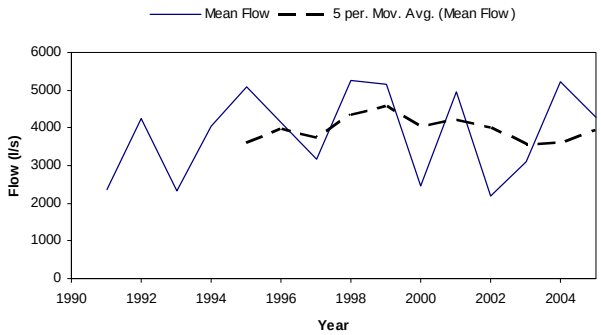
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993	398	2317	352641
1981				1994	365	4034	197153
1982				1995	388	5104	406699
1983				1996	433	4158	380446
1984				1997	410	3175	310721
1985				1998	365	5265	425500
1986				1999	378	5157	454790
1987				2000	279	2476	221103
1988				2001	420	4969	359420
1989				2002	435	2192	277410
1990				2003	440	3090	283641
1991	435	2347	145154	2004	463	5240	425334
1992	400	4254	295000	2005	433	4273	342149

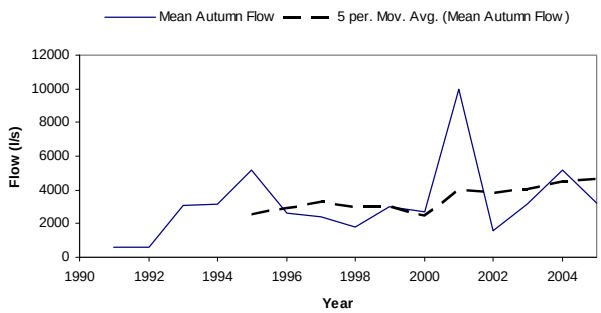
Flow Distribution

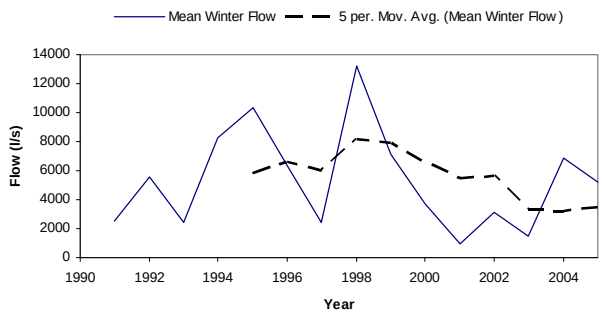
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	454790	55510	30906	21513	18366	15906	14447	12561	10754	9356
10	8174	7234	6436	5737	5097	4505	3968	3481	3023	2620
20	2308	2044	1826	1632	1470	1335	1231	1152	1087	1040
30	1006	977	951	928	908	887	870	853	836	822
40	809	796	783	770	760	749	739	728	718	708
50	698	689	679	669	661	653	646	639	632	624
60	617	610	604	598	592	586	580	574	568	562
70	556	550	545	540	535	530	526	521	516	511
80	506	501	496	492	488	484	480	476	472	468
90	464	460	456	452	448	444	432	419	407	394
100	279									

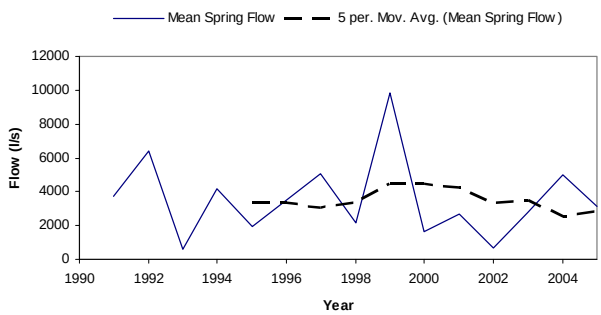

Maximum Flow
5 per. Mov. Avg. (Maximum Flow)
Flow (l/s)
Year

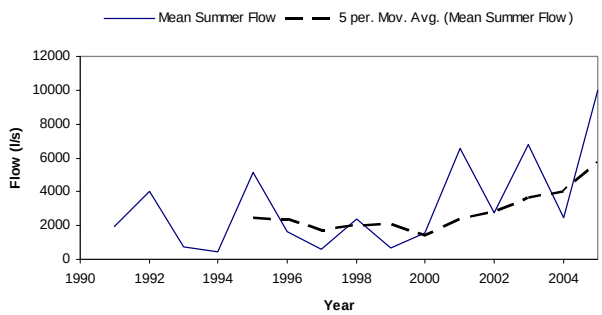

Minimum Flow
5 per. Mov. Avg. (Minimum Flow)
Flow (l/s)
Year


Mean Flow
5 per. Mov. Avg. (Mean Flow)
Flow (l/s)
Year


Mean Autumn Flow
5 per. Mov. Avg. (Mean Autumn Flow)
Flow (l/s)
Year


Mean Winter Flow
5 per. Mov. Avg. (Mean Winter Flow)
Flow (l/s)
Year


Mean Spring Flow
5 per. Mov. Avg. (Mean Spring Flow)
Flow (l/s)
Year


Mean Summer Flow
5 per. Mov. Avg. (Mean Summer Flow)
Flow (l/s)
Year

Environment Bay of Plenty
River Flow Recording Station

River	Wairoa	Site	Power Station
Site Number	14132	Grid Reference	U14:792 760
Start of Record	July 1993	Data Capture Rate	95%
Data Summary From	January 1994	To	December 2005
Data Audited From	January 1994	To	December 2005

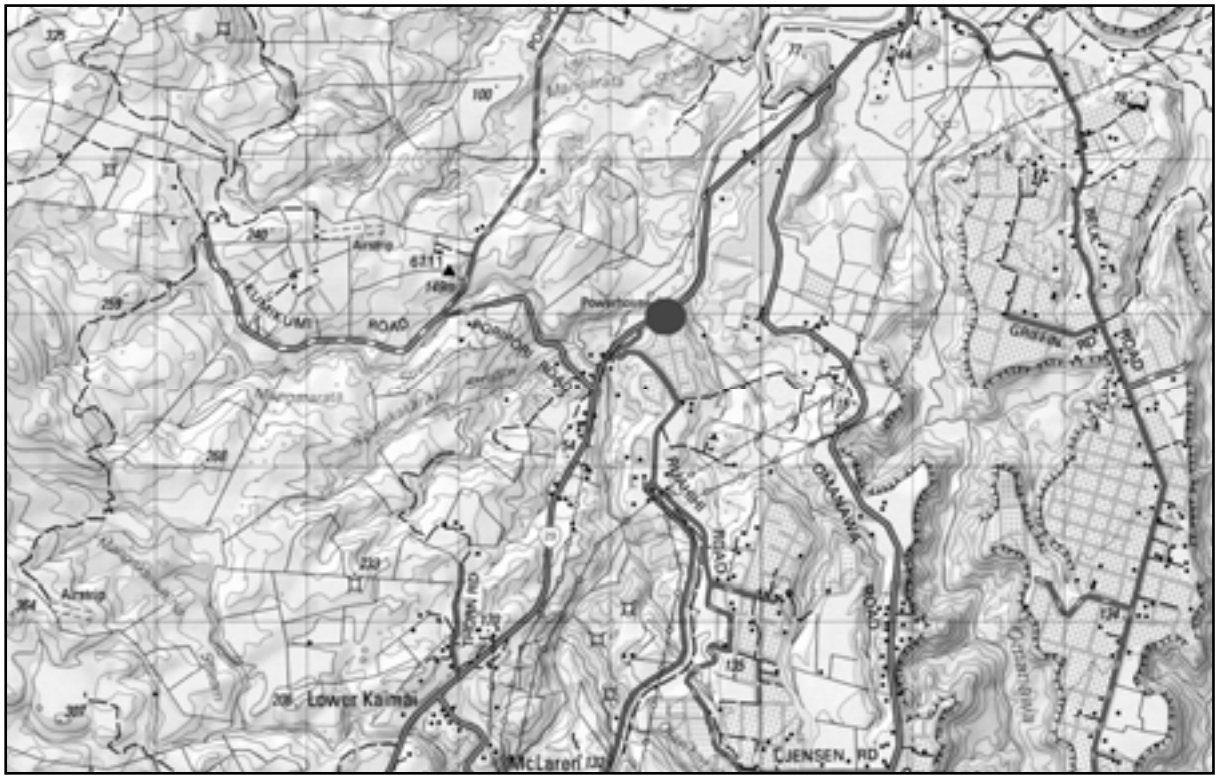
Equipment History Campbell CR10 Datalogger

Comments on Stage/Discharge Ratings

The catchment area is unnatural due to storage and piping being carried out for the Power Station. Datalogger measures turbine output and converts it back to flow through turbine.

General Comments

The site is installed as a Regional Monitoring Station for measuring flow input into Tauranga Harbour. The site is operated by Environment Bay of Plenty as part of its Natural Environment Monitoring Network.



SITE LOCATION
Wairoa at Power Station

Station Comments

Wairoa River at Ruahihi Power Station. Site Number 14132, on River Number 141000.

The local recording authority is Environment Bay of Plenty

The site is situated 12.5 kilometres from the river mouth.

Recorder installed is a Campbell datalogger. Output is in megawatts from generator 1 and 2. Combined generator output is then converted to flow using a rating table held on the datalogger.

10/07/93 - Site opened 930710 083600.

25/10/95 - Record for the period 951025 at 114500 to 951219 at 104500 not
Processed and may be missing record due to download file having
Been corrupted.

08/10/99 - Missing record for the period 991008 at 093000 to 991217 at 133000 due to corrupted data.

12/09/00 - Missing record from 1000912 at 103000 to 1000926 at 020000. Data lost from logger memory.

28/11/01 - Missing record from 1011128 at 131500 to 1011223 at 010000. Data lost from logger memory.

10/05/02 - Missing record from 1020510 at 123000 to 1020605 at 121500. Logger scrambled.

03/10/02 - Missing record from 1021003 at 110000 to 1021028 at 230000. Data lost.

29/07/03 - Missing record from 1030729 at 133000 to 1030810 at 040000. Data lost from logger memory. Data imported from trust power. Only total generation data supplied therefore data split equally in 2 to fit generator 1 and 2. Use this data with caution

24/06/04 - Missing record from 1040624 at 201500 to 1040807 at 043000. Data lost due to communication failure during downloading, and not being able to reconnect to logger. Data then written over on logger. Data imported from Trust Power. Only total generation data supplied therefore data split equally in 2 to fit generator 1 and 2. Use this data with caution.

10/10/04 - Data for Generator 1 recorded as 0 between 20041010 220000 and 20041223 121500. This is due to generator being removed from generation for routine maintenance.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	June 2006	Site Number	14132
Compiled by	Glenn Ellery	River	Wairoa
		Station	Power Station
Metric Map Reference	U14:792 760		
Catchment Area (km²)		Period of Summary	1994 to 2005

Statistical Summary

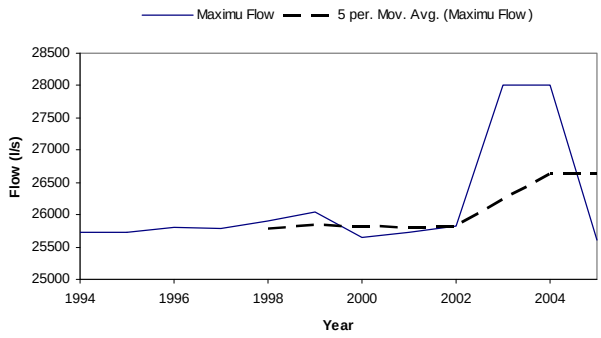
Flow (*l/s*)			
Minimum Flow	0	Maximum Flow	28000
Mean Annual Minimum Flow	0	Mean Annual Maximum Flow	26148
Mean Flow	12100	Mean Summer Flow	3459
Median Flow	11140	Mean Autumn Flow	5546
Mean Specific Flow (/km²)		Mean Winter Flow	11591
		Mean Spring Flow	7033
Low Flow Distribution Fit	GEV	Peak Flow Distribution Fit	GEV
7 day Low Flow (Minimum)	116	Peak Flow (5 yr Return)	26200
7 Day Low Flow (Mean Annual)	7192	Peak Flow (10 yr Return)	26700
7 day Low Flow (5 yr Return)	5729	Peak Flow (20 yr Return)	
7 Day Low Flow (10 yr Return)	4153	Peak Flow (50 yr Return)	
		Peak Flow (100 yr Return)	

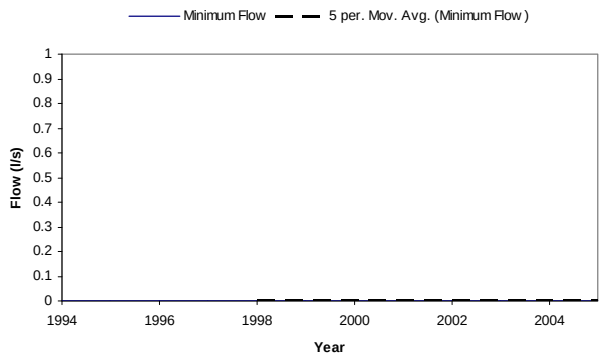
Annual Summaries

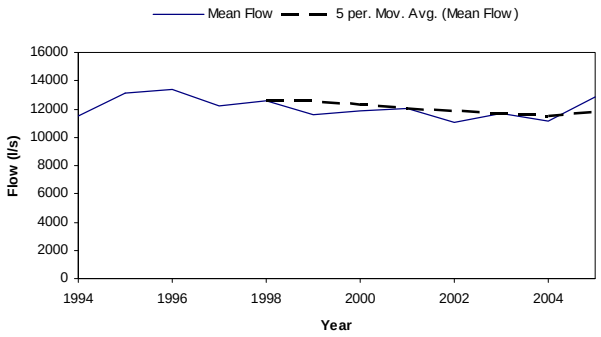
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993			
1981				1994	0	11515	25730
1982				1995	0	13110	25720
1983				1996	0	13410	25810
1984				1997	0	12214	25780
1985				1998	0	12627	25900
1986				1999	0	11611	26040
1987				2000	0	11842	25640
1988				2001	0	12053	25720
1989				2002	0	11047	25830
1990				2003	0	11676	28000
1991				2004	0	11111	28000
1992				2005	0	12878	25600

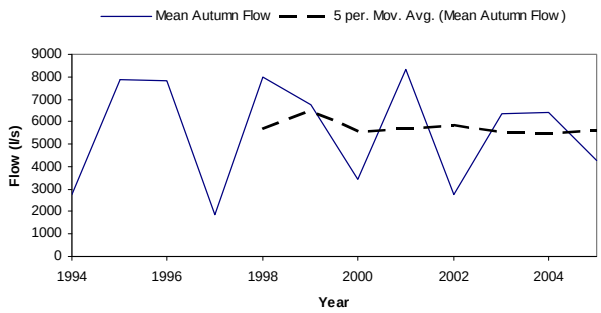
Flow Distribution

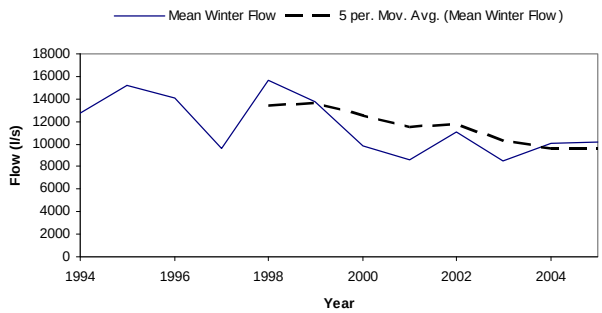
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	28000	25440	25334	25262	25195	25120	25049	24970	24862	24705
10	24379	23791	23395	23008	22404	22271	22194	22139	22098	22059
20	22022	21997	21964	21929	21898	21865	21825	21787	21728	21652
30	21309	20125	17957	14945	13490	13412	13381	13320	13264	13156
40	12904	12542	12339	12089	11691	11435	11257	11211	11190	11164
50	11140	11120	11101	11091	11075	11058	11039	11020	11006	10992
60	10972	10952	10930	10907	10893	10867	10835	10800	10754	10549
70	10160	9988	8473	4699	269	113	13	12	12	11
80	10	10	9	9	8	8	7	7	6	6
90	5	5	4	4	3	3	2	2	1	1
100	0									

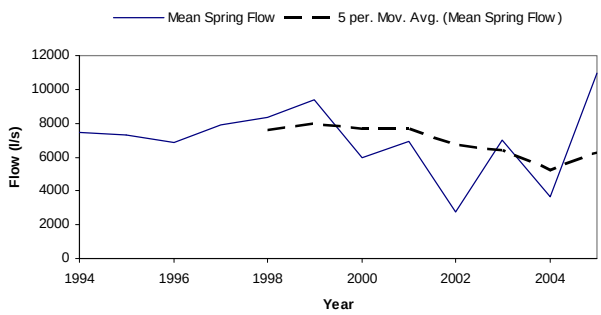

Maximu Flow
5 per. Mov. Avg. (Maximu Flow)
Flow (l/s)
Year

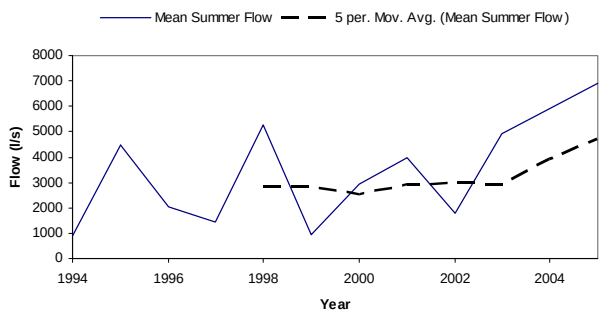

Minimum Flow
5 per. Mov. Avg. (Minimum Flow)
Flow (l/s)
Year


Mean Flow
5 per. Mov. Avg. (Mean Flow)
Flow (l/s)
Year


Mean Autumn Flow
5 per. Mov. Avg. (Mean Autumn Flow)
Flow (l/s)
Year


Mean Winter Flow
5 per. Mov. Avg. (Mean Winter Flow)
Flow (l/s)
Year


Mean Spring Flow
5 per. Mov. Avg. (Mean Spring Flow)
Flow (l/s)
Year


Mean Summer Flow
5 per. Mov. Avg. (Mean Summer Flow)
Flow (l/s)
Year

Environment Bay of Plenty
River Flow Recording Station

River	Kopurereroa	Site	S.H.29 Bridge
Site Number	14302	Grid Reference	U14:843 805
Start of Record	October 1980	Data Capture Rate	99%
Data Summary From	January 1991	To	December 2005
Data Audited From	June 1990	To	December 2005

Equipment History

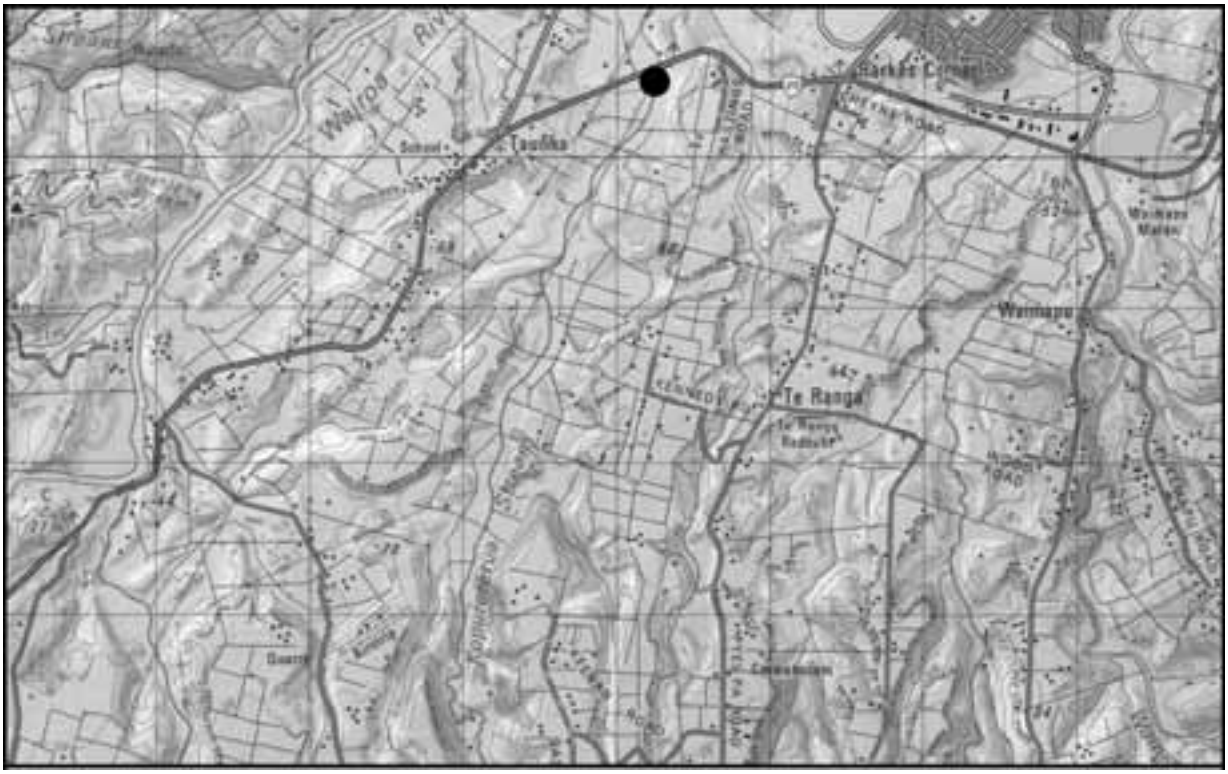
23/10/80: 6 metre monthly Foxboro chart recorder.
01/09/81: 3 metre monthly Foxboro chart recorder.
30/01/86: All equipment removed from site.
16/06/86: 6 metre monthly Foxboro chart recorder.
02/08/90: 5 metre range P.T. & WRIC datalogger.
05/12/91: P.T. & WRIC remain as backup.

Comments on Stage/Discharge Ratings

Control is by natural channel. Numerous rating changes have occurred due to the nature of the control. Ratings are available to convert Stage (mm) to Flow (*l/s*).

General Comments

The site was originally installed downstream of the bridge by the B.O.P.C.C. to collect flood level and flow data. The site is operated by Environment of Plenty as part of its Natural Environment Regional Monitoring Network. Upstream water extraction affects stage and flow records.



SITE LOCATION
Kopurereroa at S.H.29 Bridge

Station Comments

Kopurereroa River at S.H.29 Bridge. Site Number 14302, on River Number 14300.

The local recording authority is Environment Bay of Plenty.

Site established on downstream side of S.H.29 Bridge. Site is affected by pumping extractions. Lambrecht rainfall recorder installed at Williams Road in September 1980 NZMS 260 reference U15:844 695 (later to be shifted along the road to NZMS 260 Reference U15:843 692). This rainfall site is called "Williams Road" and has a Meteorological Service number of B76812.

01/09/81 - Foxboro removed and a new foxboro installed with a range of 3.0 meter, monthly. Stage resolution of 28mm per 1mm recorded. Time resolution of 281 minutes per 1mm recorded.

19/06/85 - Foxboro recorder and staff gauges moved to upstream side of S.H.29 Bridge

16/06/86 - 6 meter monthly foxboro installed 860616 105959. Stage resolution of 57mm per 1mm recorded. Time resolution of 281 minutes per 1mm recorded

27/06/90 - Stage discharge ratings commence.

02/08/90 - Foxboro removed 900802 and a 5 metre range pressure transducer
connected to a wric datalogger was installed. Stage resolution of 1mm and time resolution of 15 minutes.

05/12/91 - Site converted from pressure transducer with datalogger to a Leupold and Stevens. Stage resolution of 1mm and time resolution of 15 minutes. First tape commences 911205 at 150100.

26/12/91 - Missing record from 911226 at 021500 to 920110 at 115900 due to recorder failure.

22/05/96 - Missing data 960522 at 201500 to 960619 at 103000 due to float tape jamming. secondary data from transducer used to fill gap.

08/0//2003 - Major expansion of bridge crossing began sometime between 20030808 at 151500 and 20030908 at 134500. Works altered profile of banks upstream and downstream of bridge. Top end of rating is unlikely to change as bridge abutments controls were not changed, however medium stage height discharge relationship are altered due to bank profile changes.

08/09/03 - Missing record 20030908 at 134500 to 20030910 at 120000 due to memory overwrite.

31/08/04 - Missing record 20040831 at 123000 to 20040831 at 130000 due to lose of power during equipment install.

16/09/04 - Missing record 20040916 134500 to 153000 due to installation of new pt.

25/12/05 - Missing record 20051225 003000 to 20051228 211500 due to logger programme failure **.**

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	July 2006	Site Number	14302
Compiled by	Glenn Ellery	River	Kopurereroa
		Station	S.H.29 Bridge
Metric Map Reference	U14:843 805		
Catchment Area (km²)	60	Period of Summary	1994 to 2005

Statistical Summary

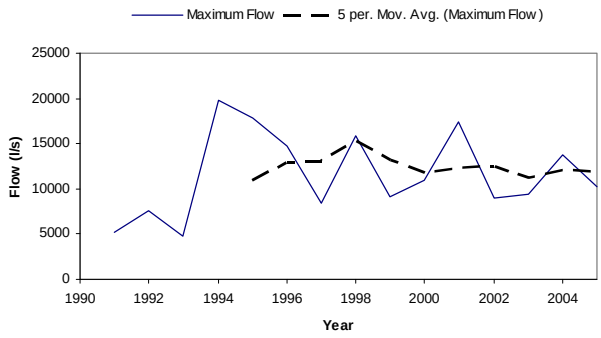
Flow (*l/s*)				
Minimum Flow	1093	Maximum Flow		19778
Mean Annual Minimum Flow	1337	Mean Annual Maximum Flow		11601
Mean Flow	1867	Mean Summer Flow		1689
Median Flow	1715	Mean Autumn Flow		1814
Mean Specific Flow (/km²)	31	Mean Winter Flow		2017
		Mean Spring Flow		1834
Low Flow Distribution Fit	GEV	Peak Flow Distribution Fit	GEV	Gumbel
7 day Low Flow (Minimum)	1196	Peak Flow (5 yr Return)	16500	16700
7 Day Low Flow (Mean Annual)	1420	Peak Flow (10 yr Return)	20000	20600
7 day Low Flow (5 yr Return)	1336	Peak Flow (20 yr Return)	23400	24500
7 Day Low Flow (10 yr Return)	1281	Peak Flow (50 yr Return)		
		Peak Flow (100 yr Return)		

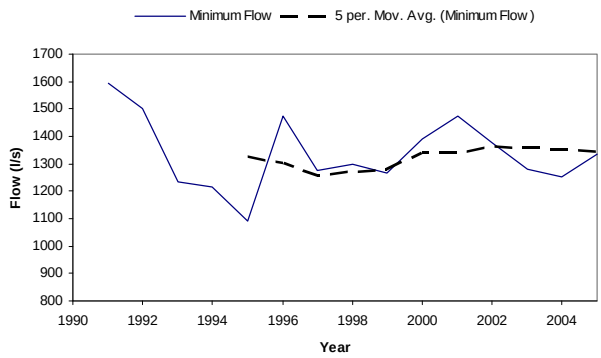
Annual Summaries

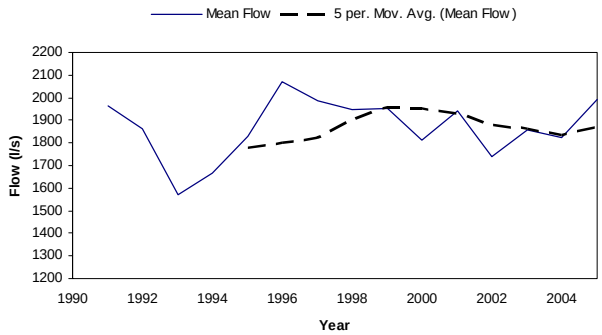
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993	1233	1572	4760
1981				1994	1215	1664	19778
1982				1995	1093	1831	17821
1983				1996	1475	2070	14765
1984				1997	1276	1988	8415
1985				1998	1297	1946	15816
1986				1999	1268	1953	9192
1987				2000	1391	1813	10976
1988				2001	1473	1944	17373
1989				2002	1377	1738	9052
1990				2003	1279	1856	9399
1991	1596	1964	5151	2004	1252	1821	13772
1992	1502	1862	7537	2005	1335	1991	10212

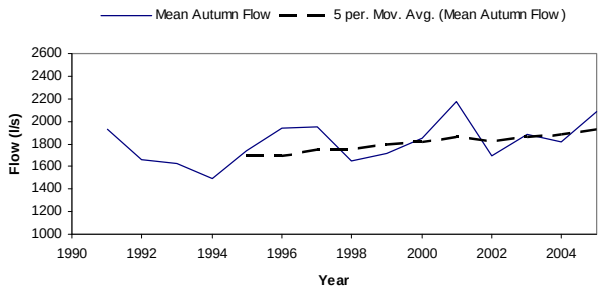
Flow Distribution

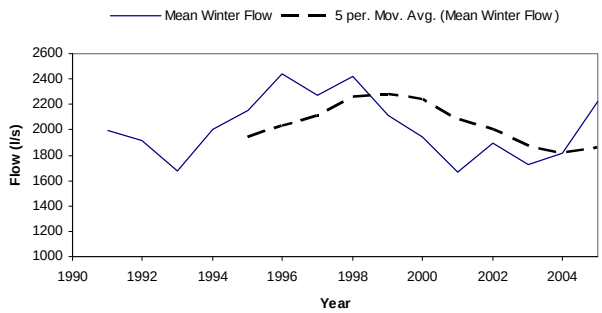
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	19778	5525	3947	3279	2891	2656	2513	2412	2334	2274
10	2227	2187	2153	2125	2100	2076	2054	2032	2011	1993
20	1977	1963	1949	1937	1923	1911	1900	1889	1879	1869
30	1860	1851	1842	1834	1826	1818	1810	1803	1796	1789
40	1782	1775	1769	1763	1756	1749	1742	1735	1728	1722
50	1715	1708	1701	1694	1687	1680	1674	1668	1662	1656
60	1649	1643	1637	1630	1624	1618	1612	1607	1601	1595
70	1590	1584	1578	1573	1567	1561	1555	1549	1543	1536
80	1530	1523	1516	1509	1502	1495	1487	1479	1472	1462
90	1452	1440	1429	1417	1403	1387	1368	1350	1327	1293
100	1093									

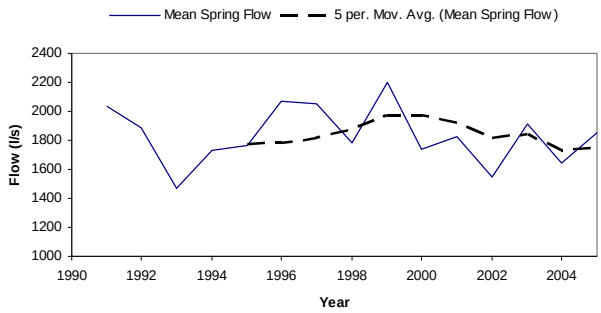

Maximum Flow
5 per. Mov. Avg. (Maximum Flow)
Flow (l/s)
Year

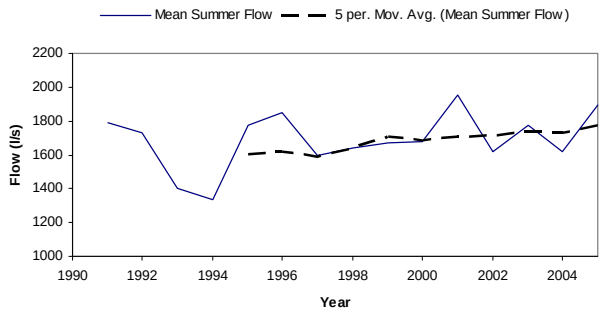

Minimum Flow
5 per. Mov. Avg. (Minimum Flow)
Flow (l/s)
Year


Mean Flow
5 per. Mov. Avg. (Mean Flow)
Flow (l/s)
Year


Mean Autumn Flow
5 per. Mov. Avg. (Mean Autumn Flow)
Flow (l/s)
Year


Mean Winter Flow
5 per. Mov. Avg. (Mean Winter Flow)
Flow (l/s)
Year


Mean Spring Flow
5 per. Mov. Avg. (Mean Spring Flow)
Flow (l/s)
Year


Mean Summer Flow
5 per. Mov. Avg. (Mean Summer Flow)
Flow (l/s)
Year

Environment Bay of Plenty
River Flow Recording Station

River	Waimapu	Site	McCarrolls Farm
Site Number	14410	Grid Reference	U14: 871 768
Start of Record	June 1990	Data Capture Rate	97%
Data Summary From	January 1991	To	December 2005
Data Audited From	June 1990	To	December 2005

Equipment History

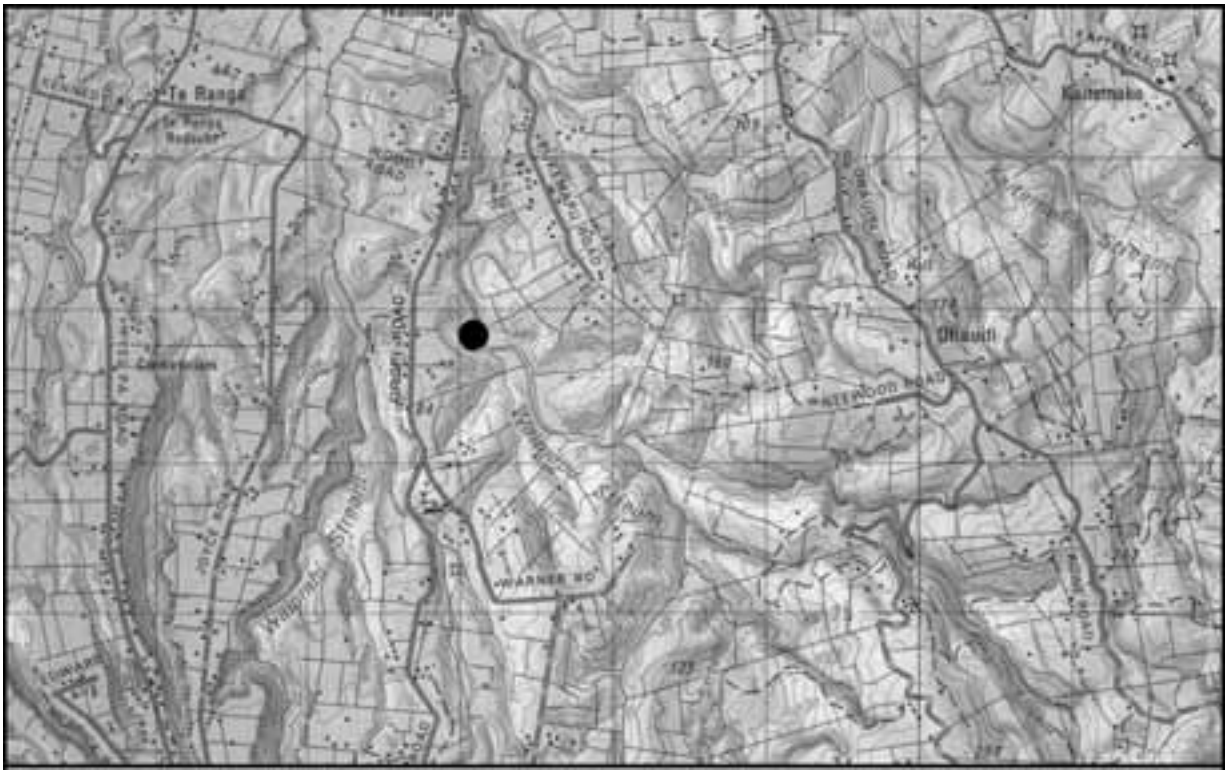
28/06/90: 5 metre range P.T. & WRIC datalogger.
20/05/93: Float with 15 minutes L&S digital recorder.
03/07/97: Float with Campbell CR500 datalogger.

Comments on Stage/Discharge Ratings

Control is by natural rock bed. Ratings available to convert stage (mm) to flow (l/s).

General Comments

Site installed as part of the Tauranga Harbour investigations. Site was relocated 300 metres upstream in 1993. Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.



SITE LOCATION
Waimapu at McCarrolls Farm

Station Comments

Waimapu River at McCarrolls Farm. Site Number 14410, on River Number 144000.

The local recording authority is Environment Bay of Plenty

This station was installed in June 1990 by Environment Bay of Plenty as part of the Tauranga Harbour investigations project.

28/06/90 - Stream flow records for this site commence at 900628 130000. Kainga logger with a time resolution of 15 minutes and 5 metre range pressure transducer installed.

11/07/90 - Missing data from 900711 at 110000 to 900726 at 114500. Cause unknown.

08/08/90 - Missing record from 900808 at 111500 to 900823 at 113000. No data was recorded on datapak when viewed.

28/08/90 - Missing record from 900828 at 033000 to 900904 at 104500. Synthetic data based on comparisons with nearby site Kopurereroa at SH.29 (site no. 14302) has been inserted.

20/11/91 - Missing record from 911120 at 164500 to 911219 at 121500 was due to equipment failure.

24/01/92 - Missing record from 920124 at 094600 and 920210 at 090100. Equipment failure.

11/05/92 - Missing record from 920511 at 113000 to 920710 at 094500 due to equipment failure.

20/05/93 - Site moved approximately 300 metres upstream and upgraded from a WRIC logger/pressure transducer (lower site) to a new stilling well recorder station (upstream site). There will be a slight reduction in catchment area from 56.72 km^2 to 56.6 km^2. The site name (McCarrolls Farm) and site number (14410) will remain the same. The stage/discharge relationship will change. The move to the new site will not alter flows but will alter levels. Upstream records commence 930520 160000. Control is broad rock control and thus will not be prone to regular rating changes. Available low flow gauging section has a broad x-section with very slow velocities.

New instrumentation consists of an L&S float recorder with a stage resolution of 1mm stage per 1 mm recorded and a time resolution of 15 minutes.

03/07/97 - Handar rotary encoder and Campbell CR500 datalogger installed. Recorder has a stage resolution of 1mm and time resolution of 15 minutes.

07/02/95 - Missing data from 950207 at 120000 to 950220 at 110000. Power supply failure.

29/06/96 - Missing record from 960629 at 114500 to 960715 at 101500 due to tape ripping on recorder.

10/06/97 - Missing record from 970610 at 111500 to 970619 at 120400 due to tape jamming.

03/07/97 - Handar rotary encoder and Campbell CR500 datalogger installed. Recorder has a stage resolution of 1mm and time resolution of 15 minutes.

@@ 14410 1041215 213000
15/12/04 - Missing record from 1041215 213000 to 1041222 100000 due to encoder failure.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	July 2006	Site Number	14410
Compiled by	G R Ellery	River	Waimapu
		Station	McCarrols Farm
Metric Map Reference	U14:871 768		
Catchment Area (km^2)	56.6	Period of Summary	1991 to 2005

Statistical Summary

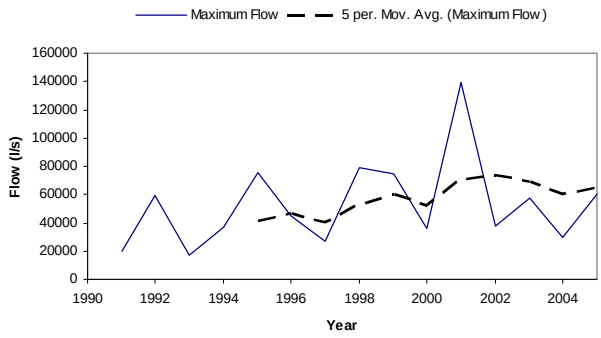
Flow (*l/s*)				
Minimum Flow	621	Maximum Flow		139475
Mean Annual Minimum Flow	769	Mean Annual Maximum Flow		52991
Mean Flow	2129	Mean Summer Flow		1667
Median Flow	1448	Mean Autumn Flow		1809
Mean Specific Flow (/km^2)	38	Mean Winter Flow		2988
		Mean Spring Flow		1809
Low Flow Distribution Fit	Gumbel	Peak Flow Distribution Fit	Gumbel	GEV
7 day Low Flow (Minimum)	679	Peak Flow (5 yr Return)	52577	50258
7 Day Low Flow (Mean Annual)	764	Peak Flow (10 yr Return)	94203	93806
7 day Low Flow (5 yr Return)	721	Peak Flow (20 yr Return)	112112	115199
7 Day Low Flow (10 yr Return)	697	Peak Flow (50 yr Return)		
		Peak Flow (100 yr Return)		

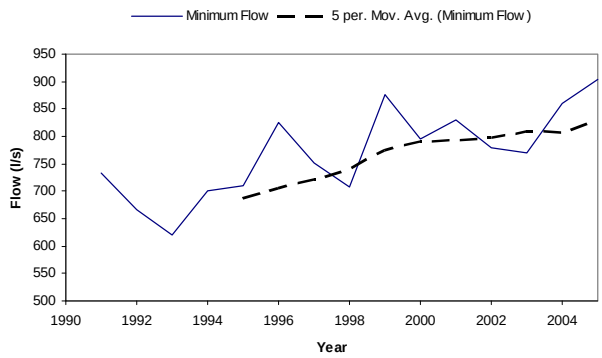
Annual Summaries

Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993	621	1301	16871
1981				1994	701	1812	36831
1982				1995	711	2836	75845
1983				1996	826	2280	45300
1984				1997	751	1781	26582
1985				1998	708	2514	79186
1986				1999	877	2349	74327
1987				2000	795	2053	35968
1988				2001	830	2693	139475
1989				2002	780	1563	37839
1990				2003	769	2077	57143
1991	733	1683	19596	2004	860	2296	29988
1992	667	2179	59566	2005	905	2456	60342

Flow Distribution

Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	139475	12601	8810	7133	6123	5433	4930	4552	4262	4024
10	3808	3610	3438	3282	3137	3012	2912	2807	2702	2611
20	2522	2449	2382	2310	2252	2196	2147	2101	2052	2012
30	1970	1932	1892	1857	1832	1798	1765	1741	1709	1686
40	1665	1642	1623	1597	1576	1553	1528	1506	1487	1470
50	1448	1429	1408	1395	1380	1362	1345	1331	1314	1298
60	1283	1266	1248	1231	1214	1198	1180	1164	1147	1129
70	1110	1092	1073	1057	1040	1025	1009	994	981	966
80	949	937	926	911	900	891	881	872	862	849
90	836	823	812	801	790	778	767	753	734	716
100	621									


Maximum Flow
5 per. Mov. Avg. (Maximum Flow)
Flow (l/s)
Year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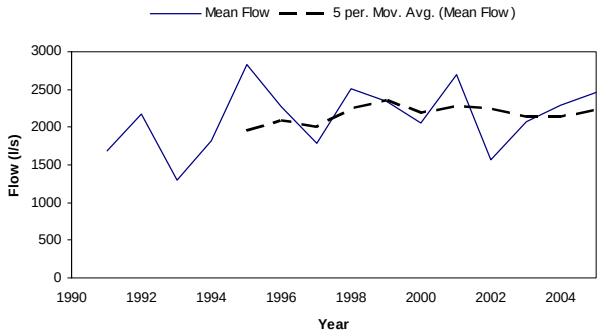
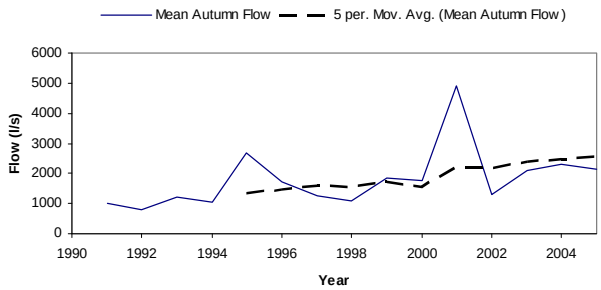
5 per. Mov. Avg. (Minimum Flow)
Flow (l/s)
Year


Mean Flow
5 per. Mov. Avg. (Mean Flow)
Flow (l/s)
Year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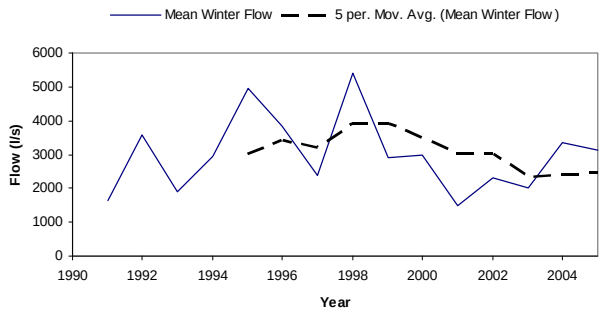
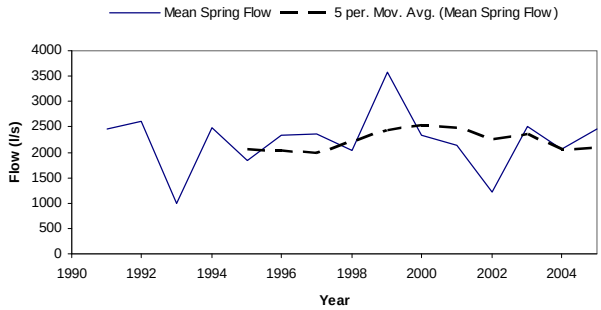
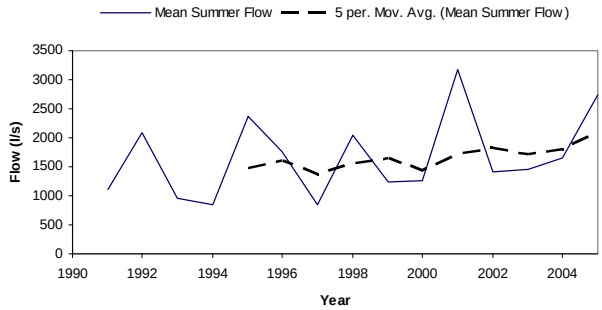
5 per. Mov. Avg. (Mean Autumn Flow)
Flow (l/s)
Year


Mean Winter Flow
5 per. Mov. Avg. (Mean Winter Flow)
Flow (l/s)
Year


Mean Spring Flow
5 per. Mov. Avg. (Mean Spring Flow)
Flow (l/s)
Year


Mean Summer Flow
5 per. Mov. Avg. (Mean Summer Flow)
Flow (l/s)
Year

Environment Bay of Plenty
River Flow Recording Station

River	Raparapahoe	Site	U/S Drop Structure
Site Number	1114651	Grid Reference	U14:017 766
Start of Record	March 1992	Data Capture Rate	96%
Data Summary From	January 1993	To	December 2005
Data Audited From	March 1992	To	December 2005

Equipment History

23/09/91 6 metre range monthly Foxboro. Stage resolution 57mm, time resolution of 281 minutes.
15/08/95 Datalogger with 5 metre pressure transducer installed. Stage resolution 5mm, time resolution 15 minutes.

Comments on Stage/Discharge Ratings

Control is by downstream drop structure. Ratings available to convert stage (mm) to flow (*l/s*).

General Comments

Site is operated by Environment Bay of Plenty and is part of the Kaituna River scheme flood protection investigations.

SITE LOCATION
Raparapahoe at U/S Drop Structure

Station Comments

Raparapahoe at Drop Structure. Site Number 1114651, on River Number 146000.

The site is situated 16.4 kilometres from mouth and replaces Raparapahoe at Manoeka Road Bridge (14630).
The local recording authority is Environment Bay of Plenty. Drop structure was installed by Environment Bay of Plenty on 22/11/88.

Top end rating based upon combination of flow gauging measurement along with output from Mike11modelled flow over drop structure.

23/09/91 - Site erected and 6 metre monthly Foxboro recorder installed.

15/08/95 - Foxboro recorder removed. Data logger with a time resolution of 15 minutes and a 5 metre pressure transducer with a stage resolution of 5mm installed.

18/10/91 - Missing record from 911018 at 090000 to 911120 at 093000 due to faulty recorder.

09/05/94 - Missing record 940509 at 122900 to 940624 at 103600 due to faulty recorder

16/07/94 - Missing record from 940716 at 80900 to 940811 at 122800 due to faulty recorder

18/09/94 - Missing record from 940918 at 120000 to 941012 at 132600 due to faulty recorder

22/11/94 - Missing record from 941122 at 145000 to 941213 at 134500 due to recorder malfunction.

24/12/94 - Missing record from 941224 at 050000 to 950110 at 151500 due to recorder malfunction.

29/06/97 - Missing record from 970629 at 051500 to 970711 at 120000 due to power supply failure.

08/02/98 - Missing record from 980208 at 121500 to 980217 at 140000 due to transducer being buried in silt.

13/07/98 - Missing record from 980713 at 203000 to 980717 at 091500 due to low battery.

13/07/98 - Data from 980713 at 203000 to 1000204 at 094500 affected by what appears to be a fault with the pressure transducer. Data should be used with caution.

04/06/99 - Missing record from 990604 at 140000 to 990609 at 134500 due to low battery.

18/02/00 - Missing record from 20000218 at 170000 to 20000229 at 113000 due to ISD pressure transducer being repaired.

08/05/02 - Missing record from 1020508 100000 to 1020513 114500. Unknown reason but gap coincides with 2002 annual inspection, may have accidently left power off.

19/06/02 - Missing record from 20020619 at 133000 to 20020703 at 101500 due to low battery.

04/08/04 - Missing record from 20040804 123000 to 20040807 154500. Gap coincides with inspection may have knocked off power lead.

20/07/04 - Missing record from 20050720 130000 to 20050722 130000 due to logger failure.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	May 2006	Site Number	1114651
Compiled by	Glenn Ellery	River	Raparapahoe
		Station	U/S Drop Structure
Metric Map Reference	U14:017 766		
Catchment Area (km^2)	46.36	Period of Summary	1992 to 2005

Statistical Summary

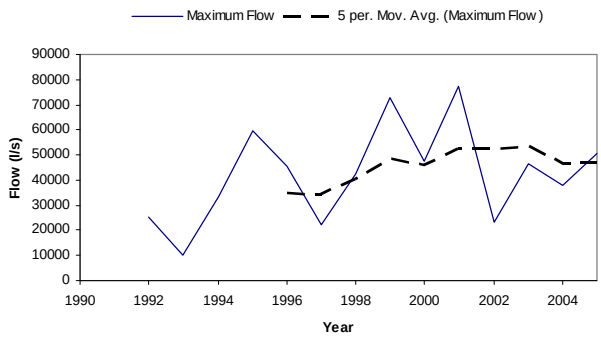
Flow (*l/s*)			
Minimum Flow	249	Maximum Flow	77163
Mean Annual Minimum Flow	577	Mean Annual Maximum Flow	42440
Mean Flow	1852	Mean Summer Flow	1515
Median Flow	1284	Mean Autumn Flow	1706
Mean Specific Flow (/km^2)	40	Mean Winter Flow	2350
		Mean Spring Flow	1904
Low Flow Distribution Fit	GEV	Peak Flow Distribution Fit	Assessed
7 day Low Flow (Minimum)	399	Peak Flow (5 yr Return)	53500
7 Day Low Flow (Mean Annual)	674	Peak Flow (10 yr Return)	66400
7 day Low Flow (5 yr Return)	574	Peak Flow (20 yr Return)	79300
7 Day Low Flow (10 yr Return)	498	Peak Flow (50 yr Return)	
		Peak Flow (100 yr Return)	

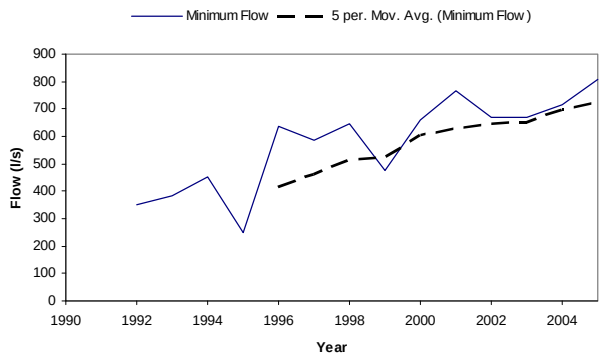
Annual Summaries

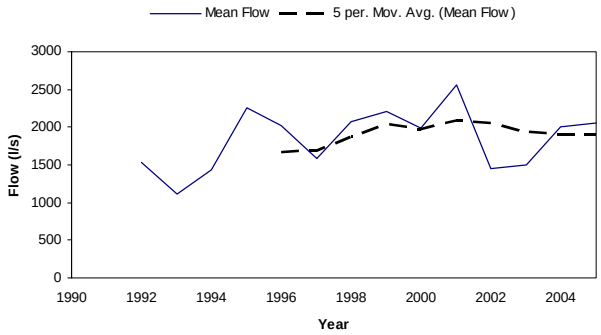
Year	Flow (*l/s*)				Year	Flow (*l/s*)		
	Minimum	Mean	Maximum			Minimum	Mean	Maximum
1980					1993	381	1117	9880
1981					1994	451	1432	33544
1982					1995	249	2260	59782
1983					1996	637	2020	45546
1984					1997	588	1586	22066
1985					1998	648	2080	42315
1986					1999	477	2212	73042
1987					2000	662	1981	47474
1988					2001	766	2556	77163
1989					2002	671	1442	23130
1990					2003	667	1498	46302
1991					2004	716	2005	38161
1992	352	1535	25223		2005	810	2056	50537

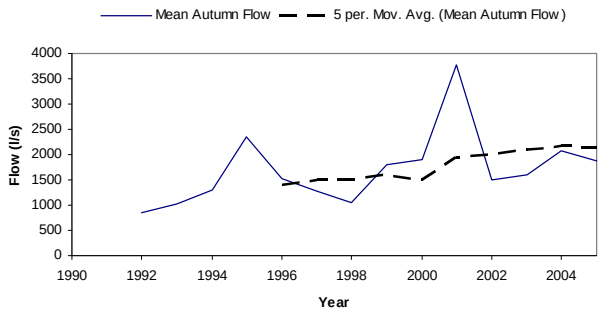
Flow Distribution

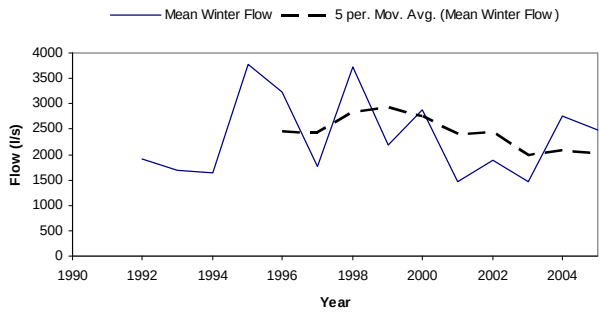
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	77163	11477	7616	6086	5170	4539	4103	3756	3494	3272
10	3101	2951	2809	2683	2572	2473	2386	2307	2238	2174
20	2112	2057	2008	1963	1925	1880	1840	1803	1769	1735
30	1706	1675	1649	1620	1596	1570	1544	1521	1501	1480
40	1461	1441	1420	1401	1383	1367	1350	1331	1315	1299
50	1284	1268	1256	1240	1227	1213	1200	1186	1174	1160
60	1147	1134	1123	1109	1098	1085	1074	1061	1050	1037
70	1024	1012	999	987	975	963	953	943	933	922
80	909	898	887	873	861	848	835	821	807	793
90	779	764	750	736	721	703	682	645	598	530
100	249									

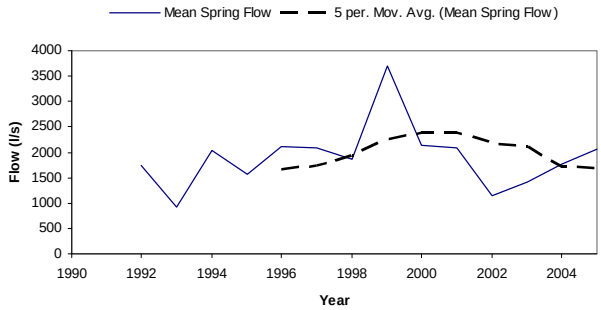

Maximum Flow
5 per. Mov. Avg. (Maximum Flow)
Flow (l/s)
Year

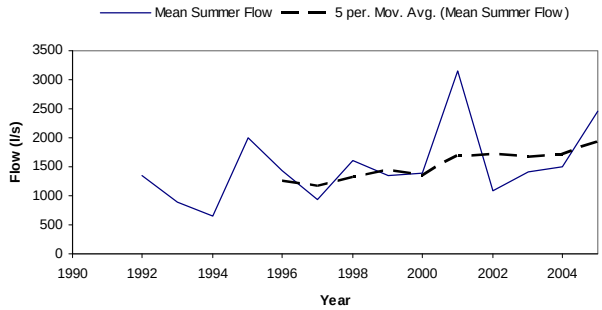

Minimum Flow
5 per. Mov. Avg. (Minimum Flow)
Flow (l/s)
Year


Mean Flow
5 per. Mov. Avg. (Mean Flow)
Flow (l/s)
Year


Mean Autumn Flow
5 per. Mov. Avg. (Mean Autumn Flow)
Flow (l/s)
Year


Mean Winter Flow
5 per. Mov. Avg. (Mean Winter Flow)
Flow (l/s)
Year


Mean Spring Flow
5 per. Mov. Avg. (Mean Spring Flow)
Flow (l/s)
Year


Mean Summer Flow
5 per. Mov. Avg. (Mean Summer Flow)
Flow (l/s)
Year

Environment Bay of Plenty
River Flow Recording Station

River	Waiari	Site	Muttons
Site Number	14627	Grid Reference	U14:034 706
Start of Record	November 1966	Data Capture Rate	96%
Data Summary From	January 1967	To	January 1995
Data Audited From	January 1982	To	July 1995

Equipment History

09/11/66: Staff gauge and chart recorder.
21/01/79: Backup Foxboro chart recorder.
10/02/82: Backup Foxboro removed.
26/02/68: Float with F&P digital recorder.
21/01/82: Float with L&S digital recorder.
29/3/94: P.T. & WRIC datalogger.

Comments on Stage/Discharge Ratings

Site control is by natural channel. Due to variable bed scour a number of railway irons have been driven into the bed to stabilise the control. The scouring has caused numerous rating changes at this site. Ratings are available to convert Stage (mm) to Flow (l/s).

General Comments

The local recording authority was the Hamilton Hydrological survey until 22/01/82. Site was operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network. Fluctuations in water level are caused by water extraction upstream of the site for Te Puke's potable water supply. Due to the lowering of the bed level the intake pipes have become inoperative. Initially a siphon system partially overcame this problem, then a pressure transducer was installed. Site closed in July 1995. NIWA now operates alternate site within the catchment.

SITE LOCATION
Waiari at Muttons

Station Comments

Waiari at Muttons. Site Number 14627, on River Number 146030.

The local recording authority is Environment Bay of Plenty

Site is subject to large bed movements. Large changes in shape and position of ratings occur.

21/01/82 - Site handed over to B.O.P.C.C. on 820122. Instruments operating at the site

09/05/83 - Data from 830509 103000 to 850912 130000 is suspect at lower stages (less than 0.2 metres) due to the use of a siphon between the river and the stilling well. This was utilised as the intakes were out of the water at lower stages.

16/12/83 - Missing record 831216 at 144500 to 840211 at 063000 due to stilling well siltation problems.

12/02/84 - Missing record 840212 at 90000 to 840213 at 110000 due to stilling well siltation problems.

17/03/84 - Missing record 840317 at 240000 to 840331 at 143000 due to stilling well siltation problems.

04/04/84 - Missing record 840404 at 110000 to 840501 at 130000 due to stilling well siltation problems.

12/02/85 - Missing record from 850212 at 023000 to 850228 at 130000 due to stilling well intake problems

02/03 85 - Missing record from 850302 at 074500 to 850306 at 130000 due to recorder malfunction.

11/03/85 - Missing record from 850311 at 160000 to 850315 at 203000 due to recorder malfunction.

19/03/85 - Missing record from 850319 at 024500 to 850507 at 101500 due to recorder malfunction.

16/06/85 - Missing record from 850616 at 193000 to 850912 at 130000 due to power supply failure.

09/10/85 - Monthly 3 metre range Foxboro chart recorder chart recorder installed as backup recorder. Recorder has a stage resolution of 28mm per 1mm recorded and a 281 time resolution of minutes per 1mm recorded.

03/05/86 - Missing record from 860503 at 164500 to 860530 at 131500 due to tape running out.

06/05/87 - Due to extremely low water levels there is missing record between 870506 and 870628, and between 870702 and 870717 for low stage processing.

15/02/88 - Missing record from 880215 at 131500 to 880317 at 104500. Due to record data being obviously wrong.

29/06/88 - Missing record from 880629 150000 to 880724 at 034500. Due to water level being below intakes and intake siphon not functioning.

10/08/88 - Missing record from 880810 at 114500 to 880815 at 111400 due to tape being hooked around pulley at bottom.

28/10/91 - Missing record from 911028 at 153000 to 911112 at 102800 due to tape ripping in recorder.

26/08/93 - Extra railway irons installed into bed of stream at control to catch more debris and lift control level.

29/03/94 - WRIC datalogger data used as primary data from this date. This overcomes the syphoning problem encountered at this site due to water level dropping below the intake pipes. Backup Foxboro recorder removed.

03/09/94 - Missing record from 940903 at 204500 to 940913 at 003000.

29/10/94 - Missing record from 941029 at 013000 to 941110 at 114500 due to recorder failure

15/07/95 - Site closed and all instruments removed.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	July 2006	Site Number	14627
Compiled by	G R Ellery	River	Waiari
		Station	Muttons
Metric Map Reference	U14:034 706		
Catchment Area (km²)	71.7	Period of Summary	1967 to 1994

Statistical Summary

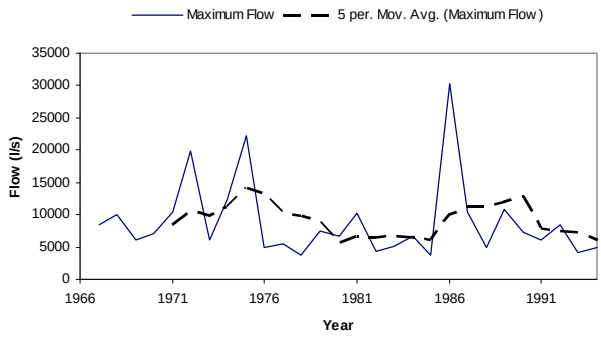
Flow (*l/s*)			
Minimum Flow	2311	Maximum Flow	69735
Mean Annual Minimum Flow	3506	Mean Annual Maximum Flow	8865
Mean Flow	4039	Mean Summer Flow	3885
Median Flow	3823	Mean Autumn Flow	4009
Mean Specific Flow (/km²)	56	Mean Winter Flow	4154
		Mean Spring Flow	3992
Low Flow Distribution Fit	GEV	Peak Flow Distribution Fit	EV1/Pearson
7 day Low Flow (Minimum)	2453	Peak Flow (5 yr Return)	58000
7 Day Low Flow (Mean Annual)	3347	Peak Flow (10 yr Return)	72000
7 day Low Flow (5 yr Return)	2984	Peak Flow (20 yr Return)	86000
7 Day Low Flow (10 yr Return)	2767	Peak Flow (50 yr Return)	126000
		Peak Flow (100 yr Return)	

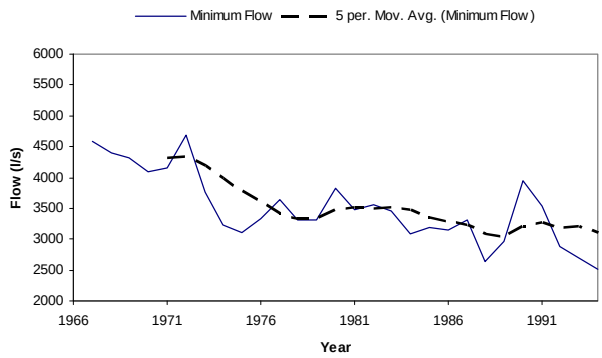
Annual Summaries

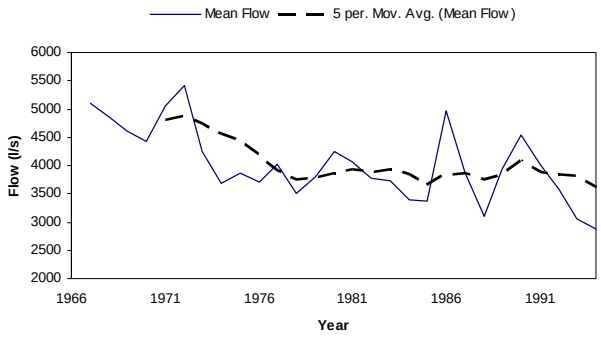
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1969	4309	4602	6030	1982	3555	3769	4256
1970	4095	4430	7024	1983	3457	3741	5065
1971	4163	5051	10379	1984	3097	3400	6724
1972	4681	5408	19927	1985	3183	3367	3734
1973	3772	4255	6147	1986	3151	4977	30195
1974	3240	3691	12477	1987	3316	3865	10357
1975	3106	3856	22230	1988	2642	3111	4966
1976	3329	3711	4867	1989	2955	3932	10873
1977	3638	4016	5580	1990	3948	4546	7292
1978	3322	3517	3740	1991	3533	4015	6009
1979	3304	3799	7472	1992	2873	3567	8547
1980	3820	4257	6646	1993	2698	3049	4133
1981	3482	4068	10212	1994	2511	2881	4837

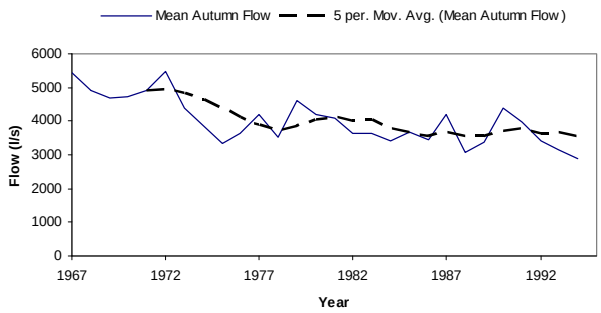
Flow Distribution

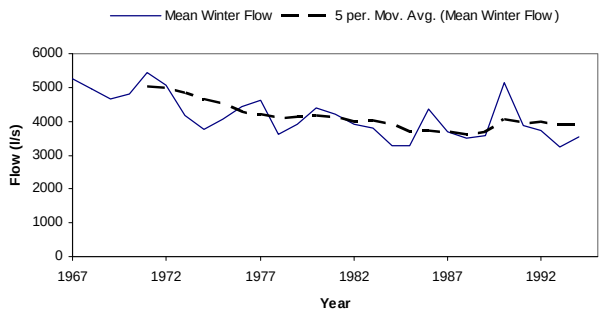
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	69735	8648	6336	5602	5305	5154	5075	5004	4943	4894
10	4848	4808	4768	4735	4708	4688	4669	4649	4638	4601
20	4552	4520	4493	4470	4428	4389	4348	4315	4293	4271
30	4250	4227	4204	4182	4162	4137	4114	4089	4064	4036
40	4011	3987	3966	3944	3926	3906	3888	3873	3859	3841
50	3823	3802	3781	3765	3746	3722	3700	3680	3661	3644
60	3631	3620	3608	3598	3587	3575	3562	3547	3532	3519
70	3506	3490	3479	3469	3458	3446	3432	3419	3401	3379
80	3357	3336	3309	3283	3258	3238	3219	3196	3174	3153
90	3129	3103	3068	3043	3006	2949	2893	2849	2796	2711
100	2311									

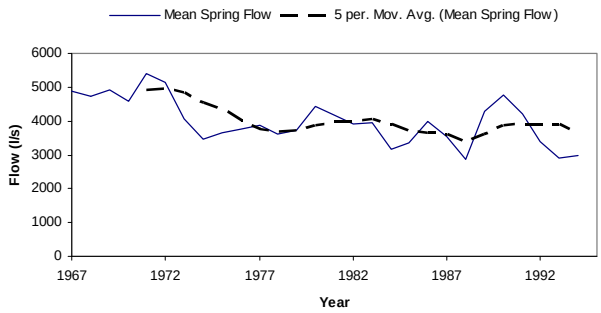


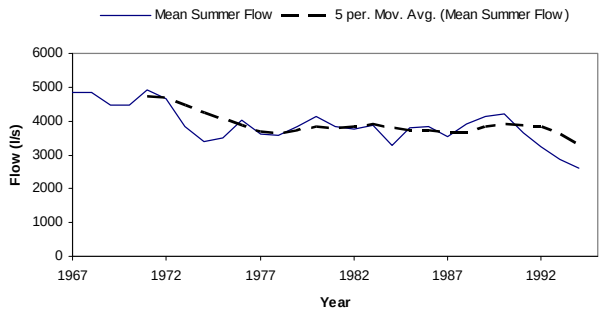












Waiari at Muttons

Environment Bay of Plenty
River Flow Recording Station

River	Mangorewa	Site	Saunders
Site Number	14628	Grid Reference	U15: 047 632
Start of Record	July 1967	Data Capture Rate	99%
Data Summary From	January 1968	To	December 2005
Data Audited From	May 1968	To	December 2005

Equipment History

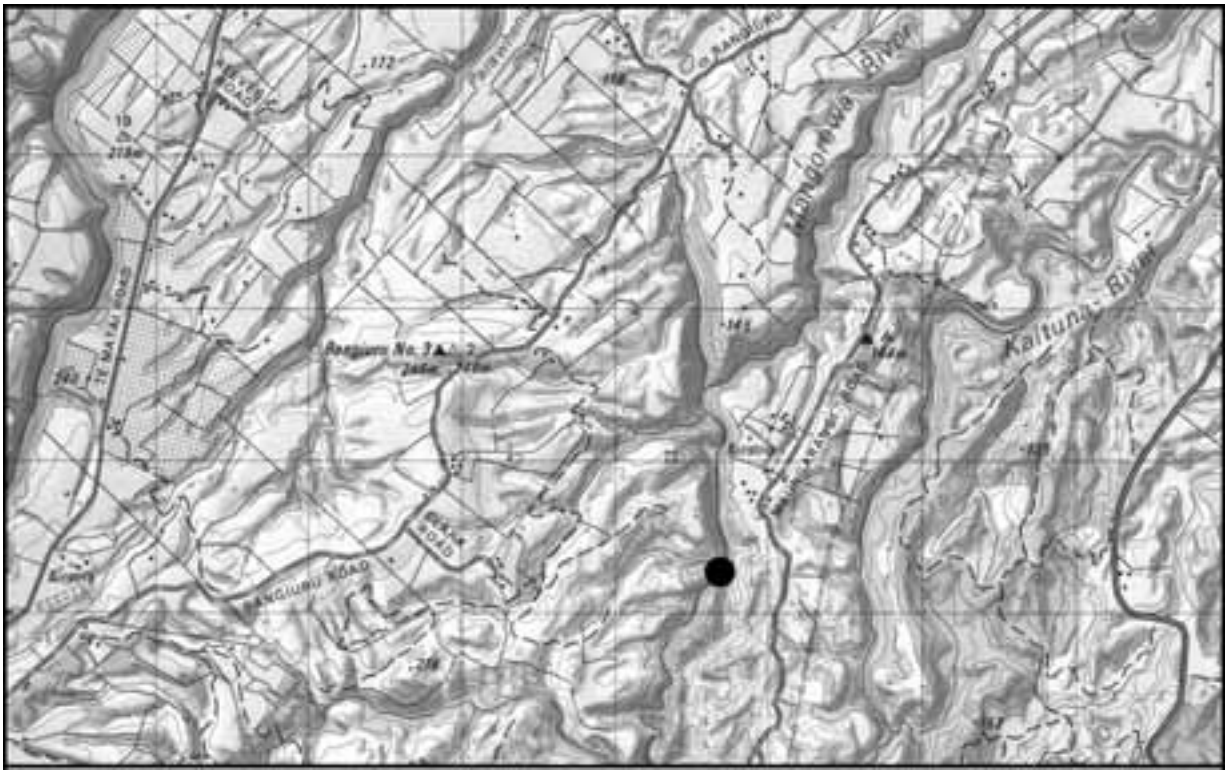
Float/counterweight system with shaft encoder. 1mm resolution.

Comments on Stage/Discharge Ratings

Control is by stable natural channel. Ratings available to convert stage (mm) to flow (l/s).

General Comments

Site was originally operated by the Hamilton Hydrological Survey until December 1981. Site is now operated by Environment Bay of Plenty as part of its Natural Environmental Monitoring Network.



SITE LOCATION
Mangorewa at Saunders

Station Comments

Mangorewa River at Saunders Farm. Site Number 14628, on River Number 146050.
Local recording authority is Environment Bay of Plenty.

Sediment concentration has also been measured at this site.

The site is situated 9.2 kilometres to confluence of the Kaituna River. The control is natural.

09/12/81 - Site handed over to B.O.P.C.C. on 811210.

30/04/91 - Site damaged by lightning. Recorder stopped causing missing record. Gap is from 910430 at 164501 to 910509 at 144600.

06/02/96 - Missing record from 960216 061500 to 960208 154500 due to Aquitel failure.

06/01/97 - Missing record from 970106 at 214500 to 970110 at 101500 due to faulty Leopold and Stevens recorder.

10/08/98 - Missing record from 980810 at 151500 to 980813 at 113000 due to Aquitel failure.

31/12/95 - Missing record from this site has been replaced with synthetic data derived from adjacent site Waiari at Muttons (14627) and rainfall records.

01/05/99 – This event was the highest recorded since the site was installed in 1967. Historical top end rating extrapolation has been used due to the lack of high stage gaugings (highest gauging is at 4125mm. Investigation of bed slope and cross-section proved inconclusive at defining the top end of the rating. However it is noted that the cross-section is rectangular in shape with vertical walls approximately 12 metres high, the upstream cross section is straight and the bed slope quite high. Discussions with NIWA, Rotorua staff also supported that in higher flood events velocities are high. Use derived peak flow with caution. This peak flow has not been used for flood frequency analysis due to uncertainty over derived flow.

07/09/00 - Missing record from 20000907 at 0444500 to 20000908 at 141500 due to Aquitel failure.

12/05/91 - Missing record from 20010512 at 93000 to 20010514 at 083000 due to Aquitel failure.

19/12/01 - Missing record from 20011219 at 53000 to 20011220 at 101500 due to Aquitel failure.

20/12/01 - Missing record from 20011220 at 104500 to 20020104 at 091500 due to Aquitel failure.

25/03/00 - Gaps affect the data set from 20050325 101500 to 20050428 104500 due to a lightening strike.
1: gap from 20050325 101500 to 20050404 123000 of 10.09 days
2: gap from 20050404 123000 to 20050413 143000 of 9.08 days
3: gap from 20050413 143000 to 20050418 130000 of 4.94 days
4: gap from 20050418 130000 to 20050418 161500 of 3.25 hours
5: gap from 20050418 161500 to 20050428 104500 of 9.77 days
6: gap from 20050518 124500 to 20050519 113000 of 22.75 hours

18/05/2005 - Missing record from 20050518 130000 to 20050519 113000 due to iQuest logger failure.

25/01/2006 - Missing record from 20060125 at 180000 to 20060125 at 114500 due to power failure.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	May 2006	Site Number	14628
Compiled by	Glenn Ellery	River	Mangorewa
		Station	Saunders
Metric Map Reference	U15:047 632		
Catchment Area (km²)	178.7	Period of Summary	1968 to 2005

Statistical Summary

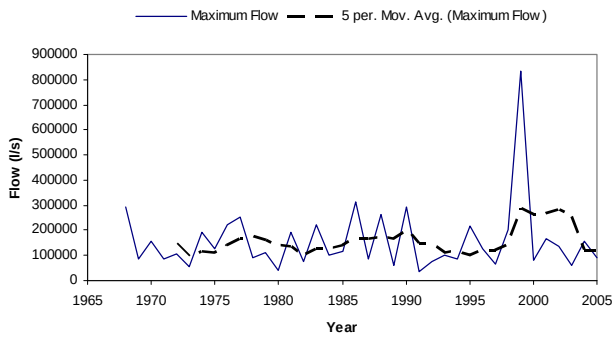
Flow (*l/s*)			
Minimum Flow	3591	Maximum Flow	834468
Mean Annual Minimum Flow	4498	Mean Annual Maximum Flow	157394
Mean Flow	6124	Mean Summer Flow	5777
Median Flow	5183	Mean Autumn Flow	5832
Mean Specific Flow (/km²)	29	Mean Winter Flow	6796
		Mean Spring Flow	6117
Low Flow Distribution Fit Utilised	Gumbel	Peak Flow Distribution Fit Utilised	GEV
7 day Low Flow (Minimum)	3607	Peak Flow (5 yr Return)	202200
7 Day Low Flow (Mean Annual)	4360	Peak Flow (10 yr Return)	259100
7 day Low Flow (5 yr Return)	4043	Peak Flow (20 yr Return)	318400
7 Day Low Flow (10 yr Return)	3867	Peak Flow (50 yr Return)	403000
		Peak Flow (100 yr Return)	

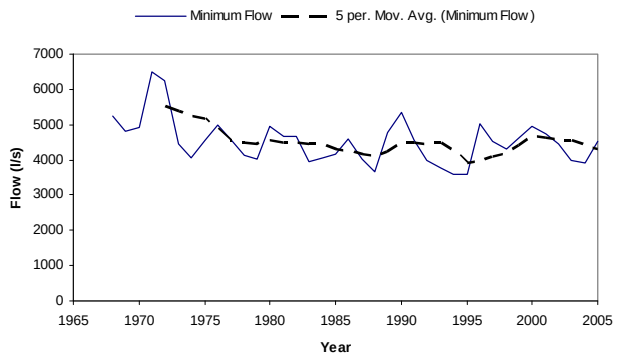
Annual Summaries

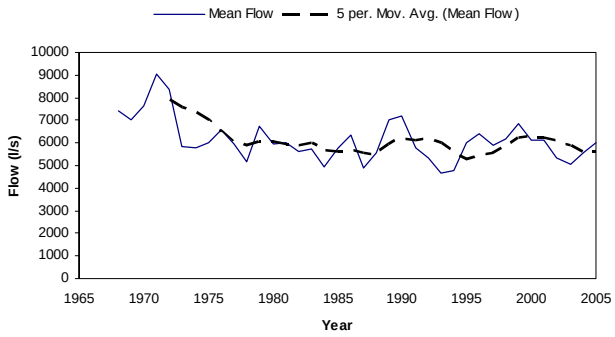
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	4958	5953	38315	1993	3774	4652	101282
1981	4670	6002	193568	1994	3591	4760	87117
1982	4661	5634	73562	1995	3591	5995	218529
1983	3934	5755	222849	1996	5014	6394	127560
1984	4042	4923	100142	1997	4534	5886	64456
1985	4174	5779	117069	1998	4308	6184	201336
1986	4605	6339	313045	1999	4637	6842	834468
1987	4031	4915	87554	2000	4957	6109	83352
1988	3644	5588	264264	2001	4724	6116	166565
1989	4761	7036	61863	2002	4438	5350	135629
1990	5361	7195	295055	2003	3985	5032	58174
1991	4568	5785	34454	2004	3926	5568	157411
1992	3999	5335	75056	2005	4516	6028	91015

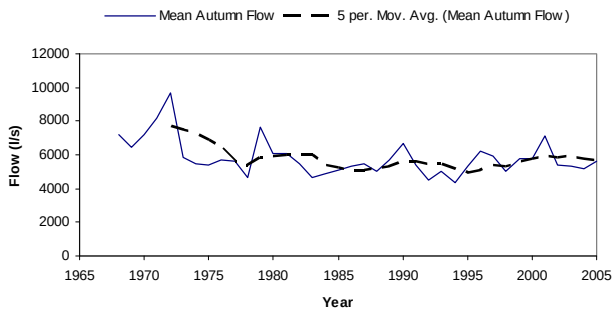
Flow Distribution

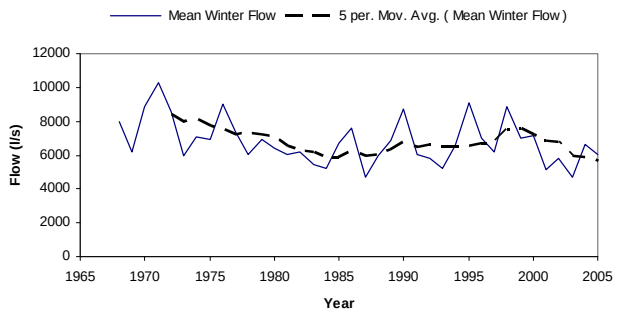
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	834468	24692	16465	12816	10963	9753	8993	8456	8040	7755
10	7571	7410	7311	7115	6928	6777	6670	6586	6503	6405
20	6307	6225	6149	6089	6034	5990	5950	5902	5848	5802
30	5763	5720	5684	5646	5606	5572	5537	5505	5473	5443
40	5415	5389	5363	5340	5316	5293	5270	5247	5224	5203
50	5183	5163	5144	5127	5110	5093	5074	5054	5032	5009
60	4989	4968	4947	4924	4903	4882	4860	4839	4818	4797
70	4775	4753	4730	4706	4680	4655	4632	4612	4589	4561
80	4532	4504	4476	4447	4418	4391	4362	4332	4302	4273
90	4247	4218	4183	4147	4111	4063	4008	3961	3854	3746
100	3591									

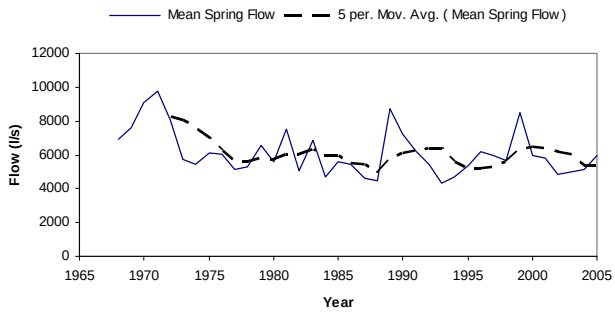


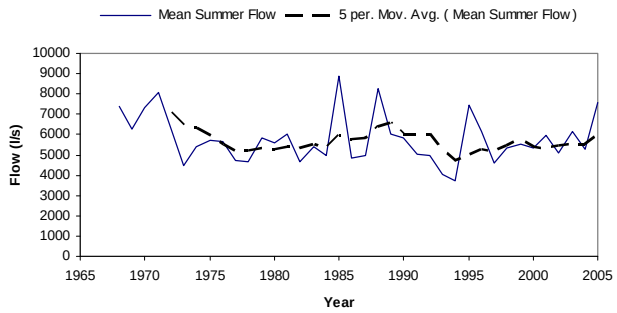












Mangorewa at Saunders

Environment Bay of Plenty
River Flow Recording Station

River	Kaituna	Site	Te Matai
Site Number	14614	Grid Reference	U14:063 727
Start of Record	May 1955	Data Capture Rate	97%
Data Summary From	January 1956	To	January 1981
Data Audited From		To	

Equipment History

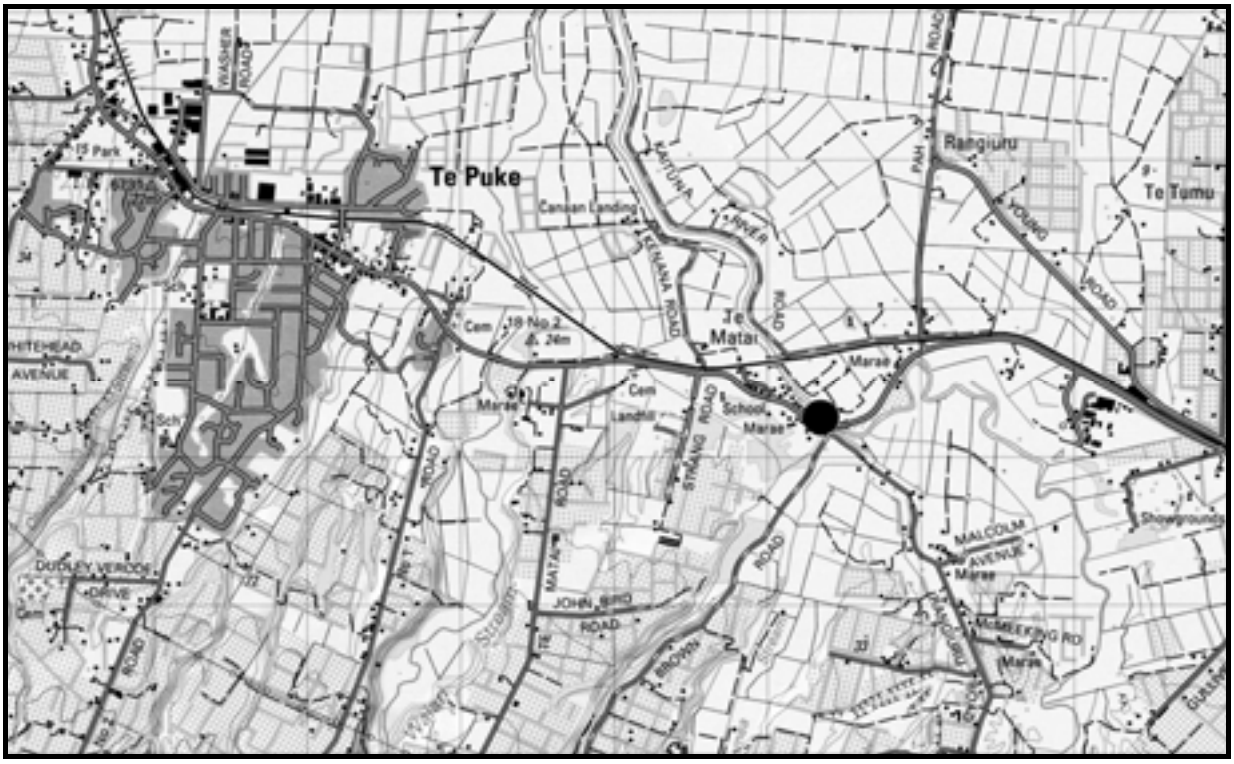
23/01/55: Staff gauge and chart recorder.
12/08/65: Float with F&P digital recorder.
06/08/86: 3 metre range Foxboro.
20/03/90: P.T. and Aquitel Remote.
01/11/99: IQuest logger.

Comments on Stage/Discharge Ratings

Control is by stable natural channel. Ratings available to convert stage (mm) to flow (l/s).

General Comments

This site recorded flow from May 1955 to January 1982 for the Hamilton Hydrological Survey. The site was transferred to the B.O.P.C.B. in January 1982, from this time tidal influences occurred as a result of the Kaituna flood control scheme. Site is now operated by Environment Bay of Plenty for flood monitoring purposes; flow discharge ratings for lower stages are no longer derived.



SITE LOCATION
Kaituna at Te Matai

Station Comments

Kaituna at Te Matai. Site Number 14614, on River Number 146000.

The local recording authority is Environment Bay of Plenty.

The site is situated 14.5 kilometres from the river mouth. Sediment concentration is also measured at the site. The gates at the outlet of Lake Rotoiti at Okere Falls act as an upstream control. Large changes in stage and flow occur when the settings on these gates are changed.

11/08/65 - Chart recorder replaced with F&P recorder on 650812. Recorder has a stage resolution of 1mm and a time resolution of 15 minutes.

16/08/67 - Synthetic record from 670816 to 670911 and from 680902 to 681001. Record derived from correlation with Waiari at Muttons. This period should not be used for flood analysis, daily mean discharges only.

02/07/68 - Synthetic record from 680702 to 681001. Record derived from correlation with Waiari at Muttons. This period should not be used for flood analysis, daily mean discharges only.

23/12/69 - Synthetic data from 691223 to 691231

16/09/72 - Synthetic data from 720916 to 720922. Record derived from correlation with Waiari at Muttons and rainfall data.

09/05/73 - Synthetic data from 730509 to 730511

04/03/79 - From 790304 at 163000 to 790305 104500 a straight line recession has been assumed as recorder was tampered with. No rain fell during this period.

26/08/80 - Missing record from 800826 134000 to 800905 100000 due to recorder malfunction. For an indication of flow during this period, refer to Mangorewa at Saunders (14628) and Kaituna at Lake Rotoiti outlet (14601). 120.9 mm of rain was recorded in Rotorua.

29/11/81 - Missing record from 811129 134500 to 811210 142700 due to recorder failure. 114.5mm of rain was recorded at Whakarewarewa during this period, with a maximum fall of 41.7mm on 811129.

07/01/82 - Site handed over to Bay of Plenty Catchment Board on 820107.

02/09/82 - Due to recorder failure there is synthetic data from 820902. This period, a gradual recession is considered adequate. F&P recorder removed from site due to water level dropping below the intake pipes. This drop was due to engineering work undertaken down stream of recorder, (Kaituna River scheme).

06/08/86 - 3 metre range Foxboro installed.

03/02/92 - Site shows a large fall in flow with minimum being reached at 240000. This is caused by the control gates at Okere Falls being shut to constrict flow.

01/11/99 - iQuest logger installed.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	July 2006	Site Number	14614
Compiled by	Glenn Ellery	River	Kaituna
		Station	Te Matai
Metric Map Reference	U14: 060 736		
Catchment Area (km²)	948	Period of Summary	1956 to 1980

Statistical Summary

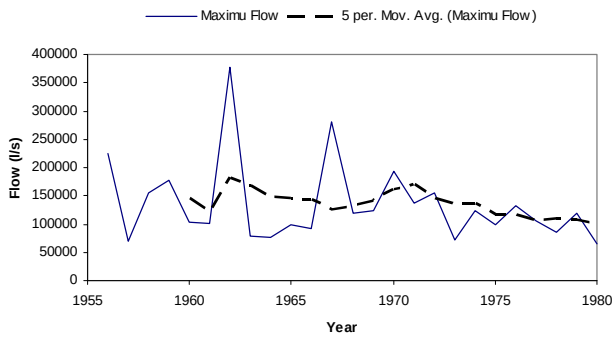
Flow (*l/s*)			
Minimum Flow	20576	Maximum Flow	376797
Mean Annual Minimum Flow	29158	Mean Annual Maximum Flow	134660
Mean Flow	39519	Mean Summer Flow	36448
Median Flow	37565	Mean Autumn Flow	37728
Mean Specific Flow (/km²)	42	Mean Winter Flow	41897
		Mean Spring Flow	41300
Low Flow Distribution Fit	GEV	Peak Flow Distribution Fit	Assessed
7 day Low Flow (Minimum)	22054	Peak Flow (5 yr Return)	170000
7 Day Low Flow (Mean Annual)	28953	Peak Flow (10 yr Return)	230000
7 day Low Flow (5 yr Return)	26043	Peak Flow (20 yr Return)	300000
7 Day Low Flow (10 yr Return)	24133	Peak Flow (50 yr Return)	405000
		Peak Flow (100 yr Return)	

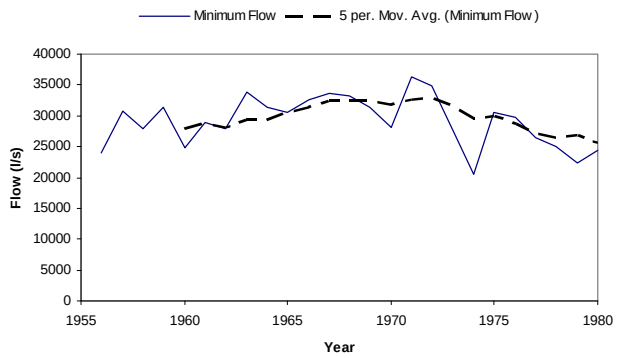
Annual Summaries

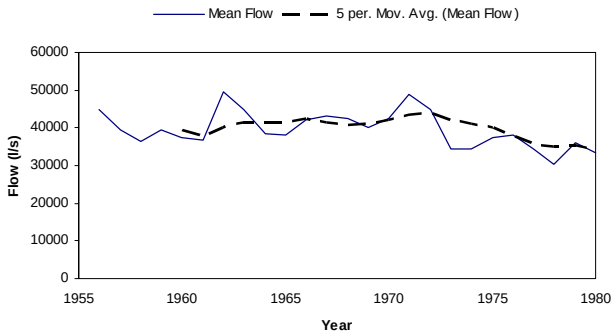
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1956	24007	44737	224948	1969	31358	42475	122601
1957	30866	39509	68766	1970	28151	48975	193508
1958	27897	36521	154611	1971	36281	44693	136916
1959	31483	39369	177694	1972	34949	34491	155502
1960	24798	37570	104438	1973	27582	34522	72036
1961	28844	36610	101073	1974	20576	37316	124306
1962	27948	49711	376797	1975	30539	38064	97964
1963	33790	44841	79632	1976	29835	34387	132161
1964	31483	38537	75547	1977	26552	30420	105818
1965	30658	37957	98454	1978	24946	35955	86451
1966	32565	42028	92400	1979	22371	33305	119597
1967	33695	43270	280009	1980	24483	42475	66165
1968	33281	42567	119116				

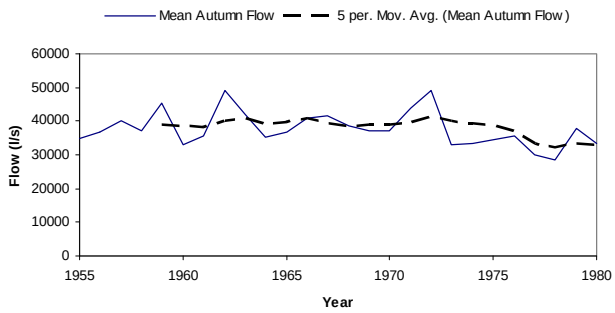
Flow Distribution

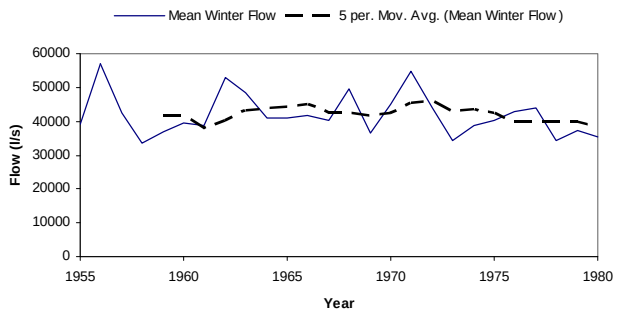
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	376797	72035	63085	59319	57175	55530	54202	53116	52034	51164
10	50673	49969	49345	48671	48074	47541	47010	46527	46099	45626
20	45166	44711	44361	43995	43659	43282	42992	42670	42352	42087
30	41786	41526	41297	41033	40780	40530	40323	40097	39877	39688
40	39488	39279	39074	38871	38711	38521	38316	38126	37981	37779
50	37565	37369	37172	37021	36825	36660	36492	36330	36172	36067
60	35912	35747	35587	35429	35293	35182	35025	34865	34706	34556
70	34397	34296	34116	33927	33765	33635	33465	33282	33124	33022
80	32863	32669	32502	32356	32139	31897	31601	31308	30971	30579
90	30263	29835	29518	29122	28798	28346	27661	26831	26070	24807
100	20576									

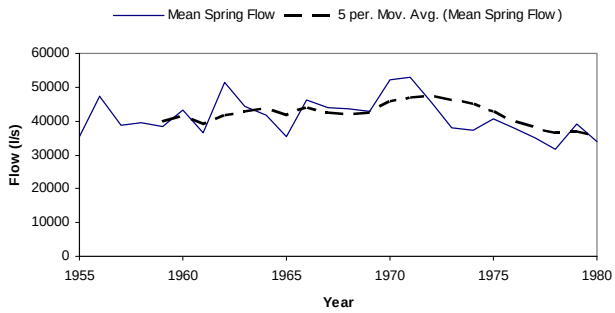

Maximu Flow
5 per. Mov. Avg. (Maximu Flow)
Flow (l/s)
Year

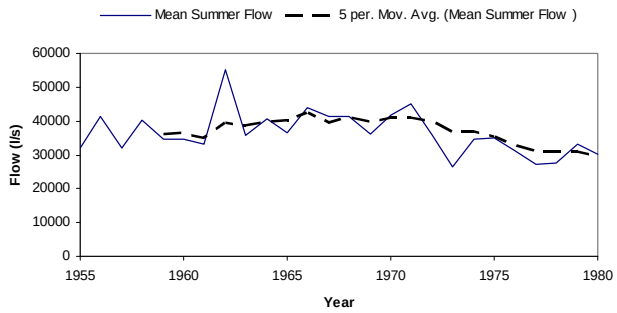

Minimum Flow
5 per. Mov. Avg. (Minimum Flow)
Flow (l/s)
Year


Mean Flow
5 per. Mov. Avg. (Mean Flow)
Flow (l/s)
Year


Mean Autumn Flow
5 per. Mov. Avg. (Mean Autumn Flow)
Flow (l/s)
Year


Mean Winter Flow
5 per. Mov. Avg. (Mean Winter Flow)
Flow (l/s)
Year


Mean Spring Flow
5 per. Mov. Avg. (Mean Spring Flow)
Flow (l/s)
Year


Mean Summer Flow
5 per. Mov. Avg. (Mean Summer Flow)
Flow (l/s)
Year

Environment Bay of Plenty
River Flow Recording Station

River	Kaituna	Site	Taaheke
Site Number	1114609	Grid Reference	U15:035 499
Start of Record	October 1981	Data Capture Rate	98%
Data Summary From	January 1906	To	December 2000
Data Audited From	NIWA	To	NIWA

Equipment History

21/10/81: Float with L&S digital recorder

30/03/82: Backup Foxboro chart recorder.

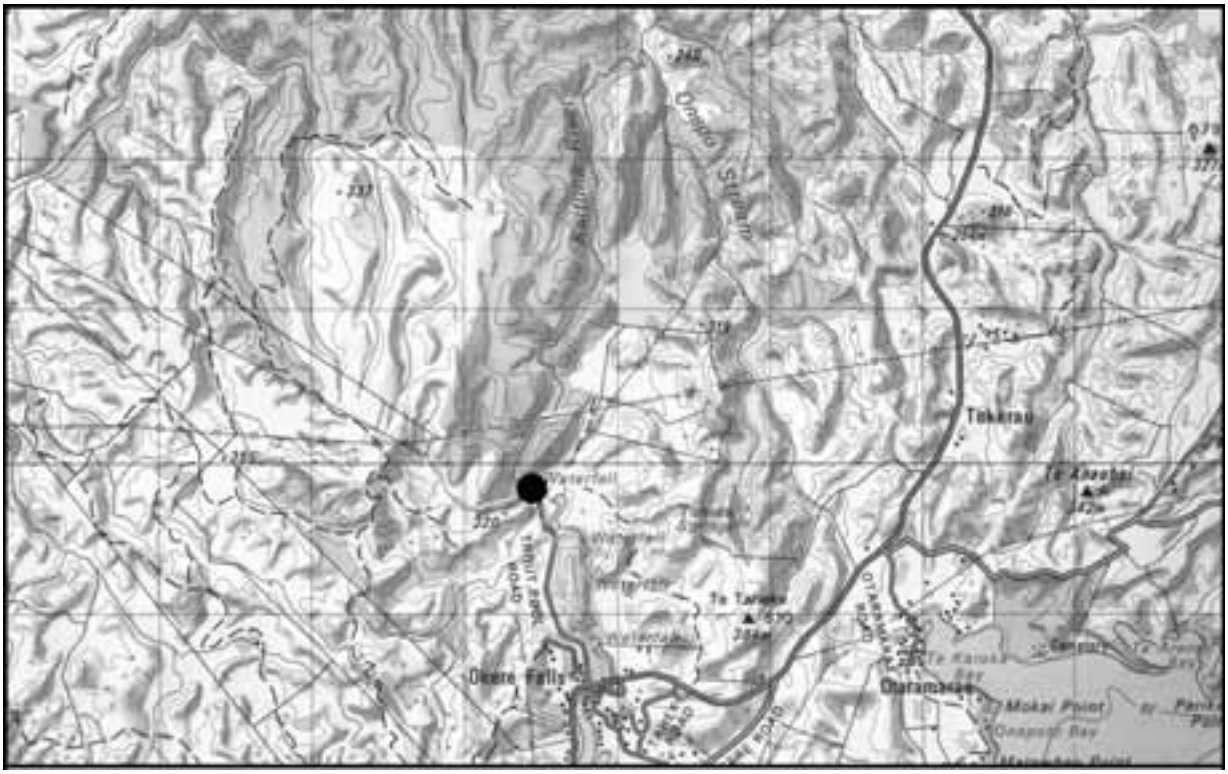
26/07/93: Float with Kainga encoder and WRIC datalogger.

Comments on Stage/Discharge Ratings

Site control is by natural rock shelf. Ratings are available to convert Stage (mm) to Flow (l/s).

General Comments

Site is operated by NIWA, Rotorua. Site was established in September 1981 due to commissioning of control gates which made flow measurement at the Lake Rotoiti at Outlet (14601) inoperable. Combining the records of both sites produces a historical flow record for the Kaituna. For the purposes of this data summary the sites have been combined, giving a complete flow record from 1906.



SITE LOCATION
Kaituna at Taaheke

Station Comments

Kaituna River at Taaheke. Site Number 1114609, on River Number 146000.

The local recording authority is NIWA, Rotorua.

Control is by natural rock shelf. Site installed as a replacement flow site for Kaituna at Lake Rotoiti Outlet because of rating interference by Okere Falls control gates.

11/12/83 - Large fall and then rise in water level on 831211 from 100000 to 160000. Control gates upstream were closed and reopened during this period.

12/11/87 - Sudden changes in water level from 871112 80000 to 871112 170000 due to maintenance work on control gates at Lake Rotoiti Outlet.

20/10/92 - Biennial audit conducted on 921020.

22/02/94 - Data from 940222 84500 to 940228 173000 is an assumed straight line. Recorder tower was replaced during this period due to corrosion of lower cylinders. Kaituna at Lake Rotoiti, (14601) showed no fluctuations during the corresponding period.

29/01/05 – Vandals damaged gate control equipment so that Lake Rotoiti control gates closed completely. River flow was reduced to zero.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	December 2006	Site Number	1114609
Compiled by	G R Ellery	River	Kaituna
		Station	Taaheke
Metric Map Reference	U15: 035 499		
Catchment Area (km²)	634	Period of Summary	1906 to 2005

Statistical Summary

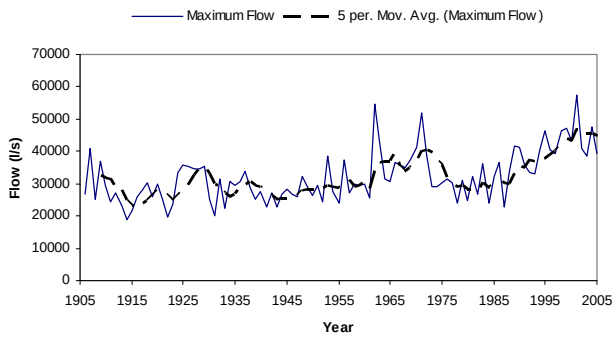
Flow (*l/s*)			
Minimum Flow	6	Maximum Flow	57326
Mean Annual Minimum Flow	12711	Mean Annual Maximum Flow	32128
Mean Flow	20687	Mean Summer Flow	18814
Median Flow	20044	Mean Autumn Flow	17976
Mean Specific Flow (/km²)	33	Mean Winter Flow	22627
		Mean Spring Flow	23285
Low Flow Distribution Fit	GEV	Peak Flow Distribution Fit	Gumbel
7 day Low Flow (Minimum)	7113	Peak Flow (5 yr Return)	37800
7 Day Low Flow (Mean Annual)	12750	Peak Flow (10 yr Return)	42400
7 day Low Flow (5 yr Return)	10936	Peak Flow (20 yr Return)	46900
7 Day Low Flow (10 yr Return)	9832	Peak Flow (50 yr Return)	52600
		Peak Flow (100 yr Return)	56900

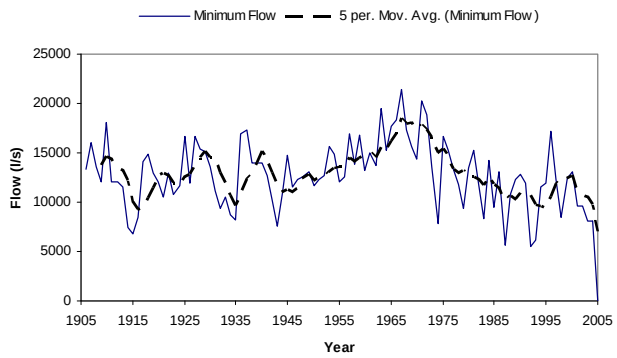
Annual Summaries

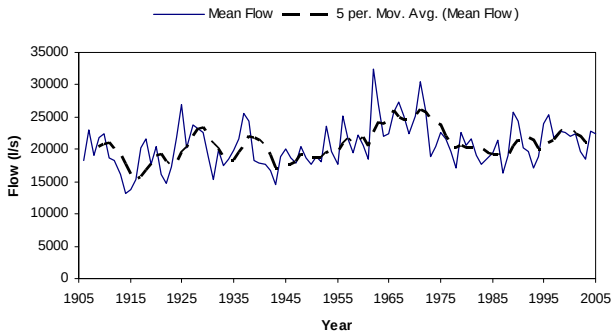
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	13422	20573	24736	1993	6189	17146	32946
1981	15282	21677	32194	1994	11531	18972	40403
1982	11798	19061	26642	1995	11960	24013	46472
1983	8293	17774	36224	1996	17186	25423	40529
1984	14243	18709	23794	1997	12296	21899	39275
1985	9425	19524	32158	1998	8412	22837	46377
1986	13097	21514	36650	1999	12392	22705	47365
1987	5621	16408	22872	2000	13114	21997	43395
1988	10717	19066	33653	2001	9555	22508	57326
1989	12367	25724	41625	2002	9673	19687	40905
1990	12777	24369	41251	2003	8113	18546	38483
1991	11936	20315	35886	2004	8067	22821	47780
1992	5545	19742	33528	2005	6	22322	39400

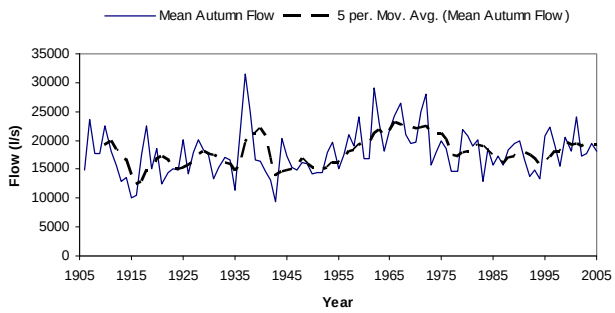
Flow Distribution

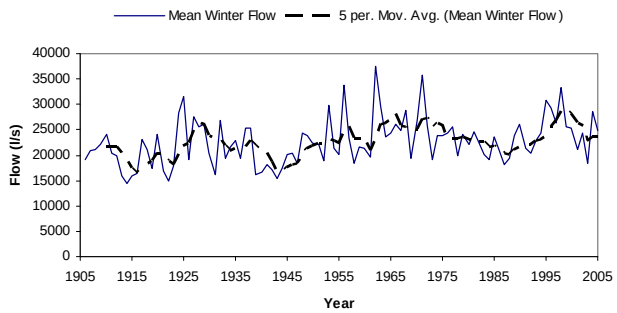
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	57326	37354	35142	33664	32568	31644	30757	30067	29446	28808
10	28169	27661	27289	26889	26589	26313	26055	25805	25571	25340
20	25156	24926	24724	24513	24273	24013	23798	23552	23368	23176
30	22998	22797	22611	22485	22308	22139	22041	21886	21774	21620
40	21484	21335	21206	21069	20908	20778	20633	20515	20357	20209
50	20044	19871	19749	19594	19443	19306	19201	19038	18909	18727
60	18559	18456	18324	18199	18112	17984	17877	17754	17626	17494
70	17330	17228	17063	16893	16758	16646	16485	16301	16120	16015
80	15828	15649	15461	15308	15120	14889	14719	14485	14256	14022
90	13739	13522	13278	13026	12848	12607	12328	11951	11077	9443
100	6									

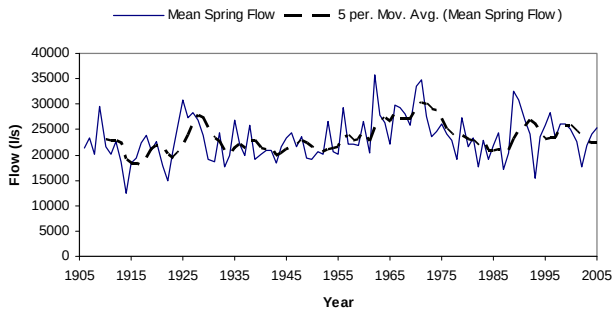


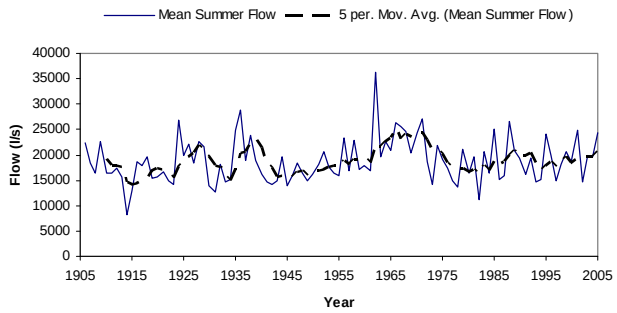












Kaituna at Taaheke

Environment Bay of Plenty
River Flow Recording Station

River	Ngongotaha	Site	S.H.5 Bridge
Site Number	1014641	Grid Reference	U15: 910 414
Start of Record	May 1975	Data Capture Rate	100%
Data Summary From	January 1976	To	December 2005
Data Audited From		To	

Equipment History

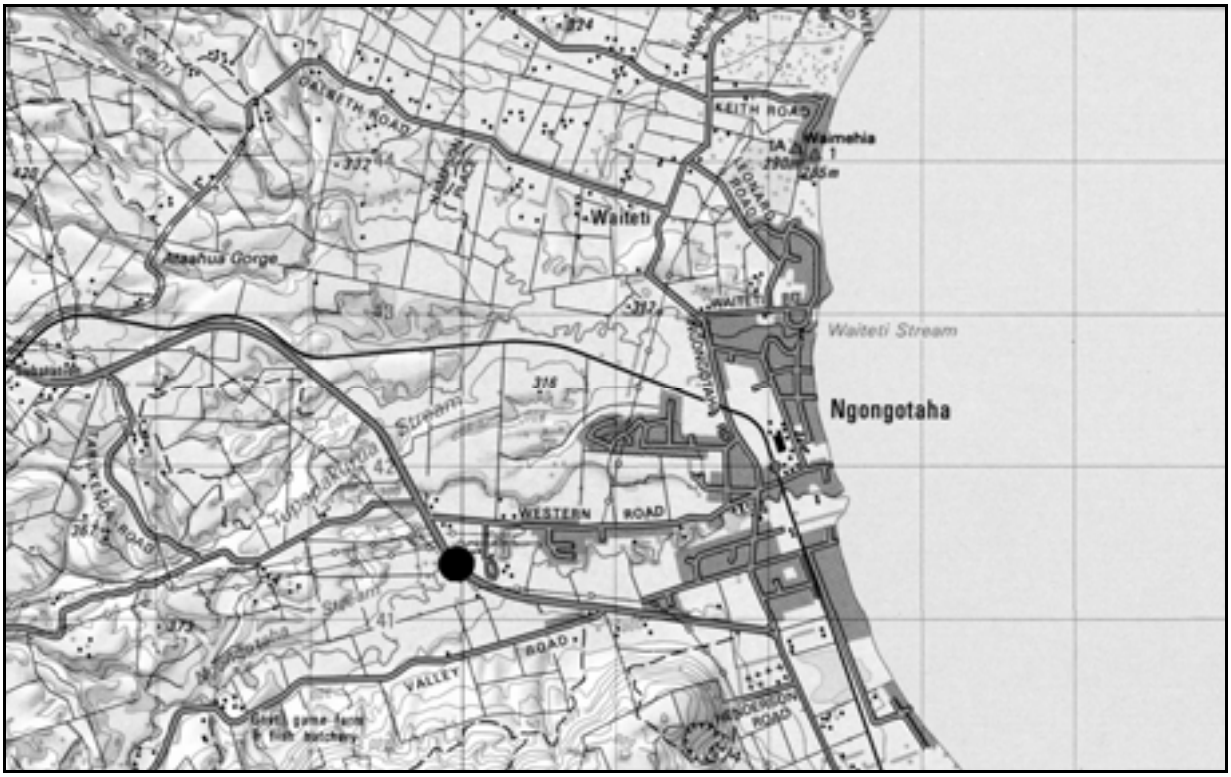
20/05/75: Float with F&P digital recorder
13/04/84: Float with L&S digital recorder.
13/12/99: 5 metre P.T. with Kainga logger.

Comments on Stage/Discharge Ratings

Control at this site is by natural bed. Ratings are available to convert Stage (mm) to Flow (l/s).

General Comments

Site is operated by NIWA, Rotorua.



SITE LOCATION
Ngongotaha at S.H. 5 Bridge

Station Comments

Ngongotaha River at S.H. 5 Bridge. Site Number 1014641, on River Number 146074.

Control is by natural bed. Approximately 800 metres upstream of recorder, Fish and Game New Zealand and Department of Conservation clean a fish trap causing small fluctuations in gauge height.

Local recording authority is NIWA, Rotorua.

20/05/75 -Recorder installed on 750520 is a 10 metre range F&P digital recorder, having a stage ratio of 1mm of stage/mm recorded and a time punchout interval of 15 minutes.

13/04/84 -Recorder replaced on 840413 154500 by a 10 metre range L&S digital recorder, having a stage ratio of 1 mm of stage/mm recorded and a time punchout interval of 15 minutes.

24/09/85 -Telemetry installed on 850925.

09/11/87 -Growth of willow trees on the channel berm downstream of the recorder since 871109 051500 has caused the high stage range of rating curves to move to the left of previous curves. This reduction in channel efficiency is documented by photos taken since the site was first established. Some "crossing" of earlier curves has occurred. The lower end of these ratings remain similar in shape, but move up and down as a consequence of bed-level changes.

22/07/92 -Top end of ratings prior to this date have been drawn without evidence of gaugings and may require adjustment. Top end of ratings starting at this date have been drawn using gaugings on 900823 and 960522 which show a flatter top end than previously thought.

21/12/93 -The instability of the rating curve above 1.4 metres is caused by willow tree growth.

14/06/98 - Ratings have a change of shape due to the July 1998 floods.

13/12/99 -Kainga logger and Greenspan transducer installed as backup recorder. Pressure transducer has a 5 metre range and 10mm resolution. Logger has a 15 minute interval.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	G R Ellery	Site Number	1014641
Compiled by	November 2006	River	Ngongotaha
		Station	S.H. 5 Bridge
Metric Map Reference	U15: 910 414		
Catchment Area (km²)	73.3	Period of Summary	1976 to 2005

Statistical Summary

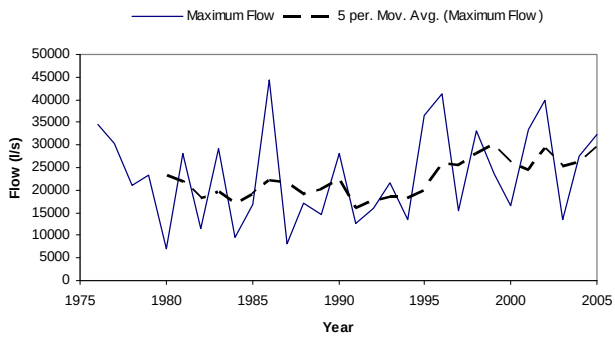
Flow (*l/s*)			
Minimum Flow	919	Maximum Flow	44420
Mean Annual Minimum Flow	1178	Mean Annual Maximum Flow	23357
Mean Flow	1747	Mean Summer Flow	1669
Median Flow	1560	Mean Autumn Flow	1577
Mean Specific Flow (/km²)	24	Mean Winter Flow	1945
		Mean Spring Flow	1804
Low Flow Distribution Fit	GEV	Peak Flow Distribution Fit	GEV
7 day Low Flow (Minimum)	940	Peak Flow (5 yr Return)	32310
7 Day Low Flow (Mean Annual)	1115	Peak Flow (10 yr Return)	38000
7 day Low Flow (5 yr Return)	1013	Peak Flow (20 yr Return)	42920
7 Day Low Flow (10 yr Return)	960	Peak Flow (50 yr Return)	48560
		Peak Flow (100 yr Return)	

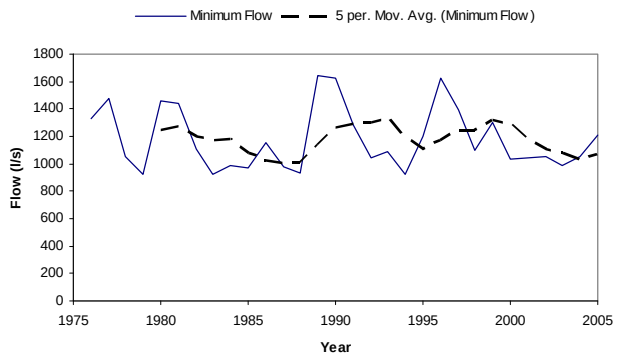
Annual Summaries

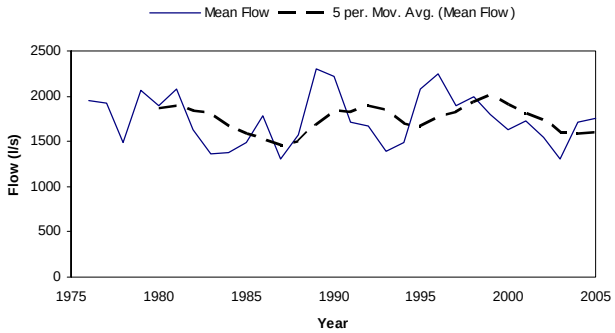
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	1892	1460	6992	1993	1086	1389	21535
1981	2081	1438	28050	1994	925	1495	13360
1982	1634	1110	11500	1995	1196	2084	36447
1983	1356	919	29102	1996	1629	2248	41345
1984	1381	988	9422	1997	1397	1903	15532
1985	1483	965	16992	1998	1095	1995	33245
1986	1780	1157	44420	1999	1298	1795	23464
1987	1300	983	8182	2000	1036	1633	16490
1988	1568	936	17049	2001	1041	1725	33451
1989	2309	1646	14535	2002	1052	1546	39848
1990	2216	1622	28131	2003	991	1303	13429
1991	1716	1284	12633	2004	1051	1715	27624
1992	1665	1042	16042	2005	1207	1752	32428

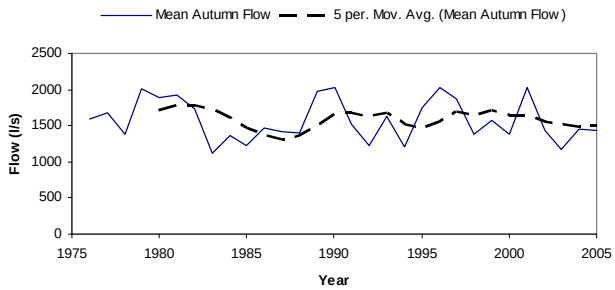
Flow Distribution

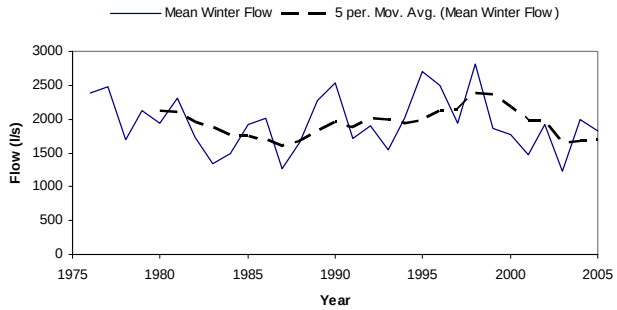
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	44420	5501	4045	3406	3062	2828	2661	2534	2438	2361
10	2297	2246	2199	2158	2124	2091	2061	2038	2016	1995
20	1973	1953	1934	1915	1898	1881	1863	1847	1831	1815
30	1800	1786	1772	1758	1746	1734	1722	1709	1696	1683
40	1671	1659	1648	1636	1624	1614	1603	1592	1581	1570
50	1560	1550	1540	1528	1517	1505	1494	1483	1473	1463
60	1452	1442	1432	1422	1410	1400	1390	1379	1368	1358
70	1348	1338	1328	1319	1310	1299	1289	1278	1268	1258
80	1247	1237	1227	1216	1205	1194	1181	1170	1159	1148
90	1138	1126	1113	1100	1087	1071	1055	1038	1019	984
100	919									

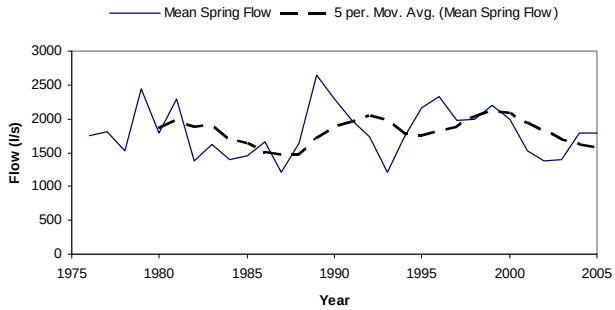


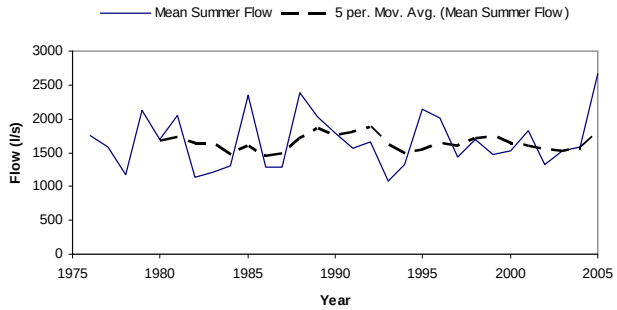












Ngongotaha at S.H.5 Bridge

Environment Bay of Plenty
River Flow Recording Station

River	Utuhina	Site	S.H.5 Bridge
Site Number	14610	Grid Reference	U16: 943 365
Start of Record	September 1967	Data Capture Rate	97%
Data Summary From	January 1968	To	December 1996
Data Audited From	January 1980	To	April 1997

Equipment History

29/06/67: Foxboro chart recorder
13/10/75: Float with F&P digital recorder.
22/11/88: Float with L&S digital recorder.

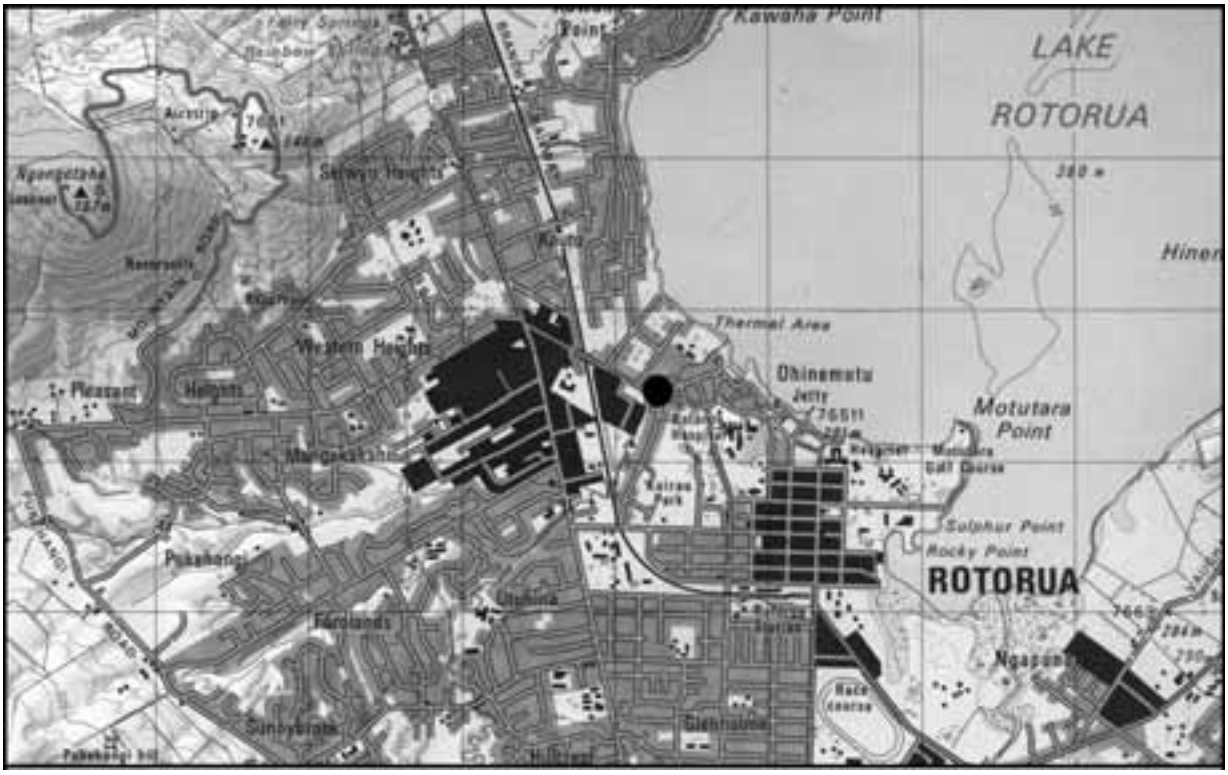
Comments on Stage/Discharge Ratings

Control is by natural channel. Ratings available to convert stage (mm) to flow (*l/s*).

General Comments

Site was initially installed by Water & Soil Division Hamilton. Site handed over to B.O.P.C.C. in January 1980. Daily fluctuations in water levels are caused by City Water Supply intake upstream at Hunt's farm.

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network. Alternate site Utuhina at Depot Street (14637) opened September 2005 as part of Lake Rotorua water quality management.



SITE LOCATION
Utuhina at S.H. 5 Bridge

Station Comments

Utuhina at S.H.5 Bridge. Site Number 14610, on River Number 146075.

Local recording authority is Environment Bay of Plenty.

Sediment concentrations are recorded.

03/10/75 - Synthetic data from 751003 to 751013. Record derived from correlation with Ngongotaha at SH.5 Bridge and Puarenga at FRI.

13/10/75 - Chart recorder replaced with F&P recorder on 751013.

02/01/80 -Site handed over to Bay of Plenty Catchment Commission on 800103.

15/03/81 - Due to recorder failure there is missing record between 810315 at 113000 and 810416 at 124500. 202 mm of rainfall was recorded at met B86124 raingauge during this period.

03/08/82 - Missing record from 820803 at 033000 to 820805 at 034500.

05/08/82 - Missing record from 820805 at 040000 to 820812 at 130000.

12/08/82 - Missing record from 820812 at 131500 to 820822 at 140000.

14/05/83 - Missing record from 830514 at 150000 to 830615 at 123000.

08/01/84 - Missing record from 840108 at 190000 to 840112 at 014500.

04/06/87 - Missing record from 870604 at 090000 to 870616 at 134500.

16/09/88 - Missing record from 880916 at 131500 to 880920 at 130000.

09/11/88 - Missing record from 881109 at 110000 to 881122 at 140000.

11/05/89 - Missing record from 890418 at 113000 to 890511 at 153000.

10/03/91 - Data from 910310 at 130000 to 910318 at 174500 was edited using edit option ramp. The ramping was carried out because of unnatural fluctuations in w/l caused by fishermen removing portions of the control.

01/12/92 - Missing record from 921201 at 100000 to 921201 at 120000.

23/02/93 - Missing record from 930223 at 101500 to 930223 at 114500.

14/04/93 - Missing record from 930414 at 1500 to 930416 at 123000.

02/06/96 - Missing record from 930602 at 121500 to 930602 at 133000.

22/03/94 - Missing record from 940322 at 115000 to 940322 at 130000.

15/06/96 - Missing record from 960615 at 174500 to 960617 141500.

03/04/97 - Site closed. Equipment removed. One cylinder remains buried with static tubes.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	July 2006	Site Number	14610
Compiled by	G R Ellery	River	Utuhina
		Station	S.H.5 Bridge.
Metric Map Reference	U16:943 365		
Catchment Area (km²)	59.6	Period of Summary	1968 to 1996

Statistical Summary

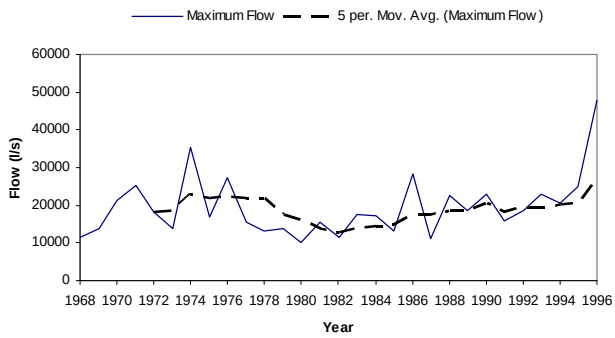
Flow (*l/s*)			
Minimum Flow	896	Maximum Flow	47746
Mean Annual Minimum Flow	1207	Mean Annual Maximum Flow	19492
Mean Flow	1965	Mean Summer Flow	1765
Median Flow	1729	Mean Autumn Flow	1746
Mean Specific Flow (/km²)	33	Mean Winter Flow	2211
		Mean Spring Flow	2138
Low Flow Distribution Fit	GEV	Peak Flow Distribution Fit	Pearson
7 day Low Flow (Minimum)	999	Peak Flow (5 yr Return)	25600
7 Day Low Flow (Mean Annual)	1280	Peak Flow (10 yr Return)	32700
7 day Low Flow (5 yr Return)	1165	Peak Flow (20 yr Return)	42100
7 Day Low Flow (10 yr Return)	1088	Peak Flow (50 yr Return)	55000
		Peak Flow (100 yr Return)	

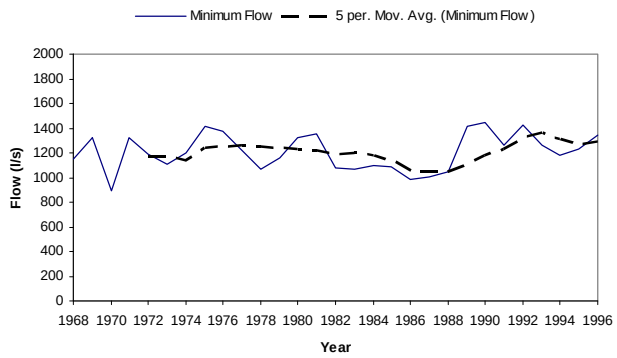
Annual Summaries

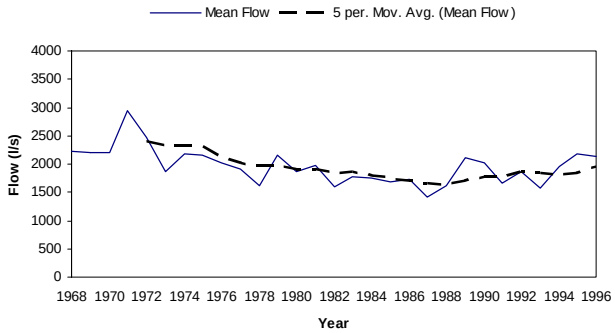
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1971	1321	2941	25418	1984	1099	1761	17149
1972	1187	2478	18241	1985	1087	1686	12993
1973	1104	1869	13881	1986	980	1739	28403
1974	1197	2169	35509	1987	1003	1405	11100
1975	1415	2165	17017	1988	1051	1617	22488
1976	1374	2015	27383	1989	1411	2102	18408
1977	1218	1907	15600	1990	1445	2033	22759
1978	1063	1628	13251	1991	1265	1671	15874
1979	1155	2148	13733	1992	1423	1858	18702
1980	1326	1855	10196	1993	1263	1583	22790
1981	1357	1988	15569	1994	1181	1961	20454
1982	1072	1587	11498	1995	1227	2190	24785
1983	1067	1770	17493	1996	1346	2137	47746

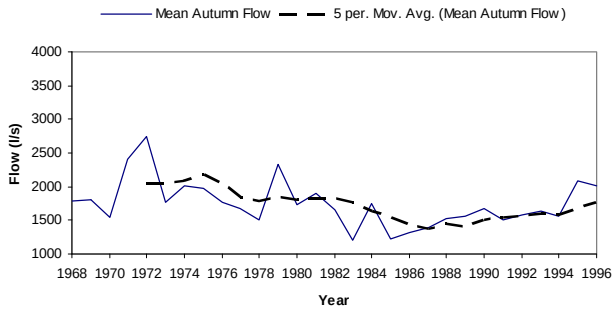
Flow Distribution

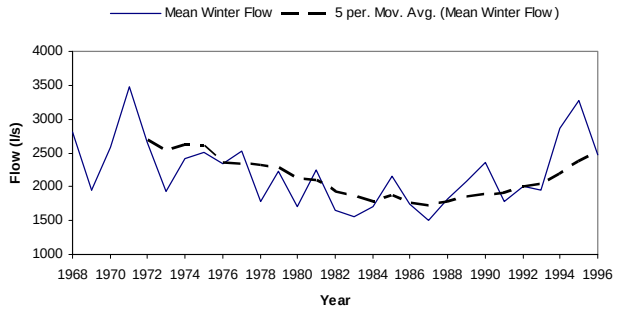
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	47746	5528	4402	3891	3602	3390	3218	3077	2954	2851
10	2761	2678	2607	2547	2491	2440	2394	2354	2314	2277
20	2241	2210	2183	2154	2128	2106	2084	2063	2042	2021
30	2002	1982	1964	1946	1930	1913	1898	1884	1870	1858
40	1845	1834	1822	1811	1799	1787	1776	1764	1752	1741
50	1729	1718	1707	1696	1686	1676	1667	1658	1649	1639
60	1630	1620	1610	1600	1590	1580	1570	1561	1551	1542
70	1533	1524	1515	1507	1498	1489	1480	1471	1462	1453
80	1446	1438	1429	1419	1407	1395	1382	1368	1354	1340
90	1327	1313	1300	1284	1263	1238	1207	1179	1143	1109
100	896									

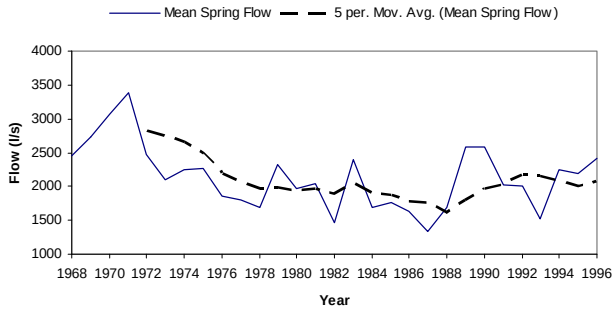

Maximum Flow
5 per. Mov. Avg. (Maximum Flow)
Flow (l/s)
Year

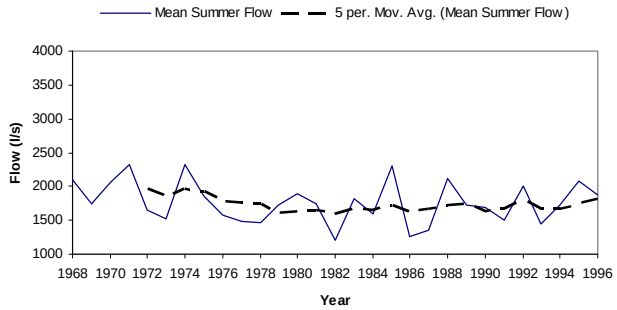

Minimum Flow
5 per. Mov. Avg. (Minimum Flow)
Flow (l/s)
Year


Mean Flow
5 per. Mov. Avg. (Mean Flow)
Flow (l/s)
Year


Mean Autumn Flow
5 per. Mov. Avg. (Mean Autumn Flow)
Flow (l/s)
Year


Mean Winter Flow
5 per. Mov. Avg. (Mean Winter Flow)
Flow (l/s)
Year


Mean Spring Flow
5 per. Mov. Avg. (Mean Spring Flow)
Flow (l/s)
Year


Mean Summer Flow
5 per. Mov. Avg. (Mean Summer Flow)
Flow (l/s)
Year

Environment Bay of Plenty
River Flow Recording Station

River	Puarenga	Site	F.R.I
Site Number	14625	Grid Reference	U16: 962 334
Start of Record	May 1975	Data Capture Rate	98%
Data Summary From	January 1976	To	January 1997
Data Audited From	July 1991	To	July 1997

Equipment History

06/05/75: Float with F&P digital recorder.

02/07/91: Float with L&S digital recorder.

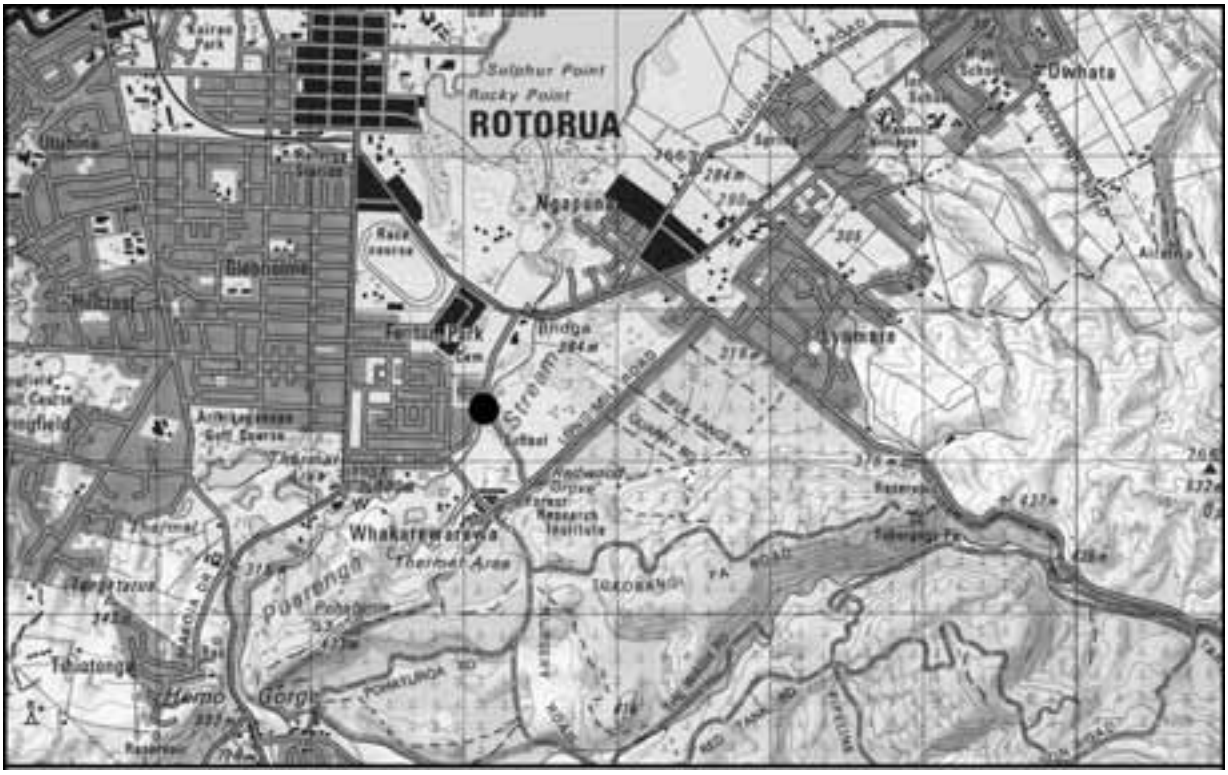
13/07/92: Backup encoder and WRIC datalogger.

Comments on Stage/Discharge Ratings

Control is by natural channel and gabion baskets since February 1985.
Ratings available to convert stage (mm) to flow (l/s).

General Comments

This site was established in 1966 for pollution studies and water resources surveys. It was known as Whakarewarewa School. Independent pumping stations upstream cause daily fluctuations in the water level. Site transferred to B.O.P.C.C. in January 1980. Transferred to MWD in August 1982 for inclusion in the Rotorua Geothermal Monitoring programme. Site was transferred to Environment Bay of Plenty in July 1991 and is part of the Natural Environment Regional Monitoring Network. In July 1993 site operation was contracted to NIWA, Rotorua.



SITE LOCATION
Puarenga at F.R.I.

Station Comments

Puarenga at F.R.I. Site Number 14625, on River Number 146076.

The local recording authority is Environment Bay of Plenty.

The station is situated 2.2 kilometres from mouth. The control is by natural bedrock. The site was established in 1966 for pollution studies and water resources surveys. There are flow gaugings only until a F&P digital recorder was installed 750505. Independent pumping stations upstream of the recorder cause daily fluctuations in water level, these may cause spikes when all pumps are operating at the same time.

01/01/76 -Annual minimum for 1976 shows up as being a spike, but is the result of pumping upstream of the recorder.

02/01/80 -Site transferred to Bay of Plenty Catchment Commission on 800103.

12/08/82 -Site transferred to Water and Soil Division, MWD, Rotorua for inclusion in the Rotorua Geothermal Monitoring programme. Also installed at this site is a temperature recorder. Data is filed under Site Number 2026 on the miscellaneous tape from 820922 at 153000.

01/01/85 - Annual minimum for 1985 shows up as being a spike and is a true event due to the action of pumping upstream of the recorder.

26/02/85 - Gabion baskets installed across stream to stabilize stream bed and act as control. Stream flow was raised 10 to 15 millimetres while baskets were being installed from 850226 081500 to 850226 114500.

07/10/88 - There is a change in the bottom end rating shape from 880312 230000 to 881007 010000 due to a change in the channel efficiency at the low stage as the result of weed growth on the channel bed. This has led to a slight improvement in channel efficiency further up the curve.

02/07/91 - Site handed over to Environment Bay of Plenty.

01/07/93 - Operation of site contracted out by Environment Bay of Plenty, to NIWA, Rotorua.

17/07/97 - Site closed and instruments removed.

04/10/05 – Site reopened. iQuest dalaogger and Handar shaft encoder installed. Time resolution 15 minutes, stage resolution 1 mm.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	July 2006	Site Number	14625
Compiled by	G R Ellery	River	Puarenga
		Station	F.R.I
Metric Map Reference	U16: 962 234		
Catchment Area (km²)	74.8	Period of Summary	1976 to 1996

Statistical Summary

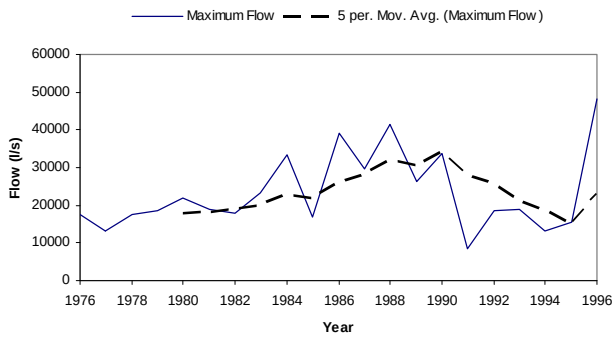
Flow (*l/s*)				
Minimum Flow	829	Maximum Flow		48307
Mean Annual Minimum Flow	1089	Mean Annual Maximum Flow		23403
Mean Flow	1751	Mean Summer Flow		1602
Median Flow	1533	Mean Autumn Flow		1560
Mean Specific Flow (/km²)	23	Mean Winter Flow		1991
		Mean Spring Flow		1866
Low Flow Distribution Fit	Gumbel	Peak Flow Distribution Fit	Gumbel	GEV
7 day Low Flow (Minimum)	996	Peak Flow (5 yr Return)	31000	31700
7 Day Low Flow (Mean Annual)	1134	Peak Flow (10 yr Return)	37200	38700
7 day Low Flow (5 yr Return)	1052	Peak Flow (20 yr Return)	43200	45700
7 Day Low Flow (10 yr Return)	1007	Peak Flow (50 yr Return)	50900	55400
		Peak Flow (100 yr Return)		

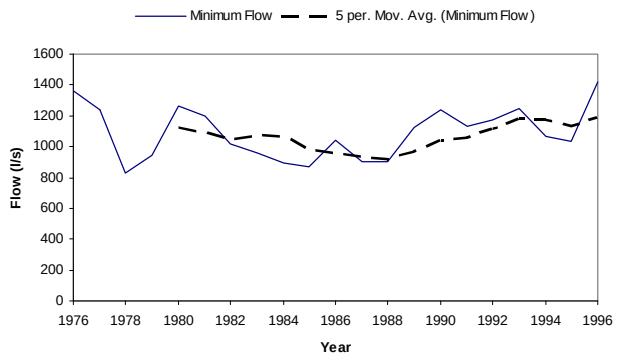
Annual Summaries

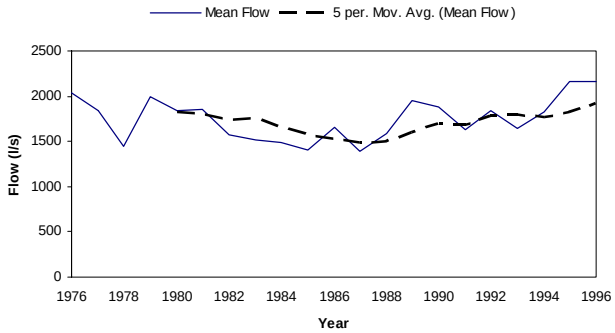
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1976	1365	2031	17511	1989	1122	1951	26326
1977	1242	1844	13291	1990	1241	1886	33668
1978	829	1440	17454	1991	1130	1635	8263
1979	941	1997	18582	1992	1172	1841	18455
1980	1263	1836	21861	1993	1244	1641	18846
1981	1196	1856	18995	1994	1070	1830	13306
1982	1021	1574	17949	1995	1031	2164	15482
1983	961	1523	23339	1996	1421	2167	48307
1984	896	1488	33235				
1985	868	1398	16739				
1986	1045	1662	38984				
1987	902	1386	29519				
1988	902	1584	41356				

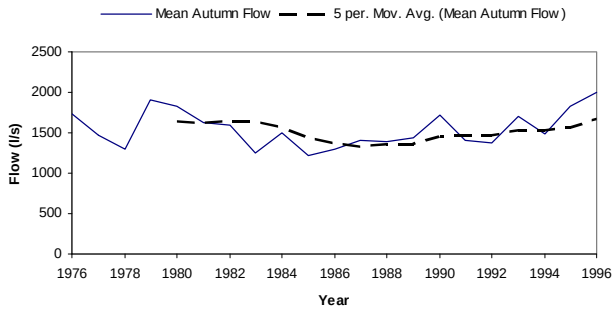
Flow Distribution

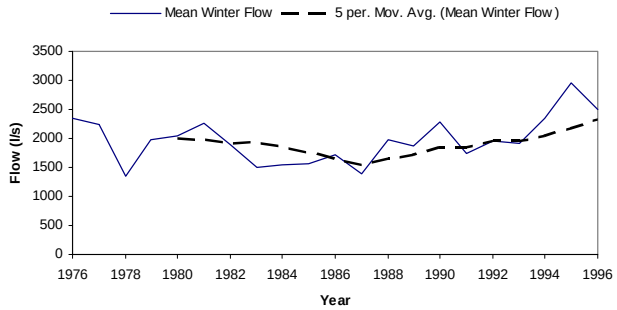
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	48307	5198	4049	3539	3219	2992	2825	2688	2581	2493
10	2423	2362	2308	2255	2205	2162	2122	2085	2051	2020
20	1993	1963	1936	1912	1890	1870	1851	1834	1817	1800
30	1783	1768	1753	1738	1724	1710	1696	1681	1666	1653
40	1639	1627	1616	1604	1593	1582	1572	1562	1551	1541
50	1533	1523	1513	1503	1493	1483	1473	1463	1452	1443
60	1433	1423	1414	1405	1396	1388	1379	1371	1364	1355
70	1347	1339	1332	1324	1317	1310	1303	1296	1289	1281
80	1274	1266	1258	1250	1242	1232	1224	1214	1204	1193
90	1181	1170	1158	1145	1131	1116	1099	1083	1065	1041
100	829									

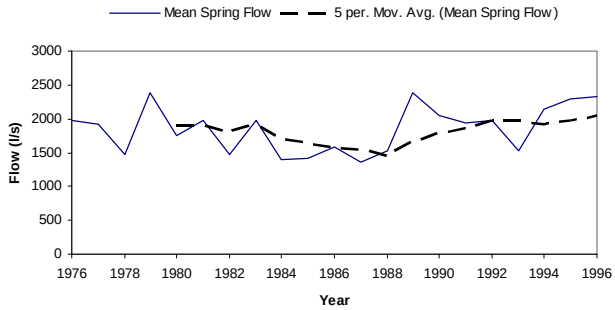


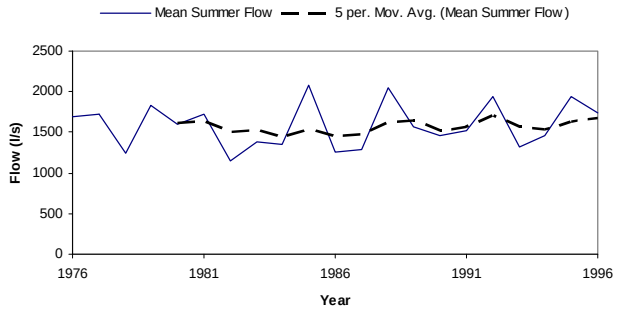












Puarenga at F.R.I

Environment Bay of Plenty
River Flow Recording Station

River	Puarenga	Site	Hemo Gorge
Site Number	1114613	Grid Reference	U16: 947 314
Start of Record	August 1982	Data Capture Rate	100%
Data Summary From	January 1983	To	December 1996
Data Audited From	June 1991	To	December 1996

Equipment History

05/08/82 : Float with F & P digital recorder
01/07/93: Float with L & S digital recorder

Comments on Stage/Discharge Ratings

Control is by stable natural bed rock. Ratings available to convert stage (mm) to flow (l/s).

General Comments

Site was transferred to B.O.P.R.C. in July 1991. This site is established for use in the Rotorua Geothermal Monitoring programme. Rotorua District Council have an automatic water pumping station upstream of the recorder causing diurnal fluctuation in the water level.

SITE LOCATION
Puarenga at Hemo Gorge

Station Comments

Puarenga River at Hemo Gorge. Site Number 1114613, on River Number 146076.

09/10/85 - Site closed 851009 093000

28/06/91 - Site re-opened.

01/07/91 - Site control handed over to B.O.P.R.C.

01/07/93 - Site control contracted out to NIWA, Rotorua by Environment Bay of Plenty. Data processing carried out by NIWA to their standards.

17/07/97 - Site closed and instruments removed.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	July 2006	Site Number	1114613
Compiled by	G R Ellery	River	Purenga
		Station	Hemo Gorge
Metric Map Reference	U16 947 314		
Catchment Area (km²)	72.8	Period of Summary	1983 to 1996

Statistical Summary

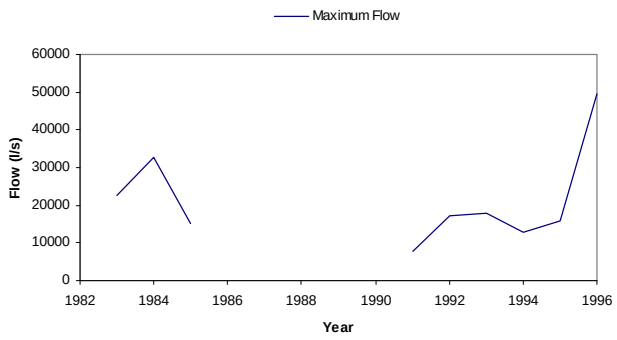
Flow (*l/s*)				
Minimum Flow	741	Maximum Flow		49416
Mean Annual Minimum Flow	941	Mean Annual Maximum Flow		21277
Mean Flow	1609	Mean Summer Flow		1427
Median Flow	1391	Mean Autumn Flow		1367
Mean Specific Flow (/km²)	22	Mean Winter Flow		1857
		Mean Spring Flow		1759
Low Flow Distribution Fit	Gumbel	Peak Flow Distribution Fit	Gumbel	GEV
7 day Low Flow (Minimum)	807	Peak Flow (5 yr Return)	30238	29722
7 Day Low Flow (Mean Annual)	965	Peak Flow (10 yr Return)		
7 day Low Flow (5 yr Return)	878	Peak Flow (20 yr Return)		
7 Day Low Flow (10 yr Return)		Peak Flow (50 yr Return)		
		Peak Flow (100 yr Return)		

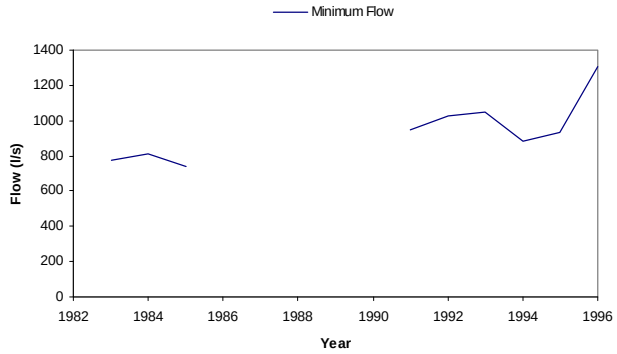
Annual Summaries

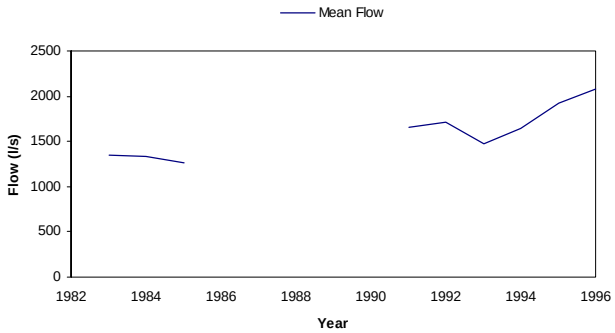
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993	1046	1469	17788
1981				1994	883	1648	12896
1982				1995	932	1929	15686
1983	774	1342	22677	1996	1306	2077	49416
1984	813	1331	32635	1997			
1985	741	1263	15240	1998			
1986				1999			
1987				2000			
1988				2001			
1989				2002			
1990				2003			
1991	946	1653	7880	2004			
1992	1026	1712	17271	2005			

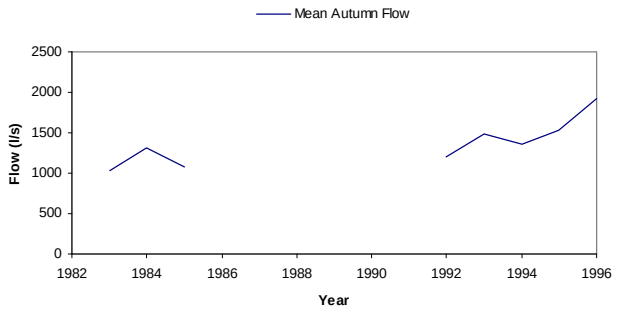
Flow Distribution

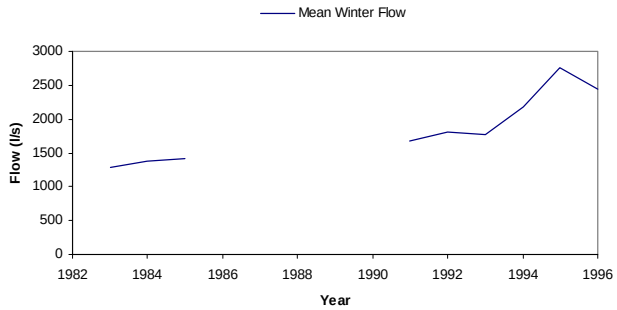
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	49416	4969	3924	3442	3136	2931	2753	2623	2512	2420
10	2337	2267	2209	2160	2117	2078	2037	2001	1963	1928
20	1896	1867	1839	1811	1787	1766	1747	1730	1712	1693
30	1676	1659	1641	1625	1610	1597	1580	1565	1551	1538
40	1525	1510	1495	1480	1466	1452	1438	1426	1414	1402
50	1391	1378	1366	1353	1339	1325	1311	1298	1285	1273
60	1262	1252	1243	1233	1224	1215	1208	1200	1193	1186
70	1179	1172	1165	1158	1152	1146	1139	1132	1124	1116
80	1106	1096	1087	1078	1068	1060	1052	1042	1032	1021
90	1010	999	984	971	960	949	937	924	909	881
100	741									

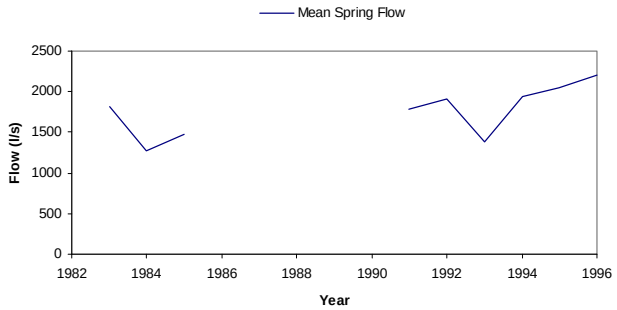


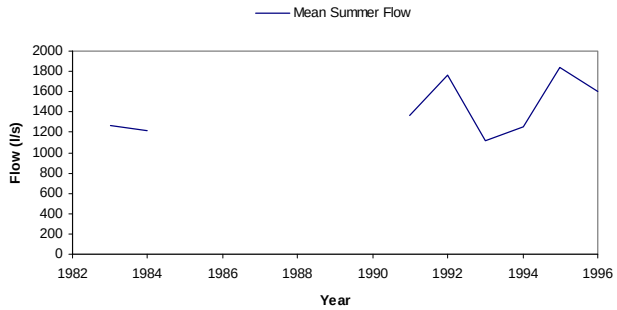












Puarenga at Hemo Gorge

Environment Bay of Plenty
River Flow Recording Station

River	Roto-a-Tamaheke	Site	Path
Site Number	1114610	Grid Reference	U16: 959 328
Start of Record	February 1984	Data Capture Rate	98%
Data Summary From	January 1985	To	December 2000
Data Audited From	January 1990	To	December 2000

Equipment History

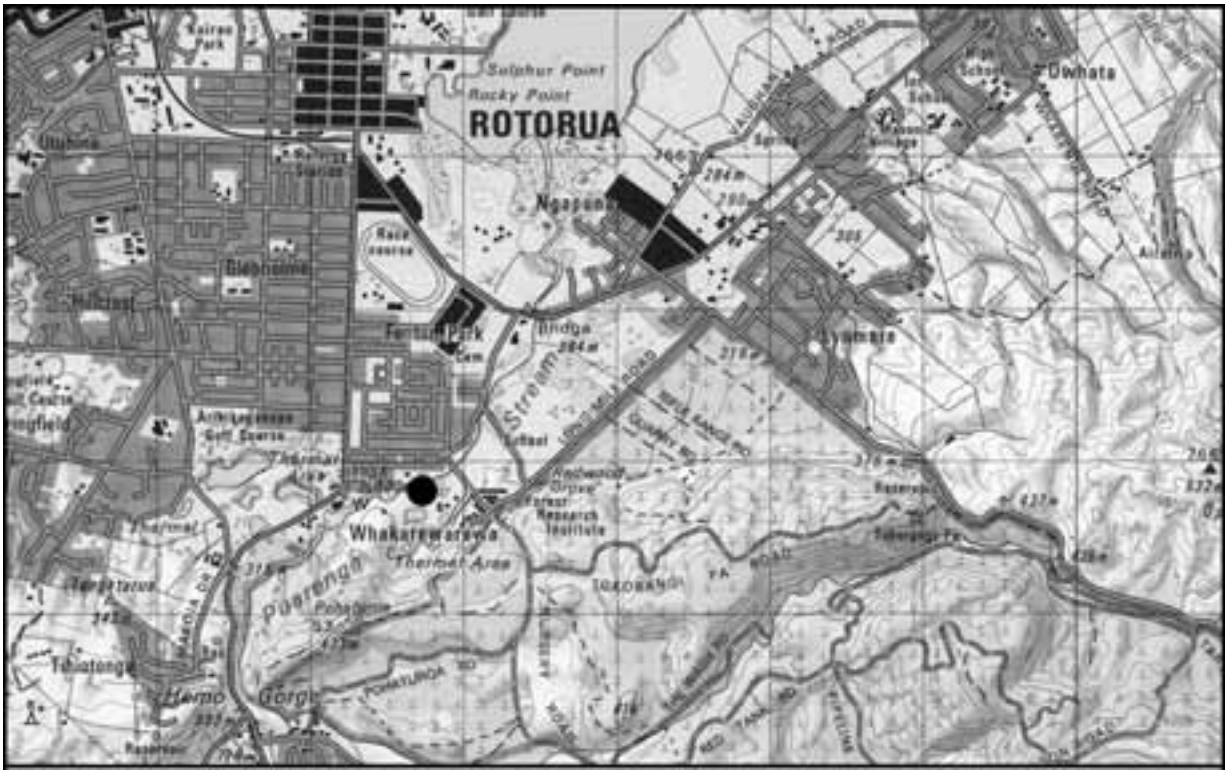
29/02/84: Float/counterweight system with shaft encoder. 1mm resolution.

Comments on Stage/Discharge Ratings

Control is by 90 degree V-notch weir. Ratings available to convert stage (mm) to flow (l/s).

General Comments

This site was installed by Rotorua Water Resource Survey as part of the Rotorua Geothermal Monitoring programme. Man-made interference to hot pools upstream of the recorder has affected data collected for short periods throughout the record. Roto-a-Tamaheke is one of two flow sites in this catchment. Te Kokonga at Bathhouse measures flow at the western outlet of Lake Roto-a-Tamaheke. Site was operated by NIWA, Rotorua. On the 02/07/91 it was handed over to Environment Bay of Plenty and is operated as part of its Natural Environment Regional Monitoring Network. In July 1993 operation of the site was contracted back to NIWA, Rotorua.



SITE LOCATION
Roto-a-Tamaheke at Path

Station Comments

Roto-a-Tamaheke River at Path. Site Number 1114610, on River Number 146076.

The local recording authority is Environment Bay of Plenty. The control is by 90 degree V-notch weir.

The site has been installed as part of the Rotorua geothermal monitoring programme. This site is one of two flow sites in the catchment. The other, Te Kokonga at Bathhouse Site Number 1114615, measures the flow at the western end of Lake Roto-a-Tamaheke. There is also an automatic raingauge installed at this site, (861221). The rating curve is based on the formula q=1.34*h to the power of 2.48. Gaugings at the site are normally carried out at a narrow x-section approximately 1.5 metres above the V-notch. Lower flow gaugings have a reduced number of verticals and high associated uncertainty.

15/07/84 - Data from 840715 240000 to 841010 240000 shows high water level due to the western outlet of Roto-a-Tamaheke being blocked off, resulting in the entire discharge of the area flowing through the Roto-a-Tamaheke at Path site.

23/06/84 - Spikes occur throughout the dataset as a result of man made interference to hot pools upstream of the recorder.

28/10/89 - A dam was built between Spring 337 and 337/1 between 891028 and 891029 and the by pass between 337 and 428 was opened up. The dam between 337 and 337/1 was breached about 891206 with the by pass still being opened. Also a pipe was installed in Spring 426, below water level, through to 428 on 891111 and 891112. This pipe was blocked on 891113 by Water Resources Survey staff and has subsequently been removed. The above work was carried out by an interested member of the public.

30/08/90 - Missing record from 900830 161500 to 900911 090000 due to a board being stuck across the V-notch, this raised the stage by 32mm, an apparent 30% increase in flow.

24/06/91 - Missing record from 910624 150000 to 910626 160000 due to the recorder being removed to allow for the installation of a new recorder shed.

02/07/91 - Site handed over to Environment Bay of Plenty.

23/08/91 - Board put across weir. Water level artificially raised by 130mm at 134500. Board removed by DSIR on 910827 091500. Data has had 130 mm subtracted prior to corrections to external staff gauge.

29/09/91 - Board put across weir caused artificial rise in water level. Board removed on 911002 between 124500 and 130000. Data has been corrected to delete this artificially high stage.

06/02/92 - Culvert on south side of recorder was opened by persons unknown. When staff visited the site they closed the culvert prior to changing the tape. Processing of this tape (#5) has taken this into account. Relevelled internal plumbob and external staff gauge. Cleared silt from around intakes, water level inside tower rose 15mm.

23/12/93 - Between 931223 and 930108 outflow altered by a channel from Spring 426 being cut 400mm deeper, diverting flow from Spring from flowing over weir.

29/12/95 - Data from 951229 211500 to 960108 193000 was affected by the placement of a board across the mouth of the v-notch. It is not known if water was flowing under the board, it has been assumed not. The data has been corrected first using a rating to produce the correct flow for the recorded stage. Then the original rating, inverted, has been applied to obtain the correct stage.

08/02/96 - Board removed from v-notch. Rating change.

26/02/98 - Unusual stage plots on or around the 980226 are likely to be caused by alterations to hot springs above the recorder. The most likely of these is Spring 426, at about this time the outflow from the spring was diverted from the outflow channel into Spring 428, just above the site.

10/01/00 - Site closed.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	July 2006	Site Number	1114610
Compiled by	G R Ellery	River	Roto-a-Tamaheke
		Station	Path
Metric Map Reference	U16: 959 328		
Catchment Area (km²)	0.45	Period of Summary	1985 to 2000

Statistical Summary

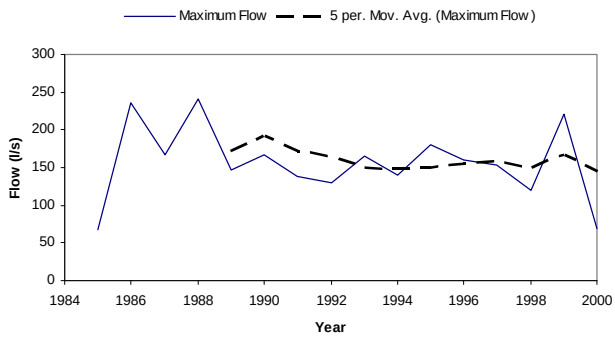
Flow (*l/s*)				
Minimum Flow	4	Maximum Flow		241
Mean Annual Minimum Flow	12	Mean Annual Maximum Flow		156
Mean Flow	28	Mean Summer Flow		30
Median Flow	27	Mean Autumn Flow		28
Mean Specific Flow (/km²)	62	Mean Winter Flow		26
		Mean Spring Flow		27
Low Flow Distribution Fit	Gumbel	Peak Flow Distribution Fit	Gumbel	GEV
7 day Low Flow (Minimum)	4	Peak Flow (5 yr Return)	193	195
7 Day Low Flow (Mean Annual)	14	Peak Flow (10 yr Return)	224	228
7 day Low Flow (5 yr Return)	10	Peak Flow (20 yr Return)	253	261
7 Day Low Flow (10 yr Return)	8	Peak Flow (50 yr Return)		
		Peak Flow (100 yr Return)		

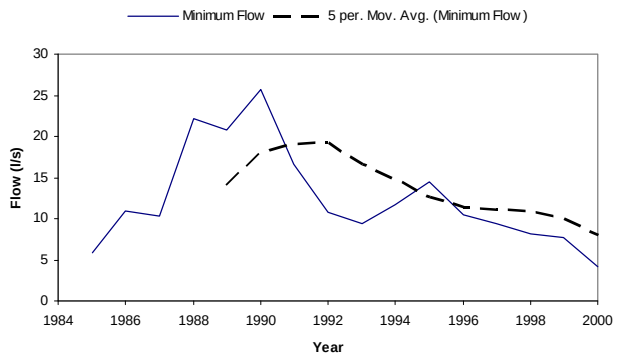
Annual Summaries

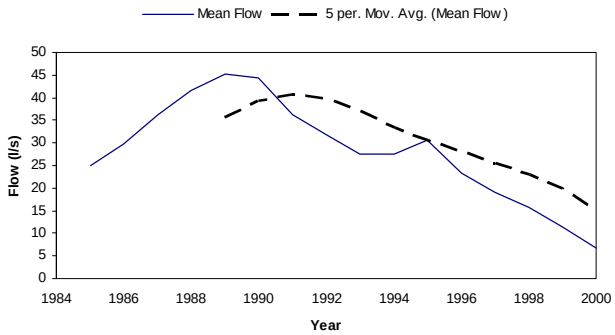
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993	9	28	165
1981				1994	12	27	139
1982				1995	14	31	180
1983				1996	11	23	160
1984				1997	9	19	153
1985	6	25	68	1998	8	16	119
1986	11	30	235	1999	8	11	221
1987	10	36	167	2000	4	7	68
1988	22	42	241	2001			
1989	21	45	147	2002			
1990	26	44	166	2003			
1991	17	36	138	2004			
1992	11	32	130	2005			

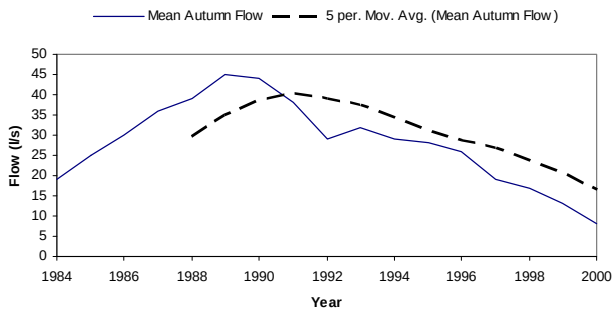
Flow Distribution

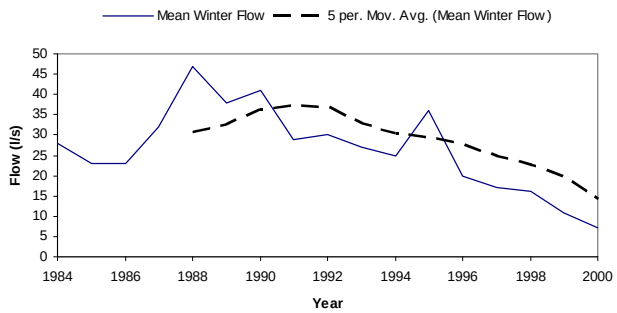
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	241	67	58	55	52	51	49	48	47	46
10	45	44	44	43	43	42	41	41	40	40
20	39	39	38	38	37	37	37	36	36	35
30	35	34	34	34	33	33	33	32	32	31
40	31	31	30	30	30	29	29	29	28	28
50	27	27	27	26	26	26	25	25	24	24
60	24	23	23	23	22	22	21	21	20	20
70	20	19	19	18	18	17	17	16	16	16
80	15	15	14	14	13	12	12	11	11	10
90	10	10	9	9	9	8	7	6	5	5
100	4									

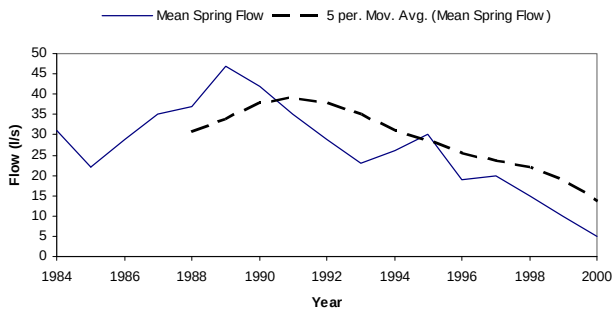


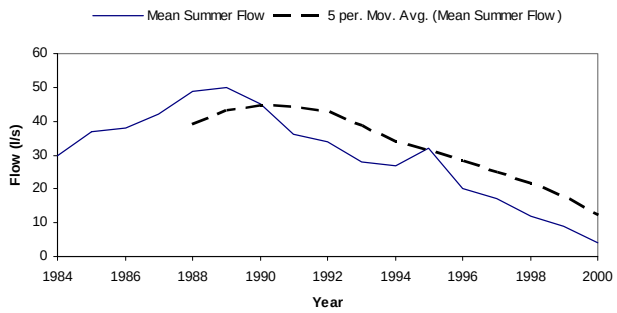












Roto-a-Tamaheke at Path

Environment Bay of Plenty
River Flow Recording Station

River	Te Kokonga	Site	Bathhouse
Site Number	1114615	Grid Reference	U16:956 328
Start of Record	June 1984	Data Capture Rate	95%
Data Summary From	January 1985	To	December 2000
Data Audited From	January 1990	To	December 2000

Equipment History

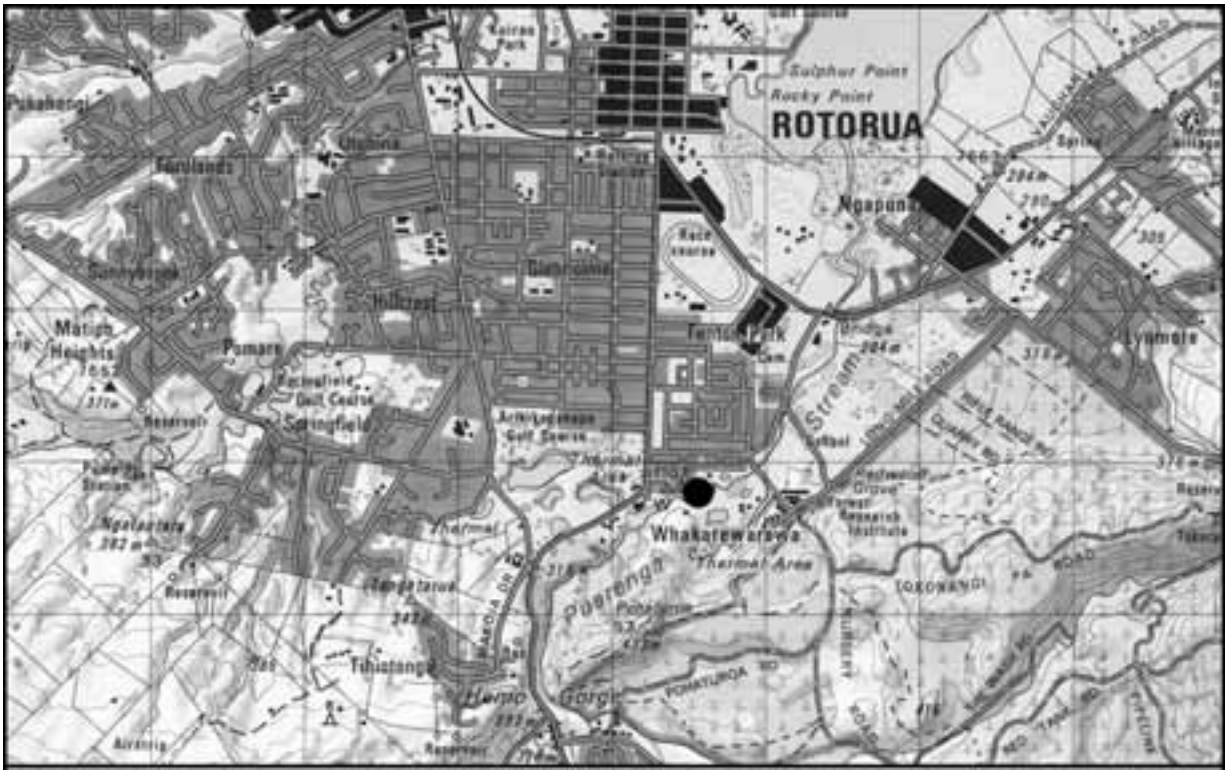
Float/counterweight system with shaft encoder. 1mm resolution.

Comments on Stage/Discharge Ratings

Site control is by stainless steel pipe. Ratings are based on volumetric gaugings taken at the inlet to the Bathhouse. Ratings are available to convert Stage (mm) to Flow (l/s).

General Comments

This site was installed by Rotorua Water Resource Survey as part of the Rotorua Geothermal Monitoring programme. Te Kokonga is one of two flow sites in this catchment. Roto-a-Tamaheke at Path measures flow at the eastern outlet of Lake Roto-a-Tamaheke. Site was operated by NIWA, Rotorua. On the 04/07/91 the site was handed over to Environment Bay of Plenty and is operated as part of its Natural Environment Regional Monitoring Network. In July 1993 site operation was contracted back to NIWA, Rotorua.



SITE LOCATION
Te Kokonga at Bathhouse

Station Comments

Te Kokonga at Bathhouse. Site Number 1114615, on River Number 146076.

The local recording authority is Environment Bay of Plenty.
Control is by 300mm stainless steel pipe. Te Kokonga is one of two flow sites in the Roto-a-Tamaheke catchment - the other Tamaheke at Path measures the flow at the eastern outlet of Roto-a-Tamaheke.

Water level at this site represents the level in the "control box". This control box has a 225mm inlet, from Roto-a-Tamaheke, which is controlled by the locals to supply their bathhouse. The outlet is via a 300mm pipe which acts as the control. The intake for the recorder tower also comes from this box. As a result of this manipulation by the locals, sudden changes in water level can occur, hence the data contains many spikes, a constant surge is also evident.

Gaugings above are carried out by the volumetric method by measuring the fill time into a large drum (approximately 226 litres)in the bathhouse. There is a large scatter in the observed gaugings which is caused in part by the measurement procedure (timing errors) and derivation of gauge height. The majority of gaugings prior to 1997 had external staff gauge readings used for the gauge height. The staff gauge is housed within the box and is subject to turbulence and drawdown effects and is difficult to read. Due to the short time period available to carry out gaugings (imposed by owners of the bathhouse) there are no corresponding recorder readings to apply to these gaugings.

Rating changes should not occur due to the nature of the control box, however there appears to have been some movement and may be identified by observing the long term changes in level of the downward spikes when the flow through the box is reduced to a trickle.

08/11/90 - Missing record from 901108 124500 to 901115 103000 due to Spring 328 being cleaned out of silt from around the control box, thus disrupting the intake pipe to the recorder tower.

26/10/90 - Last gauging by DSIR.

04/07/91 - Site taken over by B.O.P.R.C. on 910704.

17/06/92 - First B.O.P.R.C. Gauging at gauge height 1.220 metres and a flow indicative of a change in rating since the last gauging on 901026 by DSIR. This was confirmed by several gaugings on 920805. A number of fluctuations can be noted in the data, the most notable of which appears to occur on 910621. Investigation of this abnormal fluctuation (probably the result of human influence) suggests a link to the change in rating. A piece of wood was later (see comment of 920810) found to be jammed in the control box causing the rating change. A new rating (002) has therefore been filed at 910621.

10/08/92 - Board found jammed in control box was removed / thereby lowering the rating relationship. New rating filed at 920810 112500. This rating is not the same as the original rating.

01/07/93 - Operation of sites contracted out to NIWA Rotorua by Environment Bay of Plenty.

01/07/98 - Site operated by Environment Bay of Plenty.

10/01/01 - Site closed.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	July 2006	Site Number	1114615
Compiled by	G R Ellery	River	Te Kokonga
		Station	Bathhouse
Metric Map Reference	U16:956 328		
Catchment Area (km²)	0.5	Period of Summary	1985 to 2000

Statistical Summary

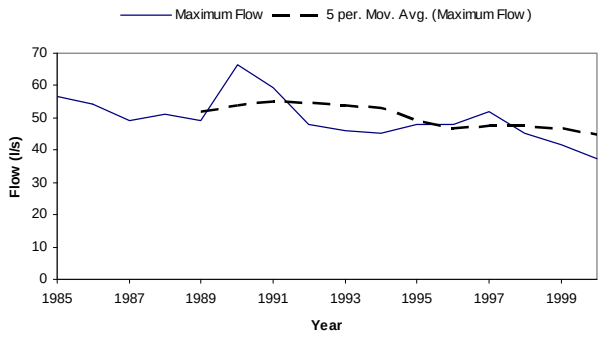
Flow (*l/s*)			
Minimum Flow	0	Maximum Flow	66
Mean Annual Minimum Flow	1	Mean Annual Maximum Flow	50
Mean Flow	23	Mean Summer Flow	19
Median Flow	23	Mean Autumn Flow	22
Mean Specific Flow (/km²)	0.5	Mean Winter Flow	28
		Mean Spring Flow	25
Low Flow Distribution Fit	GEV	Peak Flow Distribution Fit	Gumbel
7 day Low Flow (Minimum)	3	Peak Flow (5 yr Return)	55
7 Day Low Flow (Mean Annual)	10	Peak Flow (10 yr Return)	59
7 day Low Flow (5 yr Return)	7	Peak Flow (20 yr Return)	63
7 Day Low Flow (10 yr Return)	6	Peak Flow (50 yr Return)	
		Peak Flow (100 yr Return)	

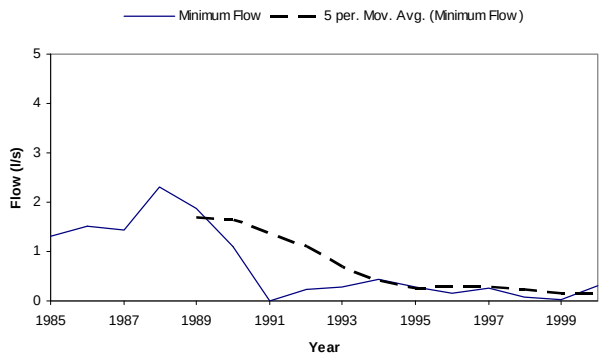
Annual Summaries

Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993	0	25	46
1981				1994	0	23	45
1982				1995	0	20	48
1983				1996	0	19	48
1984				1997	0	30	52
1985	1	22	57	1998	0	28	45
1986	2	21	54	1999	0	23	42
1987	1	20	49	2000	0	21	38
1988	2	22	51	2001			
1989	2	24	49	2002			
1990	1	25	66	2003			
1991	0	21	59	2004			
1992	0	25	48	2005			

Flow Distribution

Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	66	39	38	36	36	35	34	34	33	33
10	33	32	32	32	31	31	31	30	30	30
20	29	29	29	29	29	28	28	28	28	28
30	27	27	27	27	26	26	26	26	26	25
40	25	25	25	25	25	24	24	24	24	24
50	23	23	23	23	23	23	22	22	22	22
60	22	21	21	21	21	21	20	20	20	20
70	19	19	19	19	18	18	18	18	17	17
80	17	17	16	16	15	15	15	14	14	13
90	13	13	12	12	11	10	9	8	6	3
100	0									


Maximum Flow
5 per. Mov. Avg. (Maximum Flow)
Flow (l/s)
Year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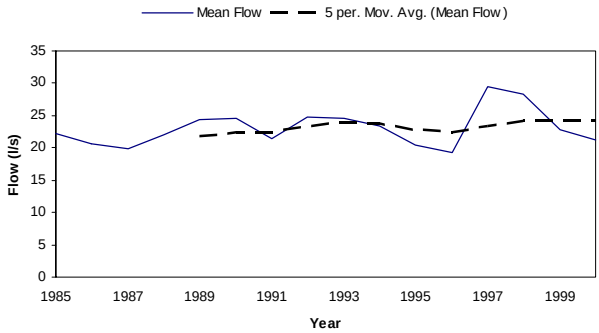
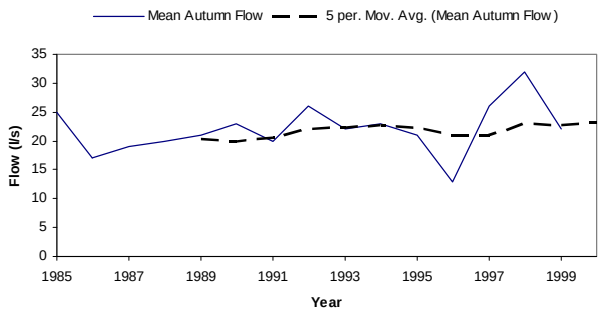
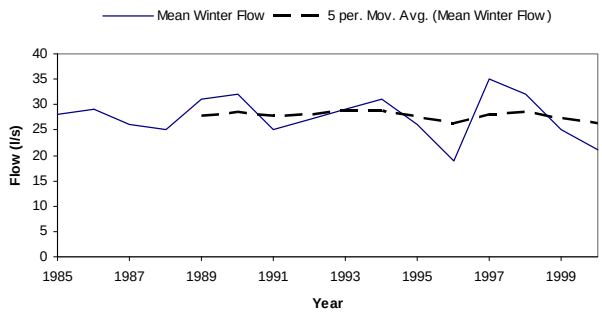
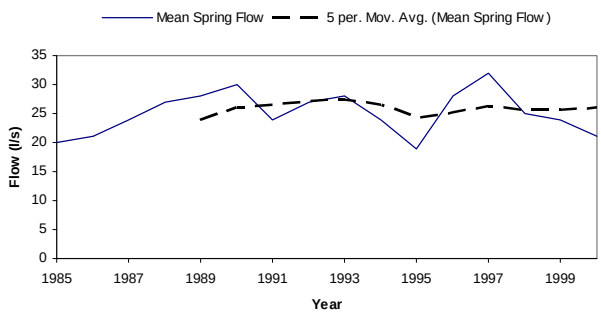
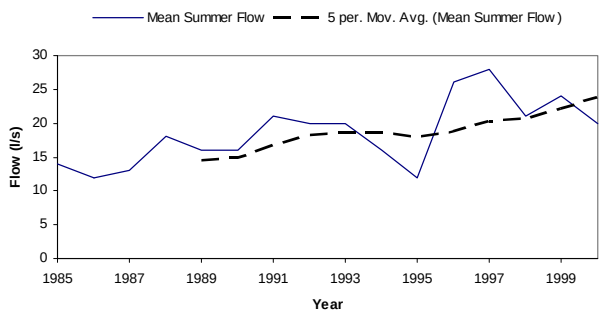
5 per. Mov. Avg. (Minimum Flow)
Flow (l/s)
Year


Mean Flow
5 per. Mov. Avg. (Mean Flow)
Flow (l/s)
Year


Mean Autumn Flow
5 per. Mov. Avg. (Mean Autumn Flow)
Flow (l/s)
Year


Mean Winter Flow
5 per. Mov. Avg. (Mean Winter Flow)
Flow (l/s)
Year


Mean Spring Flow
5 per. Mov. Avg. (Mean Spring Flow)
Flow (l/s)
Year


Mean Summer Flow
5 per. Mov. Avg. (Mean Summer Flow)
Flow (l/s)
Year

Environment Bay of Plenty
River Flow Recording Station

River	Pongakawa	Site	Old Coach Road
Site Number	14703	Grid Reference	V15: 187 663
Start of Record	June 1997	Data Capture Rate	97%
Data Summary From	January 1998	To	December 2005
Data Audited From	June 1997	To	December 2005

Equipment History

Float/counterweight system with shaft encoder. 1mm resolution.

Comments on Stage/Discharge Ratings

Control is by natural channel. Site is prone to significant weed growth during summer months that constricts channel width and changes ratings. Smoothed ratings are utilised to cater for the gradual weed growth over time. Bed is extremely mobile being made up of fine pumice gravels and sands. Ratings available to convert stage (mm) to flow (l/s).

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environmental Monitoring Network.

SITE LOCATION
Pongakawa at Old Coach Road

Station Comments

Pongakawa Old Coach Road. Site number is 14703 on river number.

The site is situated at NZMS260 grid reference V15:187 663 and drains 50 km2.

Site record has diurnal fluctuations which may be caused by land use in the upstream catchment or extraction for Pongakawa water supply.

Site is prone to significant weed growth during summer months that constricts channel width and changes ratings. Smoothed ratings are utilised to cater for the gradual weed growth over time. Bed is extremely mobile being made up of fine pumice gravels and sands.

25/06/97 - Site installed. Datalogger is a CR500 with a recording interval of 15 minutes. Sensor is a handar rotary encoder with a stage resolution of 1mm.

11/03/99 - Missing record from 990311 at 083000 to 990319 at 040000 due to battery failure.

30/08/99 - Missing record from 990830 at 104500 to 990906 at 104500 due to battery failure.

31/01/00 - Missing record from 1000131 at 013000 to 1000215 at 114500 due to battery failure.

07/11/00 - Missing record from 1001107 at 91500 to 1001126 at 030000 due to memory overwrite on logger.

27/03/01 - Missing record from 1010327 234500 to 1010331 203000 due to logger failure.

20/06/01 - Missing record from 20010620 131500 to 20010623 173000 due to memory overwrite on logger.

15/02/02 - Missing record from 1020215 131500 to 1020216 090000 due to battery failure.

03/07/02 - Missing record from 1020703 123000 to 1020706 040000 due to memory overwrite on logger.

05/10/03 - Missing record from 20031005 240000 to 20031006 150000. Cause unknown. Assumed straight line recession.

1/12/03 - Missing record from 20031201 154500 to 20031205 120000 due to operator error. Power to logger likely to have been disrupted.

23/01/04 - Missing record from 20040123 141500 to 20040203 124500 due to operator error. Power to logger was disrupted. Logger was not reset.

17/03/04 - Missing record from 20040317 123000 to 20040323 064500. Logger downloaded late, causing data to be overwritten.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	July 2006	Site Number	14703
Compiled by	G R Ellery	River	Pongakawa
		Station	Old Coach Road
Metric Map Reference	V15: 185 462		
Catchment Area (km²)	50	Period of Summary	1998 to 2005

Statistical Summary

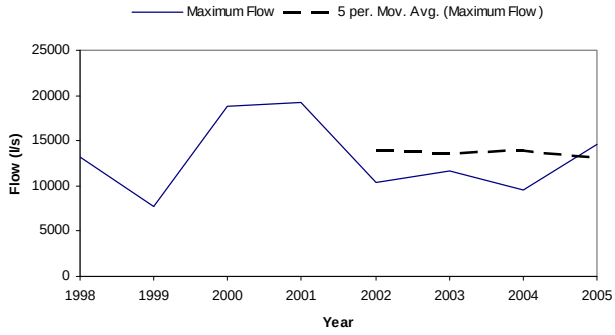
Flow (*l/s*)			
Minimum Flow	3816	Maximum Flow	19202
Mean Annual Minimum Flow	4252	Mean Annual Maximum Flow	13125
Mean Flow	4679	Mean Summer Flow	4617
Median Flow	4617	Mean Autumn Flow	4758
Mean Specific Flow (/km²)	94	Mean Winter Flow	4711
		Mean Spring Flow	4589
Low Flow Distribution Fit	GEV	Peak Flow Distribution Fit	Gumbel
7 day Low Flow (Minimum)	3859	Peak Flow (5 yr Return)	16469
7 Day Low Flow (Mean Annual)	4345	Peak Flow (10 yr Return)	19202
7 day Low Flow (5 yr Return)	4126	Peak Flow (20 yr Return)	
7 Day Low Flow (10 yr Return)	3930	Peak Flow (50 yr Return)	
		Peak Flow (100 yr Return)	

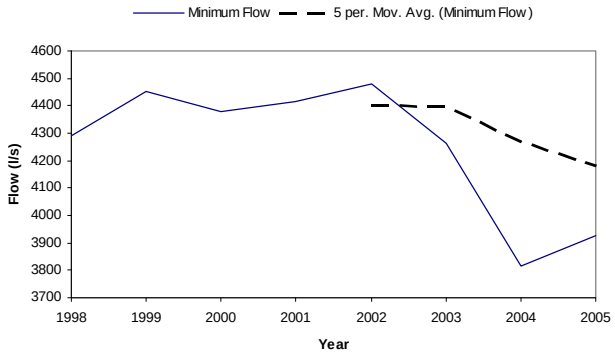
Annual Summaries

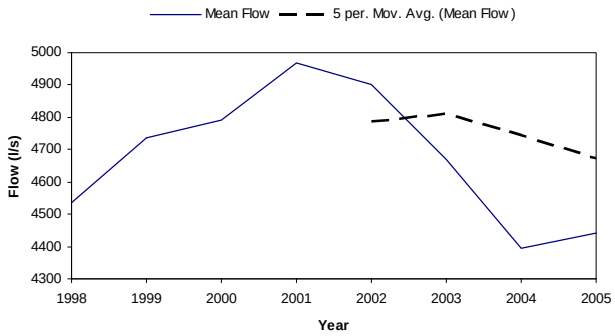
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993			
1981				1994			
1982				1995			
1983				1996			
1984				1997			
1985				1998	4291	4536	13170
1986				1999	4454	4736	7748
1987				2000	4378	4790	18797
1988				2001	4414	4967	19202
1989				2002	4479	4902	10383
1990				2003	4262	4668	11675
1991				2004	3816	4394	9483
1992				2005	3925	4443	14538

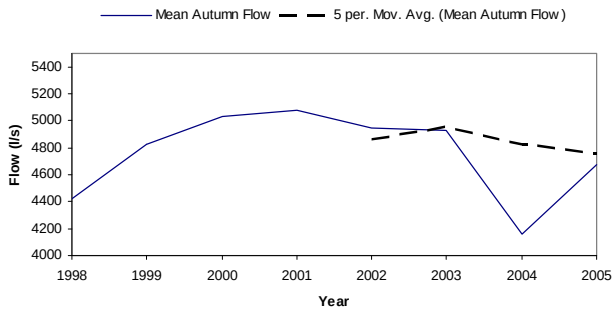
Flow Distribution

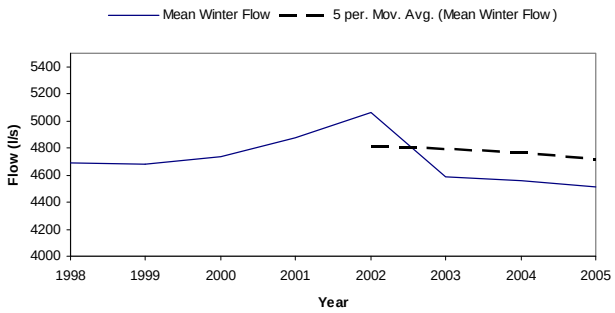
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	19202	5979	5437	5289	5226	5169	5130	5103	5072	5051
10	5033	5018	4999	4983	4962	4949	4934	4919	4907	4897
20	4887	4876	4865	4856	4849	4842	4833	4825	4818	4810
30	4801	4793	4784	4774	4764	4753	4740	4729	4718	4706
40	4696	4687	4679	4671	4661	4651	4644	4637	4630	4624
50	4617	4612	4604	4601	4594	4589	4585	4579	4574	4568
60	4563	4557	4551	4545	4541	4533	4526	4519	4510	4505
70	4497	4490	4485	4480	4474	4468	4464	4459	4453	4451
80	4445	4442	4437	4430	4423	4414	4405	4393	4379	4360
90	4340	4320	4295	4262	4213	4157	4120	4079	4028	3968
100	3816									

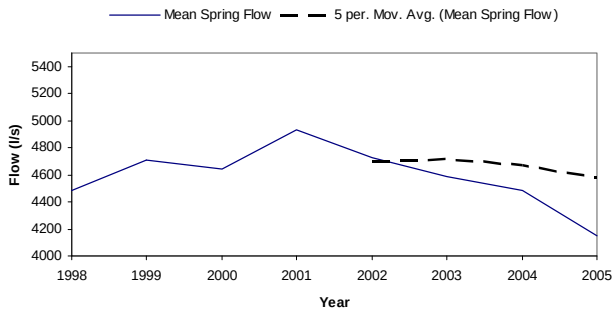


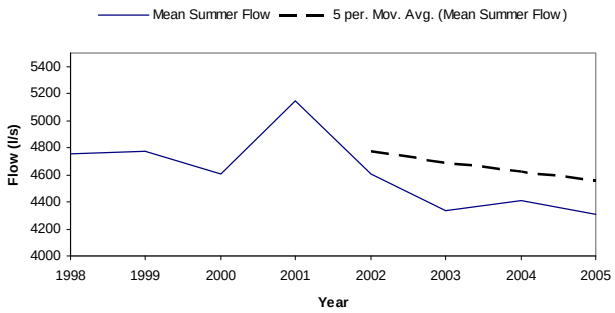












Pongakawa at Old Coach Road

Environment Bay of Plenty
River Flow Recording Station

River	Tarawera	Site	Awakaponga
Site Number	15302	Grid Reference	V15: 412 559
Start of Record	May 1948	Data Capture Rate	99%
Data Summary From	January 1949	To	December 2005
Data Audited From	July 1992	To	December 2005

Equipment History

01/01/36: Staff gauge installed.
23/08/65: F&P digital recorder.
15/06/92: Backup Foxboro removed.
15/09/99: iQuest logger and Handar.
16/12/48: Kent chart recorder.
24/08/82: Backup Foxboro chart recorder.
01/07/92: Float with L&S digital recorder.
15/03/05: Sutron pressure transducer replaces Handar.

Comments on Stage/Discharge Ratings

Site has a natural control with the riverbed comprising sandy pumice.
Ratings are available to convert Stage (mm) to Flow (l/s).

General Comments

Site was operated by NIWA, Rotorua until 01/07/92. Use of draglines in the clearing of the river channel appears to have affected stage data for periods throughout the record. Drawn off by the Pulp and Paper mills causes frequent rises and falls in the stage record. Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

SITE LOCATION
Tarawera at Awakaponga

Station Comments

Tarawera River at Awakaponga. Site Number 15302, on River Number 153000.

The local recording authority is Environment Bay of Plenty.
The site is situated 6.5 kilometres from the mouth. The control is by natural channel. The catchment area includes landlocked lakes: Rotomahana, Rerewhakaaitu, Okataina, Okareka, Tikitapu, and Rotokakahi totalling 243km^2.

The lower reaches of the Tarawera River where the water level recorder is located has a sandy pumice bed, which causes cross section changes on an hour by hour basis. The bed load travelling past the recorder site varies from two to four hundred tonnes per day. The changes in bed level have a direct effect on water levels at the site with the station never registering smooth recession curves. This combined with water extraction by the pulp and paper mills upstream causes the stage fluctuations that are apparent when the filed data has three millimetres or less compression applied. Dragline and earthquake effects are best seen in the variation due to major changes in water level slope through the reach.

28/05/48 - Data from 480528 to 541217 was obtained from weekly staff gauge readings. Some flood events over this period had an increased frequency of readings to establish peak heights and define hydrograph shapes. The staff gauge used for these readings was situated downstream of the present recorder location at the Railway Bridge.

01/01/73 - From 730101 the increased water draw off by the pulp and paper mills causes frequent large, rapid, rises and falls in the stage record. These fluctuations are responsible for a lag between some external and internal readings observed at the site. The rating change beginning 730723 at 150500 is due to a gradual increase in cross sectional area at the gauging site and is probably attributable to a reduction in sediment transport during a year which only produced 75% of the mean annual rainfall. This trend was reversed after a fresh in October, causing the rating curve to revert back to its previous position.

01/02/75 - Dragline operations observed in channel from February 1975, causing unusual shaped base flow recessions.

10/08/77 - Syphon intake installed on 770810 094500 to enable the recorder to operate below the invert level of the bottom intake.

02/03/87 - Data from 870302 133000 to 870303 133300 was filed from the Foxboro backup recorder as the digital recorder was badly affected by an earthquake. The order of the sequence of events between 134200 and 140300 is a guess only as they appear instantaneous on the Foxboro chart.

01/06/87 - Drag line clearing channel upstream and downstream of recorder from 870601 to 870721. This work appears to have affected the stage record from 870616.

03/02/88 - Dragline was observed clearing channel 880203 112400. This work appears to have affected the stage data from 880123.

29/04/92 - Missing record 920429 080000 to 920429 143000.

01/07/92 - Site handed over to Environment Bay of Plenty. Instrumentation L&S tape recorder with 1mm resolution, connected to an Aquitel Remote.

29/11/92 - Reduction in water level while Tasman pulp and paper mill shut effluent outfall gates for approximately 2 hours, while floating a boat stuck on an effluent pond bar.

15/12/94 - Missing record from 941215 231500 to 941216 084500 due to earthquake affecting recorder.

22/09/95 - Missing record from 950922 113000 to 950925 151500.

07/11/95 - Missing record from 951107 091600 to 951110 130000 due to float tape not being on pulleys.

24/11/96 - Data from 961124 0 to 961130 240000 shows the result of Tasman pulp and paper mill stopping their discharge into the river at Pipe Bridge.

15/11/ 97 - Missing record from 971115 124500 to 971117 130000.

15/03/2005 - Sutron Gas Purge system installed as replacement for Handar 436B encoder (primary stage recorder). Sensor has a resolution of +/-5mm and a recording interval of 15 minutes. Tower now sitting above normal water level.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	July 2006	Site Number	15302
Compiled by	G R Ellery	River	Tarawera
		Station	Awakaponga
Metric Map Reference	V15: 412 559		
Catchment Area (km²)	906	Period of Summary	1949 to 2005

Statistical Summary

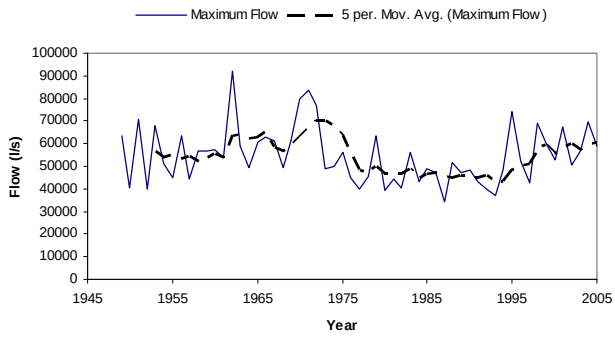
Flow (*l/s*)			
Minimum Flow	15186	Maximum Flow	92392
Mean Annual Minimum Flow	22824	Mean Annual Maximum Flow	54754
Mean Flow	30364	Mean Summer Flow	28664
Median Flow	29065	Mean Autumn Flow	28721
Mean Specific Flow (/km²)	34	Mean Winter Flow	32636
		Mean Spring Flow	32361
Low Flow Distribution Fit	GEV	Peak Flow Distribution Fit	Gumbel
7 day Low Flow (Minimum)	17079	Peak Flow (5 yr Return)	64000
7 Day Low Flow (Mean Annual)	22495	Peak Flow (10 yr Return)	72000
7 day Low Flow (5 yr Return)	20264	Peak Flow (20 yr Return)	79000
7 Day Low Flow (10 yr Return)	18938	Peak Flow (50 yr Return)	88000
		Peak Flow (100 yr Return)	95000

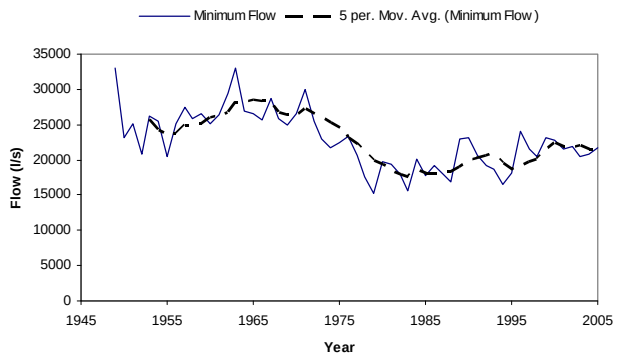
Annual Summaries

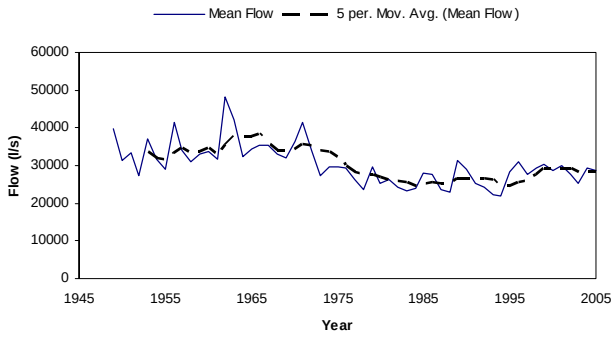
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	19727	25151	39111	1993	18614	22377	37221
1981	19472	26169	44205	1994	16478	21851	48445
1982	17899	24377	40218	1995	18107	28199	74188
1983	15669	23234	56265	1996	24023	30967	52184
1984	20155	24100	43496	1997	21550	27548	42957
1985	17752	28024	48989	1998	20389	29408	68882
1986	19116	27538	47410	1999	23241	30456	60018
1987	17985	23428	34225	2000	22740	28511	52685
1988	16936	22851	51708	2001	21597	29984	67521
1989	22908	31212	47289	2002	21922	27613	50335
1990	23094	28892	48101	2003	20521	25359	56501
1991	20691	25415	43023	2004	20821	29396	69919
1992	19185	24358	39691	2005	21783	28540	58739

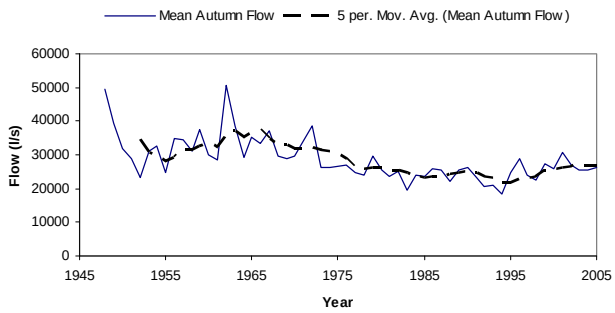
Flow Distribution

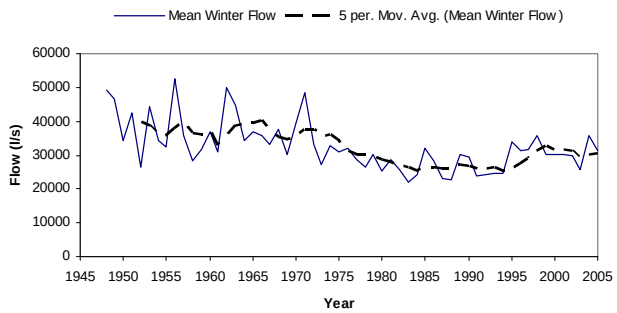
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	92392	54801	50410	47993	46136	44575	43598	42559	41442	40507
10	39693	39016	38431	37913	37422	37013	36631	36245	35919	35621
20	35298	34948	34664	34363	34104	33858	33630	33389	33158	32958
30	32762	32549	32346	32129	31925	31734	31549	31353	31163	30975
40	30784	30595	30427	30255	30080	29890	29705	29518	29347	29206
50	29065	28909	28746	28602	28447	28310	28154	28012	27857	27710
60	27561	27414	27265	27117	26985	26841	26697	26543	26382	26229
70	26063	25902	25730	25564	25393	25229	25061	24885	24704	24530
80	24357	24183	23996	23803	23612	23422	23235	23045	22840	22620
90	22374	22121	21862	21591	21277	20895	20537	20040	19445	18605
100	15186									

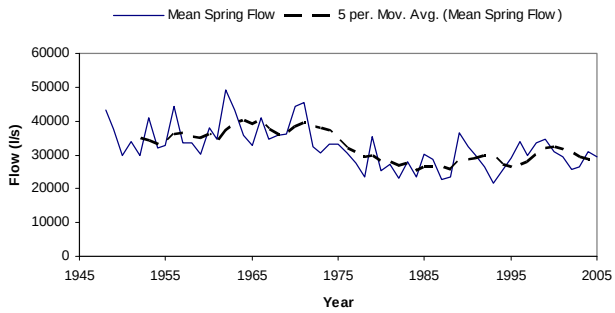

Maximum Flow
5 per. Mov. Avg. (Maximum Flow)
Flow (l/s)
Year

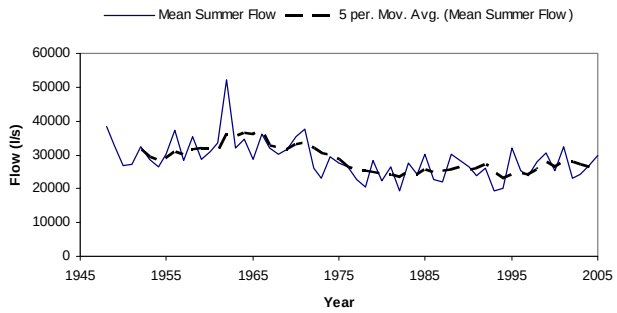

Minimum Flow
5 per. Mov. Avg. (Minimum Flow)
Flow (l/s)
Year


Mean Flow
5 per. Mov. Avg. (Mean Flow)
Flow (l/s)
Year


Mean Autumn Flow
5 per. Mov. Avg. (Mean Autumn Flow)
Flow (l/s)
Year


Mean Winter Flow
5 per. Mov. Avg. (Mean Winter Flow)
Flow (l/s)
Year


Mean Spring Flow
5 per. Mov. Avg. (Mean Spring Flow)
Flow (l/s)
Year


Mean Summer Flow
5 per. Mov. Avg. (Mean Summer Flow)
Flow (l/s)
Year

Environment Bay of Plenty
River Flow Recording Station

River	Tarawera	Site	Lake Outlet
Site Number	15341	Grid Reference	V16:174 303
Start of Record	November 1971	Data Capture Rate	100%
Data Summary From	January 1972	To	December 2005
Data Audited From	NIWA	To	NIWA

Equipment History

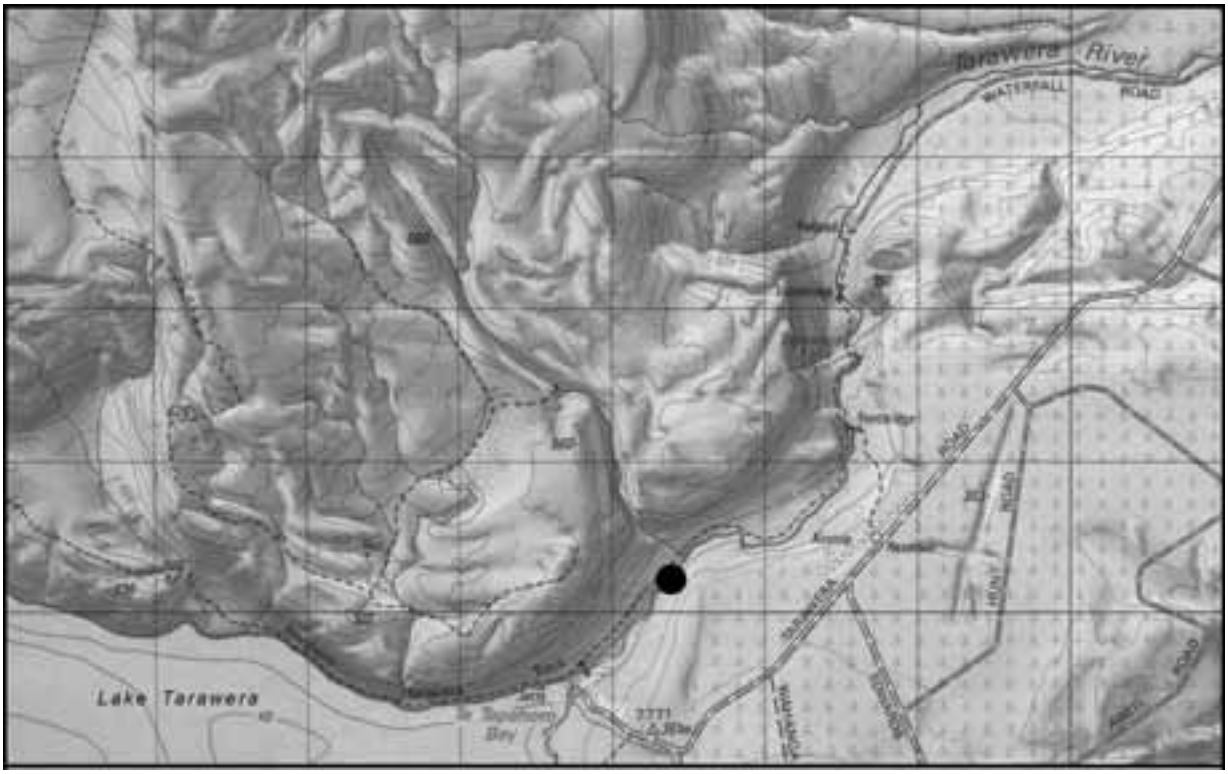
01/11/71: Float with F&P digital recorder.
06/06/90: Backup Foxboro chart recorder.
11/08/93: Shaft encoder and WRIC data logger.

Comments on Stage/Discharge Ratings

Control is by stable natural channel. Ratings available to convert stage (mm) to flow (l/s).

General Comments

Site is operated by NIWA, Rotorua.



SITE LOCATION
Tarawera at Lake Outlet

Station Comments

Tarawera River at Lake Outlet. Site Number 15341, on River Number 153000.

The local recording authority is NIWA, Rotorua.

Control is by natural channel.

31/12/95 - Periods of missing data have been filled with a synthetic record constructed by using a correlation with Lake Tarawera at Te Wairoa (15301).

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	December 2006	Site Number	15341
Compiled by	G R Ellery	River	Tarawera
		Station	Lake Outlet
Metric Map Reference	V16: 174 303		
Catchment Area (km²)	413	Period of Summary	1972 to 2005

Statistical Summary

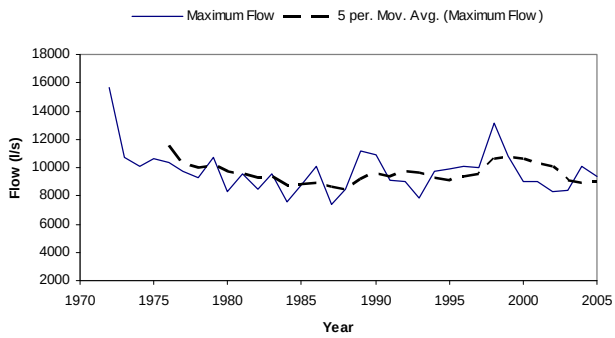
Flow (*l/s*)			
Minimum Flow	3844	Maximum Flow	15678
Mean Annual Minimum Flow	4792	Mean Annual Maximum Flow	9748
Mean Flow	6700	Mean Summer Flow	6179
Median Flow	6546	Mean Autumn Flow	6084
Mean Specific Flow (/km²)	16	Mean Winter Flow	7070
		Mean Spring Flow	7400
Low Flow Distribution Fit	GEV	Peak Flow Distribution Fit	Gumbel
7 day Low Flow (Minimum)	4017	Peak Flow (5 yr Return)	10800
7 Day Low Flow (Mean Annual)	4686	Peak Flow (10 yr Return)	11700
7 day Low Flow (5 yr Return)	4387	Peak Flow (20 yr Return)	12500
7 Day Low Flow (10 yr Return)	4232	Peak Flow (50 yr Return)	13600
		Peak Flow (100 yr Return)	

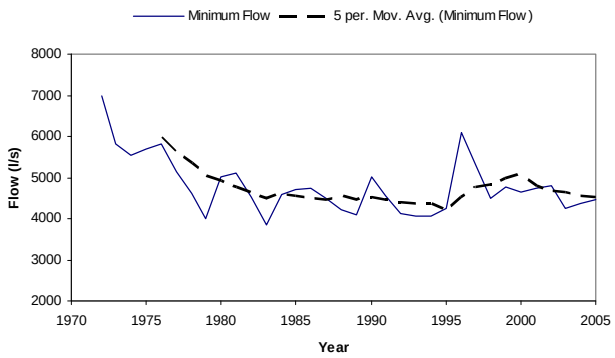
Annual Summaries

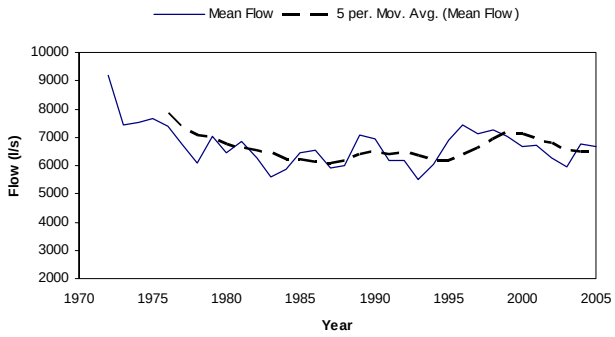
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	5002	6444	8303	1993	4073	5490	7832
1981	5108	6851	9518	1994	4073	6033	9722
1982	4534	6258	8492	1995	4231	6918	9932
1983	3844	5610	9575	1996	6081	7457	10125
1984	4578	5866	7613	1997	5319	7144	10009
1985	4709	6446	8755	1998	4495	7239	13163
1986	4733	6552	10125	1999	4765	7040	10828
1987	4495	5907	7363	2000	4660	6685	9007
1988	4225	6019	8475	2001	4739	6722	8988
1989	4095	7068	11133	2002	4792	6277	8325
1990	5023	6943	10893	2003	4254	5948	8381
1991	4545	6162	9118	2004	4360	6760	10125
1992	4129	6200	9025	2005	4470	6682	9381

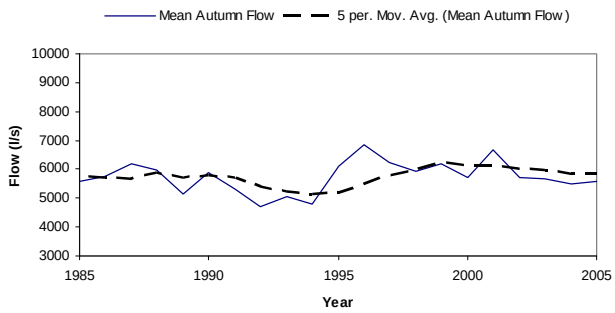
Flow Distribution

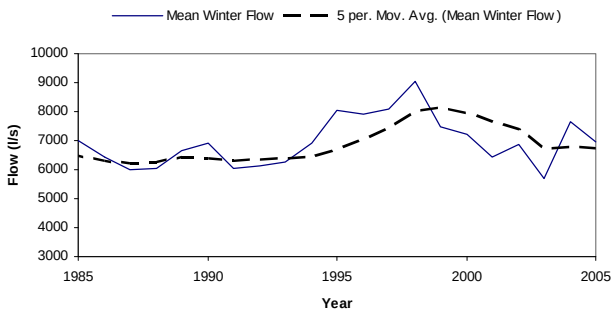
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	15678	10116	9630	9373	9165	8984	8847	8730	8626	8528
10	8439	8361	8282	8210	8139	8070	8004	7940	7877	7815
20	7754	7692	7637	7583	7533	7488	7441	7395	7354	7311
30	7271	7228	7191	7157	7122	7084	7046	7009	6976	6945
40	6912	6877	6838	6798	6760	6721	6684	6648	6614	6580
50	6546	6512	6479	6446	6413	6381	6351	6321	6292	6263
60	6234	6206	6175	6148	6119	6091	6061	6030	6000	5969
70	5937	5905	5872	5842	5810	5776	5742	5705	5669	5633
80	5596	5556	5511	5467	5423	5380	5339	5294	5247	5204
90	5151	5100	5048	4983	4921	4852	4755	4649	4508	4346
100	3844									

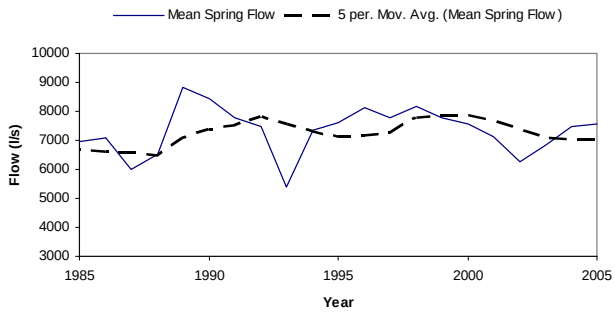


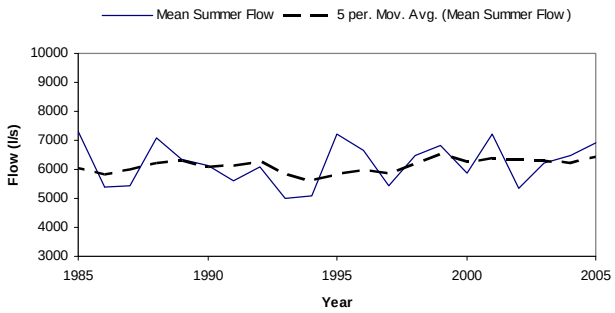












Tarawera at Lake Outlet

Environment Bay of Plenty
River Flow Recording Station

River	Rangitaiki	Site	Te Teko
Site Number	15412	Grid Reference	V15:435 448
Start of Record	June 1948	Data Capture Rate	100%
Data Summary From	January 1949	To	December 2005
Data Audited From	NIWA	To	NIWA

Equipment History

01/06/48: Staff gauge installed.

07/09/52: Kent chart recorder.

25/08/65: Float with F&P digital recorder.

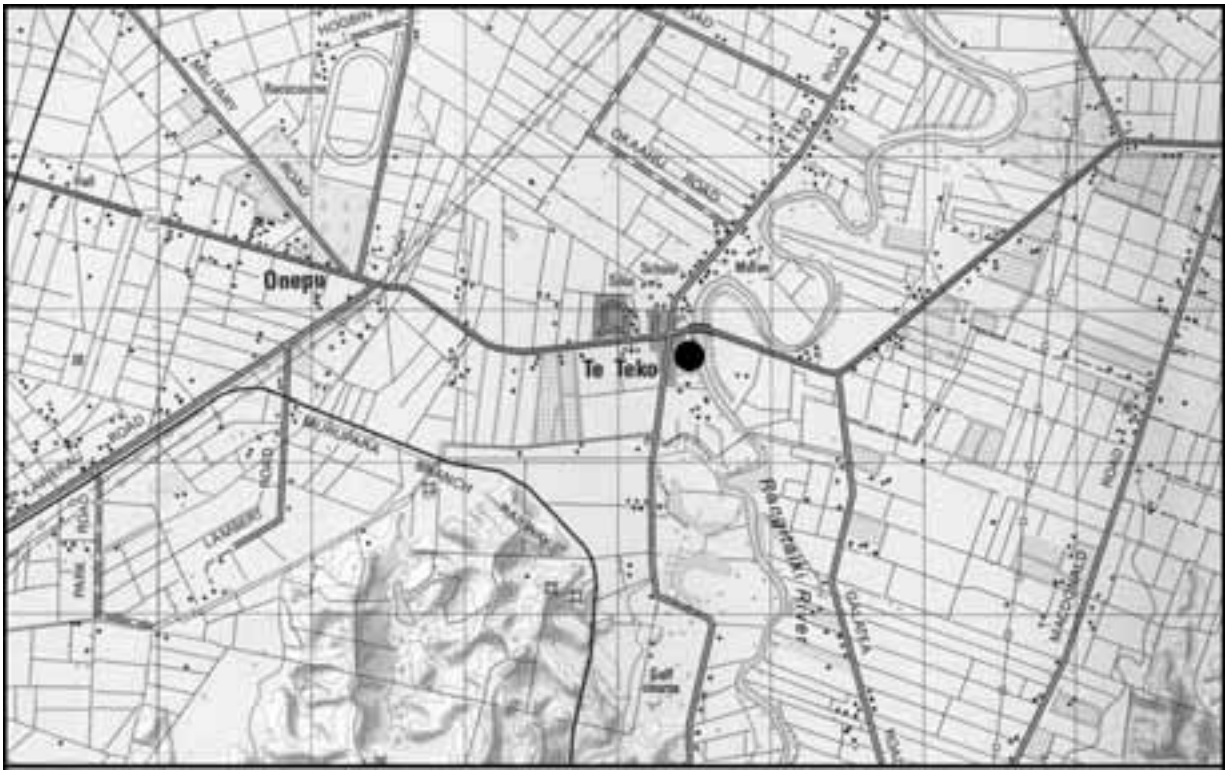
08/03/88: Backup Foxboro chart recorder.

Comments on Stage/Discharge Ratings

Control is by natural channel. Ratings available to convert stage (mm) to flow (l/s).

General Comments

Site is operated by NIWA, Rotorua. Record from June 1948 to October 1952 is from staff gauge at Edgecumbe Bridge, approximately 12 kilometres downstream. Water levels were affected by the filling of Lake Matahina in November 1966. Since then water levels have been affected by the dam operation. Flow recorded at Matahina Dam has been used as a backup.



SITE LOCATION
Rangitaiki at Te Teko

Station Comments

Rangitaiki River at Te Teko. Site Number 15412, on River Number 154000.

The local recording authority is NIWA, Rotorua.

The site is situated 23 kilometres from the river mouth, and has a natural channel control. Sediment concentration is also measured at this site.

07/09/52 -Chart data was not filed until 521001. Charts have not been digitised so data filed are mainly one daily value.

24/11/66 -Stage values on 661125 and 661126 go below zero due to the filling of Lake Matahina. From now on water levels are affected by the Matahina Dam.

31/01/86 -Staff gauge zero lowered 1.0 metre.

02/03/87 -Stage record from 870302 133000 to 870302 160000 has been affected by an earthquake. The stage record has been filed as recorded although this may not produce true flows during the event.

04/03/88 - Missing record from 880304 123000 to 880308 121500 due to water level receding below bottom of intake pipe. Backup recorder installed to record water levels when stage drops below bottom intake.

31/05/88 -The unusual stage hydrograph during June and July 1988 was due to the Matahina Dam being refilled after maintenance work to the right bank abatement.

27/07/02 - Missing record from 27 July 2002 081500 to 29 July 2002 111500 due to vandals breaking into recorder house and smashing all recording equipment.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	December 2006	Site Number	15412
Compiled by	G R Ellery	River	Rangitaiki
		Station	Te Teko
Metric Map Reference	V15:435 448		
Catchment Area (km^2)	2893	Period of Summary	1949 to 2005

Statistical Summary

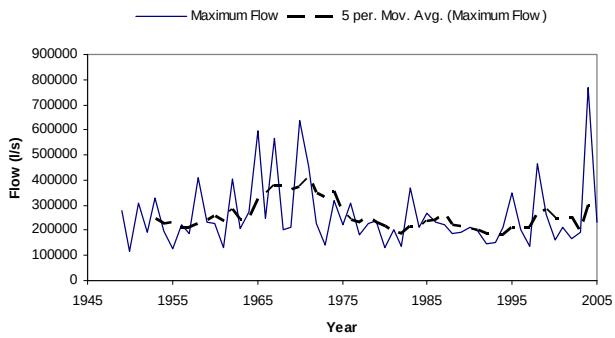
Flow (*l/s*)			
Minimum Flow	6200	Maximum Flow	769985
Mean Annual Minimum Flow	39176	Mean Annual Maximum Flow	260683
Mean Flow	70537	Mean Summer Flow	66010
Median Flow	61888	Mean Autumn Flow	59884
Mean Specific Flow (/km^2)	24	Mean Winter Flow	84804
		Mean Spring Flow	82052
Low Flow Distribution Fit	GEV	Peak Flow Distribution Fit	Equally weighted TCEV, GEV & GEV, Log Pearson III
7 day Low Flow (Minimum)	32563	Peak Flow (5 yr Return)	320000
7 Day Low Flow (Mean Annual)	41917	Peak Flow (10 yr Return)	410000
7 day Low Flow (5 yr Return)	38418	Peak Flow (20 yr Return)	505000
7 Day Low Flow (10 yr Return)	36339	Peak Flow (50 yr Return)	650000
		Peak Flow (100 yr Return)	780000

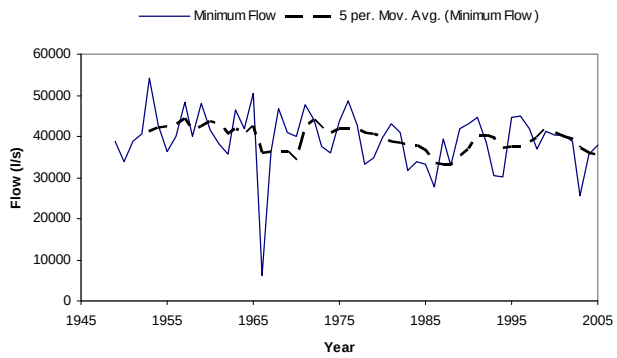
Annual Summaries

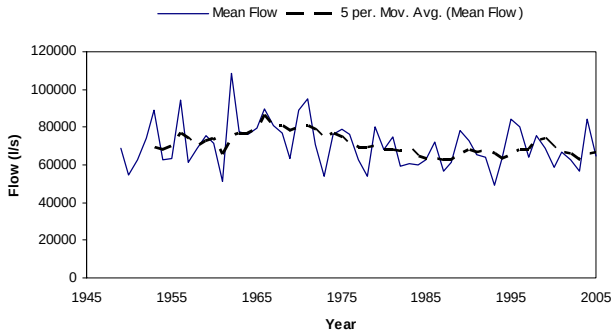
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	39638	68274	130903	1993	30378	49547	150866
1981	43212	74904	201712	1994	30134	63458	212771
1982	40926	59141	138947	1995	44563	84372	349119
1983	31800	60906	371180	1996	44773	80223	204713
1984	33814	60003	214429	1997	41833	63708	135306
1985	33302	63001	266043	1998	36892	75245	463810
1986	27568	72152	231431	1999	41195	68505	265245
1987	39238	56371	223114	2000	40238	58789	162335
1988	32826	61465	186769	2001	40288	66431	212780
1989	41982	77979	191557	2002	38685	62606	164865
1990	43087	72947	213252	2003	25596	56560	190192
1991	44762	65718	198288	2004	35694	84065	769985
1992	38387	63847	145804	2005	37880	64518	233677

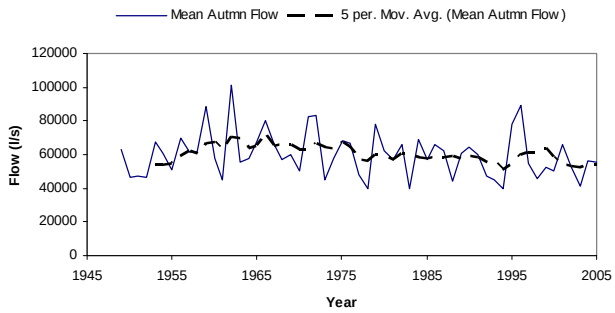
Flow Distribution

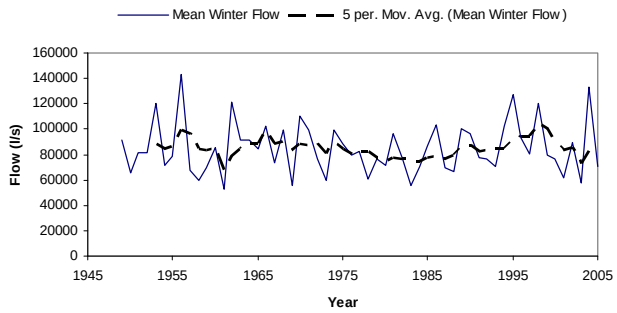
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	769985	178903	152127	139800	132872	126449	121377	117330	113918	111026
10	108338	105603	103225	100983	98880	97042	95337	93659	92102	90656
20	89170	87743	86337	85068	83802	82588	81512	80379	79193	78166
30	77125	76150	75236	74366	73575	72800	72085	71337	70582	69793
40	69035	68278	67564	66875	66119	65411	64708	64047	63385	62689
50	62027	61404	60813	60230	59616	59053	58473	57904	57393	56861
60	56258	55710	55176	54621	54115	53543	52985	52472	51954	51427
70	50910	50430	50016	49608	49274	48956	48677	48427	48198	47953
80	47714	47444	47164	46871	46546	46225	45894	45507	45068	44616
90	44202	43617	43109	42561	41947	41197	40468	39639	38434	36107
100	6200									

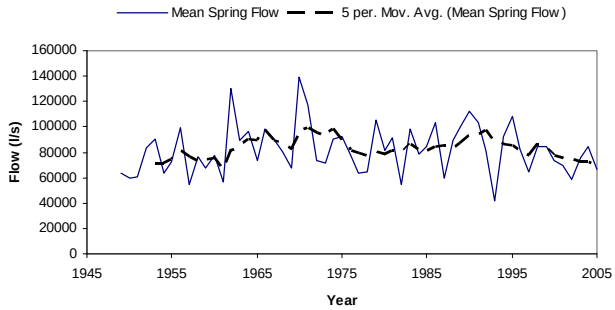

Maximum Flow
5 per. Mov. Avg. (Maximum Flow)
Flow (l/s)
Year

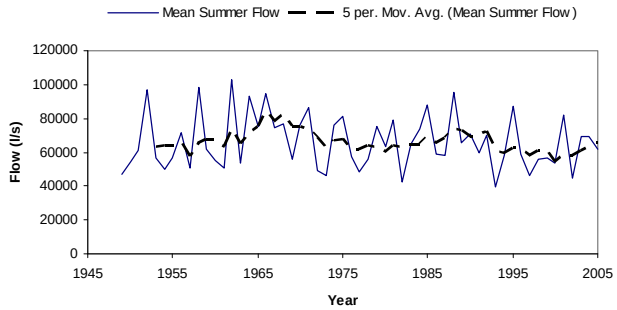

Minimum Flow
5 per. Mov. Avg. (Minimum Flow)
Flow (l/s)
Year


Mean Flow
5 per. Mov. Avg. (Mean Flow)
Flow (l/s)
Year


Mean Autmn Flow
5 per. Mov. Avg. (Mean Autmn Flow)
Flow (l/s)
Year


Mean Winter Flow
5 per. Mov. Avg. (Mean Winter Flow)
Flow (l/s)
Year


Mean Spring Flow
5 per. Mov. Avg. (Mean Spring Flow)
Flow (l/s)
Year


Mean Summer Flow
5 per. Mov. Avg. (Mean Summer Flow)
Flow (l/s)
Year

Environment Bay of Plenty
River Flow Recording Station

River	Rangitaiki	Site	Murupara
Site Number	15408	Grid Reference	V17:326 981
Start of Record	June 1948	Data Capture Rate	98%
Data Summary From	January 1949	To	December 2005
Data Audited From	NIWA	To	NIWA

Equipment History

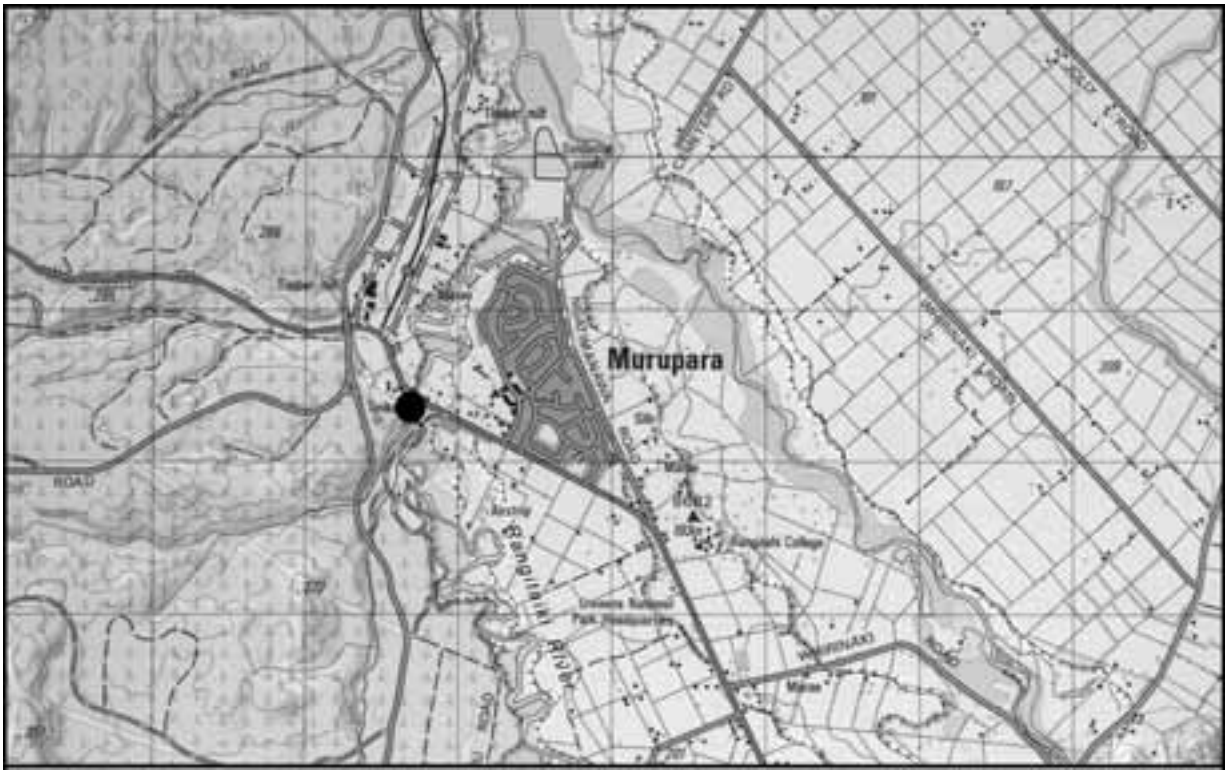
01/01/48: Staff gauge installed.
06/02/59: Kent chart recorder.
22/08/84: Float with L&S digital recorder.
16/09/52: Bristol chart recorder.
24/08/65: Float with F&P digital recorder.
13/06/88: Backup Foxboro chart recorder.

Comments on Stage/Discharge Ratings

Site control is natural channel. Ratings are available to convert Stage (mm) to Flow (l/s).

General Comments

Site is operated by NIWA, Rotorua. Stage record has been affected by the Wheao Power Scheme from 1982. Sediment concentration is also measured at this site.



SITE LOCATION
Rangitaiki at Murupara

Station Comments

Rangitaiki River at Murupara. Site Number 15408, on River Number 154000.

The local recording authority is NIWA, Rotorua.

From April 1982 stage record is affected by the Wheao Power Scheme. Sediment concentration is also measured at the site.

01/01/48
Staff gauge installed 480101. Record from 480601 to 520915 is readings taken from daily staff gauge observations. Data for the period of daily readings is not completely reliable with the reader generally only reading the gauge to 0.1ft (30mm).

17/09/52
The stage record has been manually read from the Bristol charts at a rate of one point per day. From 520917 to 581215 during any period where the recorder has malfunctioned daily staff gauge readings have been filed. Record from 520917 to 650824 was checked against Whirinaki at Galatea (15410). This check showed only daily mean discharges should be used. The original charts are held by Works (Major Projects), Wellington, if any storm analysis is required.

01/10/70 -
A lag between internal and external stage occurred from 701001 due to a bend in the intake pipe reducing its diameter and gravel deposition over the intakes caused by the change in channel alignment. The effect of gravel deposition is minimised by removing it from around the intakes half yearly or when required.

01/04/82 - Rapid stage fluctuations from April 1982 to December 1982 were caused by the Wheao power scheme construction and testing.

30/12/82 - Wheao power station head race collapse caused a very short sharp flood hydrograph on 821230.

14/12/83 - Wheao power scheme began influencing the stage record at Murupara after being rebuilt from December 1983.

31/12/95 -Periods of record may be replaced with synthetic data correlated from the following sites, Whirinaki at Galatea, (15410), Rangitaiki at Kopuriki (15413) and rainfall stations Minginui (Met B86671) and Waimihia (Met B6821).

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	December 2006	Site Number	15408
Compiled by	G R Ellery	River	Rangitaiki
		Station	Murupara
Metric Map Reference	V17: 329 984		
Catchment Area (km²)	1184	Period of Summary	1949 to 2005

Statistical Summary

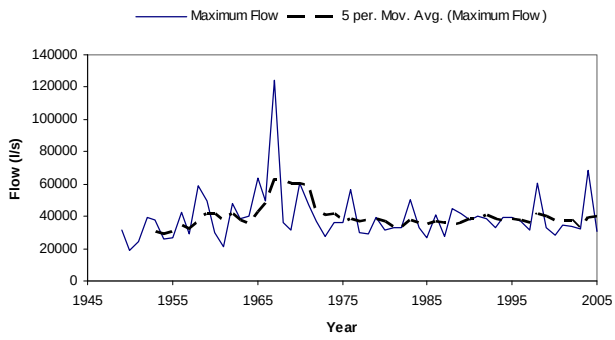
Flow (*l/s*)			
Minimum Flow	7016	Maximum Flow	124339
Mean Annual Minimum Flow	13614	Mean Annual Maximum Flow	39459
Mean Flow	21446	Mean Summer Flow	22278
Median Flow	20608	Mean Autumn Flow	18719
Mean Specific Flow (/km²)	18	Mean Winter Flow	22305
		Mean Spring Flow	24551
Low Flow Distribution Fit	GEV	Peak Flow Distribution Fit	Pearson
7 day Low Flow (Minimum)	10722	Peak Flow (5 yr Return)	52000
7 Day Low Flow (Mean Annual)	14623	Peak Flow (10 yr Return)	62000
7 day Low Flow (5 yr Return)	12933	Peak Flow (20 yr Return)	73000
7 Day Low Flow (10 yr Return)	11930	Peak Flow (50 yr Return)	87000
		Peak Flow (100 yr Return)	99000

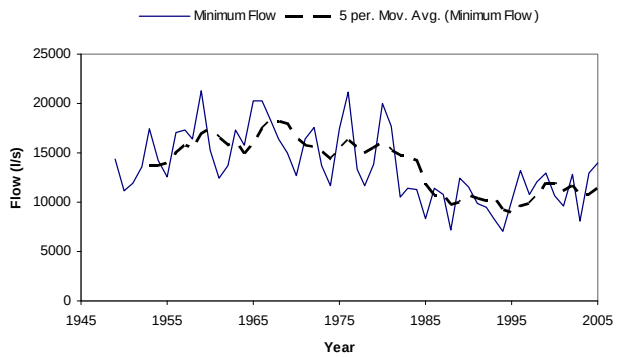
Annual Summaries

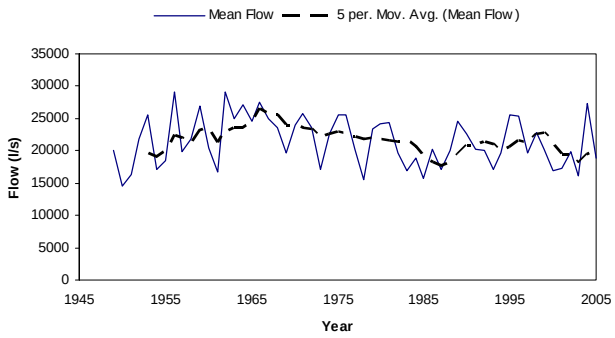
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	19966	24102	31672	1993	8270	17176	33161
1981	17743	24308	33280	1994	7016	19668	39577
1982	10451	19597	33143	1995	10155	25647	39498
1983	11436	16906	50552	1996	13261	25340	37110
1984	11303	18796	33282	1997	10793	19712	31143
1985	8358	15769	27122	1998	12104	22751	60317
1986	11382	20158	40615	1999	12991	20274	33286
1987	10761	17147	27791	2000	10601	16922	28168
1988	7197	19978	44761	2001	9581	17293	34649
1989	12489	24597	41882	2002	12788	19877	33782
1990	11493	22656	38133	2003	8075	16139	31985
1991	9903	20279	40481	2004	12952	27313	68260
1992	9525	20095	38397	2005	13912	18832	30685

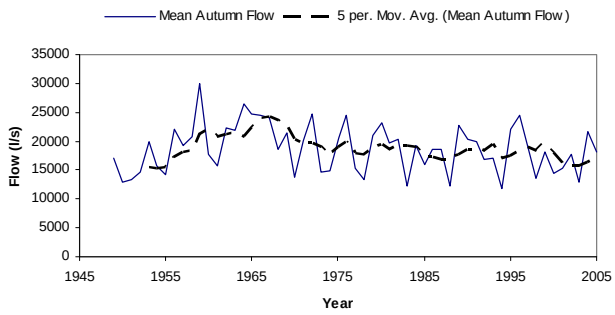
Flow Distribution

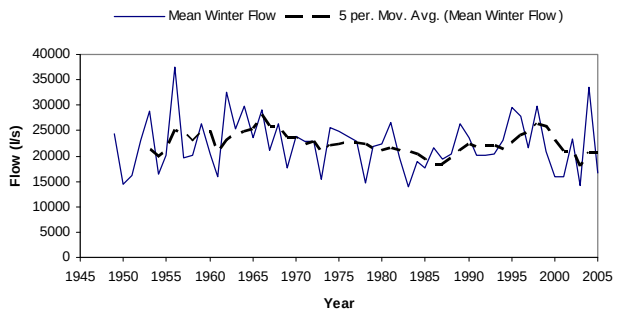
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	124339	39518	36131	34495	33491	32736	32043	31467	30885	30311
10	29870	29346	28928	28524	28187	27811	27464	27162	26858	26592
20	26307	26052	25840	25568	25333	25123	24925	24723	24528	24343
30	24138	23932	23745	23580	23372	23185	23008	22817	22632	22438
40	22276	22109	21935	21731	21573	21413	21252	21060	20878	20734
50	20608	20460	20306	20104	19948	19764	19617	19418	19247	19129
60	18977	18855	18686	18523	18386	18230	18085	18005	17826	17658
70	17534	17383	17228	17036	16853	16717	16541	16364	16155	15976
80	15861	15727	15553	15365	15194	15123	14976	14767	14587	14380
90	14248	14071	13816	13590	13351	13052	12773	12547	12125	11728
100	7016									

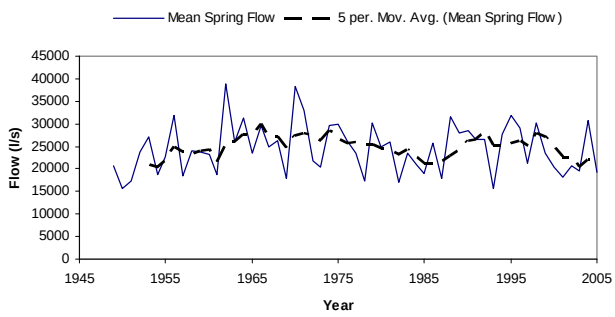


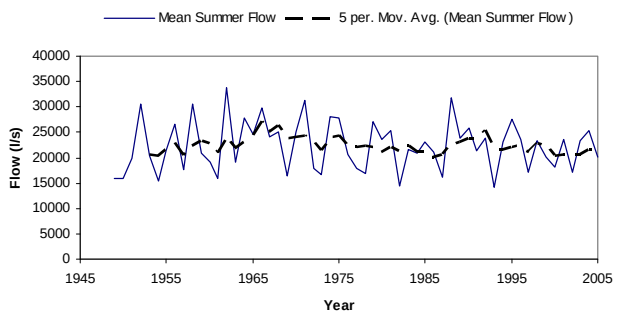












Rangitaiki at Murupara

Environment Bay of Plenty
River Flow Recording Station

River	Whirinaki	Site	Galatea
Site Number	15410	Grid Reference	V17:368 952
Start of Record	December 1952	Data Capture Rate	96%
Data Summary From	January 1953	To	December 2000
Data Audited From	NIWA	To	NIWA

Equipment History

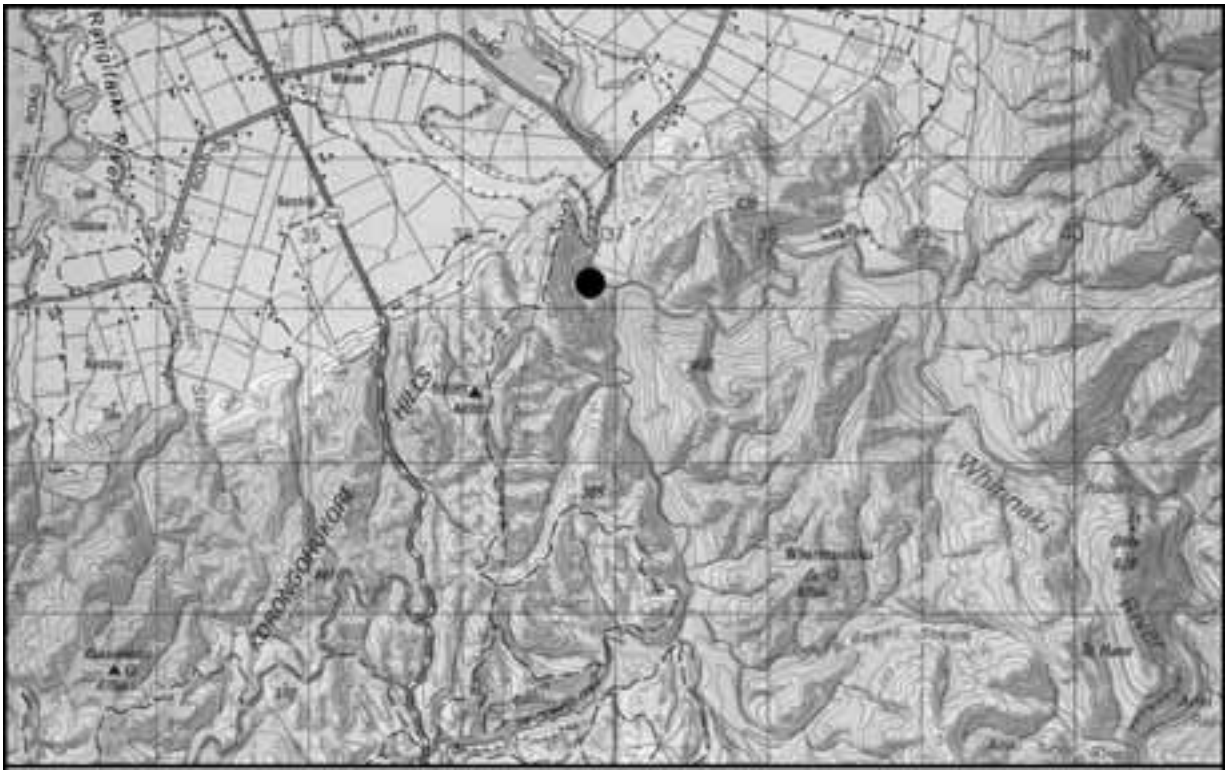
03/12/52: Kent chart recorder
24/08/65: Float with F&P digital.
25/06/80: Backup Foxboro chart recorder
28/02/84: Float with L&S digital.
08/06/00: Sutron pressure sensor with Aquitel datalogger.

Comments on Stage/Discharge Ratings

Site control is natural channel. Ratings are available to convert Stage (mm) to Flow (l/s).

General Comments

Site is operated by NIWA, Rotorua. Sediment concentration is also measured at this site.



SITE LOCATION
Whirinaki at Galatea

Station Comments

Whirinaki River at Galatea. Site Number 15410, on River Number 154000.

The local recording authority is NIWA, Rotorua.

Reduced Level lowered by 305mm on 670203. Sediment concentration is also measured at this site.

24/08/65 - Recorder installed on 650824 133000 is a F&P digital, recording at 3mm increments, and 15 minute time intervals. Intake pipe does not function properly from 650824 133000 to 651216 120000. Water levels may not be truly representative of river during this period.

26/02/73 - Recorder well, drained itself intermittently from 730226 to 730409.

04/03/76 - Fast drop in water level for brief periods between 760304 and 770302. This is due to downstream intake taking over from upstream intake. Bed slopes significantly between the two intakes, so that water level radically drops during this change of operation. Stage is corrected to the external upstream, but shape of recession has not been.

11/11/77 - Channel modified on 771111 through recorder and cableway sections to let water pass intakes uniformly, thereby eliminating fast drops in water levels.

28/02/84 - New recorder site established 500 metres upstream on 840228 154500.

27/02/85 - Due to removal of shingle from the control for channel alignment work by the Bay of Plenty Catchment Commission, an overall drop in water level of 20mm occurred between 850227 083000 and 850227 131500.

25/07/88 - During the flood of 25 and26 July 1988 the recorder structure sank 200mm. Rating curve 019 covers the change in reduced levels, with the recorder and staff gauges having a new Reduced Level, of 199.757 metres.

11/07/98 - Missing record from 980711 203000 to 980713 174500 due to the loss of the complete site and approximately 50 metres of river bank that the site was attached to during the flood at this time.

13/07/98 - Recorder replaced at the temporary site 980713 174500 by a Kainga Encoder with a range of 10 metres, a resolution of 1 mm, and a time interval of 15 minutes, connected directly to the Remote. Data is filed via telemetry.

08/06/2000 -Sutron sensor and yellow logger installed. Sutron set to mean over 10 seconds and the 0 - 5 volts output set to 0 - 5 metres.

13/12/2003 - Missing record from 13 December 2003 53000 to 15 December 2003 141500. The site had a lightening strike which disabled all instrumentation.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	December 2005	Site Number	15410
Compiled by	G R Ellery	River	Whirinaki
		Station	Galatea
Metric Map Reference	V17: 368 952		
Catchment Area (km²)	534	Period of Summary	1953 to 2005

Statistical Summary

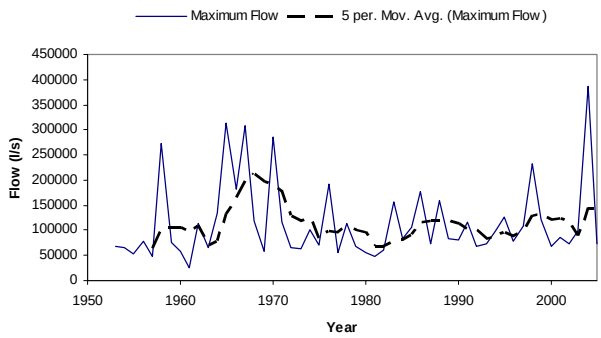
Flow (*l/s*)			
Minimum Flow	2588	Maximum Flow	386881
Mean Annual Minimum Flow	4780	Mean Annual Maximum Flow	114561
Mean Flow	14858	Mean Summer Flow	12515
Median Flow	11766	Mean Autumn Flow	10185
Mean Specific Flow (/km²)	28	Mean Winter Flow	19435
		Mean Spring Flow	17363
Low Flow Distribution Fit	GEV	Peak Flow Distribution Fit	EV1
7 day Low Flow (Minimum)	2896	Peak Flow (5 yr Return)	165000
7 Day Low Flow (Mean Annual)	4780	Peak Flow (10 yr Return)	215000
7 day Low Flow (5 yr Return)	4108	Peak Flow (20 yr Return)	265000
7 Day Low Flow (10 yr Return)	3706	Peak Flow (50 yr Return)	330000
		Peak Flow (100 yr Return)	380000

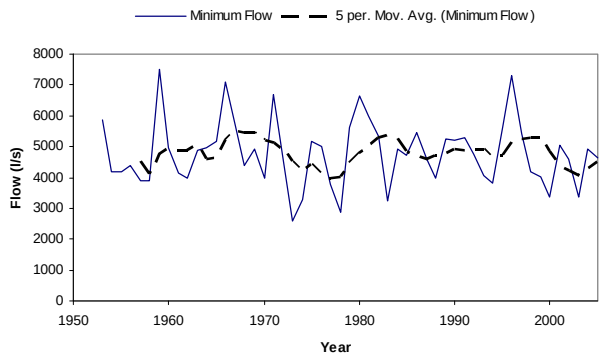
Annual Summaries

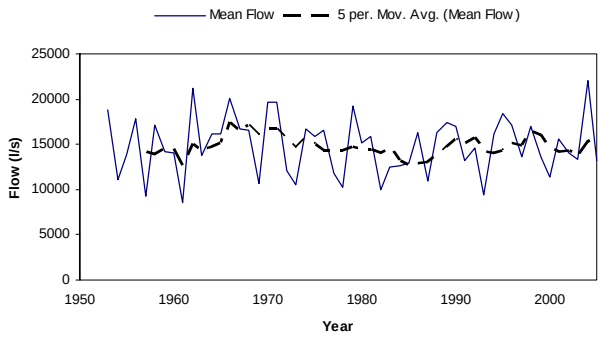
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	6661	15105	54513	1993	4061	9358	72666
1981	5992	15873	48892	1994	3830	16188	98984
1982	5332	9987	60069	1995	5658	18439	127616
1983	3249	12538	157618	1996	7308	17129	78372
1984	4933	12656	83433	1997	5404	13634	108755
1985	4708	12898	107110	1998	4182	16926	233311
1986	5466	16309	175737	1999	4008	13650	120777
1987	4577	10937	73875	2000	3384	11417	69345
1988	3989	16279	158611	2001	5048	15643	86638
1989	5264	17389	83847	2002	4578	14057	74100
1990	5222	17024	79882	2003	3384	13371	97723
1991	5273	13210	115123	2004	4934	22054	386881
1992	4767	14617	67765	2005	4620	13245	72829

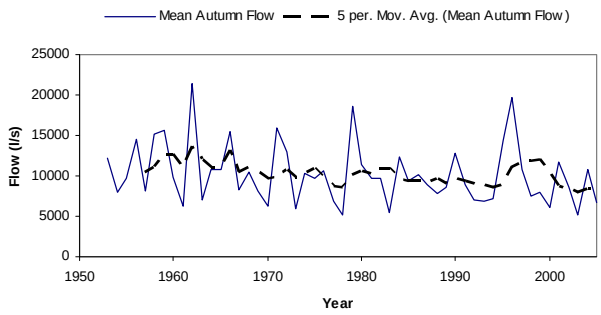
Flow Distribution

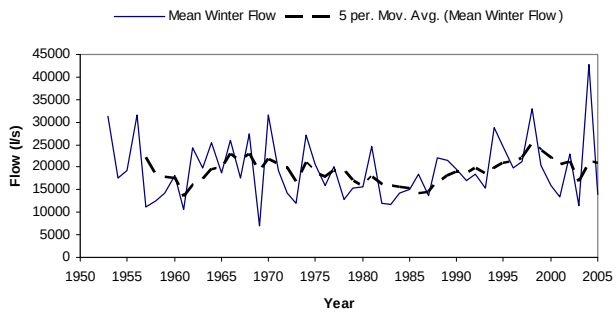
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	386881	57165	46342	40712	37029	34329	32368	30747	29373	28230
10	27223	26253	25366	24525	23821	23146	22514	21944	21401	20855
20	20351	19855	19390	18937	18507	18117	17746	17408	17068	16724
30	16402	16105	15820	15575	15314	15040	14790	14549	14304	14070
40	13856	13633	13409	13192	12968	12750	12534	12329	12137	11959
50	11766	11569	11380	11189	11004	10825	10669	10495	10330	10157
60	9986	9803	9634	9456	9288	9144	8993	8853	8700	8548
70	8389	8244	8101	7951	7803	7665	7549	7431	7300	7168
80	7028	6895	6754	6614	6484	6372	6256	6141	6013	5881
90	5732	5580	5435	5335	5177	4985	4767	4526	4273	3926
100	2588									

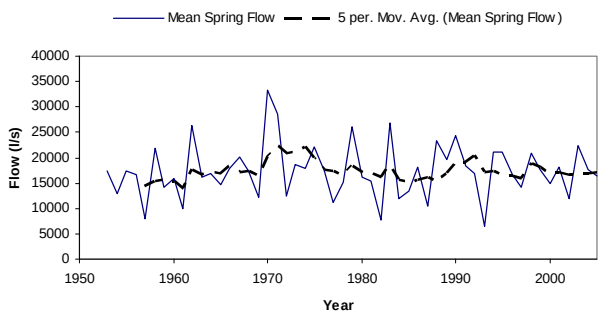


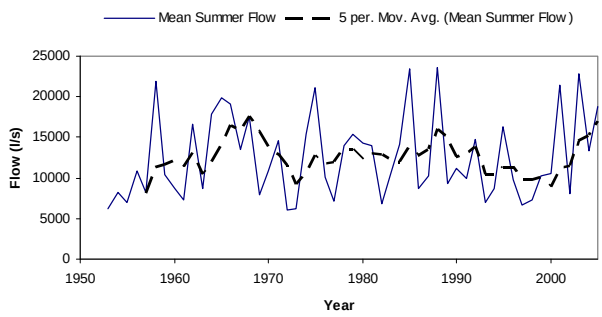












Whirinaki at Galatea

Environment Bay of Plenty
River Flow Recording Station

River	Whakatane	Site	Whakatane
Site Number	15514	Grid Reference	W15:609 475
Start of Record	July 1956	Data Capture Rate	100%
Data Summary From	January 1957	To	December 2005
Data Audited From	NIWA	To	NIWA

Equipment History

31/07/56: Kent chart recorder

30/10/75: Float with F&P digital recorder.

23/07/87: Float with F&P digital and Aquitel Remote

06/01/94: Float with Encoder and Aquitel Remote.

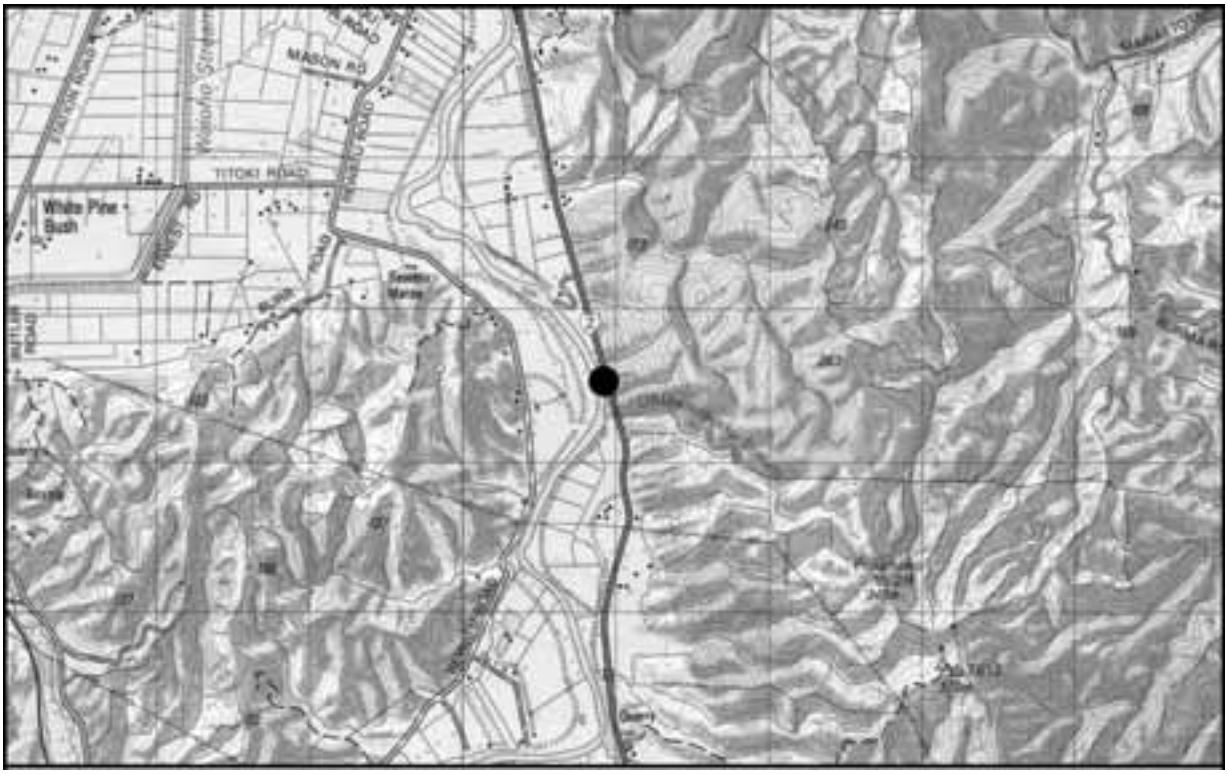
Comments on Stage/Discharge Ratings

Site control is by natural sand-gravel bed that may be susceptible to bed level changes.

Ratings are available to convert to Stage (mm) to Flow (l/s).

General Comments

Site is operated by NIWA, Rotorua. Site is influenced by tidal effect that is apparent up to mean flow during spring tide events. Suspended sediment is also measured at this site.



SITE LOCATION
Whakatane at Whakatane

Station Comments

Whakatane River at Whakatane. Site Number 15514, on River Number 155000.

The local recording authority is NIWA, Rotorua.
The site is situated 13.5 kilometres from the mouth and control is by downstream riffle.
The natural river character has undergone major changes since the stations construction. Major flood protection works in the form of 10 year and 100 year return period stop banking, upstream and downstream channel diversion and straightening, and rip rap emplacement on the right bank adjacent to the recorder tower were undertaken from the mid 1960's. Large-scale gravel and sand abstraction has also occurred from the 1940's and is continuing today. The station is situated on the outside bank of a meander bend crest. The channel bed material is mixed sand-gravel and therefore the channel is susceptible to bed-level changes.

Rating changes may also occur due to localised bank erosion and control modification due to floods or gravel extraction activities. The site is also influenced by a tidal effect, which is apparent up to mean flow during spring tide events. The effect tends to exaggerate river flows when the tidal peak elevates river levels. Suspended sediment concentration is also measured at this site. Data from 560731 150000 to 610119 240000 was reprocessed and archived at 960101. The original processing is archived on the miscellaneous file under site number 2215. A surge in the recorder tower and a small time lag between river and recorder tower levels occurs at periods of high stage.

31/12/60 -Many of the flood peaks from 1961 to 1975 recorded on Kent charts were verified by actual event observations and/or from floodmarks on the recorder tower.

27/05/83 -New gauging cableway commissioned on 830527 100000.

26/10/83 -Ten year stopbank overtopped approximately 2 kilometres upstream of recorder.

23/07/87 -Aquitel telemetry installed on 870723 140000 as additional backup recorder and for flood warning. Unless otherwise stated, from this date onwards backup data is obtained from the Aquitel remote unless that too is unavailable or erroneous. Periods where telemetered data is filed are not commented.

31/12/00 -Missing record from the principle recorder occurs throughout this data set. Backup chart records and telemetry data has been used where available.

02/05/2003 - Missing record from 2 May 2003 34501 to 5 May 2003 132959 due to a failure of the main recorder. The backup recorder also failed during this period.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	December 2006	Site Number	15514
Compiled by	G R Ellery	River	Whakatane
		Station	Whakatane
Metric Map Reference	W15: 609 475		
Catchment Area (km²)	1557	Period of Summary	1957 to 2005

Statistical Summary

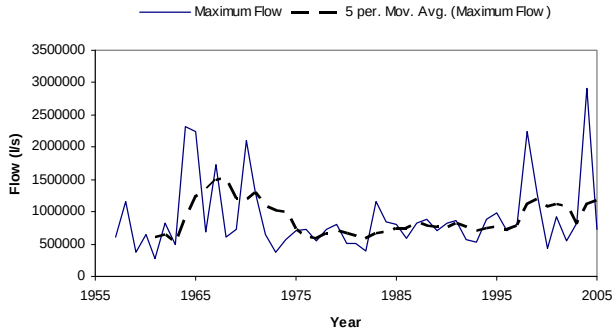
Flow (*l/s*)			
Minimum Flow	5758	Maximum Flow	2900990
Mean Annual Minimum Flow	10057	Mean Annual Maximum Flow	907869
Mean Flow	57274	Mean Summer Flow	43625
Median Flow	36176	Mean Autumn Flow	42013
Mean Specific Flow (/km²)	34	Mean Winter Flow	78456
		Mean Spring Flow	65099
Low Flow Distribution Fit	GEV	Peak Flow Distribution Fit	EV1 by Jenkins method
7 day Low Flow (Minimum)	6390	Peak Flow (5 yr Return)	1190000
7 Day Low Flow (Mean Annual)	10583	Peak Flow (10 yr Return)	1580000
7 day Low Flow (5 yr Return)	8760	Peak Flow (20 yr Return)	1960000
7 Day Low Flow (10 yr Return)	7654	Peak Flow (50 yr Return)	2450000
		Peak Flow (100 yr Return)	2820000

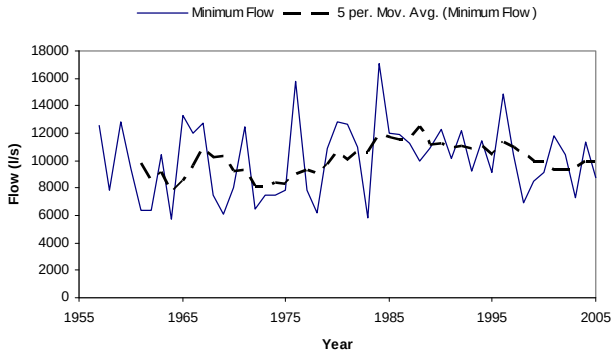
Annual Summaries

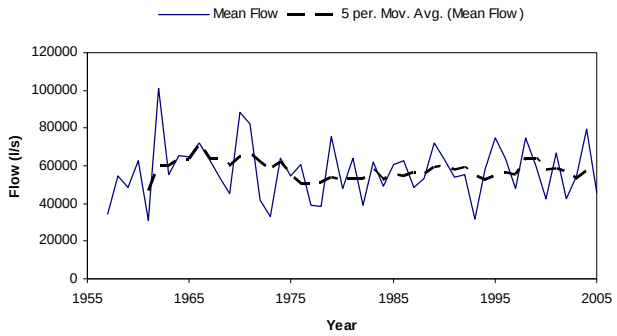
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	12832	48170	513564	1993	9206	31997	527026
1981	12619	64156	514677	1994	11433	57867	884174
1982	11026	38872	394890	1995	9157	75049	983283
1983	5787	62231	1155360	1996	14832	63734	711637
1984	17072	49383	837938	1997	10386	47773	798431
1985	11956	60485	805619	1998	6937	74778	2242940
1986	11909	62845	584823	1999	8491	59799	1260860
1987	11233	48705	826519	2000	9120	42490	429552
1988	9943	53433	887034	2001	11859	66828	920073
1989	10847	71811	713024	2002	10411	42778	555732
1990	12264	63192	826812	2003	7329	54564	819671
1991	10158	53811	869865	2004	11345	79792	2900990
1992	12146	54969	578940	2005	8798	46158	732145

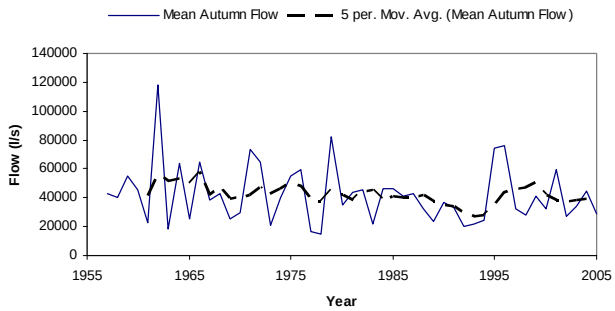
Flow Distribution

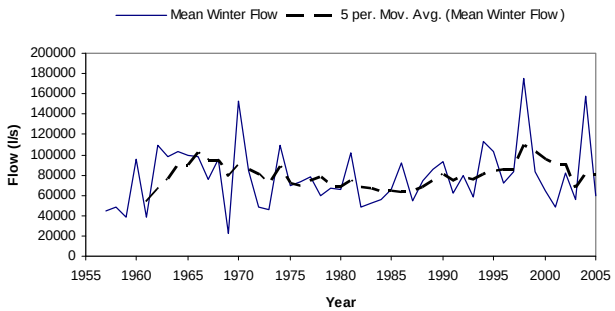
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	2900990	369062	261210	212353	183980	163514	148400	136924	127919	120465
10	113559	107985	102786	98212	93962	90080	86452	83185	80034	77259
20	74610	72311	70128	68094	66126	64272	62494	60847	59341	57811
30	56452	55124	53862	52584	51347	50168	49069	48006	46895	45868
40	44830	43834	42839	41899	41012	40132	39288	38493	37717	36948
50	36176	35432	34704	34009	33336	32680	32023	31340	30708	30098
60	29491	28891	28339	27778	27202	26642	26105	25563	25018	24484
70	23958	23437	22904	22397	21911	21441	20998	20521	20041	19568
80	19096	18624	18141	17673	17216	16757	16302	15868	15416	14962
90	14486	13963	13441	12923	12391	11766	11126	10447	9634	8592
100	5758									

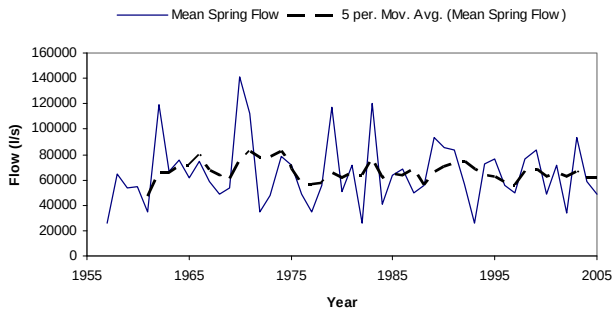


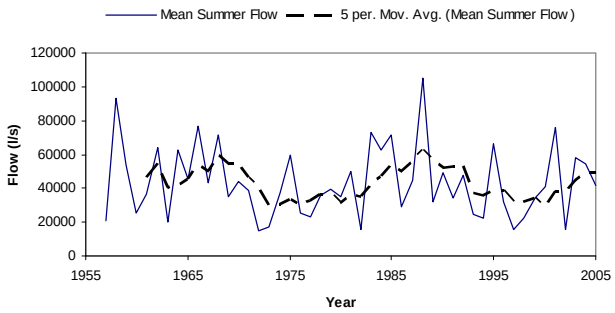












Whakatane at Whakatane

Environment Bay of Plenty
River Flow Recording Station

River	Waimana	Site	Gorge
Site Number	15511	Grid Reference	W16: 366 644
Start of Record	October 1950	Data Capture Rate	98%
Data Summary From	January 1951	To	December 1980
Data Audited From		To	

Equipment History

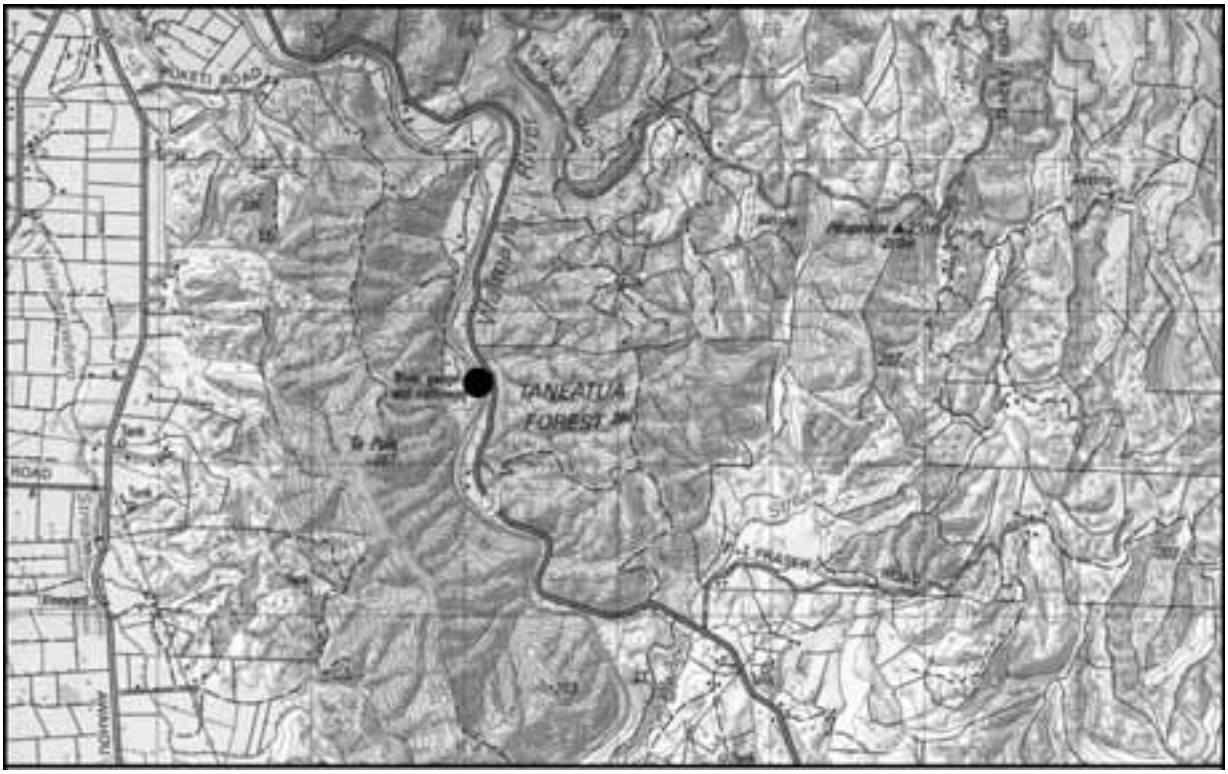
01/10/50: Staff gauge and chart recorder
29/08/69: Float with F&P digital recorder.
12/06/79: Float with L&S digital recorder
19/07/99: Float with Aquitel Remote.

Comments on Stage/Discharge Ratings

Site has a natural gravel control. Ratings cease on 27 November 1980.
Ratings are available to convert Stage (mm) to Flow (l/s).

General Comments

This site recorded flow from October 1950 to November 1980 for the Hamilton Hydrological Survey. Site was handed over to B.O.P.C.C. on 03/01/81 and now operates for flood monitoring purposes.. Site is now operated by Environment Bay of Plenty as part of its Natural Environmental Monitoring Network.



SITE LOCATION
Waimana at Gorge

Station Comments

Waimana River at Waimana Gorge. Site Number 15511, on River Number 155090.

The local recording authority is Environment B·O·P.
The site is situated 29.5 kilometres from mouth. The control is a natural gravel riverbed.

01/10/50
Stage/time data for the period 501001 to 660121 has been hand tabulated from the water level charts by Power Division staff at Head Office. In general not enough points have been taken off the charts to accurately define the shape of some hydrographs. Flood peaks have been tabulated but filed at times to suit the tabulation interval being used. Although there are some variations, tabulation intervals are:

501001 to 560101 3 hourly values
560101 to 610709 12 hourly values
610709 to 660121 6 hourly values

With some 2 and 3 hourly values for these periods and in extreme cases, some daily mean discharges are 38% higher than they should be. In general the daily mean discharge are in error between +/-3%.

27/11/80 - Site changed from rated site to non-rated site on 801127.

26/11/80 - Fictitious rating for stage height only. For details see Environment B·O·P.

02/01/81 -Site handed over to B.O.P.C.C. on 810103.

19/07/91 - Aquitel logger installed for telemetered flood warning purposes.

31/12/95 - Periods of missing record and synthetic data occur throughout the data record. Some periods of missing record have been filled with synthetic data based on comparisons with some or all of the following sites. Meteorological gauges; Ruatoki (B87101), Matahi (B887212), Waimana (B87103), Ogilvie Bridge (873103), and water levels Whakatane at Whakatane (15514) and Waimana at Ogilvie Bridge (15536).

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	July 2006	Site Number	15511
Compiled by	G R Ellery	River	Waimana
		Station	Gorge
Metric Map Reference	W16: 642 375		
Catchment Area (km²)	440	Period of Summary	1951 to 1979

Statistical Summary

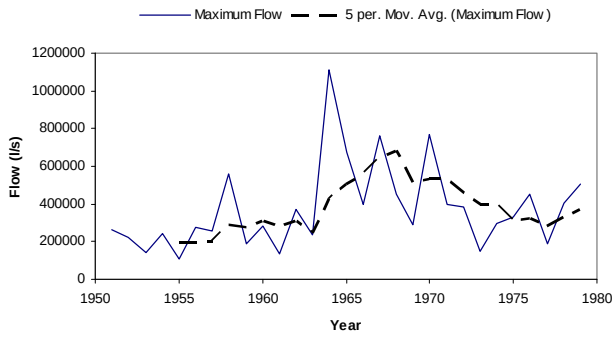
Flow (*l/s*)			
Minimum Flow	1511	Maximum Flow	1112050
Mean Annual Minimum Flow	3580	Mean Annual Maximum Flow	373369
Mean Flow	19703	Mean Summer Flow	14172
Median Flow	12531	Mean Autumn Flow	17292
Mean Specific Flow (/km²)	45	Mean Winter Flow	26412
		Mean Spring Flow	20874
Low Flow Distribution Fit	GEV	Peak Flow Distribution Fit	GEV
7 day Low Flow (Minimum)	1822	Peak Flow (5 yr Return)	520000
7 Day Low Flow (Mean Annual)	3161	Peak Flow (10 yr Return)	670000
7 day Low Flow (5 yr Return)	2538	Peak Flow (20 yr Return)	820000
7 Day Low Flow (10 yr Return)	2238	Peak Flow (50 yr Return)	1050000
		Peak Flow (100 yr Return)	1240000

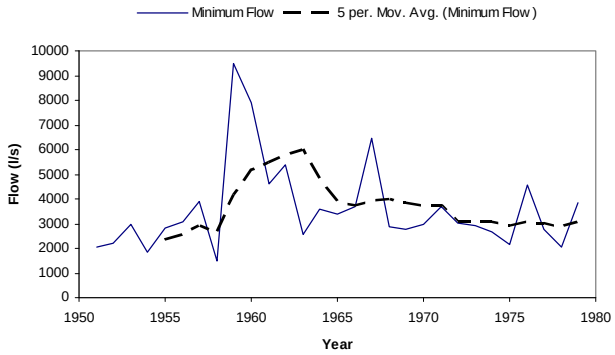
Annual Summaries

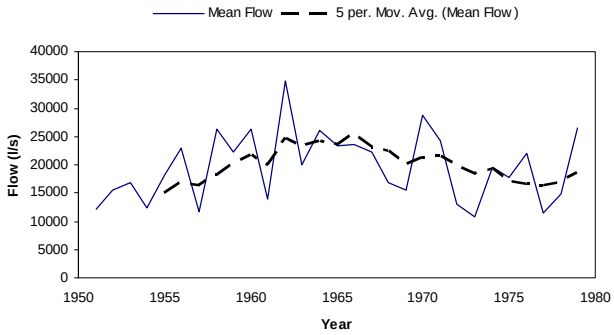
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1954	1838	12253	242267	1967	6457	22280	765130
1955	2797	18312	104550	1968	2868	16848	449216
1956	3078	22821	274431	1969	2773	15528	288074
1957	3897	11594	259062	1970	2968	28787	771690
1958	1511	26199	561022	1971	3701	24205	395893
1959	9511	22213	186751	1972	3018	13122	385831
1960	7917	26206	283812	1973	2933	10844	146662
1961	4606	14026	134141	1974	2688	19502	294009
1962	5393	34934	370273	1975	2168	17802	327458
1963	2555	19977	233043	1976	4567	22077	449891
1964	3590	26154	1112050	1977	2768	11560	185643
1965	3397	23286	677408	1978	2044	14796	401346
1966	3692	23505	398723	1979	3849	26532	504973

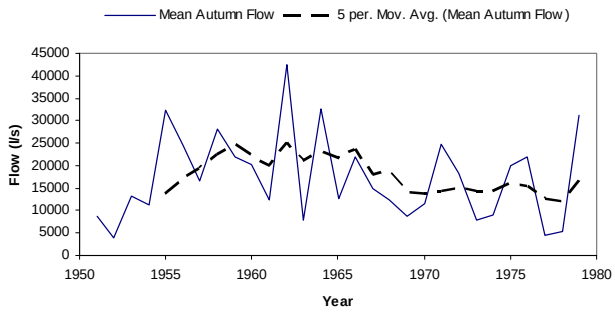
Flow Distribution

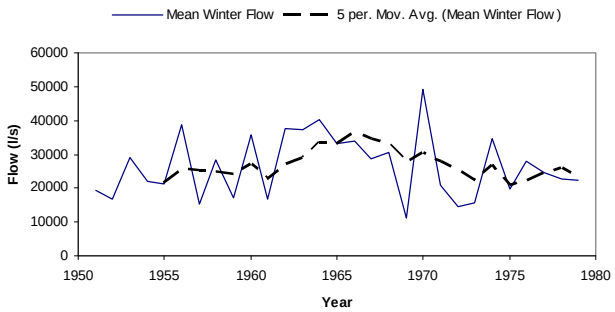
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	1112050	126608	89513	73273	63886	56936	51741	47666	44381	41472
10	38993	36856	35030	33420	32006	30791	29579	28457	27474	26673
20	25860	25108	24422	23797	23172	22552	21915	21302	20721	20141
30	19653	19224	18752	18281	17883	17434	17050	16698	16313	15919
40	15549	15229	14887	14552	14241	14000	13685	13367	13065	12819
50	12531	12243	11985	11725	11466	11198	10956	10726	10531	10332
60	10115	9904	9678	9468	9259	9031	8800	8601	8409	8199
70	7989	7774	7557	7369	7149	6921	6704	6532	6340	6151
80	5965	5804	5629	5452	5277	5090	4917	4727	4545	4348
90	4190	4054	3894	3729	3577	3422	3275	3123	2958	2535
100	1511									

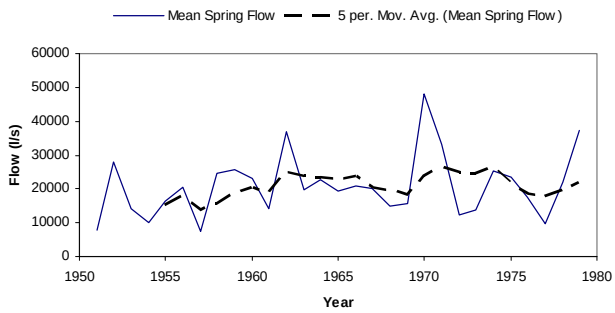


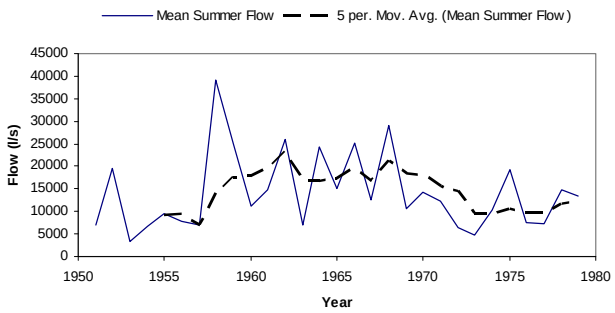












Waimana at Gorge

Environment Bay of Plenty
River Flow Recording Station

River	Waimana	Site	Ranger Station
Site Number	15544	Grid Reference	W16:642 375
Start of Record	February 1995	Data Capture Rate	100%
Data Summary From	January 1996	To	December 2005
Data Audited From	February 1995	To	December 2005

Equipment History

20/02/95: Kainga WRIC and Kainga encoder installed. 11/04/96: Kainga WRIC datalogger as backup.

02/09/99: DS-4483 logger installed with Sutron pressure sensor, with a CR500 and Kainga P.T. for backup.

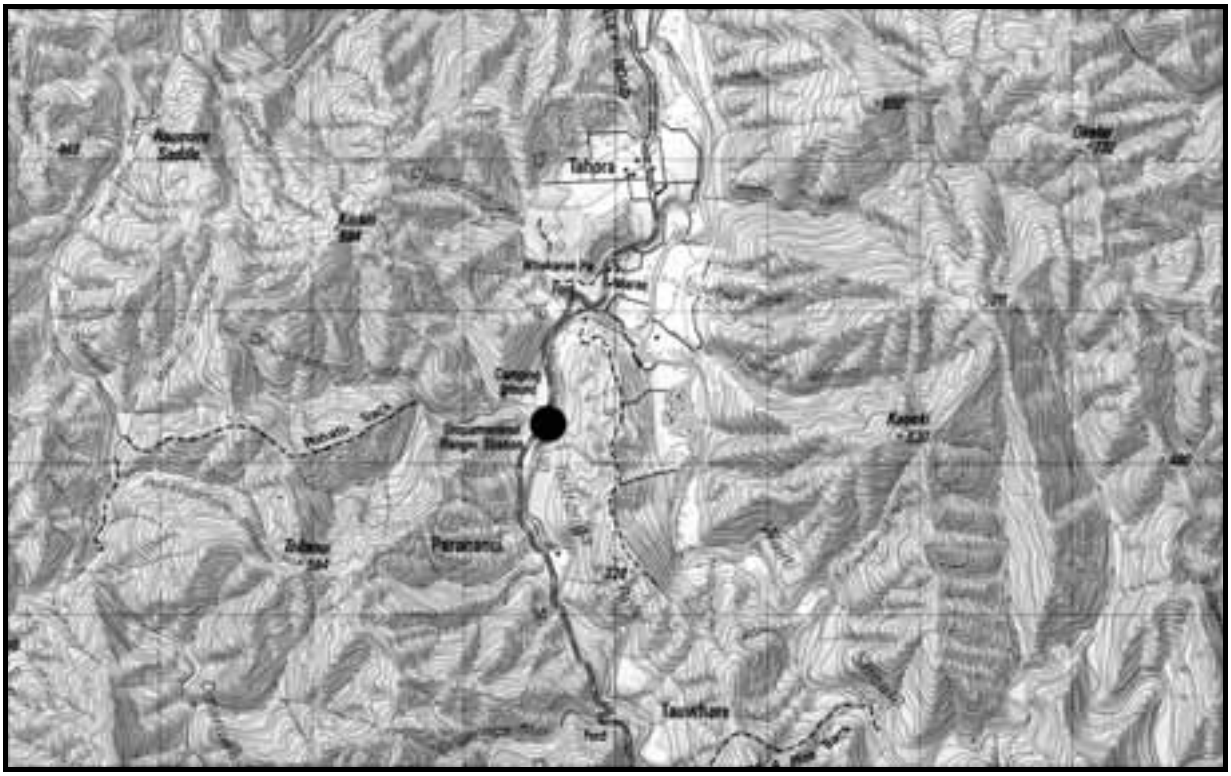
Comments on Stage/Discharge Ratings

Site control is by a bedrock structure located across the channel 10 metres downstream of site. Ratings are available to convert Stage (mm) to Flow (l/s).

General Comments

Site installed 950209 by Environment Bay of Plenty. Site is operated for flood monitoring purposes and is also part of the Natural Environment Regional Monitoring Network.

Flood frequency data derived from combined Waimana at Olgilvie Bridge (site number 15536) and Waimana at Ranger station dataset.



SITE LOCATION
Waimana at Ranger Station

Station Comments

Waimana River at Ranger Station. Site Number 15544, on River Number 155090.

The site is situated 40.25 kilometres from the confluence with the Whakatane River and 62 kilometres from the mouth of the Whakatane River. NZMS 260 Reference W16:696 153. Drains 216 km^2. The control is by a bedrock structure located across the channel 10 metres downstream of the site.

09/02/95 - Six steel cylinders bolted together with an aluminium recorder house.

20/02/95 - Kainga WRIC and Kainga shaft encoder installed.

11/04/96 - L&S recorder installed. Kainga WRIC data is used as backup.

02/07/98 - Missing record from 980702 64500 to 980707 123000 due to site being destroyed during flood event. Maximum water levels were pegged from floodmarks (on 3/7/98) with a level of 7.65 metres measured.

02/07/98 - Slope area gauging calculation (Gauging number 62) resulted in a discharge of 913.6 cumecs. Mean area was 245.724m2. A Mannings n of 0.035 was used in the calculation. This event raised the level of the bed by approximately 600mm. This addition of bed material completely buried the bedrock control. Removal of the bed material over time could result in a migration of the rating curves back to historical positions until the control takes effect again.

25/01/99 - Missing record from 990125 50000 to 990127 124500 due to new site installation. No rainfall was recorded at surrounding raingauges, a straight line recession was implemented. New equipment includes a Sutron Gas Bubbler P.T. (0-15 metre range). A Kainga PT 0-10 metre range. Logging is done via a CR500.

02/09/99 - DS-4483 logger installed with Sutron P.T. connected to it as the main recording instrument. CR500 with Kainga P.T. provides backup record.

29/09/03 - Missing record from 20030929 at 160000 to 20031002 at 134500 due to programme fault in logger. 26mm of rainfall fell over this period.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	July 2006	Site Number	15544
Compiled by	G R Ellery	River	Waimana
		Station	Ranger Station
Metric Map Reference	W16:642 375		
Catchment Area (km²)	216	Period of Summary	1996 to 2005

Statistical Summary

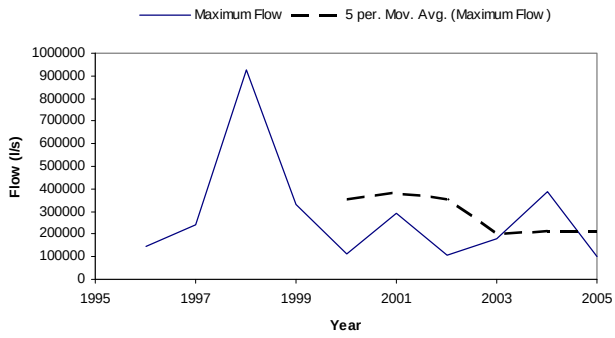
Flow (*l/s*)				
Minimum Flow	1104	Maximum Flow		582848
Mean Annual Minimum Flow	1542	Mean Annual Maximum Flow		282295
Mean Flow	8816	Mean Summer Flow		6905
Median Flow	5427	Mean Autumn Flow		6386
Mean Specific Flow (/km²)	41	Mean Winter Flow		13026
		Mean Spring Flow		10131
Low Flow Distribution Fit	GEV	Peak Flow Distribution Fit	Gumbel	GEV
7 day Low Flow (Minimum)	1231	Peak Flow (5 yr Return)	297000	279000
7 Day Low Flow (Mean Annual)	1423	Peak Flow (10 yr Return)	368000	361000
7 day Low Flow (5 yr Return)	1293	Peak Flow (20 yr Return)	435000	455000
7 Day Low Flow (10 yr Return)	1238	Peak Flow (50 yr Return)	522000	600000
		Peak Flow (100 yr Return)		

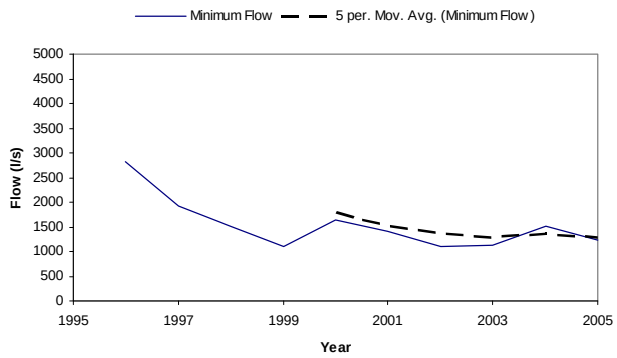
Annual Summaries

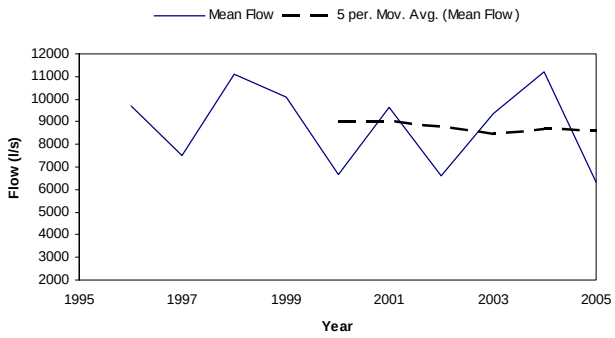
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993			
1981				1994			
1982				1995			
1983				1996	2809	9692	144453
1984				1997	1935	7512	244381
1985				1998	1517	11103	928862
1986				1999	1104	10075	330354
1987				2000	1649	6688	113726
1988				2001	1423	9620	293415
1989				2002	1110	6596	105058
1990				2003	1124	9364	178022
1991				2004	1516	11237	385656
1992				2005	1233	6304	99025

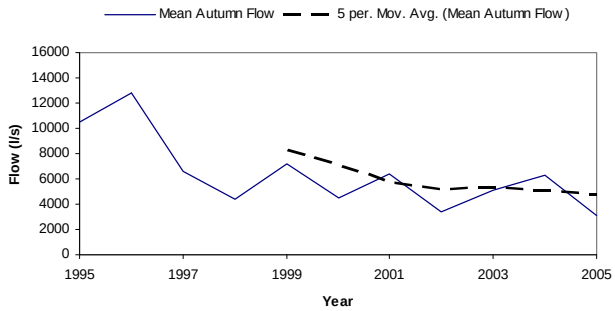
Flow Distribution

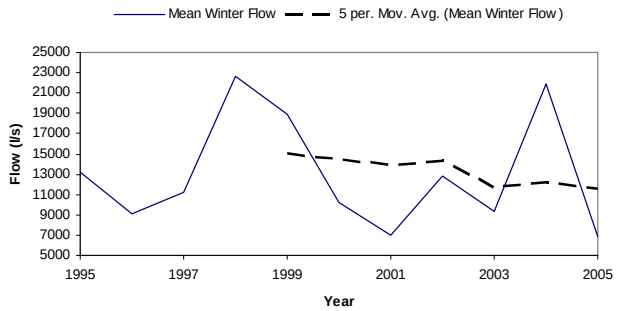
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	582848	60614	42158	34111	29468	25741	23132	21097	19445	18030
10	16901	15905	15011	14202	13479	12860	12294	11765	11314	10911
20	10516	10181	9871	9587	9318	9070	8835	8627	8424	8218
30	8034	7873	7715	7543	7384	7236	7097	6965	6839	6712
40	6583	6450	6318	6196	6076	5956	5844	5733	5623	5522
50	5427	5332	5225	5123	5024	4930	4838	4743	4650	4564
60	4480	4396	4317	4240	4163	4085	4015	3946	3879	3813
70	3745	3674	3608	3534	3456	3380	3299	3224	3138	3059
80	2975	2889	2808	2727	2645	2563	2492	2421	2330	2215
90	2118	2024	1929	1838	1761	1695	1601	1502	1411	1311
100	1104									

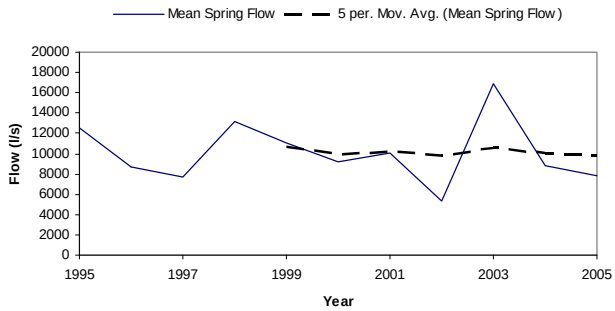


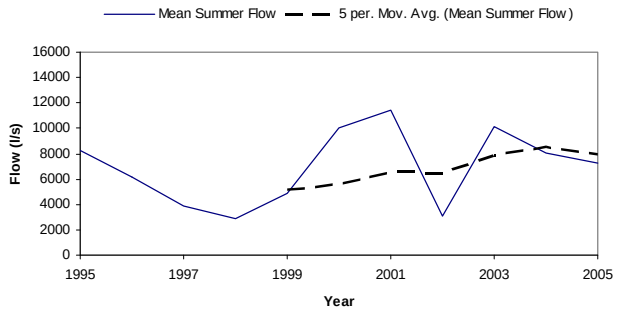












Waimana at Ranger Station

Environment Bay of Plenty
River Flow Recording Station

River	Waimana	Site	Olgilvie Bridge
Site Number	15536	Grid Reference	W16: 704 128
Start of Record	February 1968	Data Capture Rate	99%
Data Summary From	January 1969	To	December 1996
Data Audited From	January 1969	To	December 1995

Equipment History

14/02/68: Float with F&P digital recorder.

08/08/73: Backup Foxboro chart recorder.

03/03/94: Float with L&S digital recorder.

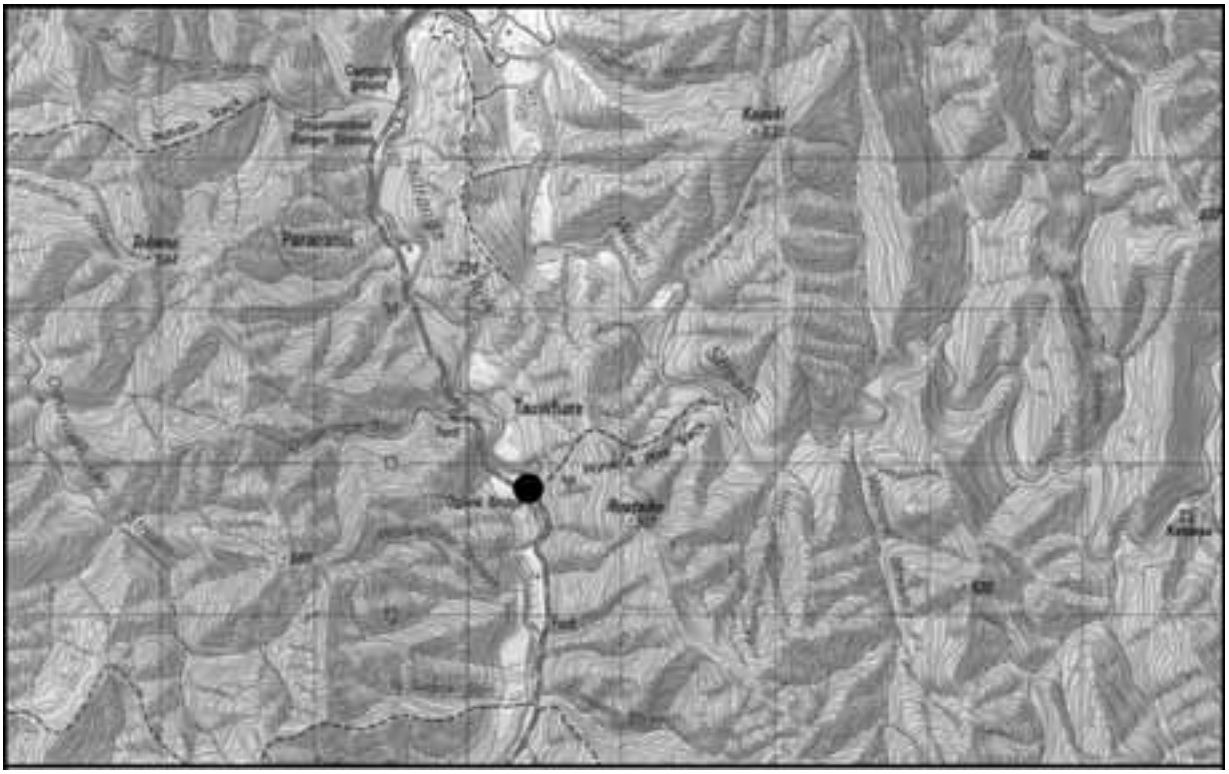
Comments on Stage/Discharge Ratings

Site control is by a shingle bar. The bar is unstable and moves easily in floods. Because of this some scatter of gaugings about the rating curves is unavoidable. Ratings are available to convert Stage (mm) to Flow (l/s).

General Comments

Site was operated by NIWA, Rotorua. Site handed over to Environment Bay of Plenty in March 1994 and is was operated as part of the Natural Environment Regional Monitoring Network. Site replaced by Wamana at Ranger Station, site number 15544.

Flood frequency data derived from combined Waimana at Olgilvie Bridge and Waimana at Ranger Station (site number 15544) dataset.



SITE LOCATION
Waimana at Ogilvie Bridge

Station Comments

Waimana River at Ogilvie Bridge. Site Number 15536, on River Number 155090.

The local recording authority is Environment Bay of Plenty.

The site is situated 42.75 kilometres from the confluence with the Whakatane River and 64.5 kilometres from the mouth of the Whakatane River. Sediment concentration is also measured at this site.

14/02/68 - An unusual steepening in recessions will sometimes be seen in the stage data between approximately 1700mm and 1900mm. This is a site characteristic occurring only at low stage and caused by the stilling well picking up the water level down stream of the well.

29/06/68 - Missing record 680629 181501 to 680705 221500 due to recorder malfunction. During the flood of 680629 the recorder structure dropped 244mm.

30/01/69 - The recorder structure dropped further during this flood.

05/05/69 - Missing record 690505 115000 to 690618 140000 due to removal of recorder structure. Records recommenced at new location (5 metres down stream) at 690618 140000. Te Panaa recorded 206.0 mm of rain during this period.

25/03/75 - The steps in stage recorded at 750325 and 910514 and 920605 were due to the installation of a groin immediately down stream of the stilling well.

31/12/95 - Data audit carried out on flow site 15536 for the period 940303 to 951231. The data audit was produced by Environment B·O·P who operated the site during this time. The data audit required some data to be reprocessed.

11/04/96 - Site removed. Replaced by Waimana at Ranger Station, site number 15544.

09/10/97 - Rating curve comment: in construction of the top end of the rating curves for the period which the site was under Environment Bay of Plenty control, have used the high stage gaugings prior to 940303 103000 to help define the shape. This is partly due to the small number of high stage gaugings undertaken by Environment Bay of Plenty. Extrapolation of the velocity and area curves for the post 940303 gaugings show flow values that slightly favour the pre 940303 gaugings. These patterns hold true up to ~3000mm stage, have therefore tried to find a suitable fit between the pre and post 940303 gaugings for the top end rating curve.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	July 2006	Site Number	15536
Compiled by	G R Ellery	River	Waimana
		Station	Olgiilvie Bridge
Metric Map Reference	W16: 704 128		
Catchment Area (km²)	211	Period of Summary	1969 to 1995

Statistical Summary

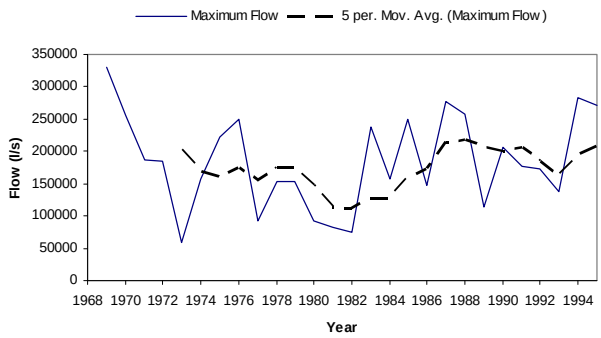
Flow (*l/s*)				
Minimum Flow	468	Maximum Flow		329953
Mean Annual Minimum Flow	1440	Mean Annual Maximum Flow		184472
Mean Flow	8148	Mean Summer Flow		6479
Median Flow	4882	Mean Autumn Flow		5521
Mean Specific Flow (/km²)	39	Mean Winter Flow		10777
		Mean Spring Flow		10134
Low Flow Distribution Fit	GEV	Peak Flow Distribution Fit	Gumbel	GEV
7 day Low Flow (Minimum)	614	Peak Flow (5 yr Return)	297000	279000
7 Day Low Flow (Mean Annual)	1513	Peak Flow (10 yr Return)	368000	361000
7 day Low Flow (5 yr Return)	1220	Peak Flow (20 yr Return)	435000	455000
7 Day Low Flow (10 yr Return)	1017	Peak Flow (50 yr Return)	522000	600000
		Peak Flow (100 yr Return)		

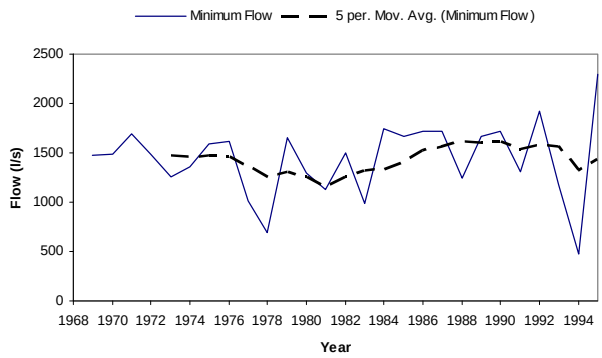
Annual Summaries

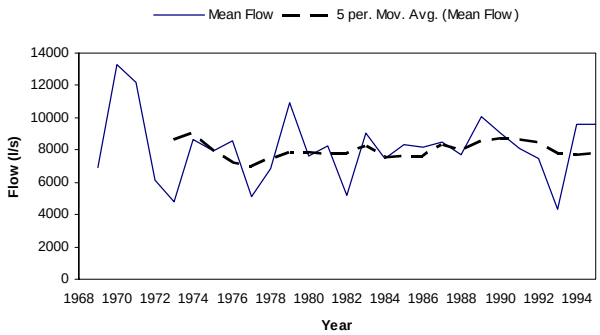
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1970	1490	13310	254929	1983	992	9043	237001
1971	1690	12189	186959	1984	1750	7445	157833
1972	1493	6109	184531	1985	1662	8356	249124
1973	1251	4772	59753	1986	1712	8169	147416
1974	1355	8673	156375	1987	1716	8498	277598
1975	1586	7977	221232	1988	1247	7699	257088
1976	1610	8569	250601	1989	1669	10096	113233
1977	1011	5152	91724	1990	1720	9073	207182
1978	693	6835	153707	1991	1309	8089	176664
1979	1648	10933	153432	1992	1917	7463	173751
1980	1300	7656	92250	1993	1183	4347	136993
1981	1133	8253	82756	1994	468	9567	283273
1982	1501	5219	73747	1995	2292	9562	271645

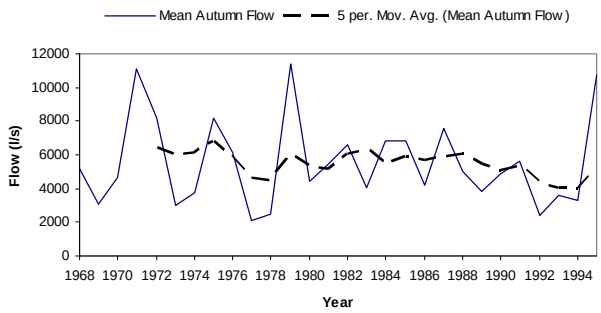
Flow Distribution

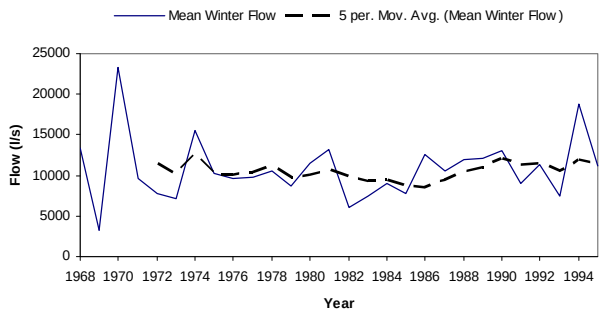
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	329953	57577	40159	32555	27893	24719	22403	20405	18856	17528
10	16376	15423	14591	13861	13166	12543	12005	11506	11088	10682
20	10285	9936	9593	9257	8959	8676	8408	8156	7926	7711
30	7522	7332	7151	6979	6817	6654	6500	6356	6219	6097
40	5968	5840	5726	5616	5509	5404	5297	5197	5089	4986
50	4882	4783	4682	4588	4498	4405	4319	4237	4146	4058
60	3976	3890	3804	3724	3637	3556	3483	3407	3340	3267
70	3196	3129	3061	2998	2933	2869	2807	2747	2682	2616
80	2557	2498	2437	2371	2302	2239	2172	2113	2060	2012
90	1961	1911	1845	1771	1693	1597	1507	1421	1293	1114
100	468									

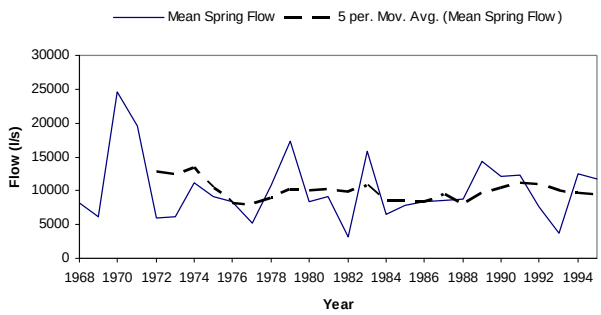

Maximum Flow
5 per. Mov. Avg. (Maximum Flow)
Flow (l/s)
Year

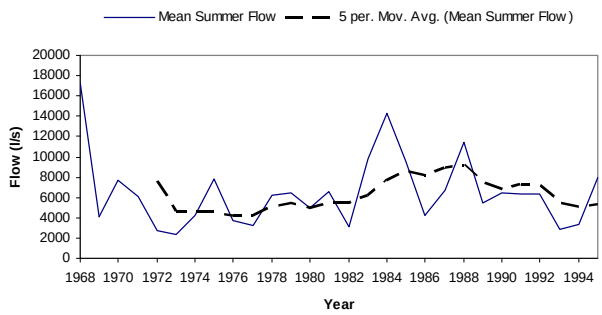

Minimum Flow
5 per. Mov. Avg. (Minimum Flow)
Flow (l/s)
Year


Mean Flow
5 per. Mov. Avg. (Mean Flow)
Flow (l/s)
Year


Mean Autumn Flow
5 per. Mov. Avg. (Mean Autumn Flow)
Flow (l/s)
Year


Mean Winter Flow
5 per. Mov. Avg. (Mean Winter Flow)
Flow (l/s)
Year


Mean Spring Flow
5 per. Mov. Avg. (Mean Spring Flow)
Flow (l/s)
Year


Mean Summer Flow
5 per. Mov. Avg. (Mean Summer Flow)
Flow (l/s)
Year

Environment Bay of Plenty
River Flow Recording Station

River	Nukuhou	Site	Old Quarry Road
Site Number	15605	Grid Reference	W16:729 387
Start of Record	September 1990	Data Capture Rate	98%
Data Summary From	January 1991	To	December 2005
Data Audited From	September 1997	To	December 2005

Equipment History

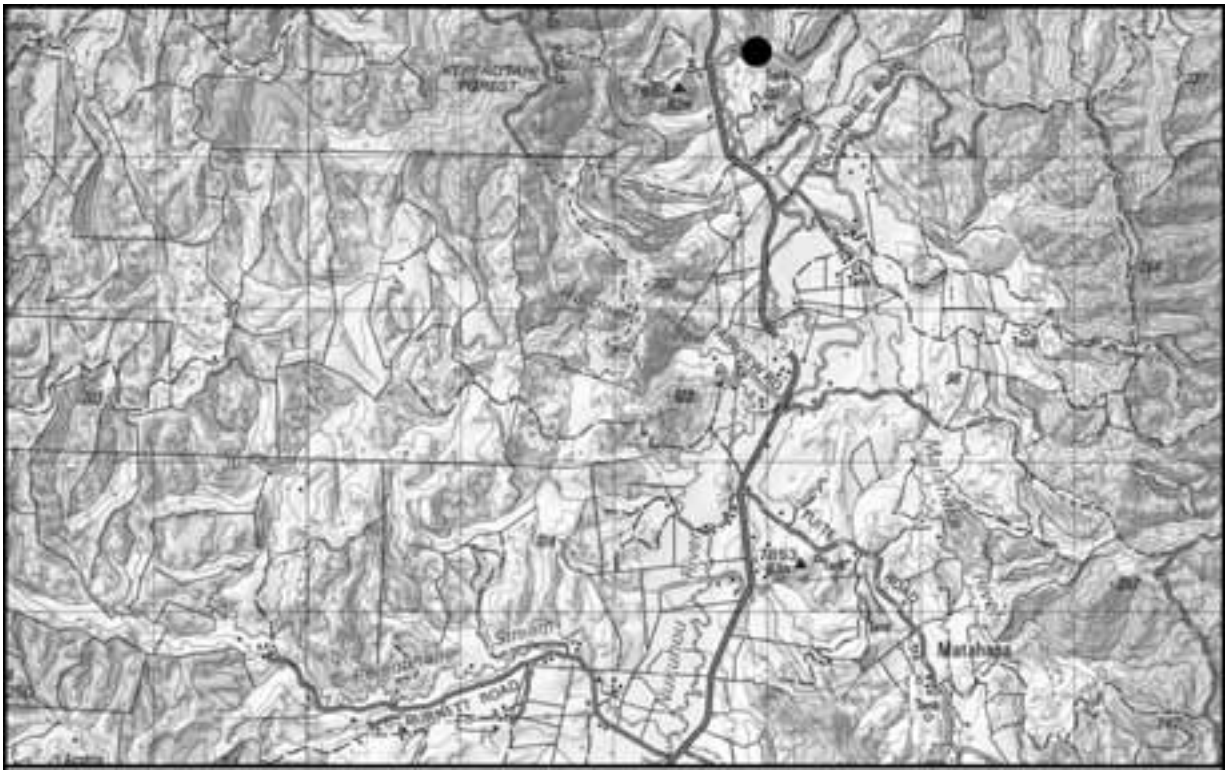
13/09/90: Float with L&S digital recorder.
26/08/99: iQuest logger and Handar.

Comments on Stage/Discharge Ratings

Site control is by natural gravel channel. Ratings are available to convert Stage (mm) to Flow (l/s).

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.



SITE LOCATION
Nukuhou at Old Quarry Road

Station Comments

Nukuhou River at Old Quarry Road. Site Number 15605, on River Number 156010.

Controlling authority is Environment Bay of Plenty.

This site is situated 10.5 kilometres from the mouth. It has a natural gravel control.

River is slow and meandering. Overhanging trees and berm flow contribute to loop rating effect at higher stages. Ratings are drawn to go approximately through the middle of the loop, therefore some deviation from the rating may be evident for higher stage gaugings.

Gaugings are by wading at lower stages and by slackline at higher stages. Slackline x-section above stage height of approximately 1 metre is broad and flat. Gaugings are filed at the end time of each gauging up until 970101. From 970101 onwards gaugings are filed to mid gauge time.

23/09/90 - Missing record from 900923 at 164500 to 900928 at 1016 due to tape jamming in recorder.

24/01/90 - Missing record from 901024 at 080000 to 901029 at 94500 due to tape ripping.

10/09/91 - Missing record from 910910 at 104500 to 910930 at 111500 due to recorder failure.

04/06/92 - Data from 920604 101500 to 921002 084500 should be treated with caution due to recorder time (slow) problem. Data has been corrected to inspection times.

10/08/92 - Missing record from 920810 at 141500 to 920814 at 111500 due to ripped tape.

01/09/94 - Missing record from 940901 at 154500 to 940905 at 143000 due to l&s not punching.

14/06/95 - Missing record from 950614 at 180000 to 950620 at 150000 due to recorder failure.

13/07/95 - Missing record from 950713 at 163000 to 950719 at 123000 due to Aquitel remote crashing.

17/11 95 - Missing record from 951117 at 180000 to 951120 at 101500 due to Aquitel remote coldstarting.

22/11/95 - Missing record from 951122 at 150000 to 951124 at 113100.

27/11/95 - Missing record from 951127 at 150000 to 951208 at 153000 due to Aquitel remote crashing.

27/02/96 - Missing record 960227 at 093000 to 960229 at 094500 due to Aquitel remote failure.

08/05/96 - Missing record from 960508 at 164500 to 960515 at 114500 due to Aquitel failure.

18/05/96 - Missing record from 960518 at 011500 to 960522 134500 due to Aquitel remote crashing.

22/05/96 - Missing record from 960522 at 170000 to 960523 at 113000 due to remote not being started.

24/06/96 - Missing record from 960624 at 053000 to 960626 at 113000 due to Aquitel remote failure.

26/09/99 - Missing record from 990926 at 223000 to 990908 at 101500 due to fault with new iQuest logger

26/08/99 - iQuest logger and Handar encoder installed. Time resolution of 15 minutes. Stage resolution 1 mm.

02/03/00 - Missing record from 1000302 at 240000 to 1000303 at 101500 due to programming fault.

06/04/03 - Change in mid-stage rating shape due to left bank mid berm suffering significant scour. Scour was exacerbated by upstream channel works that removed some meander loops and may have increased velocities through section.

15/07/03 - Missing record from 20030715 at 113000 to 20030803 at 023000 due to memory overwrite.

23/07/04 - Tower flushed. Flushing only appears to have been partially successful as bottom end of recessions show signs of siltation through to subsequent tower flushing on 20041202 at 141500. Use lower flow data with caution.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	July 2006	Site Number	15605
Compiled by	G R Ellery	River	Nukuhou
		Station	Old Quarry Road
Metric Map Reference	W16:729 387		
Catchment Area (km^2)	67	Period of Summary	1991 to 2005

Statistical Summary

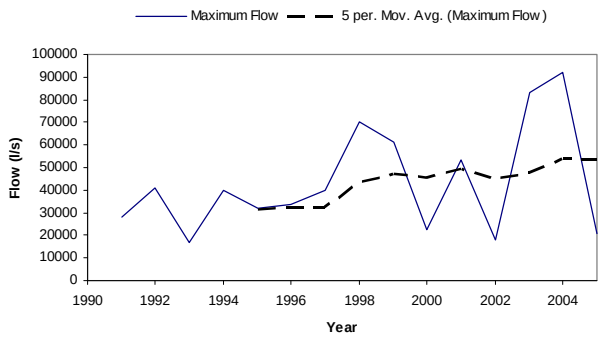
Flow (*l/s*)				
Minimum Flow	82	Maximum Flow		91924
Mean Annual Minimum Flow	201	Mean Annual Maximum Flow		43550
Mean Flow	1867	Mean Summer Flow		1183
Median Flow	1074	Mean Autumn Flow		1216
Mean Specific Flow (/km^2)	28	Mean Winter Flow		3038
		Mean Spring Flow		2078
Low Flow Distribution Fit	Gumbel	Peak Flow Distribution Fit	Gumbel	GEV
7 day Low Flow (Minimum)	92	Peak Flow (5 yr Return)	62000	60000
7 Day Low Flow (Mean Annual)	191	Peak Flow (10 yr Return)	76000	76000
7 day Low Flow (5 yr Return)	152	Peak Flow (20 yr Return)	90000	93000
7 Day Low Flow (10 yr Return)	130	Peak Flow (50 yr Return)		
		Peak Flow (100 yr Return)		

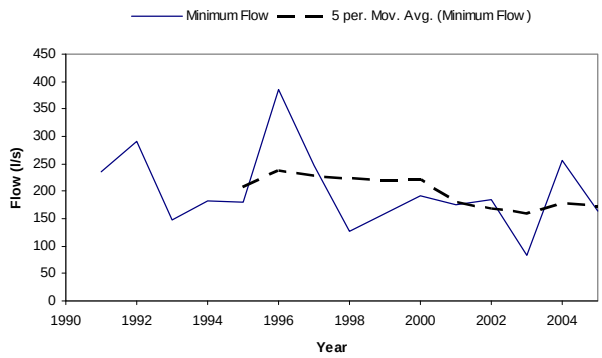
Annual Summaries

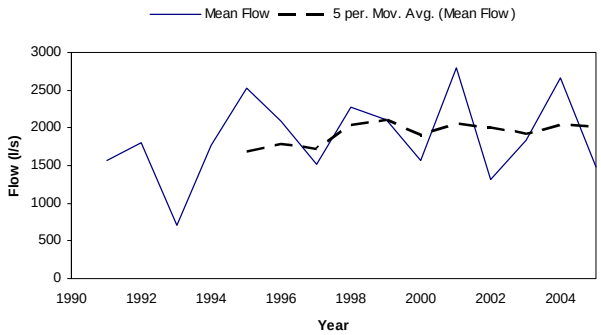
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993	147	711	16838
1981				1994	183	1777	40105
1982				1995	179	2535	31778
1983				1996	386	2093	33621
1984				1997	248	1515	39960
1985				1998	127	2276	70484
1986				1999	159	2107	61328
1987				2000	192	1568	22483
1988				2001	175	2792	53236
1989				2002	184	1315	17977
1990				2003	82	1830	83346
1991	235	1564	28288	2004	257	2670	91924
1992	291	1810	41171	2005	163	1486	20710

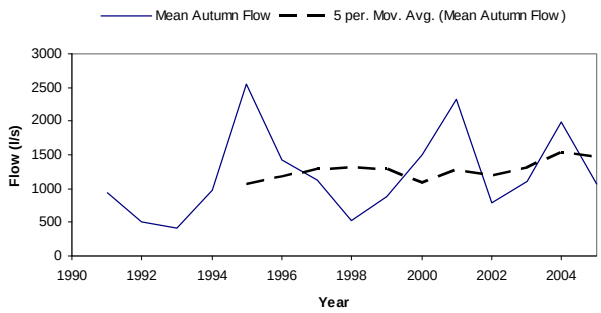
Flow Distribution

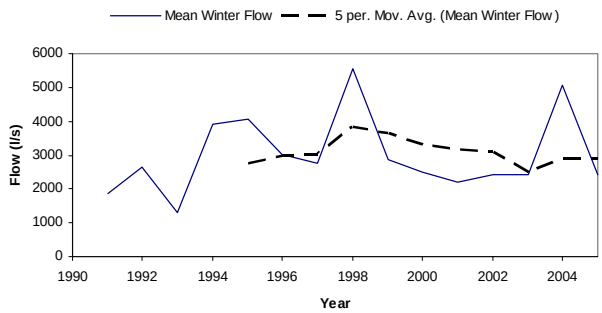
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	91924	14212	9686	7713	6486	5738	5161	4728	4343	4025
10	3760	3523	3327	3157	3013	2882	2767	2662	2564	2477
20	2392	2315	2250	2187	2130	2071	2014	1961	1911	1862
30	1820	1773	1723	1677	1633	1588	1547	1505	1464	1426
40	1393	1356	1322	1287	1256	1225	1194	1164	1130	1102
50	1074	1044	1014	985	956	926	900	875	849	822
60	798	772	748	725	704	682	657	634	612	592
70	571	552	534	520	506	492	476	461	447	432
80	418	402	389	376	365	353	341	328	316	304
90	289	276	263	250	236	222	208	196	176	150
100	82									

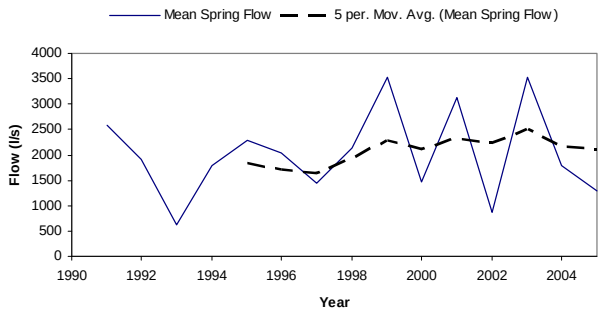


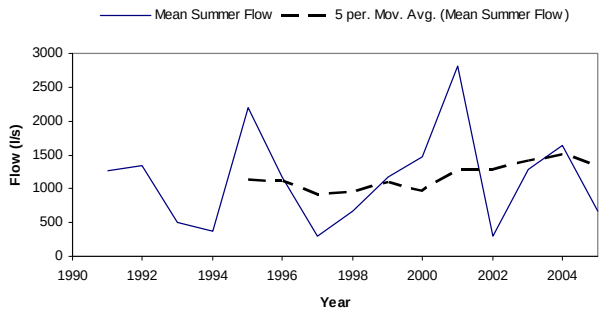












Nukuhou at Old Quarry Road

Environment Bay of Plenty
River Flow Recording Station

River	Waioeka	Site	Cableway
Site Number	15901	Grid Reference	W16:876 219
Start of Record	March 1958	Data Capture Rate	95%
Data Summary From	January 1959	To	December 2005
Data Audited From	NIWA	To	NIWA

Equipment History

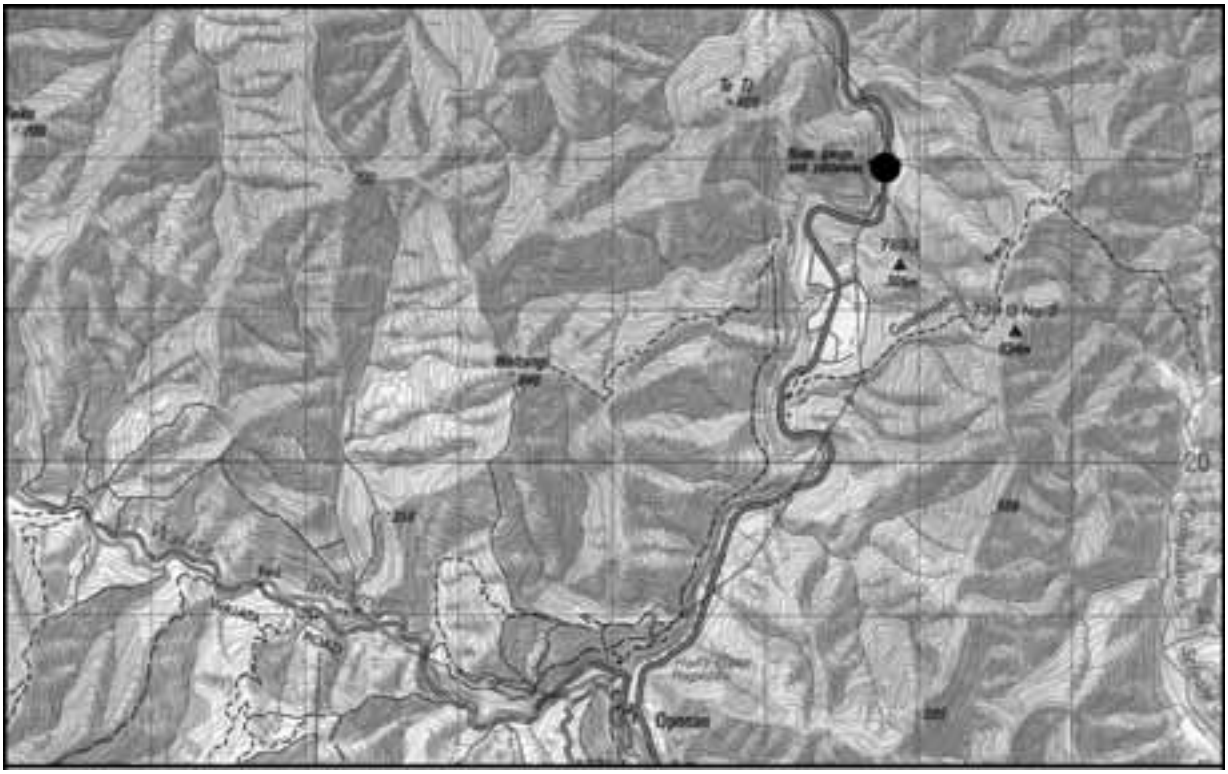
10/03/58: Monthly Lea chart recorder.
03/03/59: Monthly Kent chart recorder.
04/09/69: Float with F&P digital recorder.
16/02/77: Backup Foxboro chart recorder.
15/12/87: 10 metre range P.T. and Aquitel.
09/12/93: Encoder with WRIC data logger.

Comments on Stage/Discharge Ratings

Site control is by natural gravel bed. Rating curve is well defined with gaugings over the full range. Ratings are available to convert Stage (mm) to Flow (l/s).

General Comments

Site is operated by NIWA, Rotorua. Environment Bay of Plenty operate their own equipment at the same site for flood monitoring purposes.



SITE LOCATION
Waioeka at Cableway

Station Comments

Waioeka River at Gorge Cableway. Site Number 15901, on River Number 159000.

The local recording authority is NIWA, Rotorua.

The site is situated 36.6 kilometres from the mouth.

01/09/67 -Logs cleared around staff gauge and intakes, causing drop in stage of 150mm.

30/06/76 - Control of site transferred from Rotorua to Gisborne Water Resources Survey on 760630.

23/01/79 - Periods of missing record occurred from November 1977 to January 1979 due to intake problems. New middle intake installed 790123 causing 75mm rise in stage.

18/11/86 - Continued problems with intake. Bottom intake extended by approximately 800mm and tower desilted on 861118.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	December 2006	Site Number	15901
Compiled by	G R Ellery	River	Waioeka
		Station	Cableway
Metric Map Reference	W16: 876 219		
Catchment Area (km²)	640	Period of Summary	1959 to 2005

Statistical Summary

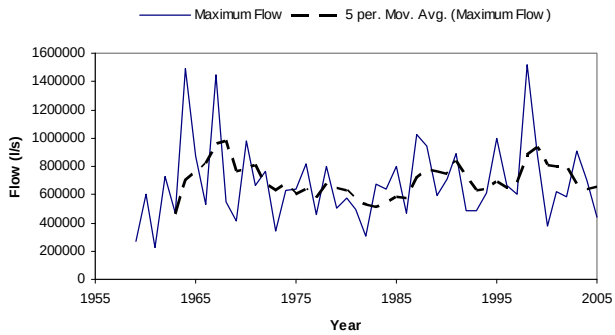
Flow (*l/s*)			
Minimum Flow	1141	Maximum Flow	1520537
Mean Annual Minimum Flow	4030	Mean Annual Maximum Flow	684923
Mean Flow	31592	Mean Summer Flow	22253
Median Flow	16739	Mean Autumn Flow	25017
Mean Specific Flow (/km²)	49	Mean Winter Flow	44082
		Mean Spring Flow	36358
Low Flow Distribution Fit	GEV	Peak Flow Distribution Fit	Pearson III
7 day Low Flow (Minimum)	1828	Peak Flow (5 yr Return)	904000
7 Day Low Flow (Mean Annual)	4004	Peak Flow (10 yr Return)	1047000
7 day Low Flow (5 yr Return)	3179	Peak Flow (20 yr Return)	1297000
7 Day Low Flow (10 yr Return)	2696	Peak Flow (50 yr Return)	1583000
		Peak Flow (100 yr Return)	1845000

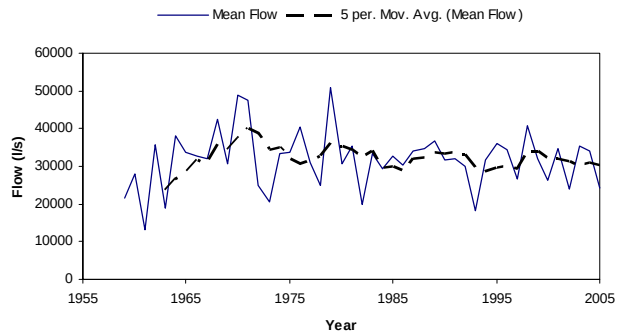
Annual Summaries

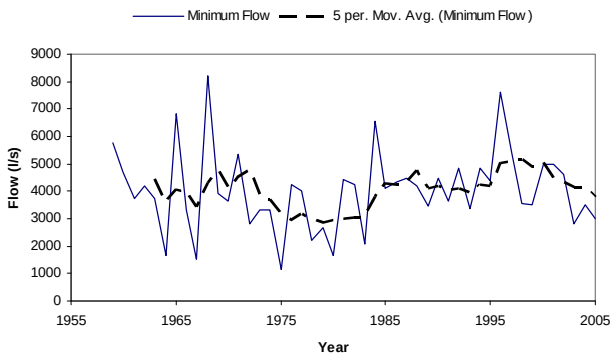
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	1680	30640	574702	1993	3371	18044	483860
1981	4449	35235	491910	1994	4837	31763	610068
1982	4248	20034	303544	1995	4401	36018	1001960
1983	2093	33274	674550	1996	7604	34285	666555
1984	6535	29274	635707	1997	5396	26663	605871
1985	4101	32593	799272	1998	3574	40818	1520540
1986	4343	30367	465064	1999	3515	31993	882375
1987	4482	34112	1026020	2000	4971	26144	379086
1988	4197	34689	943341	2001	4992	34759	622917
1989	3445	36740	593709	2002	4598	23813	586478
1990	4476	31536	713512	2003	2798	35347	906962
1991	3632	32072	887364	2004	3498	34165	705536
1992	4832	29972	483183	2005	2984	24109	440316

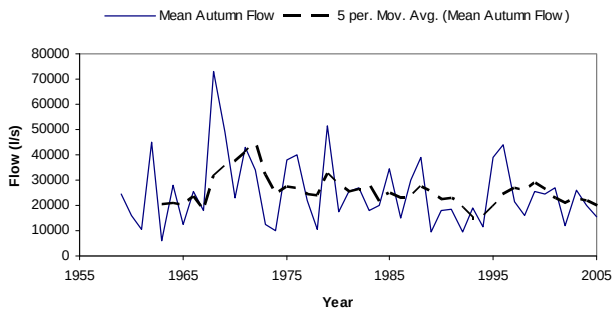
Flow Distribution

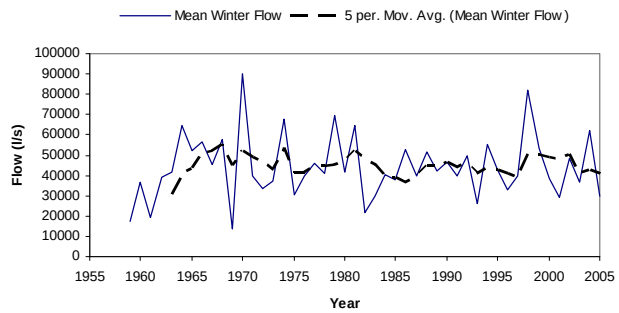
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	1520537	250091	177043	141686	120777	105501	94062	84893	77682	71633
10	66583	62264	58527	55307	52510	49904	47490	45365	43398	41515
20	39830	38262	36768	35380	34103	32934	31833	30781	29801	28872
30	27988	27168	26391	25639	24909	24210	23552	22930	22343	21797
40	21256	20731	20228	19742	19261	18802	18364	17932	17513	17109
50	16739	16374	15998	15637	15288	14946	14618	14297	13980	13676
60	13375	13080	12790	12500	12212	11930	11659	11379	11115	10837
70	10577	10333	10098	9861	9610	9358	9112	8862	8624	8391
80	8154	7913	7673	7433	7195	6958	6728	6509	6283	6060
90	5840	5623	5410	5182	4945	4705	4457	4155	3750	3115
100	1141									

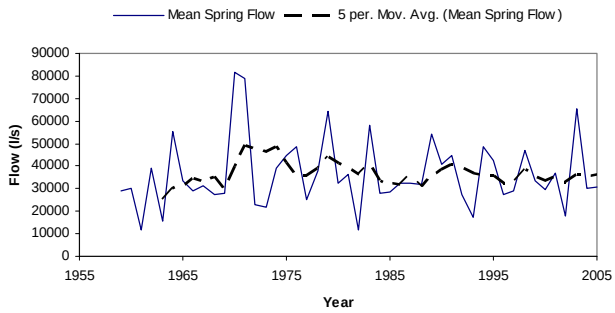


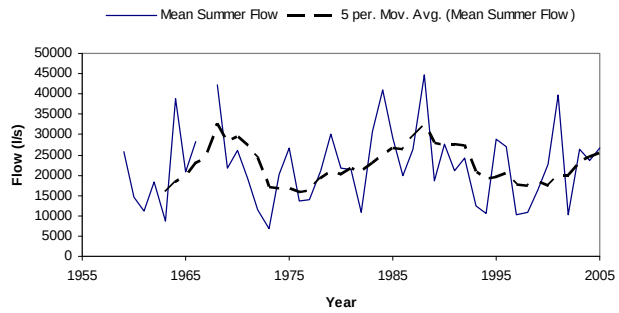












Waioeka at Cableway

Environment Bay of Plenty
River Flow Recording Station

River	Otara	Site	Browns Bridge
Site Number	16002	Grid Reference	W16:931 376
Start of Record	March 1979	Data Capture Rate	90%
Data Summary From	January 1980	To	December 2005
Data Audited From	December 1989	To	December 2005

Equipment History

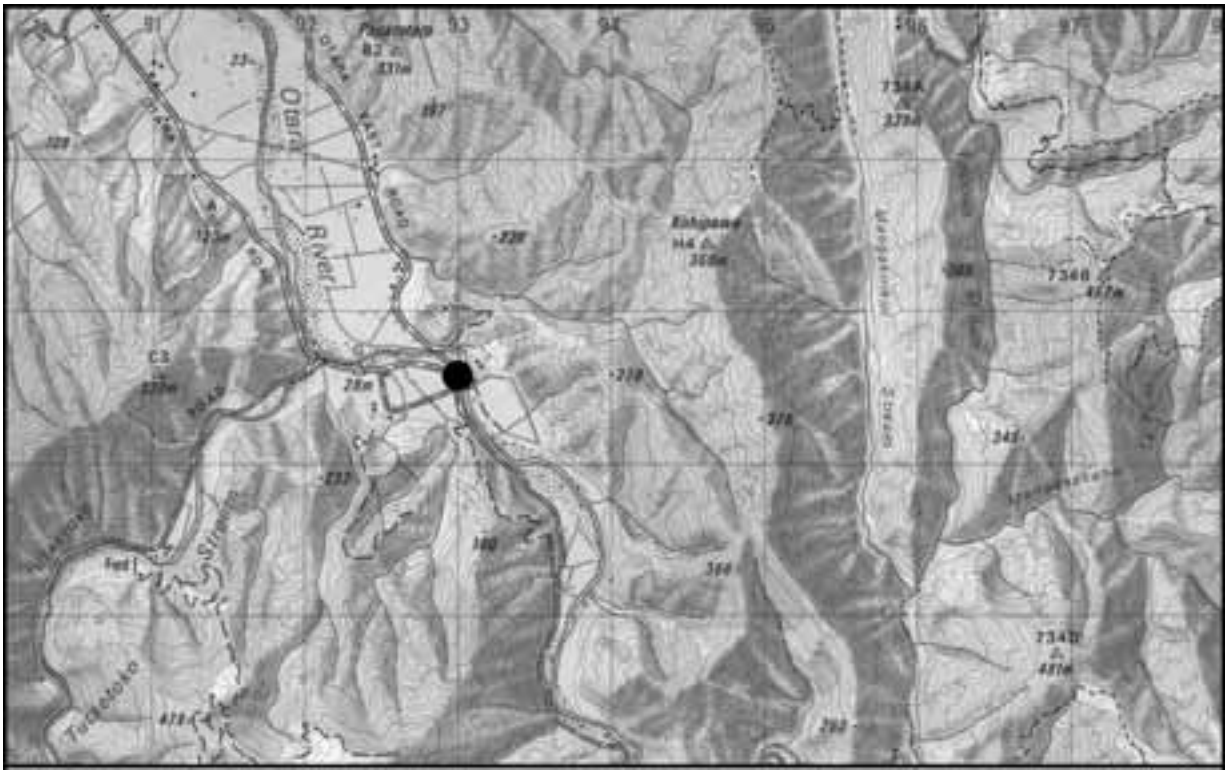
02/06/72 - Recorder installed is an Ericsson.
01/02/79: Monthly Foxboro chart recorder.
13/12/89: 10 metre P.T. & Aquitel Remote.
15/11/93: Float with L&S digital recorder.

Comments on Stage/Discharge Ratings

Site control is by natural gravel bed. Control is unstable and there have been numerous rating changes at this site. Gravel extraction occurs at this site and can cause rating changes. Ratings are available to convert Stage (mm) to Flow (l/s)

General Comments

Site was originally operated by the East Cape Catchment Board, before being handed over in November 1989. This site is also used for flood monitoring purposes. Site is now operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.



SITE LOCATION
Otara at Browns Bridge

Station Comments

Otara River at Browns Bridge. Site Number 16002, on River Number 160000.

The local recording authority is Environment Bay of Plenty.

The site is situated 20.34 kilometres from the mouth. Lower flow gaugings are performed by wading, higher flow gaugings are performed from the bridge using a gauging crane and suspended meter. The bed in the vicinity of the recorder on the Otara River at Browns Bridge consists mainly of gravels and is subject to regular movement during freshes. During larger events major changes in bed shape are possible with resulting changes in rating shape. At a stage of approximately 1.9 metres bank overflow occurs into berm area.

01/02/79 - Recorder installed is a 5 metre range monthly Foxboro with a time resolution of 281 minutes / mm recorded and a stage resolution of 47mm stage / mm recorded.

01/11/89 - Site handed over to Environment Bay of Plenty. As part of local authority reorganisation. Collection and processing procedures for this data is unknown. This data should be used with caution.

13/12/89 - Recorder installed is an Aquitel remote with a time resolution of 15 minutes connected to a 10metre pressure transducer with an accuracy of 20 mm. Foxboro retained as a backup recorder.

24/12/89 - Missing record from 891224 at 023000 to 900104 at 134500 due to power supply failure. During this period Pakihi (16004) an upstream site recorded a small fresh.

11/10/91

Site handed over to Environment Bay of Plenty as part of local authority reorganisation. Data from March 1979 transferred to Environment Bay of Plenty. Collection and processing procedures for this data is unknown, use data with caution.

15/11/93 - Stilling well and Leopold and Stevens digital recorder installed. Recorder has a 15 minute time resolution and a stage resolution of 1 mm of stage change to 1 mm recorded.

30/08/94 - Missing record for the period 940830 at 124500 to 940907 at 141500 due to equipment failure.

13/10/95 - Missing record for the period 951013 at 151500 to 951018 at 144500 due to Aquitel remote failure.

26/12/95 - Missing record for the period 951226 at 133000 to 960109 at 093900 due to Aquitel remote failure.

27/05/96 - Data from 960527 at 083000 to 960626 at 160000 missing due to siltation of intakes.

14/09/96 - Missing record from 960914 at 201500 to 960920 at 144500 due to recorder failure.

01/10/96 - Missing record from 961001 at 094500 to 961009 at 101500 due to recorder failure

30/09/97 - Missing record from 970930 at 104500 to 971001 at 120000 due to recorder failure.

19/10/97 - Missing record from 971019 at 141500 to 971022 at 104500 due to power supply fault.

23/10/97 - Missing record from 971023 at 060000 to 971024 at 110000 due to Aquitel remote failure.

22/04/01 - Missing record from 20010422 at 070000 to 20010426 at 154500 due to encoder fault.

17/07/04 - Missing record from 20040717 211500 to 20040720 170000 due to failing Handar 436BD encoder.

23/07/04 - Missing record from 20040723 120000 to 20040723 124500.

18/08/04 - Missing record from 20040818 170000 to 20040823 160000 due to failing Handar 436BD encoder.

19/12/04 - Missing record from 20041219 111500 to 2041223 111500. Cause unknown.

17/07/04 - Missing record from 20040717 at 211500 to 20040720 at 170000 due to bank slumping and blocking intakes.

18/08/04 - Missing record from 20040818 at 170000 to 20040823 at 160000 due to encoder jamming.

17/10/05 - Missing record from 20051017 at 184500 to 20051018 at 113000 due to encoder jamming.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	July 2006	Site Number	16002
Compiled by	G R Ellery	River	Otara
		Station	Browns Bridge
Metric Map Reference	W16:931 376		
Catchment Area (km²)	254	Period of Summary	1980 to 2005

Statistical Summary

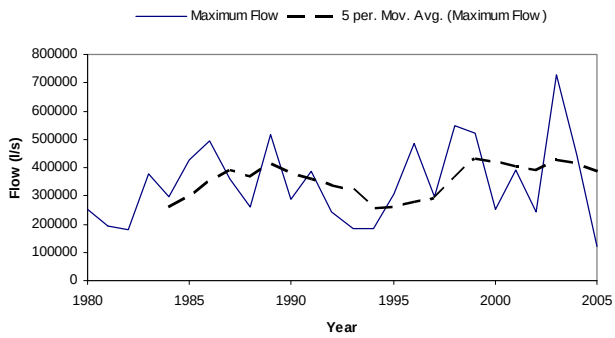
Flow (*l/s*)			
Minimum Flow	495	Maximum Flow	727521
Mean Annual Minimum Flow	1502	Mean Annual Maximum Flow	345142
Mean Flow	11840	Mean Summer Flow	9409
Median Flow	6123	Mean Autumn Flow	8829
Mean Specific Flow (/km²)	47	Mean Winter Flow	15848
		Mean Spring Flow	12430
Low Flow Distribution Fit	GEV	Peak Flow Distribution Fit	GEV
7 day Low Flow (Minimum)	663	Peak Flow (5 yr Return)	463000
7 Day Low Flow (Mean Annual)	1607	Peak Flow (10 yr Return)	562000
7 day Low Flow (5 yr Return)	1226	Peak Flow (20 yr Return)	666000
7 Day Low Flow (10 yr Return)	1004	Peak Flow (50 yr Return)	812000
		Peak Flow (100 yr Return)	

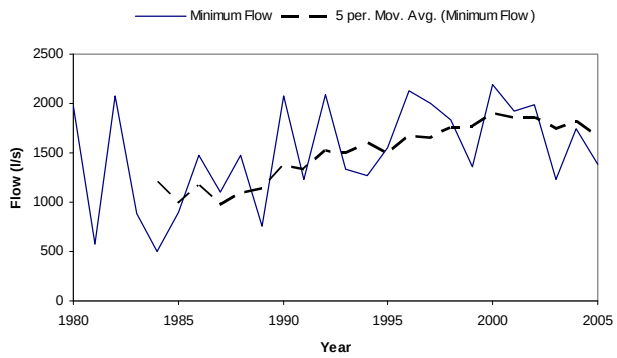
Annual Summaries

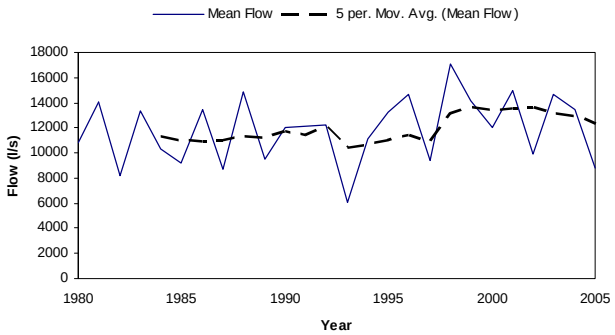
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	1974	10772	249867	1993	1337	6072	183156
1981	574	14062	191708	1994	1269	11151	182522
1982	2072	8144	181884	1995	1552	13290	303431
1983	888	13350	379321	1996	2133	14620	483152
1984	495	10312	297694	1997	1998	9366	297507
1985	898	9215	427229	1998	1827	17055	549808
1986	1470	13463	495514	1999	1365	14151	519387
1987	1106	8741	357574	2000	2191	11995	252876
1988	1470	14914	259394	2001	1929	14980	391790
1989	753	9554	517039	2002	1992	9860	244158
1990	2082	12013	287602	2003	1228	14656	727521
1991	1229	12139	385586	2004	1744	13430	445367
1992	2091	12229	243326	2005	1388	8835	119281

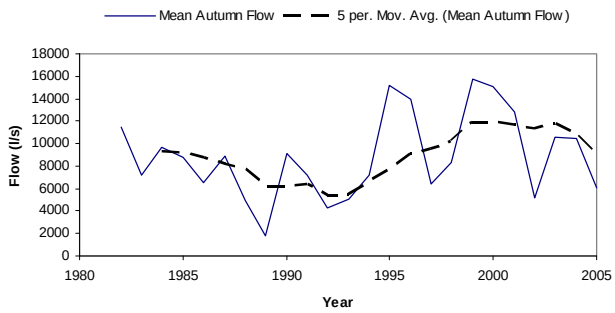
Flow Distribution

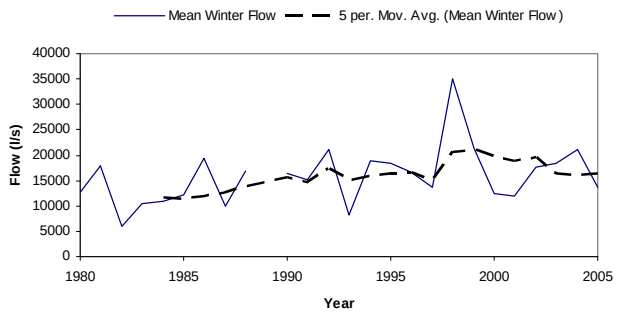
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	727521	110664	71406	53622	43626	37025	32542	29091	26442	24354
10	22618	21209	19896	18756	17809	16933	16117	15417	14805	14243
20	13717	13214	12754	12324	11893	11513	11160	10826	10505	10204
30	9908	9629	9365	9112	8871	8646	8431	8221	8026	7832
40	7641	7456	7284	7121	6957	6806	6659	6520	6387	6257
50	6123	5982	5844	5720	5599	5482	5366	5248	5133	5027
60	4928	4827	4724	4621	4523	4424	4327	4230	4138	4045
70	3958	3872	3779	3686	3596	3509	3423	3330	3239	3157
80	3076	2995	2914	2818	2729	2647	2572	2494	2416	2336
90	2260	2177	2106	2017	1898	1786	1679	1548	1404	1178
100	495									

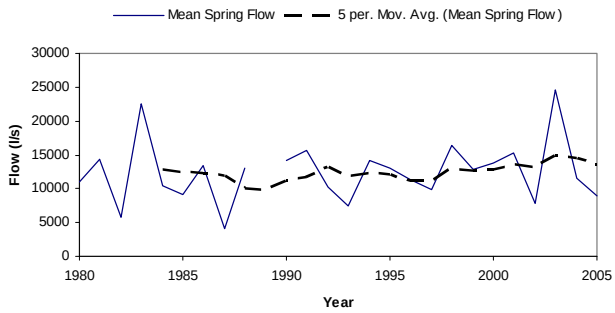


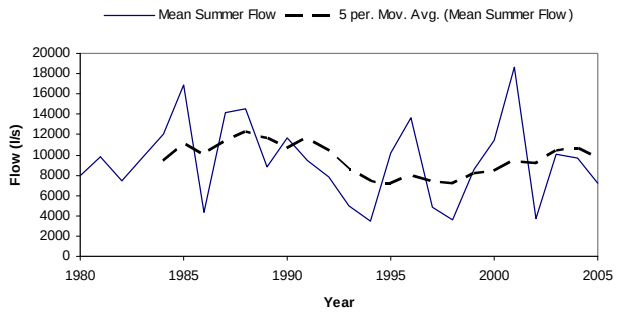












Otara at Browns Bridge

Environment Bay of Plenty
River Flow Recording Station

River	Motu	Site	Houpoto
Site Number	16501	Grid Reference	X15: 181 609
Start of Record	April 1957	Data Capture Rate	99%
Data Summary From	January 1958	To	December 2005
Data Audited From		To	

Equipment History

08/04/1957 - Recorder is a 20 feet range weekly Lea, time resolution of 38 minutes/mm recorded and a stage ratio of 24 mm of stage/mm chart recorded.

27/05/1957 - Recorder replaced by a 20 feet range 32 day Lea, having a time resolution of 152 minutes/mm recorded and a stage ratio of 24mm of stage/mm chart recorded.

19/03/1958 - Recorder replaced on 580319 by a 25 feet range 32 day Kent, having a time resolution of 96 minutes/mm recorded and a stage ratio of 30mm of stage/mm chart recorded.

16/08/1966 - Recorder replaced on 660816 by a 30 metre range F&P, having a time interval of 15 minutes and a stage ratio of 3mm of stage/mm recorded.

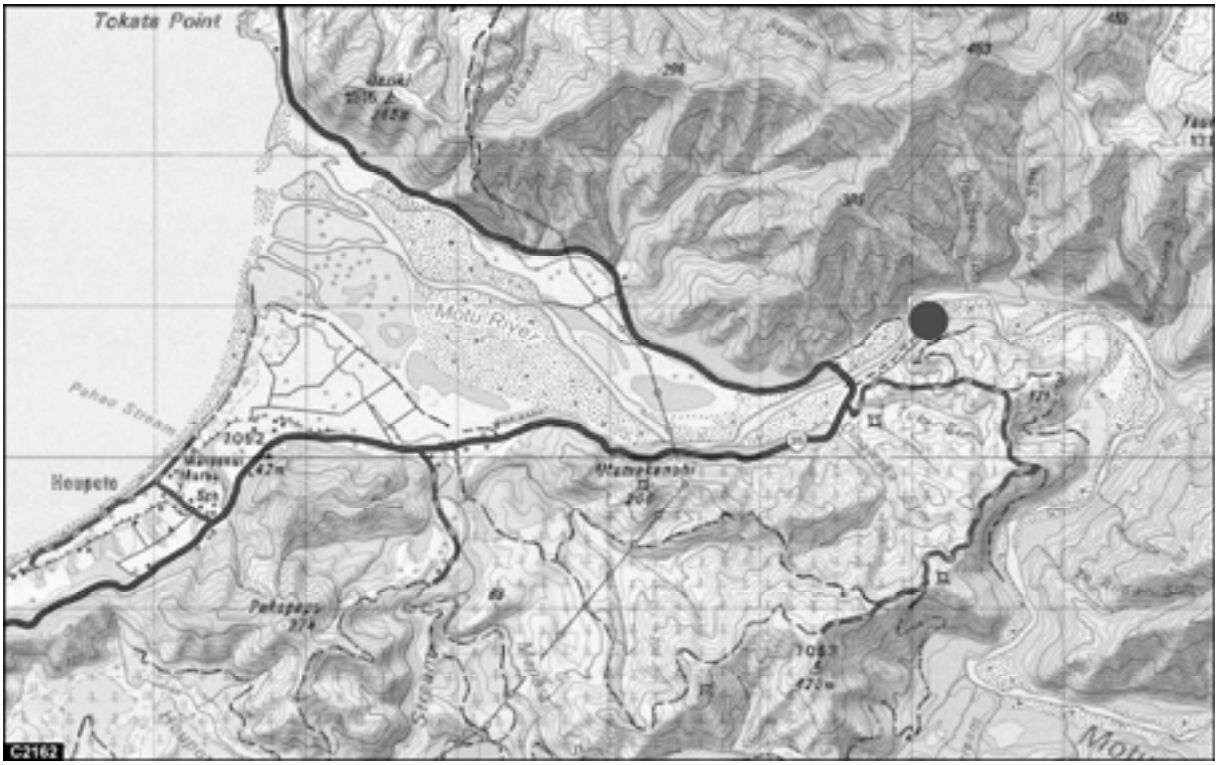
09/09/1992 -Recorder replaced 920909 114500 by a datalogger and shaft encoder. This unit has a 10 metre range with a time interval of 15 minutes and a stage ratio of 1mm of stage/mm recorded.

Comments on Stage/Discharge Ratings

Control is by stable natural channel. Ratings available to convert stage (mm) to flow (l/s).

General Comments

Site is operated by NIWA – Rotorua.



NIWA
Taihoro Nukurangi

SITE LOCATION
Motu at Houpoto

Station Comments

07/04/1957 - Motu At Houpoto on the Motu river, river number 165000

Station operated by the Hamilton then Rotorua hydro surveys, MWD, from 1957 to 1976.
The local recording authority is NIWA, Rotorua.

1/10/1962 - Missing record for period 621001 103001 to 621003 155959. Clock removed for repair.

31/12/1965 - Missing record for period 651231 061301 to 660107 125959. Clock stopped.

17/10/1966 - Missing record for period 661017 124501 to 661106 145959. Silting in well.

2/09/1975 - Missing record for period 750902 200001 to 750922 111459 due to faulty recorder.

18/04/1977 - Missing record for period 770418 123001 to 770531 134459. Punch motor failure

28/07/1997 - Missing record for period 770728 223001 to 770811 144959. Timer stopped.

25/09/1985 - Missing record for period 850925 103801 to 851016 135959. Jammed punchblock on F&P and backup Foxboro pen failure.

29/05/1995 - Missing record from 950529 153001 to 950601 114500. The aquitel remote failed during this period.

14/09/1996 - Missing record from 960914 151501 to 960916 115959 due to a faulty remote. The backup Foxboro recorder also failed during this period.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	December 2006	Site Number	16501
Compiled by	G R Ellery	River	Motu
		Station	Houpoto
Metric Map Reference	X15: 181 609		
Catchment Area (km²)	1393	Period of Summary	1958 to 2005

Statistical Summary

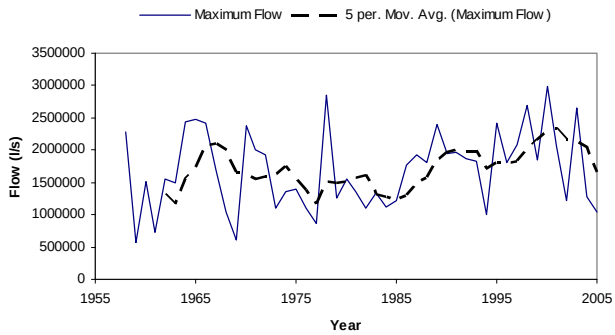
Flow (*l/s*)			
Minimum Flow	6737	Maximum Flow	2988068
Mean Annual Minimum Flow	13391	Mean Annual Maximum Flow	1692403
Mean Flow	91564	Mean Summer Flow	63552
Median Flow	53513	Mean Autumn Flow	70667
Mean Specific Flow (/km²)	66	Mean Winter Flow	127762
		Mean Spring Flow	102113
Low Flow Distribution Fit	Gumbel	Peak Flow Distribution Fit	GEV
7 day Low Flow (Minimum)	7025	Peak Flow (5 yr Return)	2215000
7 Day Low Flow (Mean Annual)	13722	Peak Flow (10 yr Return)	2520000
7 day Low Flow (5 yr Return)	11660	Peak Flow (20 yr Return)	2773000
7 Day Low Flow (10 yr Return)	10514	Peak Flow (50 yr Return)	3051000
		Peak Flow (100 yr Return)	

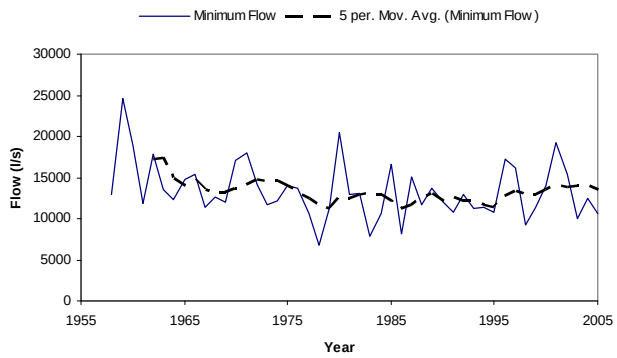
Annual Summaries

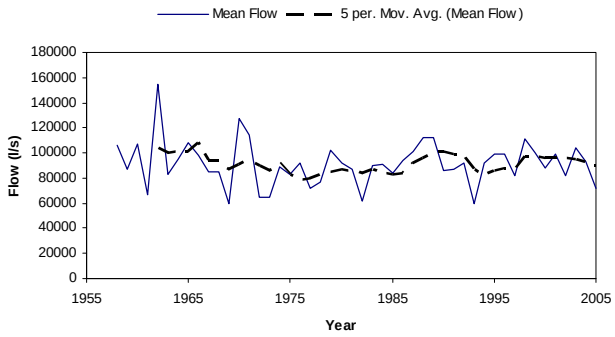
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	20464	92326	1543830	1993	11195	59907	1820450
1981	12857	86732	1350980	1994	11455	91582	1012320
1982	13078	61582	1094370	1995	10779	99545	2419260
1983	7884	90176	1330940	1996	17205	99531	1802740
1984	10571	91194	1114060	1997	16096	81935	2081940
1985	16616	83710	1216980	1998	9282	111619	2695040
1986	8180	93995	1776350	1999	11454	99674	1840850
1987	15008	100633	1922160	2000	13987	87613	2988070
1988	11667	112472	1803200	2001	19269	99507	2058700
1989	13702	111745	2392580	2002	15328	82222	1212540
1990	11944	85573	1937840	2003	10067	104183	2656870
1991	10800	87070	1962370	2004	12472	93435	1279580
1992	12877	91761	1858510	2005	10665	71396	1032760

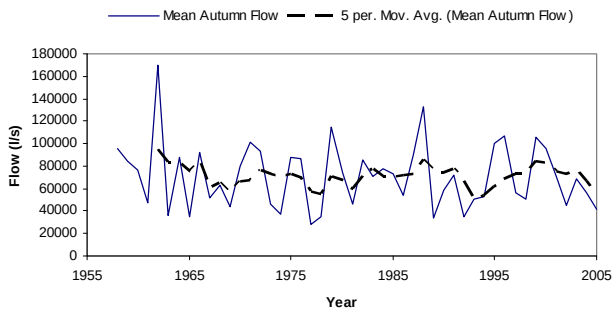
Flow Distribution

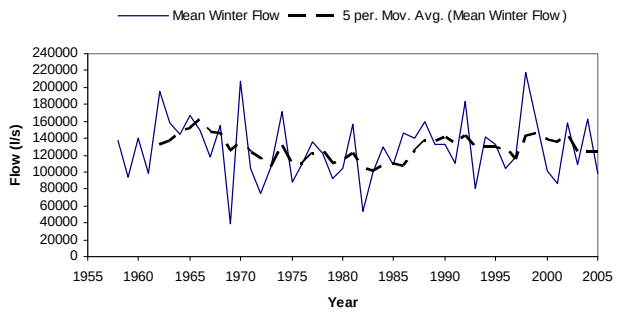
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	2988068	665778	475520	384899	329628	290633	260443	236126	216656	200409
10	186650	174804	164606	155670	147858	140940	134622	128954	123709	118955
20	114502	110341	106497	102986	99726	96598	93736	91060	88556	86189
30	83932	81718	79631	77671	75857	74061	72346	70727	69146	67579
40	66111	64664	63302	61959	60626	59325	58115	56914	55715	54592
50	53513	52415	51340	50246	49205	48208	47165	46183	45241	44291
60	43384	42486	41605	40744	39902	39050	38147	37293	36468	35675
70	34885	34104	33329	32566	31828	31113	30409	29681	28978	28291
80	27592	26908	26236	25585	24924	24256	23581	22860	22146	21484
90	20825	20093	19304	18552	17671	16752	15757	14770	13498	11732
100	6737									

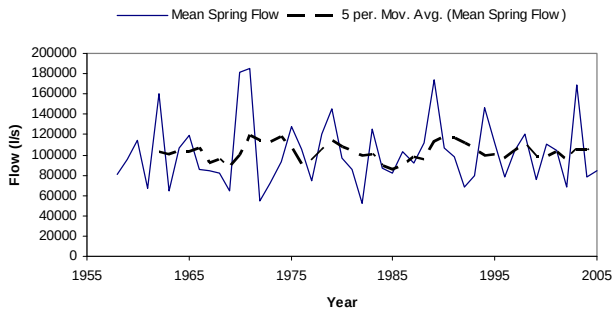


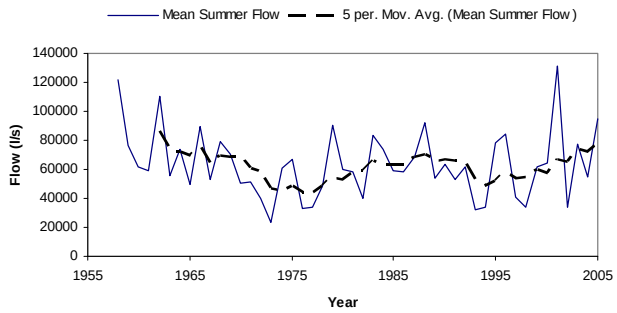












Motu at Houpoto

3.6 River Level Data Summaries

The river level data summaries in this chapter are provided in the following sequences of 4 pages per site:

Page 1 Provides general information regarding the site, such as its location, instrument types, start of record, etc.

Page 2 Lists site comments that should be read in conjunction with the results of the data summary. Note that these comments are an edited selection of the full set of comments. Contact the recording authority for a full set of comments if required.

Page 3 Displays the Summary information

Page 4 Graphical presentation of a selection of parameters provided in Page 3.

The ID No. in Table 3.6 indicates the order in which individual site data summaries are provided in this report.

Table 3.6 River Level Monitoring Sites

ID Number	Page No.	River	Site	Period of Audit	Data Capture Rate (%)
1	321	Tuapiro	Woodlands Rd	1985-2005	98
2	325	Kopurereroa	S.H.29	1991-2005	99
3	329	Kaituna	Fords Cut	1981-2005	86
4	333	Kaituna	Clarkes	1981-2005	95
5	337	Raparapahoe	Above Drop Structure	1992-2005	96
6	341	Mangorewa	Saunders	1968-2005	99
7	345	Kaituna	Te Matai	1968-2005	97
8	349	Ngongotaha	S.H.5 Bridge	1976-2005	99
9	353	Tarawera	Awakaponga	1949-2005	99
10	357	Rangitaiki	Thornton	1989-2005	89
11	361	Rangitaiki	Te Teko	1949-2005	100
12	365	Rangitaiki	Murupara	1949-2005	100
13	369	Whakatane	Town Wharf	1987-2005	80
14	373	Whakatane	Whakatane	1957-2005	99
15	377	Whakatane	Huitieke	1987-2005	93
16	381	Waimana	Gorge	1951-2005	97
17	385	Waimana	Ranger Station	1996-2005	100
18	389	Otara	Town Wharf	1991-2005	94
19	393	Waioeka	Mouth of Gorge	1987-2005	94
20	397	Waioeka	Cableway	1959-2005	95
21	401	Otara	Browns Bridge	1980-2005	90
22	405	Pakihi Station	Pakihi	1989-2005	86


River Level Monitoring Sites
of the Bay of Plenty Region
Environment Bay of Plenty
REGIONAL COUNCIL
Bay of Plenty
Mayor Island
Waihi Beach
Bowentown Heads
Karewa Island
Matakana Island
Tauranga Harbour
Motuhaku Island
Motiti Island
Motunau Island
Volkner Rocks
Whakaari/White Island
Cape Runaway
Lottin Point
Waihau Bay
Waikawa Point
Te Kaha Point
Rurima Island
Moutoki Island
Moutohora Island
Kohi Point
Ohiwa Harbour
Torere
Kawerau
Lake Rotoma
L. Rotorua
Matata 20km
Cambridge 51km
Tirau 25km
Putaruru 28km
Tokoroa 44km
Taupo (SH5) 56km
Taupo 23km
Rangitaiki
Napier 96km
Gisborne 64km
Waikaremoana 28km
Ruatahuna
Murupara
Rerewhakaaitu
Reference
river level monitoring site
regional boundary
district boundaries
state highway
major road
town, locality
native forest
exotic forest
horticulture
pasture and cropping
other
Scale
River Level Monitoring Sites
1 Tuapiro at Woodlands Road
2 Kopurereroa at SH29
3 Kaituna at Fords Cut
4 Kaituna at Clarkes
5 Raparapahoe at Above Drop Structure
6 Mangorewa at Saunders Farm
7 Kaituna at Te Matai
8 Ngongotaha at SH5 Bridge
9 Tarawera at Awakaponga
10 Rangitaiki at Thornton
11 Rangitaiki at Te Teko
12 Rangitaiki at Murupara
13 Whakatane at Town Wharf
14 Whakatane at Whakatane
15 Whakatane at Huitieke
16 Waimana at Gorge
17 Waimana at Ranger Station
18 Otara at Town Wharf
19 Waioeka at Mouth of Gorge
20 Waioeka at Cableway
21 Otara at Browns Bridge
22 Pakihi at Pakihi Station

Environment Bay of Plenty
River Level Recording Station

River	Tuapiro	Site	Woodlands Road
Site Number	13310	Grid Reference	T13:661 057
Start of Record	February 1984	Data Capture Rate	98%
Data Summary From	January 1995	To	December 2005
Data Audited From	February 1984	To	December 2005

Equipment History

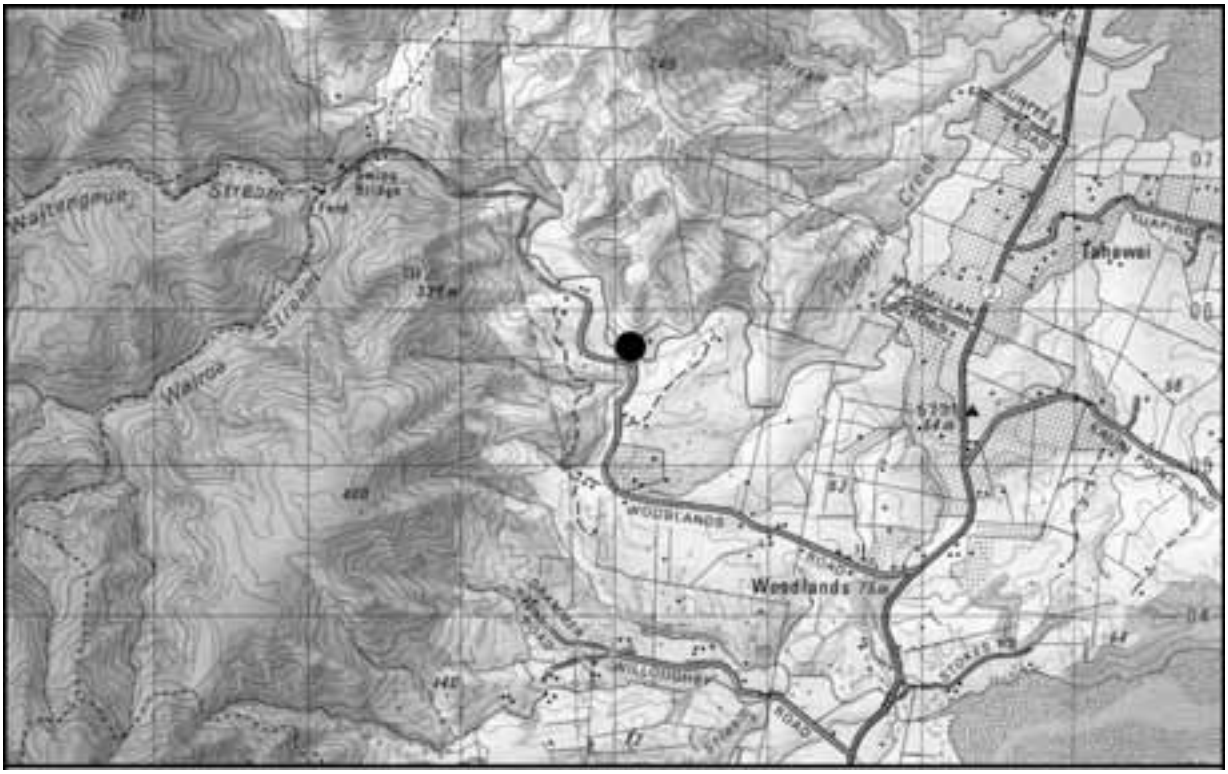
Float/counterweight system with shaft encoder. 1mm resolution.

Comments on Stage/Discharge Ratings

Control is by concrete ford. Stream overtops channel and floods surrounding paddocks at high levels. Ratings available to convert stage (mm) to (l/s).

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environmental Monitoring Network.



SITE LOCATION
Tuapiro at Woodlands Road

Station Comments

Tuapiro River at Woodlands Road. Site Number 13310, on River Number 133000.
The local recording authority is Environment Bay of Plenty.

The control is by a stable concrete ford, some movement in bottom end of ratings due to holes through ford filling up and clearing themselves. Spot gaugings carried out since 690318. L&S and recording tower installed 840202. Continuous water level records begin 840202 154500. Top of ford is approximately 0.94 metres on gauge. Bottom of culverts through ford at approximately 0.46 metres on gauge. Ramp corrections applied on numerous occasions since site installed due to debris collecting on ford during flood events.

02/02/84 - Records commenced on 840202 154500. Equipment is a 10 metre L&S digital recorder having a stage ratio of 1mm of stage/mm recorded and a time punch out of 15 minutes.

22/05/84 - Missing record from 840522 at 063000 to 840713 at 140000 due to L&S recorder jamming.

13/07/84 - Missing record from 840713 at 234500 to 840720 at 131500 due to float tape coming off roller.

02/06/86 - Missing record from 860602 at 074500 to 860709 at 124500 due to battery voltage dropping too low to record

11/01/88 - Missing record from 880111 at 120000 to 880125 at 130000 due to L&S recorder jamming.

02/11/89 - Missing record from 891102 at 213000 to 891107 at 123000 due to L&S recorder malfunctioning.

09/12/92 - Missing record from 921209 at 104500 to 921222 at 143000 due to battery voltage dropping too low to record.

13/09/95 - Missing record from 950913 at 063000 to 950920 at 140000 due to Aquitel remote failure.

16/01/96 - Missing record from 960116 at 011500 to 960117 at 104500 due to Aquitel remote having cold started.

24/01/96 - Missing record from 960124 at 174500 to 960131 at 100000 due to Aquitel remote having crashed.

11/02/96 - Missing record from 960211 at 093000 to 960214 at 121500 due to Aquitel remote having locked up.

12/03/96 - Missing record from 960312 at 044500 to 960314 at 131500 due to Aquitel remote having crashed.

15/03/96 - Missing record from 960315 at 070000 to 960320 at 111500 due to Aquitel remote having crashed.

30/12/96 - Missing record 961230 at 174500 to 970107 at 150000 due to upstream suspension bridge being destroyed in flood and washing onto recorder, demolishing recorder hut.

18/10/97 - Missing record from 971018 at 060000 to 971021 at 113000 due to Aquitel failure.

27/07/98 - Missing record from 980727 at 151500 to 980729 at 113000 due to Aquitel failure.

21/04/00 - Missing record from 1000421 at 114500 to 1000427 at 234500 due to rats chewing through power cables.

12/01/02 - Missing record from 1020112 53000 to 1020113 60000 due to deterioration of comms quality.

07/09/04 - Missing record from 20040907 093000 to 20040907 153000 due to communications problems (faulty GPRS unit).

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Complied	August 2006	Site Number	13310
Compiled by	Glenn Ellery	River	Tuapiro
		Station	Woodlands Road
Metric Map Reference	T13:661 057		
Catchment Area (km²)	39.05	Period of Summary	1985 to 2005

Statistical Summary

Level (mm) Moturiki Datum			
Minimum Level	34988	Maximum Level	37226
Mean Annual Minimum Level	35029	Mean Annual Maximum Level	36710
Mean Level	35200	Mean Summer Level	35154
Median Level	35140	Mean Autumn Level	35157
		Mean Winter Level	35280
		Mean Spring Level	35211
Low Level Distribution Fit	GEV	Peak Level Distribution Fit	GEV
7 day Low Level (Minimum)	34990	Peak Level (5 yr Return)	36984
7 Day Low Level (Mean Annual)	35030	Peak Level (10 yr Return)	37135
7 day Low Level (5 yr Return)	35017	Peak Level (20 yr Return)	37257
7 Day Low Level (10 yr Return)	35009		

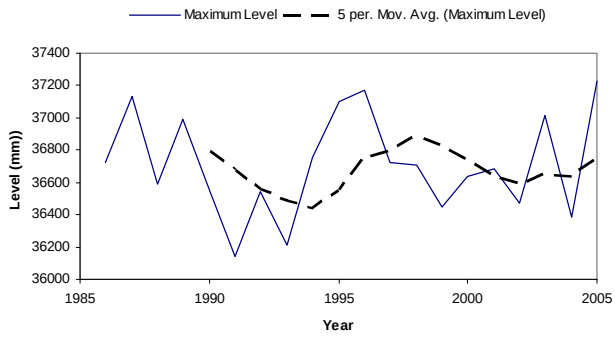
Annual Summaries

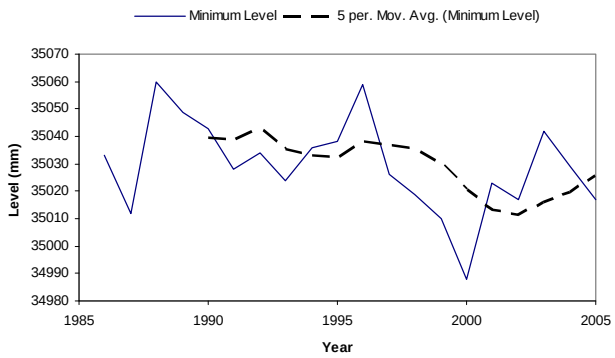
Year	Level (mm) Moturiki Datum			Year	Level (mm) Moturiki Datum		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993	35024	35136	36211
1981				1994	35036	35227	36757
1982				1995	35038	35241	37105
1983				1996	35059	35231	37168
1984				1997	35026	35183	36721
1985				1998	35019	35197	36704
1986	35033	35170	36720	1999	35010	35160	36446
1987	35012	35179	37131	2000	34988	35161	36638
1988	35060	35241	36586	2001	35023	35241	36685
1989	35049	35294	36988	2002	35017	35152	36473
1990	35043	35189	36547	2003	35042	35214	37014
1991	35028	35150	36145	2004	35029	35196	36387
1992	35034	35218	36542	2005	35017	35224	37226

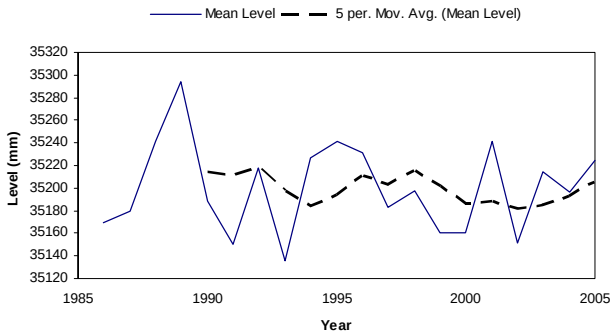
Level Distribution

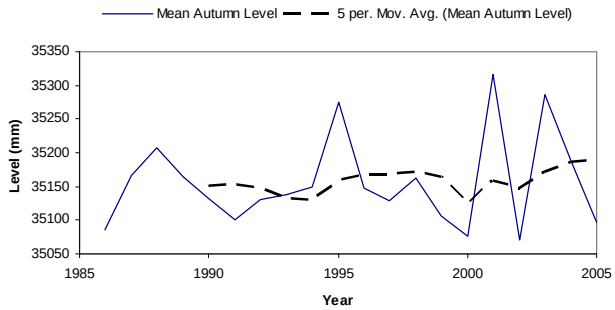
Level (mm) Moturiki Datum

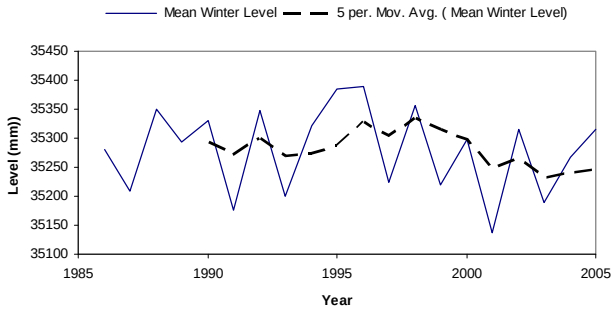
Percentiles	0	1	2	3	4	5	6	7	8	9
0	37226	35841	35696	35623	35576	35546	35521	35501	35483	35468
10	35454	35442	35430	35416	35400	35379	35357	35339	35323	35309
20	35297	35286	35277	35267	35259	35252	35245	35238	35232	35226
30	35220	35215	35210	35205	35200	35195	35190	35186	35182	35177
40	35173	35169	35165	35162	35158	35155	35153	35149	35146	35143
50	35140	35138	35135	35132	35129	35127	35124	35122	35119	35117
60	35115	35112	35110	35108	35106	35104	35102	35100	35098	35096
70	35094	35092	35090	35088	35086	35084	35082	35080	35077	35075
80	35073	35070	35068	35066	35063	35061	35059	35057	35055	35053
90	35050	35048	35045	35041	35039	35036	35032	35028	35023	35015
100	34988									

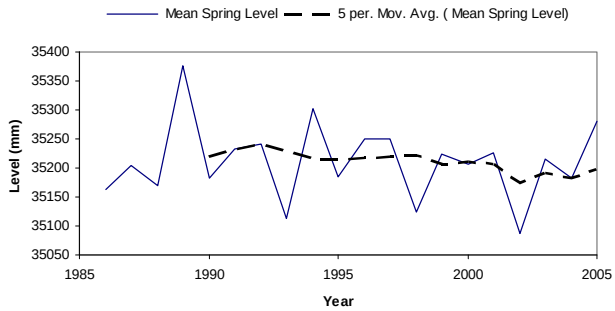


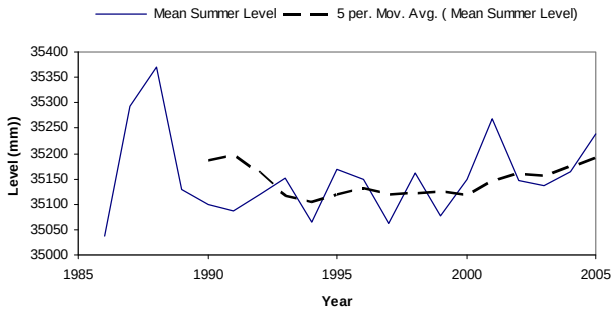












Tuapiro at Woodlands Road

Environment Bay of Plenty
River Level Recording Station

River	Kopurereroa	Site	S.H.29 Bridge
Site Number	14302	Grid Reference	U14:843 805
Start of Record	October 1980	Data Capture Rate	99%
Data Summary From	January 1991	To	December 2005
Data Audited From	June 1990	To	December 2005

Equipment History

23/10/80: 6 metre monthly Foxboro chart recorder.

01/09/8: 3 metre monthly Foxboro chart recorder.

30/01/86: All equipment removed from site.

16/06/86: 6 metre monthly Foxboro chart recorder.

02/08/90: 5 metre range P.T. & WRIC datalogger.

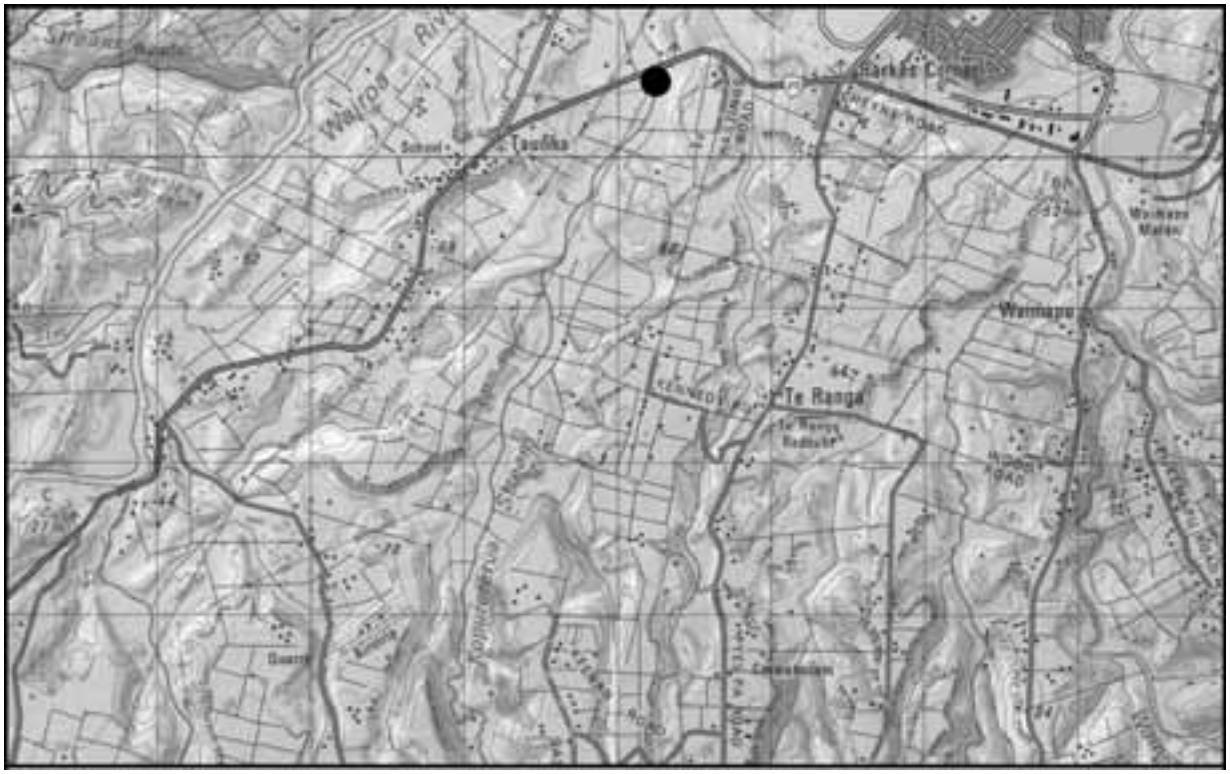
05/12/91: P.T. & WRIC remain as backup.

Comments on Stage/Discharge Ratings

Control is by natural channel. Numerous rating changes have occurred due to the nature of the control. Ratings are available to convert Stage (mm) to Flow (l/s).

General Comments

The site was originally installed downstream of the bridge by the B.O.P.C.C. to collect flood level and flow data. The site is operated by Environment ay of Plenty as part of its Natural Environment Regional Monitoring Network. Upstream water extraction affects stage and flow records.



SITE LOCATION
Kopurereroa at S.H.29 Bridge

Station Comments

Kopurereroa River at S.H.29 Bridge. Site Number 14302, on River Number 14300.

The local recording authority is Environment Bay of Plenty

Site established on downstream side of S.H.29 Bridge. Site is affected by pumping extractions. Lambrecht rainfall recorder installed at Williams Road in September 1980 NZMS 260 reference U15:844 695 (later to be shifted along the road to NZMS 260 Reference U15:843 692). This rainfall site is called "Williams Road" and has a Meteorological Service number of B76812.

1/09/81 - Foxboro removed and a new Foxboro installed with a range of 3.0 meter, monthly. Stage resolution of 28mm per 1mm recorded. Time resolution of 281 minutes per 1mm recorded.

19/06/85 - Foxboro recorder and staff gauges moved to upstream side of S.H.29 Bridge

16/06/86 - 6 meter monthly Foxboro installed. Stage resolution of 57mm per 1mm recorded. Time resolution of 281 minutes per 1mm recorded

27/06/90 - Stage discharge ratings commence.

2/08/90 - Foxboro removed 900802 and a 5 metre range pressure transducer connected to a datalogger was installed. Stage resolution of 1mm and time resolution of 15 minutes.

5/12/91 - Site converted from pressure transducer with datalogger to a Leupold and Stevens. Stage resolution of 1mm and time resolution of 15 minutes. First tape commences 911205 at 150100.

26/12/91 - Missing record from 911226 at 021500 to 920110 at 115900 due to recorder failure.

8/08/03 - Major expansion of bridge crossing began some time between 20030808 at 151500 and 20030908 at 134500. Works altered profile of banks upstream and downstream of bridge. Top end of rating is unlikely to change as bridge abutments controls were not changed, however medium stage height discharge relationship are altered due to bank profile changes.

8/09/03 - Missing record 20030908 at 134500 to 20030910 at 120000 due to memory overwrite.

31/08/04 - Missing record 20040831 at 123000 to 20040831 at 130000 due to lose of power during equipment install.

16/09/04 - Missing record 20040916 134500 to 153000 due to installation of new pressure transducer..

25/05/05 - Missing record 20051225 003000 to 20051228 211500 due to logger programme failure **.**

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Complied	August 2006	Site Number	14302
Compiled by	Glenn Ellery	River	Kopurereroa
		Station	S.H.29 Bridge
Metric Map Reference	U14:843 805		
Catchment Area (km²)	60	Period of Summary	1991 to 2005

Statistical Summary

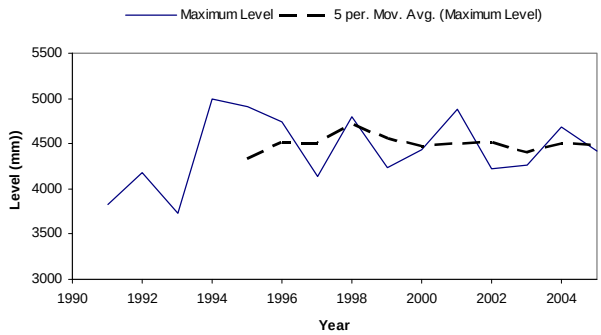
Level (mm) Moturiki Datum			
Minimum Level	2802	Maximum Level	4993
Mean Annual Minimum Level	2876	Mean Annual Maximum Level	4430
Mean Level	3014	Mean Summer Level	2969
Median Level	2985	Mean Autumn Level	3031
		Mean Winter Level	3040
		Mean Spring Level	2980
Low Level Distribution Fit	GEV	Peak Level Distribution Fit	GEV
7 day Low Level (Minimum)	2838	Peak Level (5 yr Return)	4789
7 Day Low Level (Mean Annual)	2869	Peak Level (10 yr Return)	4950
7 day Low Level (5 yr Return)	2848	Peak Level (20 yr Return)	5069
7 Day Low Level (10 yr Return)	2838		

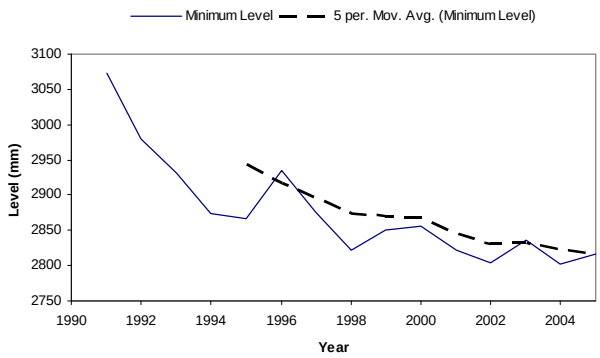
Annual Summaries

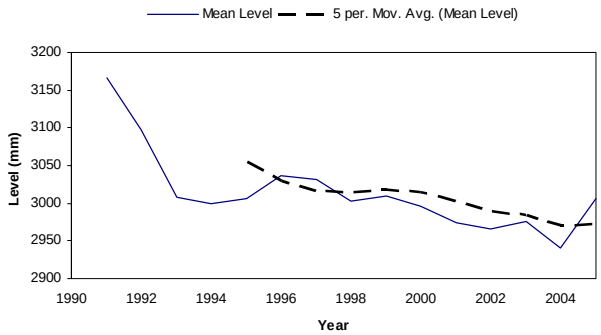
Year	Level (mm) Moturiki Datum			Year	Level (mm) Moturiki Datum		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993	2931	3009	3733
1981				1994	2873	2999	4993
1982				1995	2866	3006	4906
1983				1996	2935	3037	4735
1984				1997	2875	3032	4133
1985				1998	2822	3003	4798
1986				1999	2850	3009	4238
1987				2000	2856	2996	4437
1988				2001	2821	2974	4882
1989				2002	2804	2966	4221
1990				2003	2836	2976	4265
1991	3073	3167	3829	2004	2802	2941	4688
1992	2980	3097	4185	2005	2817	3005	4414

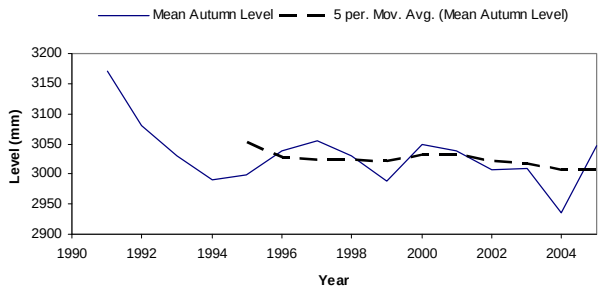
Level Distribution

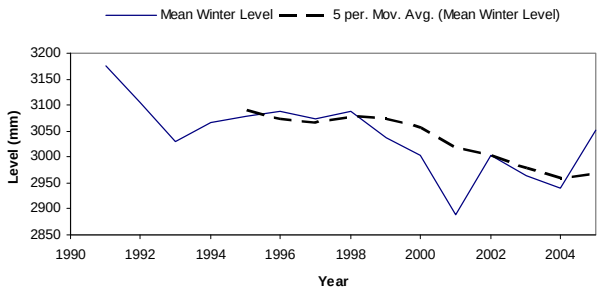
Level (mm) Moturiki Datum										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	4993	3729	3447	3319	3247	3209	3186	3170	3161	3155
10	3149	3142	3134	3123	3114	3106	3098	3090	3084	3077
20	3071	3066	3060	3055	3051	3047	3043	3038	3035	3031
30	3028	3026	3023	3020	3017	3015	3013	3011	3008	3006
40	3004	3002	3000	2998	2996	2994	2992	2990	2988	2986
50	2985	2983	2981	2979	2977	2976	2974	2972	2971	2969
60	2967	2966	2964	2962	2960	2959	2957	2955	2953	2951
70	2949	2947	2945	2942	2940	2937	2934	2931	2927	2924
80	2921	2918	2914	2911	2908	2905	2901	2898	2895	2892
90	2888	2885	2881	2878	2874	2870	2866	2860	2853	2844
100	2802									

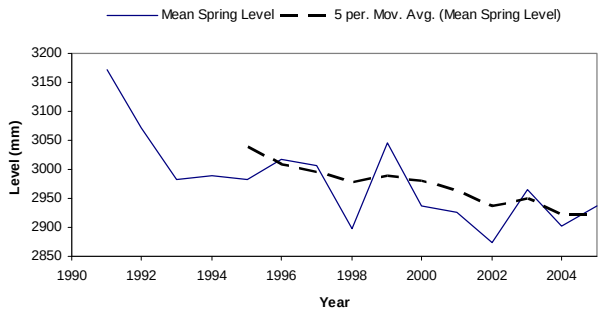


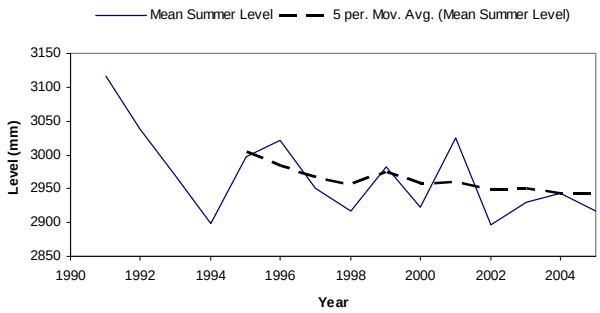












Kopurereroa at S.H.29 Bridge

Environment Bay of Plenty
River Level Recording Station

River	Kaituna	Site	Fords Cut
Site Number	14618	Grid Reference	V14:108 773
Start of Record	August 1955	Data Capture Rate	86%
Data Summary From	January 1981	To	December 2005
Data Audited From	March 1983	To	December 2005

Equipment History

03/08/80: 3 metre range monthly Foxboro chart recorder.

06/07/95: Float with L&S digital recorder.

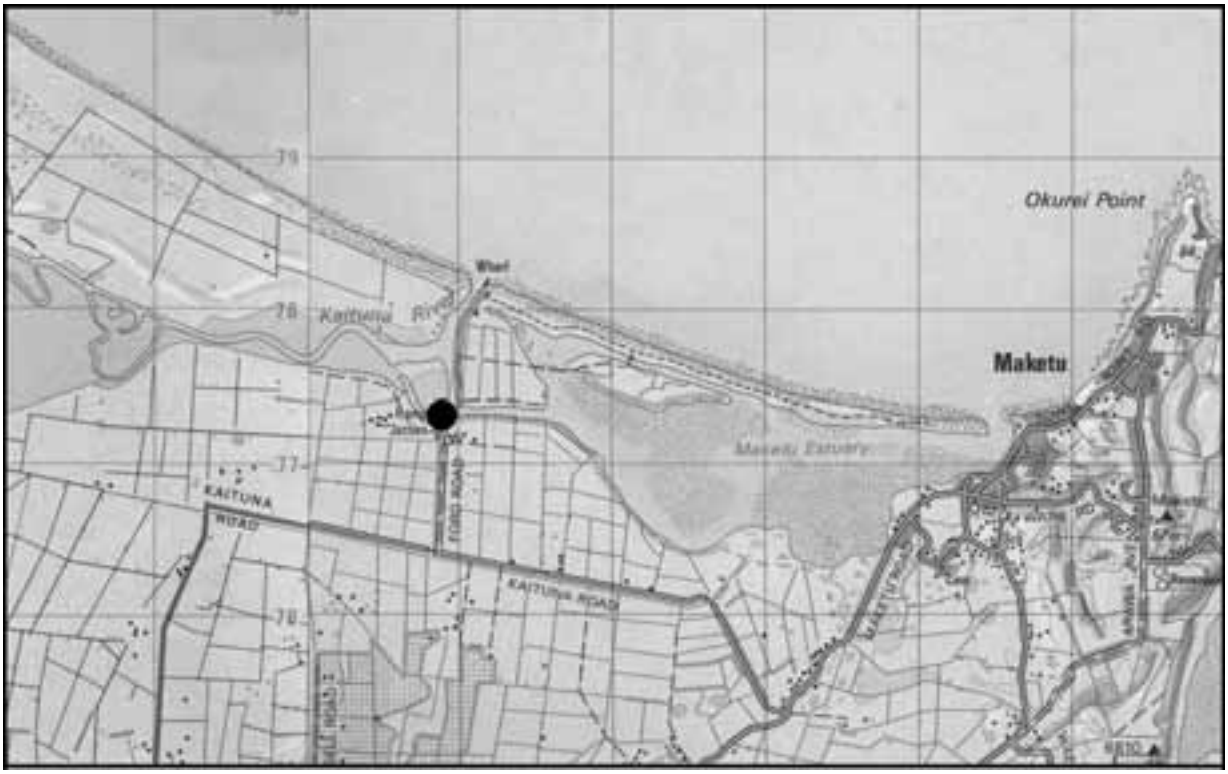
23/04/01: IQuest logger with Kainga encoder.

Comments on Stage/Discharge Ratings

Ratings are available to convert Stage (mm) to Reduced Level (mm) in Moturiki Datum.

General Comments

Records from 1955 exist as part of the lower Kaituna river flood protection scheme investigations. These early records are of unknown quality and therefore have not been processed.



SITE LOCATION
Kaituna at Fords Cut

Station Comments

Kaituna River at Fords Cut. Site Number 14618, on River Number 146000.

The local recording authority is Environment Bay of Plenty
Discharges are not measured at this site.
Site installed 07/08/80 as part of Kaituna River major scheme flood protection investigations. Staff gauges not always set to zero Moturiki Datum so linear ratings have been provided to make this transformation.

06/08/80 - Weekly Foxboro was changed to monthly Foxboro.

28/07/89 - Foxboro re-installed at floodgates, as was a 3 metre staff-gauge.

23/06/95 - P.V.C. cylinder and aluminium recorder house were installed.
Level was taken for underside of recorder house.

06/07/95 - L&S installed at this site. First punchout at 134500. Level was again taken for underside of recorder house, no change. Recorder has a time resolution of 15 minutes and a stage resolution of 1mm.

12/07/95 - Internal plumbob was installed and levelled; staff gauge was shifted and re-levelled. 50mm diameter hole for intake was reduced to 12mm at 130000 to stop surges. Foxboro, diaphragm and house were removed.

31/12/95 - Numerous periods of missing record and synthetic data occur throughout the entire data set.

23/04/01 - IQuest logger installed.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Complied	December 2006	Site Number	14618
Compiled by	G R Ellery	River	Kaituna
		Station	Fords Cut
Metric Map Reference	V14:108 773		
Catchment Area (km²)	1248	Period of Summary	1981 to 2005

Statistical Summary

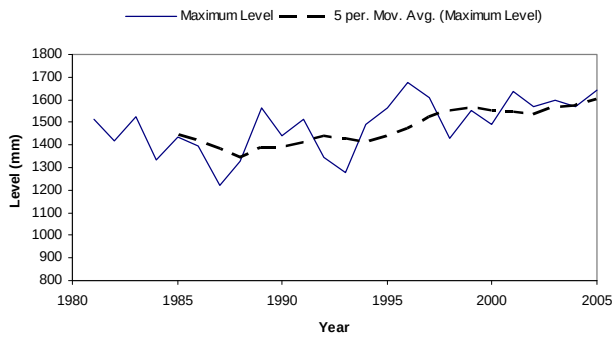
Level (mm)			
Minimum Level	-673	Maximum Level	1677
Mean Annual Minimum Level	-580	Mean Annual Maximum Level	1486
Mean Level	278	Mean Summer Level	279
Median Level	265	Mean Autumn Level	306
		Mean Winter Level	288
		Mean Spring Level	239
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	GEV
7 day Low Level (Minimum)	-34	Peak Level (5 yr Return)	1596
7 Day Low Level (Mean Annual)	72	Peak Level (10 yr Return)	1635
7 day Low Level (5 yr Return)	38	Peak Level (20 yr Return)	1660
7 Day Low Level (10 yr Return)	12	Peak Level (50 yr Return)	
		Peak Level (100 yr Return)	

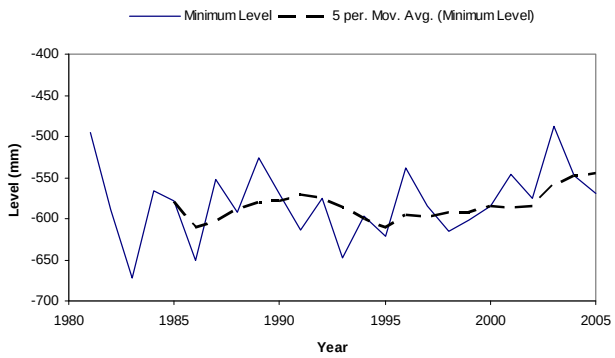
Annual Summaries

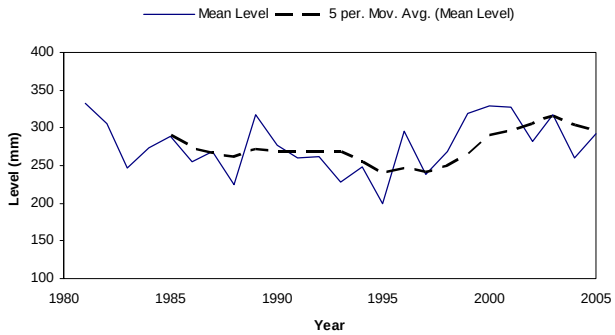
Year	Level (mm)			Year	Level (mm)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993	-647	229	1280
1981	-496	333	1512	1994	-597	248	1493
1982	-589	305	1418	1995	-622	200	1565
1983	-673	247	1522	1996	-538	295	1677
1984	-566	274	1333	1997	-585	237	1611
1985	-578	290	1435	1998	-616	268	1432
1986	-650	256	1394	1999	-602	320	1552
1987	-552	269	1224	2000	-585	330	1493
1988	-593	224	1328	2001	-546	328	1637
1989	-526	317	1562	2002	-575	282	1568
1990	-569	276	1439	2003	-487	318	1598
1991	-614	260	1516	2004	-547	260	1568
1992	-575	262	1347	2005	-569	292	1644

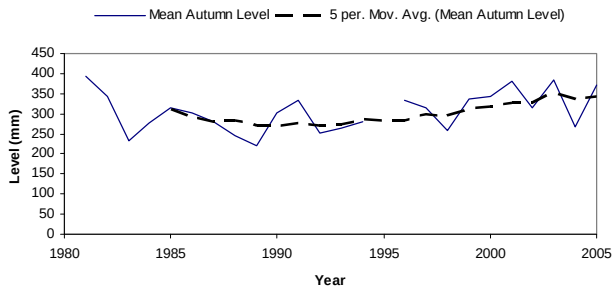
Level Distribution

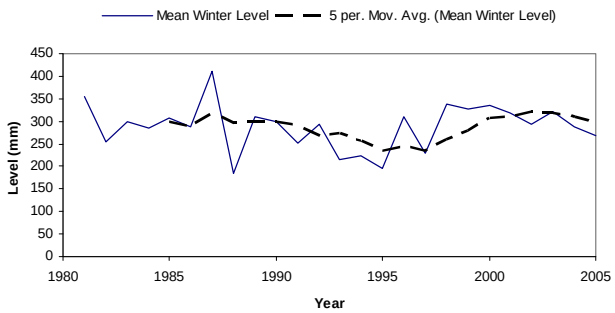
Level (mm)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	1677	1105	1034	986	950	920	895	872	851	832
10	814	796	780	764	749	734	719	705	691	677
20	664	650	637	623	610	597	584	570	557	544
30	531	518	505	491	478	465	452	439	425	412
40	399	385	372	358	345	332	318	305	291	278
50	265	251	238	225	212	198	185	172	159	146
60	133	120	107	94	82	69	56	44	31	19
70	7	-6	-18	-30	-42	-54	-66	-78	-90	-102
80	-113	-125	-137	-149	-161	-174	-186	-199	-212	-226
90	-239	-254	-269	-284	-301	-319	-340	-364	-394	-437
100	-673									

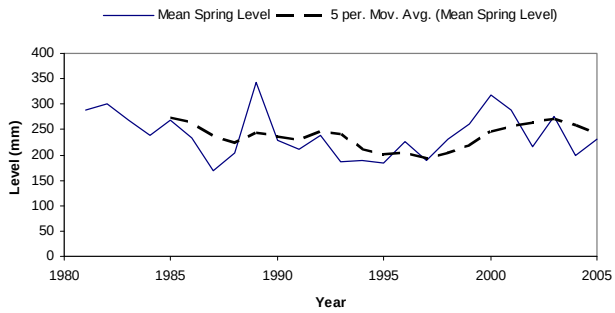


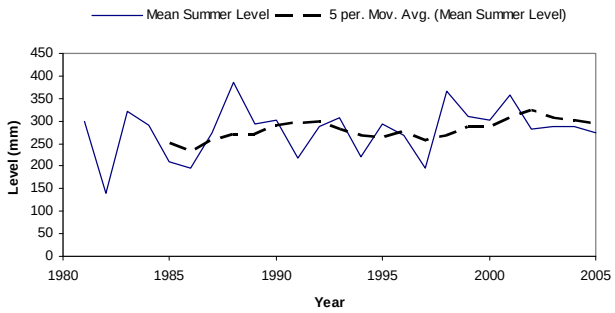












Kaituna at Fords Cut

Environment Bay of Plenty
River Level Recording Station

River	Kaituna	Site	Clarkes
Site Number	1114607	Grid Reference	U14: 055 779
Start of Record	April 1980	Data Capture Rate	95%
Data Summary From	January 1981	To	December 2005
Data Audited From	January 1981	To	December 2005

Equipment History

24/04/80: 5 metre range Monthly Foxboro chart recorder.

04/09/95: Pressure transducer and WRIC datalogger.

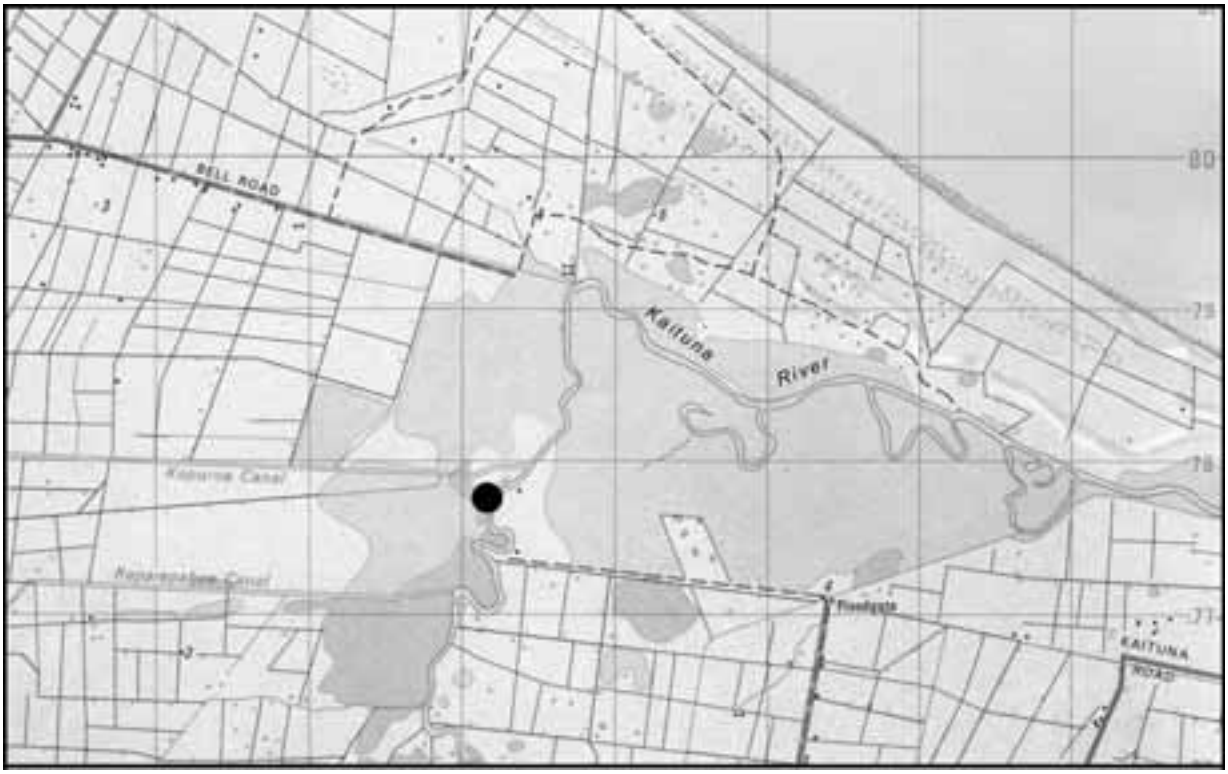
21/02/00: Pressure transducer and Campbell Scientific CR510.

Comments on Stage/Discharge Ratings

Ratings available to convert stage (mm) to Level (mm).

General Comments

Site was installed as part of the lower Kaituna river flood protection scheme investigation.



SITE LOCATION
Kaituna at Clarkes

Station Comments

Kaituna River at Clarkes. Site Number 1114607, on River Number 146000.

The local recording authority is Environment Bay of Plenty.

The site is situated 6.85 kilometres from the mouth at NZMS 260 Reference U14: 055 779 and has a natural control.

Site installed 800424 as part of Kaituna River major scheme flood protection investigations. Staff gauges not always set to zero Moturiki Datum so linear ratings have been provided to make this transformation. Discharges are not measured at this site.

Level is controlled to some degree by the Okere Falls control gates at Lake Rotoiti. Large changes in level and flow may occur when these gates are repositioned. Site is subject to tidal fluctuations.

24/04/80 - 5 metre range 31 day chart Foxboro installed. Recorder has a time resolution of 281 minutes per 1mm recorded and a stage resolution of 47mm per 1mm recorded.

18/11/83 - Cut at Fords opened. Increased tidal fluctuation due to diversion.

01/11/89 - Site transferred to Environment Bay of Plenty

10/07/91 - 5 metre range Foxboro was replaced with a 6 metre range Foxboro. Staff gauges were also lowered by 1 metre and levelled.

21/12/92 - Data from 921221 084000 to 930119 085400 has a time error of 1.45 days. This data should be used with caution. The stages are correct.

04/09/95 - Foxboro was removed and a WRIC datalogger was installed along with a pressure transducer. Recorder has a time resolution of 15 minutes and a stage resolution of 10mm.

31/12/95 - Numerous periods of missing record and synthetic data occur throughout the entire data set.

21/02/00 - Campbell Scientific CR510 installed. Recording interval 15 minutes. Due to site being removed and re-installed 400m upstream. Site moved to avoid large build-up of sand and weed along embankment, which has gradually suppressed the true range of the pressure transducer.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Complied	October 2006	Site Number	1114607
Compiled by	G R Ellery	River	Kaituna
		Station	Clarkes
Metric Map Reference	U14: 055 779		
Catchment Area (km²)	1233	Period of Summary	1981 to 2005

Statistical Summary

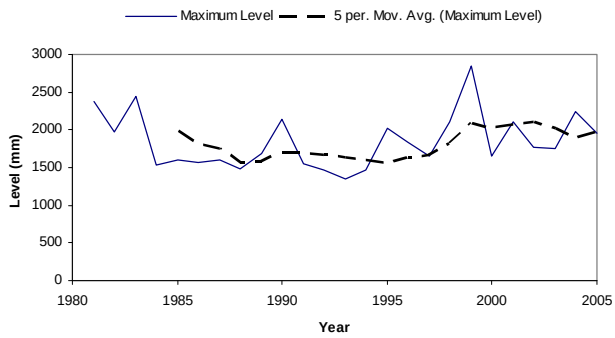
Level (mm)			
Minimum Level	-444	Maximum Level	2851
Mean Annual Minimum Level	-125	Mean Annual Maximum Level	1849
Mean Level	558	Mean Summer Level	533
Median Level	553	Mean Autumn Level	593
		Mean Winter Level	653
		Mean Spring Level	563
Low Level Distribution Fit Utilised	Gumbel	Peak Level Distribution Fit Utilised	Gumbel
7 day Low Level (Minimum)	38	Peak Level (5 yr Return)	2122
7 Day Low Level (Mean Annual)	249	Peak Level (10 yr Return)	2344
7 day Low Level (5 yr Return)	155	Peak Level (20 yr Return)	2556
7 Day Low Level (10 yr Return)	103	Peak Level (50 yr Return)	2832
		Peak Level (100 yr Return)	3038

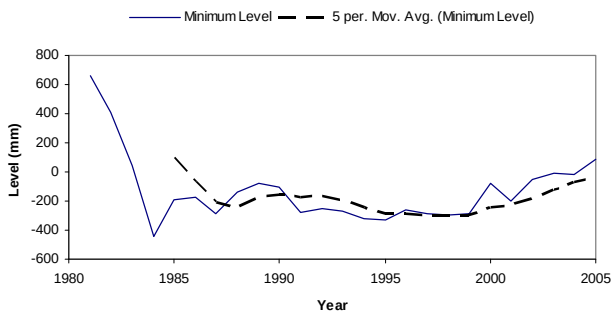
Annual Summaries

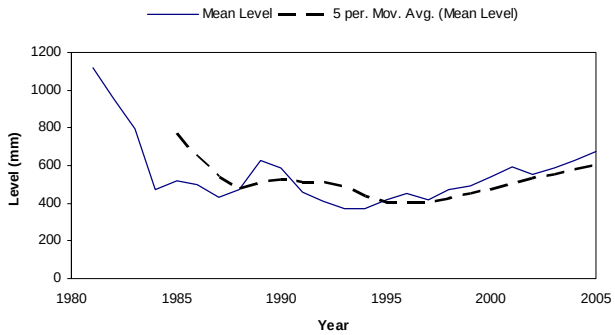
Year	Level (mm)			Year	Level (mm)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993	-266	370	1350
1981	665	1121	2371	1994	-321	368	1474
1982	408	955	1965	1995	-330	420	2028
1983	40	795	2436	1996	-260	450	1834
1984	-444	470	1538	1997	-288	420	1650
1985	-190	518	1606	1998	-295	474	2105
1986	-171	496	1573	1999	-291	490	2851
1987	-284	433	1596	2000	-75	542	1655
1988	-136	475	1484	2001	-200	591	2113
1989	-75	626	1692	2002	-53	554	1768
1990	-105	586	2148	2003	-6	589	1761
1991	-274	457	1557	2004	-20	628	2249
1992	-254	411	1468	2005	89	672	1959

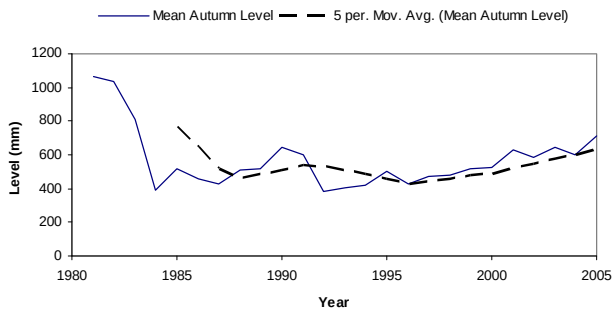
Level Distribution

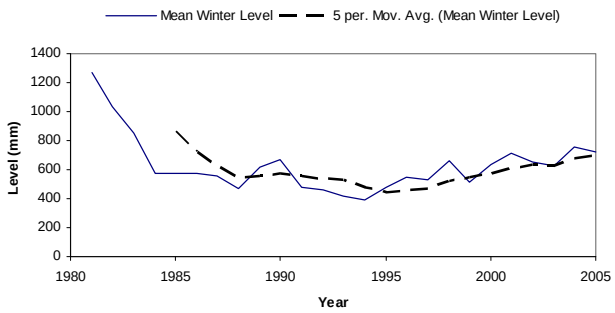
Level (mm)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	2851	1400	1277	1214	1170	1136	1108	1083	1060	1040
10	1021	1004	988	972	958	944	930	917	904	892
20	880	868	857	845	834	823	812	801	790	779
30	768	757	746	736	725	714	704	693	682	671
40	661	650	639	628	617	607	596	585	574	564
50	553	542	531	520	509	499	488	477	466	455
60	445	434	423	412	401	390	378	367	356	345
70	334	323	311	300	289	278	266	255	243	232
80	220	208	196	183	171	158	145	131	117	102
90	87	71	54	35	15	-8	-33	-62	-99	-145
100	-444									

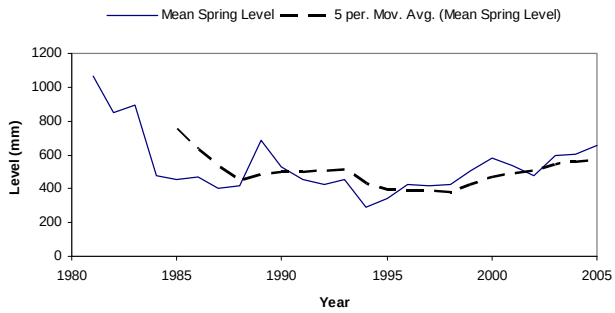


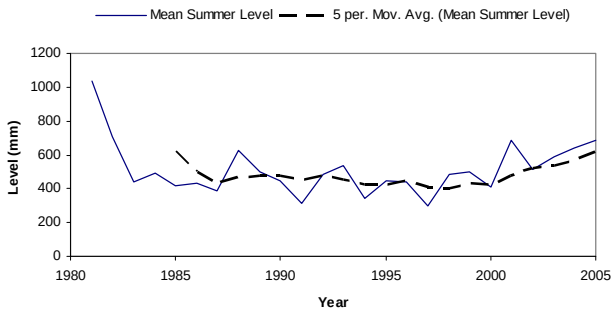












Kaituna at Clarkes

Environment Bay of Plenty
River Flow Recording Station

River	Raparapahoe	Site	Above Drop Structure
Site Number	1114651	Grid Reference	U14:017 766
Start of Record	March 1992	Data Capture Rate	96%
Data Summary From	January 1993	To	December 2005
Data Audited From	March 1992	To	December 2005

Equipment History

23/09/91 6 metre range monthly Foxboro. Stage resolution 57mm, time resolution of 281 minutes.

15/08/95 Datalogger with 5 metre pressure transducer installed. Stage resolution 5mm, time resolution 15 minutes.

Comments on Stage/Discharge Ratings

Control is by downstream drop structure. Ratings available to convert stage (mm) to flow (l/s).

General Comments

Site is operated by Environment Bay of Plenty and is part of the Kaituna River scheme flood protection investigations

SITE LOCATION
Raparapahoe at U/S Drop Structure

Station Comments

Raparapahoe at Drop Structure. Site Number 1114651, on River Number 146000.

The site is situated 16.4 kilometres from mouth and replaces Raparapahoe at Manoeka Road Bridge (14630).
The local recording authority is Environment Bay of Plenty. Drop structure was installed by Environment Bay of Plenty on 22/11/88.

Top end rating based upon combination of flow gauging measurement along with output from Mike11modelled flow over drop structure.

23/09/91 - Site erected and 6 metre monthly Foxboro recorder installed.

15/08/95 - Foxboro recorder removed. Data logger with a time resolution of 15 minutes and a 5 metre pressure transducer with a stage resolution of 5mm installed.

18/10/91 - Missing record from 911018 at 090000 to 911120 at 093000 due to faulty recorder.

09/05/94 - Missing record 940509 at 122900 to 940624 at 103600 due to faulty recorder

16/07/94 - Missing record from 940716 at 80900 to 940811 at 122800 due to faulty recorder

18/09/94 - Missing record from 940918 at 120000 to 941012 at 132600 due to faulty recorder

22/11/94 - Missing record from 941122 at 145000 to 941213 at 134500 due to recorder malfunction.

24/12/94 - Missing record from 941224 at 050000 to 950110 at 151500 due to recorder malfunction.

29/06/97 - Missing record from 970629 at 051500 to 970711 at 120000 due to power supply failure.

08/02/98 - Missing record from 980208 at 121500 to 980217 at 140000 due to transducer being buried in silt.

13/07/98 - Missing record from 980713 at 203000 to 980717 at 091500 due to low battery.

13/07/98 - Data from 980713 at 203000 to 1000204 at 094500 affected by what appears to be a fault with the pressure transducer. Data should be used with caution.

04/06/99 - Missing record from 990604 at 140000 to 990609 at 134500 due to low battery.

18/02/00 - Missing record from 20000218 at 170000 to 20000229 at 113000 due to ISD pressure transducer being repaired.

08/05/02 - Missing record from 1020508 100000 to 1020513 114500. Unknown reason but gap coincides with 2002 annual inspection, may have accidently left power off.

19/06/02 - Missing record from 20020619 at 133000 to 20020703 at 101500 due to low battery.

04/08/04 - Missing record from 20040804 123000 to 20040807 154500. Gap coincides with inspection may have knocked off power lead.

20/07/04 - Missing record from 20050720 130000 to 20050722 130000 due to logger failure.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	May 2006	Site Number	1114651
Compiled by	Glenn Ellery	River	Raparapahoe
		Station	Above Drop Structure
Metric Map Reference	U14:017 766		
Catchment Area (km²)	46.36	Period of Summary	1992 to 2005

Statistical Summary

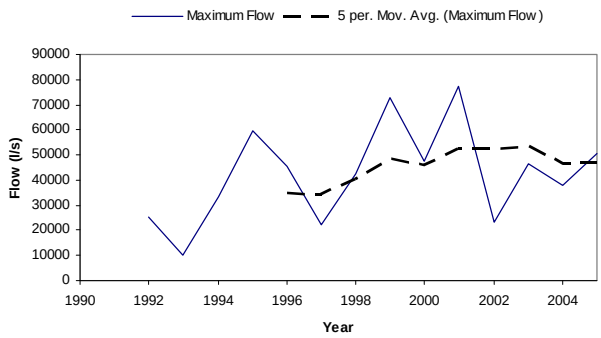
Flow (*l/s*)				
Minimum Flow	249	Maximum Flow		77163
Mean Annual Minimum Flow	577	Mean Annual Maximum Flow		42440
Mean Flow	1852	Mean Summer Flow		1515
Median Flow	1284	Mean Autumn Flow		1706
Mean Specific Flow (/km²)	40	Mean Winter Flow		2350
		Mean Spring Flow		1904
Low Flow Distribution Fit	GEV	Peak Flow Distribution Fit	Gumbel	GEV
7 day Low Flow (Minimum)	399	Peak Flow (5 yr Return)	57400	59800
7 Day Low Flow (Mean Annual)	674	Peak Flow (10 yr Return)	69500	69000
7 day Low Flow (5 yr Return)	574	Peak Flow (20 yr Return)	81100	77200
7 Day Low Flow (10 yr Return)	498	Peak Flow (50 yr Return)		
		Peak Flow (100 yr Return)		

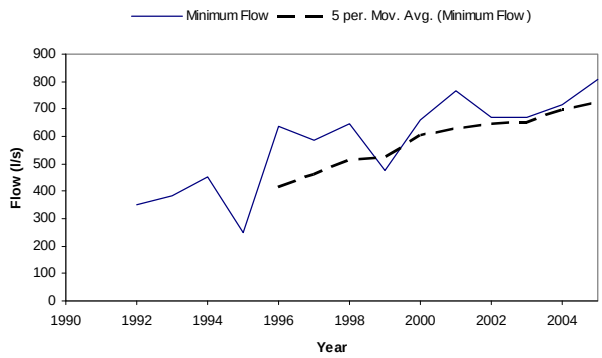
Annual Summaries

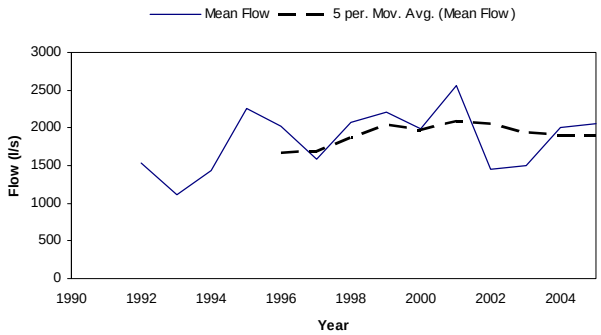
Year	Flow (*l/s*)			Year	Flow (*l/s*)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993	381	1117	9880
1981				1994	451	1432	33544
1982				1995	249	2260	59782
1983				1996	637	2020	45546
1984				1997	588	1586	22066
1985				1998	648	2080	42315
1986				1999	477	2212	73042
1987				2000	662	1981	47474
1988				2001	766	2556	77163
1989				2002	671	1442	23130
1990				2003	667	1498	46302
1991				2004	716	2005	38161
1992	352	1535	25223	2005	810	2056	50537

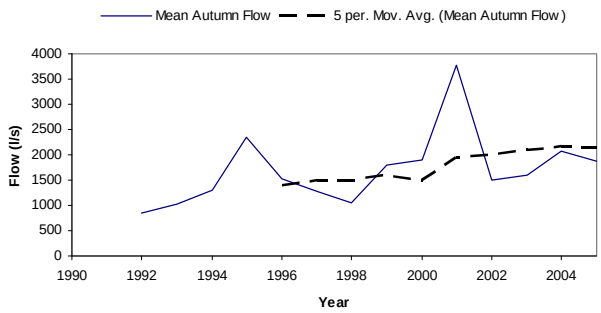
Flow Distribution

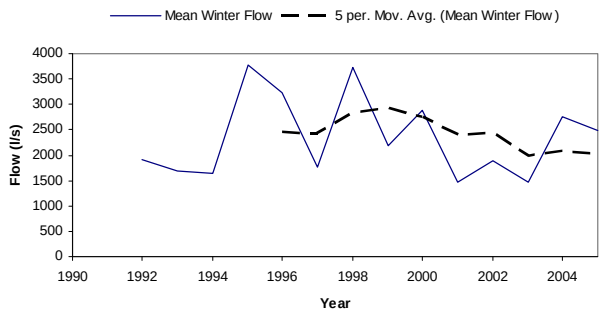
Flow (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	77163	11477	7616	6086	5170	4539	4103	3756	3494	3272
10	3101	2951	2809	2683	2572	2473	2386	2307	2238	2174
20	2112	2057	2008	1963	1925	1880	1840	1803	1769	1735
30	1706	1675	1649	1620	1596	1570	1544	1521	1501	1480
40	1461	1441	1420	1401	1383	1367	1350	1331	1315	1299
50	1284	1268	1256	1240	1227	1213	1200	1186	1174	1160
60	1147	1134	1123	1109	1098	1085	1074	1061	1050	1037
70	1024	1012	999	987	975	963	953	943	933	922
80	909	898	887	873	861	848	835	821	807	793
90	779	764	750	736	721	703	682	645	598	530
100	249									

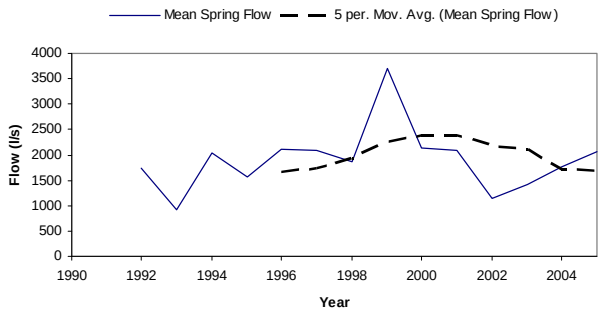


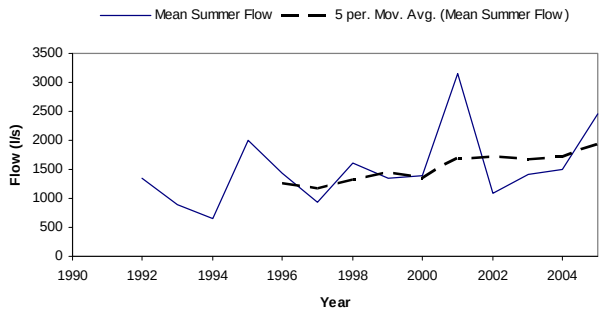












Raparapahoe at Above Drop Structure

Environment Bay of Plenty
River Level Recording Station

River	Mangorewa	Site	Saunders
Site Number	13309	Grid Reference	U15: 047 632
Start of Record	July 1967	Data Capture Rate	99%
Data Summary From	January 1968	To	December 2005
Data Audited From	May 1968	To	December 2005

Equipment History

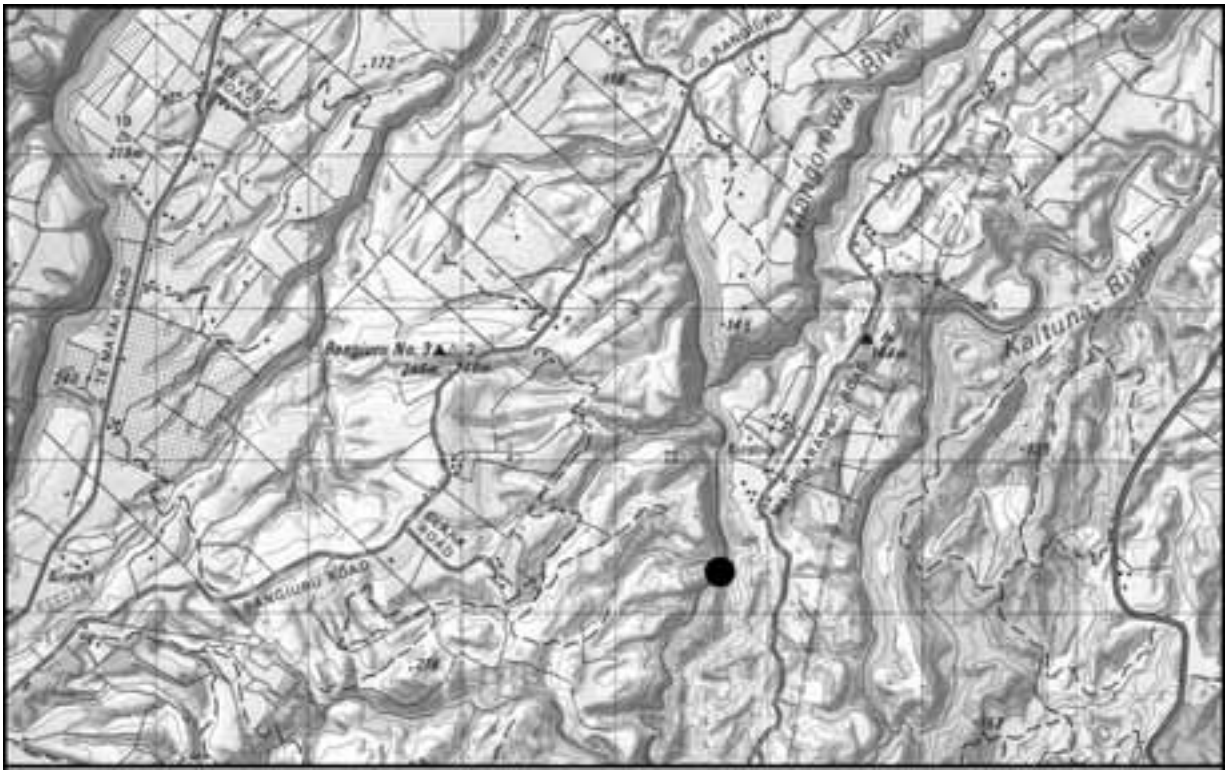
Float/counterweight system with shaft encoder. 1mm resolution.

Comments on Stage/Discharge Ratings

Control is by stable natural channel. Ratings available to convert stage (mm) to flow (l/s).

General Comments

Site was originally operated by the Hamilton Hydrological Survey until December 1981. Site is now operated by Environment Bay of Plenty as part of its Natural Environmental Monitoring Network.



SITE LOCATION
Mangorewa at Saunders

Station Comments

Mangorewa River at Saunders Farm. Site Number 14628, on River Number 146050.
Local recording authority is Environment Bay of Plenty.

Sediment concentration has also been measured at this site.
The site is situated 9.2 kilometres to confluence of the Kaituna River. The control is natural.

09/12/81 - Site handed over to B.O.P.C.C. on 811210.

30/04/91 - Site damaged by lightning. Recorder stopped causing missing record. Gap is from 910430 at 164501 to 910509 at 144600.

06/02/96 - Missing record from 960216 061500 to 960208 154500 due to Aquitel failure.

06/01/97 - Missing record from 970106 at 214500 to 970110 at 101500 due to faulty Leopold and Stevens recorder.

10/08/98 - Missing record from 980810 at 151500 to 980813 at 113000 due to Aquitel failure.

31/12/95 - Missing record from this site has been replaced with synthetic data derived from adjacent site Waiari at Muttons (14627) and rainfall records.

01/05/99 – This event was the highest recorded since the site was installed in 1967. Historical top end rating extrapolation has been used due to the lack of high stage gaugings (highest gauging is at 4125mm. Investigation of bed slope and cross-section proved inconclusive at defining the top end of the rating. However it is noted that the cross-section is rectangular in shape with vertical walls approximately 12 metres high, the upstream cross section is straight and the bed slope quite high. Discussions with NIWA, Rotorua staff also supported that in higher flood events velocities are high. Use derived peak flow with caution.

07/09/00 - Missing record from 20000907 at 0444500 to 20000908 at 141500 due to Aquitel failure.

12/05/91 - Missing record from 20010512 at 93000 to 20010514 at 083000 due to Aquitel failure.

19/12/01 - Missing record from 20011219 at 53000 to 20011220 at 101500 due to Aquitel failure.

20/12/01 - Missing record from 20011220 at 104500 to 20020104 at 091500 due to Aquitel failure.

25/03/00 - Gaps affect the data set from 20050325 101500 to 20050428 104500 due to a lightening strike.
1: gap from 20050325 101500 to 20050404 123000 of 10.09 days
2: gap from 20050404 123000 to 20050413 143000 of 9.08 days
3: gap from 20050413 143000 to 20050418 130000 of 4.94 days
4: gap from 20050418 130000 to 20050418 161500 of 3.25 hours
5: gap from 20050418 161500 to 20050428 104500 of 9.77 days
6: gap from 20050518 124500 to 20050519 113000 of 22.75 hours

18/05/2005 - Missing record from 20050518 130000 to 20050519 113000 due to iQuest logger failure.

25/01/2006 - Missing record from 20060125 at 180000 to 20060125 at 114500 due to power failure.

Environment Bay of Plenty
Hydrological Flow Summary

Date Complied	August 2006	Site Number	14628
Compiled by	Glenn Ellery	River	Mangorewa
		Station	Saunders
Metric Map Reference	U15:047 632		
Catchment Area (km²)	178.7	Period of Summary	1968 to 2005

Statistical Summary

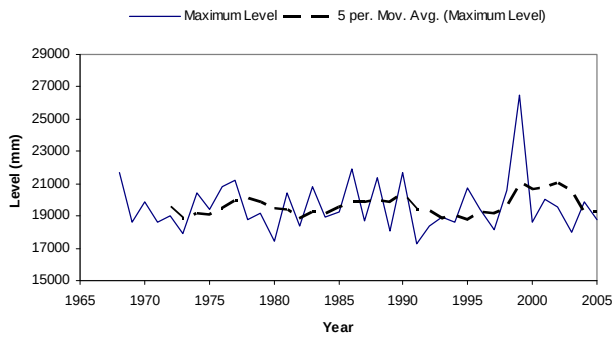
Level (mm) Moturiki Datum			
Minimum Level	15872	Maximum Level	26507
Mean Annual Minimum Level	15989	Mean Annual Maximum Level	19630
Mean Level	16086	Mean Summer Level	16063
Median Level	16038	Mean Autumn Level	16071
		Mean Winter Level	16122
		Mean Spring Level	16088
Low Level Distribution Fit Utilised	Gumbel	Peak Level Distribution Fit Utilised	GEV
7 day Low Level (Minimum)	15873	Peak Level (5 yr Return)	20688
7 Day Low Level (Mean Annual)	15966	Peak Level (10 yr Return)	21713
7 day Low Level (5 yr Return)	15926	Peak Level (20 yr Return)	22769
7 Day Low Level (10 yr Return)	15905	Peak Level (50 yr Return)	24251

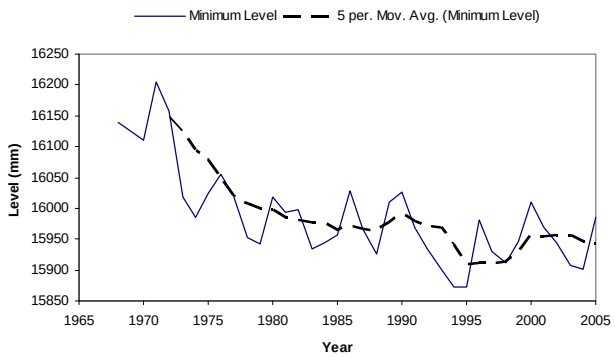
Annual Summaries

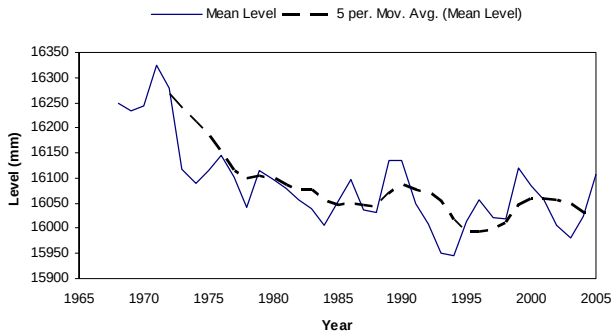
Year	Level (mm) Moturiki Datum			Year	Level (mm) Moturiki Datum		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	16018	16096	17453	1993	15901	15950	18938
1981	15994	16080	20433	1994	15872	15945	18657
1982	15998	16057	18360	1995	15872	16013	20780
1983	15934	16040	20833	1996	15982	16057	19412
1984	15944	16005	18910	1997	15931	16022	18137
1985	15957	16054	19226	1998	15912	16019	20545
1986	16028	16096	21918	1999	15947	16119	26507
1987	15967	16037	18659	2000	16011	16084	18581
1988	15926	16031	21354	2001	15970	16058	20041
1989	16010	16135	18073	2002	15944	16006	19548
1990	16026	16134	21719	2003	15907	15981	18005
1991	15969	16048	17277	2004	15902	16025	19900
1992	15934	16009	18400	2005	15985	16108	18736

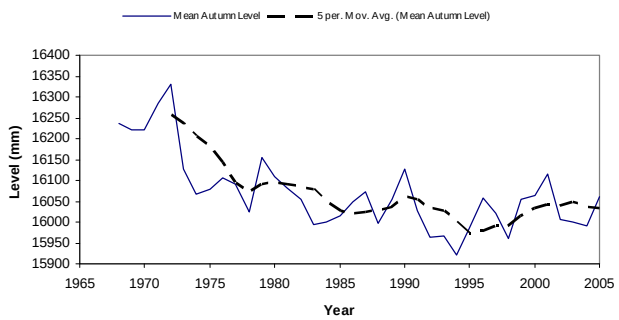
Level Distribution

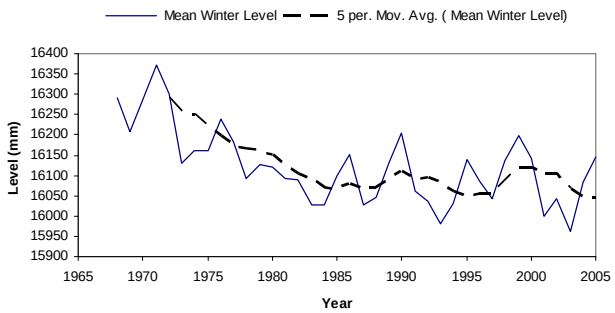
Level (mm) Moturiki Datum										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	26507	16964	16632	16478	16397	16345	16308	16280	16262	16250
10	16241	16232	16221	16213	16206	16199	16190	16182	16172	16163
20	16154	16147	16139	16133	16126	16120	16113	16107	16102	16097
30	16093	16090	16086	16083	16079	16076	16073	16071	16068	16065
40	16063	16061	16058	16055	16053	16050	16047	16045	16043	16040
50	16038	16036	16034	16031	16030	16028	16026	16024	16022	16020
60	16018	16016	16014	16012	16010	16008	16006	16005	16003	16001
70	15999	15997	15994	15992	15990	15987	15985	15982	15979	15977
80	15974	15972	15969	15967	15965	15962	15960	15957	15955	15952
90	15949	15945	15940	15934	15929	15925	15919	15910	15903	15889
100	15872									

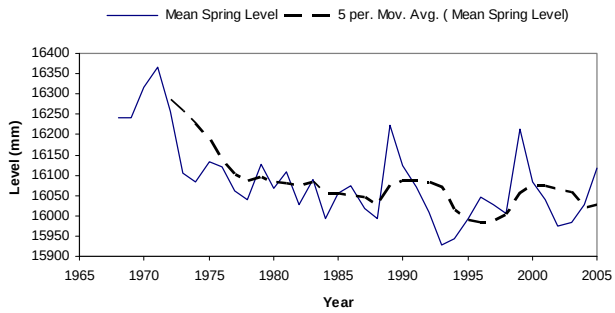


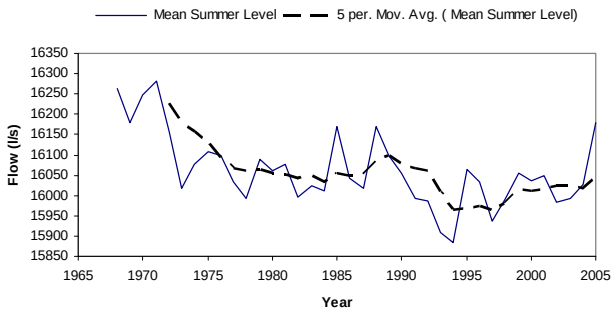












Mangorewa at Saunders

Environment Bay of Plenty
River Level Recording Station

River	Kaituna	Site	Te Matai
Site Number	14614	Grid Reference	U14:063 727
Start of Record	May 1955	Data Capture Rate	97%
Data Summary From	January 1968	To	December 2005
Data Audited From	January 1998	To	December 2005

Equipment History

23/01/55: Staff gauge and chart recorder.
06/08/86: 3 metre range Foxboro.
01/11/99: IQuest logger.
12/08/65: Float with F&P digital recorder.
20/03/90: P.T. and Aquitel Remote.

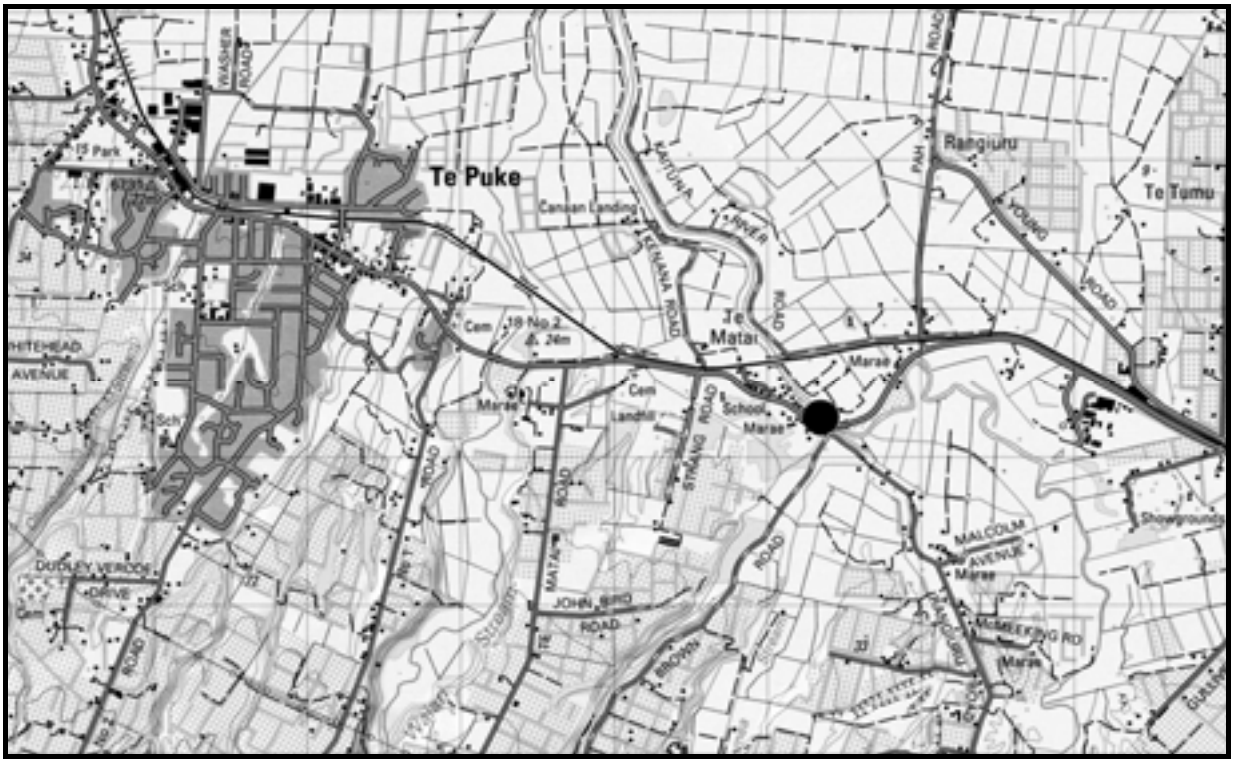
Comments on Stage/Discharge Ratings

Control is by stable natural channel. Ratings available to convert stage (mm) to flow (l/s).

General Comments

This site recorded flow from May 1955 to January 1982 for the Hamilton Hydrological Survey. The site was transferred to the B.O.P.C.B. in January 1982, from this time tidal influences occurred as a result of the Kaituna flood control scheme. Site is now operated by Environment Bay of Plenty for flood monitoring purposes; flow discharge ratings for lower stages are no longer derived.

Users of the statistics presented should be aware of the change in level regime in the mid 80's due to the effect of the Kaituna flood control scheme.



SITE LOCATION
Kaituna at Te Matai

Station Comments

Kaituna at Te Matai. Site Number 14614, on River Number 146000.

The local recording authority is Environment Bay of Plenty.

The site is situated 14.5 kilometres from the river mouth. Sediment concentration is also measured at the site. The gates at the outlet of Lake Rotoiti at Okere Falls act as an upstream control. Large changes in stage and flow occur when the settings on these gates are changed.

11/08/65 - Chart recorder replaced with F&P recorder on 650812. Recorder has a stage resolution of 1mm and a time resolution of 15 minutes.

16/08/67 - Synthetic record from 670816 to 670911 and from 680902 to 681001. Record derived from correlation with Waiari at Muttons. This period should not be used for flood analysis, daily mean discharges only.

02/07/68 - Synthetic record from 680702 to 681001. Record derived from correlation with Waiari at Muttons. This period should not be used for flood analysis, daily mean discharges only.

23/12/69 - Synthetic data from 691223 to 691231

16/09/72 - Synthetic data from 720916 to 720922. Record derived from correlation with Waiari at Muttons and rainfall data.

09/05/73 - Synthetic data from 730509 to 730511

04/03/79 - From 790304 at 163000 to 790305 104500 a straight line recession has been assumed as recorder was tampered with. No rain fell during this period.

26/08/80 - Missing record from 800826 134000 to 800905 100000 due to recorder malfunction. For an indication of flow during this period, refer to Mangorewa at Saunders (14628) and Kaituna at Lake Rotoiti outlet (14601). 120.9 mm of rain was recorded in Rotorua.

29/11/81 - Missing record from 811129 134500 to 811210 142700 due to recorder failure. 114.5mm of rain was recorded at Whakarewarewa during this period, with a maximum fall of 41.7mm on 811129.

07/01/82 - Site handed over to Bay of Plenty Catchment Board on 820107.

02/09/82 - Due to recorder failure there is synthetic data from 820902. This period, a gradual recession is considered adequate. F&P recorder removed from site due to water level dropping below the intake pipes. This drop was due to engineering work undertaken down stream of recorder, (Kaituna River scheme).

06/08/86 - 3 metre range Foxboro installed.

03/02/92 - Site shows a large fall in flow with minimum being reached at 240000. This is caused by the control gates at Okere Falls being shut to constrict flow.

01/11/99 - iQuest logger installed.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Complied	August 2006	Site Number	14614
Compiled by	Glenn Ellery	River	Kaituna
		Station	Te Matai
Metric Map Reference	U14: 060 736		
Catchment Area (km²)	948	Period of Summary	1968 to 2005

Statistical Summary

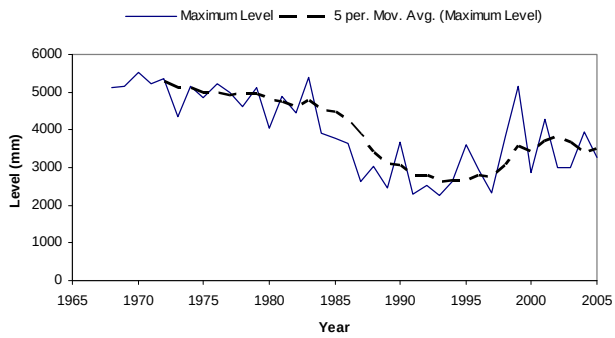
Level (mm) Moturiki Datum			
Minimum Level	699	Maximum Level	5530
Mean Annual Minimum Level	1731	Mean Annual Maximum Level	3962
Mean Level	2147	Mean Summer Level	2040
Median Level	1941	Mean Autumn Level	2078
		Mean Winter Level	2231
		Mean Spring Level	2187
Low Level Distribution Fit (using 1985-2005 data)	GEV	Peak Level Distribution Fit (using 1985-2005 data)	Gumbel
7 day Low Level (Minimum)	965	Peak Level (5 yr Return)	3760
7 Day Low Level (Mean Annual)	1050	Peak Level (10 yr Return)	4230
7 day Low Level (5 yr Return)	977	Peak Level (20 yr Return)	4700
7 Day Low Level (10 yr Return)	934		

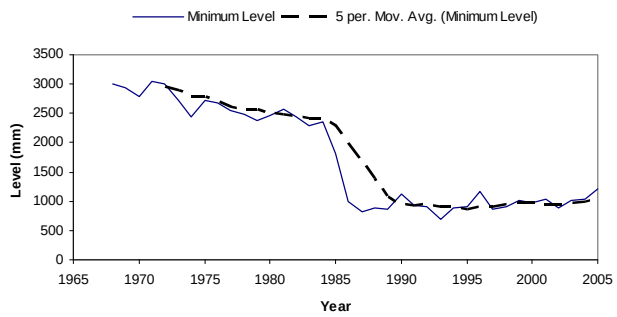
Annual Summaries

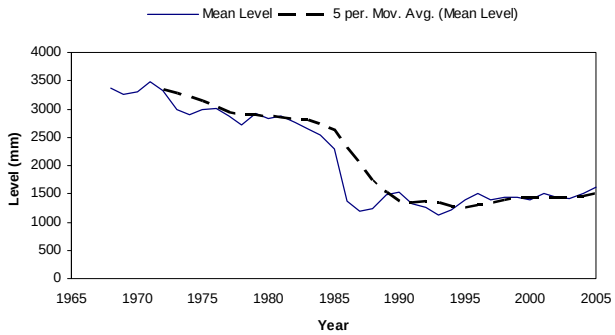
Year	Level (mm) Moturiki Datum			Year	Level (mm) Moturiki Datum		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	2462	2828	4054	1993	699	1118	2249
1981	2565	2886	4890	1994	891	1223	2634
1982	2436	2760	4439	1995	910	1390	3623
1983	2295	2650	5386	1996	1159	1501	2923
1984	2347	2541	3921	1997	868	1400	2324
1985	1816	2296	3788	1998	906	1437	3848
1986	999	1379	3626	1999	1013	1444	5157
1987	827	1197	2639	2000	964	1399	2863
1988	885	1230	3019	2001	1033	1505	4268
1989	863	1491	2464	2002	883	1430	3004
1990	1128	1521	3672	2003	1019	1421	2996
1991	928	1329	2277	2004	1029	1511	3960
1992	898	1258	2533	2005	1203	1617	3278

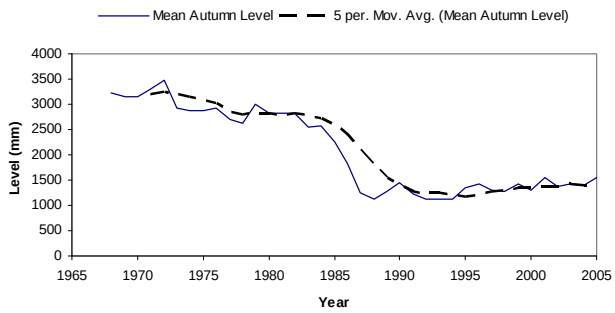
Level Distribution

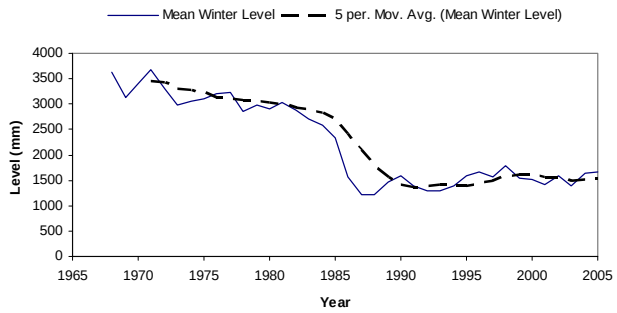
Level (mm) Moturiki Datum										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	5530	3975	3740	3607	3513	3441	3393	3343	3292	3248
10	3213	3185	3160	3139	3119	3099	3078	3055	3033	3015
20	2995	2976	2958	2941	2925	2909	2893	2876	2859	2842
30	2826	2809	2792	2777	2760	2740	2719	2694	2668	2642
40	2611	2583	2552	2523	2485	2446	2389	2331	2222	2074
50	1941	1846	1775	1725	1685	1653	1626	1600	1578	1558
60	1539	1523	1507	1493	1479	1465	1453	1441	1429	1418
70	1407	1395	1383	1371	1360	1349	1339	1329	1318	1307
80	1296	1284	1273	1261	1249	1236	1222	1208	1193	1178
90	1163	1149	1134	1119	1102	1085	1065	1039	1004	957
100	699									

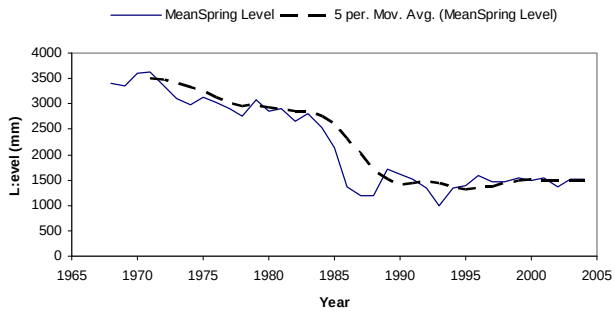


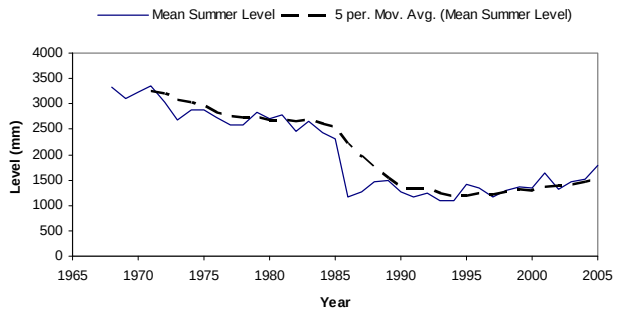












Kaituna at Te Matai

Environment Bay of Plenty
River Level Recording Station

River	Ngongotaha	Site	S.H.5 Bridge
Site Number	1014641	Grid Reference	U15: 910 414
Start of Record	May 1975	Data Capture Rate	99%
Data Summary From	January 1976	To	December 2005
Data Audited From	May 1975	To	December 2005

Equipment History

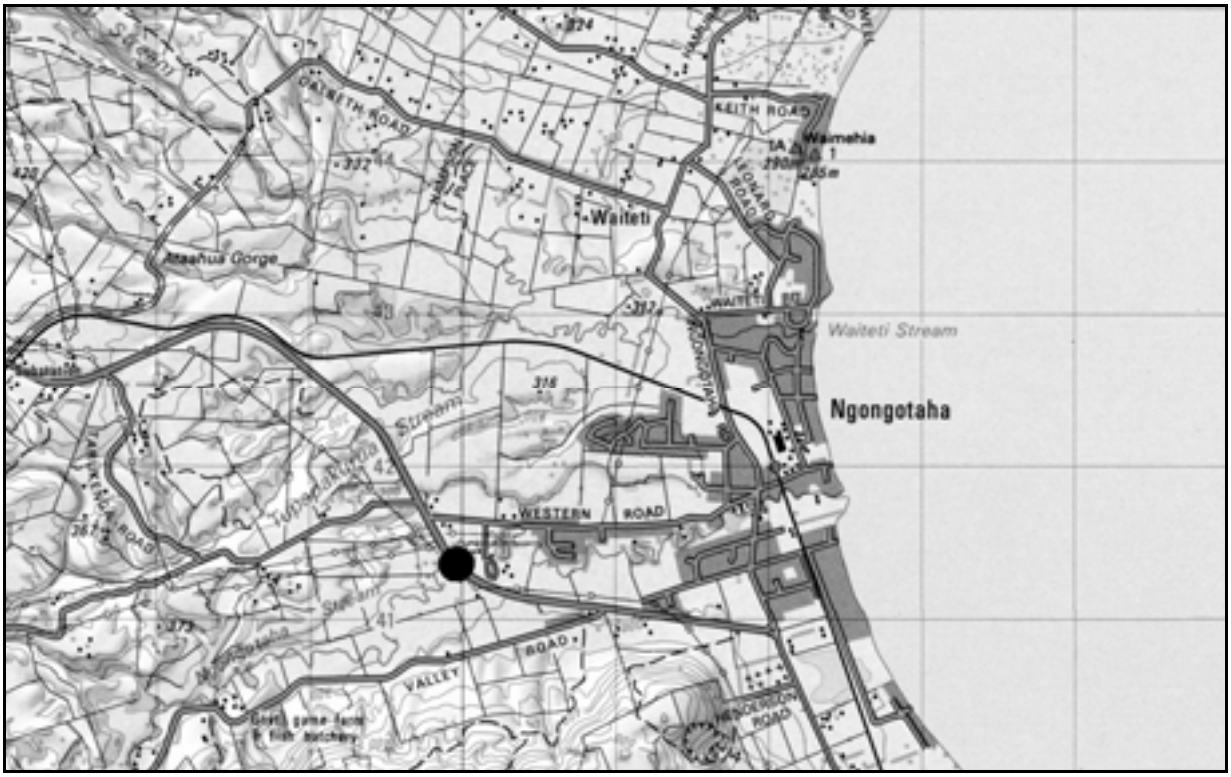
20/05/75: Float with F&P digital recorder.
13/04/84: Float with L&S digital recorder.
13/12/99: 5 metre P.T. with Kainga logger.

Comments on Stage/Discharge Ratings

Control at this site is by natural bed. Ratings are available to convert Stage (mm) to Reduced Level (mm) in Moturiki datum.

General Comments

Site is operated by NIWA, Rotorua.



SITE LOCATION
Ngongotaha at S.H.5 Bridge

Station Comments

Ngongotaha River at S.H. 5 Bridge. Site Number 1014641, on River Number 146074.

Control is by natural bed. Approximately 800 metres upstream of recorder, Fish and Game New Zealand and DOC clean a fish trap causing small fluctuations in gauge height.

Local recording authority is NIWA, Rotorua.

20/05/75 - Recorder installed on 750520 is a 10 metre range F&P digital recorder, having a stage ratio of 1mm of stage/mm recorded and a time punchout interval of 15 minutes.

13/04/84 - Recorder replaced on 840413 154500 by a 10 m range L&S digital recorder, having a stage ratio of 1 mm of stage/mm recorded and a time punchout interval of 15 minutes.

24/09/85 - Telemetry installed on 850925

09/11/87 - Growth of willow trees on the channel berm downstream of the recorder since 871109 051500 has caused the high stage range of rating curves to move to the left of previous curves. This reduction in channel efficiency is documented by photos taken since the site was first established. Some "crossing" of earlier curves has occurred. The lower end of these ratings remains similar in shape, but move up and down as a consequence of bed-level changes.

21/12/93 - The instability of the rating curve above 1.4 metre is caused by willow tree growth.

14/06/98 - Ratings have a change of shape due to the July 1998 floods.

13/12/99- Kainga logger and Greenspan transducer installed as backup recorder. Pressure transducer has a 5 metre range and 10mm resolution. Logger has a 15 minute interval.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Complied	December 2006	Site Number	1014641
Compiled by	G R Ellery	River	Ngongotaha
		Station	S.H.5 Bridge
Metric Map Reference	U15: 910 414		
Catchment Area (km²)	73.3	Period of Summary	1976 to 2005

Statistical Summary

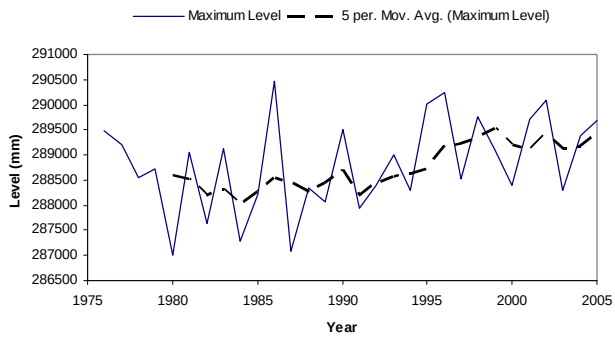
Level (mm)			
Minimum Level	285602	Maximum Level	290457
Mean Annual Minimum Level	285794	Mean Annual Maximum Level	288821
Mean Level	285940	Mean Summer Level	285923
Median Level	285915	Mean Autumn Level	285903
		Mean Winter Level	285986
		Mean Spring Level	285951
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	GEV
7 day Low Level (Minimum)	285608	Peak Level (5 yr Return)	289657
7 Day Low Level (Mean Annual)	285784	Peak Level (10 yr Return)	290037
7 day Low Level (5 yr Return)	285697	Peak Level (20 yr Return)	290319
7 Day Low Level (10 yr Return)	285638	Peak Level (50 yr Return)	290592
		Peak Level (100 yr Return)	

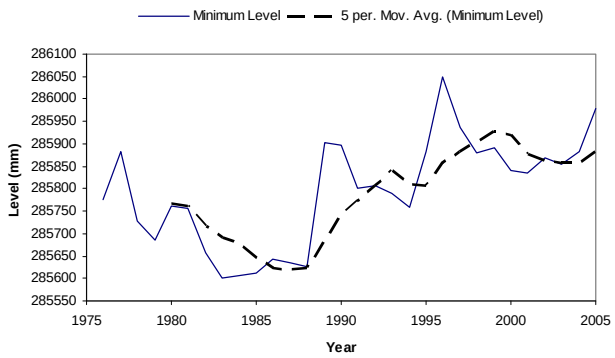
Annual Summaries

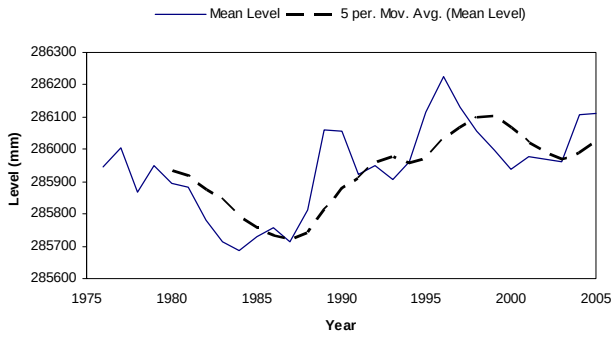
Year	Level (mm)				Year	Level (mm)		
	Minimum	Mean	Maximum			Minimum	Mean	Maximum
1980	285762	285894	286995		1993	285790	285908	289009
1981	285756	285883	289066		1994	285760	285963	288298
1982	285658	285781	287643		1995	285882	286116	290012
1983	285602	285713	289134		1996	286050	286227	290241
1984	285607	285688	287296		1997	285937	286130	288533
1985	285612	285728	288208		1998	285879	286055	289758
1986	285643	285759	290457		1999	285890	285998	289086
1987	285635	285713	287091		2000	285840	285937	288386
1988	285626	285811	288358		2001	285835	285978	289716
1989	285902	286060	288079		2002	285869	285969	290095
1990	285897	286055	289498		2003	285855	285960	288306
1991	285801	285921	287939		2004	285882	286106	289370
1992	285806	285949	288390		2005	285978	286110	289692

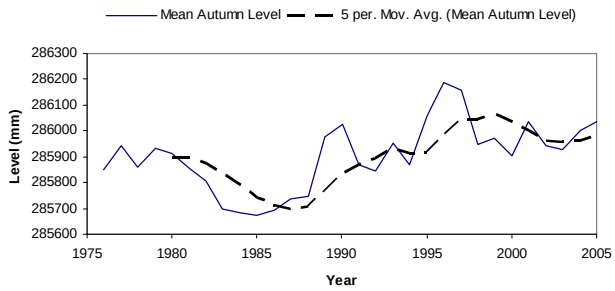
Level Distribution

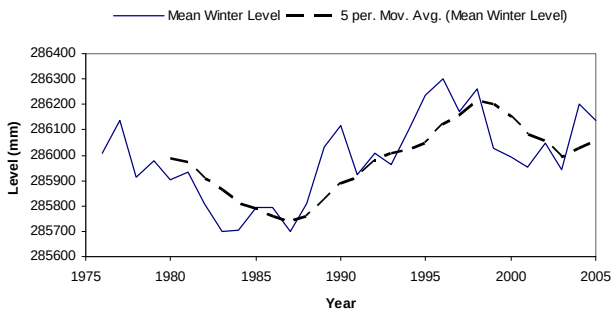
Level (mm)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	290457	286830	286516	286389	286311	286262	286226	286200	286179	286164
10	286150	286138	286128	286117	286108	286100	286091	286081	286073	286065
20	286057	286050	286042	286036	286028	286021	286015	286009	286003	285998
30	285992	285988	285983	285978	285973	285968	285964	285959	285955	285951
40	285948	285944	285941	285938	285934	285931	285927	285924	285921	285918
50	285915	285912	285909	285906	285903	285900	285897	285894	285891	285887
60	285884	285881	285878	285874	285870	285865	285860	285855	285849	285844
70	285839	285834	285829	285824	285818	285812	285805	285799	285793	285788
80	285781	285772	285763	285751	285736	285724	285716	285708	285701	285694
90	285688	285682	285676	285671	285666	285661	285654	285645	285637	285628
100	285602									

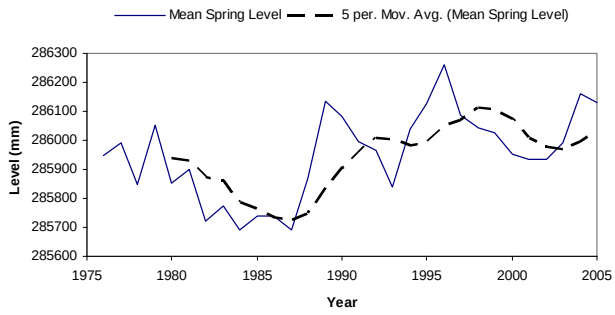


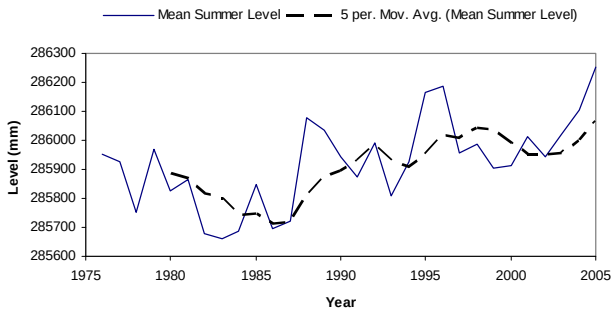












Ngongotaha at S.H.5 Bridge

Environment Bay of Plenty
River Level Recording Station

River	Tarawera	Site	Awakaponga
Site Number	15302	Grid Reference	V15: 412 559
Start of Record	May 1948	Data Capture Rate	99%
Data Summary From	January 1949	To	December 2005
Data Audited From	July 1992	To	December 2005

Equipment History

01/01/36: Staff gauge installed.
23/08/65: F&P digital recorder.
15/06/92: Backup Foxboro removed.
15/09/99: IQuest logger and Handar.
16/12/48: Kent chart recorder.
24/08/82: Backup Foxboro chart recorder.
01/07/92: Float with L&S digital recorder.
15/03/05: Sutron pressure transducer replaces Handar.

Comments on Stage/Discharge Ratings

Site has a natural control with the riverbed comprising sandy pumice.
Ratings are available to convert Stage (mm) to Flow (l/s).

General Comments

Site was operated by NIWA, Rotorua until 01/07/92. Use of draglines in the clearing of the river channel appears to have affected stage data for periods throughout the record. Drawn off by the Pulp and Paper mills causes frequent rises and falls in the stage record. Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network. Users of the level data should be aware of the degrading bed since 1971.

SITE LOCATION
Tarawera at Awakaponga

Station Comments

Tarawera River at Awakaponga. Site Number 15302, on River Number 153000.

The local recording authority is Environment Bay of Plenty.
The site is situated 6.5 kilometres from the mouth. The control is by natural channel. The catchment area includes landlocked lakes: Rotomahana, Rerewhakaaitu, Okataina, Okareka, Tikitapu, and Rotokakahi totalling 243km^2.

The lower reaches of the Tarawera River where the water level recorder is located has a sandy pumice bed, which causes cross section changes on an hour by hour basis. The bed load travelling past the recorder site varies from two to four hundred tonnes per day. The changes in bed level have a direct effect on water levels at the site with the station never registering smooth recession curves. This combined with water extraction by the pulp and paper mills upstream causes the stage fluctuations that are apparent when the filed data has three millimetres or less compression applied. Dragline and earthquake effects are best seen in the variation due to major changes in water level slope through the reach.

28/05/48 - Data from 480528 to 541217 was obtained from weekly staff gauge readings. Some flood events over this period had an increased frequency of readings to establish peak heights and define hydrograph shapes. The staff gauge used for these readings was situated downstream of the present recorder location at the Railway Bridge.

01/01/73 - From 730101 the increased water draw off by the pulp and paper mills causes frequent large, rapid, rises and falls in the stage record. These fluctuations are responsible for a lag between some external and internal readings observed at the site. The rating change beginning 730723 at 150500 is due to a gradual increase in cross sectional area at the gauging site and is probably attributable to a reduction in sediment transport during a year which only produced 75% of the mean annual rainfall. This trend was reversed after a fresh in October, causing the rating curve to revert back to its previous position.

01/02/75 - Dragline operations observed in channel from February 1975, causing unusual shaped base flow recessions.

10/08/77 - Syphon intake installed on 770810 094500 to enable the recorder to operate below the invert level of the bottom intake.

02/03/87 - Data from 870302 133000 to 870303 133300 was filed from the Foxboro backup recorder as the digital recorder was badly affected by an earthquake. The order of the sequence of events between 134200 and 140300 is a guess only as they appear instantaneous on the Foxboro chart.

01/06/87 - Drag line clearing channel upstream and downstream of recorder from 870601 to 870721. This work appears to have affected the stage record from 870616.

03/02/88 - Dragline was observed clearing channel 880203 112400. This work appears to have affected the stage data from 880123.

29/04/92 - Missing record 920429 080000 to 920429 143000 .

01/07/92 - Site handed over to Environment Bay of Plenty. Instrumentation L&S tape recorder with 1mm resolution, connected to an Aquitel Remote.

29/11/92 - Reduction in water level while Tasman pulp and paper mill shut effluent outfall gates for approximately 2 hours, while floating a boat stuck on an effluent pond bar.

15/12/94 - Missing record from 941215 231500 to 941216 084500 due to earthquake affecting recorder.

22/09/95 - Missing record from 950922 113000 to 950925 151500.

07/11/95 - Missing record from 951107 091600 to 951110 130000 due to float tape not being on pulleys.

24/11/96 - Data from 961124 0 to 961130 240000 shows the result of Tasman pulp and paper mill stopping their discharge into the river at Pipe Bridge.

15/11/ 97 - Missing record from 971115 124500 to 971117 130000 .

15/03/2005 - Sutron Gas Purge system installed as replacement for Handar 436B encoder (primary stage recorder). Sensor has a resolution of +/-5mm and a recording interval of 15 minutes. Tower now sitting above normal water level.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Complied	August 2006	Site Number	15302
Compiled by	G R Ellery	River	Tarawera
		Station	Awakaponga
Metric Map Reference	V15: 412 559		
Catchment Area (km²)	906	Period of Summary	1949 to 2005

Statistical Summary

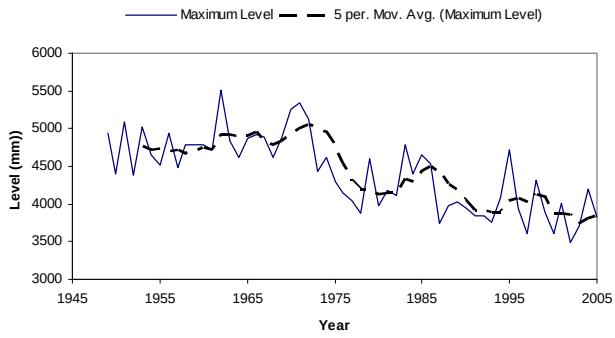
Level (*l/s*)			
Minimum Level	2350	Maximum Level	5507
Mean Annual Minimum Level	3508	Mean Annual Maximum Level	4414
Mean Level	3730	Mean Summer Level	3675
Median Level	3791	Mean Autumn Level	3702
		Mean Winter Level	3800
		Mean Spring Level	3777
Low Level Distribution Fit	GEV	Peak Level Distribution Fit	GEV
7 day Low Level (Minimum)	2396	Peak Level (5 yr Return)	4849
7 Day Low Level (Mean Annual)	3519	Peak Level (10 yr Return)	5074
7 day Low Level (5 yr Return)	3085	Peak Level (20 yr Return)	5251
7 Day Low Level (10 yr Return)	2758	Peak Level (50 yr Return)	5435
		Peak Level (100 yr Return)	

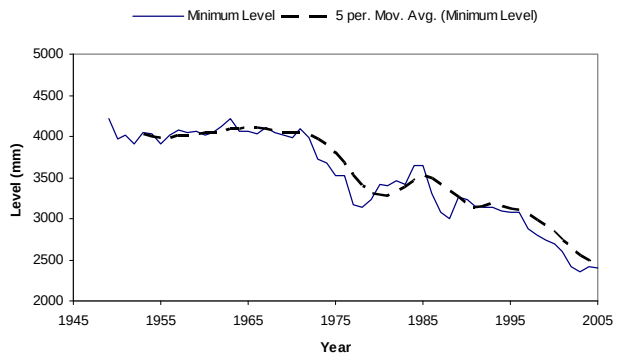
Annual Summaries

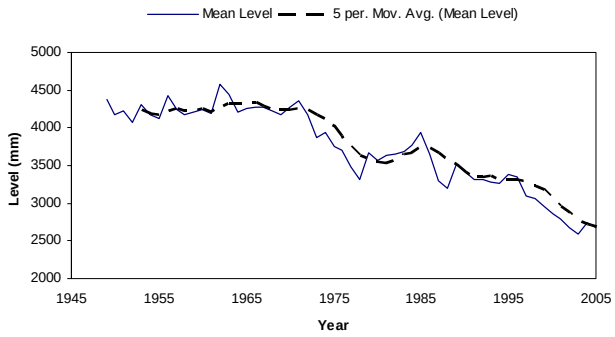
Year	Level (mm) Moturiki Datum			Year	Level (mm) Moturiki Datum		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	3413	3575	3984	1993	3146	3276	3762
1981	3406	3643	4173	1994	3090	3269	4078
1982	3466	3649	4118	1995	3084	3390	4725
1983	3409	3684	4790	1996	3083	3346	3949
1984	3646	3777	4399	1997	2874	3103	3613
1985	3652	3942	4655	1998	2793	3061	4308
1986	3309	3648	4527	1999	2741	2968	3887
1987	3076	3300	3741	2000	2689	2856	3610
1988	3000	3195	3983	2001	2595	2800	4005
1989	3256	3510	4030	2002	2413	2667	3492
1990	3235	3408	3950	2003	2350	2583	3703
1991	3156	3312	3848	2004	2408	2736	4196
1992	3142	3308	3838	2005	2405	2671	3823

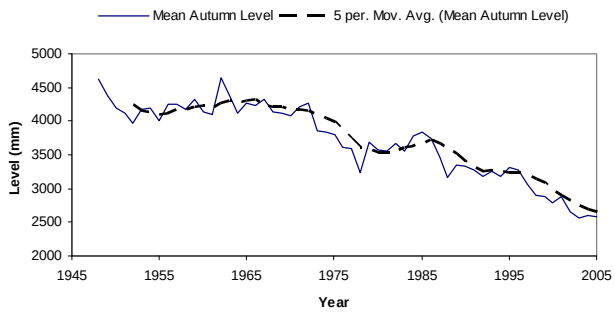
Level Distribution

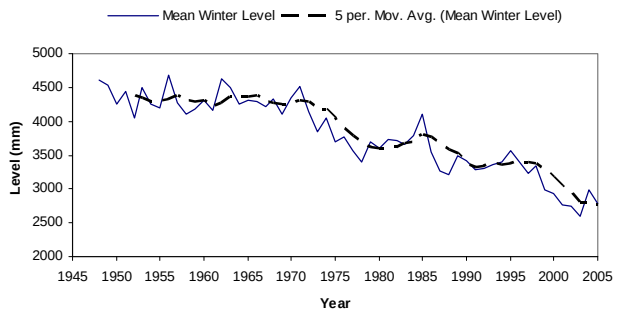
Level (mm) Moturiki Datum										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	5507	4718	4619	4557	4509	4479	4449	4415	4390	4368
10	4349	4333	4319	4307	4295	4285	4274	4263	4252	4242
20	4233	4223	4214	4205	4197	4189	4181	4173	4164	4156
30	4148	4139	4130	4122	4113	4105	4097	4089	4080	4070
40	4059	4046	4031	4009	3974	3932	3898	3862	3837	3812
50	3791	3768	3747	3727	3706	3687	3668	3649	3631	3616
60	3600	3585	3568	3553	3535	3512	3487	3464	3442	3419
70	3395	3375	3357	3338	3320	3302	3285	3268	3250	3234
80	3216	3199	3181	3164	3146	3120	3091	3043	2983	2920
90	2882	2844	2803	2765	2728	2688	2649	2609	2557	2498
100	2350									

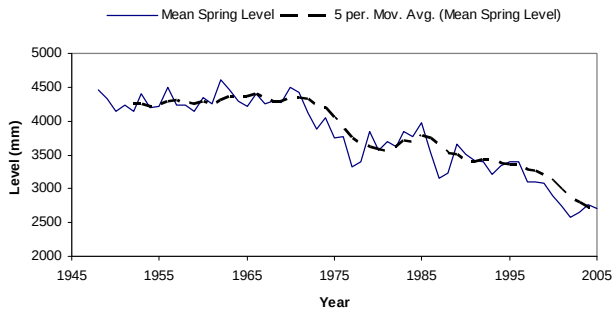


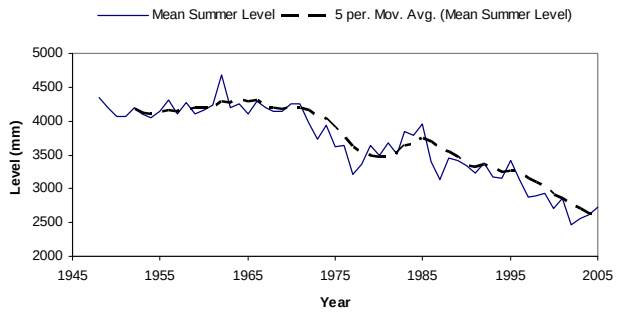












Tarawera at Awakaponga

Environment Bay of Plenty
River Level Recording Station

River	Rangitaiki	Site	Thornton
Site Number	15401	Grid Reference	W15:507 576
Start of Record	February 1965	Data Capture Rate	87%
Data Summary From	January 1989	To	December 2005
Data Audited From	January 1994	To	December 2005

Equipment History

03/08/80: 3 metre range Monthly Foxboro chart recorder.

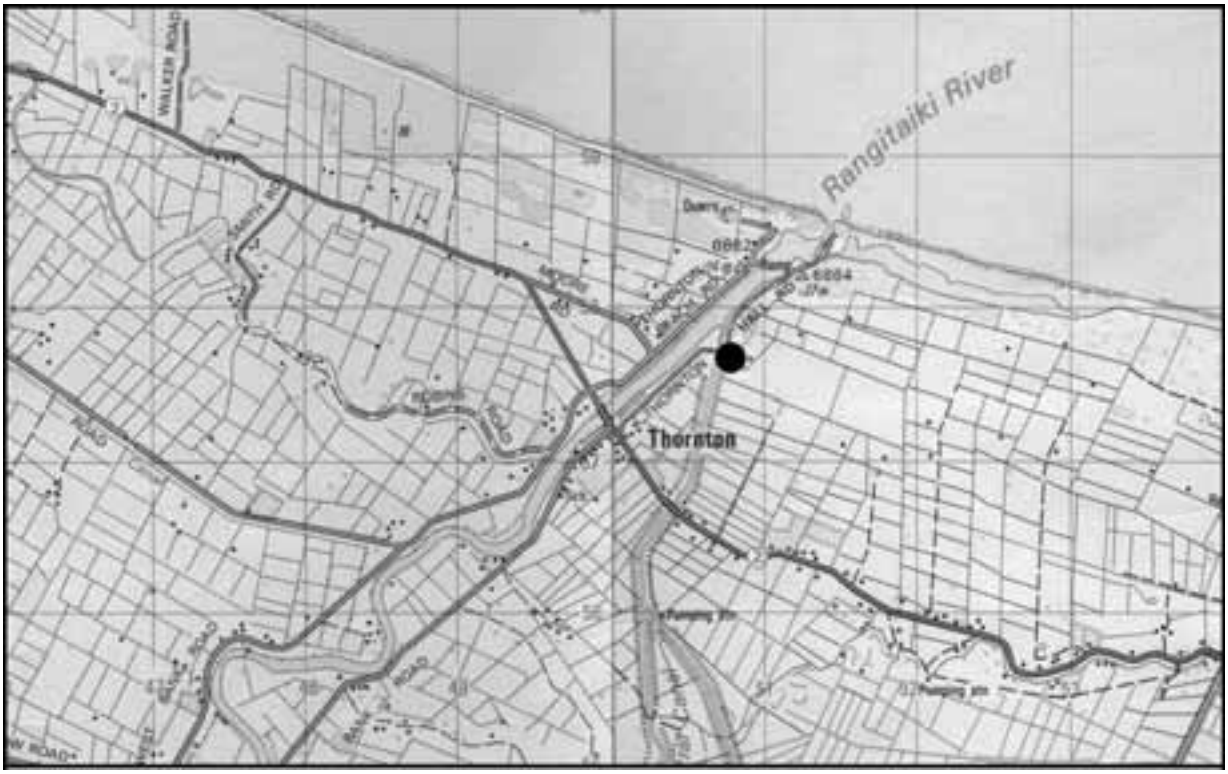
06/07/95: Float with L&S digital recorder.

Comments on Stage/Discharge Ratings

Ratings are available to convert Stage (mm) to Reduced Level (mm) in Moturiki Datum.

General Comments

This site was originally operated in the 1960's by the Drainage Board. Some charts are available and some storms have been processed. Site is operated by Environment Bay of Plenty for engineering purposes in the Lower Rangitaiki catchment.



SITE LOCATION
Rangitaiki at Thornton

Station Comments

Rangitaiki River at Thornton. Site Number 15401, on River Number 154000.

The local recording authority is Environment Bay of Plenty

The recorder is located on Reids central canal, 50 metres above the confluence with the Rangitaiki River. The 1960's chart recorder is thought to have been set to Drainage Board Datum which is thought to be MSL=96.8 ft. 96.8 ft = 29.505 metres. All data processed from this period has had 29.505 metres subtracted from it to reduce it to mean sea level (Moturiki Datum). The charts are held by the Bay of Plenty Catchment Board.

23/10/88
On the 23rd October an Aquitel Remote, A-D converter and a pressure transducer were installed. This is installed temporarily for the engineering department.

19/10/89
During this period 981019 to 920904 there were periods of missing data due to equipment problems with the primary recorder. Gaps have been filled with Foxboro data where available and some periods of synthetic data occur.

20/07/94
Steel stilling well cylinders installed. Water level is now recorded by a float connected to an encoder.

05/05/2000
WRIC logger replaced by Campbell logger.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Complied	December 2006	Site Number	15401
Compiled by	G R Ellery	River	Rangitaiki
		Station	Thornton
Metric Map Reference	W15:507 576		
Catchment Area (km²)	3004	Period of Summary	1989 to 2005

Statistical Summary

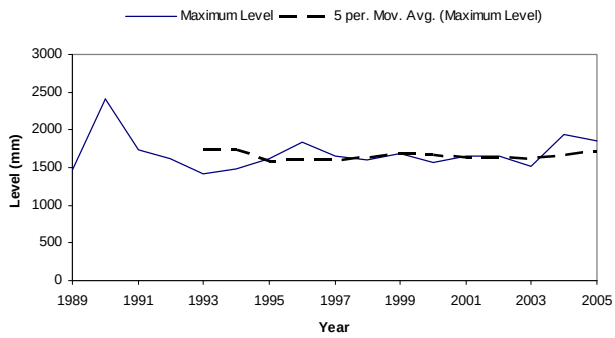
Level (mm)			
Minimum Level	-600	Maximum Level	2409
Mean Annual Minimum Level	-442	Mean Annual Maximum Level	1690
Mean Level	371	Mean Summer Level	365
Median Level	332	Mean Autumn Level	380
		Mean Winter Level	398
		Mean Spring Level	344
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	GEV
7 day Low Level (Minimum)	-66	Peak Level (5 yr Return)	1809
7 Day Low Level (Mean Annual)	172	Peak Level (10 yr Return)	1959
7 day Low Level (5 yr Return)	122	Peak Level (20 yr Return)	2130
7 Day Low Level (10 yr Return)	78	Peak Level (50 yr Return)	
		Peak Level (100 yr Return)	

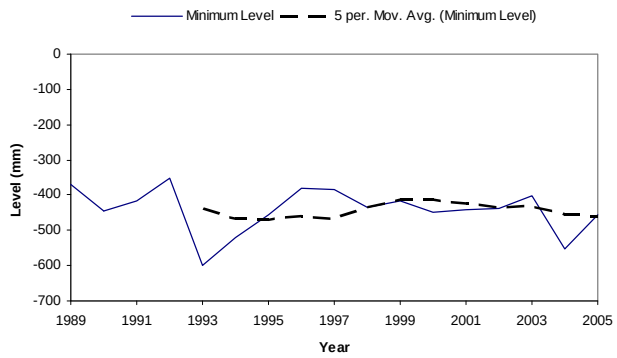
Annual Summaries

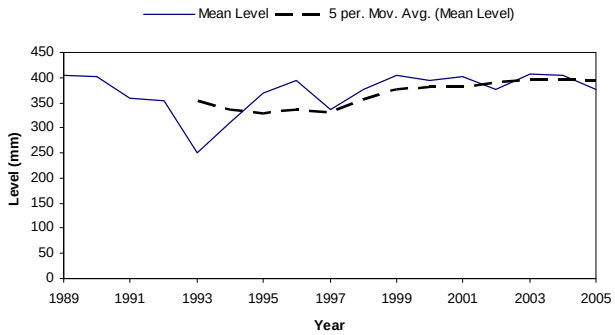
Year	Level (mm)				Year	Level (mm)		
	Minimum	Mean	Maximum			Minimum	Mean	Maximum
1980					1993	-600	250	1419
1981					1994	-519	312	1481
1982					1995	-456	368	1622
1983					1996	-379	395	1835
1984					1997	-383	337	1657
1985					1998	-435	376	1599
1986					1999	-416	405	1678
1987					2000	-447	395	1575
1988					2001	-443	401	1654
1989	-369	404	1474		2002	-439	376	1646
1990	-444	401	2409		2003	-402	407	1521
1991	-418	359	1734		2004	-553	405	1935
1992	-352	354	1625		2005	-457	378	1859

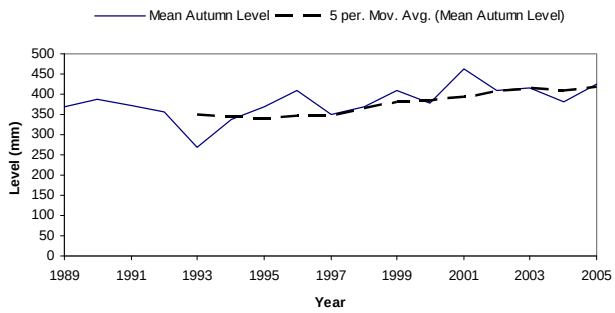
Level Distribution

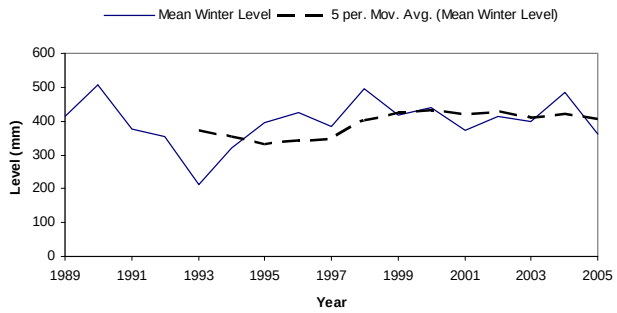
Level (mm)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	2409	1235	1162	1115	1079	1050	1024	1002	982	964
10	947	930	915	900	885	870	856	842	829	815
20	802	788	775	762	748	735	721	707	693	679
30	664	649	634	619	603	587	570	554	537	520
40	503	486	469	451	434	417	400	382	365	348
50	332	315	299	283	268	252	237	222	207	193
60	179	165	151	138	125	112	100	88	76	64
70	53	42	31	20	9	-2	-12	-23	-33	-43
80	-54	-64	-74	-84	-95	-105	-116	-126	-137	-149
90	-160	-173	-185	-199	-214	-230	-248	-269	-295	-334
100	-600									

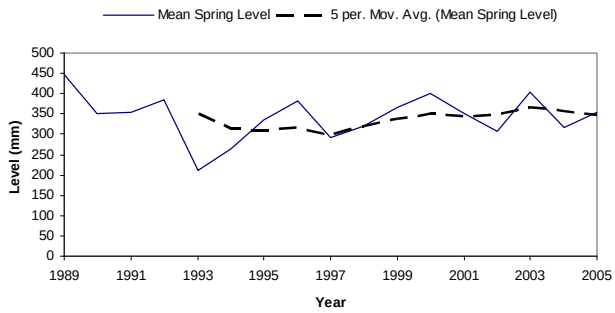


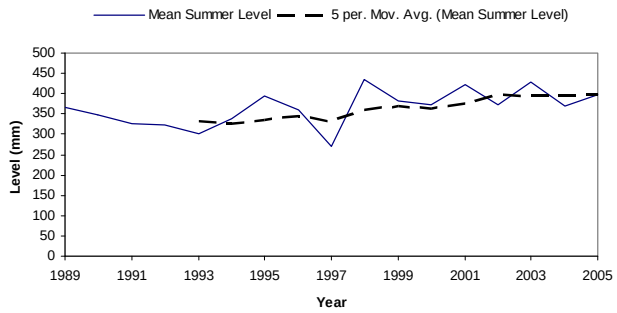












Rangitaiki at Thornton

Environment Bay of Plenty
River Level Recording Station

River	Rangitaiki	Site	Te Teko
Site Number	15412	Grid Reference	V15:435 448
Start of Record	June 1948	Data Capture Rate	100%
Data Summary From	January 1949	To	December 2005
Data Audited From	June 1948	To	December 2005

Equipment History

01/06/48: Staff gauge installed.

25/08/65: Float with F&P digital recorder.

07/09/52: Kent chart recorder.

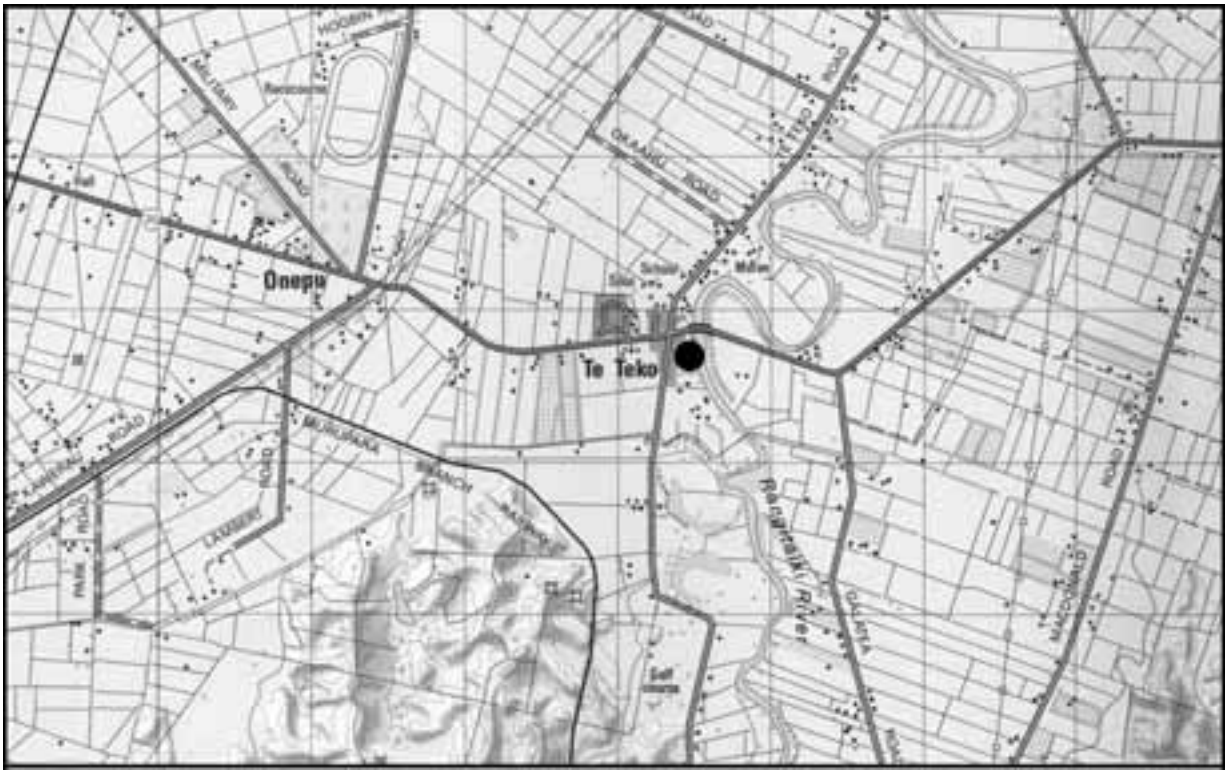
08/03/88: Backup Foxboro chart recorder.

Comments on Stage/Discharge Ratings

Ratings are available to convert Stage (mm) to Reduced Level (mm) in Moturiki Datum.

General Comments

Site is operated by NIWA, Rotorua. Record from June 1948 to October 1952 is from staff gauge at Edgecumbe Bridge, approximately 12 kilometres down stream. Water levels were affected by the filling of Lake Matahina in November 1966. Since then water levels have been affected by the dam operation. Flow recorded at Matahina Dam has been used as a backup. Site is now contains equipment operated as part of Environment Bay of Plenty's Natural Environment Regional Monitoring Network for flood monitoring purposes



SITE LOCATION
Rangitaiki at Te Teko

Station Comments

Rangitaiki River at Te Teko. Site number 15412, on River Number 154000.

The local recording authority is NIWA, Rotorua.

The site is situated 23 kilometres from the river mouth, and has a natural channel control. Sediment concentration is also measured at this site.

07/09/52 - Chart data was not filed until 521001. Charts have not been digitised so data filed are mainly one daily value.

24/11/66 - Stage values on 661125 and 661126 go below zero due to the filling of Lake Matahina. From now on water levels are affected by the Matahina dam.

02/03/87 - Stage record from 870302 133000 to 870302 160000 has been affected by an Earthquake. The stage record has been filed as recorded although this may not produce true flows during the event.

04/03/88 - Missing record from 880304 123000 to 880308 121500 due to water level receding below bottom of intake pipe.

08/03/88 - Chart recorder installed on 880308 121500 to record water levels when stage drops below bottom intake.

31/05/88 - The unusual stage hydrograph during June and July 1988 was due to the Matahina dam being refilled after maintenance work to the right bank abatement.

05/07/96 - Data from 960705 140000 to 960706 140000 is an assumed straightline. Matahina power station was not generating during this period, as the dam was being dewatered for major maintenance.

27/07/02 - Missing record from 27 July 2002 081500 to 29 July 2002 111500 due to vandals breaking into recorder house and smashing all recording equipment.

30/0//03 - Data from 30 July 2003 024500 to 8 august 2003 114500 has been suppressed due to the syphon being partially blocked. During this time the shape and frequency of the hydrographs has been affected. Accuracy of the data is +/- 15 %.

31/10/04 - Data from 31 October 2004 051500 to 19 November 2004 161500 is almost a flat line trace. This trace is correct and is caused by Matahina dam operating on one generator during maintenance.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Complied	December 2006	Site Number	15412
Compiled by	G R Ellery	River	Rangitaiki
		Station	Te Teko
Metric Map Reference	V15:435 448		
Catchment Area (km²)	1184	Period of Summary	1949 to 2005

Statistical Summary

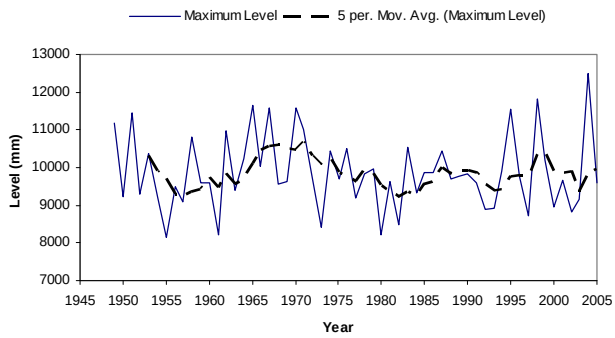
Level (mm)			
Minimum Level	5860	Maximum Level	12501
Mean Annual Minimum Level	6638	Mean Annual Maximum Level	9874
Mean Level	7288	Mean Summer Level	7183
Median Level	7138	Mean Autumn Level	7091
		Mean Winter Level	7565
		Mean Spring Level	7502
Low Level Distribution Fit Utilised	Gumbel	Peak Level Distribution Fit Utilised	GEV
7 day Low Level (Minimum)	6147	Peak Level (5 yr Return)	10643
7 Day Low Level (Mean Annual)	6625	Peak Level (10 yr Return)	11193
7 day Low Level (5 yr Return)	6450	Peak Level (20 yr Return)	11692
7 Day Low Level (10 yr Return)	6352	Peak Level (50 yr Return)	12300
		Peak Level (100 yr Return)	

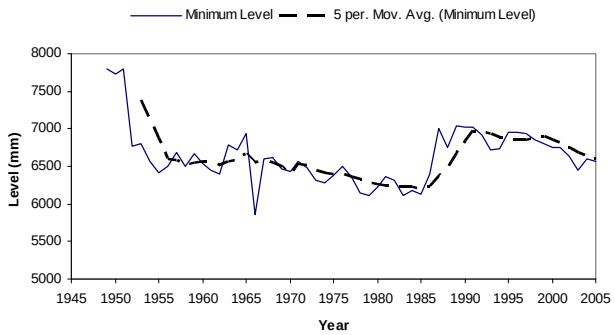
Annual Summaries

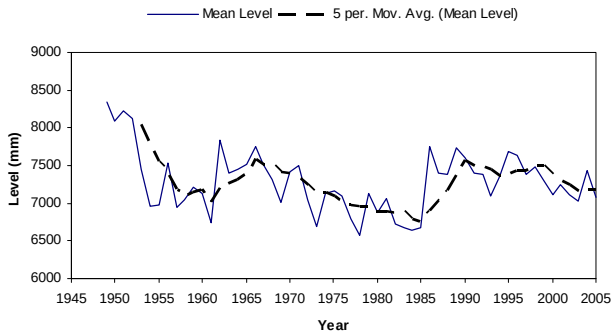
Year	Level (mm)			Year	Level (mm)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	6878	6228	8225	1993	6714	7102	8922
1981	7070	6365	9644	1994	6736	7349	9895
1982	6721	6313	8495	1995	6953	7688	11538
1983	6676	6104	10555	1996	6957	7634	9761
1984	6645	6173	9325	1997	6945	7376	8705
1985	6669	6127	9871	1998	6846	7487	11811
1986	7747	6396	9851	1999	6801	7306	10203
1987	7401	7001	10441	2000	6753	7110	8965
1988	7386	6748	9694	2001	6754	7252	9663
1989	7729	7033	9768	2002	6637	7117	8833
1990	7597	7027	9825	2003	6445	7023	9149
1991	7397	7018	9611	2004	6605	7434	12501
1992	7389	6913	8877	2005	6574	7086	9612

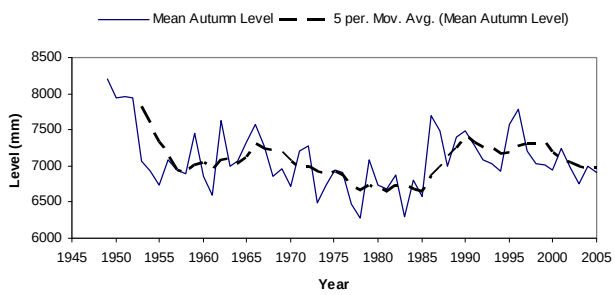
Level Distribution

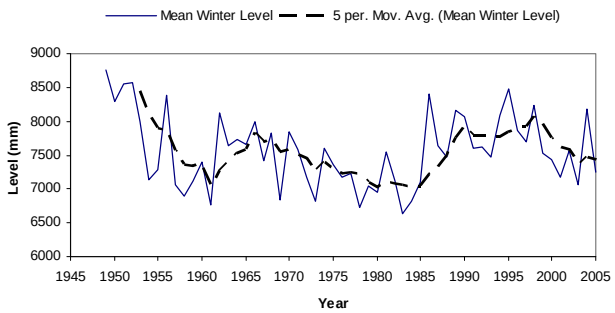
Level (mm)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	12501	9183	8850	8698	8578	8472	8391	8322	8267	8208
10	8162	8120	8086	8049	8010	7974	7941	7909	7881	7854
20	7822	7791	7758	7724	7690	7655	7622	7592	7564	7537
30	7511	7485	7459	7436	7415	7395	7377	7361	7342	7322
40	7302	7282	7263	7246	7228	7210	7193	7177	7163	7151
50	7138	7124	7112	7102	7093	7084	7074	7063	7051	7038
60	7024	7010	6996	6983	6969	6956	6943	6932	6922	6912
70	6902	6890	6877	6863	6847	6831	6816	6804	6791	6779
80	6768	6758	6746	6731	6715	6696	6677	6655	6636	6612
90	6592	6567	6543	6516	6482	6446	6411	6387	6354	6291
100	5860									

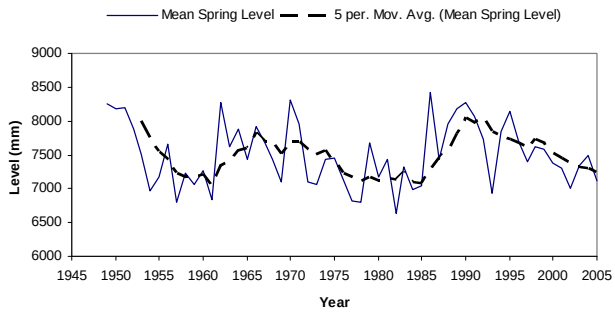


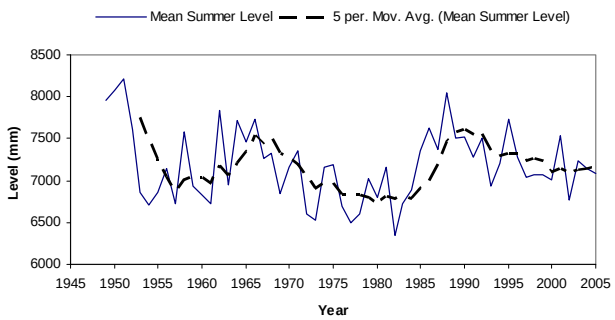












Rangitaiki at Te Teko

Environment Bay of Plenty
River Level Recording Station

River	Rangitaiki	Site	Murupara
Site Number	15408	Grid Reference	V17:329 984
Start of Record	June 1948	Data Capture Rate	100%
Data Summary From	January 1949	To	December 2000
Data Audited From	June 1948	To	December 2000

Equipment History

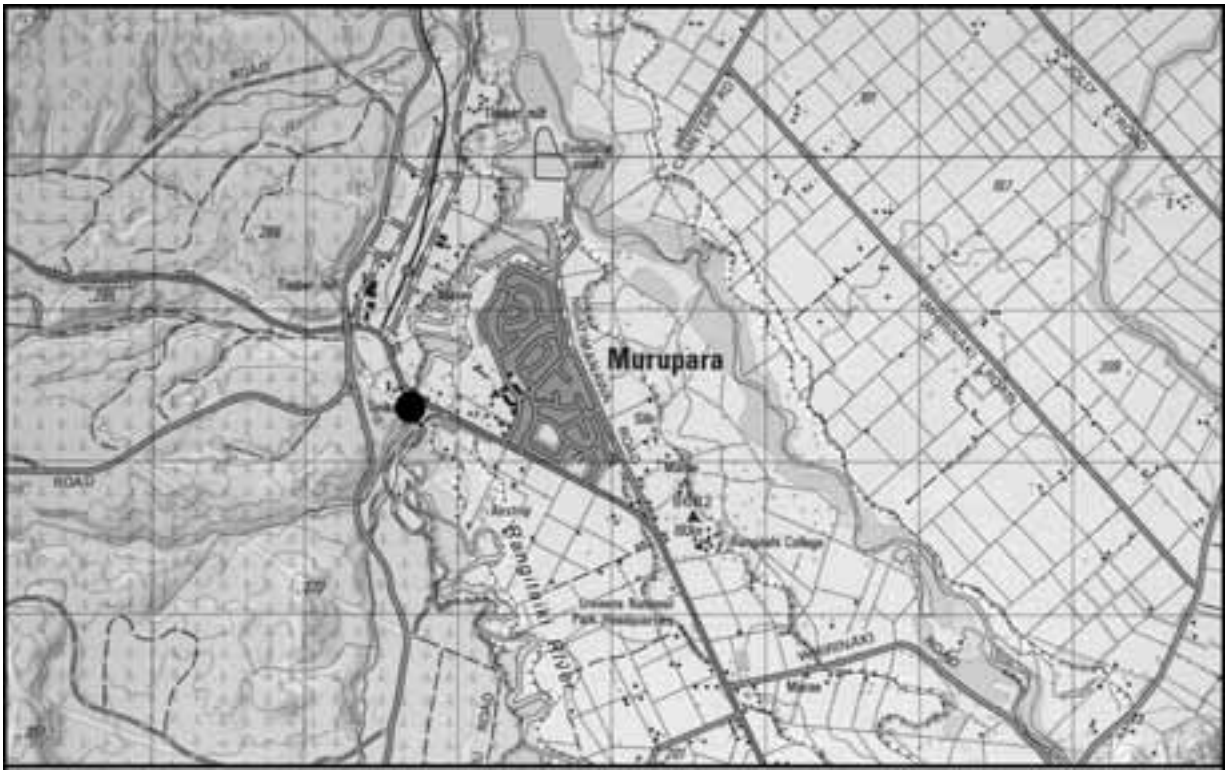
01/01/48: Staff gauge installed.
06/02/59: Kent chart recorder.
13/06/83: Backup Foxboro chart recorder.
12/08/94: Float with Kainga Encoder and Aquitel Remote
16/09/52: Bristol chart recorder.
24/08/65: Float with F&P digital recorder.
22/08/84: Float with L&S digital recorder.

Comments on Stage/Discharge Ratings

Ratings are available to convert Stage (mm) to Reduced Level (mm) Moturiki Datum.

General Comments

Site is operated by NIWA, Rotorua. Stage record has been affected by the Wheao Power Scheme from 1982. Sediment concentration is also measured at this site.



SITE LOCATION
Rangitaiki at Murupara

Station Comments

Rangitaiki River at Murupara. Site Number 15408, on River Number 154000.

The local recording authority is NIWA, Rotorua.

From April 1982 stage record is affected by the Wheao Power Scheme. Sediment concentration is also measured at the site.

31/12/47 - Record from 480601 to 520915 is readings taken from daily staff gauge observations.
Data for the period of daily readings is not completely reliable with the reader generally only reading the gauge to 0.1ft (30mm).

17/09/52 - The stage record has been manually read from the Bristol charts at a rate of one point per day. From 520917 to 581215 during any period where the recorder has malfunctioned, daily staff gauge readings have been filed. Record from 520917 to 650824 was checked against Whirinaki at Galatea (site 15410), this check showed only daily mean discharges should be used. The original charts are held by Works (Major Projects Wellington) if any storm analysis is required.

01/11/55 - There is no chart record from 551101 100000 to 560815 134500. All values filed are daily staff gauge readings.

06/02/59 - Recorder installed on day 590206 is a 6.10 metre (20ft) range, monthly Kent with a time resolution of 96 minutes/mm recorded and a stage ratio of 24mm of stage/mm chart recorded.

24/08/65 - Recorder replaced on 650824 153000 by a 15 minute punch F&P digital with a recording resolution of 1/mm increment.

01/04/82 - Rapid stage fluctuations from April 1982 to December 1982 were caused by the Wheao power scheme construction and testing.

30/12/82 - Wheao power station head race collapse caused a very short sharp flood hydrograph on 821230.

14/12/83 - Wheao power scheme began influencing the stage record at Murupara after being rebuilt from December 1983.

12/08/94 - Recorder replaced 940812 114500 by a Kainga encoder with a range of 10 metres, a resolution of 1 mm, and a time interval of 15 minutes, connected directly to the Remote. Data is now filed via telemetry.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Complied	December 2006	Site Number	15408
Compiled by	G R Ellery	River	Rangitaiki
		Station	Murupara
Metric Map Reference	V17:329 984		
Catchment Area (km²)	1184	Period of Summary	1949 to 2005

Statistical Summary

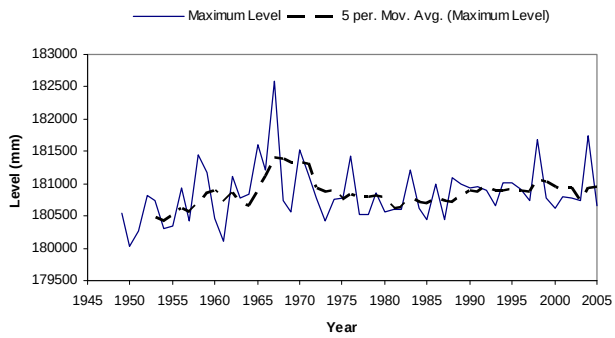
Level (mm)			
Minimum Level	179674	Maximum Level	182589
Mean Annual Minimum Level	179901	Mean Annual Maximum Level	180847
Mean Level	180206	Mean Summer Level	180220
Median Level	180174	Mean Autumn Level	180082
		Mean Winter Level	180218
		Mean Spring Level	180306
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	Gumbel
7 day Low Level (Minimum)	179750	Peak Level (5 yr Return)	181156
7 Day Low Level (Mean Annual)	179821	Peak Level (10 yr Return)	181410
7 day Low Level (5 yr Return)	179867	Peak Level (20 yr Return)	181653
7 Day Low Level (10 yr Return)	179942	Peak Level (50 yr Return)	181968
		Peak Level (100 yr Return)	

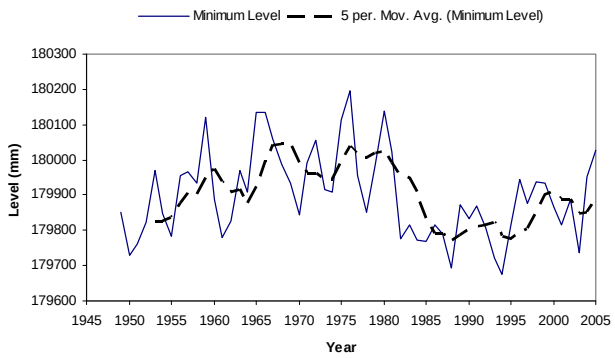
Annual Summaries

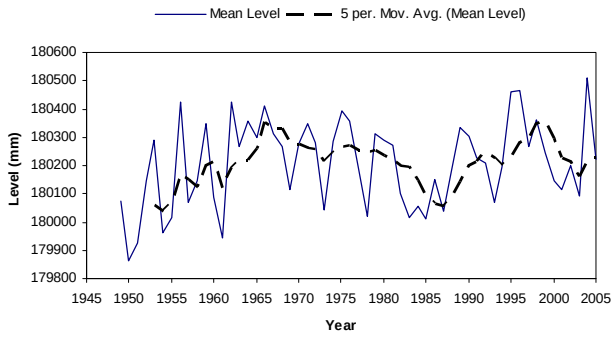
Year	Level (mm)			Year	Level (mm)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	180138	180291	180569	1993	179723	180070	180667
1981	180025	180270	180606	1994	179674	180194	181019
1982	179776	180099	180601	1995	179814	180459	181016
1983	179814	180015	181216	1996	179945	180463	180924
1984	179771	180058	180616	1997	179875	180266	180739
1985	179768	180011	180449	1998	179937	180360	181675
1986	179815	180151	180992	1999	179934	180244	180782
1987	179791	180039	180441	2000	179866	180146	180618
1988	179692	180177	181093	2001	179816	180116	180805
1989	179872	180334	180994	2002	179886	180202	180769
1990	179834	180302	180940	2003	179737	180094	180744
1991	179868	180226	180962	2004	179951	180508	181750
1992	179809	180209	180889	2005	180026	180221	180669

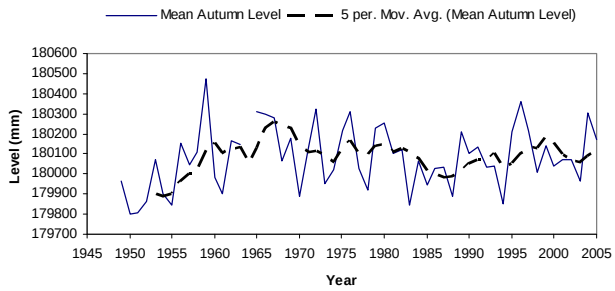
Level Distribution

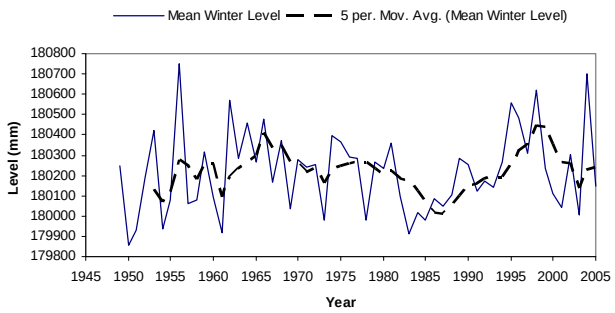
Level (mm)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	182589	180874	180772	180717	180679	180647	180619	180597	180578	180558
10	180539	180521	180503	180486	180472	180458	180444	180431	180418	180409
20	180399	180388	180379	180370	180361	180353	180345	180338	180330	180321
30	180314	180307	180299	180291	180284	180278	180270	180262	180256	180248
40	180242	180234	180228	180221	180214	180207	180200	180194	180188	180181
50	180174	180166	180160	180154	180148	180142	180136	180130	180124	180119
60	180111	180105	180099	180095	180090	180082	180076	180069	180062	180056
70	180049	180043	180038	180032	180028	180022	180016	180010	180004	179998
80	179996	179988	179981	179974	179966	179959	179951	179944	179936	179925
90	179916	179910	179900	179888	179884	179874	179859	179848	179826	179791
100	179674									

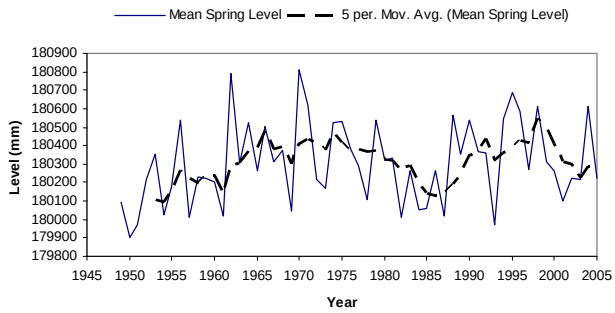


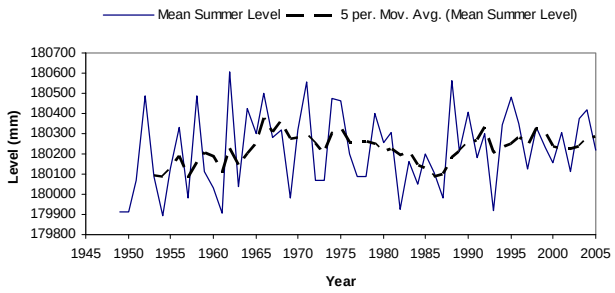












Rangitaiki at Murupara

Environment Bay of Plenty
River Level Recording Station

River	Whakatane	Site	Town Wharf
Site Number	15509	Grid Reference	W15:619 537
Start of Record	March 1986	Data Capture Rate	80%
Data Summary From	January 1987	To	December 2005
Data Audited From	March 1986	To	December 2005

Equipment History

Float/counterweight system with shaft encoder. 1mm resolution.

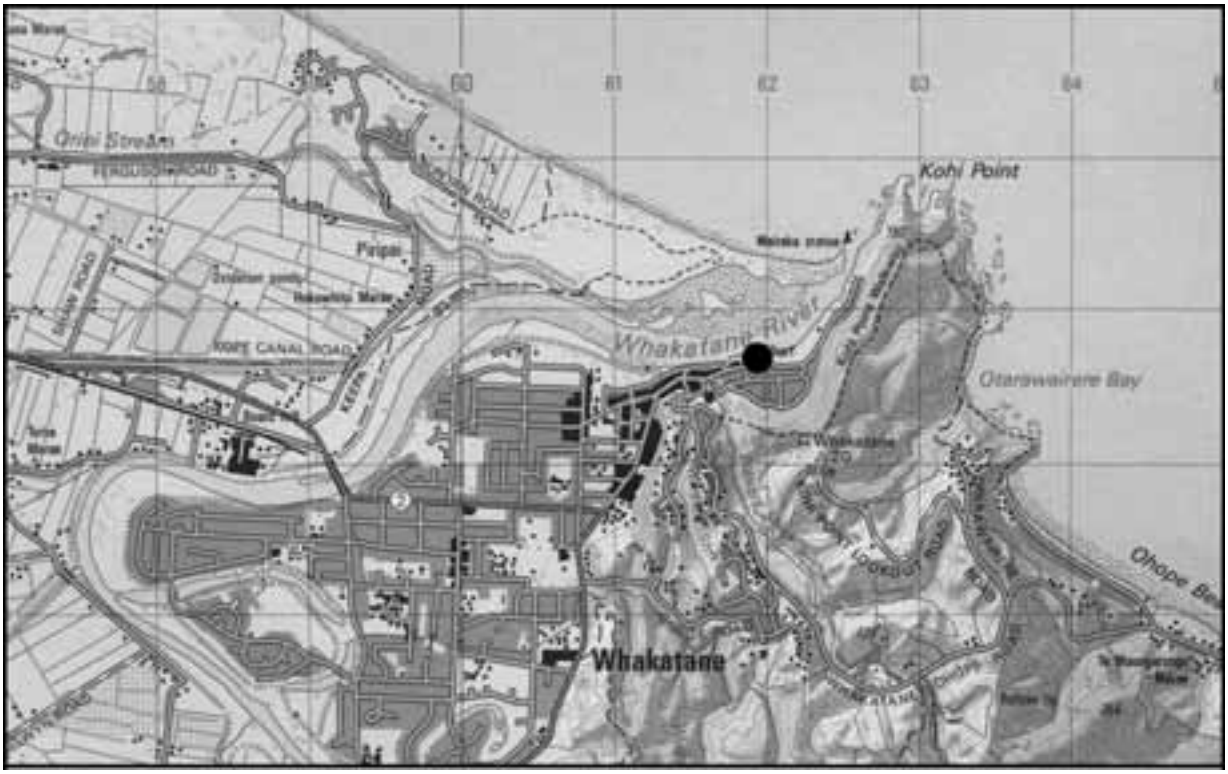
22-07-64: Staff gauge and Lea chart recorder
14-01-86: 3 metre range Stevens chart recorder
20-07-90: 5 metre range P.T. & WRIC datalogger
21-05-91: 3 metre range Stevens chart recorder
23-08-93: Encoder & WRIC datalogger

Comments on Stage/Discharge Ratings

Ratings are available to convert Stage (mm) to Reduced Level (mm) in Moturiki Datum

General Comments

Site is operated by Environment Bay of Plenty for engineering investigation works. This site is tidally influenced and has been used by the R.N.Z.N. Hydrographic office for calculating secondary point tide tables.



SITE LOCATION
Whakatane at Town Wharf

Station Comments

Whakatane River at Town Wharf. Site Number 15509, on River Number 155000.

The local recording authority is Environment Bay of Plenty

Staff gauge installed 22/7/64. R.L.Zero = -2.5 ft. Moturiki datum. The highest stage recorded =2.316m Moturiki Datum on 10/04/68 during the Wahine Storm. The staff gauge converted to new R.L.Zero = -1.000 metres (Moturiki Datum) on 7/5/86.

20/09/90
Lea recorder removed temporarily and WRIC and pressure transducer installed. This was done in response to a request, by the R.N.Z.N. Hydrographic Office, for accurate tidal readings to enable the inclusion of Whakatane as a secondary port in the NZ Nautical Almanac. Pressure transducer is 5m range with values recorded every 6 minutes.

01/01/96
General comment: record for the period 960101 to 980101 shows periods where the high and low tide is missing. This appears to have a random occurrence. The data after these events is still valid due to external values matching recorded values. There is no evidence of the float or counter-weight jamming.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Complied	December 2006	Site Number	15509
Compiled by	G R Ellery	River	Whakatane
		Station	Town Wharf
Metric Map Reference	W15:619 537		
Catchment Area (km²)	1795	Period of Summary	1987 to 2005

Statistical Summary

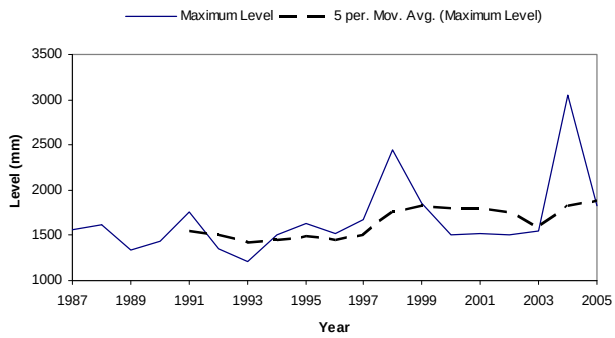
Level (mm)			
Minimum Level	-1069	Maximum Level	3048
Mean Annual Minimum Level	-934	Mean Annual Maximum Level	1677
Mean Level	166	Mean Summer Level	157
Median Level	166	Mean Autumn Level	183
Mean Specific Level (/km²)		Mean Winter Level	194
		Mean Spring Level	132
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	GEV
7 day Low Level (Minimum)	-153	Peak Level (5 yr Return)	1827
7 Day Low Level (Mean Annual)	-45	Peak Level (10 yr Return)	2091
7 day Low Level (5 yr Return)	-89	Peak Level (20 yr Return)	2424
7 Day Low Level (10 yr Return)	-120	Peak Level (50 yr Return)	
		Peak Level (100 yr Return)	

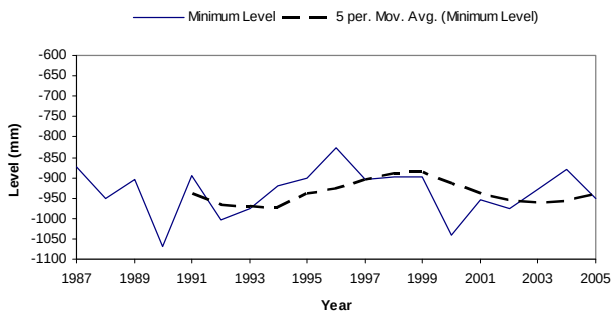
Annual Summaries

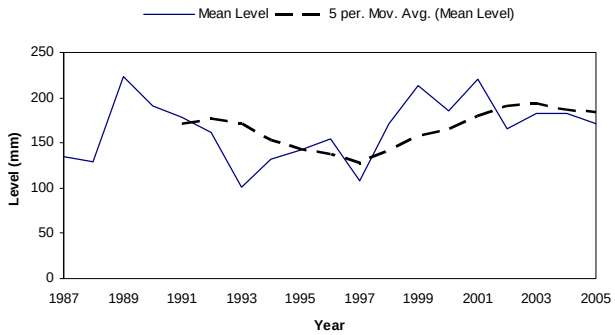
Year	Level (mm)			Year	Level (mm)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993	-976	101	1208
1981				1994	-919	132	1503
1982				1995	-901	142	1635
1983				1996	-828	154	1515
1984				1997	-903	108	1674
1985				1998	-899	172	2440
1986				1999	-897	213	1856
1987	-873	135	1561	2000	-1040	185	1507
1988	-952	129	1613	2001	-955	220	1516
1989	-903	223	1343	2002	-976	166	1508
1990	-1069	191	1442	2003	-929	182	1542
1991	-896	179	1758	2004	-880	182	3048
1992	-1005	161	1358	2005	-950	172	1834

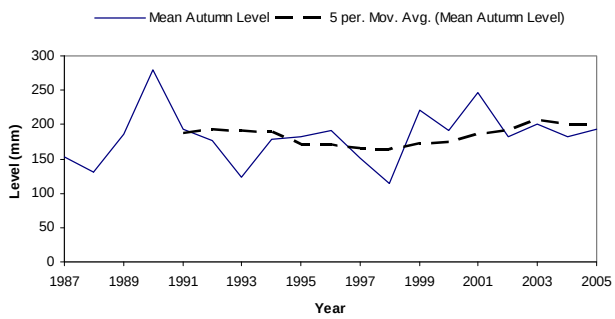
Level Distribution

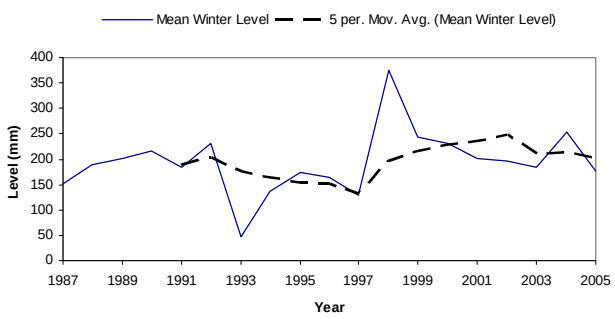
Level (mm)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	3048	1130	1052	1003	966	934	908	885	864	844
10	825	808	791	775	760	745	730	715	701	686
20	672	657	643	628	614	599	584	568	553	537
30	521	505	489	472	455	438	420	403	385	367
40	349	331	313	295	277	258	240	221	203	184
50	166	148	129	111	93	74	56	38	20	2
60	-16	-34	-52	-70	-87	-104	-122	-139	-156	-173
70	-189	-206	-222	-238	-254	-270	-285	-301	-316	-331
80	-346	-361	-377	-392	-407	-423	-439	-455	-471	-488
90	-505	-523	-542	-563	-585	-609	-636	-668	-709	-767
100	-1069									

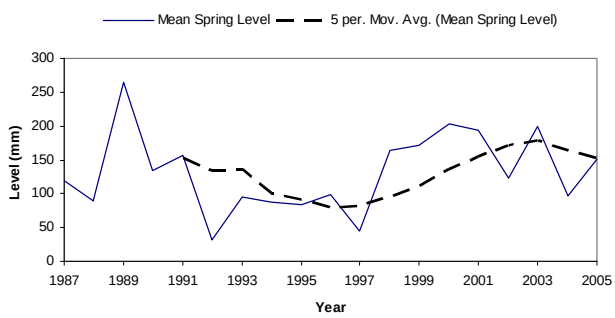


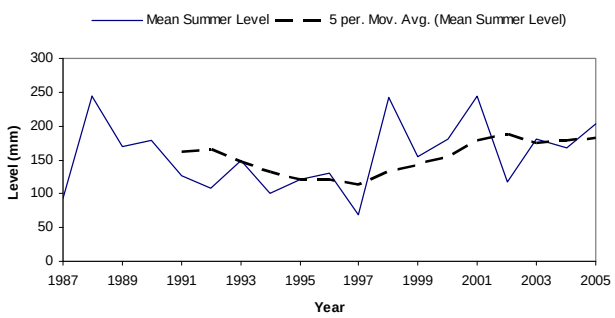












Whakatane at Town Wharf

Environment Bay of Plenty
River Level Recording Station

River	Whakatane	Site	Whakatane
Site Number	15514	Grid Reference	W15:609 475
Start of Record	July 1956	Data Capture Rate	99%
Data Summary From	January 1957	To	December 2005
Data Audited From	July 1956	To	December 2005

Equipment History

31/07/56: Kent chart recorder.

23/07/87: Float with F&P digital and Aquitel Remote.

30/10/75: Float with F&P digital recorder.

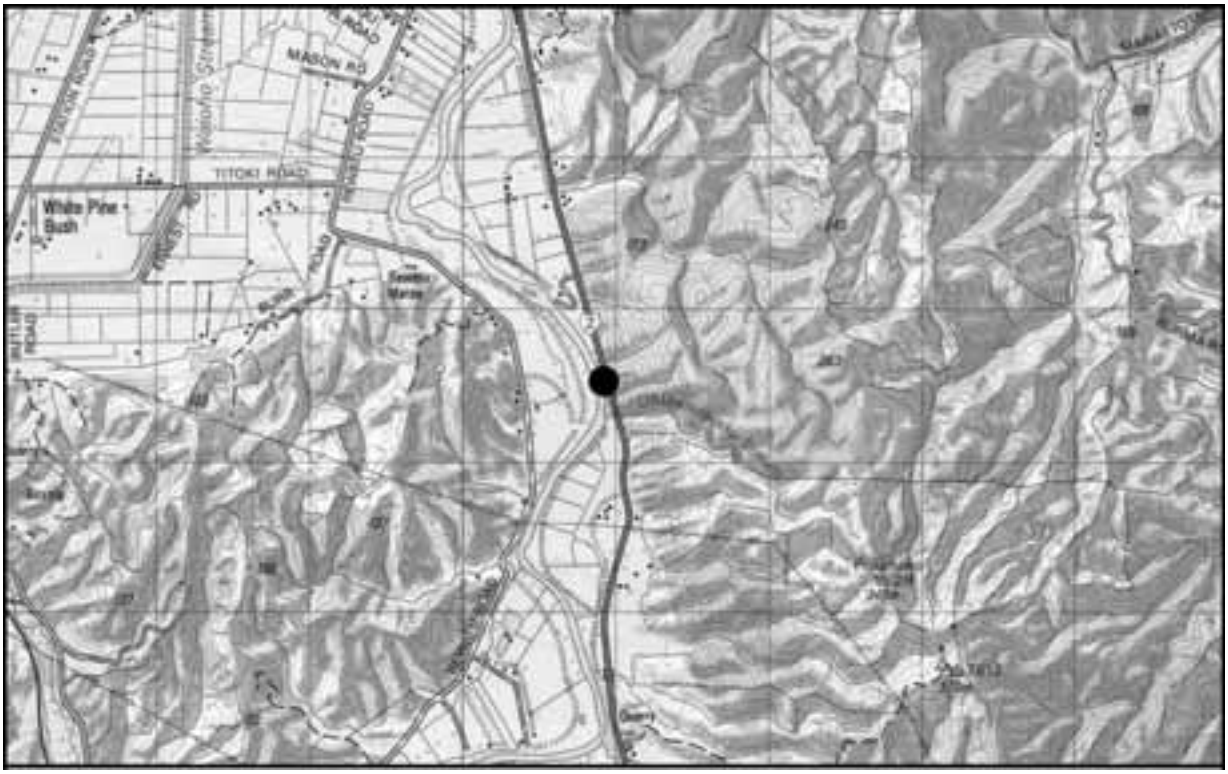
06/01/94: Float with Encoder and Aquitel.

Comments on Stage/Discharge Ratings

Ratings are available to convert Stage (mm) to Reduced Level (mm) in Moturiki Datum.

General Comments

Site is operated by NIWA, Rotorua. Site is influenced by a tidal effect that is apparent up to mean flow during spring tide events. Suspended sediment is also measured at this site. Site also contains equipment owned by Environment Bay of Plenty that is utilised for flood monitoring purposes.



SITE LOCATION
Whakatane at Whakatane

Station Comments

Whakatane River at Whakatane. Site Number 15514, on River Number 155000

The local recording authority is NIWA, Rotorua.

The site is situated 13.5 kilometres. from the mouth. Site control is by downstream riffle. The natural river character has undergone major changes since the stations construction. Major flood protection works in the form of 10 year and 100 year return period stop banking, upstream and downstream channel diversion and straightening, and rip-rap emplacement on the right bank adjacent to the recorder tower were undertaken from the mid 1960's. Large-scale gravel and sand abstraction has also occurred from the 1940's and is continuing today. The station is situated on the outside bank of a meander bend crest. The channel bed material is mixed sand-gravel and therefore the channel is susceptible to bed-level changes.
Rating changes may also occur due to localised bank erosion and control modification due to floods or gravel extraction activities. The site is also influenced by a tidal effect, which is apparent up to mean flow during spring tide events. The effect tends to exaggerate river flows when the tidal peak elevates river levels. Suspended sediment concentration is also measured at this site.

The original processing is archived on the miscellaneous file under site number 2215. A surge in the recorder tower and a small time lag between river and recorder tower levels occurs at periods of high stage.

31/12/60 - Many of the flood peaks from 1961 to 1975 recorded on Kent charts were verified by actual event observations and/or from floodmarks on the recorder tower.

19/01/61 - Data from 610119 240000 to 630909 240000 is generally filed at 6-hourly, 12-hourly or 24-hourly intervals depending on stage variation from Kent charts. Nearly all of the tidal influence has been ignored.

27/05/83 - New gauging cableway commissioned on 830527 100000.

26/10/83 -Ten year stopbank overtopped approximately 2 kilometres upstream of recorder.

23/07/87 - Aquitel telemetry installed on 870723 140000 as additional backup recorder and for flood warning. Unless otherwise stated from this date onwards backup data is obtained from the Aquitel Remote unless that too is unavailable or erroneous. Periods where telemetered data is filed are not commented.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Complied	December 2006	Site Number	15514
Compiled by	G R Ellery	River	Whakatane
		Station	Whakatane
Metric Map Reference	W15:609 475		
Catchment Area (km²)	1557	Period of Summary	1957 to 2005

Statistical Summary

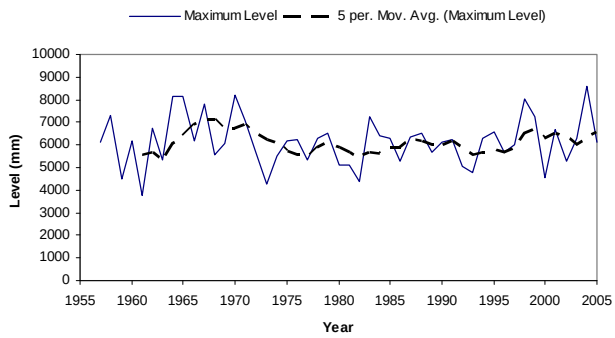
Level (mm)			
Minimum Level	931	Maximum Level	8593
Mean Annual Minimum Level	1146	Mean Annual Maximum Level	6141
Mean Level	1729	Mean Summer Level	1591
Median Level	1581	Mean Autumn Level	1561
		Mean Winter Level	1940
		Mean Spring Level	1831
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	GEV
7 day Low Level (Minimum)	951	Peak Level (5 yr Return)	7067
7 Day Low Level (Mean Annual)	1155	Peak Level (10 yr Return)	7593
7 day Low Level (5 yr Return)	1088	Peak Level (20 yr Return)	8024
7 Day Low Level (10 yr Return)	1044	Peak Level (50 yr Return)	8490
		Peak Level (100 yr Return)	

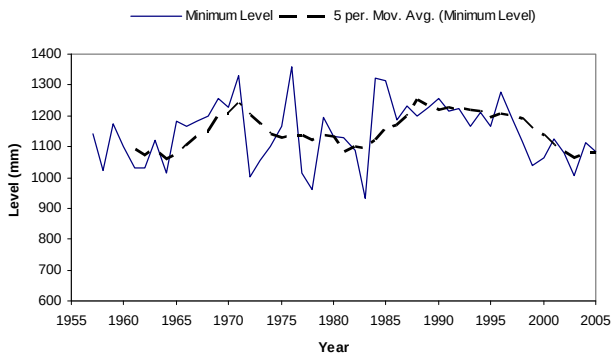
Annual Summaries

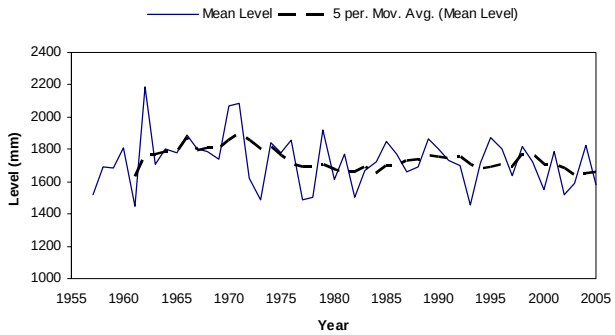
Year	Level (mm)			Year	Level (mm)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	1133	1611	5112	1993	1166	1459	4756
1981	1128	1769	5119	1994	1211	1713	6290
1982	1089	1506	4359	1995	1165	1875	6548
1983	931	1666	7229	1996	1275	1799	5661
1984	1323	1726	6400	1997	1190	1634	6007
1985	1315	1847	6290	1998	1116	1817	8011
1986	1186	1772	5277	1999	1038	1727	7266
1987	1231	1657	6357	2000	1064	1553	4547
1988	1200	1690	6533	2001	1124	1790	6692
1989	1229	1865	5667	2002	1080	1520	5277
1990	1258	1799	6105	2003	1006	1588	6283
1991	1214	1728	6246	2004	1114	1826	8593
1992	1225	1703	5029	2005	1084	1579	6101

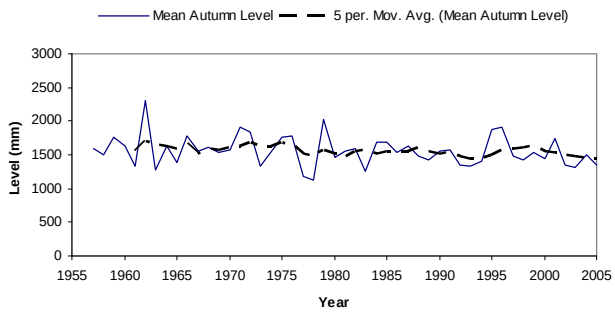
Level Distribution

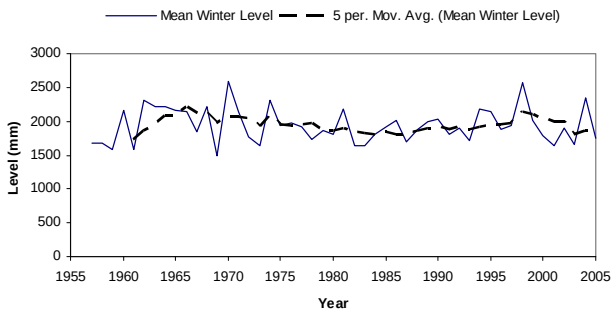
Level (mm)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	8593	4222	3505	3132	2914	2756	2637	2545	2467	2404
10	2349	2299	2253	2211	2171	2135	2102	2071	2043	2017
20	1993	1968	1947	1926	1906	1887	1870	1853	1837	1821
30	1807	1792	1779	1765	1753	1740	1728	1716	1704	1692
40	1680	1670	1659	1649	1639	1628	1618	1608	1599	1590
50	1581	1572	1563	1554	1545	1536	1527	1519	1510	1502
60	1493	1485	1477	1468	1459	1451	1443	1435	1427	1419
70	1411	1404	1397	1389	1382	1374	1366	1358	1349	1341
80	1333	1325	1316	1307	1299	1289	1280	1271	1261	1251
90	1241	1229	1217	1205	1190	1174	1152	1130	1102	1060
100	931									

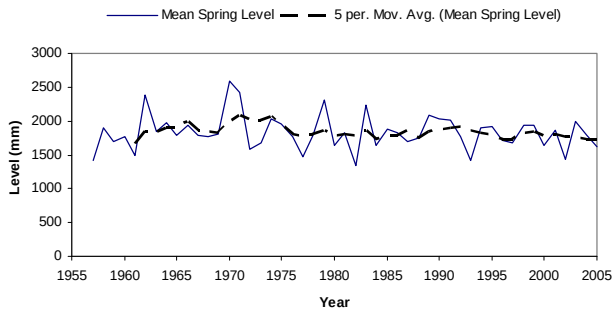


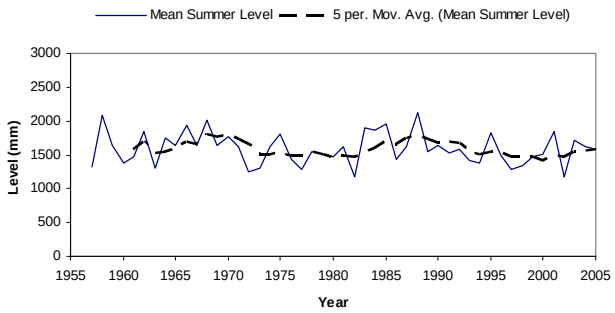












Whakatane at Whakatane

Environment Bay of Plenty
River Level Recording Station

River	Whakatane	Site	Huitieke
Site Number	15541	Grid Reference	W17:604 074
Start of Record	April 1986	Data Capture Rate	93%
Data Summary From	January 1987	To	December 2005
Data Audited From	January 1998	To	December 2005

Equipment History

28/04/86: Float with F&P digital recorder and Jepsen slave.

14/06/90: Float with L&S digital recorder and Aquitel Remote.

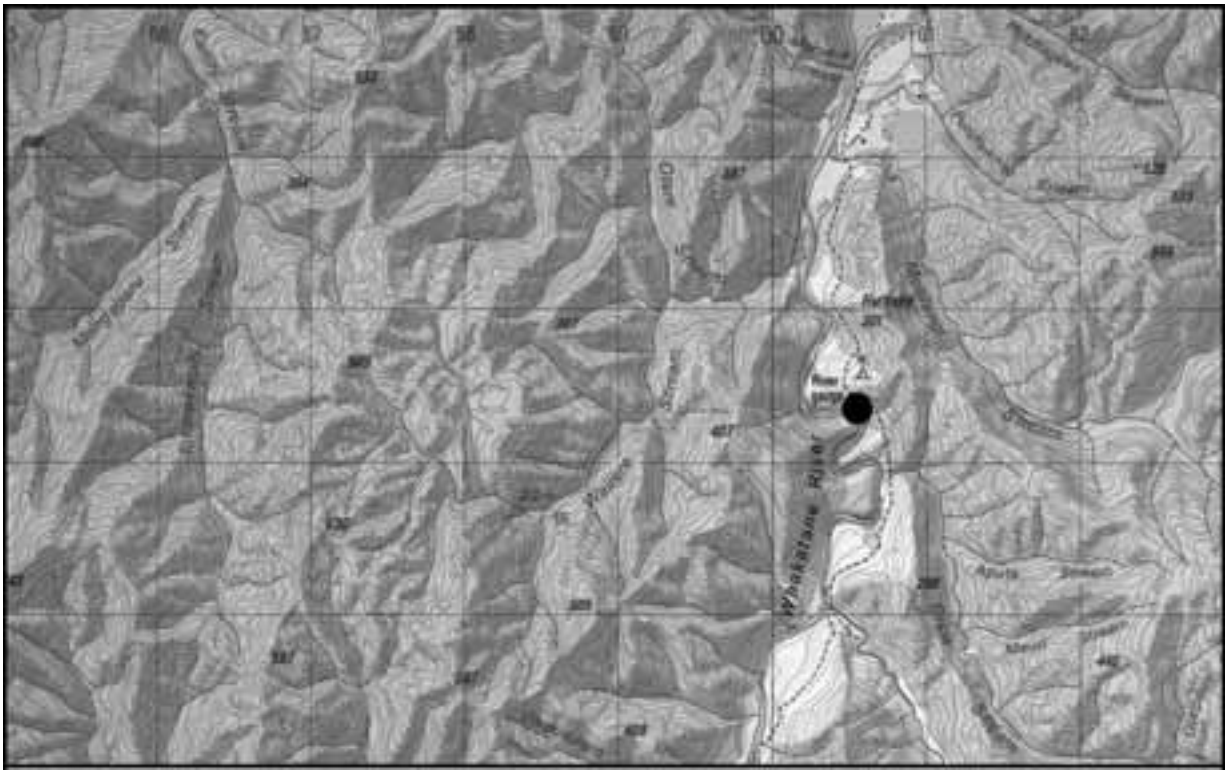
21/6/00: Float with Handar and IQuest DS4483 datalogger.

Comments on Stage/Discharge Ratings

Ratings are available to convert Stage (mm) to Reduced Level (mm) in assumed datum.

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring network for flood warning and monitoring purposes.



SITE LOCATION
Whakatane at Huitieke

Station Comments

Whakatane River at Huitieke. Site Number 15541, on River Number 15500.

The local recording authority is Environment Bay of Plenty

The site is situated 58.5 kilometres from the mouth. Site control is by unstable gravel bed. No discharge is measured at this site. This site was installed as part of the Whakatane-Waimana flood warning system.

28/04/86 - Synthetic type 3 rating to convert Stage values to Assumed Datum. This rating was established from surveyed level of staff gauge carried out on 911008. It was assumed that the staff gauge had not moved between 860428 to 911008. Caution should be used when using rated data through this period.

17/07/86 - Missing record due to gravel build up inside tower from 860717 to 900629.

31/12/95 - Synthetic data has been inserted during periods of missing record. Synthetic data is derived from comparisons with Waimana at Ogilvies Bridge (15536). Aquitel telemetry data has also been used where available.

24/02/02 - Missing record 20020224 114500 to 20030304 at 091500 due to battery and radio being stolen from site.

29/05/04 - Missing record from 20040529 020000 to 20040602 114500. Logger program failed, after being incorrectly updated on 20040526 114500. Program reloaded.

18/06/04 - Missing record from 20040618 221500 to 20040625 104500 due to logger program failure.

17/7/04 - Missing record from 20040717 201500 to 20040719 140000 due to logger program failure.

20/7/04 - Blockage in stilling well intake becomes evident 20040720 084500 (flat line in stage trace). The well was thought to be fully flushed from 20040721 094500 to 20040721 160000, resulting in a natural stage recession until 20040721 164500. However, a deeper obstruction at 0.765m remained until 20040722 073000 when the tower was flushed again. Due to high stage, further silt/gravel obstruction was unclear, but remained until 20040901. Water levels which exceeded the level of the blockage were recorded throughout this event. Hence the flat line remains in the data set, to show where water levels remained below the blockage.

1/09/04 - Missing record from 20040901 140000 to 20040902 163000. Huitieke fully flushed at normal river stage. Drainage holes (4) clearly visible (afterwards) in base of stilling well.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Complied	December 2006	Site Number	15541
Compiled by	G R Ellery	River	Whakatane
		Station	Huitieke
Metric Map Reference	W17:604 074		
Catchment Area (km²)	620	Period of Summary	1987 to 2005

Statistical Summary

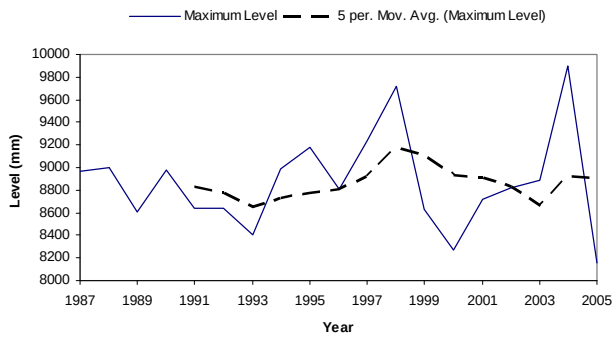
Level (mm)			
Minimum Level	6566	Maximum Level	9904
Mean Annual Minimum Level	6816	Mean Annual Maximum Level	8870
Mean Level	7124	Mean Summer Level	7063
Median Level	7076	Mean Autumn Level	7024
		Mean Winter Level	7243
		Mean Spring Level	7183
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	Gumbel
7 day Low Level (Minimum)	6573	Peak Level (5 yr Return)	9193
7 Day Low Level (Mean Annual)	6816	Peak Level (10 yr Return)	9455
7 day Low Level (5 yr Return)	6718	Peak Level (20 yr Return)	9707
7 Day Low Level (10 yr Return)	6649	Peak Level (50 yr Return)	
		Peak Level (100 yr Return)	

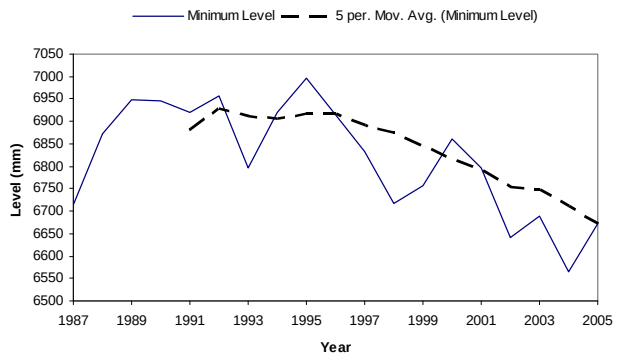
Annual Summaries

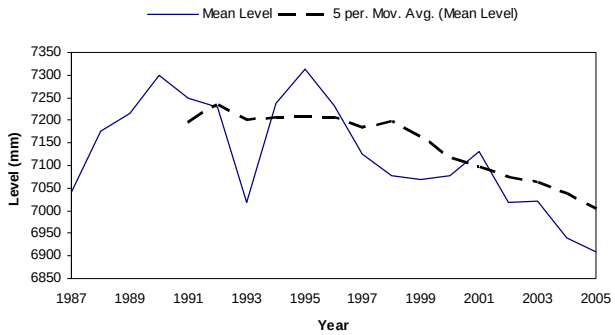
Year	Level (mm)			Year	Level (mm)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993	6795	7017	8407
1981				1994	6919	7239	8986
1982				1995	6996	7315	9178
1983				1996	6915	7231	8804
1984				1997	6834	7125	9241
1985				1998	6716	7077	9717
1986				1999	6756	7069	8625
1987	6713	7040	8963	2000	6862	7079	8268
1988	6872	7177	8996	2001	6795	7130	8722
1989	6949	7214	8602	2002	6642	7020	8816
1990	6945	7299	8982	2003	6690	7022	8885
1991	6919	7250	8639	2004	6566	6940	9904
1992	6958	7230	8644	2005	6671	6910	8157

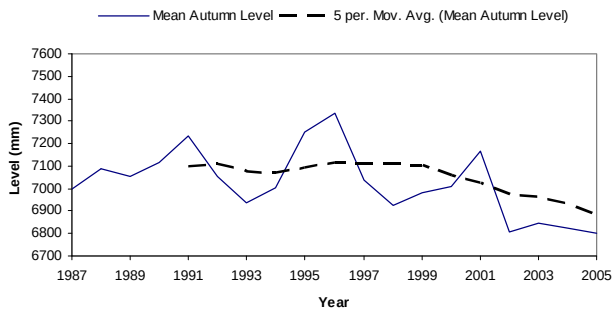
Level Distribution

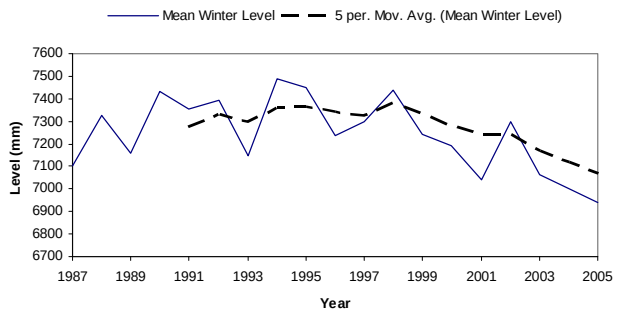
Level (mm)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	9904	8052	7872	7761	7679	7622	7580	7544	7512	7482
10	7458	7435	7415	7397	7379	7362	7347	7333	7321	7309
20	7298	7287	7276	7266	7257	7247	7239	7230	7221	7212
30	7204	7197	7189	7181	7174	7167	7159	7152	7146	7140
40	7134	7127	7121	7115	7109	7103	7097	7092	7086	7081
50	7076	7071	7066	7060	7055	7049	7044	7038	7033	7028
60	7024	7019	7014	7009	7004	7000	6995	6990	6987	6982
70	6977	6972	6967	6962	6957	6952	6946	6940	6934	6927
80	6921	6913	6906	6897	6889	6881	6874	6866	6858	6850
90	6840	6830	6815	6801	6785	6772	6755	6733	6715	6685
100	6566									

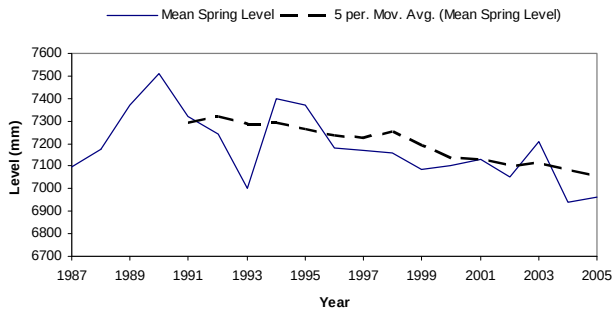


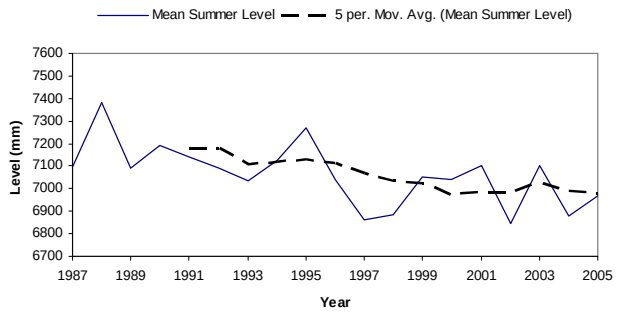












Whakatane at Huitieke

Environment Bay of Plenty
River Level Recording Station

River	Waimana	Site	Gorge
Site Number	15511	Grid Reference	W16: 366 644
Start of Record	October 1950	Data Capture Rate	97%
Data Summary From	January 1951	To	December 2005
Data Audited From		To	December 2005

Equipment History

01/10/50: Staff gauge and chart recorder.
29/08/69: Float with F&P digital recorder.
12/06/79: Float with L&S digital recorder.
19/07/99: Float with Aquitel Remote.

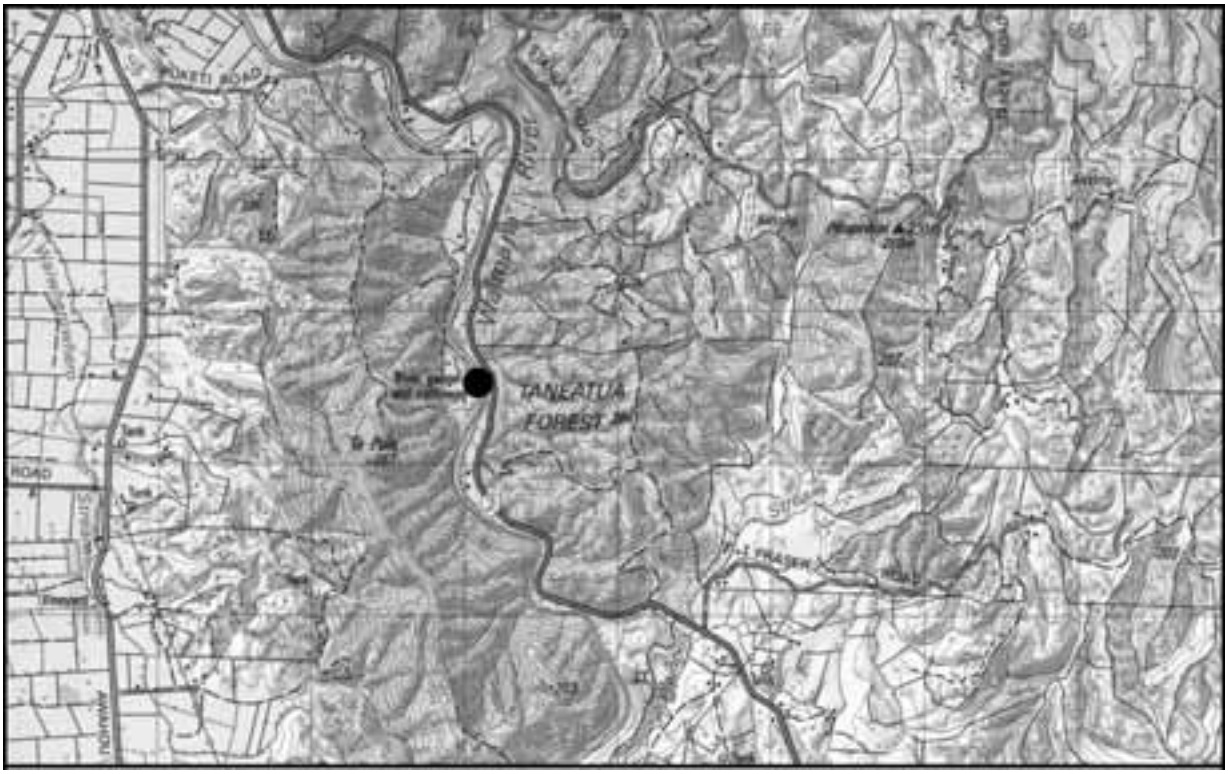
Comments on Stage/Discharge Ratings

Site has a natural gravel control.

Ratings are available to convert Stage (mm) to Flow (l/s). Ratings cease on 27 November 1980.

General Comments

This site recorded flow from October 1950 to November 1980 for the Hamilton Hydrological Survey. Site was handed over to B.O.P.C.C. on 03/01/81 and now operates for flood monitoring purposes. Site is now operated by Environment Bay of Plenty as part of its Natural Environmental Monitoring Network.



SITE LOCATION
Waimana at Gorge

Station Comments

Waimana River at Waimana Gorge. Site Number 15511, on River Number 155090.

The local recording authority is Environment Bay of Plenty.
The site is situated 29.5 kilometres from mouth. The control is a natural gravel riverbed.

01/10/50
Stage/time data for the period 501001 to 660121 has been hand tabulated from the water level charts by Power Division staff at Head Office. In general not enough points have been taken off the charts to accurately define the shape of some hydrographs. Flood peaks have been tabulated but filed at times to suit the tabulation interval being used. Although there are some variations, tabulation intervals are:

501001 to 560101 3 hourly values
560101 to 610709 12 hourly values
610709 to 660121 6 hourly values

With some 2 and 3 hourly values for these periods and in extreme cases, some daily mean discharges are 38% higher than they should be. In general the daily mean discharge are in error between +/-3%.

27/11/80 - Site changed from rated site to non-rated site on 801127.

02/01/81 -Site handed over to B.O.P.C.C. on 810103.

19/07/91 - Aquitel logger installed for telemetered flood warning purposes.

31/12/95 - Periods of missing record and synthetic data occur throughout the data record. Some periods of missing record have been filled with synthetic data based on comparisons with some or all of the following sites. Meteorological gauges; Ruatoki (B87101), Matahi (B887212), Waimana (B87103), Ogilvie Bridge (873103), and water levels Whakatane at Whakatane (15514) and Waimana at Ogilvie Bridge (15536).

Environment Bay of Plenty
Hydrological Level Summary

Date Complied	December 2006	Site Number	15511
Compiled by	G R Ellery	River	Waimana
		Station	Gorge
Metric Map Reference	W16: 642 375		
Catchment Area (km²)	440	Period of Summary	1951 to 2005

Statistical Summary

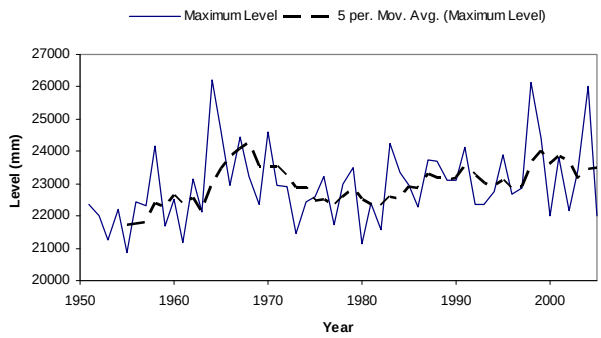
Level (mm) Moturiki Datum			
Minimum Level	19068	Maximum Level	26194
Mean Annual Minimum Level	19548	Mean Annual Maximum Level	22968
Mean Level	19905	Mean Summer Level	19822
Median Level	19882	Mean Autumn Level	19826
		Mean Winter Level	20035
		Mean Spring Level	19943
Low Level Distribution Fit	GEV	Peak Level Distribution Fit	Gumbel
7 day Low Level (Minimum)	19085	Peak Level (5 yr Return)	23846
7 Day Low Level (Mean Annual)	19513	Peak Level (10 yr Return)	24562
7 day Low Level (5 yr Return)	19338	Peak Level (20 yr Return)	25248
7 Day Low Level (10 yr Return)	19222	Peak Level (50 yr Return)	26136
		Peak Level (100 yr Return)	

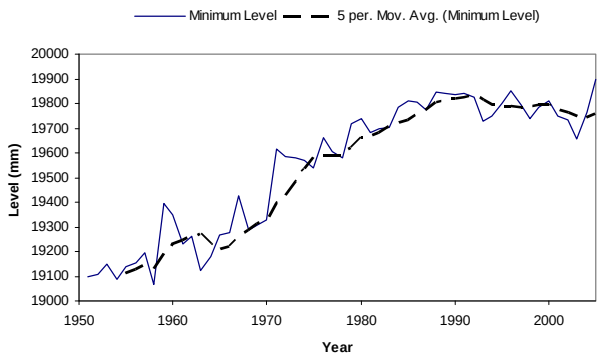
Annual Summaries

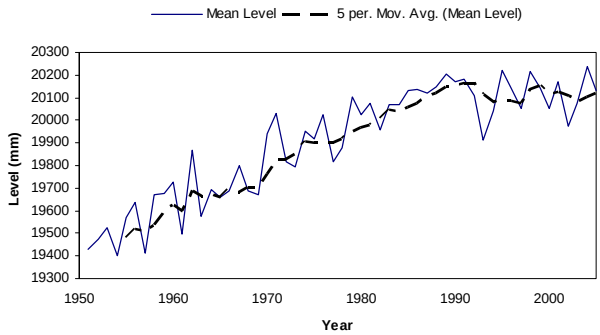
Year	Level (mm) Moturiki Datum			Year	Level (mm) Moturiki Datum		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	19681	20073	22404	1993	19729	19910	22374
1981	19700	19957	21586	1994	19747	20042	22760
1982	19702	20070	24262	1995	19799	20221	23912
1983	19784	20072	23334	1996	19853	20144	22669
1984	19809	20129	22966	1997	19796	20052	22890
1985	19803	20138	22276	1998	19739	20216	26144
1986	19774	20118	23734	1999	19785	20143	24424
1987	19845	20147	23679	2000	19810	20052	22005
1988	19839	20207	23095	2001	19751	20169	23811
1989	19836	20173	23121	2002	19733	19972	22152
1990	19840	20182	24136	2003	19656	20078	23432
1991	19826	20109	22346	2004	19764	20238	25999
1992	19681	20073	22404	2005	19898	20131	22014

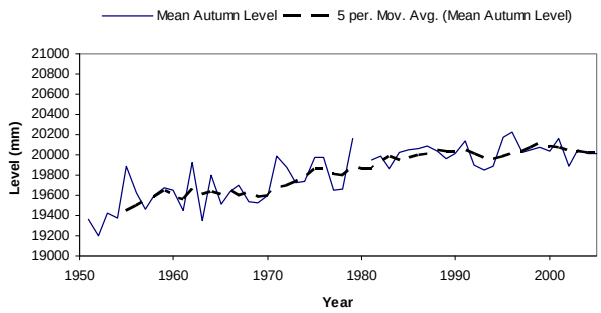
Level Distribution

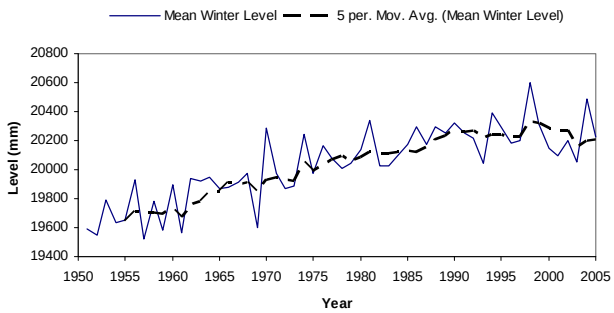
Level (*l/s*)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	26194	21306	20947	20778	20668	20587	20527	20476	20434	20397
10	20364	20333	20307	20283	20261	20242	20223	20205	20188	20173
20	20159	20145	20132	20120	20108	20097	20086	20076	20066	20056
30	20046	20037	20028	20018	20010	20001	19992	19984	19976	19969
40	19961	19953	19945	19937	19928	19920	19913	19906	19898	19890
50	19882	19875	19867	19859	19852	19844	19837	19829	19820	19811
60	19802	19793	19785	19775	19766	19757	19748	19738	19727	19715
70	19702	19688	19676	19664	19651	19641	19629	19620	19610	19598
80	19586	19571	19553	19534	19518	19496	19477	19457	19437	19421
90	19399	19376	19358	19337	19315	19296	19274	19244	19209	19165
100	19068									

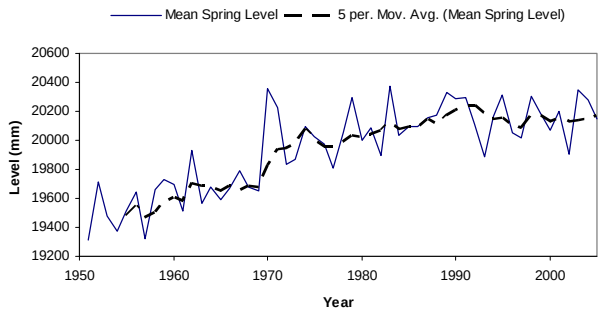


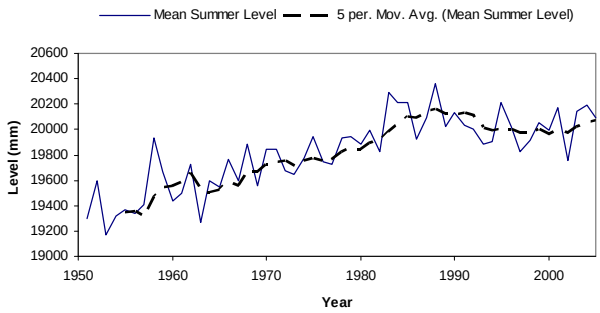












Waimana at Gorge

Environment Bay of Plenty
River Level Recording Station

River	Waimana	Site	Ranger Station
Site Number	15544	Grid Reference	W16:642 375
Start of Record	February 1995	Data Capture Rate	100%
Data Summary From	January 1996	To	December 2005
Data Audited From	February 1995	To	December 2005

Equipment History

20/02/95: Kainga WRIC and Kainga encoder installed. 11/04/96: Kainga WRIC datalogger as backup.

02/09/99: DS-4483 logger installed with Sutron pressure sensor, with a CR500 and Kainga P.T. for backup.

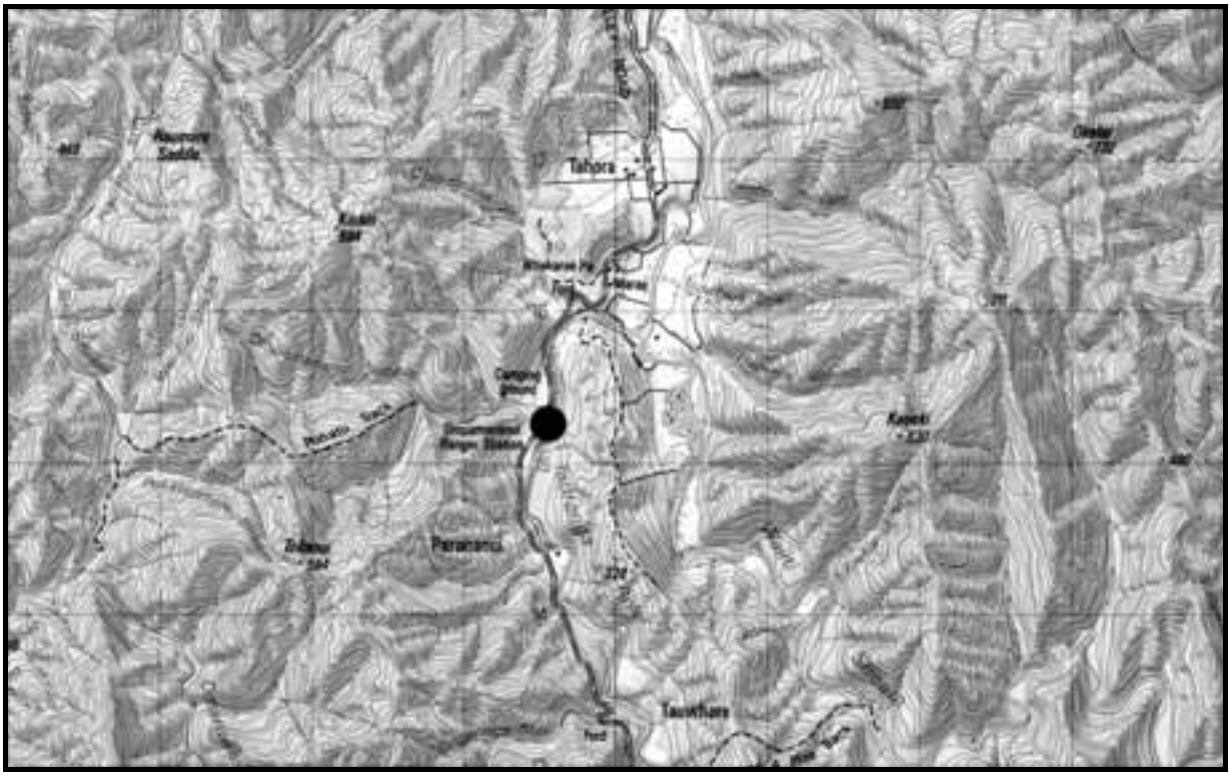
Comments on Stage/Discharge Ratings

Site control is by a bedrock structure located across the channel 10 metres downstream of site. Ratings are available to convert Stage (mm) to Flow (l/s).

General Comments

Site installed 950209 by Environment Bay of Plenty. Site is operated for flood monitoring purposes and is also part of the Natural Environment Regional Monitoring Network.

Large flood in 1998 lifted stream bed significantly approximately 600mm.



SITE LOCATION
Waimana at Ranger Station

Station Comments

Waimana River at Ranger Station. Site Number 15544, on River Number 155090.

The site is situated 40.25 kilometres from the confluence with the Whakatane River and 62 kilometres from the mouth of the Whakatane River. NZMS 260 Reference W16:696 153. Drains 216 km^2. The control is by a bedrock structure located across the channel 10 metres downstream of the site.

09/02/95 - Six steel cylinders bolted together with an aluminium recorder house.

20/02/95 - Kainga WRIC and Kainga shaft encoder installed.

11/04/96 - L&S recorder installed. Kainga WRIC data is used as backup.

02/07/98 - Missing record from 980702 64500 to 980707 123000 due to site being destroyed during flood event. Maximum water levels were pegged from floodmarks (on 3/7/98) with a level of 7.65 metres measured.

02/07/98 - Slope area gauging calculation (Gauging number 62) resulted in a discharge of 913.6 cumecs. Mean area was 245.724m2. A Mannings n of 0.035 was used in the calculation. This event raised the level of the bed by approximately 600mm. This addition of bed material completely buried the bedrock control. Removal of the bed material over time could result in a migration of the rating curves back to historical positions until the control takes effect again.

25/01/99 - Missing record from 990125 50000 to 990127 124500 due to new site installation. No rainfall was recorded at surrounding rain gauges, a straight line recession was implemented. New equipment includes a Sutron Gas Bubbler P.T. (0-15 metre range). A Kainga PT 0-10 metre range. Logging is done via a CR500.

02/09/99 – DS-4483 logger installed with Sutron P.T. connected to it as the main recording instrument. CR500 with Kainga P.T. provides backup record.

29/09/03 – Missing record from 20030929 at 160000 to 20031002 at 134500 due to programme fault in logger. 26mm of rainfall fell over this period.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Complied	July 2006	Site Number	15544
Compiled by	G R Ellery	River	Waimana
		Station	Ranger Station
Metric Map Reference	W16:642 375		
Catchment Area (km²)	216	Period of Summary	1996 to 2005

Statistical Summary

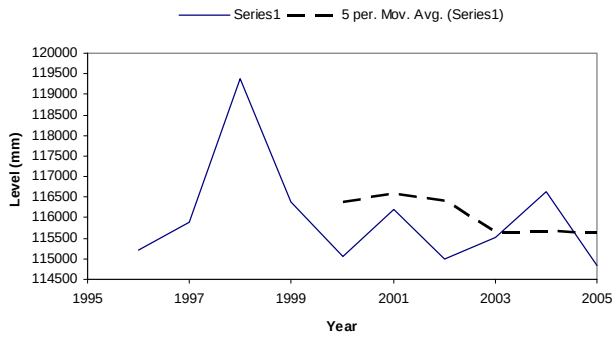
Level (mm) Moturiki Datum			
Minimum Level	112999	Maximum Level	117672
Mean Annual Minimum Level	113246	Mean Annual Maximum Level	116014
Mean Level	113257	Mean Summer Level	113471
Median Level	113499	Mean Autumn Level	113431
		Mean Winter Level	113621
		Mean Spring Level	113569
Low Level Distribution Fit	GEV	Peak Level Distribution Fit	Gumbel
7 day Low Level (Minimum)	113005	Peak Level (5 yr Return)	116490
7 Day Low Level (Mean Annual)	113251	Peak Level (10 yr Return)	117095
7 day Low Level (5 yr Return)	113123		
7 Day Low Level (10 yr Return)	113030		

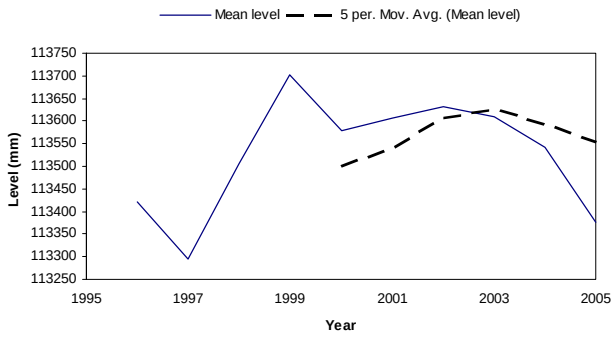
Annual Summaries

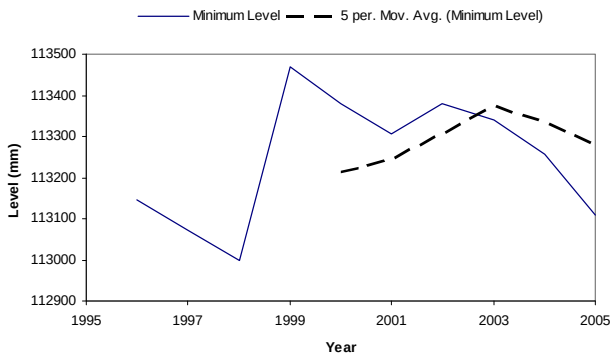
Year	Level (mm) Moturiki Datum			Year	Level (mm) Moturiki Datum		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993			
1981				1994			
1982				1995			
1983				1996	113146	113420	115212
1984				1997	113073	113296	115889
1985				1998	112999	113506	119379
1986				1999	113468	113702	116399
1987				2000	113380	113579	115070
1988				2001	113307	113608	116202
1989				2002	113380	113632	114992
1990				2003	113341	113609	115529
1991				2004	113258	113541	116626
1992				2005	113110	113376	114843

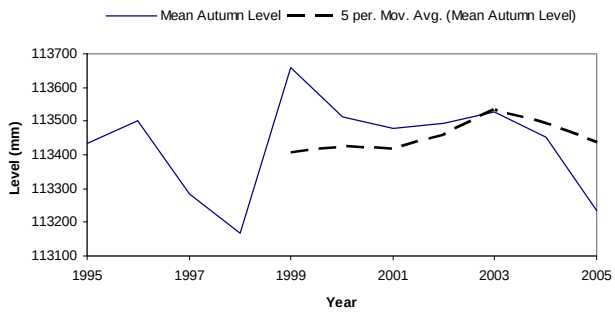
Level Distribution

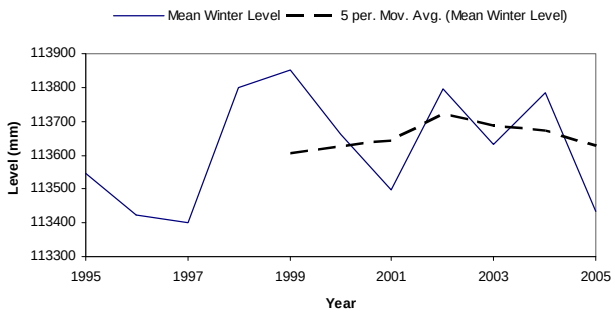
Level (mm) Moturiki Datum										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	117672	114489	114256	114138	114057	113999	113954	113918	113888	113861
10	113838	113814	113792	113774	113756	113740	113726	113713	113702	113691
20	113681	113672	113663	113655	113648	113641	113634	113627	113622	113616
30	113611	113605	113599	113594	113588	113581	113575	113569	113562	113556
40	113550	113544	113538	113533	113528	113524	113520	113515	113510	113505
50	113499	113494	113489	113484	113480	113475	113471	113467	113463	113459
60	113455	113450	113443	113436	113430	113425	113420	113414	113407	113401
70	113395	113390	113384	113376	113369	113360	113352	113345	113336	113328
80	113320	113311	113302	113290	113281	113271	113261	113248	113235	113224
90	113212	113200	113182	113164	113147	113132	113120	113104	113085	113048
100	112999									

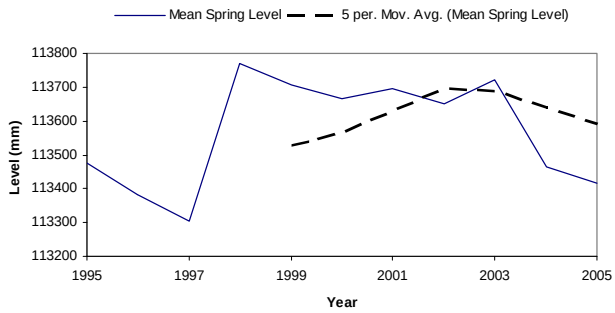


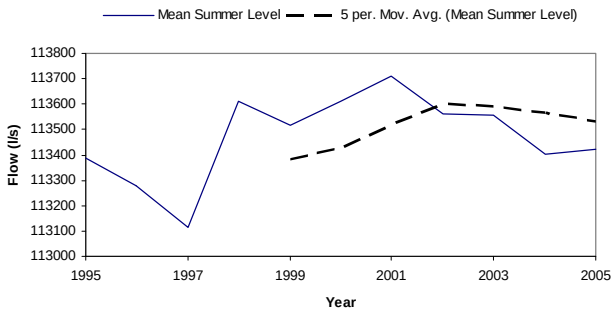












Waimana at Ranger Station

Environment Bay of Plenty
River Level Recording Station

River	Otara	Site	Opotiki Wharf
Site Number	16007	Grid Reference	W15:861 468
Start of Record	August 1990	Data Capture Rate	94%
Data Summary From	January 1991	To	December 2005
Data Audited From	August 1990	To	December 2005

Equipment History

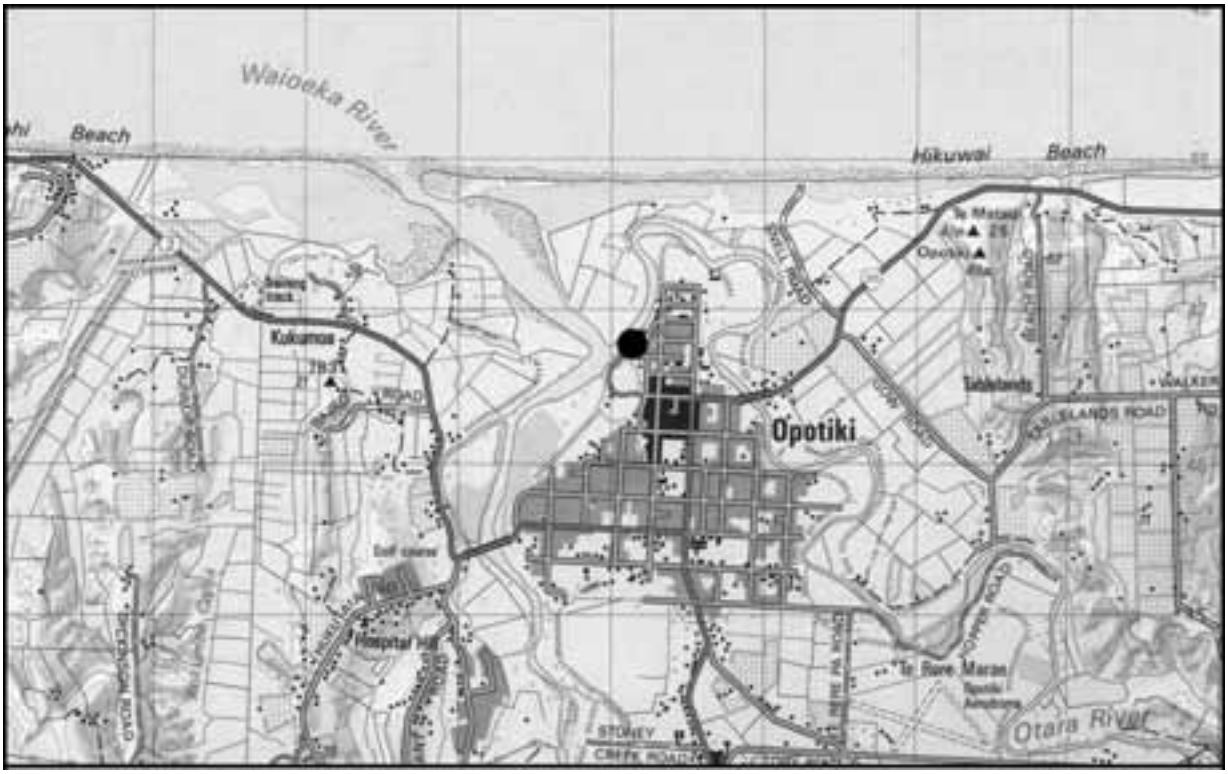
01/08/90: 5 metre range P.T. and datalogger.

Comments on Stage/Discharge Ratings

Ratings are available to convert Stage (mm) to Reduced Level (mm) in Moturiki Datum.

General Comments

Site is operated by Environment Bay of Plenty for engineering design on the Waioeka-Otara flood protection scheme.



SITE LOCATION
Otara at Opotiki Wharf

Station Comments

Otara River at Opotiki Wharf. Site Number 16007, on River Number 160000.

The local recording authority is Environment Bay of Plenty.

The site is situated on the Otara River upstream of the confluence with the Waioeka River. The site is tidally influenced and is located 2 kilometres from the mouth.

02/08/90
Water level recording commences. Data is recorded at six minute intervals.

31/12/95
Periods of missing record occur throughout the data, due to power failure and equipment malfunction.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Complied	December 2006	Site Number	16007
Compiled by	G R Ellery	River	Otara
		Station	Opotiki Wharf
Metric Map Reference	W15:861 468		
Catchment Area (km²)	257	Period of Summary	1991 to 2005

Statistical Summary

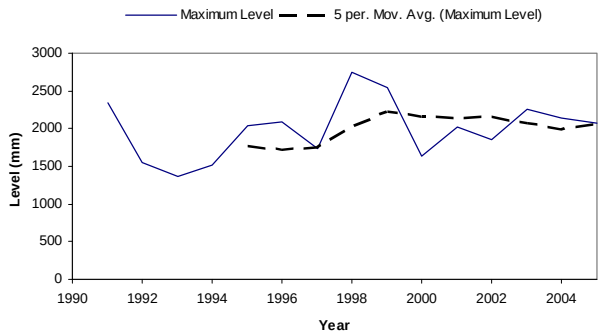
Level (mm)			
Minimum Level	-1107	Maximum Level	2743
Mean Annual Minimum Level		Mean Annual Maximum Level	
Mean Level	234	Mean Summer Level	
Median Level	233	Mean Autumn Level	
		Mean Winter Level	
		Mean Spring Level	
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	GEV
7 day Low Level (Minimum)	-86	Peak Level (5 yr Return)	2340
7 Day Low Level (Mean Annual)	-1	Peak Level (10 yr Return)	2532
7 day Low Level (5 yr Return)	-35	Peak Level (20 yr Return)	2688
7 Day Low Level (10 yr Return)	-58	Peak Level (50 yr Return)	
		Peak Level (100 yr Return)	

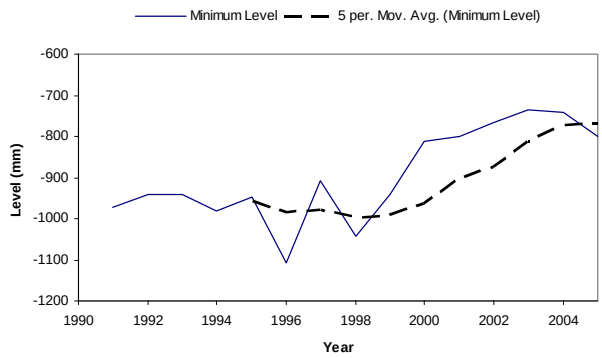
Annual Summaries

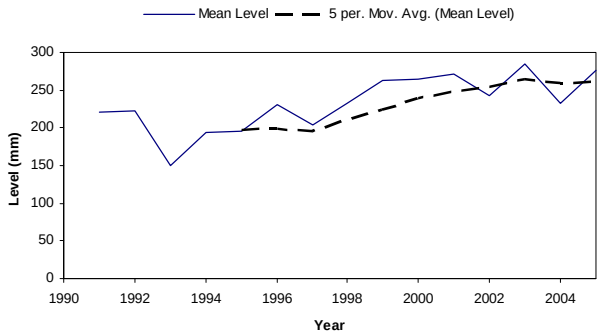
Year	Level (mm)			Year	Level (mm)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993	-941	150	1370
1981				1994	-981	194	1516
1982				1995	-948	195	2036
1983				1996	-1107	231	2090
1984				1997	-909	204	1741
1985				1998	-1042	233	2743
1986				1999	-943	262	2551
1987				2000	-813	264	1639
1988				2001	-801	271	2030
1989				2002	-767	243	1862
1990				2003	-736	285	2253
1991	-972	220	2341	2004	-742	233	2148
1992	-940	223	1554	2005	-800	276	2076

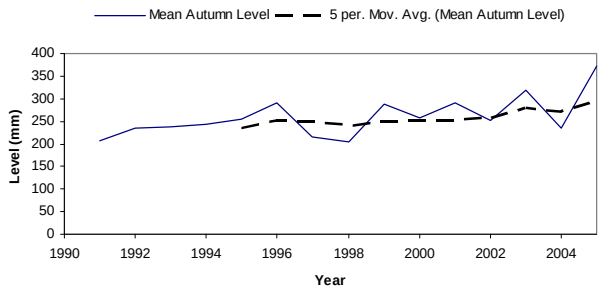
Level Distribution

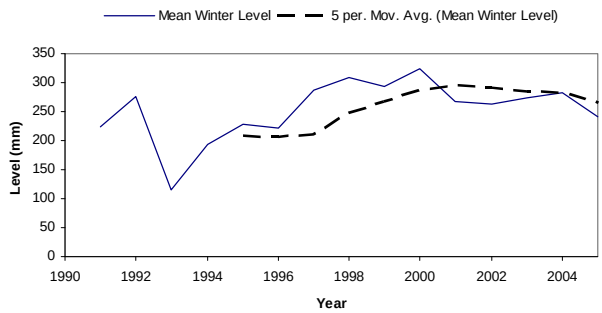
Level (mm)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	2743	1249	1158	1104	1064	1031	1004	980	958	938
10	919	901	884	868	852	837	822	807	793	778
20	764	750	736	721	707	693	678	664	649	633
30	618	601	585	568	550	533	515	496	477	458
40	439	419	399	378	358	337	316	295	275	254
50	233	212	191	171	150	130	109	89	70	50
60	31	12	-7	-26	-44	-63	-80	-98	-116	-133
70	-150	-166	-183	-199	-215	-230	-246	-261	-276	-291
80	-306	-321	-336	-351	-367	-382	-397	-413	-429	-446
90	-463	-481	-500	-521	-543	-568	-596	-630	-672	-733
100	-1107									

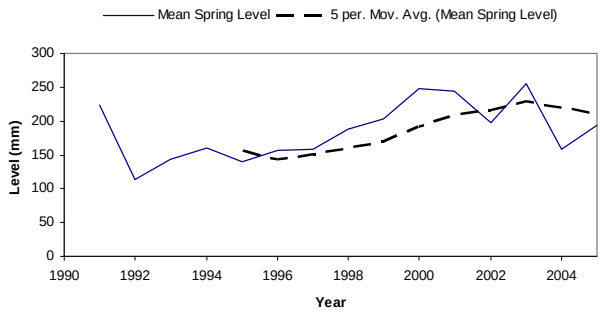


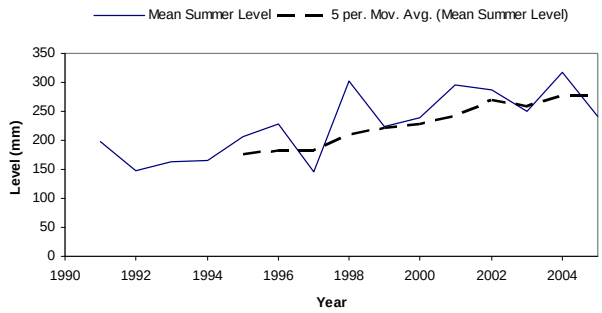












Otara at Opotiki Wharf

Environment Bay of Plenty
River Level Recording Station

River	Waioeka	Site	Mouth of Gorge
Site Number	15912	Grid Reference	W16:862 365
Start of Record	November 1981	Data Capture Rate	94%
Data Summary From	January 1987	To	December 2005
Data Audited From	December 1989	To	December 2005

Equipment History

27/1/81: 10 metre range monthly Foxboro chart recorder.

07/12/89: 10 metre range P.T. with Aquitel Remote.

16/05/90: 6 metre range backup Foxboro chart recorder.

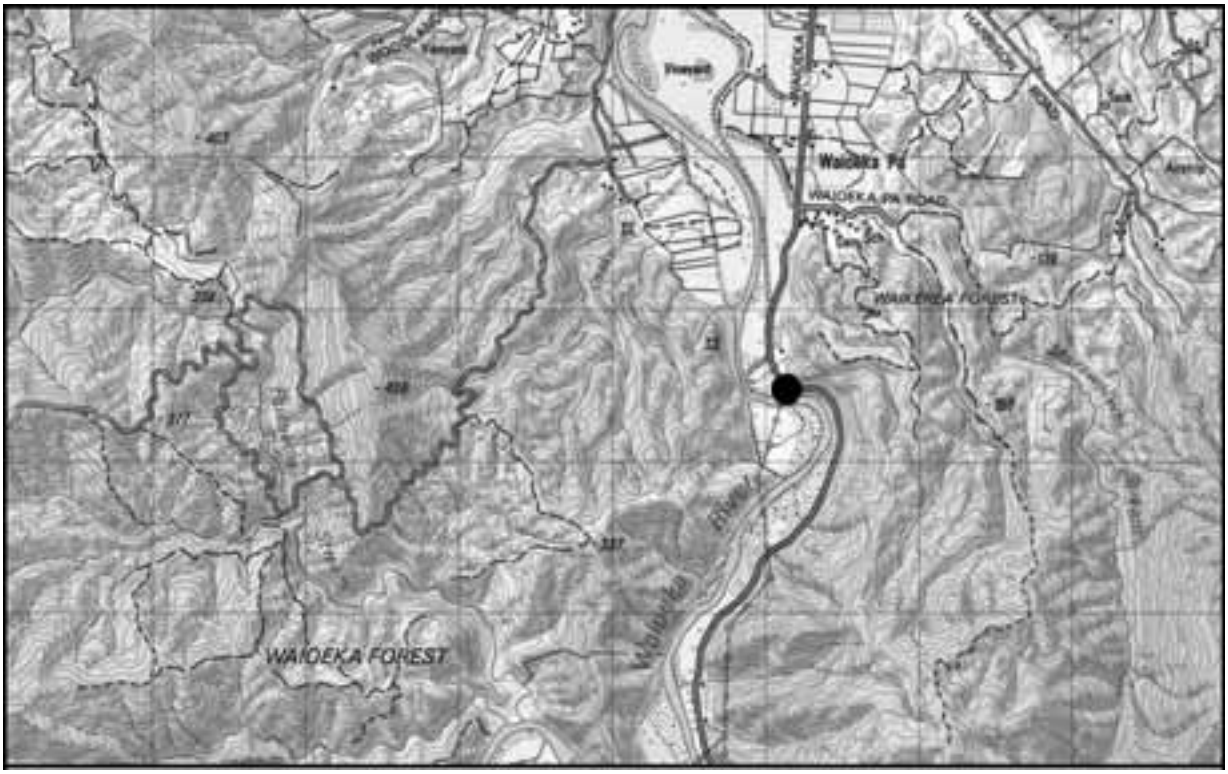
26/10/99: 10 metre range P.T. with I Quest DS4483 datalogger.

Comments on Stage/Discharge Ratings

Ratings are available to convert Stage (mm) to Reduced Level (mm) in Moturiki Datum

General Comments

Site was originally operated by the Gisborne District Council and its predecessor the East Cape Catchment Board. Site was handed over to Environment Bay of Plenty in November 1989. This site is operated for flood monitoring and warning purposes.



SITE LOCATION
Waioeka at Mouth of Gorge

Station Comments

Waioeka River at Mouth of Gorge. Site Number 15912, on River Number 15900.

The local recording authority is Environment Bay Of Plenty.

The site is situated 13.62 kilometres from the mouth of the river. The site is affected by gravel extraction from gravel beach, which forms part of the downstream control.

27/11/81
Data for the period 811127 112500 to 890424 104700 has been obtained from the Gisborne District Council who then operated the site under the East Cape Catchment Board organisation.

13/03/86
First R/L rating recorded. 13760mm Moturiki Datum.

01/11/89
Site handed over to Environment Bay of Plenty.

31/12/95
Periods of missing record and synthetic data occur throughout the data set. Some periods of Synthetic data are based on a correlation with Otara at Browns Bridge (16002).

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Complied	December 2006	Site Number	15912
Compiled by	G R Ellery	River	Waioeka
		Station	Mouth of Gorge
Metric Map Reference	W16:862 365		
Catchment Area (km²)	750	Period of Summary	1987 to 2005

Statistical Summary

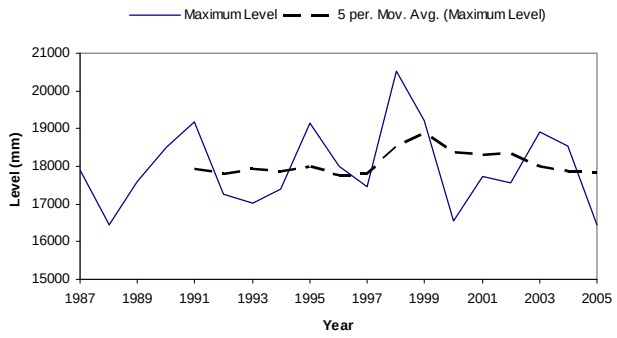
Level (mm)			
Minimum Level	13572	Maximum Level	20520
Mean Annual Minimum Level	14191	Mean Annual Maximum Level	17970
Mean Level	14646	Mean Summer Level	14562
Median Level	14636	Mean Autumn Level	14549
		Mean Winter Level	14795
		Mean Spring Level	14697
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	Gumbel
7 day Low Level (Minimum)	13605	Peak Level (5 yr Return)	18804
7 Day Low Level (Mean Annual)	14235	Peak Level (10 yr Return)	19481
7 day Low Level (5 yr Return)	13965	Peak Level (20 yr Return)	20131
7 Day Low Level (10 yr Return)	13755	Peak Level (50 yr Return)	
		Peak Level (100 yr Return)	

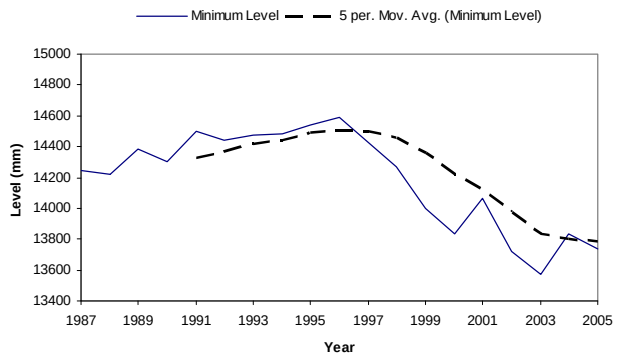
Annual Summaries

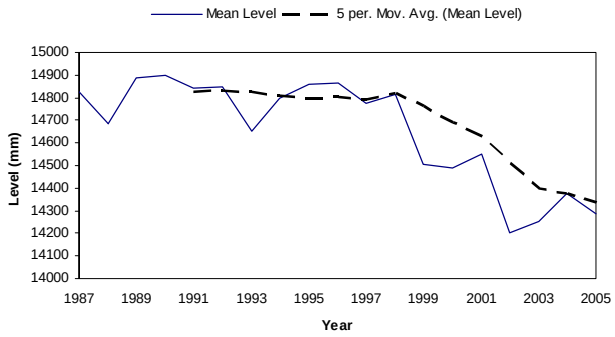
Year	Level (mm)			Year	Level (mm)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993	14474	14654	17039
1981				1994	14487	14795	17398
1982				1995	14537	14862	19157
1983				1996	14588	14867	17998
1984				1997	14428	14776	17462
1985				1998	14269	14814	20520
1986				1999	13998	14504	19227
1987	14246	14825	17898	2000	13834	14487	16567
1988	14221	14688	16457	2001	14061	14553	17746
1989	14386	14885	17590	2002	13717	14201	17547
1990	14301	14898	18492	2003	13572	14254	18919
1991	14496	14842	19191	2004	13836	14379	18523
1992	14446	14849	17271	2005	13738	14288	16436

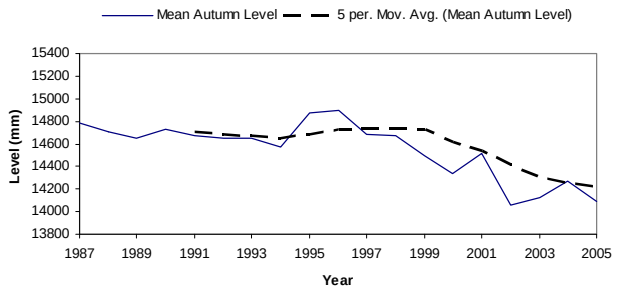
Level Distribution

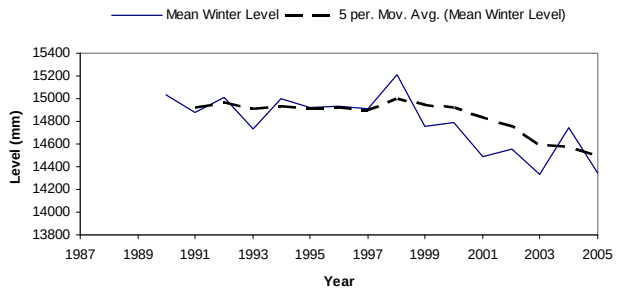
Level (mm)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	20520	16019	15686	15530	15427	15349	15286	15236	15193	15153
10	15120	15087	15057	15031	15007	14986	14967	14949	14932	14915
20	14900	14887	14873	14860	14848	14837	14826	14816	14806	14796
30	14787	14778	14769	14761	14753	14745	14737	14729	14721	14713
40	14705	14697	14690	14682	14676	14669	14662	14656	14649	14642
50	14636	14630	14623	14618	14613	14607	14601	14595	14589	14583
60	14577	14570	14564	14556	14549	14542	14535	14527	14518	14510
70	14502	14491	14476	14457	14438	14416	14393	14373	14353	14335
80	14315	14295	14275	14254	14231	14207	14188	14167	14141	14118
90	14094	14068	14041	14013	13987	13951	13916	13879	13818	13749
100	13572									

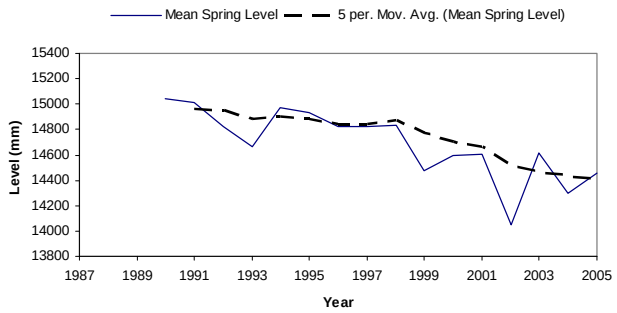


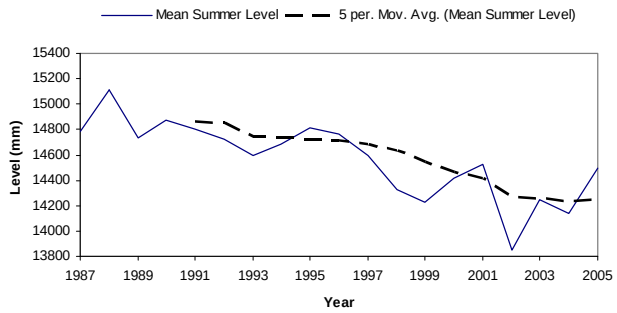












Waioeka at Mouth of Gorge

Environment Bay of Plenty
River Level Recording Station

River	Waioeka	Site	Cableway
Site Number	15901	Grid Reference	W16:876 219
Start of Record	March 1958	Data Capture Rate	95%
Data Summary From	January 1959	To	December 2005
Data Audited From	March 1958	To	December 2005

Equipment History

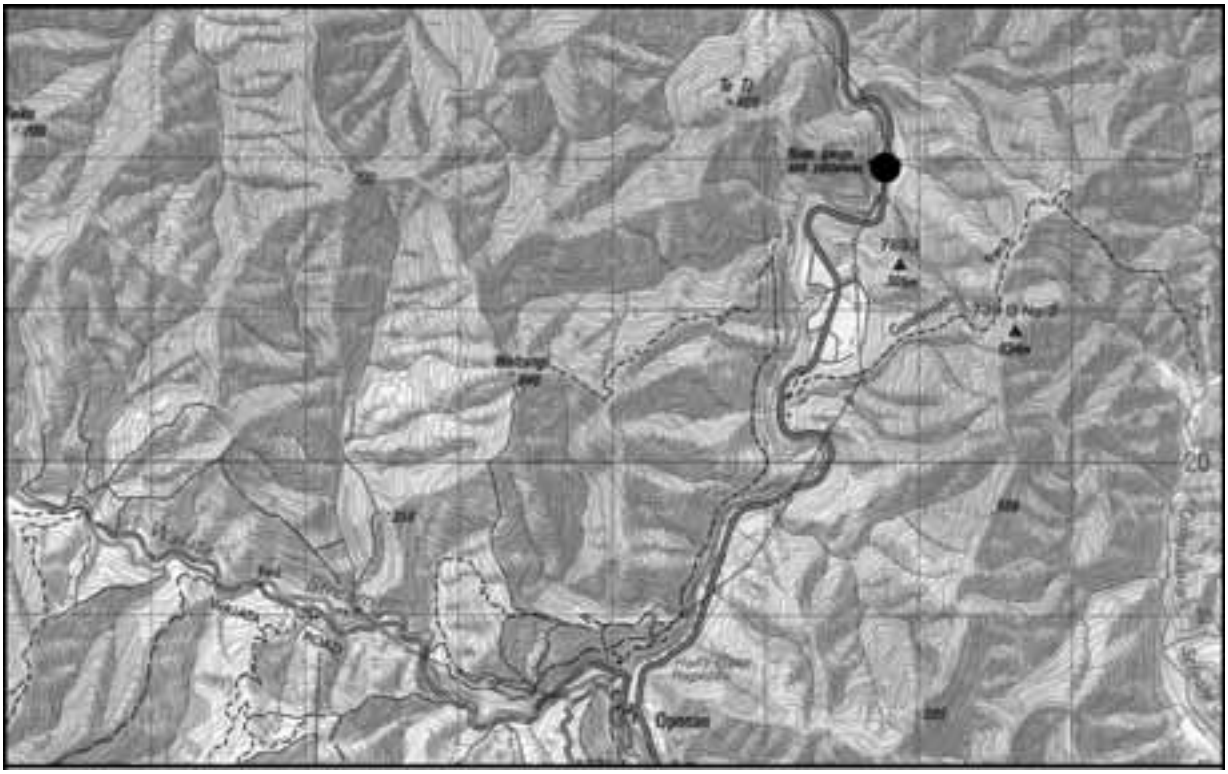
10/03/58: Monthly Lea chart recorder.
03/03/59: Monthly Kent chart recorder.
04/09/69: Float with F&P digital recorder.
16/02/77: Backup Foxboro chart recorder.
15/12/89: 10 metre range P.T. and Aquitel (EBOP)
09/12/93: Encoder and WRIC data logger.
28/07/94: P.T. replaced by encoder (EBOP).

Comments on Stage/Discharge Ratings

Control is by stable natural channel. Ratings available to convert stage (mm) to Level (mm).

General Comments

Site is shared by Environment Bay of Plenty and NIWA Rotorua. Environment Bay of Plenty equipment is telemetered and used for flood warning and monitoring purposes



NIWA
Taihoro Nukurangi

SITE LOCATION
Waioeka at Cableway

Station Comments

Waioeka River at Gorge Cableway. Site number 15901, on River Number 159000.

The local recording authority is NIWA, Rotorua.

The site is situated 36.6 kilometres from the river mouth. Environment B·O·P uses the site for flood monitoring purposes.

24/10/56 - Staff gauge installed 561024.

26/01/56 - Gaugings at 561026, 580719, 581224, 640311 carried out by slope area method.

10/03/58 - Recorder installed on 580317 is a 20 foot range monthly Lea.

01/09/67 - Logs cleared around staff gauge and intakes causing drop in stage of 150mm.

30/06/76 - Control of site transferred from Rotorua to Gisborne Water Resources Survey on 760630.

23/01/79 - Periods of missing record occurred from November 1977 to January 1979 due to intake problems. New middle intake installed 790123 causing 75mm rise in stage.

18/11/86 - Continued problems with intake. Bottom intake extended by approximately 800mm and tower desilted on 861118.

2/07/98 - Data from 980702 083000 to 980702 094500 is derived by measuring flood peak inside tower after event to an accuracy of +/- 5 mm. Peak time was derived by following the rate of rise up the event. Float hit recorder house floor during flood.

21/07/98 - Data from 980721 60000 to 980722 230000 is a flat trace due to silt build up in large flood.

18/12/03 - Syphon tube length shortened causing a rise in stage from 1639 to 1700 mm. This rise has been left in the data. The flow will be fixed with a rating change at this date and time.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Complied	December 2006	Site Number	15901
Compiled by	G R Ellery	River	Waioeka
		Station	Cableway
Metric Map Reference	W16:876 219		
Catchment Area (km²)	640	Period of Summary	1959 to 2005

Statistical Summary

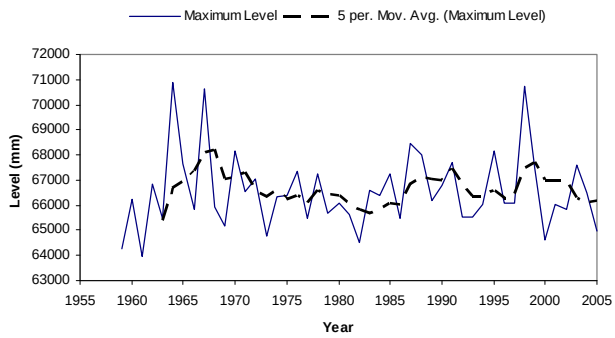
Level (mm)			
Minimum Level	61446	Maximum Level	70888
Mean Annual Minimum Level	61800	Mean Annual Maximum Level	66555
Mean Level	62297	Mean Summer Level	62156
Median Level	62223	Mean Autumn Level	62212
		Mean Winter Level	62476
		Mean Spring Level	62369
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	Gumbel
7 day Low Level (Minimum)	61449	Peak Level (5 yr Return)	67564
7 Day Low Level (Mean Annual)	61782	Peak Level (10 yr Return)	68547
7 day Low Level (5 yr Return)	61652	Peak Level (20 yr Return)	69404
7 Day Low Level (10 yr Return)	61570	Peak Level (50 yr Return)	70513
		Peak Level (100 yr Return)	

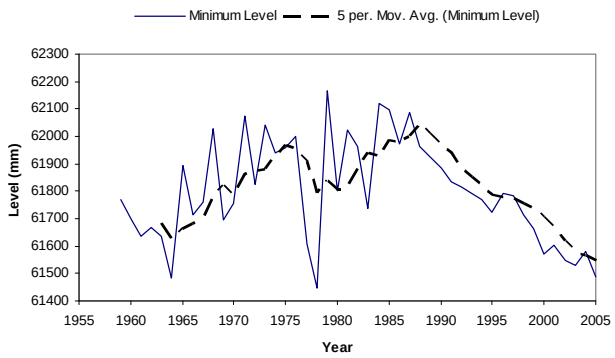
Annual Summaries

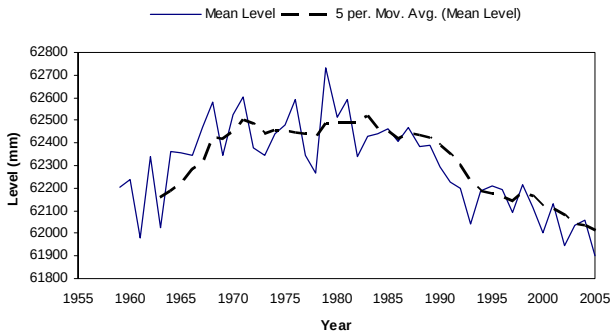
Year	Level (mm)			Year	Level (mm)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	61800	62512	66067	1993	61793	62043	65523
1981	62023	62594	65620	1994	61770	62186	66025
1982	61965	62341	64507	1995	61725	62212	68178
1983	61736	62429	66597	1996	61793	62195	66106
1984	62118	62443	66390	1997	61781	62091	66077
1985	62097	62462	67253	1998	61714	62213	70750
1986	61972	62407	65470	1999	61661	62112	67445
1987	62088	62466	68440	2000	61570	62001	64629
1988	61965	62386	68008	2001	61602	62129	66023
1989	61927	62389	66167	2002	61549	61944	65817
1990	61883	62293	66803	2003	61529	62035	67577
1991	61835	62228	67717	2004	61582	62058	66485
1992	61815	62199	65519	2005	61488	61899	64980

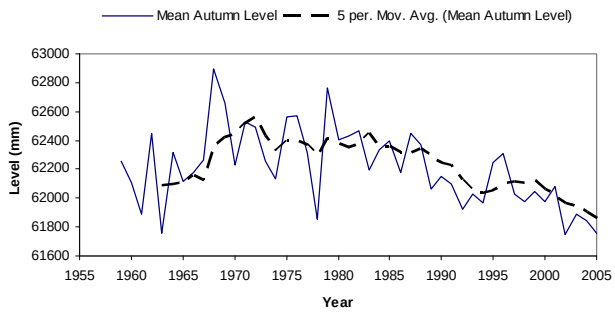
Level Distribution

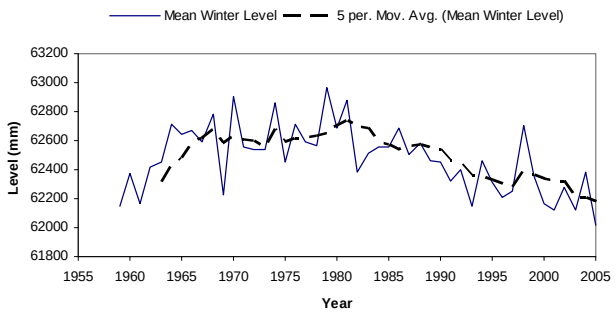
Level (mm)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	70888	64103	63612	63371	63222	63112	63028	62956	62897	62848
10	62806	62770	62737	62708	62680	62654	62631	62610	62590	62571
20	62553	62536	62520	62506	62492	62479	62466	62453	62441	62429
30	62417	62406	62394	62383	62372	62361	62351	62341	62331	62322
40	62312	62302	62293	62284	62274	62266	62257	62248	62239	62231
50	62223	62215	62207	62199	62190	62181	62173	62164	62155	62146
60	62138	62129	62120	62110	62101	62091	62082	62072	62063	62053
70	62043	62034	62024	62014	62004	61994	61984	61974	61964	61953
80	61942	61930	61917	61906	61895	61884	61874	61862	61851	61840
90	61826	61809	61792	61773	61754	61733	61706	61677	61646	61586
100	61446									

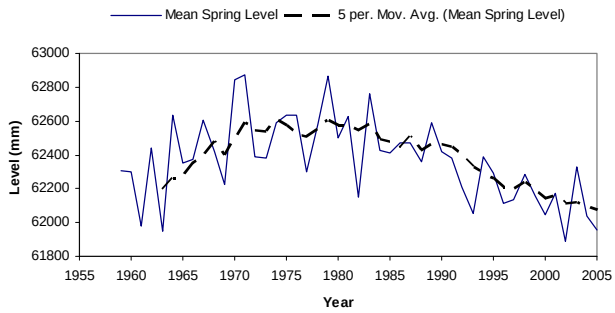


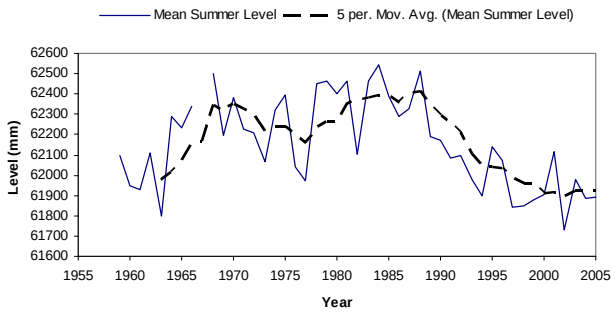












Waioeka at Cableway

Environment Bay of Plenty
River Level Recording Station

River	Otara	Site	Browns Bridge
Site Number	16002	Grid Reference	W16:931 376
Start of Record	March 1979	Data Capture Rate	90%
Data Summary From	January 1980	To	December 2005
Data Audited From	December 1989	To	December 2005

Equipment History

02/06/72 - Recorder installed is an Ericsson.

01/02/79: Monthly Foxboro chart recorder

13/12/89: 10 metre P.T. & Aquitel Remote

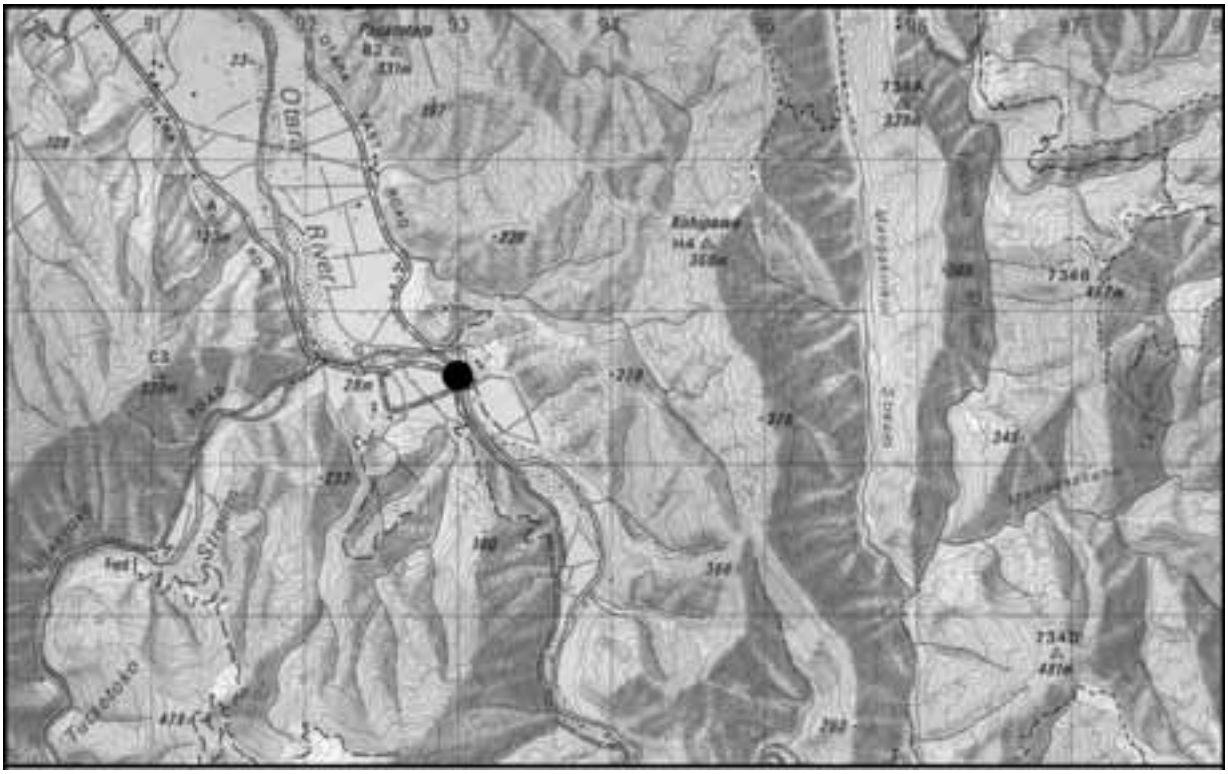
15/11/93: Float with L&S digital recorder.

Comments on Stage/Discharge Ratings

Site control is by natural gravel bed. Control is unstable and there have been numerous rating changes at this site. Gravel extraction occurs at this site and can cause rating changes. Ratings are available to convert Stage (mm) to Flow (l/s)

General Comments

Site was originally operated by the East Cape Catchment Board, before being handed over in November 1989. This site is also used for flood monitoring purposes. Site is now operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.



SITE LOCATION
Otara at Browns Bridge

Station Comments

Otara River at Browns Bridge. Site Number 16002, on River Number 160000. The local recording authority is Environment Bay of Plenty.

The site is situated 20.34 kilometres from the mouth. Lower flow gaugings are performed by wading, higher flow gaugings are performed from the bridge using a gauging crane and suspended meter. The bed in the vicinity of the recorder on the Otara River at Browns Bridge consists mainly of gravels and is subject to regular movement during freshes. During larger events major changes in bed shape are possible with resulting changes in rating shape. At a stage of approximately 1.9 metres bank overflow occurs into berm area.

01/02/79 - Recorder installed is a 5 metre range monthly Foxboro with a time resolution of 281 minutes / mm recorded and a stage resolution of 47mm stage / mm recorded.

01/11/89 - Site handed over to Environment Bay of Plenty. As part of local authority reorganisation. Collection and processing procedures for this data is unknown. This data should be used with caution.

13/12/89 - Recorder installed is an Aquitel remote with a time resolution of 15 minutes connected to a 10metre pressure transducer with an accuracy of 20 mm. Foxboro retained as a backup recorder.

24/12/89 - Missing record from 891224 at 023000 to 900104 at 134500 due to power supply failure. During this period Pakihi (16004) an upstream site recorded a small fresh.

11/10/91 - Site handed over to Environment Bay of Plenty as part of local authority reorganisation. Data from March 1979 transferred to Environment Bay of Plenty. Collection and processing procedures for this data is unknown, use data with caution.

15/11/93 - Stilling well and L&S installed. Recorder has a 15 minute time resolution and a stage resolution of 1 mm.

30/08/94 - Missing record for the period 940830 at 124500 to 940907 at 141500 due to equipment failure.

13/10/95 - Missing record for the period 951013 at 151500 to 951018 at 144500 due to Aquitel remote failure.

26/12/95 - Missing record for the period 951226 at 133000 to 960109 at 093900 due to Aquitel remote failure.

27/05/96 – Missing record for the period 960527 at 083000 to 960626 at 160000 due to siltation of intakes.

14/09/96 - Missing record from 960914 at 201500 to 960920 at 144500 due to recorder failure.

01/10/96 - Missing record from 961001 at 094500 to 961009 at 101500 due to recorder failure

30/09/97 - Missing record from 970930 at 104500 to 971001 at 120000 due to recorder failure.

19/10/97 - Missing record from 971019 at 141500 to 971022 at 104500 due to power supply fault.

23/10/97 - Missing record from 971023 at 060000 to 971024 at 110000 due to Aquitel remote failure.

22/04/01 - Missing record from 20010422 at 070000 to 20010426 at 154500 due to encoder fault.

17/07/04 - Missing record from 20040717 211500 to 20040720 170000 due to failing Handar 436BD encoder.

23/07/04 - Missing record from 20040723 120000 to 20040723 124500.

18/08/04 - Missing record from 20040818 170000 to 20040823 160000 due to failing Handar 436BD encoder.

19/12/04 - Missing record from 20041219 111500 to 2041223 111500. Cause unknown.

17/07/04 - Missing record from 20040717 at 211500 to 20040720 at 170000 due to bank slumping and blocking intakes.

18/08/04 - Missing record from 20040818 at 170000 to 20040823 at 160000 due to encoder jamming.

17/10/05 - Missing record from 20051017 at 184500 to 20051018 at 113000 due to encoder jamming.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Complied	August 2006	Site Number	16002
Compiled by	G R Ellery	River	Otara
		Station	Browns Bridge
Metric Map Reference	W16:931 376		
Catchment Area (km²)	254	Period of Summary	1980 to 2005

Statistical Summary

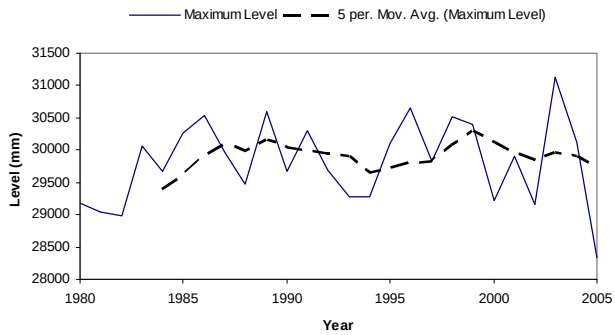
Level (mm) Moturiki Datum			
Minimum Level	26422	Maximum Level	31127
Mean Annual Minimum Level	26694	Mean Annual Maximum Level	29822
Mean Level	27049	Mean Summer Level	26992
Median Level	26986	Mean Autumn Level	26971
		Mean Winter Level	27129
		Mean Spring Level	27082
Low Level Distribution Fit	GEV	Peak Level Distribution Fit	GEV
7 day Low Level (Minimum)	26461	Peak Level (5 yr Return)	30405
7 Day Low Level (Mean Annual)	26686	Peak Level (10 yr Return)	30676
7 day Low Level (5 yr Return)	26585	Peak Level (20 yr Return)	30878
7 Day Low Level (10 yr Return)	26521	Peak Level (50 yr Return)	31077

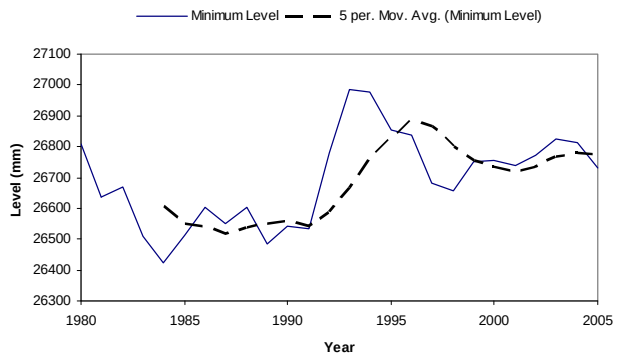
Annual Summaries

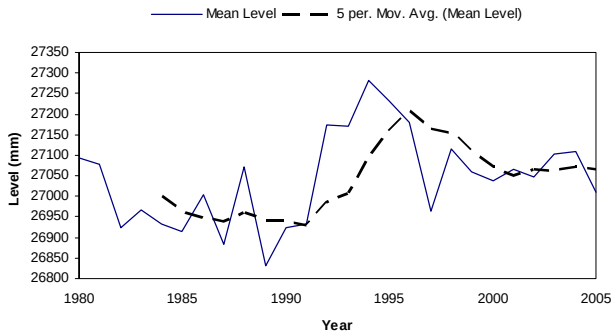
Year	Level (mm) Moturiki Datum			Year	Level (mm) Moturiki Datum		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	26809	27093	29177	1993	26986	27171	29283
1981	26637	27079	29044	1994	26977	27282	29278
1982	26668	26925	28976	1995	26855	27232	30104
1983	26510	26968	30069	1996	26836	27179	30649
1984	26422	26932	29677	1997	26682	26963	29830
1985	26512	26913	30270	1998	26657	27116	30516
1986	26604	27004	30527	1999	26751	27061	30402
1987	26549	26884	29971	2000	26756	27038	29217
1988	26604	27072	29467	2001	26740	27067	29902
1989	26483	26832	30602	2002	26771	27048	29164
1990	26544	26923	29679	2003	26824	27103	31127
1991	26533	26933	30300	2004	26813	27108	30117
1992	26778	27173	29690	2005	26731	27009	28329

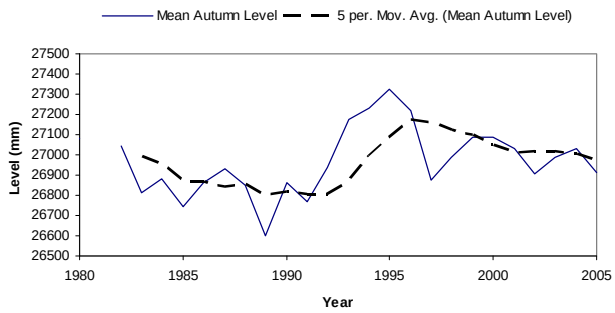
Level Distribution

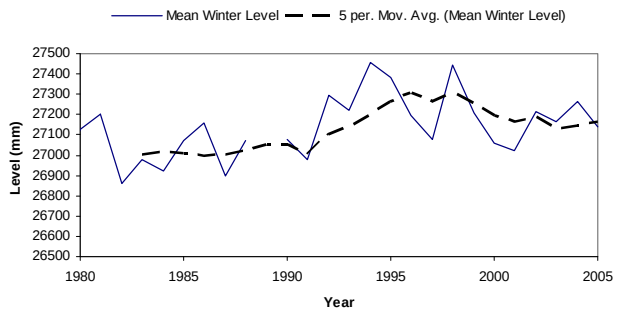
Level (mm) Moturiki Datum										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	31127	28375	28042	27851	27729	27639	27576	27527	27485	27447
10	27417	27389	27364	27342	27320	27301	27283	27267	27252	27237
20	27223	27210	27198	27187	27176	27166	27156	27146	27136	27127
30	27117	27109	27101	27093	27085	27078	27071	27065	27058	27052
40	27047	27040	27034	27029	27022	27016	27010	27004	26998	26992
50	26986	26980	26974	26968	26962	26956	26950	26944	26938	26932
60	26926	26921	26915	26910	26905	26899	26894	26888	26883	26878
70	26873	26867	26862	26857	26852	26846	26840	26835	26830	26824
80	26817	26810	26803	26795	26787	26779	26771	26761	26752	26742
90	26730	26717	26703	26689	26675	26658	26636	26614	26582	26553
100	26422									

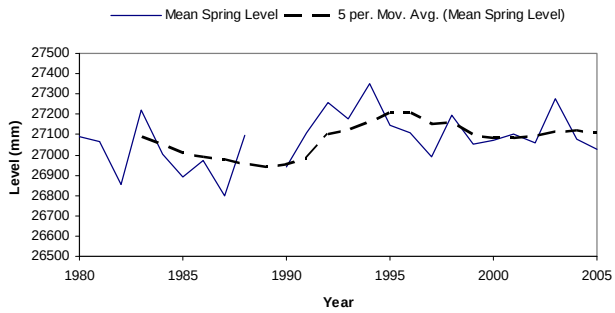


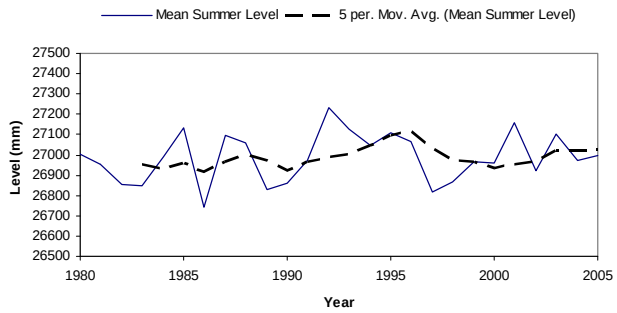












Otara at Browns Bridge

Environment Bay of Plenty
River Level Recording Station

River	Pakihi	Site	Pakihi Station
Site Number	16004	Grid Reference	X16:979 325
Start of Record	August 1979	Data Capture Rate	86%
Data Summary From	January 1980	To	December 2005
Data Audited From	November 1989	To	December 2005

Equipment History

28/08/79: 5 metre range monthly Foxboro chart recorder.

23/02/90: 5 metre range P.T. with Aquitel remote.

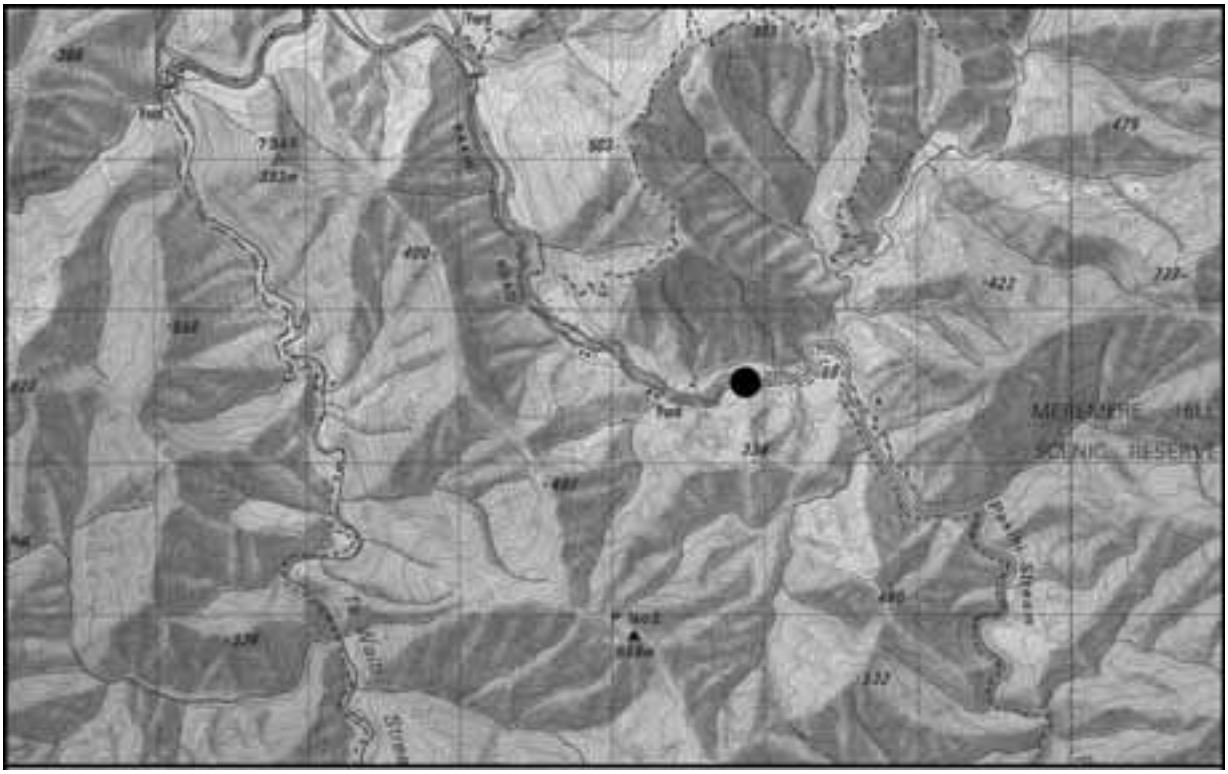
29/05/95: Backup Foxboro removed.

Comments on Stage/Discharge Ratings

Ratings are available to convert Stage (mm) to Reduced Level (mm) in assumed datum.

General Comments

Site was operated by Gisborne District Council and its predecessor East Cape Catchment Board. The site was handed over to Environment Bay of Plenty in November 1989. This site is used for flood monitoring and warning purposes..



SITE LOCATION
Pakihi at Pakihi Station

Station Comments

Pakihi River at Pakihi Station. Site Number 16004, on River Number 160020.

The local recording authority is Environment Bay of Plenty.

The site is situated approx 5.9 kilometres upstream of confluence with Te Waiti Stream
Staff gauge records from 640304. This original staff gauge site was approximately 50 metres upstream of house on opposite side of river, but was demolished in slip of 640311. Stilling well installed 640907 on left bank, upstream of house. New recorder site installed on left bank approximately 75 metres downstream of original site.

01/11/89 - Site transferred to Environment Bay of Plenty. Site is not rated, used for level purposes only.

23/02/90 - Aquitel telemetry unit and 5 metre range pressure transducer installed 900223. Useable records from this equipment not available until 900312.
Pressure transducer suffers from diurnal fluctuations due to temperature effects.

31/12/95 - Periods of missing record and synthetic data occur throughout the data set. Where possible missing record has been filled with data from the backup recorder. Synthetic data is based on correlations with rainfall record and downstream site Otara at Browns Bridge (16002).

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Complied		Site Number	16004
Compiled by		River	Pakihi
		Station	Pakihi Station
Metric Map Reference	X16:979 325		
Catchment Area (km²)	109	Period of Summary	1980 to 2005

Statistical Summary

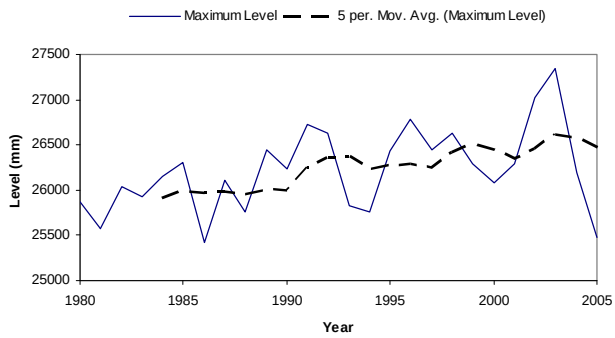
Level (mm)			
Minimum Level	24150	Maximum Level	27350
Mean Annual Minimum Level	24403	Mean Annual Maximum Level	26224
Mean Level	24600	Mean Summer Level	24560
Median Level	24554	Mean Autumn Level	24571
		Mean Winter Level	24700
		Mean Spring Level	24631
Low Level Distribution Fit Utilised	Gumbel	Peak Level Distribution Fit Utilised	GEV
7 day Low Level (Minimum)	24154	Peak Level (5 yr Return)	26660
7 Day Low Level (Mean Annual)	24349	Peak Level (10 yr Return)	26877
7 day Low Level (5 yr Return)	24282	Peak Level (20 yr Return)	27044
7 Day Low Level (10 yr Return)	24245	Peak Level (50 yr Return)	27214
		Peak Level (100 yr Return)	

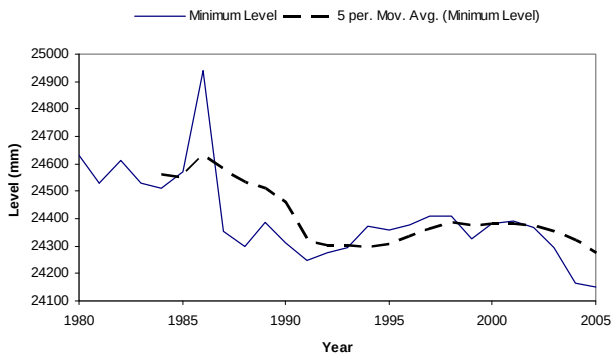
Annual Summaries

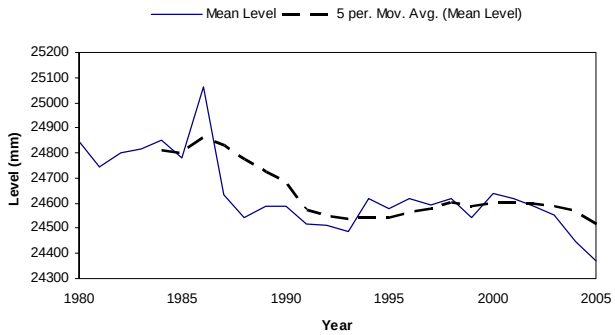
Year	Level (mm)			Year	Level (mm)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	24632	24845	25872	1993	24295	24485	25824
1981	24527	24743	25576	1994	24374	24619	25763
1982	24611	24801	26046	1995	24359	24577	26436
1983	24528	24817	25920	1996	24377	24617	26778
1984	24513	24851	26157	1997	24409	24591	26449
1985	24572	24780	26312	1998	24410	24619	26634
1986	24938	25066	25426	1999	24324	24541	26292
1987	24353	24632	26113	2000	24382	24638	26083
1988	24299	24545	25756	2001	24393	24617	26299
1989	24388	24589	26450	2002	24367	24586	27018
1990	24311	24587	26234	2003	24292	24554	27350
1991	24248	24518	26728	2004	24164	24449	26200
1992	24274	24514	26634	2005	24150	24369	25472

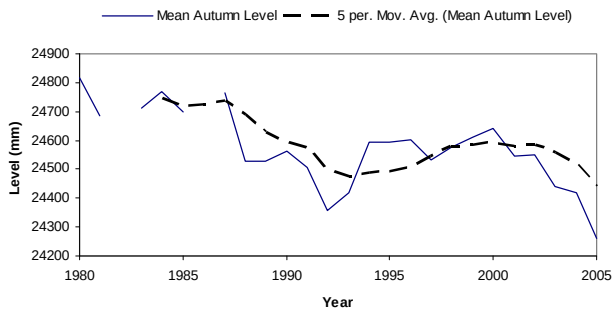
Level Distribution

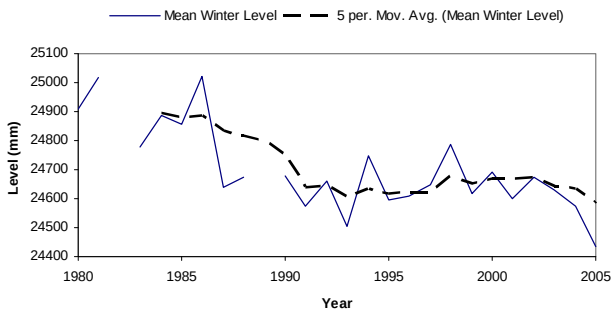
Level (mm)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	27350	25409	25240	25152	25080	25026	24981	24946	24918	24893
10	24873	24856	24841	24827	24812	24799	24788	24776	24765	24753
20	24744	24732	24722	24712	24704	24696	24688	24681	24675	24669
30	24663	24657	24650	24644	24638	24632	24626	24620	24614	24609
40	24602	24597	24591	24586	24581	24576	24572	24567	24563	24558
50	24554	24551	24546	24542	24538	24535	24531	24527	24524	24520
60	24516	24512	24508	24504	24500	24496	24491	24486	24482	24478
70	24473	24468	24464	24459	24455	24450	24446	24441	24436	24431
80	24426	24421	24416	24411	24406	24401	24395	24388	24382	24376
90	24370	24363	24356	24348	24339	24329	24317	24304	24282	24239
100	24150									

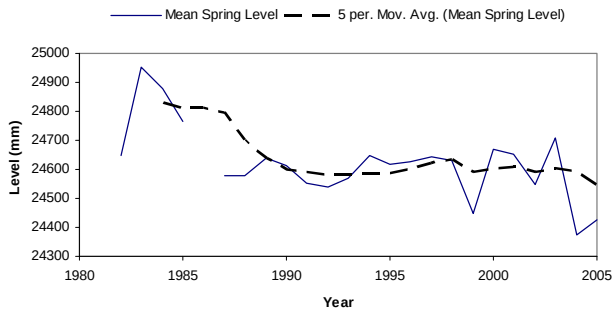


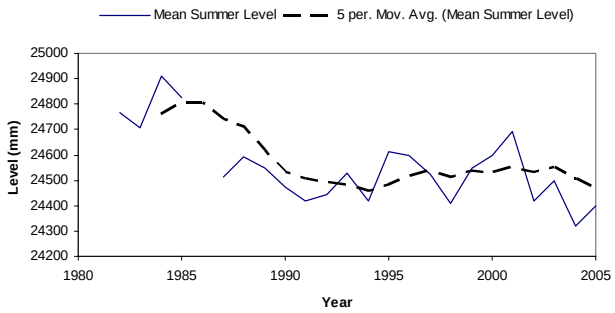












Pakihi at Pakihi Station

3.7 Lake Level Data Summaries

The lake level data summaries in this chapter are provided in the following sequences of 4 pages per station:

Page 1 Provides general information regarding the station, such as its location, instrument types, start of record, etc.

Page 2 Lists station comments that should be read in conjunction with the results of the data summary. Note that these comments are an edited selection of the full set of comments. Contact the recording authority for a full set of comments if required.

Page 3 Displays the summary information. If the lake has had significant level control put in place within the period of the summary, then this page will be for the pre-control period.

Page 4 Graphical presentation of a selection of parameters provided in Page 3. If the lake has had significant level control put in place within the period of the summary, then this page will be for the pre-control period.

Page 5 (where applicable) Displays the summary information. If the lake has had significant level control put in place within the period of the summary, then this page will be for the post-control period.

Page 6 (where applicable) Graphical presentation of a selection of parameters provided in Page 5. If the lake has had significant level control put in place within the period of the summary, then this page will be for the post-control period.

The ID No. in Table 3.7 indicates the order in which individual station data summaries are provided in this report.

Table 3.7 Lake Level Monitoring Stations

ID Number	Page No.	Lake	Site	Period of Audit	Data Capture Rate (%)
1	411	Rotorua	Town Wharf	1953-2005	98
2	415	Rotoiti	Okawa Bay	1906-2005	98
3	421	Rotehu	Te Pohue Bay	1954-2005	94
4	425	Rotoma	Otangiwai Point	1954-2005	97
5	429	Okataina	Tauranganui Bay	1953-2005	99
6	433	Okareka	Acacia Rd.	1966-2005	86
7	437	Tikitapu	Tarawera Rd.	1972-2005	100
8	441	Tarawera	Te Wairoa	1926-2005	96
9	445	Rotokakahi	Wairoa Outlet	1973-2005	100
10	449	Rotomahana	Crater Bay	1925-2005	90
11	453	Okaro	Reserve	1990-2005	100
12	457	Rerewhakaaitu	Homestead Arm	1984-2005	96


Lake Level Monitoring Sites
of the Bay of Plenty Region
Environment Bay of Plenty
REGIONAL COUNCIL
Bay of Plenty
Mayor Island
Waihi Beach
Bowentown Heads
Katikati
Tauranga Harbour
Karewa Island
Matakana Island
TAURANGA
Mount Maunganui
Motuhaku Island
Motiti Island
Motunau Island
Te Puna
Maketu
Okurei Point
Waihi Estuary
Te Puke
Otamarakau
Rurima Island
Moutoki Island
Moutohora Island
Volkner Rocks
Whakaari/White Island
Cape Runaway
Lottin Point
Waihau Bay
Potikirua
Te Araroa
Waikawa Point
Te Kaha Point
Te Kaha
Omaio Bay
Cambridge
Edgecumbe
Kohi Point
Ohope
WHAKATANE
Ohiwa Harbour
Torere
Opotiki
Taneatua
Kawerau
Ngongotaha
L. Rotorua
Lake Rotoma
Mamaku
ROTORUA
Tokoroa
Taupo (SH5)
Rerewhakaaitu
Murupara
Gisborne
Ruatahuna
Waikaremoana
Taupo
Rangitaiki
Napier
KAIMAI RANGE
RAUKUMARA RANGE
IKAWHENUA RANGE
KAHIKATEA RANGE
HUIARAU RANGE
Reference
lake level monitoring site
regional boundary
district boundaries
state highway
major road
town, locality
native forest
exotic forest
horticulture
pasture and cropping
other
Scale
Lake Level Monitoring Sites
1 Rotorua at Town Wharf
2 Rotoiti at Okawa Bay
3 Rotoehu at Te Pohue Bay
4 Rotoma at Otangiwai Point
5 Okataina at Tauranganui Bay
6 Okareka at Acacia Road
7 Tikitapu at Tarawera Road
8 Tarawera at Te Wairoa
9 Rotokakahi at Te Wairoa Outlet
10 Rotomahana at Crater Bay
11 Okaro at Reserve
12 Rerewhakaaitu at Homestead Arm

Environment Bay of Plenty
Lake Level Recording Station

Lake	Rotorua	Site	Town Wharf
Site Number	14615	Grid Reference	U16: 951 364
Start of Record	July 2003	Data Capture Rate	98%
Data Summary From	January 1953	To	December 2005
Data Audited From	NIWA (pre - July 2003)	To	December 2005

Equipment History

07/03/66: 1.5 metre range monthly Kent chart recorder.
27/07/73: Hourly F&P digital recorder.
16/07/03: 5m range PT and CR510 data logger
31/10/03: Float with DS-4483 data logger

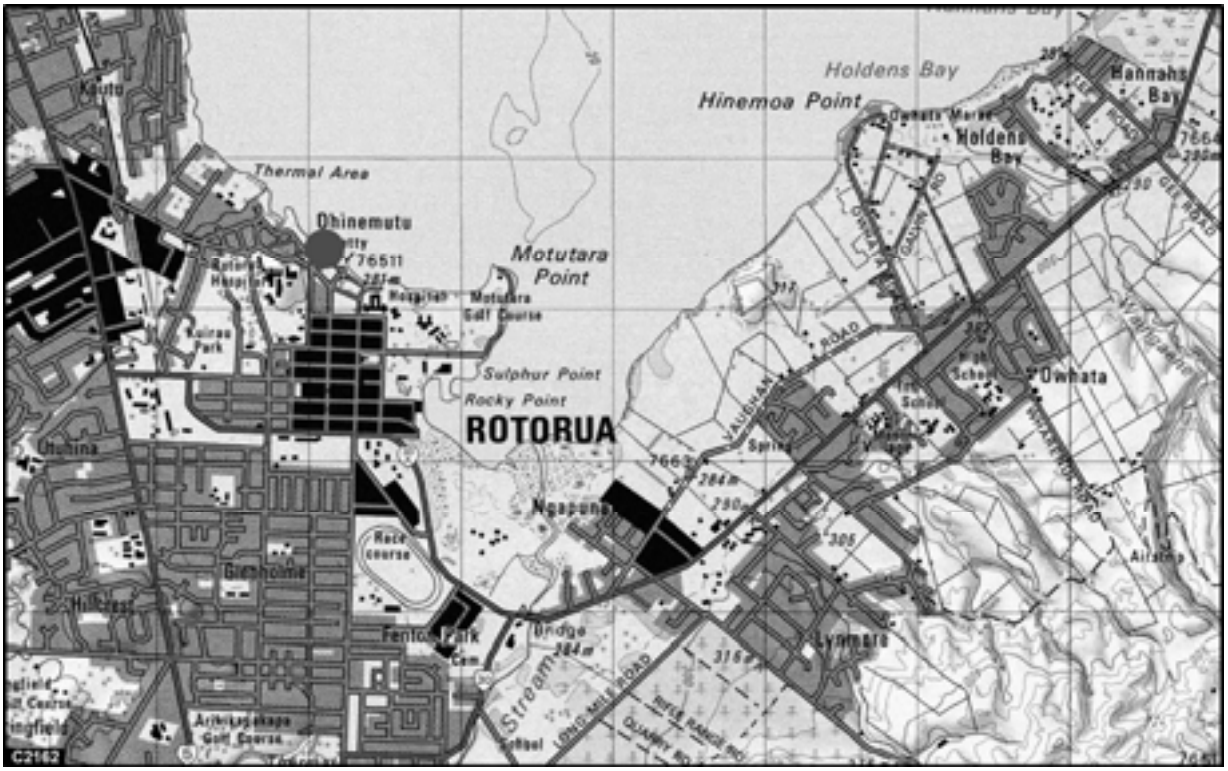
Comments on Stage/Discharge Ratings

Ratings are available to convert Stage (mm) to Reduced Level (mm) in Moturiki Datum.
Ratings are available to convert Stage (mm) to Discharge (l/s) through the Ohau Channel.

General Comments

Lake levels are controlled by stop logs at the outlet weir. Data from September 1953 to March 1966 comes from Lake Rotorua at Wharf (Site No. 14615). Subsequent data was provided by the NIWA (Rotorua) operated site at Mission Bay, until the Rotorua Wharf site was re-instated by Environment BOP in July 2003.

NOTE: Benchmarks in the area of the Mission Bay recorder are known to be sinking. Refer enquiries to the appropriate recording authority.



SITE LOCATION
Rotorua at Town Wharf

Station Comments

Lake Rotorua at Wharf. Site number 14615.

Surface Area (km2)	Average Depth (m)	Maximum Depth (m)	Maximum Length (km)	Maximum Width (km)	Type
80	11.0	44.8	12.1	9.7	Volcanic

Source: Waters of New Zealand (1992).

The dataset is not homogeneous because the lake level outlet control was severely modified by enlargement of Ohau Channel in 1972-73. This resulted in a drop in lake level of around 0.4 metre. Following that date lake levels were controlled by gabions until a permanent structure was completed in September 1989.

The lake level frequency analysis therefore cannot be carried out using conventional techniques. It is achieved by a hydraulic transformation of the lake outflows frequency. This results in substantially lower levels than those estimated by the standard level frequency method.

The site is situated at the Rotorua Lakefront, approximately 80m from the shore, on a wharf used by charter and scenic cruise vessels. The lake level is governed by a weir at the opposite end of the lake (Ohau Channel, draining to Lake Rotoiti).

The local recording authority is Environment Bay of Plenty.

Periods of synthetic data occur throughout the record. Synthetic data compiled using Mission Bay recorder, at northern end of Lake Rotorua.

31/08/52
Data from 31/08/52 240000 to 66/03/05 240000 are taken from Lake Rotorua at Wharf.

31/12/58
Only four readings were taken from January 1959 to March 1959.

07/03/66
Data from 07/03/66 to 16/07/03 are taken from Mission Bay recorder, courtesy of NIWA, Rotorua. Phone (07) 346 1950.

24/04/72
Daily recorder installed to measure seiche time intervals from 24/04/72 to 19/05/72. Reconstructed weekly charts held by NIWA, Rotorua.

30/04/89
A new weir was constructed between 30/04/89 120000 and 22/09/89 120000. The weir is designed to keep the level of Lake Rotorua high in times of low inflows. To help modify flows in times of extremes, a series of stop logs can be added or removed to regulate the flow. There can be a maximum of three stop logs in each of the front, middle and back positions on the weir.

16/07/03
Rotorua Wharf site resurrected 16/07/03. Pressure transducer and Campbell CR510 datalogger installed, recording at two minute intervals until 28/08/03, when interval was increased to 30 minutes. Purpose was to determine relationship between the existing Rotorua Wharf staff gauge and the NIWA recorder at Mission Bay. Mission Bay recorder appears to be overstating lake level by approximately 40mm.

31/10/03
A permanent stilling well recorder site was established at Rotorua Wharf (Lakefront), to ensure lake level is managed at a point that enables the Rotorua Wharf boat operators to avoid running aground.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Compiled	October 2006	Site Number	14615
Compiled by	Craig Putt	Lake	Rotorua
		Station	Town Wharf
Metric Map Reference	U16: 951 364		
Catchment Area (km²)	500	Period of Summary	1953 to 2005

Statistical Summary

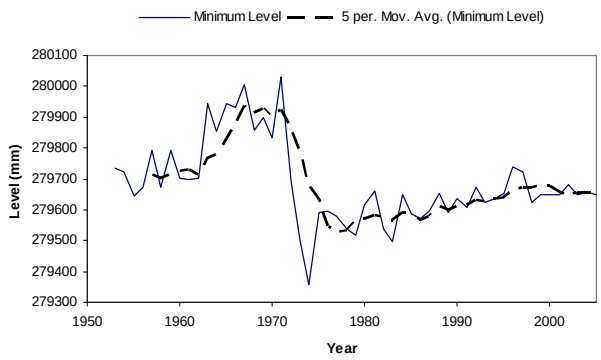
Level (mm Moturiki Datum)			
Minimum Level	279359	Maximum Level	280794
Mean Annual Minimum Level	279661	Mean Annual Maximum Level	280161
Mean Level	279903	Mean Summer Level	279846
Median Level	279866	Mean Autumn Level	279848
		Mean Winter Level	279965
		Mean Spring Level	279955
Low Level Distribution Fit Utilised	Gumbel	Peak Level Distribution Fit Utilised	Gumbel
7 day Low Level (Minimum)	279371	Peak Level (5 yr Return)	280325
7 Day Low Level (Mean Annual)	279646	Peak Level (10 yr Return)	280437
7 day Low Level (5 yr Return)	279581	Peak Level (20 yr Return)	280544
7 Day Low Level (10 yr Return)	279546	Peak Level (50 yr Return)	280683
		Peak Level (100 yr Return)	280787

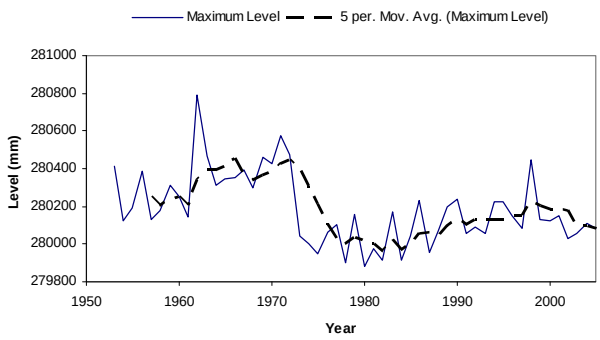
Annual Summaries

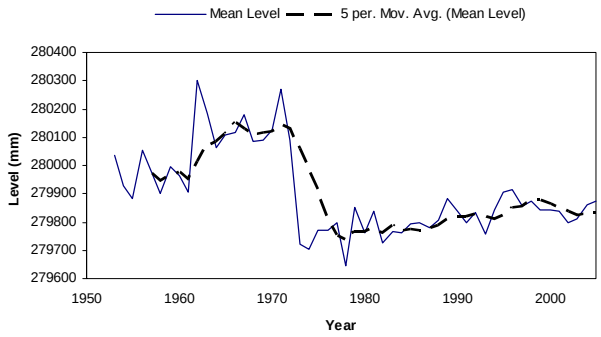
Year	Level (mm Moturiki Datum)			Year	Level (mm Moturiki Datum)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	279614	279762	279878	1993	279623	279757	280054
1981	279660	279837	279976	1994	279637	279844	280228
1982	279539	279724	279912	1995	279651	279904	280228
1983	279496	279765	280173	1996	279738	279915	280153
1984	279647	279764	279915	1997	279721	279857	280080
1985	279589	279794	280042	1998	279624	279873	280450
1986	279571	279799	280231	1999	279648	279844	280128
1987	279597	279782	279952	2000	279650	279843	280122
1988	279654	279806	280071	2001	279649	279837	280151
1989	279591	279885	280200	2002	279681	279798	280030
1990	279638	279837	280238	2003	279647	279811	280058
1991	279608	279797	280057	2004	279655	279859	280110
1992	279674	279832	280089	2005	279648	279873	280082

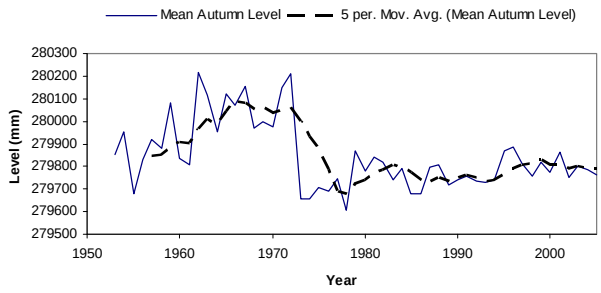
Level Distribution

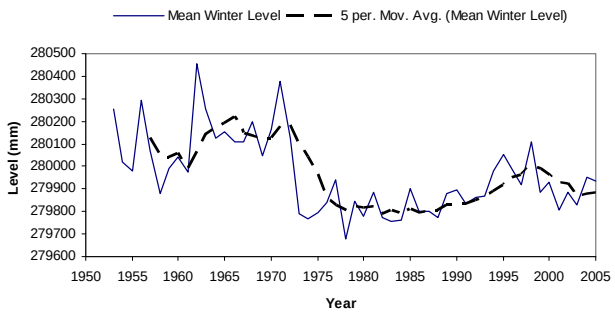
Level (mm Moturiki Datum)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	280794	280427	280365	280331	280301	280274	280244	280222	280204	280187
10	280173	280159	280144	280129	280116	280106	280097	280086	280076	280068
20	280059	280051	280042	280036	280029	280023	280014	280007	280000	279993
30	279987	279979	279974	279966	279960	279952	279946	279939	279933	279926
40	279919	279914	279908	279903	279898	279892	279887	279882	279876	279871
50	279866	279861	279856	279852	279847	279843	279839	279835	279830	279826
60	279822	279818	279813	279809	279805	279801	279797	279793	279789	279785
70	279781	279778	279774	279770	279767	279763	279759	279754	279750	279745
80	279740	279735	279731	279726	279721	279716	279711	279706	279702	279696
90	279689	279682	279675	279668	279660	279650	279638	279622	279598	279568
100	279359									

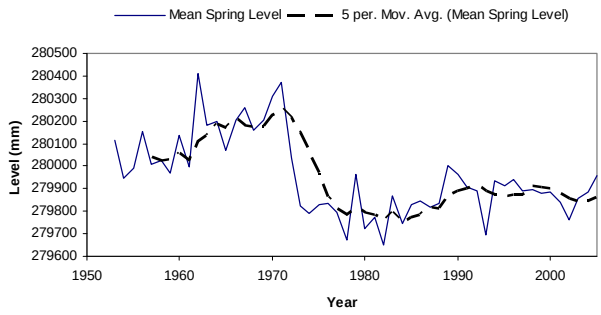


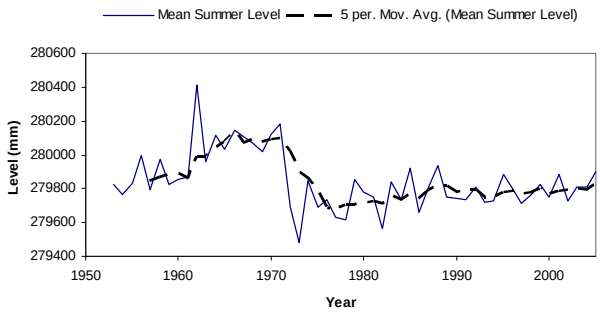












Rotorua at Town Wharf

Environment Bay of Plenty
Lake Level Recording Station

Lake	Rotoiti (Pre-Control)	Site	Okawa Bay
Site Number	1114675	Grid Reference	V15: 304 447
Start of Record	June 2001	Data Capture Rate	98%
Data Summary From	January 1906	To	December 2005
Data Audited From	January 1906	To	December 2005

Equipment History

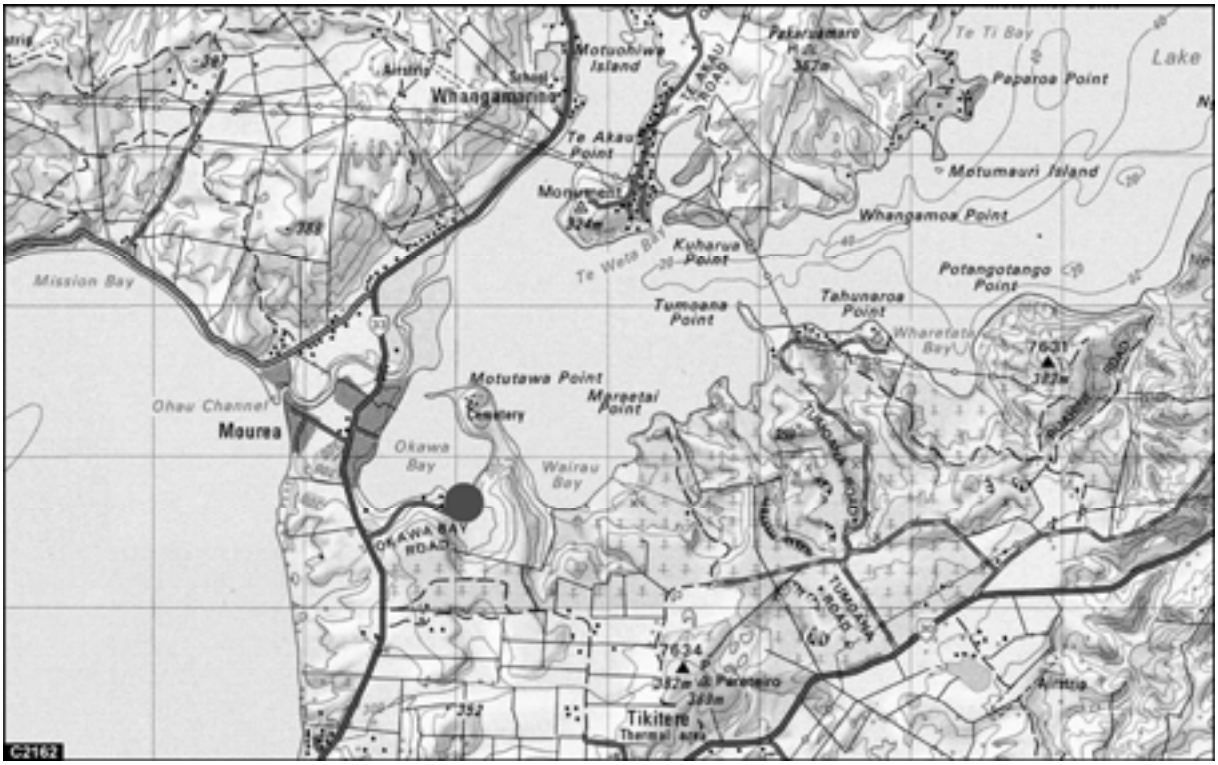
02/11/1905: Staff gauge installed.
16/01/42: Yearly Littlejohn chart recorder.
03/07/56: Weekly Lea chart recorder.
13/12/58: Monthly Kent chart recorder.
11/08/65: Float with F&P digital recorder.
03/11/80: Float with L&S digital recorder.
18/09/00: Float with iQuest DS-4483 logger.
09/12/05: Float with iRis 320 datalogger.

Comments on Stage/Discharge Ratings

Ratings available to convert Stage (mm) to Reduced Level (mm) in Moturiki Datum.

General Comments

This summary is of two datasets separated by the commissioning of the Okere Control Gates in January 1982. The gates are located 40 metres north of Rotoiti Outlet recorder station (Site No. 14601, operated by NIWA, Rotorua). Rotoiti Outlet was utilised by Environment BOP until May 2001, in association with the control gates. In May 2001, Environment BOP established a new site at Okawa Bay to avoid the draw-down effect of the Okere Gates, on recorded lake level.



SITE LOCATION
Rotoiti at Okawa Bay

Station Comments

Lake Rotoiti at Okawa Bay. Site Number 1114675, on River Number 146000.

Surface Area (km2)	Average Depth (m)	Maximum Depth (m)	Maximum Length (km)	Maximum Width (km)	Type
34.35	33.04	122	15.0	3.6	Volcanic

Source: Waters of New Zealand (1992).
The local recording authority is Environment BOP.

Data is filed in staff gauge heights and can be converted to Moturiki Datum by applying Kind 3 ratings.

The dataset is not homogenous, because of the construction of the Okere Gates control structure commissioned in October 1982. The 100 year lake level was calculated by hydraulically routing the 100 year inflow hydrograph through the lake storage. The 50 year lake level was calculated through a straight adjustment corresponding to the difference between the 50 and 100 year levels in the 1995 Hydro-Meteorological Data Summaries. The accuracy of this is suitable for this publication and planning purposes.

From 820109 lake level control is via gates operated by Environment BOP. Flow data may be synthesised from site 1114609 Kaituna River at Taaheke. Staff gauge datum changed 560813 240000.

02/11/1905
Staff gauge height data available at Outlet from 051102 240000 (the local recording authority is now NIWA, Rotorua. Phone 07 346 1950.). From 051102 to 420116 staff gauge readings were made intermittently and were to varying accuracy. That is, staff gauge readings were taken to the nearest 0.1, 0.05, or 0.01 foot stage Increment depending on reader. All stage data to 420116 240000 is filed at 240000.

16/01/42
Recorder installed at Outlet on 420116 is a 16 foot range yearly Littlejohn having a time resolution of 1.18 days/mm recorded and a stage ratio of 24 mm of stage/mm chart recorded. Most early Littlejohn record should be treated with caution due to little or no routine periodic inspection/checking. Stage record edited to +/-20 mm accuracy for audit purposes.

28/03/43
Instrument was set to agree with staff gauge on 28/03/43, but when checked on 05/11/43 it differed by 0.3 feet. Data was filed assuming the error developed evenly over these seven months.

18/09/46
Instrument dismantled for overhaul for period 17/09/46 to 16/07/47. Hence staff gauge readings taken at approximately fortnightly intervals to the nearest 0.05 foot increment on gauge.

13/08/56
Datum changed to Moturiki. Type 3 rating changed accordingly.

01/01/82
Control gates commissioned on approximately 01/01/82. Gates sited approximately 40 m north of recorder station. Rating derivation at this site now impossible. Flow measurement now at site number 1114609, Kaituna at Taaheke. From 09/01/82, gate setting adjustments are responsible for any abrupt changes in lake level. Modification of lake control probable for at least one month before gate commissioning due to construction activities.

07/05/01
Environment BOP shifts monitoring equipment from Kaituna at Lake Rotoiti Outlet (Site No.14601, NZMS 260s grid reference U15: 038 484) to Okawa Bay. Recorded water levels at Outlet were thought to be inaccurate due to draw down effect of Okere Falls lake level control gates, situated nearby.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Compiled	October 2006	Site Number	1114675
Compiled by	Craig Putt	Lake	Rotoiti
		Station	Okawa Bay
Metric Map Reference	V15: 304 447		
Catchment Area (km²)	632	Period of Summary	1906 to 1981

Statistical Summary (Prior to Installation of Okere Gates)

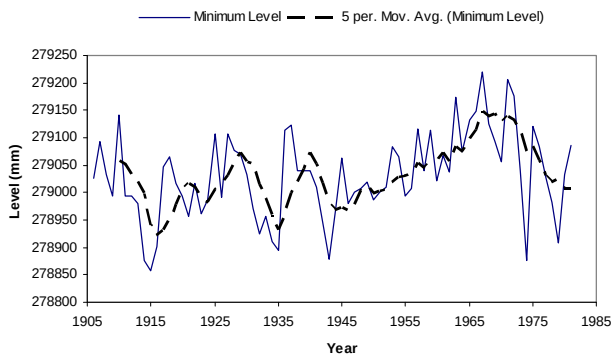
Level (mm Moturiki Datum)			
Minimum Level	278858	Maximum Level	279805
Mean Annual Minimum Level	279031	Mean Annual Maximum Level	279399
Mean Level	279200	Mean Summer Level	279158
Median Level	279193	Mean Autumn Level	279140
		Mean Winter Level	279239
		Mean Spring Level	279260
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	GEV
7 day Low Level (Minimum)	278866	Peak Level (5 yr Return)	279495
7 Day Low Level (Mean Annual)	279020	Peak Level (10 yr Return)	279558
7 day Low Level (5 yr Return)	278968	Peak Level (20 yr Return)	279614
7 Day Low Level (10 yr Return)	278936	Peak Level (50 yr Return)	279678
		Peak Level (100 yr Return)	279722

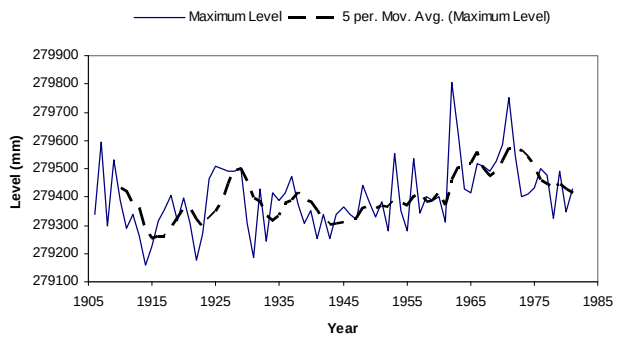
Annual Summaries

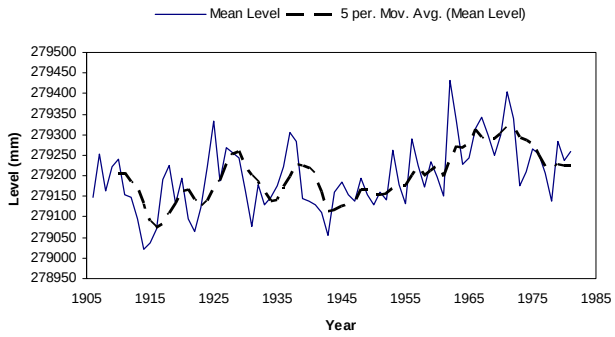
Year	Level (mm Moturiki Datum)			Year	Level (mm Moturiki Datum)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1956	279007	279291	279535	1969	279094	279251	279529
1957	279116	279226	279342	1970	279057	279299	279587
1958	279040	279174	279400	1971	279206	279405	279751
1959	279113	279235	279388	1972	279176	279338	279543
1960	279022	279197	279400	1973	279041	279176	279403
1961	279068	279152	279311	1974	278877	279210	279408
1962	279037	279432	279805	1975	279120	279264	279434
1963	279174	279334	279625	1976	279084	279253	279499
1964	279074	279228	279430	1977	279028	279208	279478
1965	279132	279243	279415	1978	278983	279137	279325
1966	279149	279314	279519	1979	278908	279284	279493
1967	279219	279343	279510	1980	279032	279236	279347
1968	279125	279298	279490	1981	279087	279259	279427

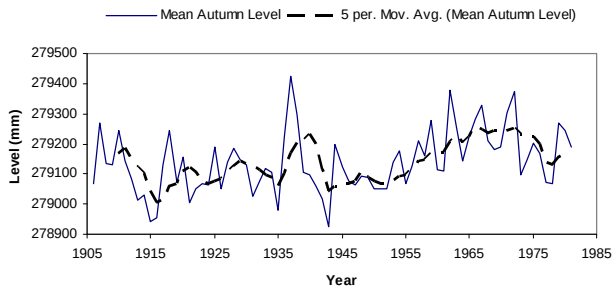
Level Distribution

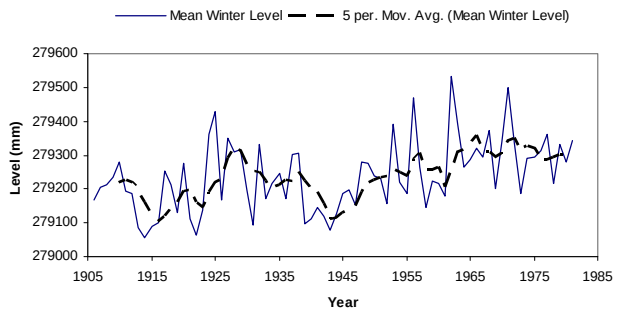
Level (mm Moturiki Datum)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	279805	279507	279474	279450	279435	279420	279409	279397	279385	279374
10	279364	279356	279350	279343	279337	279330	279325	279321	279315	279309
20	279306	279300	279295	279291	279286	279281	279277	279272	279267	279264
30	279260	279257	279252	279248	279245	279241	279237	279235	279231	279229
40	279225	279222	279218	279215	279212	279208	279206	279203	279200	279197
50	279193	279190	279186	279184	279180	279177	279174	279171	279169	279165
60	279162	279157	279154	279151	279148	279145	279141	279138	279135	279132
70	279127	279124	279121	279117	279113	279109	279108	279103	279099	279094
80	279092	279087	279083	279079	279075	279070	279065	279060	279054	279049
90	279044	279037	279031	279023	279017	279010	279001	278989	278968	278931
100	278858									

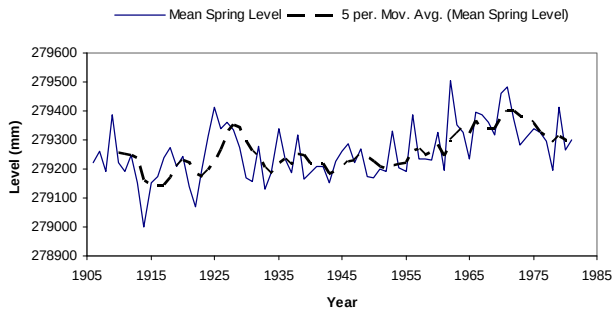


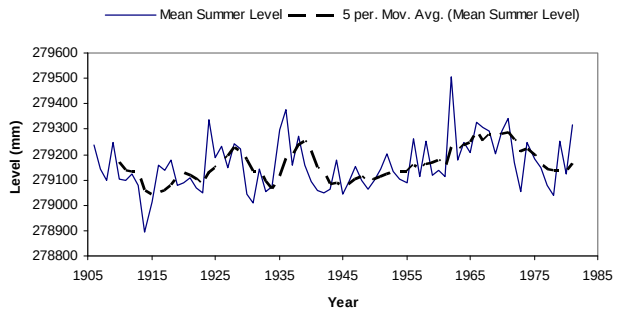












Lake Rotoiti at Okawa Bay (Prior to Installation of Okere Control Gates)

Environment Bay of Plenty
Hydrological Level Summary

Date Compiled	October 2006	Site Number	1114675
Compiled by	Craig Putt	Lake	Rotoiti
		Station	Okawa Bay
Metric Map Reference	V15: 304 447		
Catchment Area (km²)	632	Period of Summary	1982 to 2005

Statistical Summary (After Installation of Okere Gates)

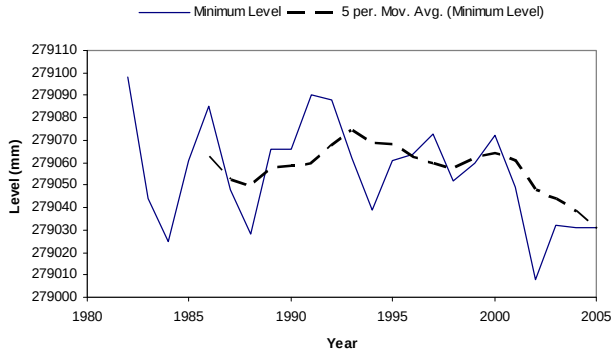
Level (mm Moturiki Datum)			
Minimum Level	279008	Maximum Level	279591
Mean Annual Minimum Level	279060	Mean Annual Maximum Level	279333
Mean Level	279165	Mean Summer Level	279154
Median Level	279151	Mean Autumn Level	279154
		Mean Winter Level	279174
		Mean Spring Level	279178
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	Gumbel
7 day Low Level (Minimum)	279039	Peak Level (5 yr Return)	279407
7 Day Low Level (Mean Annual)	279065	Peak Level (10 yr Return)	279459
7 day Low Level (5 yr Return)	279053	Peak Level (20 yr Return)	279509
7 Day Low Level (10 yr Return)	279046	Peak Level (50 yr Return)	279574
		Peak Level (100 yr Return)	279623

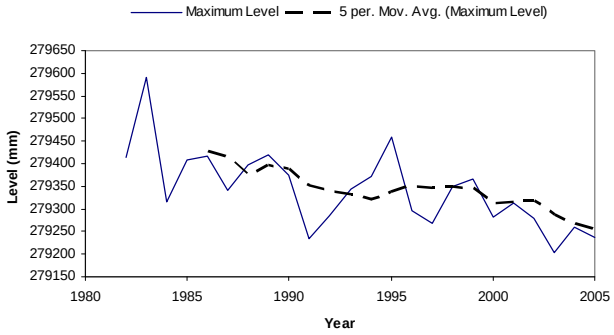
Annual Summaries

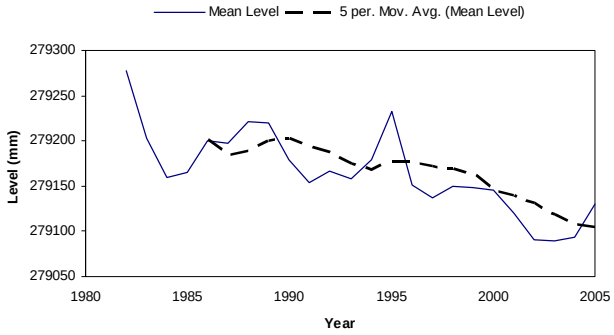
Year	Level (mm Moturiki Datum)			Year	Level (mm Moturiki Datum)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993	279062	279158	279343
1981				1994	279039	279179	279372
1982	279098	279277	279415	1995	279061	279233	279459
1983	279044	279203	279591	1996	279064	279151	279297
1984	279025	279160	279316	1997	279073	279137	279267
1985	279061	279165	279408	1998	279052	279150	279350
1986	279085	279200	279416	1999	279060	279148	279366
1987	279048	279198	279341	2000	279072	279145	279282
1988	279028	279221	279397	2001	279049	279120	279313
1989	279066	279220	279420	2002	279008	279091	279279
1990	279066	279179	279376	2003	279032	279089	279203
1991	279090	279154	279233	2004	279031	279094	279259
1992	279088	279167	279286	2005	279031	279130	279236

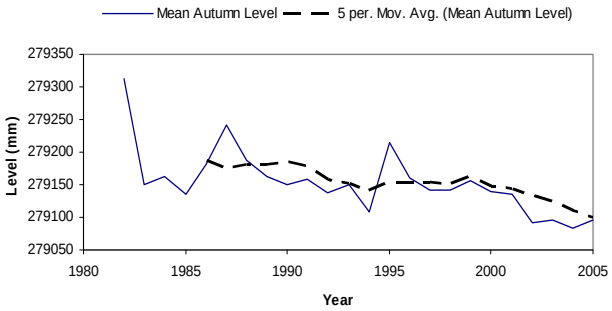
Level Distribution

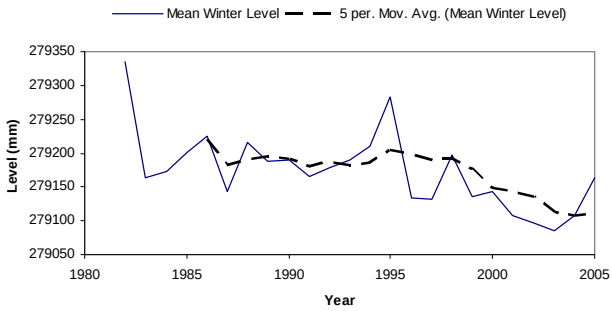
Level (mm Moturiki Datum)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	279591	279367	279345	279329	279316	279308	279301	279294	279287	279280
10	279272	279266	279260	279255	279249	279244	279239	279235	279230	279226
20	279222	279218	279213	279209	279205	279201	279198	279195	279192	279189
30	279186	279184	279182	279180	279178	279176	279174	279172	279170	279168
40	279167	279165	279163	279162	279160	279159	279157	279156	279154	279153
50	279151	279150	279148	279147	279145	279144	279143	279141	279140	279139
60	279137	279135	279134	279132	279131	279129	279128	279126	279125	279123
70	279121	279120	279118	279116	279115	279113	279112	279110	279108	279106
80	279105	279103	279101	279099	279098	279096	279093	279091	279089	279087
90	279085	279083	279081	279078	279076	279073	279070	279067	279062	279055
100	279008									

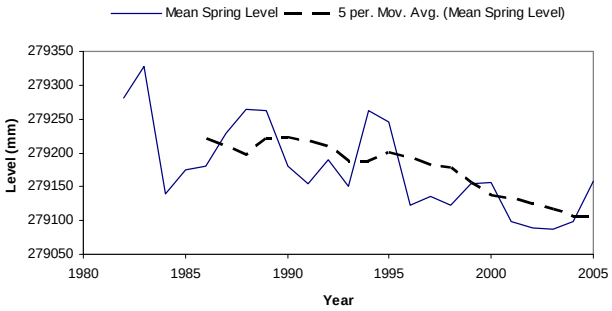


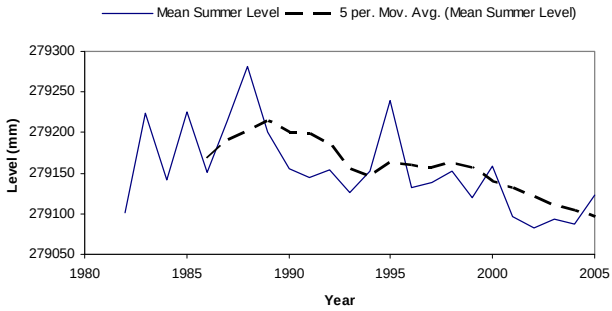












Lake Rotoiti at Okawa Bay (After Installation of Okere Control Gates)

Environment Bay of Plenty
Lake Level Recording Station

Lake	Rotoehu	Site	Te Pohue Bay
Site Number	14716	Grid Reference	V15: 085 462
Start of Record	July 1953	Data Capture Rate	94%
Data Summary From	January 1954	To	December 2005
Data Audited From	January 1986	To	December 2005

Equipment History

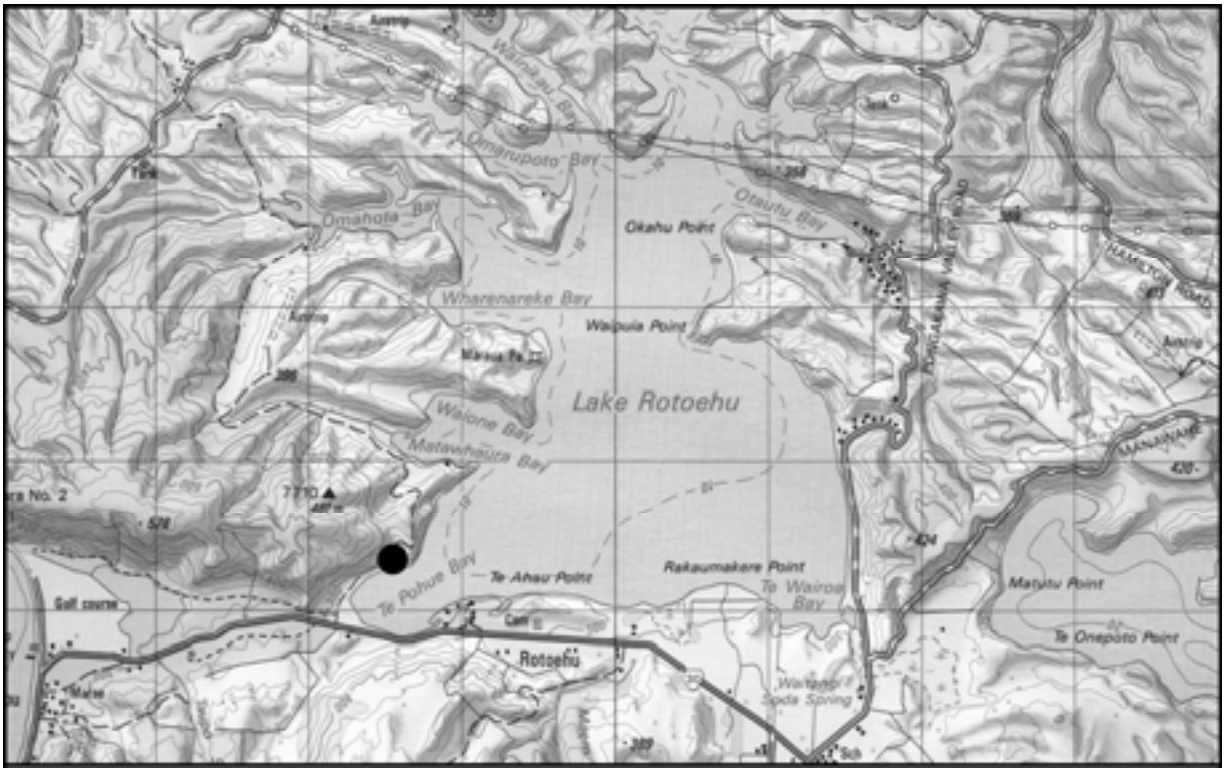
21/02/25: Staff gauge installed.
02/03/65: Kent chart recorder.
24/07/73: Float with F&P digital recorder.
14/08/79: 1.5 metre range Monthly Stevens chart.
31/01/86: Float with F&P digital recorder.
02/06/88: Float with L&S digital recorder.
27/07/93: 5 metre range P.T. with WRIC datalogger.
25/11/97: Float with Campbell CR500 datalogger.

Comments on Stage/Discharge Ratings

Ratings are available to convert Stage (mm) to Reduced Level (mm) in Moturiki Datum.

General Comments

Manual staff gauge and charts were initially recorded by the Water & Soil Division, Hamilton. Site handed over to B.O.P.C.C. in August 1979. Site was moved in April 1994 in response to lowering lake levels. Site is now operated by Environment Bay of Plenty as part of its Natural Environmental Regional Monitoring Network.



SITE LOCATION
Rotoehu at Te Pohue Bay

Station Comments

Lake Rotoehu at Te Pohue Bay. Site Number 14716, on River Number 147071.

Surface Area (km2)	Average Depth (m)	Maximum Depth (m)	Maximum Length (km)	Maximum Width (km)	Type
8.11	8.16	13.5	4.6	4.0	Volcanic

Source: Waters of New Zealand (1992).

The local recording authority is Environment BOP. Lake levels are in gauge heights, to convert to Moturiki Datum apply kind 3 ratings. Periods of synthetic data occur throughout the record. Synthetic data compiled using Lake Rotoma.

21/02/25
The lake levels for the period 250221 to 260312 are from a staff gauge installed by Mr. Martin of the Lands & Survey Department. In his report he states that it was difficult to obtain regular readings and the above period appears to be all that was recorded. Readings (in Martins datum) have been converted to Moturiki datum and filed.

12/03/26
No lake levels were recorded from 260312 to 530307.

27/03/53
Only 5 staff gauge readings were taken between 530328 and 540201.

31/12/59
No lake levels were recorded from 600101 to 620131.

02/03/65
Kent chart recorder installed 650303. Original charts held by Hamilton Hydrological Survey. Lake seiche has been recorded on charts & is of varying frequency, duration & amplitude. These variations have not been transferred to the water tape & interested users are advised to contact relevant recording authority.

07/12/78
Between 781207 and 790109, the lake level fell, and remained below invert of stilling well. As no other record is available, a straight line recession has been assumed. A total of 72.4mm fell at Rotoehu Forest during this period.

21/12/88
New recorder tower installed.

09/04/94
Dam constructed in March by member of public at French Pass burst at about this time. See file for more information.
Diurnal fluctuations in data may be due to temperature effect on pressure transducer.

14/04/94
5 metre range PT and Kainga logger re-installed at a new site approx 150m from the cylinders, north east towards the Bluffs. The instruments were moved due to development of mudflats around the cylinder intakes. Cylinders remain at original site.

25/11/97
Pressure transducer disconnected and Kainga logger removed from temporary site, near bluffs. A Handar Encoder and CR500 Datalogger were installed at the Te Pohue Bay cylinders.

31/12/00
Data audit carried out on lake level monitoring site 14716 covering the period 980101 to 20001231. Data audit passed external audit carried out by Environmental Quality Systems.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Compiled	October 2006	Site Number	14716
Compiled by	Craig Putt	Lake	Rotoehu
		Station	Te Pohue Bay
Metric Map Reference	V15: 085 462		
Catchment Area (km²)	50	Period of Summary	1954 to 2005

Statistical Summary

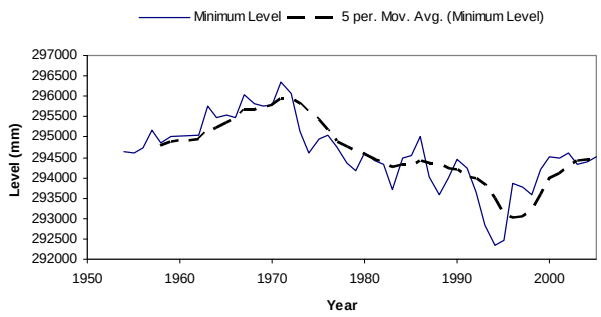
Level (mm Moturiki Datum)			
Minimum Level	292346	Maximum Level	296967
Mean Annual Minimum Level	294750	Mean Annual Maximum Level	295407
Mean Level	294970	Mean Summer Level	294952
Median Level	294936	Mean Autumn Level	294831
		Mean Winter Level	294967
		Mean Spring Level	295088
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	GEV
7 day Low Level (Minimum)	292360	Peak Level (5 yr Return)	295955
7 Day Low Level (Mean Annual)	294456	Peak Level (10 yr Return)	296318
7 day Low Level (5 yr Return)	293863	Peak Level (20 yr Return)	296611
7 Day Low Level (10 yr Return)	293468	Peak Level (50 yr Return)	296925
		Peak Level (100 yr Return)	297119

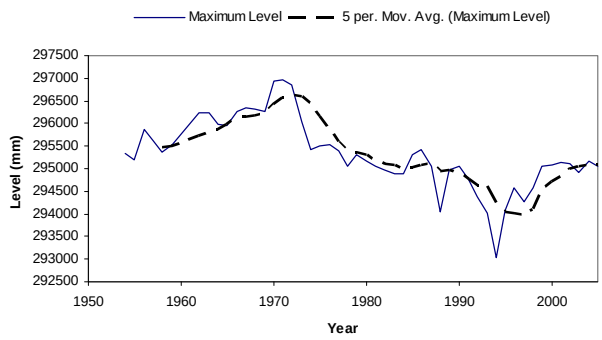
Annual Summaries

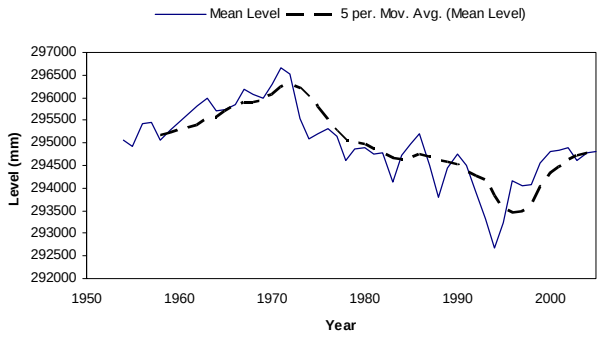
Year	Level (mm Moturiki Datum)			Year	Level (mm Moturiki Datum)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	294612	294884	295165	1993	292827	293323	294006
1981	294423	294744	295063	1994	292346	292687	293031
1982	294333	294775	294969	1995	292459	293227	294069
1983	293723	294131	294877	1996	293851	294149	294565
1984	294488	294713	294883	1997	293785	294054	294268
1985	294560	294986	295297	1998	293593	294084	294587
1986	295011	295192	295428	1999	294212	294552	295054
1987	294028	294500	295043	2000	294503	294795	295089
1988	293594	293799	294054	2001	294493	294830	295146
1989	293975	294447	294984	2002	294599	294905	295105
1990	294468	294747	295057	2003	294320	294611	294913
1991	294228	294494	294770	2004	294405	294792	295155
1992	293648	293942	294369	2005	294530	294819	295048

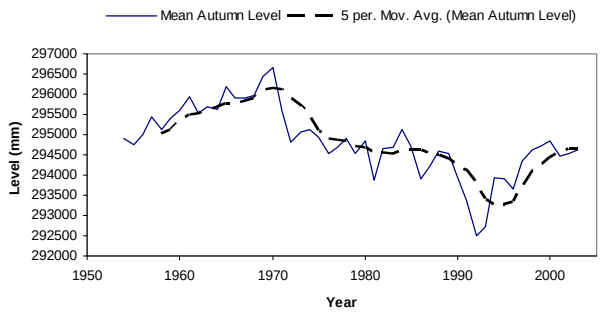
Level Distribution

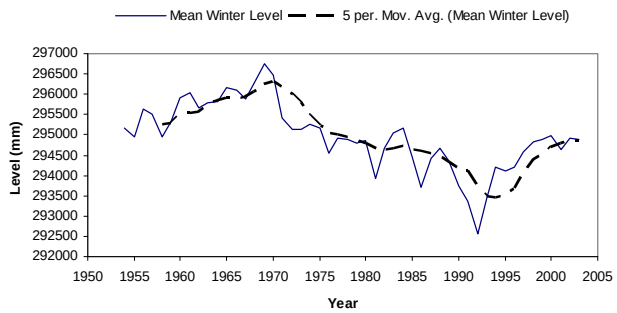
Level (mm Moturiki Datum)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	296967	296787	296649	296531	296441	296281	296224	296191	296151	296124
10	296088	296048	296008	295966	295917	295884	295864	295834	295806	295764
20	295725	295671	295592	295560	295524	295488	295463	295428	295383	295353
30	295329	295311	295284	295256	295234	295215	295194	295171	295152	295132
40	295113	295100	295077	295054	295036	295013	295001	294979	294964	294949
50	294936	294922	294911	294898	294887	294871	294859	294849	294835	294824
60	294810	294797	294782	294765	294745	294724	294706	294689	294675	294660
70	294645	294627	294609	294587	294565	294547	294527	294507	294483	294452
80	294419	294381	294344	294289	294229	294169	294110	294045	293986	293949
90	293908	293867	293816	293755	293689	293626	293349	293013	292858	292561
100	292346									

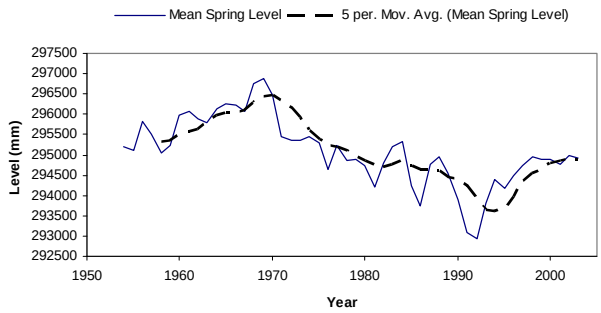


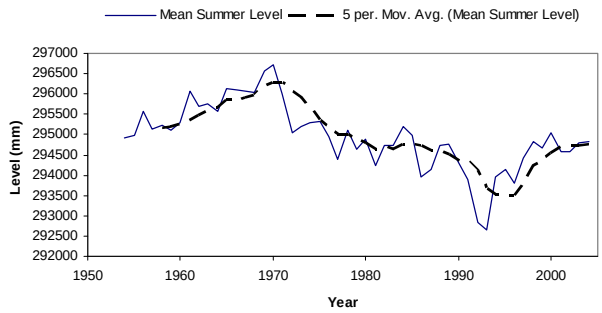












Rotoehu at Te Pohue Bay

Environment Bay of Plenty
Lake Level Recording Station

Lake	Rotoma	Site	Otangiwai Point
Site Number	14717	Grid Reference	V15: 238 434
Start of Record	March 1953	Data Capture Rate	97%
Data Summary From	January 1954	To	December 2005
Data Audited From	February 1986	To	December 2005

Equipment History

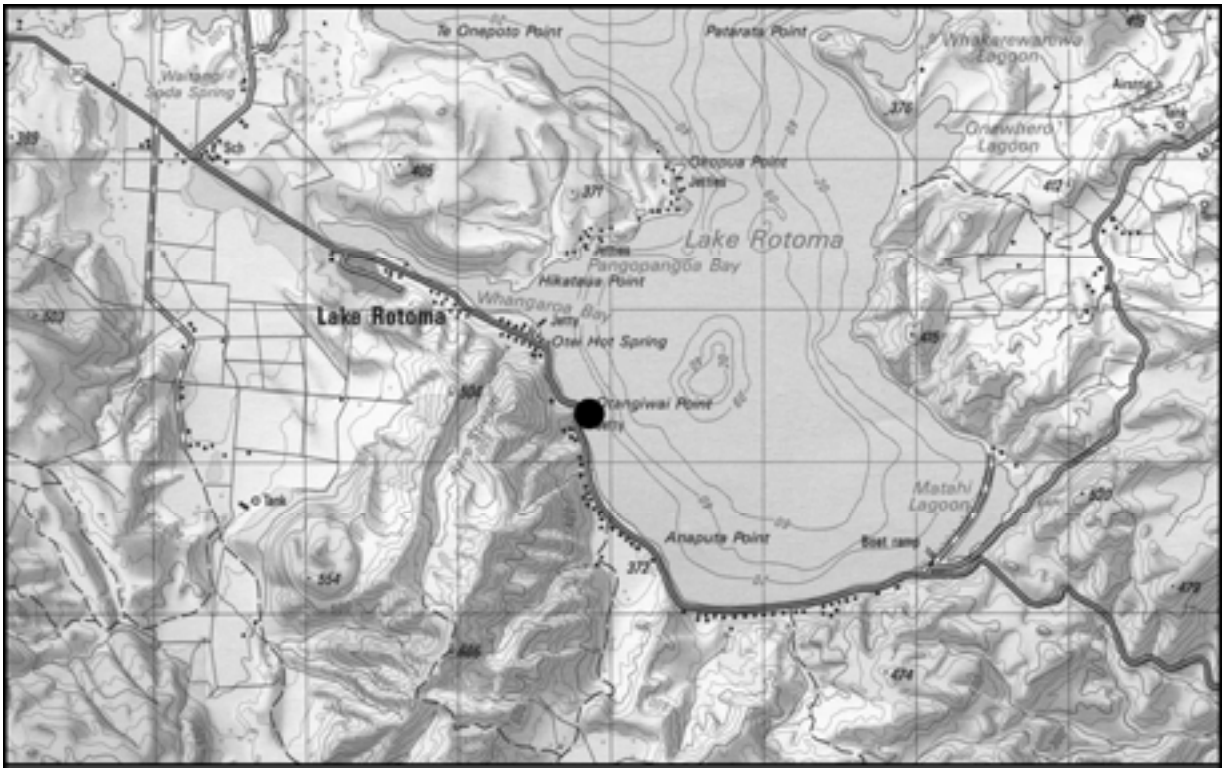
05/03/53: Staff gauge installed.
03/03/65: 3 metre range Monthly Kent chart recorder.
18/07/73: Float with F&P digital recorder.
17/09/79: 1.5 metre range Monthly Stevens chart recorder.
28/02/86: Float with F&P digital recorder.
09/06/88: Float with L&S digital recorder.
21/09/93: 5 metre range P.T. with WRIC datalogger.
17/02/94: Float with L&S digital recorder.
25/11/97: Float with Campbell CR500.

Comments on Stage/Discharge Ratings

Ratings are available to convert Stage (mm) to Reduced Level (mm) in Moturiki Datum.

General Comments

Manual staff gauge and charts were initially recorded by Water & Soil Division, Hamilton. Site handed over to B.O.P.C.C. on 18th September 1979. Site is now operated by Environment Bay of Plenty as part of its Natural Environmental Regional Monitoring Network.



SITE LOCATION
Rotoma at Otangiwai Point

Station Comments

Lake Rotoma at Otangiwai Point. Site Number 14717, on River Number 147072.

Surface Area (km2)	Average Depth (m)	Maximum Depth (m)	Maximum Length (km)	Maximum Width (km)	Type
11.16	36.9	83.0	5.2	4.7	Volcanic

Source: Waters of New Zealand (1992).

The local recording authority is Environment BOP.

Lake levels are in staff gauge heights, to convert to reduced level, Moturiki Datum, apply kind 3 rating.

Periods of synthetic data occur throughout the record. Synthetic data compiled using Lakes Rotoehu and Okataina.

25/02/25
The lake levels for the period 250225 to 260331 are from a staff gauge installed by Mr. Martin of the Lands and Survey Department. In his report he states that it was difficult to obtain regular readings and the above period appears to be all that was recorded. The readings (in Martins Datum) have been converted to Moturiki Datum and filed.

31/03/26
There were no lake levels recorded from 260331 to 530305.

05/03/53
Staff gauge installed on 530305

02/03/65
Recorder installed on 650302 at 142000 is a 3.0m range 32 day Kent.

18/09/79
Site handed over to BOP Catchment Commission on 790918. Hourly F & P recorder replaced by 1.5m monthly Stevens F chart recorder.

24/04/89
Synthetic data from 890424 at 150000 to 891120 at 090000 due to recorder working intermittently. Synthetic data based on Rotoehu and Okataina recorders.

21/09/93
Instruments change from float to pressure transducer (PT), due to lake level dropping below bottom of cylinder.

01/01/94
A data audit has been carried out on the period of record from 860228 at 000000 to 940101 at 000000. Environment BOP was the recording authority during this period with the audit being carried out by Environment BOP, in February 1994. As a part of the data Lake Rotoma at Otangiwai point data (14717) was compared with Lake Rotoehu at Te Pohue Bay data (14716), map reference V15:185462.

17/02/94
Recording tower moved 4m north along the edge of the point.

25/11/97
A Handar encoder and CR500 datalogger were installed. Recording interval is 30 minutes, stage resolution 1mm.

31/12/00
Data audit carried out on lake level monitoring site 14717 covering the period 980101 to 20001231. Data audit passed external audit carried out by Environmental Quality Systems.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Compiled	October 2006	Site Number	14717
Compiled by	Craig Putt	Lake	Rotoma
		Station	Otangiwai Point
Metric Map Reference	V15: 238 434		
Catchment Area (km²)	29	Period of Summary	1954 to 2005

Statistical Summary

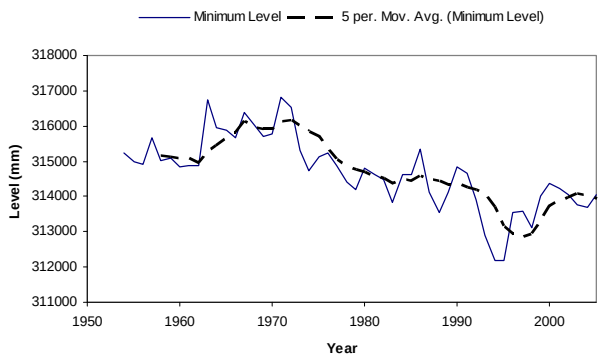
Level (mm Moturiki Datum)			
Minimum Level	312171	Maximum Level	317734
Mean Annual Minimum Level	315076	Mean Annual Maximum Level	315942
Mean Level	315117	Mean Summer Level	315154
Median Level	315118	Mean Autumn Level	314992
		Mean Winter Level	315023
		Mean Spring Level	315207
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	GEV
7 day Low Level (Minimum)	312189	Peak Level (5 yr Return)	316475
7 Day Low Level (Mean Annual)	314539	Peak Level (10 yr Return)	316984
7 day Low Level (5 yr Return)	313833	Peak Level (20 yr Return)	317401
7 Day Low Level (10 yr Return)	313372	Peak Level (50 yr Return)	317853
		Peak Level (100 yr Return)	318137

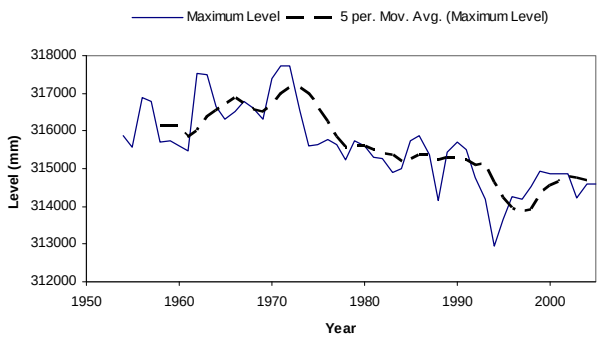
Annual Summaries

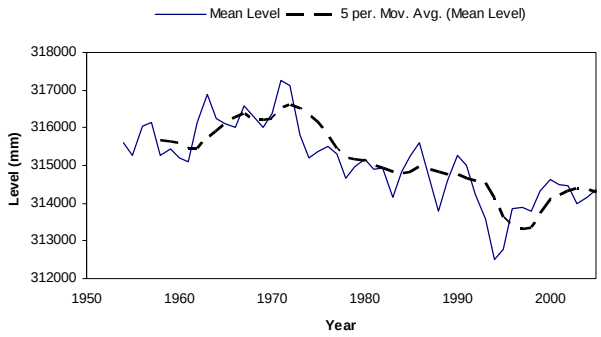
Year	Level (mm Moturiki Datum)			Year	Level (mm Moturiki Datum)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	314821	315179	315620	1993	312915	313593	314190
1981	314618	314904	315310	1994	312171	312521	312954
1982	314493	314949	315274	1995	312190	312762	313649
1983	313838	314163	314889	1996	313546	313840	314267
1984	314619	314845	315001	1997	313597	313877	314188
1985	314640	315260	315742	1998	313114	313799	314519
1986	315352	315594	315864	1999	314019	314317	314933
1987	314115	314624	315378	2000	314378	314624	314872
1988	313544	313794	314150	2001	314241	314494	314871
1989	314113	314612	315437	2002	314066	314462	314857
1990	314828	315262	315719	2003	313766	313994	314218
1991	314668	315015	315490	2004	313683	314167	314590
1992	313894	314212	314779	2005	314044	314352	314599

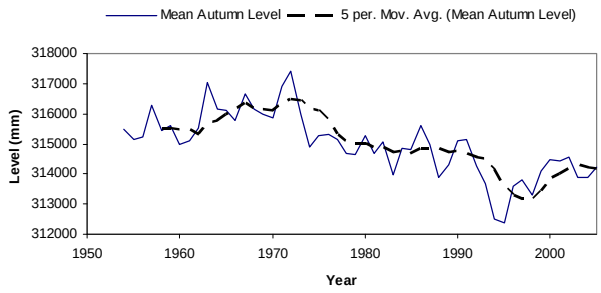
Level Distribution

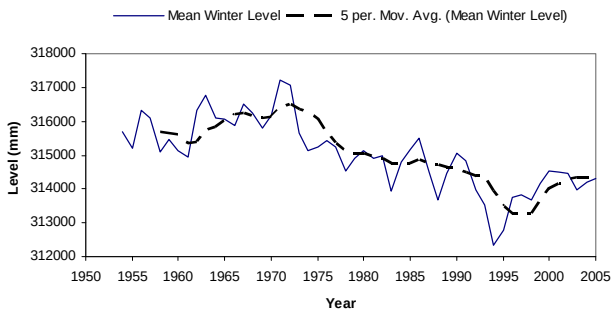
Level (mm Moturiki Datum)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	317734	317479	317292	317159	317038	316888	316792	316717	316663	316613
10	316535	316468	316408	316325	316267	316229	316194	316156	316113	316073
20	316030	315975	315918	315852	315805	315760	315719	315682	315642	315610
30	315587	315560	315536	315514	315486	315464	315444	315425	315403	315378
40	315358	315333	315307	315286	315267	315245	315213	315190	315165	315136
50	315118	315096	315076	315055	315029	315005	314983	314960	314936	314913
60	314891	314869	314845	314816	314787	314751	314709	314655	314614	314582
70	314550	314516	314488	314462	314440	314420	314399	314373	314336	314290
80	314242	314203	314163	314121	314080	314032	314001	313971	313942	313911
90	313867	313822	313745	313684	313621	313497	313273	312929	312574	312412
100	312171									

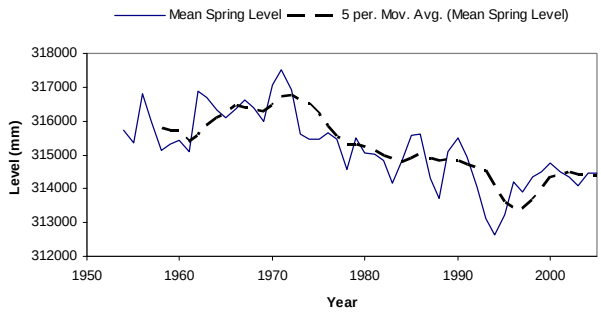


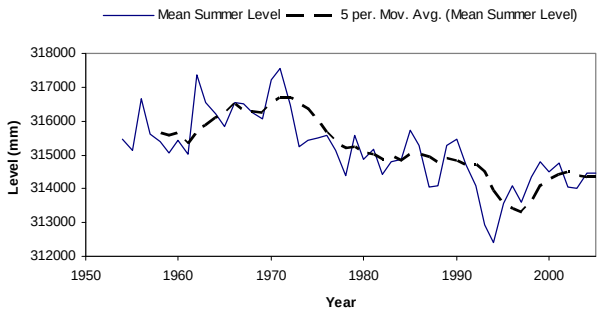












Rotoma at Otangiwai Point

Environment Bay of Plenty
Lake Level Recording Station

Lake	Okataina	Site	Tauranganui Bay
Site Number	15309	Grid Reference	V16: 110 385
Start of Record	October 1952	Data Capture Rate	99%
Data Summary From	January 1953	To	December 2005
Data Audited From	February 1986	To	December 2005

Equipment History

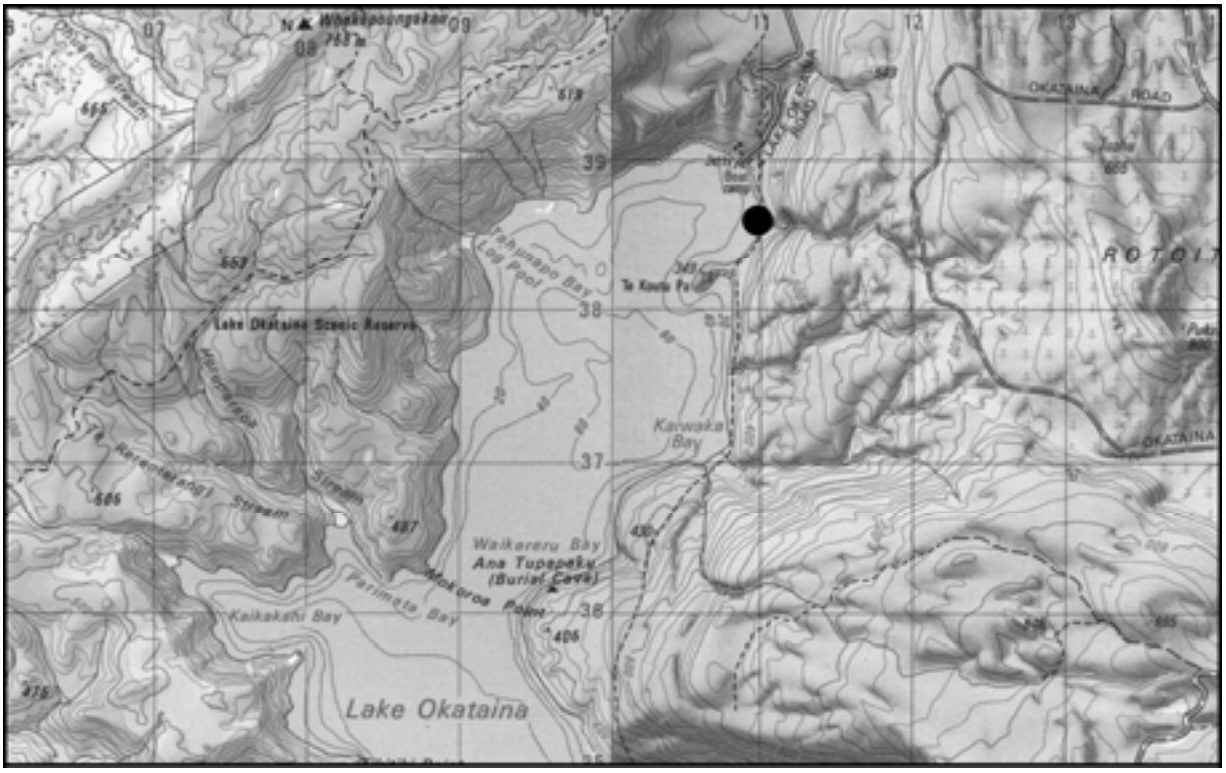
01/10/52: Staff gauge installed.
14/10/65: Chart recorder.
28/08/73: Float with F&P digital recorder.
17/09/79: 1.5 metre range Monthly Stevens chart recorder.
28/02/86: Float with F&P digital recorder.
02/06/88: Float with L&S digital recorder.
08/12/93: 5 metre range P.T. with WRIC datalogger.
24/11/97: Float with Campbell CR500 datalogger.

Comments on Stage/Discharge Ratings

Ratings are available to convert Stage (mm) to Reduced Level (mm) in Moturiki Datum.

General Comments

Manual staff gauge readings and charts were initially recorded by Water & Soil Division, Hamilton. Site handed over to B.O.P.C.C. on 18th September 1979. Site is now operated by Environment Bay of Plenty as part of its Natural Environmental Regional Monitoring Network.



SITE LOCATION
Okataina at Tauranganui Bay

Station Comments

Lake Okataina at Tauranganui Bay. Site Number 15309, on River Number 153136.

Surface Area (km2)	Average Depth (m)	Maximum Depth (m)	Maximum Length (km)	Maximum Width (km)	Type
10.8	39.4	78.5	6.2	5.0	Volcanic

Source: Waters of New Zealand (1992).

The local recording authority is Environment BOP.

Lake levels are in staff gauge heights, to convert to reduced level Moturiki datum, apply kind 3 ratings.

23/01/72
Periods of synthetic data occur throughout the record. Synthetic data compiled using Rerewhakaaitu, Rotoehu and Rotoma.

30/06/77
Recorder relocated to a new structure at NZMS map reference N76: 893 080, on 770630.

18/09/79
Site handed over to Bay of Plenty Catchment Commission on 790918.

08/12/93
L&S digital recorder and float were removed and replaced by a 5m range pressure transducer due to the water level having dropped below the level of stilling well intake.

24/11/97
A Handar encoder and CR500 datalogger were installed. Recording interval is 30 minutes.

31/12/00
Data audit carried out on lake level monitoring site 15309 covering the period 980101 to 1001231. Data audit passed external audit carried out by Environmental Quality Systems.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Compiled	October 2006	Site Number	15309
Compiled by	Craig Putt	Lake	Okataina
		Station	Tauranganui Bay
Metric Map Reference	V16: 110 385		
Catchment Area (km²)	62	Period of Summary	1953 to 2005

Statistical Summary

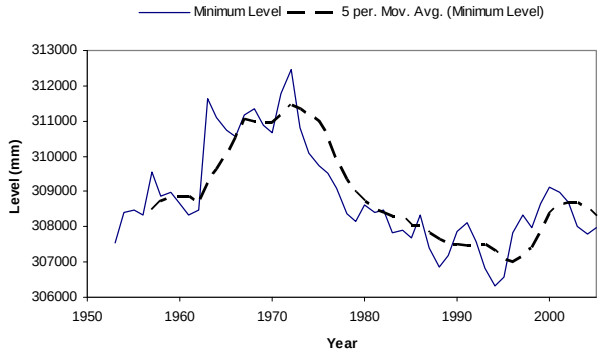
Level (mm Moturiki Datum)			
Minimum Level	306309	Maximum Level	313456
Mean Annual Minimum Level	308943	Mean Annual Maximum Level	309771
Mean Level	309221	Mean Summer Level	309286
Median Level	308303	Mean Autumn Level	309116
		Mean Winter Level	309145
		Mean Spring Level	309307
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	GEV
7 day Low Level (Minimum)	306328	Peak Level (5 yr Return)	310677
7 Day Low Level (Mean Annual)	308396	Peak Level (10 yr Return)	311649
7 day Low Level (5 yr Return)	307656	Peak Level (20 yr Return)	312641
7 Day Low Level (10 yr Return)	307244	Peak Level (50 yr Return)	314015
		Peak Level (100 yr Return)	315118

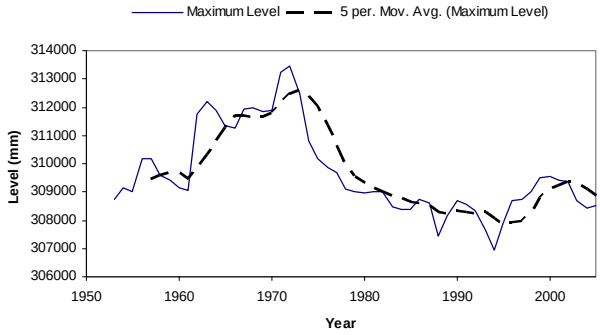
Annual Summaries

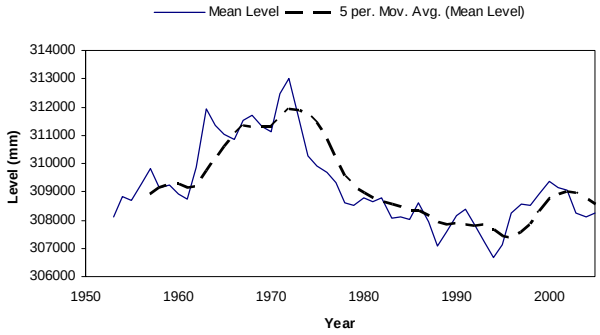
Year	Level (mm Moturiki Datum)			Year	Level (mm Moturiki Datum)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	308630	308772	308950	1993	306808	307202	307672
1981	308418	308652	309021	1994	306309	306660	306956
1982	308470	308799	308990	1995	306565	307126	307901
1983	307828	308064	308465	1996	307836	308239	308690
1984	307896	308112	308402	1997	308318	308578	308740
1985	307698	308027	308375	1998	307984	308509	309020
1986	308333	308601	308761	1999	308647	308943	309497
1987	307390	307932	308585	2000	309111	309352	309570
1988	306852	307081	307419	2001	308994	309161	309399
1989	307188	307563	308167	2002	308677	309040	309373
1990	307860	308174	308694	2003	308021	308261	308708
1991	308101	308369	308569	2004	307791	308120	308418
1992	307580	307838	308340	2005	307976	308249	308508

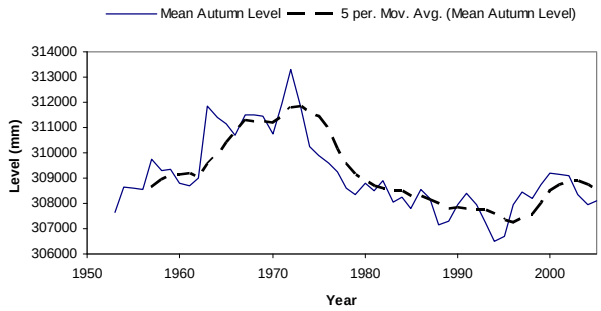
Level Distribution

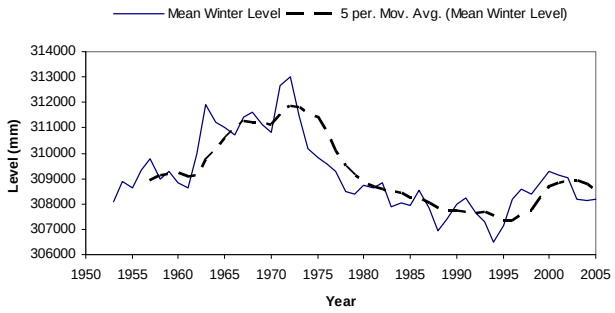
Level (mm Moturiki Datum)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	313456	313109	312881	312423	311990	311914	311859	311813	311751	311663
10	311550	311475	311380	311307	311259	311201	311143	311079	310994	310845
20	310762	310692	310299	310200	310128	309949	309862	309810	309755	309706
30	309606	309514	309418	309357	309321	309272	309233	309197	309155	309114
40	309081	309055	309023	308991	308971	308942	308914	308881	308848	308823
50	308803	308779	308758	308740	308723	308704	308695	308679	308666	308647
60	308628	308611	308594	308574	308549	308525	308505	308486	308465	308433
70	308399	308367	308339	308315	308290	308270	308250	308224	308182	308135
80	308099	308070	308040	308011	307979	307945	307911	307877	307823	307724
90	307661	307617	307470	307374	307278	307164	307031	306928	306803	306631
100	306309									

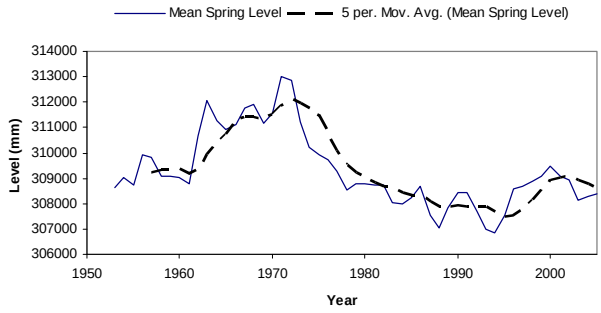


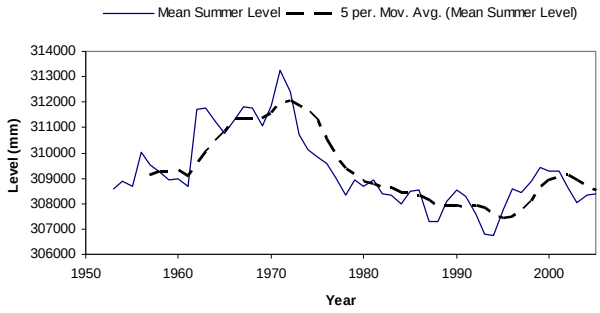












Okataina at Tauranganui Bay

Environment Bay of Plenty
Lake Level Recording Station

Lake	Okareka	Site	Acacia Bay
Site Number	15307	Grid Reference	U16: 035 308
Start of Record	July 1951	Data Capture Rate	86%
Data Summary From	January 1966	To	December 2005
Data Audited From	February 1986	To	December 2005

Equipment History

03/07/51: Staff gauge installed.
19/02/86: 1 metre range monthly Foxboro chart recorder.
23/05/91: 5 metre range P.T. and WRIC datalogger.
24/05/00: 5 metre range P.T. and Campbell CR500 datalogger.

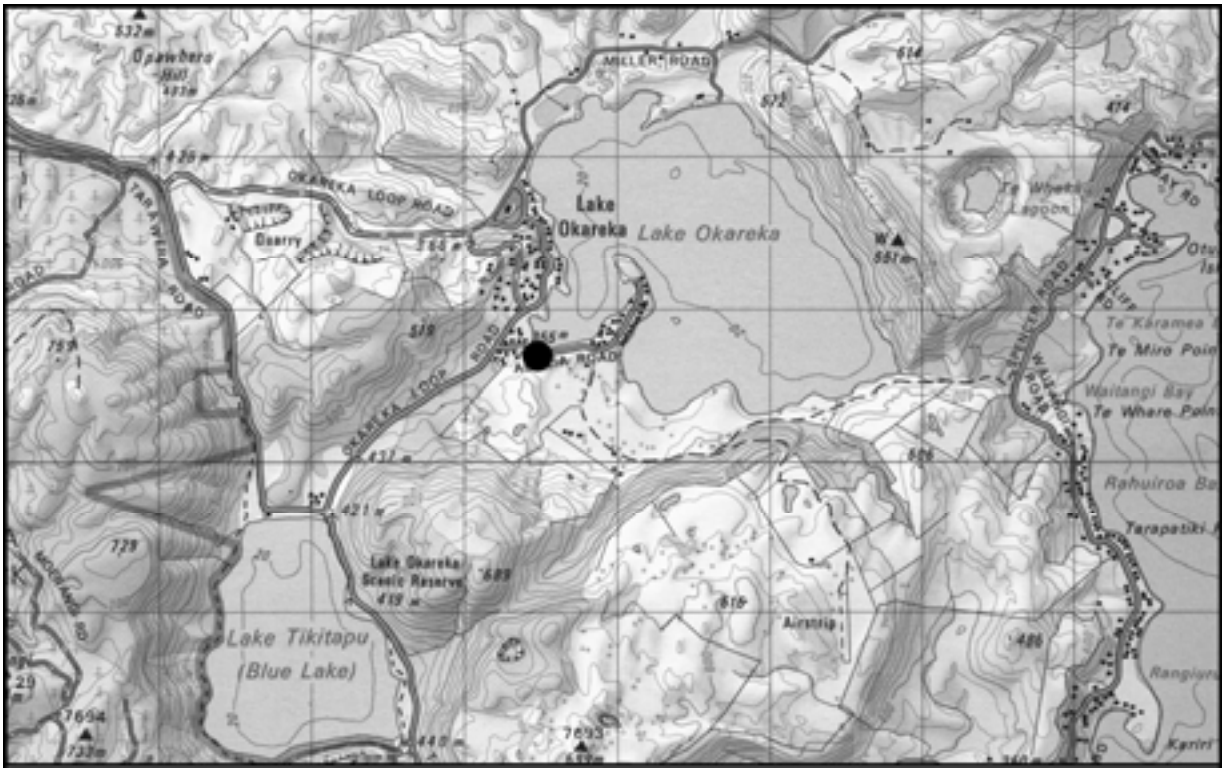
Comments on Stage/Discharge Ratings

Ratings available to convert stage (mm) to reduced level (mm) in Moturiki datum.

General Comments

Manual staff gauge readings and charts were initially recorded by Water & Soil Division, Hamilton. Site handed over to B.O.P.C.C. on 18th September 1979. Site is now operated by Environment Bay of Plenty as part of its Natural Environmental Regional Monitoring Network. A control structure on the southern side of the lake is operated by the Rotorua District Council as a high level overflow route to Lake Tarawera.

NOTE: This summary excludes data prior to the establishment of the control structure.



SITE LOCATION
Okareka at Acacia Bay

Station Comments

Lake Okareka at Acacia Bay. Site Number 15307, on River Number 147072.

Surface Area (km2)	Average Depth (m)	Maximum Depth (m)	Maximum Length (km)	Maximum Width (km)	Type
3.46	20.0	33.5	2.8	1.9	Volcanic

Source: Waters of New Zealand (1992).

The local recording authority is Environment BOP.

The dataset is not homogeneous because of construction of a control structure – in this case an overflow pipeline. This has resulted in the peak lake levels being significantly reduced.

Lake levels are filed in staff gauge heights. To convert to reduced level Moturiki Datum, apply kind 3 rating.

Periods of synthetic data occur throughout the record. Synthetic data compiled using Lake Tarawera.

15/03/96
Lake Okareka had no natural surface outlet and all drainage before the 1960's used to be via underground channels. A pump and pipeline were installed in March 1963 and operated until February 1964 in an attempt to control rising lake levels. A controlled gravity pipeline between Lake Okareka and Lake Tarawera was installed in May 1965 and is currently operated on a day to day basis by Rotorua District Council to try and maintain the lake level within the control range of 353.50m and 353.90m. Greater information can be obtained from Environment BOP report ISSN 1172 5377.

17/12/61
Intermittent readings taken from 611217 to 630101.

27/04/67
Missing record from 670427 to 710709 due to no gauge reader being available.

05/08/74
Missing record from 740805 to 750101 due to no lake readings being taken. Synthetic data can be constructed using lake levels from 15309 Lake Okataina at Tauranganui Bay.

31/03/82
Daily staff gauge readings ceased on 820331 090000, but monthly staff gauge readings continue from 820414 143000.

16/02/86
Site handed over to Bay Of Plenty Catchment Commission.

24/05/00
A 5 metre range pressure transducer and CR500 data logger were installed.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Compiled	October 2006	Site Number	15307
Compiled by	Craig Putt	Lake	Okareka
		Station	Acacia Bay
Metric Map Reference	U16: 035 308		
Catchment Area (km²)	19	Period of Summary	1966 to 2005

Statistical Summary

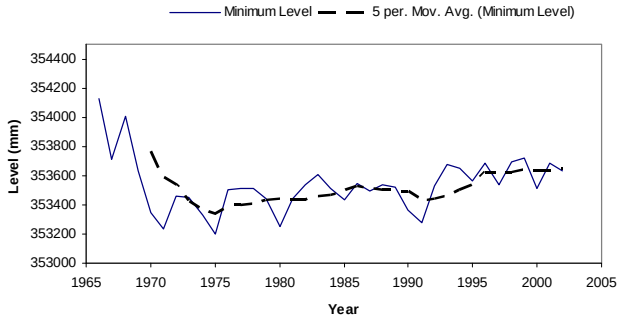
Level (mm Moturiki Datum)			
Minimum Level	353197	Maximum Level	354419
Mean Annual Minimum Level	353523	Mean Annual Maximum Level	353947
Mean Level	353733	Mean Summer Level	353729
Median Level	353727	Mean Autumn Level	353632
		Mean Winter Level	353741
		Mean Spring Level	353836
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	GEV
7 day Low Level (Minimum)	353204	Peak Level (5 yr Return)	354103
7 Day Low Level (Mean Annual)	353499	Peak Level (10 yr Return)	354210
7 day Low Level (5 yr Return)	353393	Peak Level (20 yr Return)	354306
7 Day Low Level (10 yr Return)	353330	Peak Level (50 yr Return)	354420
		Peak Level (100 yr Return)	354500

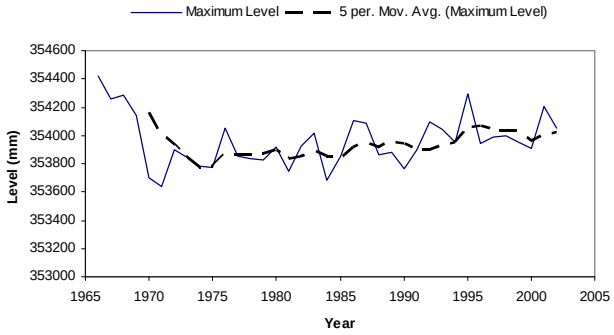
Annual Summaries

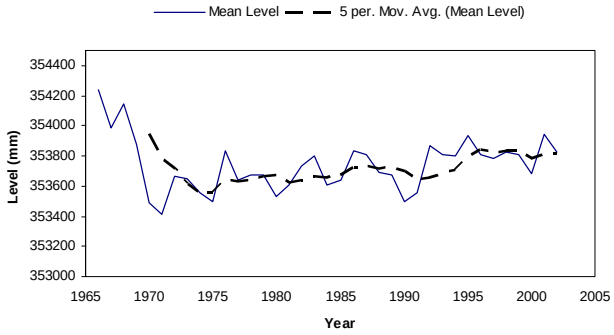
Year	Level (mm Moturiki Datum)			Year	Level (mm Moturiki Datum)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	353513	353643	353854	1993	353364	353498	353762
1981	353508	353673	353835	1994	353277	353560	353902
1982	353445	353674	353830	1995	353531	353865	354097
1983	353254	353531	353920	1996	353673	353805	354041
1984	353438	353610	353745	1997	353653	353798	353956
1985	353540	353735	353925	1998	353562	353934	354293
1986	353604	353798	354014	1999	353681	353811	353943
1987	353508	353606	353687	2000	353536	353785	353993
1988	353432	353637	353852	2001	353696	353828	353998
1989	353543	353832	354110	2002	353717	353810	353950
1990	353490	353806	354090	2003	353515	353682	353905
1991	353540	353688	353865	2004	353681	353948	354203
1992	353517	353670	353881	2005	353629	353827	354053

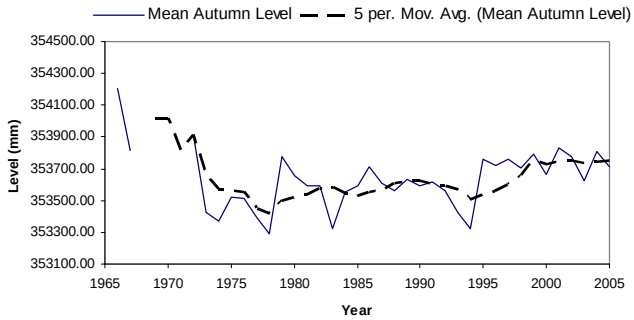
Level Distribution

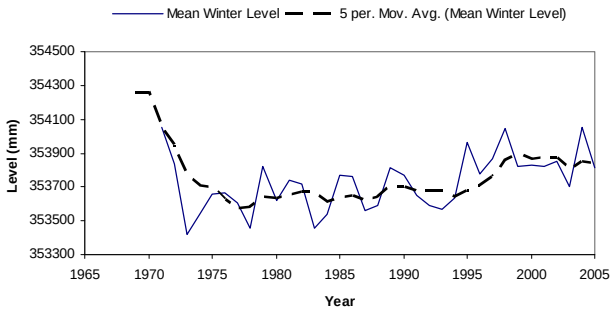
Level (mm Moturiki Datum)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	354419	354273	354231	354194	354171	354134	354088	354056	354039	354019
10	353996	353977	353960	353941	353926	353915	353904	353894	353886	353880
20	353873	353866	353860	353855	353850	353844	353840	353835	353830	353825
30	353820	353816	353811	353807	353803	353799	353795	353790	353786	353782
40	353778	353775	353770	353764	353760	353755	353749	353743	353737	353732
50	353727	353721	353715	353710	353706	353701	353696	353691	353687	353681
60	353676	353671	353667	353663	353659	353655	353649	353644	353639	353635
70	353630	353626	353621	353616	353612	353607	353601	353595	353589	353581
80	353574	353566	353559	353551	353542	353535	353525	353516	353503	353491
90	353478	353464	353449	353435	353418	353399	353373	353349	353323	353300
100	353197									

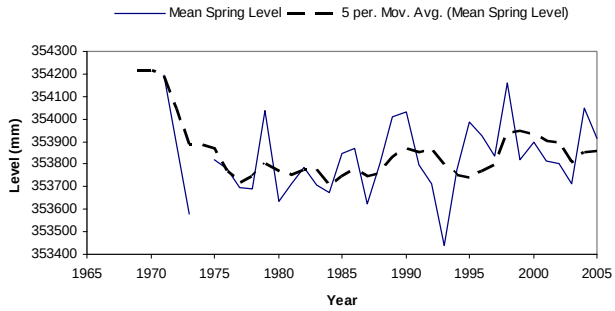


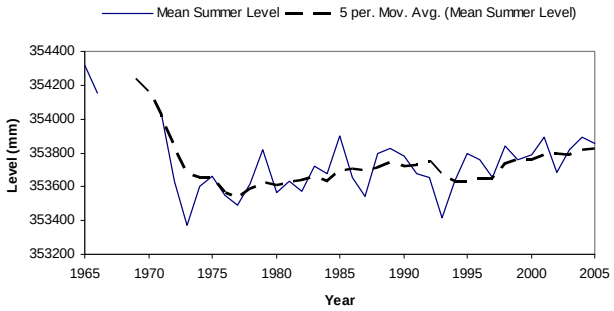












Okareka at Acacia Bay

Environment Bay of Plenty
Lake Level Recording Station

Lake	Tikitapu	Site	Tarawera Rd
Site Number	15347	Grid Reference	U16: 022 292
Start of Record	January 1972	Data Capture Rate	
Data Summary From	January 1972	To	December 2005
Data Audited From	January 1994	To	December 2005

Equipment History

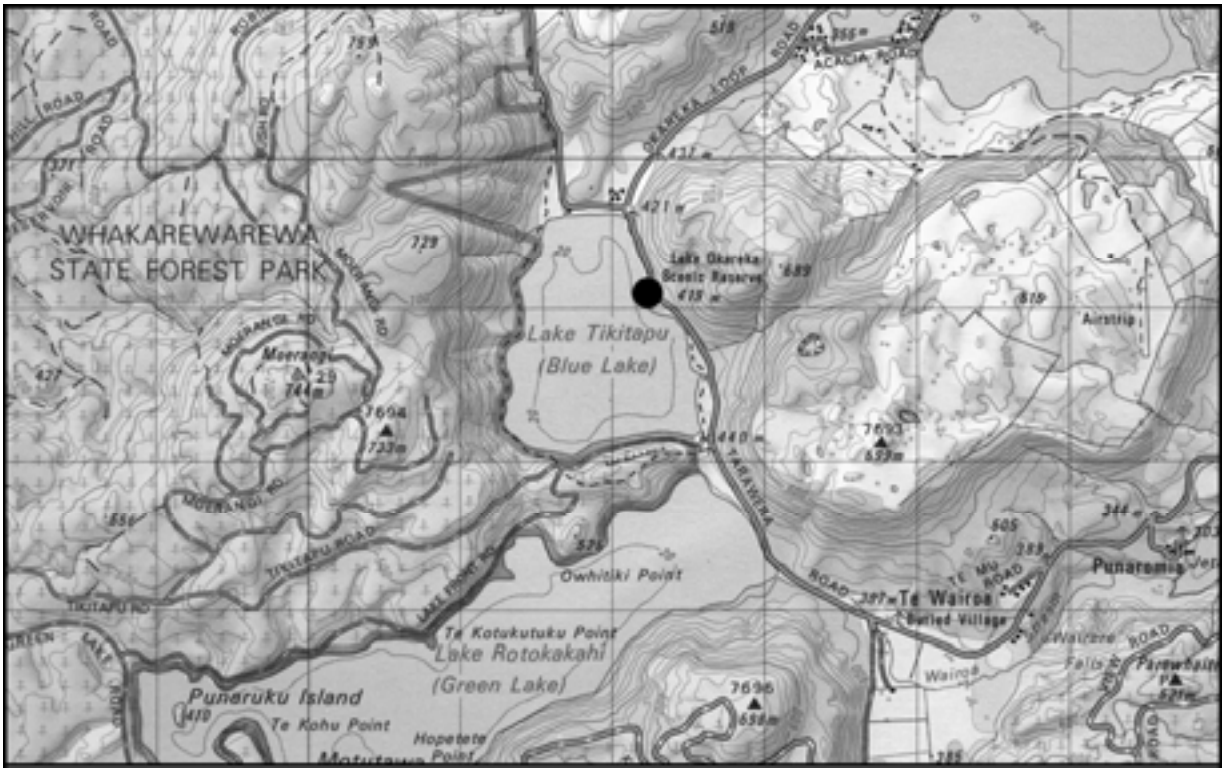
26/01/72: Staff gauge installed.

Comments on Stage/Discharge Ratings

Ratings are available to convert Stage (mm) to Reduced Level (mm) in Moturiki Datum.

General Comments

Manual staff gauge read weekly until July 1972, then bi-weekly till October 1976 and monthly since then. The local recording authority was Water & Soil Division, Hamilton. Site is now operated by Environment Bay of Plenty as part of its Natural Environmental Regional Monitoring Network.



SITE LOCATION
Tikitapu at Tarawera Rd

Station Comments

Lake Tikitapu at Tarawera Rd. Site Number 15347, on River Number 153133.

Surface Area (km2)	Average Depth (m)	Maximum Depth (m)	Maximum Length (km)	Maximum Width (km)	Type
1.4	18.0	27.5	1.6	1.3	Volcanic

Source: Waters of New Zealand (1992).

The local recording authority is Environment B.O.P.

The lake is landlocked without a surface outlet. The lake is also known as Blue Lake.

Lake levels are recorded at intermittent intervals and filed as staff gauge heights. To convert to Reduced Level Moturiki Datum, apply kind 3 rating.

31/12/00
Data audit carried out on lake level monitoring site 15347 covering the period 980101 to 20001231. Data audit passed external audit carried out by Environmental Quality Systems.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Compiled	October 2006	Site Number	15347
Compiled by	Craig Putt	Lake	Tikitapu
		Station	Tarawera Rd
Metric Map Reference	U16: 022 292		
Catchment Area (km²)	5.75	Period of Summary	1972 to 2005

Statistical Summary

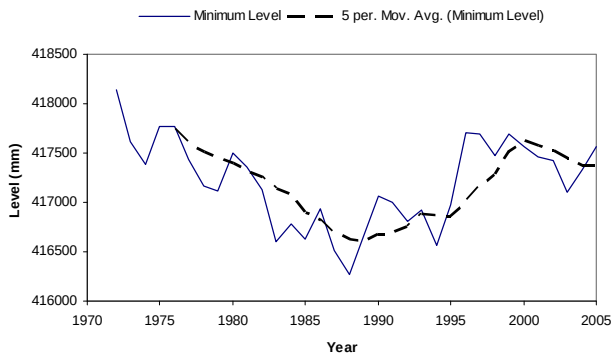
Level (mm Moturiki Datum)			
Minimum Level	416268	Maximum Level	418675
Mean Annual Minimum Level	417169	Mean Annual Maximum Level	417612
Mean Level	417407	Mean Summer Level	417453
Median Level	417464	Mean Autumn Level	417332
		Mean Winter Level	417353
		Mean Spring Level	417494
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	GEV
7 day Low Level (Minimum)	416272	Peak Level (5 yr Return)	417978
7 Day Low Level (Mean Annual)	417150	Peak Level (10 yr Return)	418099
7 day Low Level (5 yr Return)	416826	Peak Level (20 yr Return)	418174
7 Day Low Level (10 yr Return)	416599	Peak Level (50 yr Return)	418236
		Peak Level (100 yr Return)	418264

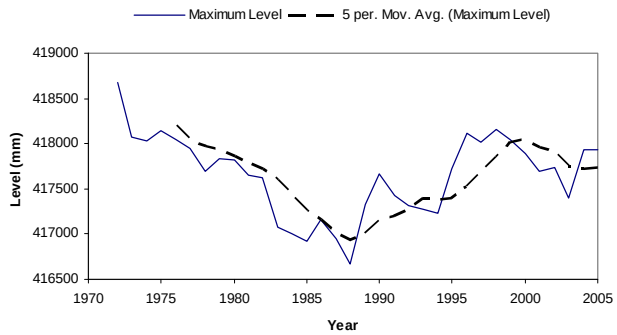
Annual Summaries

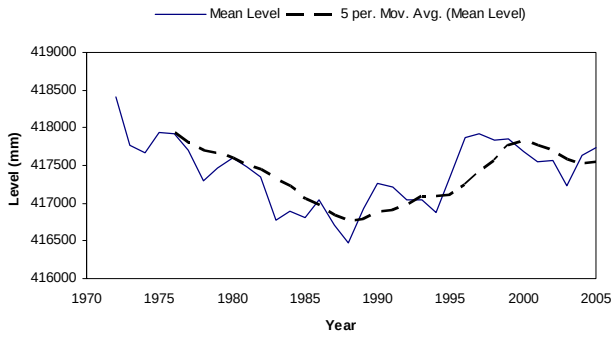
Year	Level (mm Moturiki Datum)			Year	Level (mm Moturiki Datum)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	417500	417599	417816	1993	416922	417039	417274
1981	417357	417486	417651	1994	416564	416883	417225
1982	417130	417355	417627	1995	416980	417347	417722
1983	416605	416778	417075	1996	417702	417878	418117
1984	416778	416893	417000	1997	417689	417921	418018
1985	416626	416807	416920	1998	417473	417844	418152
1986	416935	417043	417160	1999	417693	417848	418051
1987	416510	416707	416951	2000	417570	417685	417891
1988	416268	416468	416668	2001	417465	417557	417689
1989	416650	416921	417325	2002	417421	417566	417729
1990	417060	417265	417660	2003	417098	417233	417404
1991	417005	417213	417424	2004	417337	417643	417929
1992	416808	417049	417317	2005	417564	417741	417939

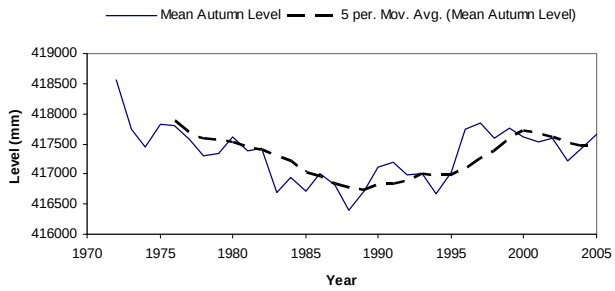
Level Distribution

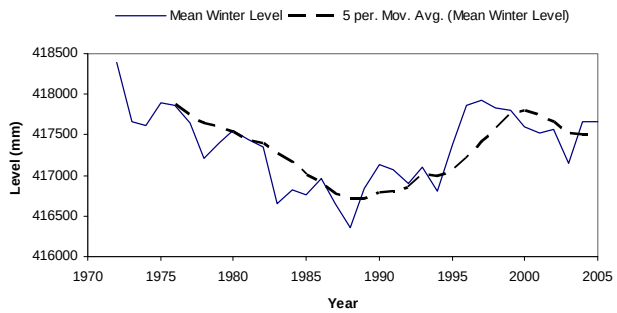
Level (mm Moturiki Datum)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	418675	418430	418358	418136	418094	418045	418021	418011	417995	417974
10	417952	417936	417927	417914	417901	417886	417877	417856	417832	417819
20	417810	417801	417790	417776	417764	417752	417743	417730	417719	417711
30	417702	417688	417679	417665	417651	417640	417626	417615	417603	417592
40	417584	417574	417564	417553	417546	417532	417518	417510	417498	417487
50	417464	417445	417431	417414	417397	417381	417364	417343	417329	417305
60	417287	417268	417250	417237	417222	417208	417192	417176	417162	417145
70	417132	417121	417104	417082	417068	417053	417034	417021	417005	416988
80	416966	416947	416934	416907	416888	416874	416863	416852	416832	416811
90	416788	416741	416712	416686	416664	416652	416625	416602	416510	416417
100	416268									

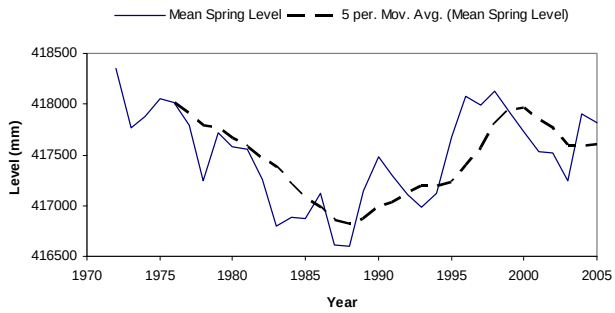


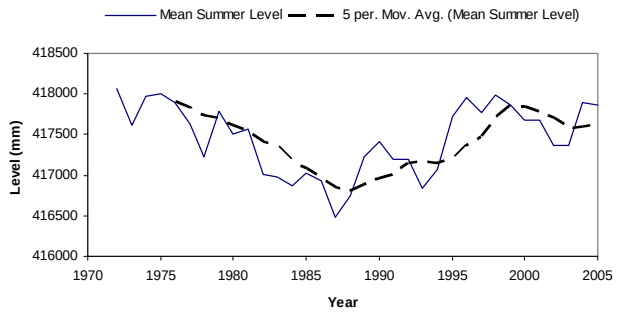












Tikitapu at Tarawera Rd

Environment Bay of Plenty
Lake Level Recording Station

Lake	Tarawera	Site	Te Wairoa
Site Number	15301	Grid Reference	U16: 057 274
Start of Record	April 1925	Data Capture Rate	96%
Data Summary From	January 1926	To	December 2005
Data Audited From	January 1994	To	December 2005

Equipment History

01/01/25: Staff gauge installed.
12/03/51: Weekly Bristol chart recorder.
17/12/58: Monthly Kent chart recorder.
24/08/73: Float with F&P digital recorder.
24/08/73: Backup is Kent chart recorder.
16/12/93: Encoder and WRIC datalogger.
01/06/94: Float with L&S datalogger.
26/11/97: Float with Campbell datalogger.

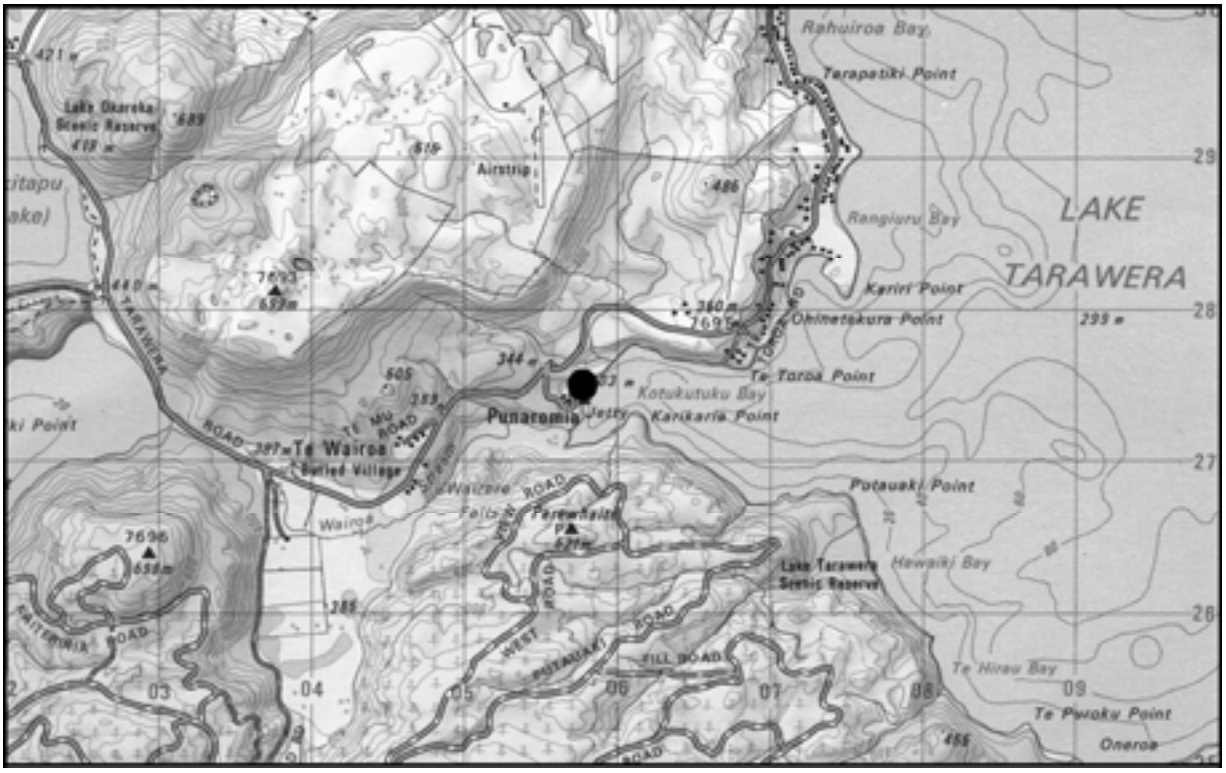
Comments on Stage/Discharge Ratings

Ratings are available to convert Stage (mm) to Reduced Level (mm) in Moturiki Datum.

General Comments

Staff gauge readings were collected on an intermittent basis from 1925 till 1951. Site was operated by NIWA, Rotorua. Site is now operated by Environment Bay of Plenty as part of its Natural Environmental Regional Monitoring Network.

NOTE: Suspected tectonic land deformation in this area could be affecting the recorder site, and hence influencing the historical relativity of the lake level record.



SITE LOCATION
Tarawera at Te Wairoa

Station Comments

Lake Tarawera at Te Wairoa. Site Number 15301, on River Number 153000.

Surface Area (km2)	Average Depth (m)	Maximum Depth (m)	Maximum Length (km)	Maximum Width (km)	Type
41.02	50	87.5	11.4	9.0	Volcanic

Source: Waters of New Zealand (1992).

The local recording authority is Environment BOP.

The catchment area includes the following land locked lakes, totalling 243km2: Rotomahana, Rerewhakaaitu, Tikitapu, Okataina, Okareka and Rotokakahi.

Data is filed in gauge heights, to convert to Moturiki datum apply kind 3 ratings.

Periods of synthetic data occur throughout the record. Synthetic data compiled using Lake Okareka.

01/01/25
A kind 3 rating has been filed for the staff gauge installed (to Martins datum) on 250101. The rating converts the filed gauge heights to Moturiki datum.

20/05/20
Staff gauge readings began 250520 on an intermittent basis until the installation of a chart recorder 510312. Periods of less than six months between readings have been treated as continuous record. Levels have generally been read to the nearest thirty millimetres (0.1ft).

03/10/44
There were no lake levels recorded from 441003 to 480101.

31/12/47
A new kind 3 rating applies from 471231, as the old staff gauge was replaced when the markings became unreadable. The new staff gauge was levelled to Martins bench mark at Te Wairoa Buried Village and set to a new reduced level zero.

12/03/51
Recorder installed on day 510312 is a 4.57 metre (15 ft) range, weekly Bristol with a time resolution of 13-64 minutes/mm recorded and a stage ratio of 43 mm of stage/mm chart recorded.

27/02/64
Recorder not operational from 640227 at 70000 to 640325 at 130000 due to tower reconstruction. Daily staff gauge readings have been filed.

17/02/94
Operation of site handed over to Environment BOP.

26/11/97
A Handar encoder and CR500 datalogger were installed. Recording interval is 30 minutes.

31/12/00
Data audit carried out on lake level monitoring site 15301 covering the period 980101 to 20001231. Data audit passed external audit carried out by Environmental Quality Systems.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Compiled	October 2006	Site Number	15301
Compiled by	Craig Putt	Lake	TARAWERA
		Station	TE WAIROA
Metric Map Reference	U16: 057 274		
Catchment Area (km²)	412	Period of Summary	1926 to 2005

Statistical Summary

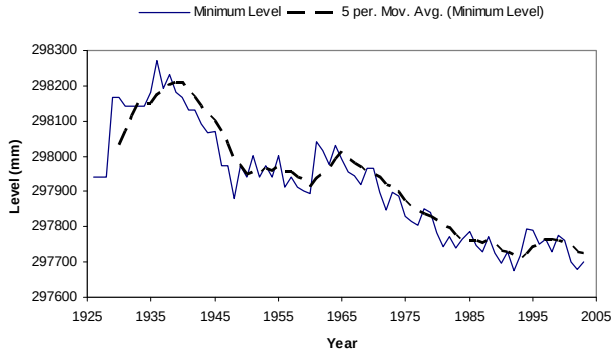
Level (mm Moturiki Datum)			
Minimum Level	297676	Maximum Level	298549
Mean Annual Minimum Level	297936	Mean Annual Maximum Level	298203
Mean Level	298028	Mean Summer Level	298032
Median Level	298012	Mean Autumn Level	298001
		Mean Winter Level	298034
		Mean Spring Level	298043
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	GEV
7 day Low Level (Minimum)	297684	Peak Level (5 yr Return)	298313
7 Day Low Level (Mean Annual)	297890	Peak Level (10 yr Return)	298403
7 day Low Level (5 yr Return)	297796	Peak Level (20 yr Return)	298485
7 Day Low Level (10 yr Return)	297740	Peak Level (50 yr Return)	298585
		Peak Level (100 yr Return)	298656

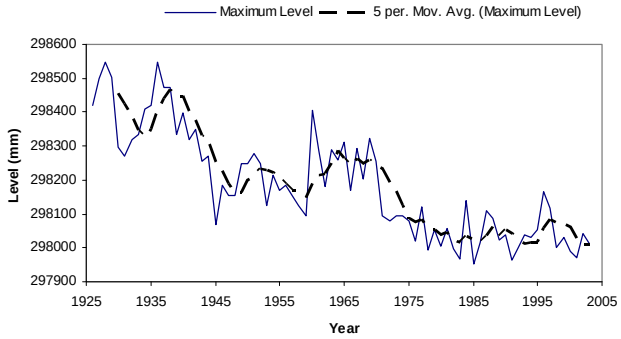
Annual Summaries

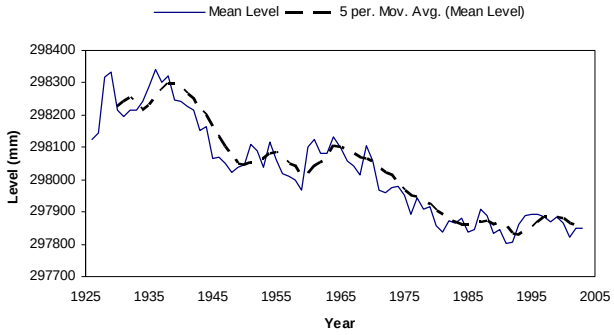
Year	Level (mm Moturiki Datum)			Year	Level (mm Moturiki Datum)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	297852	297908	297995	1993	297728	297804	297962
1981	297841	297916	298052	1994	297676	297805	298001
1982	297783	297856	298003	1995	297720	297863	298040
1983	297742	297836	298059	1996	297795	297887	298032
1984	297773	297875	297999	1997	297791	297894	298052
1985	297740	297867	297969	1998	297752	297891	298167
1986	297766	297881	298138	1999	297764	297884	298118
1987	297785	297839	297951	2000	297729	297871	298001
1988	297746	297846	298015	2001	297776	297886	298031
1989	297729	297908	298108	2002	297763	297864	297990
1990	297773	297888	298087	2003	297702	297823	297972
1991	297727	297835	298022	2004	297678	297849	298041
1992	297696	297846	298038	2005	297701	297849	298012

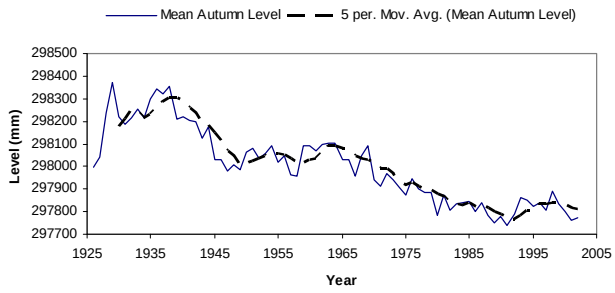
Level Distribution

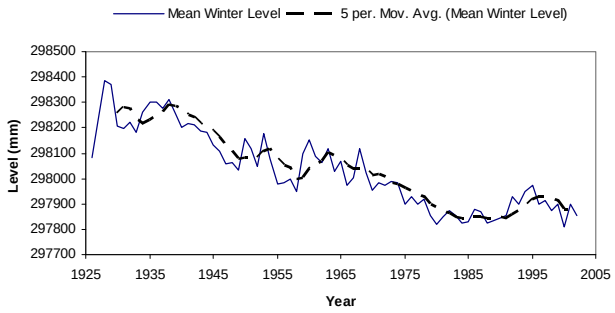
Level (mm Moturiki Datum)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	298549	298419	298375	298347	298325	298311	298295	298283	298272	298265
10	298256	298248	298240	298229	298220	298213	298205	298197	298195	298194
20	298191	298184	298173	298166	298156	298153	298144	298134	298126	298125
30	298114	298105	298095	298094	298091	298082	298075	298067	298065	298064
40	298062	298054	298046	298039	298034	298034	298033	298033	298027	298019
50	298012	298005	298004	298003	297999	297993	297987	297980	297973	297972
60	297970	297964	297958	297953	297948	297943	297940	297934	297929	297925
70	297920	297915	297911	297906	297902	297897	297893	297888	297883	297880
80	297875	297871	297866	297861	297857	297852	297847	297842	297838	297833
90	297828	297822	297815	297808	297801	297794	297785	297776	297764	297746
100	297676									

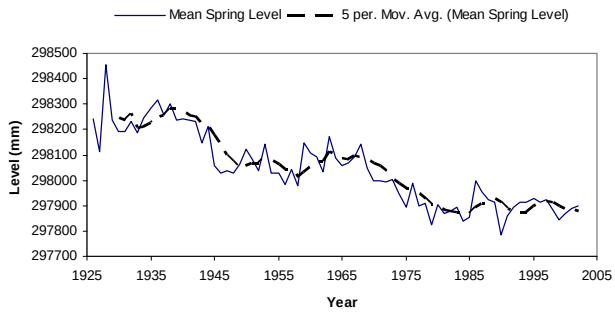


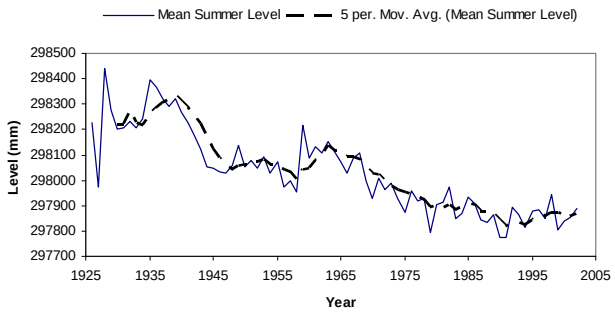












Tarawera at Te Wairoa

Environment Bay of Plenty
Lake Level Recording Station

Lake	Rotokakahi	Site	Te Wairoa
Site Number	15344	Grid Reference	U16: 030 272
Start of Record	January 1972	Data Capture Rate	
Data Summary From	January 1972	To	December 2005
Data Audited From	January 1994	To	December 2005

Equipment History

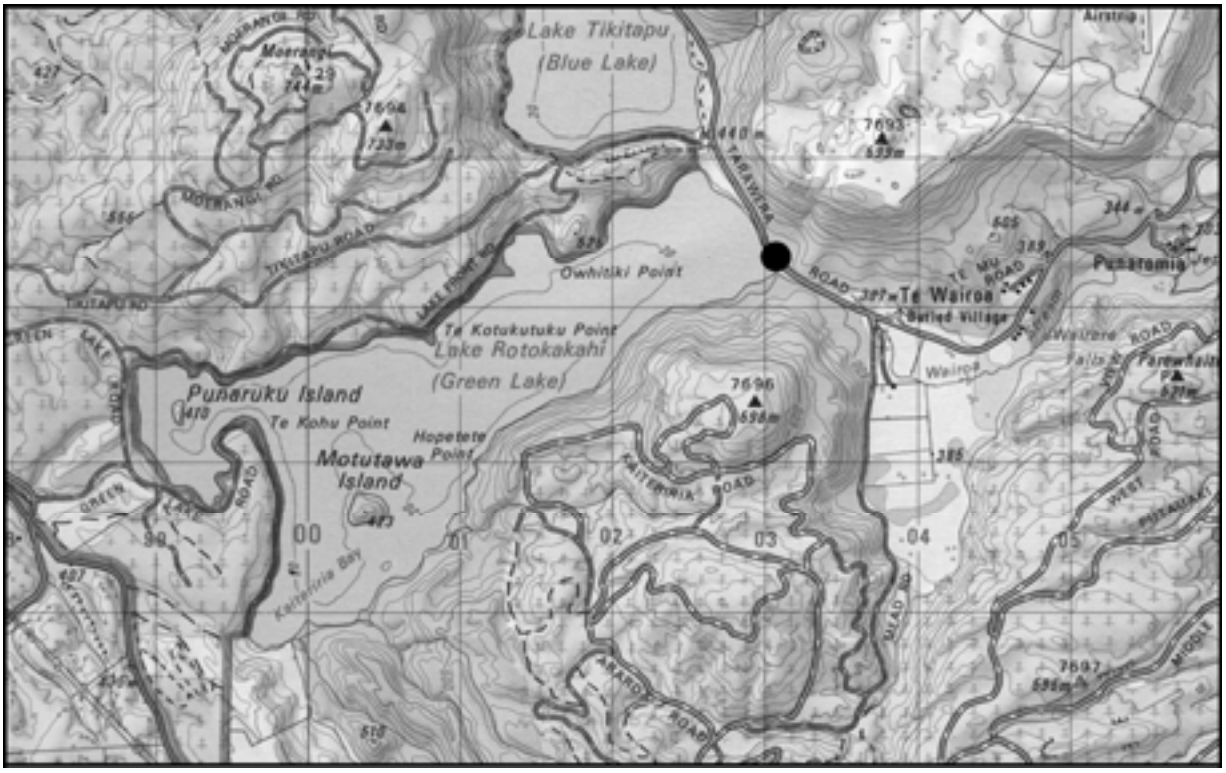
26/01/72: Staff gauge installed.

Comments on Stage/Discharge Ratings

Ratings are available to convert Stage (mm) to Reduced Level (mm) in Moturiki Datum.

General Comments

Staff gauge read weekly until August 1972, then bi-weekly until October 1976, monthly since then. Site is operated by Environment Bay of Plenty as part of its Natural Environmental Regional Monitoring Network.



SITE LOCATION
Rotokakahi at Te Wairoa

Station Comments

Lake Rotokakahi at Te Wairoa Outlet. Site Number 15344, on River Number 153132.

Surface Area (km2)	Average Depth (m)	Maximum Depth (m)	Maximum Length (km)	Maximum Width (km)	Type
4.48	17.5	32.0	4.3	1.7	Volcanic

Source: Waters of New Zealand (1992).

The local recording authority is Environment B.O.P.

Lake is also known as Green Lake. Lake volume is 77,100,000m3. Lake levels are recorded at intermittent intervals and filed as staff gauge heights. To convert to reduced level Moturiki Datum, apply kind 3 rating.

31/12/00
Data audit carried out on lake level monitoring site 15344 covering the period 980101 to 20001231. Data audit passed external audit carried out by Environmental Quality Systems.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Compiled	October 2006	Site Number	15344
Compiled by	Craig Putt	Lake	Rotokakahi
		Station	Te Wairoa
Metric Map Reference	U16: 030 272		
Catchment Area (km²)	19.9	Period of Summary	1973 to 2005

Statistical Summary

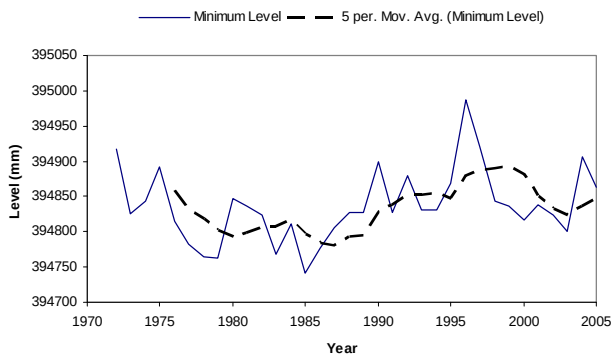
Level (mm Moturiki Datum)			
Minimum Level	394742	Maximum Level	395172
Mean Annual Minimum Level	394833	Mean Annual Maximum Level	395010
Mean Level	394920	Mean Summer Level	394905
Median Level	394912	Mean Autumn Level	394888
		Mean Winter Level	394932
		Mean Spring Level	394947
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	GEV
7 day Low Level (Minimum)	395131	Peak Level (5 yr Return)	394805
7 Day Low Level (Mean Annual)	395014	Peak Level (10 yr Return)	394786
7 day Low Level (5 yr Return)	395056	Peak Level (20 yr Return)	394772
7 Day Low Level (10 yr Return)	395084	Peak Level (50 yr Return)	394757
		Peak Level (100 yr Return)	394748

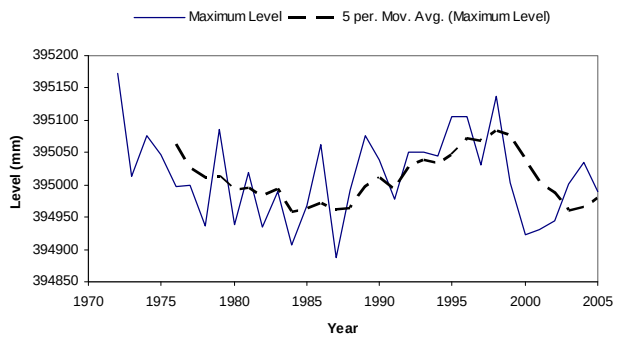
Annual Summaries

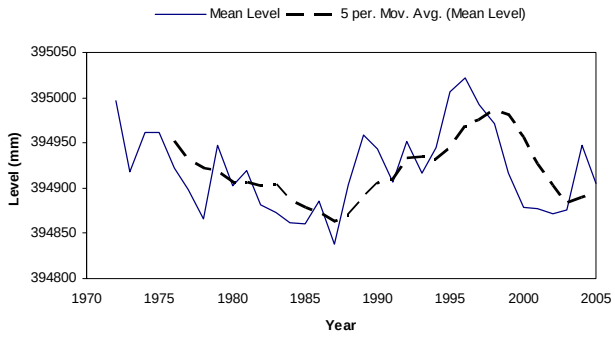
Year	Level (mm Moturiki Datum)			Year	Level (mm Moturiki Datum)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	394847	394902	394939	1993	394831	394917	395051
1981	394836	394919	395020	1994	394831	394944	395045
1982	394824	394882	394934	1995	394868	395006	395106
1983	394768	394873	394990	1996	394988	395022	395105
1984	394812	394862	394907	1997	394921	394992	395030
1985	394742	394860	394968	1998	394844	394971	395137
1986	394777	394886	395062	1999	394837	394916	395004
1987	394806	394838	394887	2000	394816	394879	394922
1988	394827	394904	394992	2001	394839	394877	394931
1989	394827	394959	395077	2002	394824	394872	394945
1990	394900	394943	395039	2003	394800	394876	395002
1991	394828	394907	394977	2004	394907	394947	395034
1992	394879	394951	395050	2005	394864	394906	394990

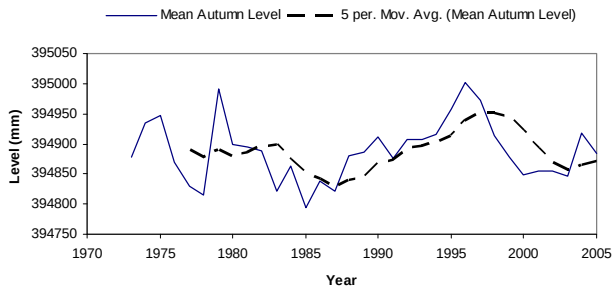
Level Distribution

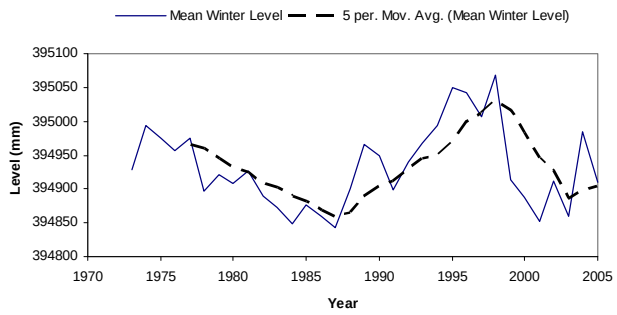
Level (mm Moturiki Datum)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	395172	395089	395069	395052	395040	395031	395023	395018	395015	395012
10	395008	395004	395001	394998	394995	394993	394990	394988	394986	394983
20	394980	394978	394976	394973	394970	394967	394964	394961	394958	394955
30	394952	394949	394946	394943	394941	394938	394936	394934	394932	394930
40	394928	394927	394925	394924	394922	394920	394918	394917	394915	394914
50	394912	394911	394910	394908	394907	394905	394904	394902	394901	394900
60	394898	394897	394895	394894	394892	394891	394889	394887	394886	394884
70	394883	394881	394880	394878	394877	394875	394873	394871	394868	394866
80	394864	394862	394859	394856	394854	394852	394850	394848	394846	394844
90	394842	394838	394834	394830	394825	394820	394817	394812	394800	394784
100	394742									

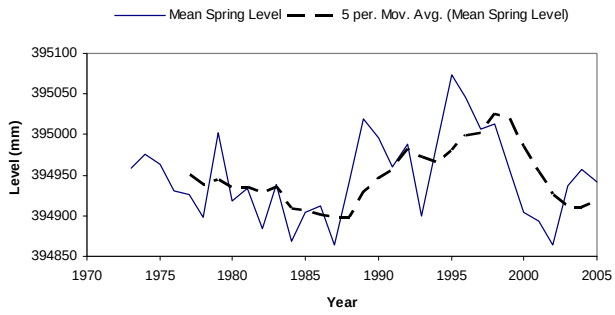

Minimum Level
5 per. Mov. Avg. (Minimum Level)
Level (mm)
Year

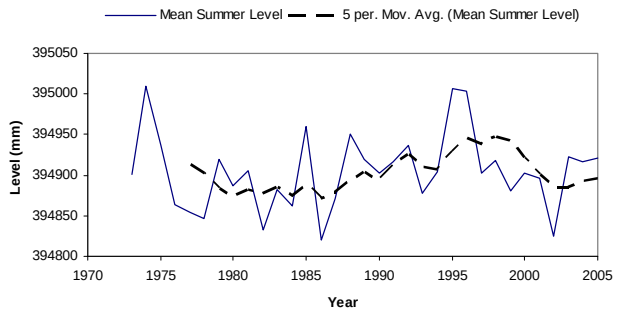

Maximum Level
5 per. Mov. Avg. (Maximum Level)
Level (mm)
Year


Mean Level
5 per. Mov. Avg. (Mean Level)
Level (mm)
Year


Mean Autumn Level
5 per. Mov. Avg. (Mean Autumn Level)
Level (mm)
Year


Mean Winter Level
5 per. Mov. Avg. (Mean Winter Level)
Level (mm)
Year


Mean Spring Level
5 per. Mov. Avg. (Mean Spring Level)
Level (mm)
Year


Mean Summer Level
5 per. Mov. Avg. (Mean Summer Level)
Level (mm)
Year

Environment Bay of Plenty
Lake Level Recording Station

Lake	Rotomahana	Site	Crater Bay
Site Number	15338	Grid Reference	V16: 140 224
Start of Record	November 1924	Data Capture Rate	90%
Data Summary From	January 1925	To	December 2005
Data Audited From	September 1979	To	December 2005

Equipment History

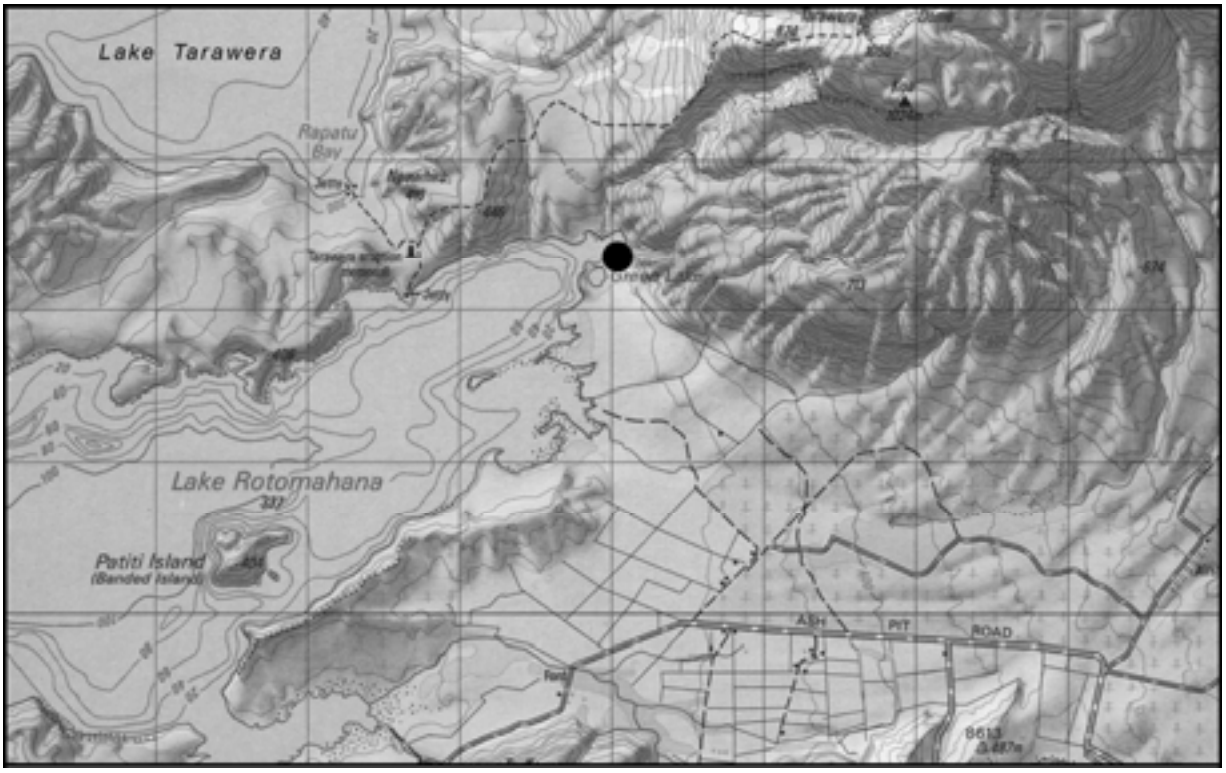
25/11/25: Staff gauges installed (Waimangu wharf & North end Landing).
29/10/65: 1.5 metre range Kent chart recorder (Ash Pit Rd).
17/07/73: Float with F&P digital recorder (Crater Bay).
18/09/79: Monthly Stevens chart recorder.
15/10/82: Temporary Foxboro chart recorder (Waimangu wharf).
17/03/86: Float with L&S digital recorder (Crater Bay).
14/11/97: Float with Campbell CR500 datalogger (Crater Bay).

Comments on Stage/Discharge Ratings

Ratings are available to convert Stage (mm) to Reduced Level (mm) in Moturiki Datum.

General Comments

Manual staff gauges were initially recorded by the Water & Soil Division, Hamilton. Recorder sites have been located in several places during the history of this site (see comments for details). Site is operated by Environment Bay of Plenty as part of its Natural Environmental Regional Monitoring Network.



SITE LOCATION
Rotomahana at Crater Bay

Station Comments

Lake Rotomahana at Crater Bay. Site Number 15338, on River Number 153134.

Surface Area (km2)	Average Depth (m)	Maximum Depth (m)	Maximum Length (km)	Maximum Width (km)	Type
7.95	60	125	6.2	2.8	Volcanic

Source: Waters of New Zealand (1992).

Local recording authority is Environment BOP.

Levels for the 50 and 100 year return periods would be affected by the performance of the high level overflow culvert.

Staff gauge data from 241125; automatically recorded data from 651029.

Periods of synthetic data occur throughout the record. Synthetic data compiled using Lake Rerewhakaaitu.

Gauges A1 to E at, or near Waimangu Wharf N85: 876 875. Gauge A1 installed November 1924. Various others were installed between 1924 and 1953. Readings from A1, A2 & B are generally daily to nearest 25mm with some to nearest 6mm. Regular readings stopped 411031, restarted in 1948 but there are 3 readings in Feb 1942 & 3 in 1947. Any further gaps are because of the launch not running or the gauge being overtopped.

25/11/24
Gauges F to H at north end landing N77: 917 902. Gauge F installed 531015, Gauge G installed 550114, and Gauge H installed 560222. 337930mm added to readings from F, G & H to convert to Moturiki datum.

31/10/41
Records of lake levels were not kept from 411031 to 480103, except for the period 420217 to 420221 and spot readings taken on the following dates, 470404, 470615 and 470910. The spot readings were taken at 0900hrs and extra points of the same level have been added to make these read as daily mean reduced levels.

01/09/62
Staff gauge under water from 620901 to 621130, inclusive.

18/09/79
Site handed over to Bay of Plenty Catchment Commission on 790918. Seiche effects of up to 12mm have been ignored when manually extracting lake levels from charts.

15/10/82
Temporary Foxboro site established near Waimangu Wharf from 821015 to 840331, due to low water levels at Crater Bay.

15/02/87
Synthetic data from 870215 to 870715 - some spot heights available.

16/11/87
Missing record from 871116 to 880122 and from 880501 to 880916, due to lake level dropping below level of stilling well intake pipes.

14/11/97
A Handar encoder and CR500 datalogger were installed. Recording interval is 30 minutes.

31/12/00
Data audit carried out on lake level monitoring site 15338 covering the period 980101 to 20001231. Data audit passed external audit carried out by Environmental Quality Systems.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Compiled	October 2006	Site Number	15338
Compiled by	Craig Putt	Lake	Rotomahana
		Station	Crater Bay
Metric Map Reference	V16: 140 224		
Catchment Area (km²)	84	Period of Summary	1925 to 2005

Statistical Summary

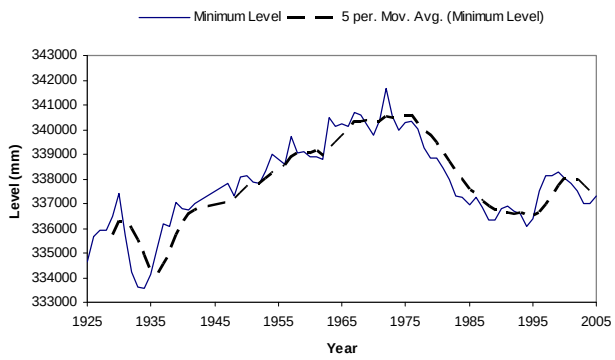
Level (mm Moturiki Datum)			
Minimum Level	333572	Maximum Level	342123
Mean Annual Minimum Level	337836	Mean Annual Maximum Level	338598
Mean Level	338203	Mean Summer Level	338829
Median Level	338144	Mean Autumn Level	338657
		Mean Winter Level	338770
		Mean Spring Level	338888
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	GEV
7 day Low Level (Minimum)	333580	Peak Level (5 yr Return)	340015
7 Day Low Level (Mean Annual)	337534	Peak Level (10 yr Return)	340842
7 day Low Level (5 yr Return)	336272	Peak Level (20 yr Return)	341520
7 Day Low Level (10 yr Return)	335447	Peak Level (50 yr Return)	342254
		Peak Level (100 yr Return)	342715

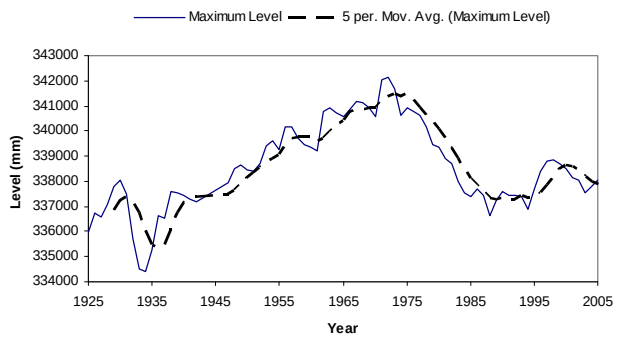
Annual Summaries

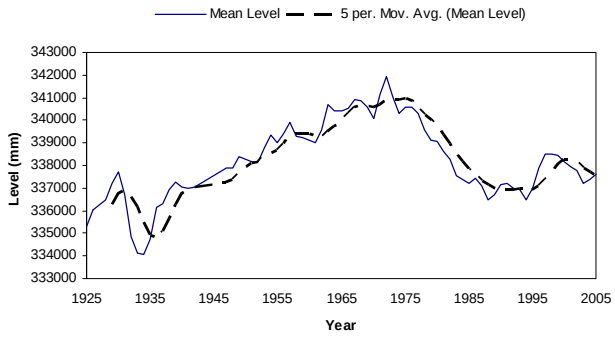
Year	Level (mm Moturiki Datum)			Year	Level (mm Moturiki Datum)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980	338840	339050	339360	1993	336568	336949	337386
1981	338456	338645	338920	1994	336081	336509	336900
1982	337987	338288	338703	1995	336381	337005	337674
1983	337307	337555	337992	1996	337532	337915	338405
1984	337238	337373	337554	1997	338137	338481	338805
1985	336943	337204	337381	1998	338125	338519	338840
1986	337241	337463	337676	1999	338294	338432	338686
1987	336829	337128	337452	2000	338026	338184	338504
1988	336325	336489	336626	2001	337799	337925	338128
1989	336336	336715	337244	2002	337535	337759	338029
1990	336796	337142	337597	2003	337025	337232	337557
1991	336892	337186	337423	2004	336982	337361	337769
1992	336694	337010	337443	2005	337312	337604	338027

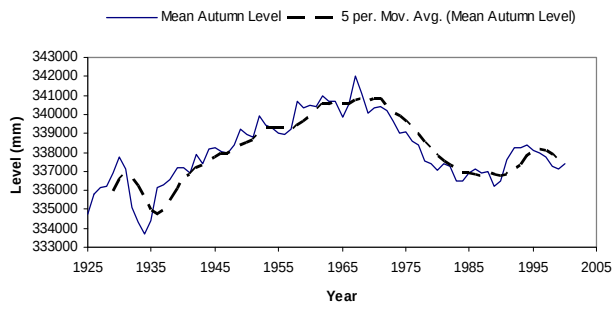
Level Distribution

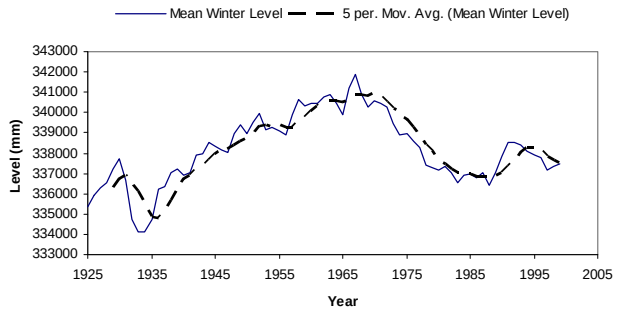
Level (mm Moturiki Datum)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	342123	341919	341398	341075	340950	340879	340810	340767	340703	340656
10	340603	340537	340493	340458	340429	340405	340378	340338	340269	340183
20	340084	339943	339873	339766	339513	339422	339357	339300	339238	339194
30	339145	339109	339059	339022	338992	338943	338902	338812	338730	338631
40	338580	338511	338445	338392	338370	338349	338319	338270	338234	338202
50	338144	338105	338033	337966	337898	337823	337758	337697	337645	337609
60	337571	337524	337472	337434	337397	337370	337343	337315	337286	337263
70	337233	337205	337176	337136	337094	337060	337021	336983	336938	336896
80	336858	336798	336723	336623	336559	336502	336442	336383	336322	336260
90	336189	336100	335960	335807	335384	334903	334654	334378	334274	333968
100	333572									

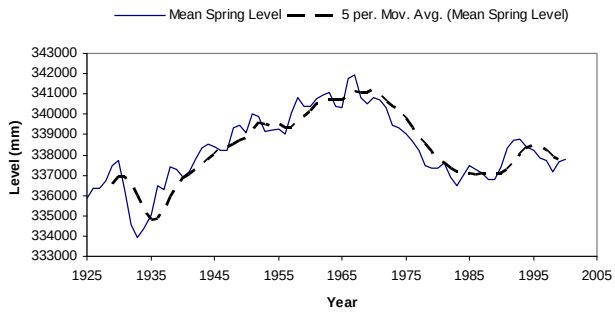


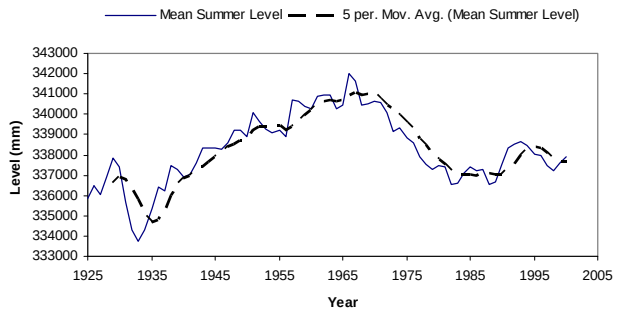












Rotomahana at Crater Bay

Environment Bay of Plenty
Lake Level Recording Station

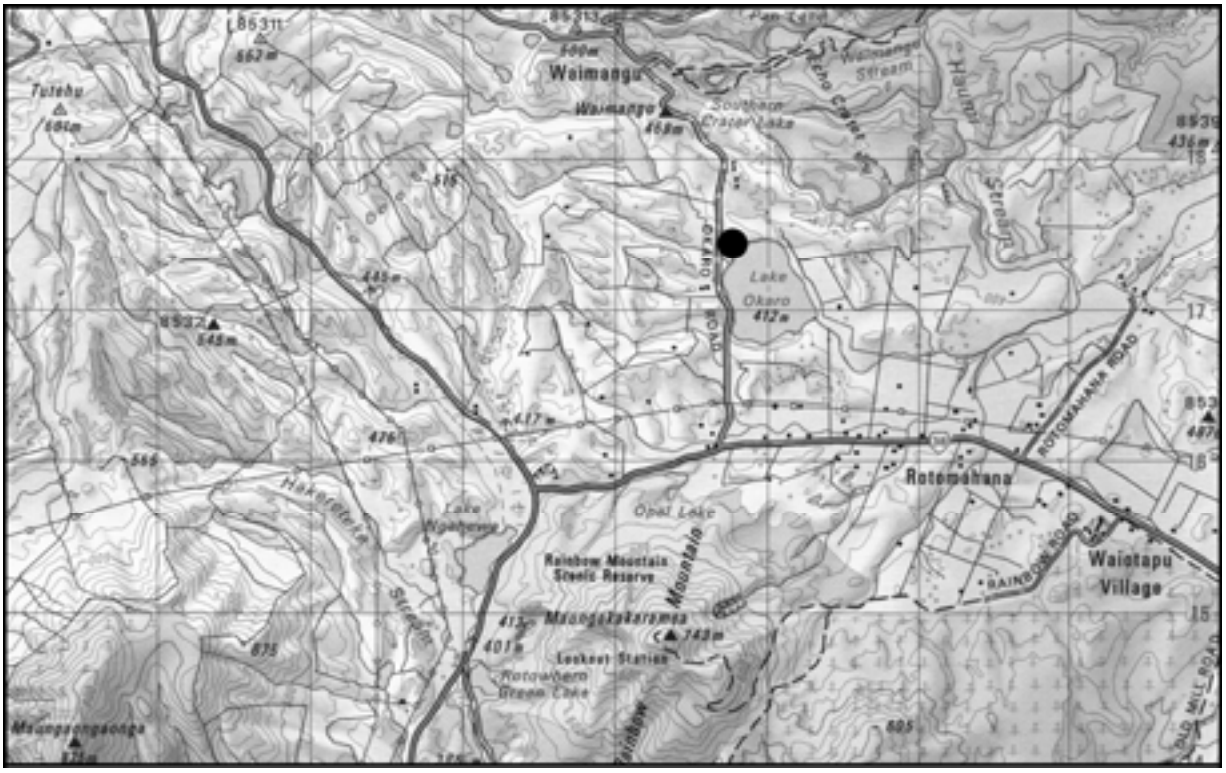
Lake	Okaro	Site	Reserve
Site Number	1015325	Grid Reference	U16: 067 173
Start of Record	November 1989	Data Capture Rate	
Data Summary From	January 1990	To	December 2005
Data Audited From	January 1990	To	December 2005

Equipment History
26/08/87: Staff gauge installed (replaced original).

Comments on Stage/Discharge Ratings
Ratings available to convert stage (mm) to reduced level (mm) in Moturiki Datum.

General Comments
Monthly staff gauge readings only. Site is operated by Environment Bay of Plenty as part of its Natural Environmental Regional Monitoring Network.

Artificial control on lake level exerted by the periodic excavation of the outlet control should be taken into account when using the prepared frequency estimates. For more information, contact the recording authority.



SITE LOCATION
Okaro at Reserve

Station Comments

Lake Okaro At Reserve. Site Number 1015325.

Surface Area (km2)	Average Depth (m)	Maximum Depth (m)	Maximum Length (km)	Maximum Width (km)	Type
0.28	12.1	18.0	0.7	0.6	Volcanic

Source: Waters of New Zealand (1992).

The local recording authority is Environment B.O.P.

This is a staff gauge only site and is read at approximately 6 weekly intervals by Environment BOP staff.

Lake levels are in gauge heights, to convert to Moturiki datum apply type three ratings.

18/08/80
This is the first date on record of staff gauge readings at Okaro. It is therefore assumed that the site was installed initially in mid to late 1980.

18/08/80 120000 17/11/89 120000
Between 800818 and 891117 the site was visited on random occasions. Subsequently, there is not a complete data record for this period.

26/08/87
Installed new staff gauge on 870826.

17/03/94
Missing data from 940317 to 940519 staff gauge not read in April.

13/09/05
Missing data from 20050913 to 20051208 staff gauge not read in November.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Compiled	October 2006	Site Number	1015325
Compiled by	Craig Putt	Lake	Okaro
		Station	Reserve
Metric Map Reference	U16: 067 173		
Catchment Area (km²)	2.5	Period of Summary	1990 to 2005

Statistical Summary

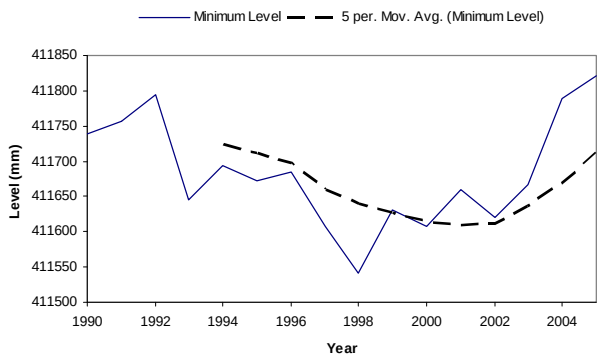
Level (mm Moturiki Datum)			
Minimum Level	411541	Maximum Level	412107
Mean Annual Minimum Level	411682	Mean Annual Maximum Level	411892
Mean Level	411787	Mean Summer Level	411747
Median Level	411782	Mean Autumn Level	411760
		Mean Winter Level	411837
		Mean Spring Level	411809
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	GEV
7 day Low Level (Minimum)	511544	Peak Level (5 yr Return)	411946
7 Day Low Level (Mean Annual)	411663	Peak Level (10 yr Return)	412000
7 day Low Level (5 yr Return)	411614	Peak Level (20 yr Return)	412046
7 Day Low Level (10 yr Return)	411585	Peak Level (50 yr Return)	412095
		Peak Level (100 yr Return)	412127

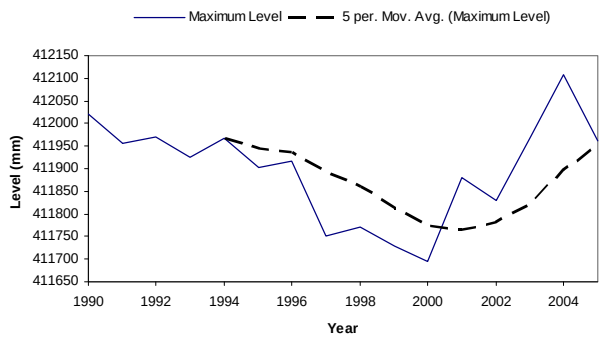
Annual Summaries

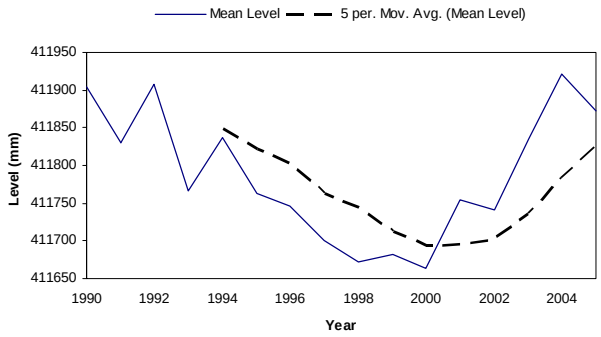
Year	Level (mm Moturiki Datum)			Year	Level (mm Moturiki Datum)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993	411645	411767	411924
1981				1994	411693	411837	411968
1982				1995	411673	411763	411902
1983				1996	411685	411746	411916
1984				1997	411607	411701	411751
1985				1998	411541	411672	411772
1986				1999	411631	411682	411728
1987				2000	411608	411664	411695
1988				2001	411659	411755	411881
1989				2002	411621	411741	411830
1990	411738	411905	412020	2003	411667	411836	411971
1991	411756	411831	411957	2004	411789	411922	412107
1992	411794	411908	411969	2005	411821	411872	411961

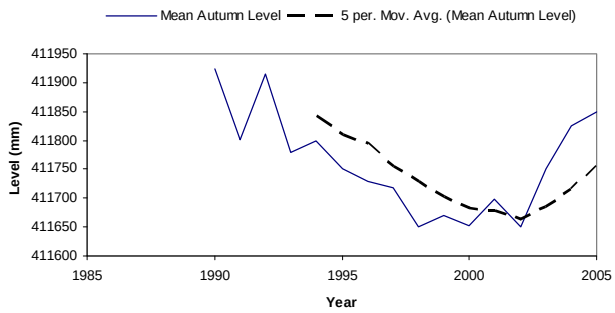
Level Distribution

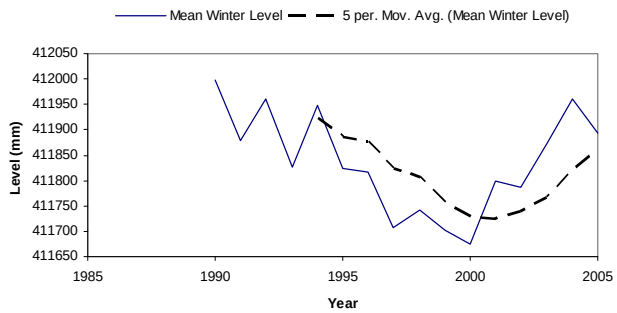
Level (mm Moturiki Datum)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	412107	412018	412004	411988	411976	411967	411963	411960	411955	411949
10	411943	411937	411928	411921	411915	411909	411905	411901	411896	411890
20	411883	411878	411873	411870	411866	411863	411860	411857	411852	411847
30	411842	411837	411832	411828	411824	411820	411816	411813	411810	411807
40	411805	411802	411801	411799	411796	411793	411790	411789	411787	411785
50	411782	411779	411775	411772	411768	411764	411761	411758	411755	411752
60	411748	411743	411741	411736	411730	411724	411721	411718	411715	411713
70	411710	411708	411705	411703	411700	411698	411696	411695	411693	411691
80	411689	411687	411685	411683	411680	411679	411677	411674	411671	411668
90	411665	411661	411655	411649	411642	411636	411632	411628	411616	411590
100	411541									

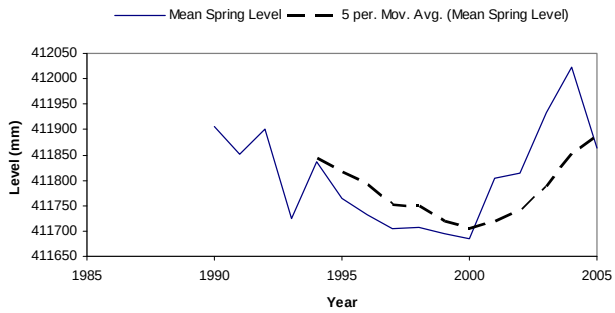


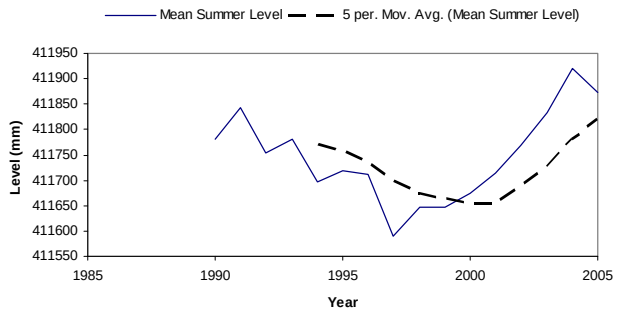












Okaro at Reserve

Environment Bay of Plenty
Lake Level Recording Station

Lake	Rerewhakaaitu	Site	Homestead Arm
Site Number	1015310	Grid Reference	V16: 145 165
Start of Record	April 1983	Data Capture Rate	96%
Data Summary From	January 1984	To	December 2005
Data Audited From	April 1983	To	December 2005

Equipment History

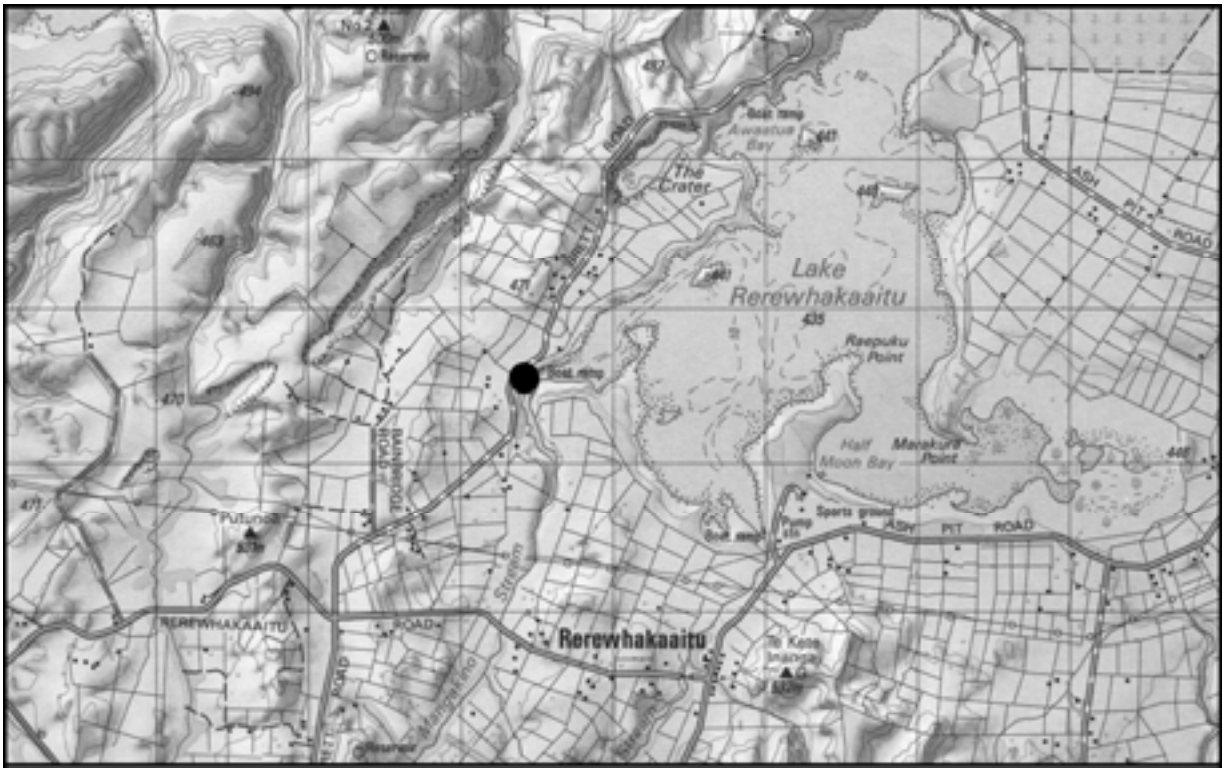
29/06/83: 3 metre range Monthly Foxboro chart recorder.
30/10/84: 10 metre range Monthly Stevens chart recorder.
14/06/88: Float with L&S digital recorder.
18/11/97: Float with Campbell CR500 datalogger.

Comments on Stage/Discharge Ratings

Ratings are available to convert Stage (mm) to Reduced Level (mm) in Moturiki Datum.

General Comments

The Lake Rerewhakaaitu recorder was originally installed at Awaatua Bay (Site No. 15308) and was operated by Water & Soil Division, Hamilton. The site was handed over to B.O.P.C.C. in July 1979. Due to low lake levels, the site was moved to Homestead Arm (1015310) in April 1983. A control structure on the eastern side of Lake Rerewhakaaitu is operated by the Rotorua District Council during periods of high water levels, to divert water from Rerewhakaaitu into the Mangaharakeke Stream. Site is now operated by Environment Bay of Plenty as part of its Natural Environmental Regional Monitoring Network.



SITE LOCATION
Rerewhakaaitu at Homestead Arm

Station Comments

Lake Rerewhakaaitu at Homestead Arm. Site Number 1015310, on River Number 153135.

Surface Area (km2)	Average Depth (m)	Maximum Depth (m)	Maximum Length (km)	Maximum Width (km)	Type
7.47	7.0	15.8	3.8	3.7	Volcanic

Source: Waters of New Zealand (1992).

The local recording authority is Environment BOP.

This site was established in April 1983 when the previous recording site (15308) at Awaatua Bay was abandoned due to low lake levels at the site. Reduced level ratings are available to convert gauge height to reduced level (Moturiki datum).

Periods of synthetic data occur throughout the record. Synthetic data compiled using Lake Rotomahana.

29/06/83
Foxboro (3m range) monthly recorder installed at site. Instrument has a time resolution of 58-291 minutes/mm recorded and a stage ratio of 28mm stage/mm chart recorded.

15/01/88
Missing record from 880115 at 125700 to 880115 at 205424 due to staff gauge lowered by 2.000 meters on 880115.

27/02/88
Missing record from 880227 at 192240 to 880307 at 162744 due to water level dropping below intake pipe level.

@@ 1015310 880308 100344
Missing record on several occasions between February 1988 and April 1988 due to water level dropping below intake pipe level.

28/03/89
Rating change after this point. When staff gauges were surveyed in 1990 an unexplained rise of 8mm was measured. The R.L. of DOSLI benchmark AD65 is questionable; DOSLI have not surveyed this benchmark since 1969. A temporary rating has been filed and will be checked after DOSLI have surveyed their benchmark.

01/01/97
Change of primary reference from external staff gauge to internal gauge.

18/11/97
A Handar encoder and CR500 datalogger were installed. Recording interval is 30 minutes.

31/12/00
Data audit carried out on lake level monitoring site 1015310 covering the period 980101 to 20001231. Data audit passed external audit carried out by Environmental Quality Systems.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Level Summary

Date Compiled	October 2006	Site Number	1015310
Compiled by	Craig Putt	Lake	Rerewhakaaitu
		Station	Homestead Arm
Metric Map Reference	V16: 145 165		
Catchment Area (km²)	54	Period of Summary	1984 to 2005

Statistical Summary

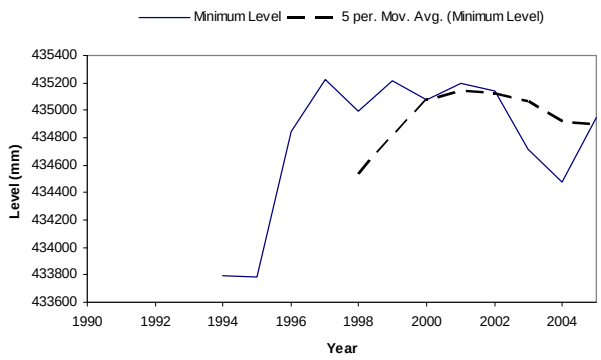
Level (mm Moturiki Datum)			
Minimum Level	433782	Maximum Level	435780
Mean Annual Minimum Level	434838	Mean Annual Maximum Level	435508
Mean Level	435114	Mean Summer Level	435082
Median Level	435254	Mean Autumn Level	434863
		Mean Winter Level	434973
		Mean Spring Level	435182
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	GEV
7 day Low Level (Minimum)	433793	Peak Level (5 yr Return)	435662
7 Day Low Level (Mean Annual)	434713	Peak Level (10 yr Return)	435734
7 day Low Level (5 yr Return)	434362	Peak Level (20 yr Return)	435774
7 Day Low Level (10 yr Return)	434092	Peak Level (50 yr Return)	435802
		Peak Level (100 yr Return)	435814

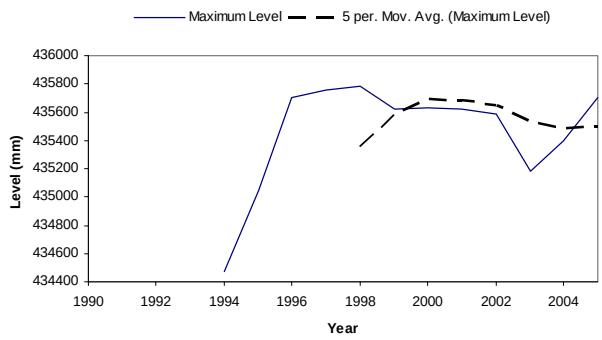
Annual Summaries

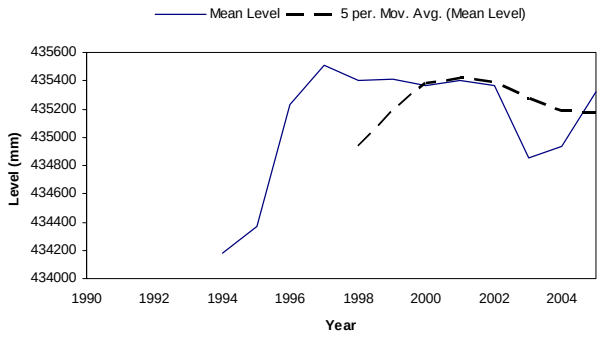
Year	Level (mm Moturiki Datum)			Year	Level (mm Moturiki Datum)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993			
1981				1994	433792	434179	434468
1982				1995	433782	434371	435047
1983				1996	434850	435227	435700
1984				1997	435227	435508	435761
1985				1998	434990	435404	435780
1986				1999	435217	435407	435621
1987				2000	435079	435366	435631
1988				2001	435193	435403	435620
1989				2002	435146	435367	435586
1990				2003	434714	434852	435185
1991				2004	434479	434939	435400
1992				2005	434946	435321	435700

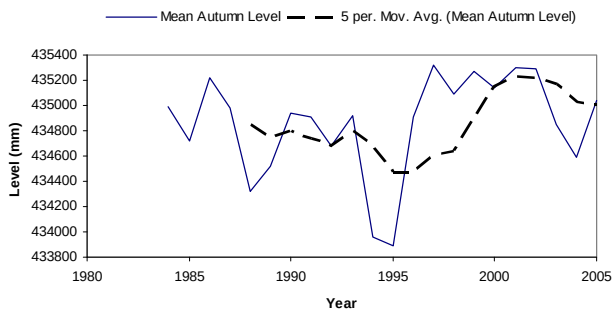
Level Distribution

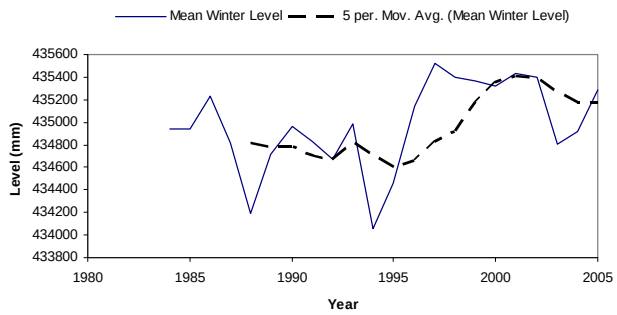
Level (mm Moturiki Datum)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	435780	435735	435716	435696	435684	435671	435660	435631	435615	435606
10	435597	435590	435580	435572	435561	435551	435540	435528	435519	435510
20	435501	435493	435485	435477	435469	435462	435456	435450	435445	435438
30	435432	435426	435420	435414	435406	435398	435388	435377	435367	435359
40	435350	435340	435330	435320	435311	435301	435288	435276	435268	435261
50	435254	435248	435242	435235	435226	435219	435212	435196	435175	435165
60	435151	435136	435123	435105	435084	435062	435040	435027	434993	434959
70	434933	434900	434878	434865	434852	434838	434825	434813	434802	434791
80	434777	434757	434740	434716	434694	434651	434591	434526	434435	434389
90	434347	434317	434238	434179	434079	434012	433953	433927	433904	433850
100	433782									

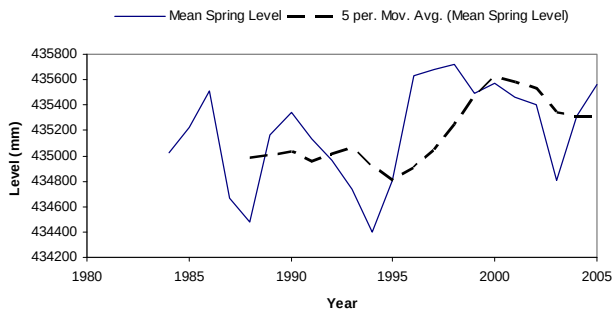


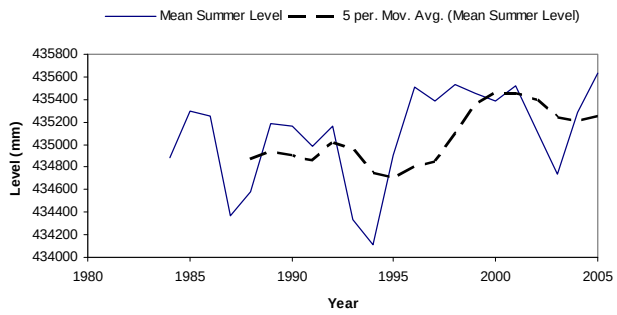












Rerewhakaaitu at Homestead Arm

3.8 Groundwater Level Data Summaries

The groundwater level data summaries in this chapter are provided in the following sequences of 4 pages per station:

Page 1 Provides general information regarding the station, such as its location, instrument types, start of record, etc.

Page 2 Lists station comments that should be read in conjunction with the results of the data summary. Note that these comments are an edited selection of the full set of comments. Contact the recording authority for a full set of comments if required.

Page 3 Displays the Summary information

Page 4 Graphical presentation of a selection of parameters provided in Page 3.

The ID No. in Table 3.8 indicates the order in which individual station data summaries are provided in this report.

Table 3.8 Groundwater Level Monitoring Stations

ID Number	Page No.	Bore	Site	Period of Audit	Data Capture Rate (%)
1	463	Duncan	Lunds Rd.	1988-2005	93
2	467	Stannett	Matahiwi	1991-2005	99
3	471	Otumoetai	Beach Rd. Reserve	1984-2005	88
4	475	Stewart	Maketu	1991-2005	99
5	479	Zink	Otakiri Rd.	1987-2005	89
6	483	Brady	Grieg Rd.	1989-2005	98
7	487	Signal	McDonalds Rd.	1989-2005	98


Groundwater Monitoring Sites
of the Bay of Plenty Region
Environment Bay of Plenty
REGIONAL COUNCIL
Bay of Plenty
Mayor Island
Waihi Beach
Bowentown Heads
Katikati
Tauranga Harbour
Karewa Island
Matakana Island
TAURANGA
Mount Maunganui
Motuhaku Island
Motiti Island
Motunau Island
Te Puna
Matamata 20km
Maketu
Okurei Point
Waihi Estuary
Te Puke
Otamarakau
Cambridge 51km
Rurima Island
Moutoki Island
Moutohora Island
Volkner Rocks
Whakaari/White Island
Cape Runaway
Lottin Point
Whangaparaoa Bay
Waihau Bay
Pohokura
Te Araroa 36km
Papatea Bay
Waikawa Point
Te Kaha Point
Te Kaha
Omaio Bay
Edgecumbe
Kohi Point
Ohope
Ohiwa Harbour
WHAKATANE
Taneatua
Opotiki
Torere
Tirau 29km
Putaruru 28km
Ngongotaha
Mamaku
L. Rotorua
Lake Rotoma
Kawerau
ROTORUA
Tokoroa 44km
Taupo (SH5) 56km
Rerewhakaaitu
Murupara
Gisborne 64km
Ruatahuna
Waikaremoana 28km
Taupo 23km
Rangitaiki
Napier 96km
RAUKUMARA RANGE
IKAWHENUA RANGE
KAHIKATEA RANGE
HUIARAU RANGE
KAIMAI RANGE
Reference
groundwater monitoring site
regional boundary
district boundaries
state highway
major road
town, locality
native forest
exotic forest
horticulture
pasture and cropping
other
Scale
Groundwater Monitoring Sites
1 Duncan at Lunds Road
2 Stannett at Matahiwi Road
3 Otumoetai at Beach Road Reserve
4 Stewarts at Maketu
5 Zink at Otakiri Road
6 Brady at Greig Road
7 Signal at McDonalds Road

Environment Bay of Plenty
Groundwater Level Recording Station

Bore	Duncan	Site	Lund Road
Site Number	2328	Grid Reference	T14:664 966
Start of Record	June 1987	Data Capture Rate	93%
Data Summary From	January 1988	To	December 2005
Data Audited From	June 1987	To	December 2005

Equipment History

01/06/87: Manual pressure gauge readings.

01/06/95: 20 metre range P.T. with WRIC datalogger.

08/12/88: 20 metre P.T. with A-D converter and Aquitel.

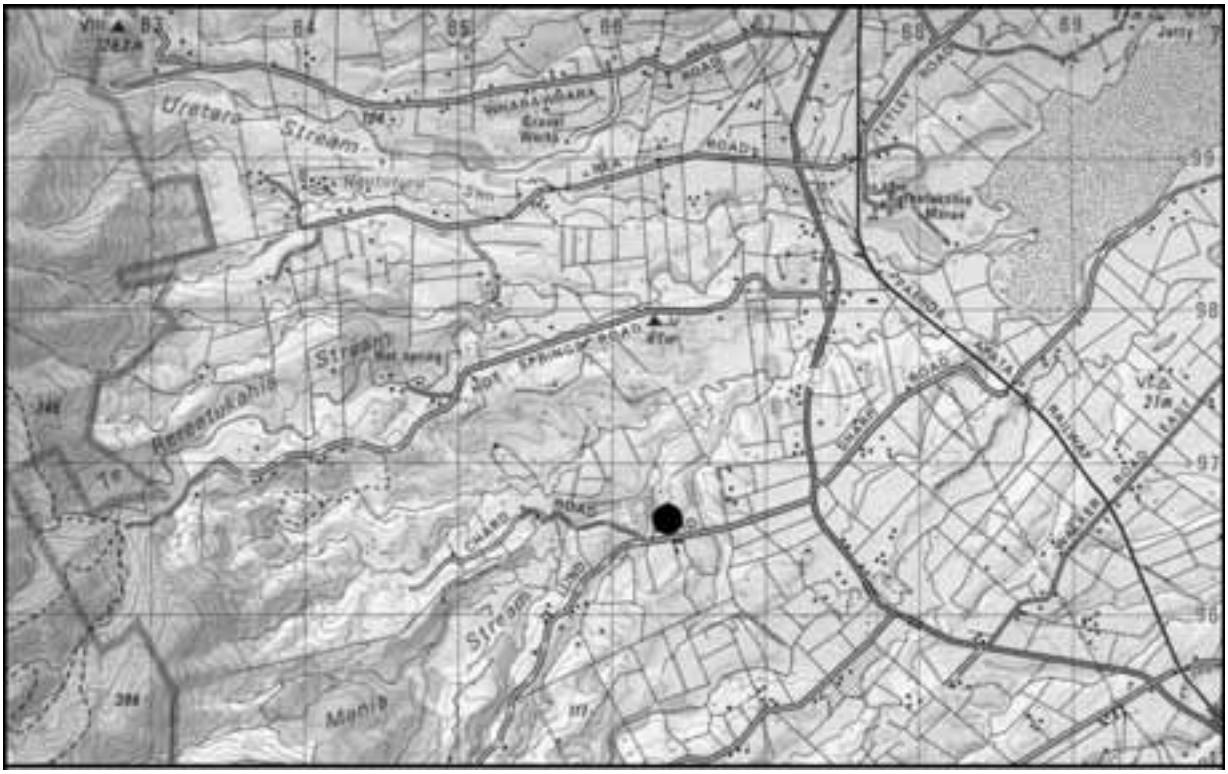
17/02/00: 20 metre range P.T. with Campbell CR500.

Comments on Stage/Discharge Ratings

Ratings are available to convert Stage (mm) to Reduced Level (mm) in Moturiki Datum.

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network. The bore is 454 metres deep.



SITE LOCATION
Duncan at Lund Road

Station Comments

Groundwater monitoring site Duncan at Lund Road. Site Number 2328.

The local recording authority is Environment Bay of Plenty

Log no: 2328
Finder no: K 41
Drilled: August 84
By: Ewen Cameron
Reduced level: 21.449 metre (890209 on “T” by gauge)
21.450 metre (890314 on “T” by gauge)
21.911 metre (890314 on undersideof recorder house)

Groundwater levels are affected by localised pumping.

01/06/87 - Manual readings available - read with a pressure gauge. Greenhouse park reads pressure gauge at 0800 daily and sends in returns. Data is stored in a Tideda file 2328.man and covers the period 870601 120000 to 891130 080000.

08/12/88 - Aquitel Remote unit installed with a time resolution of 15 minutes coupled to a 20 metre range pressure transducer. Use Reduced Level of pressure transducer 21.936 metres, pressure gauge 21.450 metres.

31/12/89 - Due to computer malfunction, data for the period 881208 000015 to 891231 115959, has been erased. Data for this period has been reconstructed by re-entering mean daily levels from previous "PDAY" output. Manual readings from 870602 80000 to 881212 080000 have also been entered. Mean daily levels have been entered as a single instantaneous level at 1200 each day, from 881213 120000 to 891231 120000. Hardcopy plots of original data confirm that the above method gives an accurate representation of levels over the period.

31/12/89 - Missing record due to computer malfunction, data for the period 891231 120000 to 900327 130000 has been erased.

04/03/92 - Missing record from 920304 150000 to 920724 110000 due to incorrect range pressure transducer being installed.

18/12/94 - Missing record from 941218 080000 to 950202 110000 due to water level going below pressure transducer height. The landowner installed a submersible pump on or about this time.

24/11/95 - Data for the period 951124 123000 to 951204 210000 looks unusual. Treat data with caution.

19/12/95 - Missing record from 951219 at 110000 to 960214 at 131500 due to several data logger and pressure transducer problems.

14/02/96 - 20m range pressure transducer installed on 960214 at 131500.

26/02/96 - Missing record from 960226 at 010000 to 960308 at 113000 due to battery voltage problem.

14/03/96 - Missing record from 960314 at 141500 to 960321 at 221500 due to unknown fault with transducer or logger.

27/09/99 - Missing record from 990826 at 110000 to 990927 at 111500 due to Datapak corruption.

17/02/00 - Missing record from 1000217 at 121500 to 1000224 at 123000. Removed WRIC and installed CR500.

9/03/00 - Missing record from 1000309 at 220000 to 1000410 at 133000 due to loss of power in data logger.

5/07/02 - Missing data from 1020705 91500 to 1020805 113000 due to a split in the supply tube to the pressure transducer.

4/10/03 - Missing data from 20031004 154500 to 20031023 103000 due to power supply failure.

15/07/05 - Missing data from 20050715 110000 to 20050727 094500 due to a faulty data logger.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Groundwater Level Summary

Date Complied	G R Ellery	Site Number	2328
Compiled by	January 2007	Bore	Duncan
		Station	Lund Road
Metric Map Reference	T14: 664 966	Period of Summary	1988 to 2005

Statistical Summary

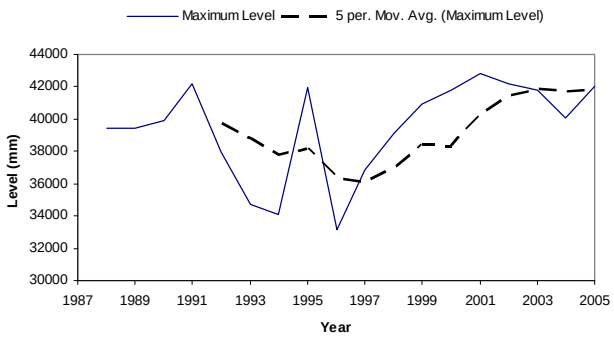
Level (mm)			
Minimum Level	11847	Maximum Level	42842
Mean Annual Minimum Level	21218	Mean Annual Maximum Level	39468
Mean Level	32590	Mean Summer Level	32538
Median Level	33163	Mean Autumn Level	34739
		Mean Winter Level	31589
		Mean Spring Level	31166
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	GEV
7 day Low Level (Minimum)	21960	Peak Level (5 yr Return)	42098
7 Day Low Level (Mean Annual)	25702	Peak Level (10 yr Return)	42594
7 day Low Level (5 yr Return)	23726	Peak Level (20 yr Return)	42844
7 Day Low Level (10 yr Return)	22414		

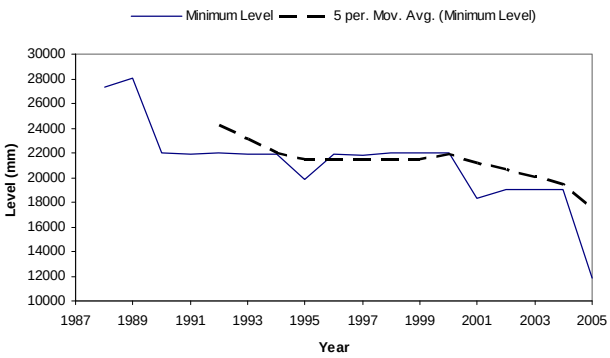
Annual Summaries

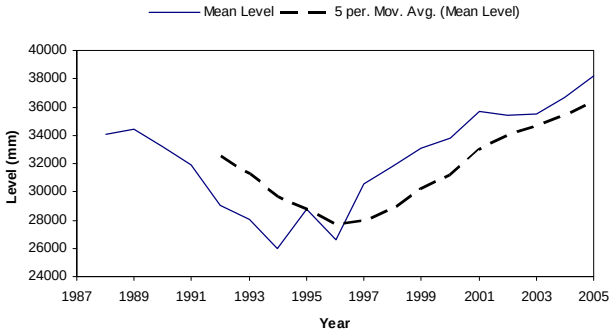
Year	Level (mm)			Year	Level (mm)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993	21940	28034	34732
1981				1994	21939	25958	34079
1982				1995	19870	28778	41936
1983				1996	21938	26585	33181
1984				1997	21827	30604	36840
1985				1998	21962	31833	39126
1986				1999	21963	33047	40905
1987				2000	21964	33762	41780
1988	27340	34112	39440	2001	18325	35720	42842
1989	28020	34442	39450	2002	19049	35415	42173
1990	21992	33162	39878	2003	19029	35489	41793
1991	21942	31947	42184	2004	19029	36692	40097
1992	21953	29012	37974	2005	11847	38231	42017

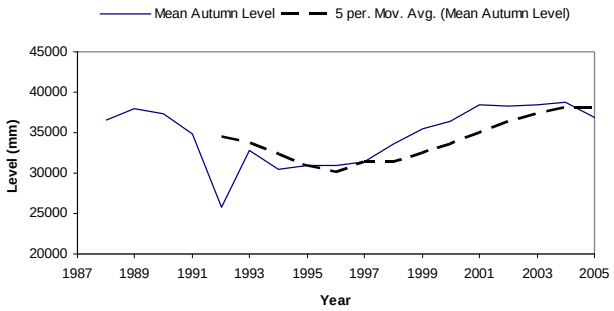
Level Distribution

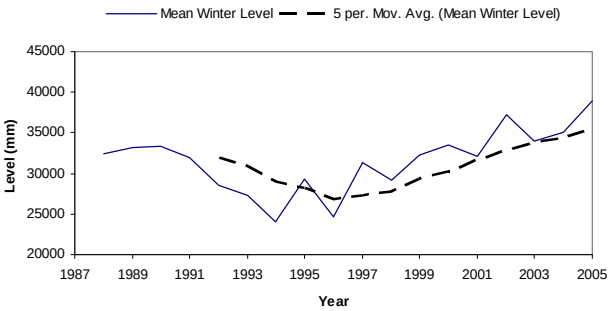
Level (mm)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	42842	40536	40002	39729	39555	39379	39192	39032	38841	38700
10	38556	38443	38355	38279	38180	38076	37973	37856	37732	37605
20	37481	37324	37166	36976	36851	36692	36565	36451	36328	36217
30	36088	35972	35835	35681	35524	35357	35200	35020	34847	34685
40	34524	34382	34275	34148	34016	33905	33753	33591	33420	33300
50	33163	33059	32980	32903	32797	32669	32551	32438	32321	32212
60	32105	31987	31886	31732	31594	31448	31332	31183	30998	30841
70	30619	30383	30192	30025	29796	29422	29160	28828	28510	28188
80	27868	27375	27014	26669	26419	26270	25956	25634	25418	25164
90	24834	24567	24089	23459	23146	22690	22456	22004	21965	21039
100	11847									

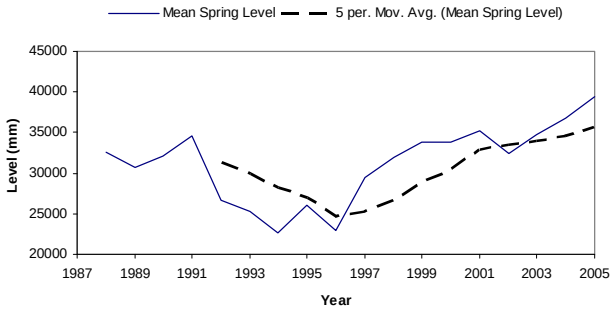


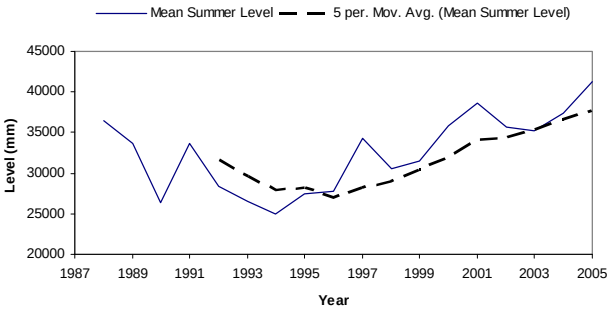












Duncan at Lund Road

Environment Bay of Plenty
Groundwater Level Recording Station

Bore	Stannett	Site	Matahiwi Road
Site Number	2533	Grid Reference	U14:793 889
Start of Record	July 1990	Data Capture Rate	99%
Data Summary From	January 1991	To	December 2005
Data Audited From	July 1990	To	December 2005

Equipment History

12/07/90: 5 metre range P.T. with A-D converter and Aquitel Remote.

27/06/94: 5 metre range P.T. with WRIC datalogger.

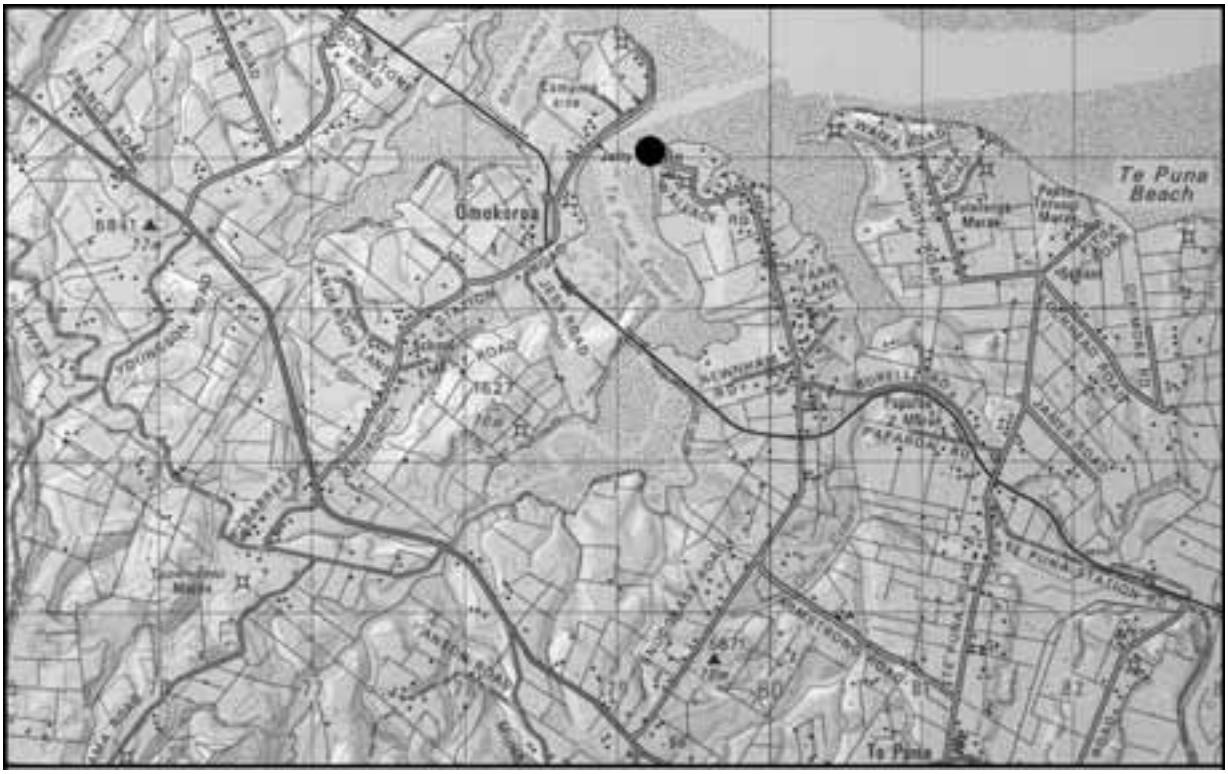
24/02/00: 5 metre range P.T. with Campbell CR500 datalogger.

Comments on Stage/Discharge Ratings

Ratings are available to convert Stage (mm) to Reduced Level (mm) in Moturiki Datum.

General Comments

Site is operated by Environment Bay of Plenty. as part of its Natural Environment Regional Monitoring Network. The bore is 247 metres deep, with static water at approximately ground level.



SITE LOCATION
Stannett at Matahiwi Road

Station Comments

Groundwater level monitoring site Stannett at Matahiwi Road. Site Number 2533.

The local recording authority is Environment Bay of Plenty.

Log No:
Finder:
Drilled: October 1975. deepened 12/01/77
By: Ewan Cameron
Reduced Level: 3.440 metre (Top of PVC)
Method: Second order

26/06/90 - Construction of this site was on 900626.

31/12/95 - Numerous amounts of missing record occur for this site over the entire data set due to instrumentation problems. While every care has been taken when processing this data, the data should be used with caution.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Groundwater Level Summary

Date Complied	January 2007	Site Number	2533
Compiled by	G R Ellery	Bore	Stannet
		Station	Matahiwi
Metric Map Reference	U14: 793 889	Period of Summary	1991 to 2005

Statistical Summary

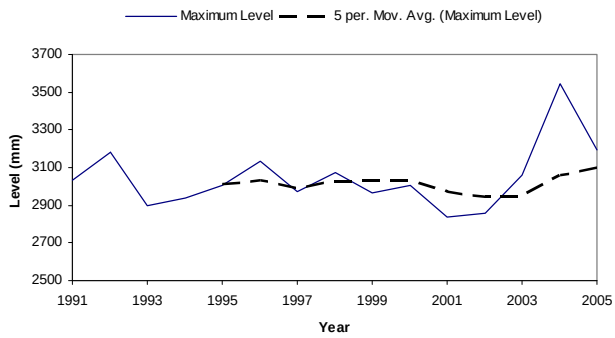
Level (mm)			
Minimum Level	1218	Maximum Level	3548
Mean Annual Minimum Level	1853	Mean Annual Maximum Level	3046
Mean Level	2411	Mean Summer Level	2341
Median Level	2403	Mean Autumn Level	2303
		Mean Winter Level	2494
		Mean Spring Level	2515
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	GEV
7 day Low Level (Minimum)	1602	Peak Level (5 yr Return)	3154
7 Day Low Level (Mean Annual)	2035	Peak Level (10 yr Return)	3267
7 day Low Level (5 yr Return)	1884	Peak Level (20 yr Return)	3387
7 Day Low Level (10 yr Return)	1774		

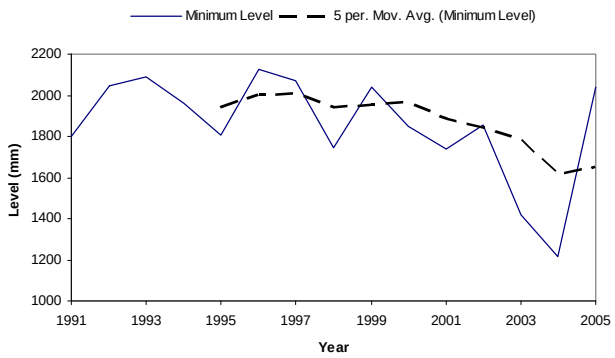
Annual Summaries

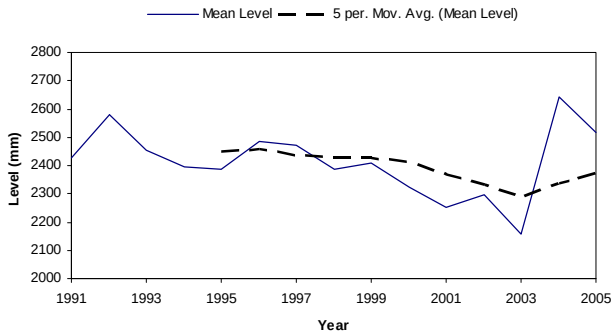
Year	Level (mm)				Year	Level (mm)		
	Minimum	Mean	Maximum			Minimum	Mean	Maximum
1980					1993	2090	2454	2895
1981					1994	1960	2397	2936
1982					1995	1805	2386	3005
1983					1996	2127	2484	3136
1984					1997	2068	2470	2974
1985					1998	1743	2388	3073
1986					1999	2039	2410	2966
1987					2000	1852	2324	3006
1988					2001	1736	2251	2838
1989					2002	1855	2299	2854
1990					2003	1417	2157	3062
1991	1799	2426	3033		2004	1218	2644	3548
1992	2046	2578	3178		2005	2037	2515	3192

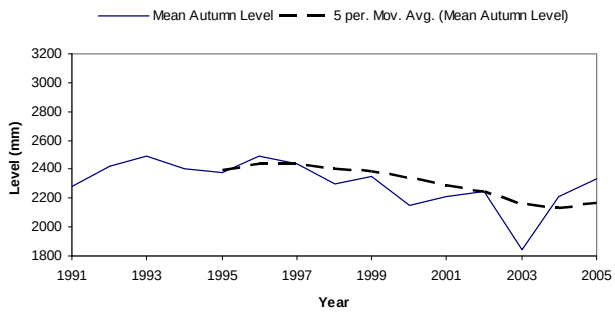
Level Distribution

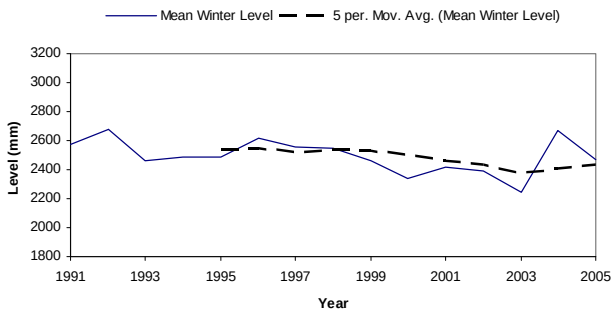
Level (mm)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	3548	3090	2988	2920	2871	2832	2802	2777	2756	2738
10	2722	2707	2694	2682	2671	2661	2651	2641	2632	2623
20	2614	2605	2597	2589	2581	2573	2565	2557	2549	2541
30	2534	2527	2519	2512	2505	2498	2491	2484	2477	2470
40	2463	2457	2450	2444	2438	2432	2426	2420	2415	2409
50	2403	2397	2392	2386	2381	2376	2371	2365	2360	2355
60	2349	2344	2339	2333	2328	2322	2316	2310	2304	2298
70	2291	2285	2278	2271	2264	2256	2249	2241	2233	2225
80	2216	2207	2197	2187	2176	2165	2153	2139	2125	2110
90	2095	2077	2056	2035	2010	1982	1950	1910	1858	1773
100	1218									

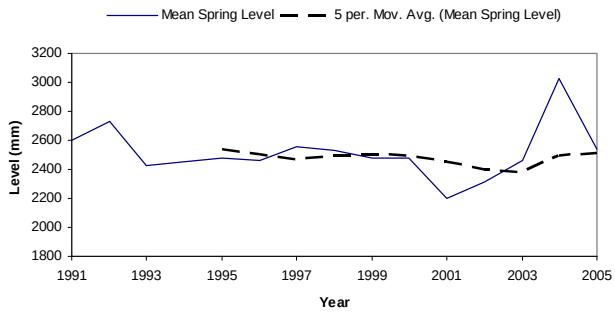


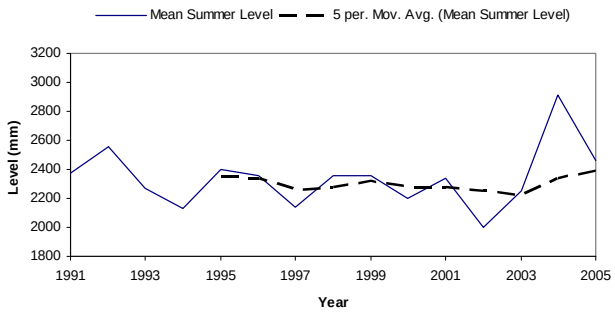












Stannett at Matahiwi Road

Environment Bay of Plenty
Groundwater Level Recording Station

Bore	Otumoetai	Site	Beach Road Reserve
Site Number	2504	Grid Reference	U14:872 885
Start of Record	February 1983	Data Capture Rate	88%
Data Summary From	January 1984	To	December 2005
Data Audited From	February 1983	To	December 2005

Equipment History

02/02/83: 1 metre range Monthly Lea chart recorder.

17/03/93: 5 metre range P.T. with WRIC datalogger.

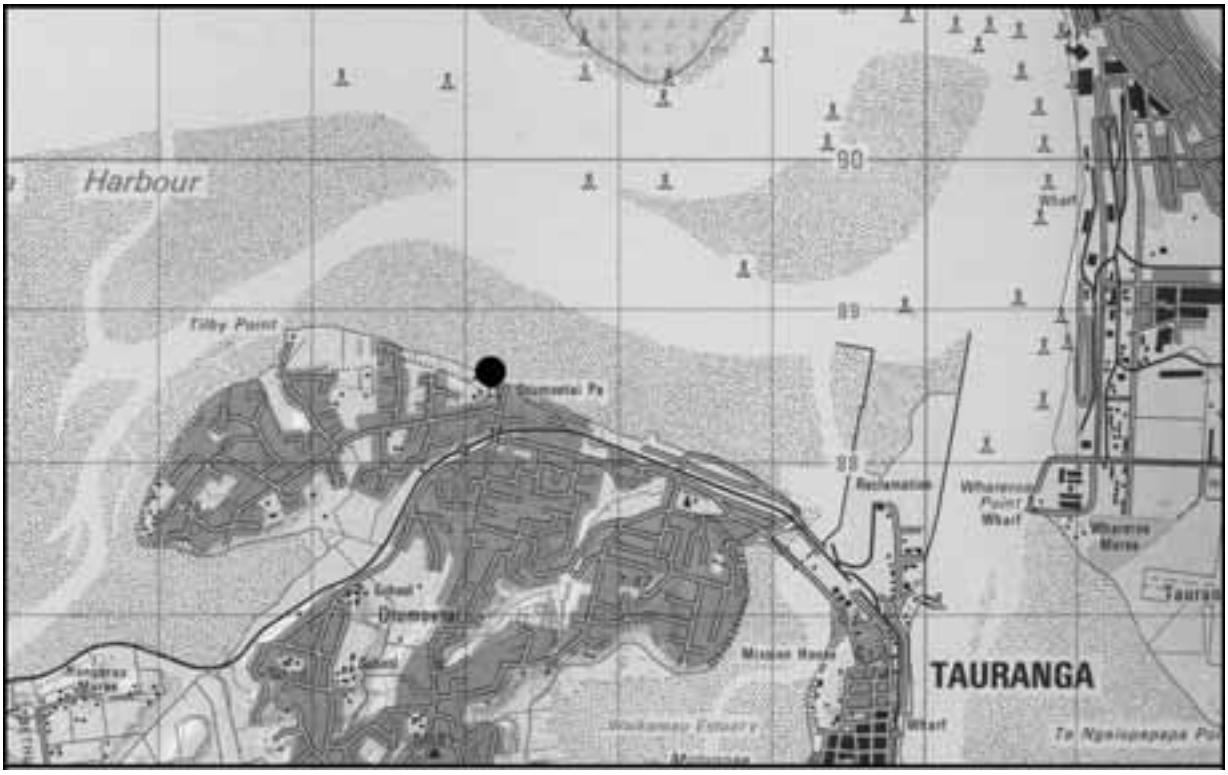
10/02/01: 5 metre range P.T. with Campbell CR500 datalogger.

Comments on Stage/Discharge Ratings

Ratings are available to convert Stage (mm) to Reduced Level (mm) in Moturiki Datum.

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network. The bore is approximately 140 metres deep and penetrates the Otumoetai warm water rhyolite aquifer. No bore log is available for this site.



SITE LOCATION
Otumoetai at Beach Road Reserve

Station Comments

Groundwater monitoring site Otumoetai at Beach Road Reserve. Site Number 2504.

The local recording authority is Environment Bay of Plenty
Log no: 2504
Finder: Not available
Drilled: Not available
By: MWD
Reduced level: 3.719 metres
Method: Second order

31/12/95
Missing record occurs in this data set due to instrumentation problems. While every care has been taken when processing this data, the data should be used with caution as there were problems associated with interpretation of charts. All charts display a tidal cycle.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Groundwater Level Summary

Date Complied	January 2007	Site Number	2504
Compiled by	G R Ellery	Bore	Otumoetai
		Station	Beach Road Reserve
Metric Map Reference	U14:872 885	Period of Summary	1984 to 2005

Statistical Summary

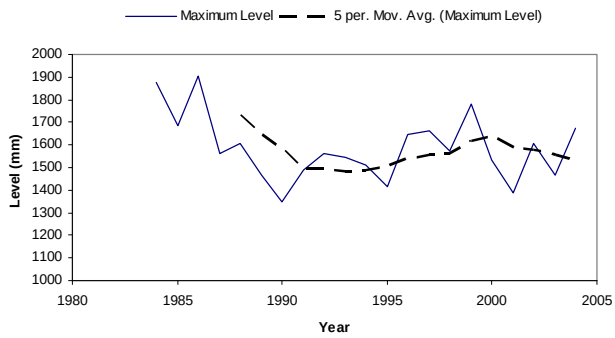
Level (mm)			
Minimum Level	-174	Maximum Level	1904
Mean Annual Minimum Level	240	Mean Annual Maximum Level	1584
Mean Level	860	Mean Summer Level	1096
Median Level	843	Mean Autumn Level	917
		Mean Winter Level	676
		Mean Spring Level	726
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	Gumbel
7 day Low Level (Minimum)	52	Peak Level (5 yr Return)	1695
7 Day Low Level (Mean Annual)	406	Peak Level (10 yr Return)	1778
7 day Low Level (5 yr Return)	284	Peak Level (20 yr Return)	1856
7 Day Low Level (10 yr Return)	201		

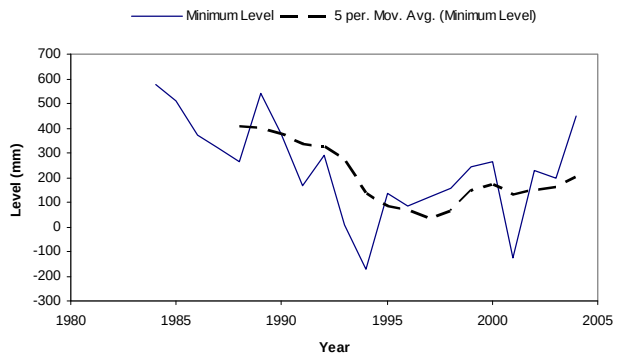
Annual Summaries

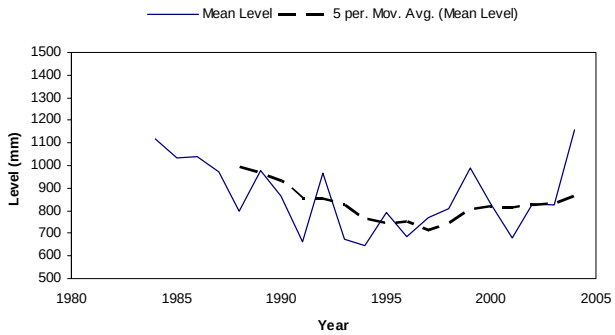
Year	Level (mm)			Year	Level (mm)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993	7	673	1545
1981				1994	-174	647	1514
1982				1995	135	794	1417
1983				1996	85	687	1648
1984	576	1120	1876	1997	121	769	1665
1985	512	1032	1687	1998	155	811	1575
1986	373	1041	1904	1999	245	990	1782
1987	323	971	1564	2000	263	831	1534
1988	266	800	1609	2001	-128	678	1389
1989	539	976	1468	2002	229	833	1608
1990	376	863	1351	2003	198	828	1468
1991	168	665	1486	2004	449	1157	1675
1992	290	964	1559	2005	264	862	1513

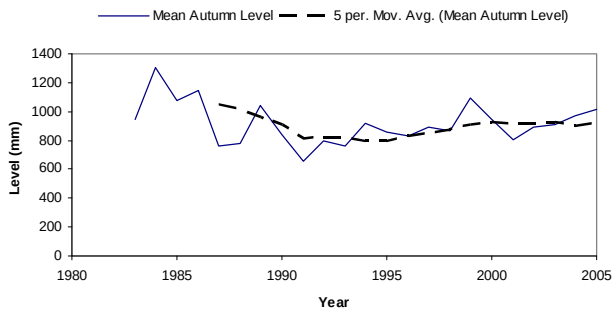
Level Distribution

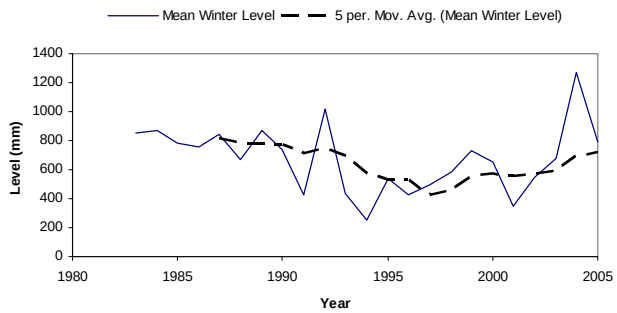
Level (mm)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	1904	1581	1493	1446	1412	1386	1363	1343	1324	1306
10	1290	1274	1259	1245	1231	1217	1203	1190	1177	1165
20	1152	1140	1128	1116	1104	1092	1081	1069	1058	1046
30	1035	1024	1013	1002	992	981	971	961	951	941
40	932	922	913	904	895	886	877	869	860	852
50	843	834	826	817	809	800	792	783	774	766
60	758	749	740	732	723	714	705	697	688	679
70	670	661	652	643	634	624	615	605	596	586
80	576	566	555	545	534	523	512	500	487	474
90	460	445	429	412	392	370	344	311	265	195
100	-174									

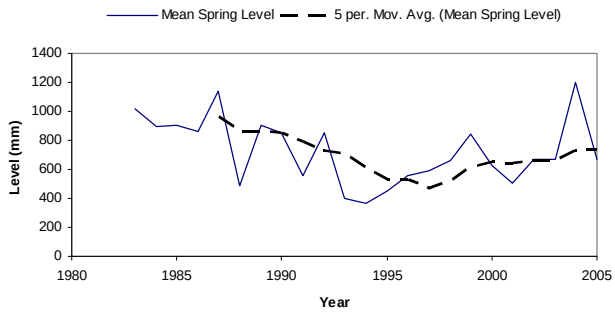

Maximum Level
5 per. Mov. Avg. (Maximum Level)
Level (mm)
Year

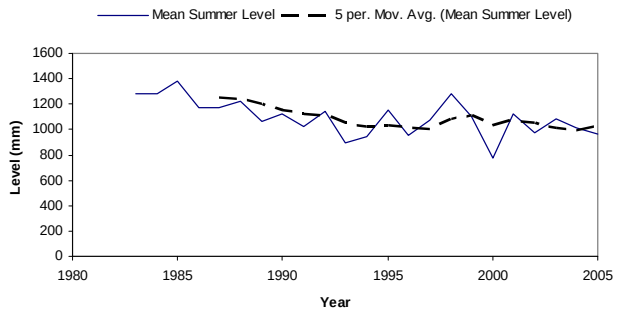

Minimum Level
5 per. Mov. Avg. (Minimum Level)
Level (mm)
Year


Mean Level
5 per. Mov. Avg. (Mean Level)
Level (mm)
Year


Mean Autumn Level
5 per. Mov. Avg. (Mean Autumn Level)
Level (mm)
Year


Mean Winter Level
5 per. Mov. Avg. (Mean Winter Level)
Level (mm)
Year


Mean Spring Level
5 per. Mov. Avg. (Mean Spring Level)
Level (mm)
Year


Mean Summer Level
5 per. Mov. Avg. (Mean Summer Level)
Level (mm)
Year

Environment Bay of Plenty
Groundwater Level Recording Station

Bore	Stewart	Site	Maketu Road
Site Number	3043	Grid Reference	V14:119 748
Start of Record	September 1990	Data Capture Rate	99%
Data Summary From	January 1991	To	December 2005
Data Audited From	September 1990	To	December 2005

Equipment History

12/09/90: Float with 15 minute L&S Digital recorder.

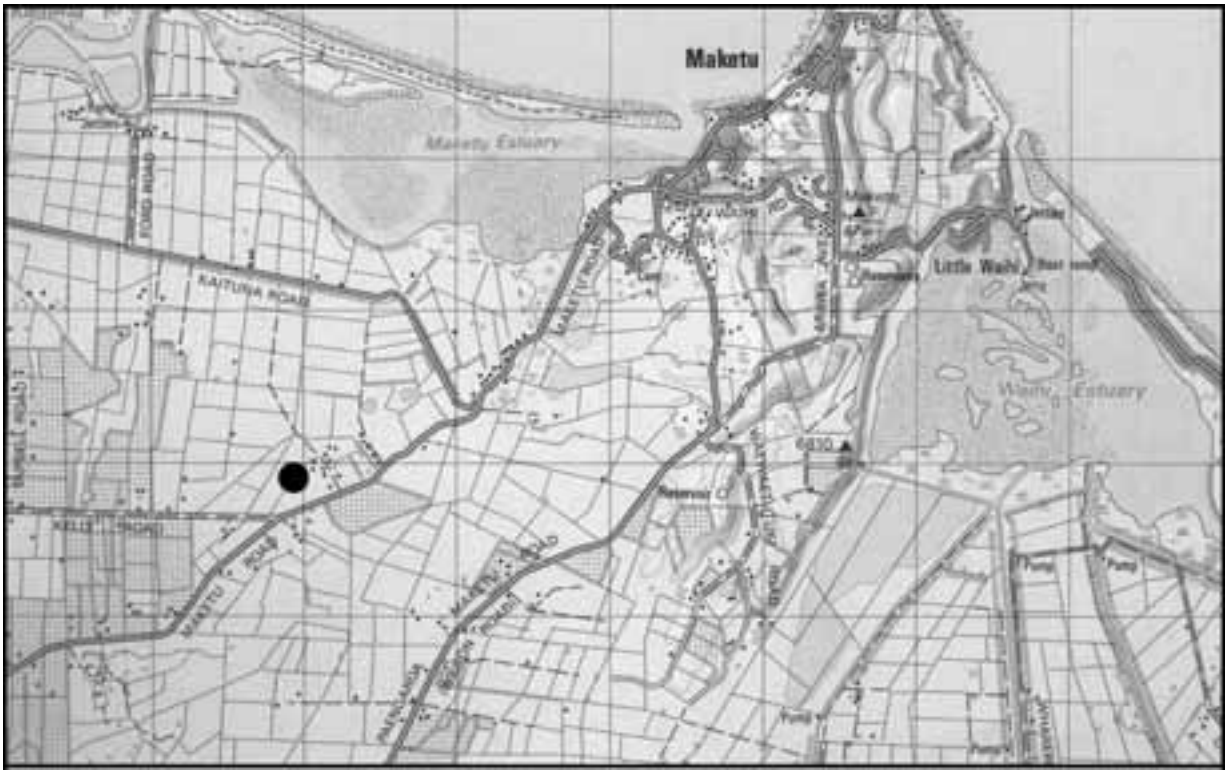
26/05/98: Float with 15 minute Campbell CR500 datalogger.

Comments on Stage/Discharge Ratings

Ratings are available to convert Stage (mm) to Reduced Level (mm) in Moturiki Datum.

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.



SITE LOCATION
Stewart at Maketu Road

Station Comments

Groundwater monitoring site. Stewart at Maketu Road. Site Number 3043.

The local recording authority is Environment Bay of Plenty.

Log no: 3043
Finder no:
Drilled:
By:
Reduced level: 3.990 metres Moturiki Datum
Method: Second order

Well is backed by barbary hedge in field off Maketu Road.

28/09/91
Water level in well affected by surface runoff.
Between 910928 063000 and 910928 223000 the water level rose 180mm with 55mm rain having fallen on 910928.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Groundwater Level Summary

Date Complied	January 2007	Site Number	3043
Compiled by	G R Ellery	Bore	Stewart
		Station	Maketu Road
Metric Map Reference	V14:119 748	Period of Summary	1991 to 2005

Statistical Summary

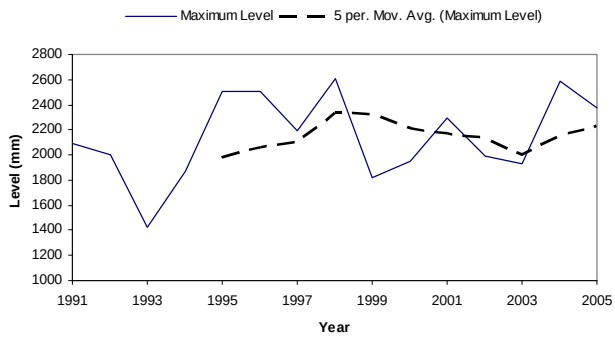
Level (mm)			
Minimum Level	815	Maximum Level	2607
Mean Annual Minimum Level	982	Mean Annual Maximum Level	2143
Mean Level	1410	Mean Summer Level	1246
Median Level	1365	Mean Autumn Level	1187
		Mean Winter Level	1641
		Mean Spring Level	1582
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	GEV
7 day Low Level (Minimum)	821	Peak Level (5 yr Return)	2448
7 Day Low Level (Mean Annual)	961	Peak Level (10 yr Return)	2587
7 day Low Level (5 yr Return)	903	Peak Level (20 yr Return)	2689
7 Day Low Level (10 yr Return)	868		

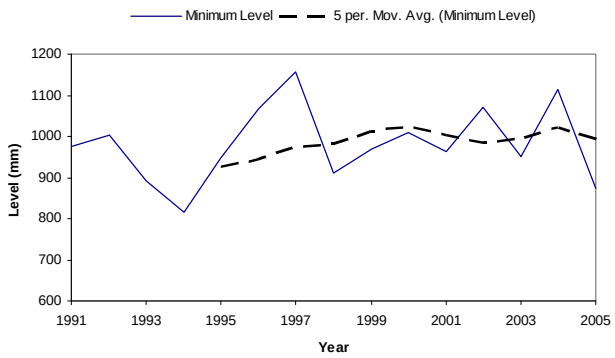
Annual Summaries

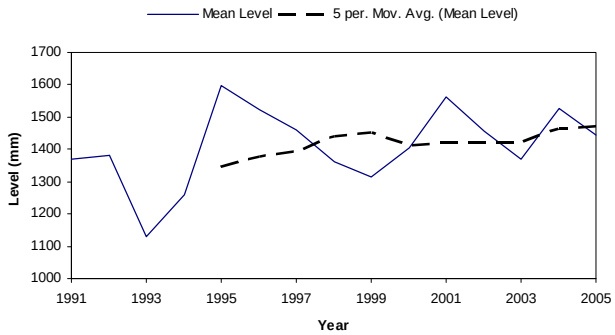
Year	Level (mm)			Year	Level (mm)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993	893	1129	1422
1981				1994	815	1260	1867
1982				1995	949	1597	2511
1983				1996	1067	1525	2510
1984				1997	1158	1459	2195
1985				1998	912	1362	2607
1986				1999	970	1314	1823
1987				2000	1010	1405	1949
1988				2001	963	1562	2298
1989				2002	1071	1455	1987
1990				2003	951	1370	1931
1991	976	1370	2090	2004	1115	1525	2585
1992	1002	1383	2003	2005	873	1445	2374

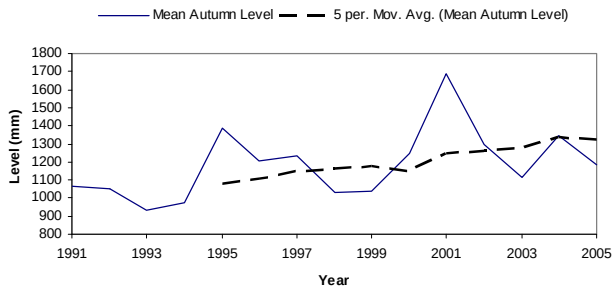
Level Distribution

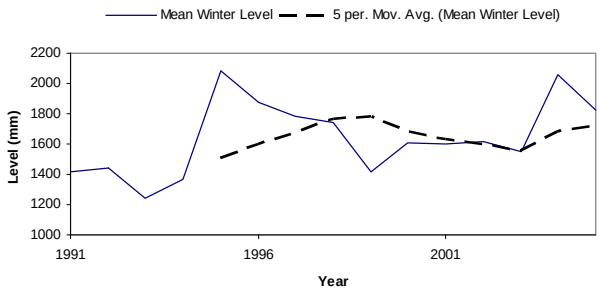
Level (mm)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	2607	2275	2174	2097	2041	1994	1953	1921	1882	1854
10	1833	1818	1804	1789	1775	1759	1745	1732	1718	1704
20	1689	1676	1665	1651	1637	1624	1612	1600	1589	1577
30	1567	1558	1550	1540	1532	1526	1518	1508	1497	1488
40	1477	1466	1456	1448	1439	1426	1414	1401	1390	1377
50	1365	1357	1348	1340	1333	1327	1319	1309	1302	1295
60	1289	1279	1269	1259	1250	1241	1233	1227	1220	1213
70	1206	1195	1184	1175	1165	1152	1140	1130	1122	1113
80	1103	1094	1085	1077	1068	1060	1054	1046	1038	1031
90	1020	1013	1003	989	980	969	951	922	901	883
100	815									

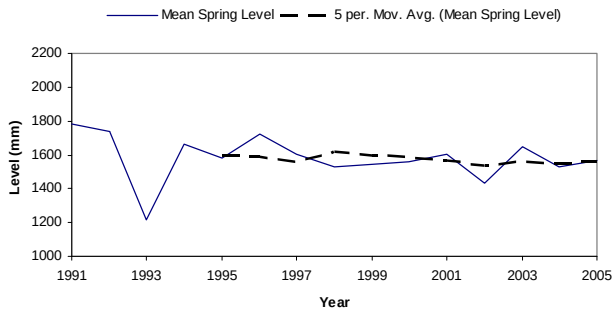


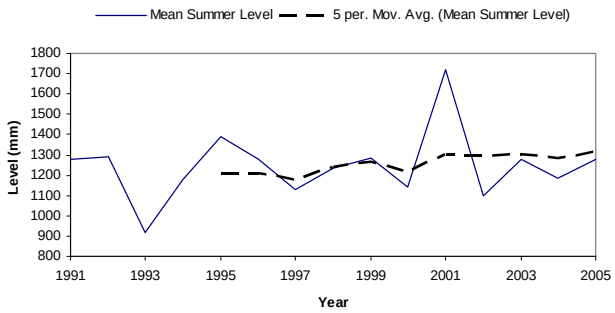












Stewart at Maketu Road

Environment Bay of Plenty
Groundwater Level Recording Station

Bore	Zink	Site	Otakiri Soldiers Road
Site Number	2541	Grid Reference	V15:391 510
Start of Record	July 1986	Data Capture Rate	89%
Data Summary From	January 1987	To	December 2005
Data Audited From	July 1986	To	December 2005

Equipment History

29/07/86: manual pressure gauge readings.
19/06/90: 20 metre range P.T. with Aquitel Remote.
16/02/00: 20 metre range P.T. with Campbell CR500 datalogger.
11/06/90: 20 metre range P.T. with L&S Digital recorder.
11/07/91: 20 metre range P.T. with WRIC datalogger.

Comments on Stage/Discharge Ratings

Ratings are available to convert Stage (mm) to Reduced Level (mm) in Moturiki Datum.

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network. A pressure gauge is located at the bore for comparison with pressure transducer readings, but the data is not corrected to the gauge. The bore is 199 metres deep, and penetrates the Matahina Ignimbrite Aquifer. Pressures at the bore head are generally in the order of 15 to 20 metres of equivalent head.

SITE LOCATION
Zink at Otakiri Soldiers Road

Station Comments

Groundwater monitoring site Zink at Otakiri Soldiers Road. Site Number 2541.

The local recording authority is Environment Bay of Plenty

Log no: 2541
Finder no: B 209
Drilled: 860217
By: Rob Garnham
Reduced level: 8.168 metre (Prequake)
8.161 metre (on "T" by gauge)
Method: second order

Bore is situated approximately 50 metres from Zinks cowshed. Pressure gauge readings are available from 29/7/86.

Extracted water is used for frost protection and milking shed requirements.

Spikes both positive and negative are apparent in the dataset. The positive spikes are the result of a tap being opened to provide water for cowshed washing. The negative spikes are a result of the activation of the large volume pump being used for frost protection and irrigation.

02/03/87 - Major earthquake affected groundwater pressures 870302.

11/06/87 - L&S digital with pressure transducer and A-D converter installed 870611. Data is recorded and stored in terms of 0.5 * head (in mm). A straight line rating is available to multiply stored values by 2 to give head in mm. The measuring point is the pressure transducer, which is situated approx 1300mm above ground level.

14/11/89 - Raised pressure transducer due to high pressures. Pressure transducer raised by 594mm (594mm from floor to centre of incoming hose).

09/02/90 - Pressure gauge installed at site.

08/02/94 -Data for period 940208 230000 to 940306 000000 has been edited to remove erroneous spikes from data. Data to be treated with caution.

31/12/95 - Missing record occurs within this data set. While every care has been taken when processing the data, caution should be exercised when using the processed data.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Groundwater Level Summary

Date Complied	January 2007	Site Number	2541
Compiled by	G R Ellery	Bore	Zink
		Station	Otakiri Soldiers Road
Metric Map Reference	V15: 391 510	Period of Summary	1987 to 2005

Statistical Summary

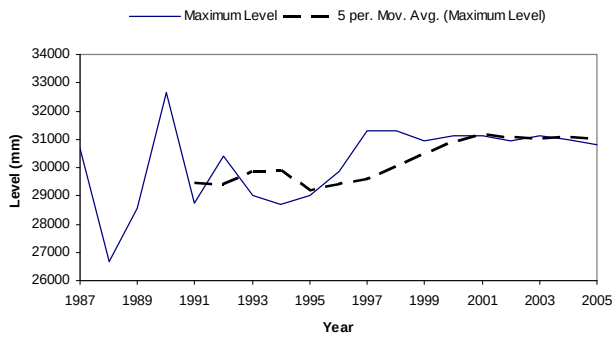
Level (mm)			
Minimum Level	9018	Maximum Level	32669
Mean Annual Minimum Level	10998	Mean Annual Maximum Level	30208
Mean Level	26797	Mean Summer Level	26742
Median Level	26949	Mean Autumn Level	26588
		Mean Winter Level	26736
		Mean Spring Level	26912
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	GEV
7 day Low Level (Minimum)	20716	Peak Level (5 yr Return)	31448
7 Day Low Level (Mean Annual)	25818	Peak Level (10 yr Return)	31753
7 day Low Level (5 yr Return)	24769	Peak Level (20 yr Return)	31925
7 Day Low Level (10 yr Return)	23809		

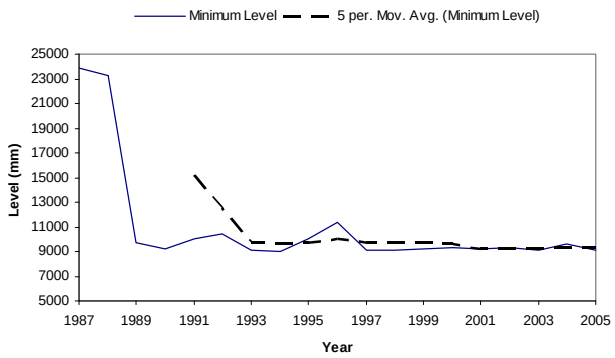
Annual Summaries

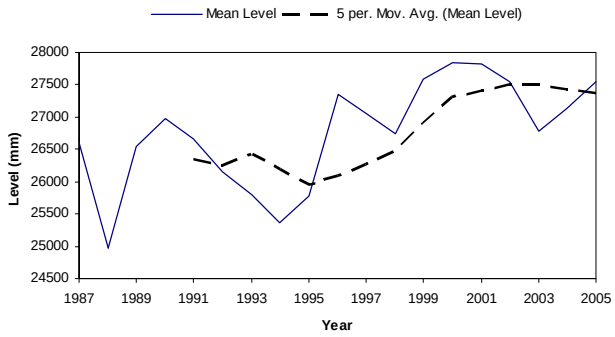
Year	Level (mm)			Year	Level (mm)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993	9141	25791	28996
1981				1994	9018	25368	28681
1982				1995	10031	25786	29025
1983				1996	11311	27352	29869
1984				1997	9065	27064	31316
1985				1998	9053	26737	31318
1986				1999	9255	27591	30924
1987	23847	26597	30668	2000	9266	27833	31142
1988	23206	24965	26664	2001	9230	27815	31102
1989	9678	26545	28573	2002	9277	27549	30959
1990	9185	26972	32669	2003	9129	26785	31145
1991	10047	26657	28723	2004	9642	27132	30968
1992	10448	26160	30422	2005	9140	27550	30796

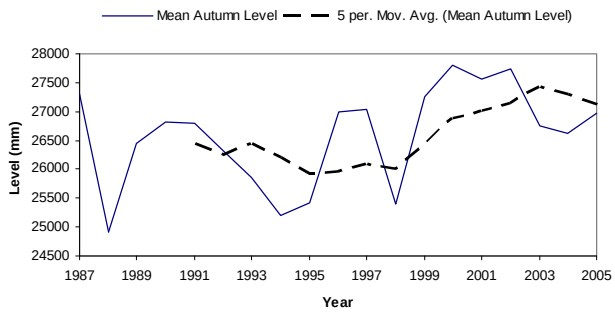
Level Distribution

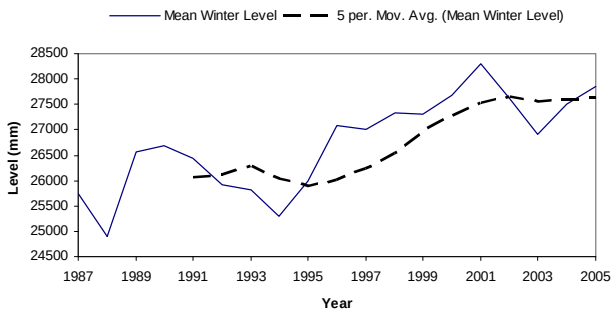
Level (mm)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	32669	28997	28485	28354	28265	28218	28171	28133	28095	28060
10	28016	27976	27933	27904	27878	27850	27824	27800	27774	27746
20	27723	27702	27679	27654	27629	27606	27582	27557	27530	27496
30	27460	27425	27390	27363	27341	27320	27295	27270	27242	27207
40	27173	27146	27122	27096	27070	27044	27021	27001	26982	26966
50	26949	26931	26912	26893	26870	26846	26827	26807	26787	26761
60	26737	26709	26686	26664	26637	26605	26580	26557	26534	26511
70	26481	26441	26383	26293	26180	26087	26009	25946	25913	25882
80	25849	25808	25768	25728	25683	25642	25574	25493	25395	25346
90	25305	25261	25212	25156	25064	24968	24889	24804	24699	24395
100	9018									

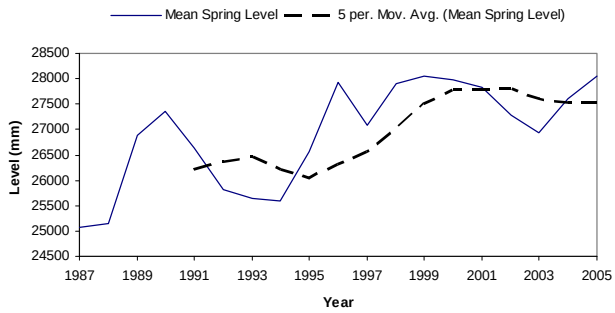


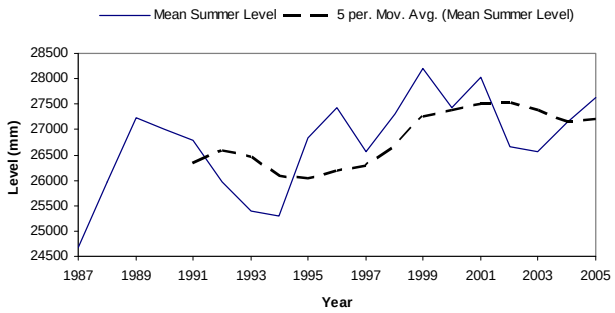












Zink at Otakiri Soldiers Road

Environment Bay of Plenty
Groundwater Level Recording Station

Bore	Brady	Site	Greig Road
Site Number	461	Grid Reference	V15:475 567
Start of Record	November 1988	Data Capture Rate	98%
Data Summary From	January 1989	To	December 2005
Data Audited From	November 1988	To	December 2005

Equipment History

10/11/88: Float with L&S digital recorder.

25/02/98: Float with Handar encoder and Campbell CR500 datalogger.

Comments on Stage/Discharge Ratings

Ratings are available to convert Stage (mm) to Reduced Level (mm) in Moturiki Datum.

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

SITE LOCATION
Brady at Greig Road

Station Comments

Groundwater monitoring site Brady at Greig Road. Site Number 461.

The local recording authority is Environment Bay of Plenty.

The bore was previously known as Battenburg.

Log no: 0461
Finder no: B 56
Drilled: 800110
By: Rob Garnham
Reduced level: 0.714 metre (800609 preqauke)
0.177 metre (870618 on bore cap postquake)
0.129 metre (881109 on bore no cap)
Method: Second order

17/07/95 - While carrying out a data audit on Brady's bore for the period of data from 881110 091500 to 921231 240000, it was found that some of the reduced levels calculated and used in processing data were incorrect. The correct reduced levels were established and the corresponding periods of data were reprocessed to agree with the corrected reduced levels.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Groundwater Level Summary

Date Complied	January 2007	Site Number	461
Compiled by	G R Ellery	Bore	Brady
		Station	Grieg Road
Metric Map Reference	V15: 475 567	Period of Summary	1989 to 2005

Statistical Summary

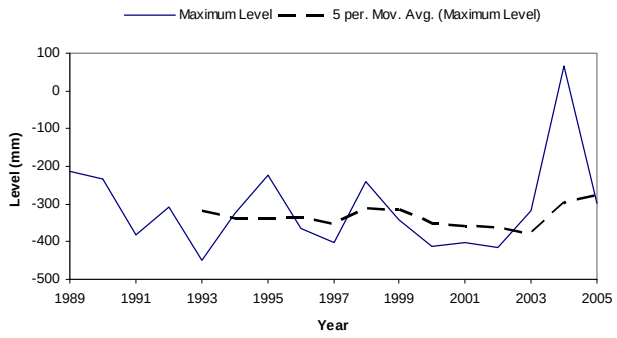
Level (mm)			
Minimum Level	-947	Maximum Level	65
Mean Annual Minimum Level	-827	Mean Annual Maximum Level	-310
Mean Level	-615	Mean Summer Level	
Median Level	-624	Mean Autumn Level	
		Mean Winter Level	
		Mean Spring Level	
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	GEV
7 day Low Level (Minimum)	-912	Peak Level (5 yr Return)	-240
7 Day Low Level (Mean Annual)	-778	Peak Level (10 yr Return)	-162
7 day Low Level (5 yr Return)	-822	Peak Level (20 yr Return)	-76
7 Day Low Level (10 yr Return)	-856		

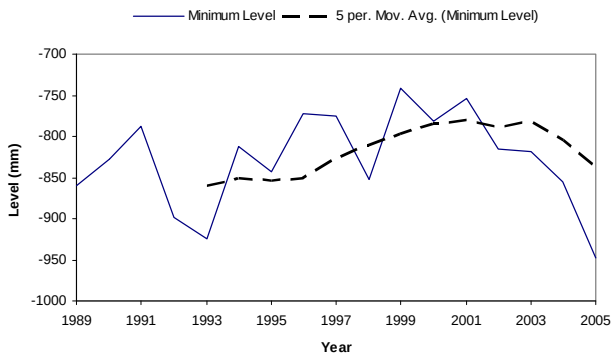
Annual Summaries

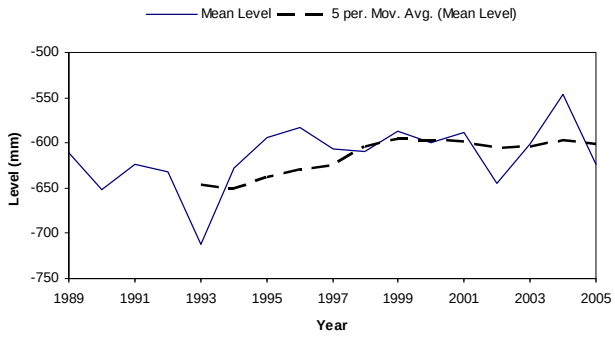
Year	Level (mm)			Year	Level (mm)		
	Minimum	Mean	Maximum		Minimum	Mean	Maximum
1980				1993	-925	-712	-450
1981				1994	-812	-627	-326
1982				1995	-843	-593	-223
1983				1996	-773	-582	-365
1984				1997	-775	-607	-401
1985				1998	-852	-609	-240
1986				1999	-741	-587	-341
1987				2000	-781	-600	-413
1988				2001	-754	-589	-403
1989	-860	-611	-214	2002	-816	-645	-417
1990	-828	-652	-233	2003	-819	-601	-319
1991	-787	-624	-381	2004	-855	-547	65
1992	-899	-632	-307	2005	-947	-624	-298

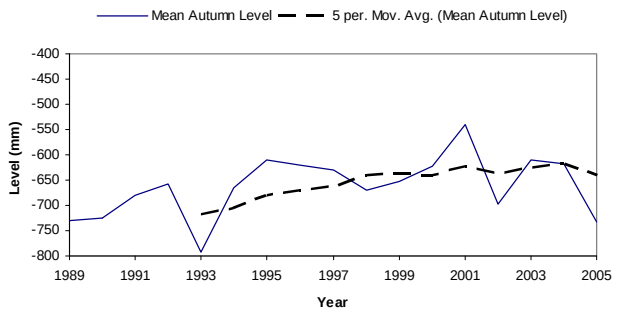
Level Distribution

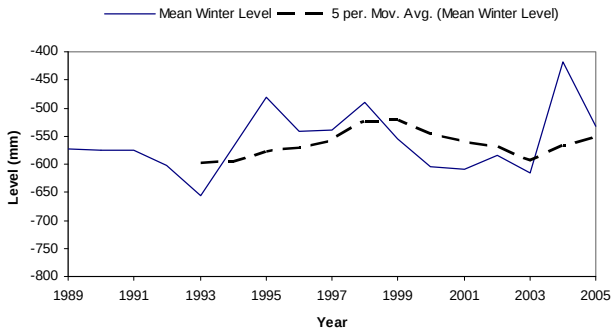
Level (mm)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	65	-335	-382	-410	-424	-438	-450	-459	-467	-475
10	-483	-489	-495	-500	-506	-511	-516	-521	-525	-530
20	-534	-538	-542	-546	-549	-553	-557	-560	-564	-567
30	-570	-573	-576	-579	-582	-585	-587	-590	-593	-596
40	-598	-601	-603	-606	-608	-611	-613	-616	-619	-621
50	-624	-626	-629	-631	-634	-636	-638	-641	-643	-645
60	-647	-649	-651	-653	-655	-657	-659	-662	-664	-667
70	-669	-672	-675	-677	-680	-683	-686	-689	-692	-696
80	-699	-702	-705	-708	-711	-714	-717	-720	-724	-728
90	-732	-737	-742	-749	-757	-765	-775	-785	-799	-827
100	-947									

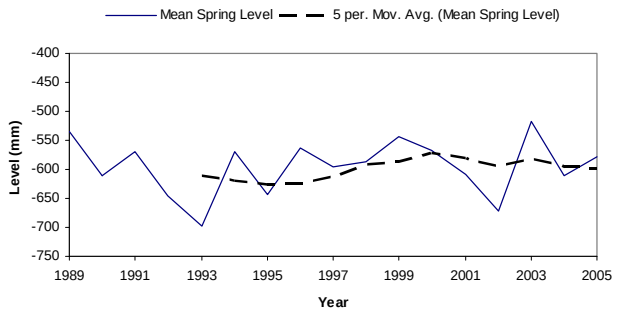

Maximum Level
5 per. Mov. Avg. (Maximum Level)
Level (mm)
Year

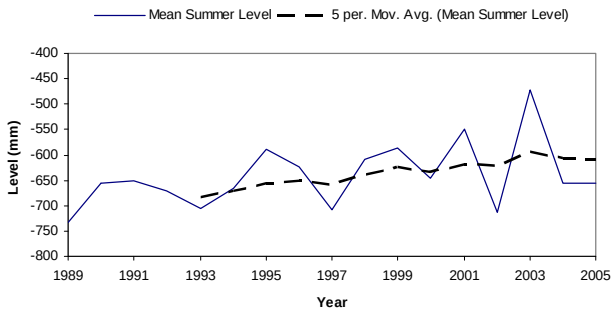

Minimum Level
5 per. Mov. Avg. (Minimum Level)
Level (mm)
Year


Mean Level
5 per. Mov. Avg. (Mean Level)
Level (mm)
Year


Mean Autumn Level
5 per. Mov. Avg. (Mean Autumn Level)
Level (mm)
Year


Mean Winter Level
5 per. Mov. Avg. (Mean Winter Level)
Level (mm)
Year


Mean Spring Level
5 per. Mov. Avg. (Mean Spring Level)
Level (mm)
Year


Mean Summer Level
5 per. Mov. Avg. (Mean Summer Level)
Level (mm)
Year

Environment Bay of Plenty
Groundwater Level Recording Station

Bore	Signal	Site	McDonald Road
Site Number	2060	Grid Reference	V15:453 442
Start of Record	September 1988	Data Capture Rate	98%
Data Summary From	January 1989	To	December 2005
Data Audited From	September 1988	To	December 2005

Equipment History

13/09/88: Float with L&S digital recorder.

21/01/98: Campbell CR500 with Handar shaft encoder.

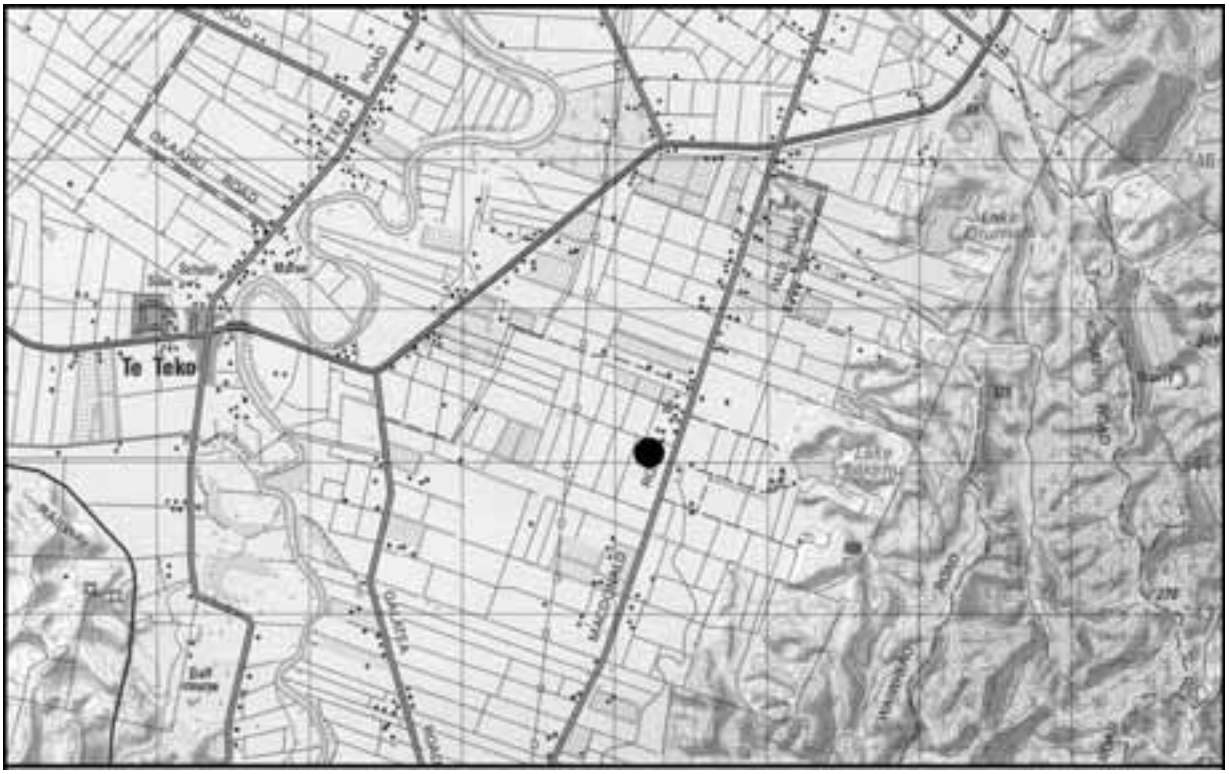
28/01/01: Campbell CR500 with pressure transducer.

Comments on Stage/Discharge Ratings

Ratings are available to convert Stage (mm) to Reduced Level (mm) in Moturiki Datum.

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.



SITE LOCATION
Signal at McDonald Road

Station Comments

Groundwater monitoring site Signal at McDonald Road. Site Number 2060.

The local recording authority is Environment Bay of Plenty.

Log no: 2060
Finder no: B103.
Drilled: April 1988
By: Rob Garnham
Reduced level: 14.010
Method: Second order

Bore was drilled by B.O.P.C.B as an investigation bore.

05/01/95 -Data from 950105 to 950130 has flat periods due to unknown reasons.
This data should be treated with caution.

31/12/95 - Data audit carried out for site 2060 Signals bore at McDonald Road. Data audit covers the period 880913 to 951231 240000 during which Environment Bay of Plenty was the recording authority. Groundwater level data was compared with groundwater level site 461 Brady at Greig Road situated at NZMS 260 Reference V15:475 567. While carrying out a data audit on Signal's bore for the period 880913 to 951231, it was found that numerous periods of data had been processed incorrectly. These batches of data have been re-processed to the correct readings and copied onto the data archive.

For additional information, please see recording authority.

Environment Bay of Plenty
Hydrological Groundwater Level Summary

Date Complied	January 2007	Site Number	2060
Compiled by	G R Ellery	Bore	Signal
		Station	McDonald Road
Metric Map Reference	V15: 453 442	Period of Summary	1989 to 2005

Statistical Summary

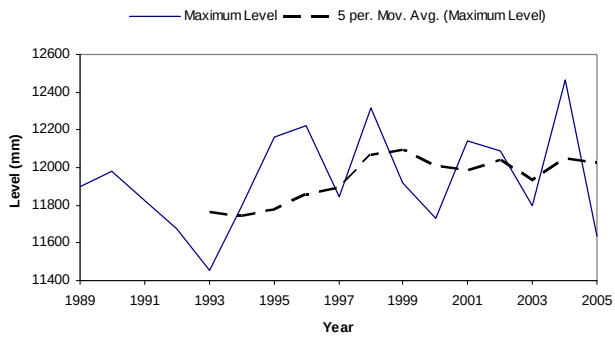
Level (mm)			
Minimum Level	9730	Maximum Level	12464
Mean Annual Minimum Level	10585	Mean Annual Maximum Level	11937
Mean Level	11361	Mean Summer Level	11181
Median Level	11359	Mean Autumn Level	11134
		Mean Winter Level	11503
		Mean Spring Level	11616
Low Level Distribution Fit Utilised	GEV	Peak Level Distribution Fit Utilised	GEV
7 day Low Level (Minimum)	10017	Peak Level (5 yr Return)	12162
7 Day Low Level (Mean Annual)	10647	Peak Level (10 yr Return)	12305
7 day Low Level (5 yr Return)	10404	Peak Level (20 yr Return)	12427
7 Day Low Level (10 yr Return)	10246		

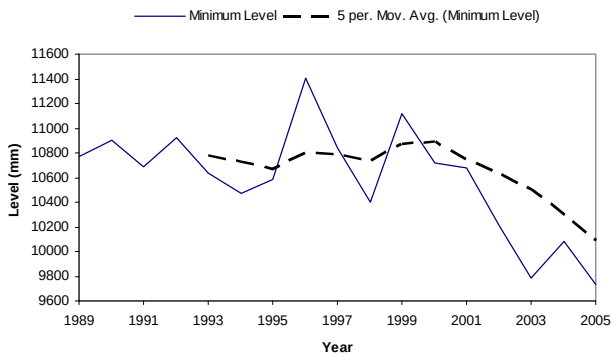
Annual Summaries

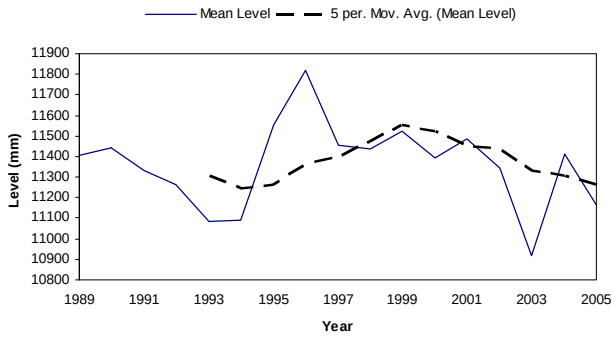
Year	Level (mm)				Year	Level (mm)		
	Minimum	Mean	Maximum			Minimum	Mean	Maximum
1980					1993	10640	11083	11451
1981					1994	10475	11091	11790
1982					1995	10586	11551	12159
1983					1996	11403	11822	12220
1984					1997	10844	11452	11844
1985					1998	10399	11438	12316
1986					1999	11116	11522	11919
1987					2000	10720	11393	11727
1988					2001	10681	11484	12141
1989	10769	11408	11898		2002	10201	11344	12091
1990	10902	11443	11981		2003	9784	10915	11797
1991	10692	11332	11822		2004	10087	11409	12464
1992	10919	11265	11679		2005	9730	11164	11634

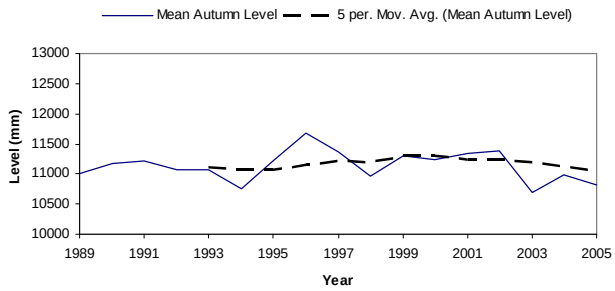
Level Distribution

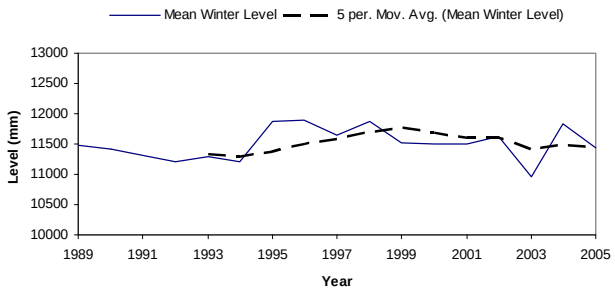
Level (mm)										
Percentiles	0	1	2	3	4	5	6	7	8	9
0	12464	12236	12149	12098	12063	12021	11959	11923	11896	11870
10	11844	11821	11801	11784	11765	11745	11728	11713	11699	11685
20	11674	11665	11657	11649	11638	11626	11616	11607	11598	11589
30	11580	11570	11561	11553	11543	11535	11528	11521	11513	11504
40	11495	11486	11478	11468	11453	11435	11420	11406	11392	11375
50	11359	11348	11335	11324	11314	11305	11297	11289	11281	11272
60	11264	11255	11245	11235	11226	11216	11207	11195	11186	11173
70	11162	11145	11129	11117	11105	11094	11082	11073	11062	11051
80	11034	11014	10997	10985	10972	10960	10941	10921	10898	10871
90	10852	10835	10810	10784	10754	10721	10678	10617	10552	10420
100	9730									

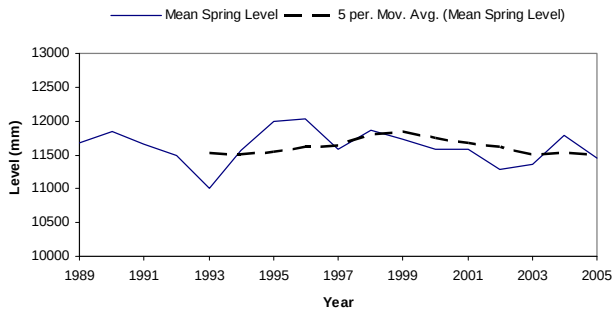


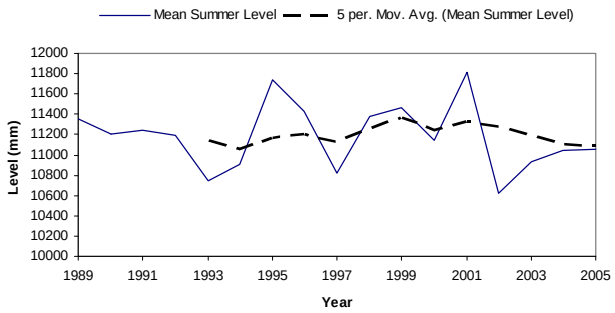












Signal at McDonald Road

3.9 Water Temperature Data Summaries

The water temperature data summaries in this chapter are provided in the following sequences of 3 pages per station:

Page 1 Provides general information regarding the station, such as its location, instrument types, start of record, etc.

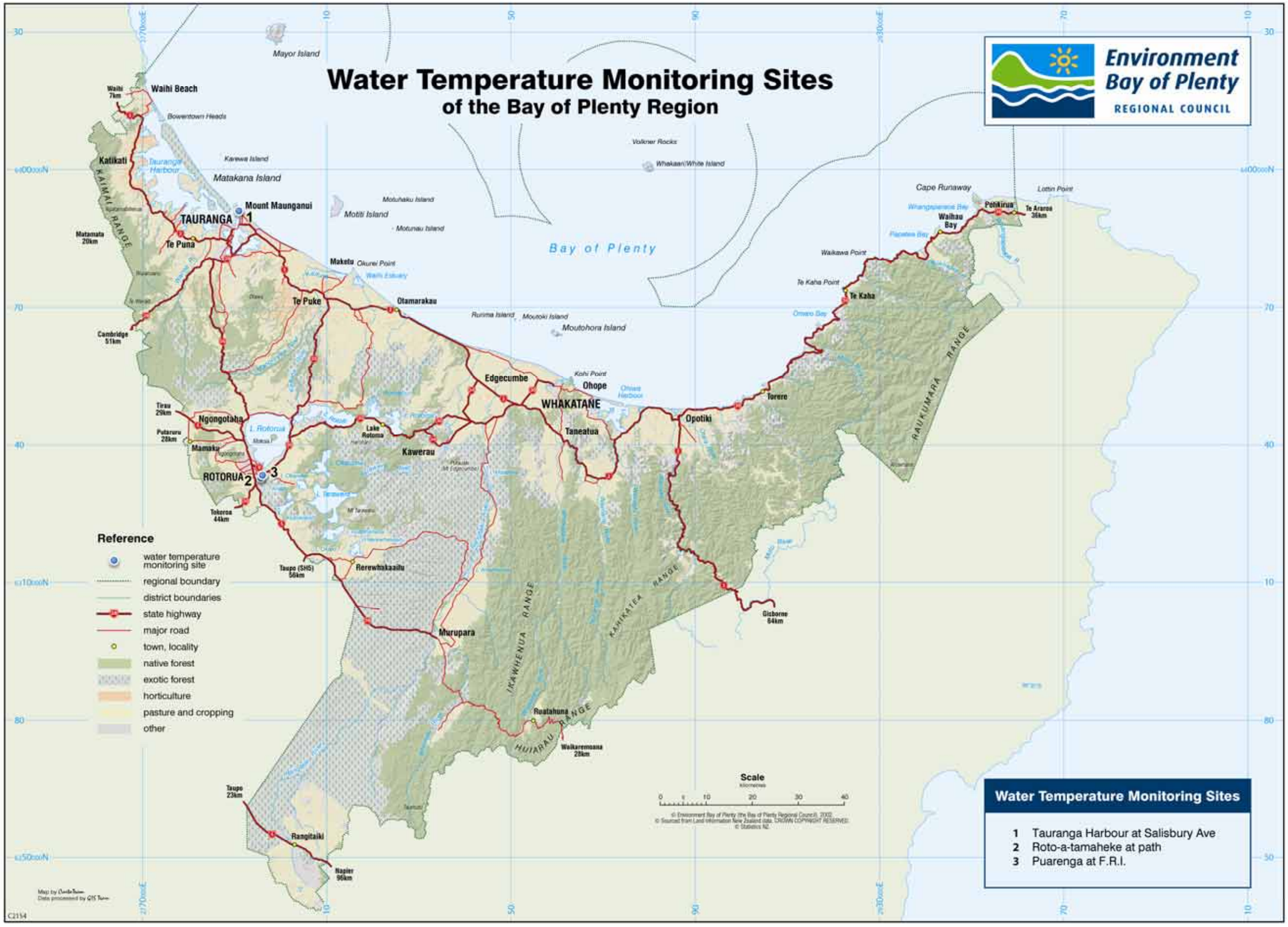
Page 2 Displays the data summary information

Page 3 Graphical presentation of a selection of parameters provided in Page 2.

The ID No. in Table 3.9 indicates the order in which individual station data summaries are provided in this report.

Table 3.9 Water Temperature Monitoring Stations

ID Number	Page No.	Site	Site	Period of Audit	Data Capture Rate (%)
1	493	Tauranga Harbour	Salisbury Avenue	1992-2005	85
2	497	Puarenga	Path	1989-2000	80
3	501	Puarenga	F.R.I	1992-1996	93


Water Temperature Monitoring Sites
of the Bay of Plenty Region
Environment Bay of Plenty
REGIONAL COUNCIL
Bay of Plenty
Mayor Island
Waihi Beach
Bowentown Heads
Katikati
Tauranga Harbour
Karewa Island
Matakana Island
Mount Maunganui
TAURANGA
Te Puna
Matamata 20km
Motuhaku Island
Motiti Island
Motunau Island
Maketu
Okurei Point
Waihi Estuary
Te Puke
Otamarakau
Cambridge 51km
Rurima Island
Moutoki Island
Moutohora Island
Volkner Rocks
Whakaari/White Island
Cape Runaway
Lottin Point
Whangaparaoa Bay
Waihau Bay
Papatea Bay
Pohkirua
Te Araroa 36km
Waikawa Point
Te Kaha Point
Te Kaha
Omaio Bay
RAUKUMARA RANGE
Kohi Point
Ohiwa Harbour
Ohope
Edgecumbe
WHAKATANE
Taneatua
Opotiki
Torere
Tirau 29km
Putaruru 28km
Ngongotaha
Mamaku
L. Rotorua
Lake Rotoma
Kawerau
ROTORUA
Tokoroa 44km
Taupo (SH5) 56km
Rerewhakaaitu
Murupara
IKAWHENUA RANGE
KAHIKATEA RANGE
Gisborne 64km
Ruatahuna
HUIARAU RANGE
Waikaremoana 28km
Taupo 23km
Rangitaiki
Napier 96km
Reference
water temperature monitoring site
regional boundary
district boundaries
state highway
major road
town, locality
native forest
exotic forest
horticulture
pasture and cropping
other
Scale
Water Temperature Monitoring Sites
1 Tauranga Harbour at Salisbury Ave
2 Roto-a-tamaheke at path
3 Puarenga at F.R.I.

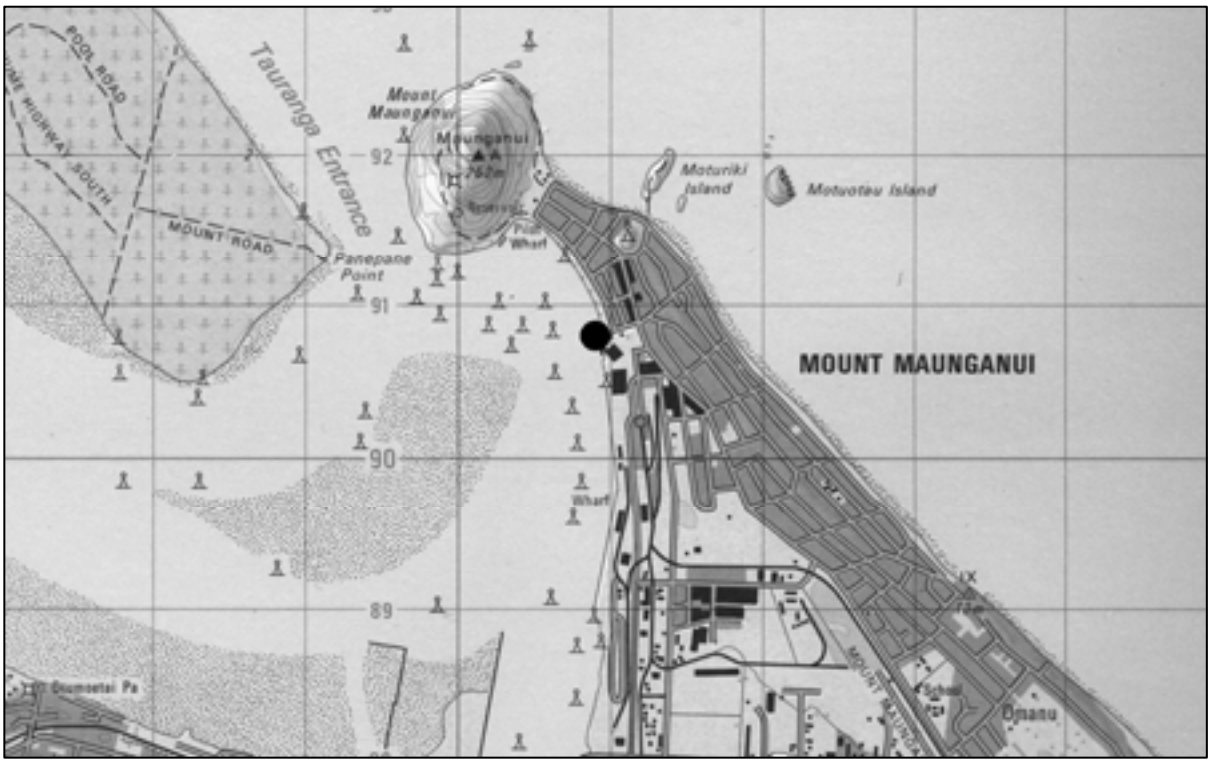
Environment Bay of Plenty
Water Temperature Recording Station

Parameter	Water Temperature	Station	Tauranga Harbour
Site Number	514212	NZMS 260 Reference	U14:909 908
Recorder Type	CS107 probe		
Start of Record	July 1991	Data Capture Rate	85%
Data Summary From	January 1992	To	December 2005
Data Audited From	July 1991	To	December 2005

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

From July 1991 to December 1992 temperature is recorded by the Phillips Linear Silicon sensor to a Kainga datalogger. On 12 December 1992 a Kainga Sensor (-5 to 35°C range) was installed as a backup. On 3 June 1994 the Kainga logger was replaced with a Campbell datalogger (CR10) with a single Kainga probe connected. Probes were subsequently replaced by V Campbell CS107 probes. The temperature probe was initially mounted on a floating jetty and therefore remained at a constant depth below the water. This jetty was removed in September 2001 so that the sensor is now mounted in a static position on the harbour edge (i.e. it has a variable head of water above it dependent on tide level).



SITE LOCATION
Water Temperature at Tauranga Harbour

Environment Bay of Plenty
Water Temperature Summary

Date Compiled	March 2007	Site Number	514212
Compiled by	G R Ellery	Station	Tauranga Harbour
Equipment Type	CS107 temperature probe		
NZMS 260 Reference	U14:909 908	Period of Summary	1992 to 2005

Statistical Summary

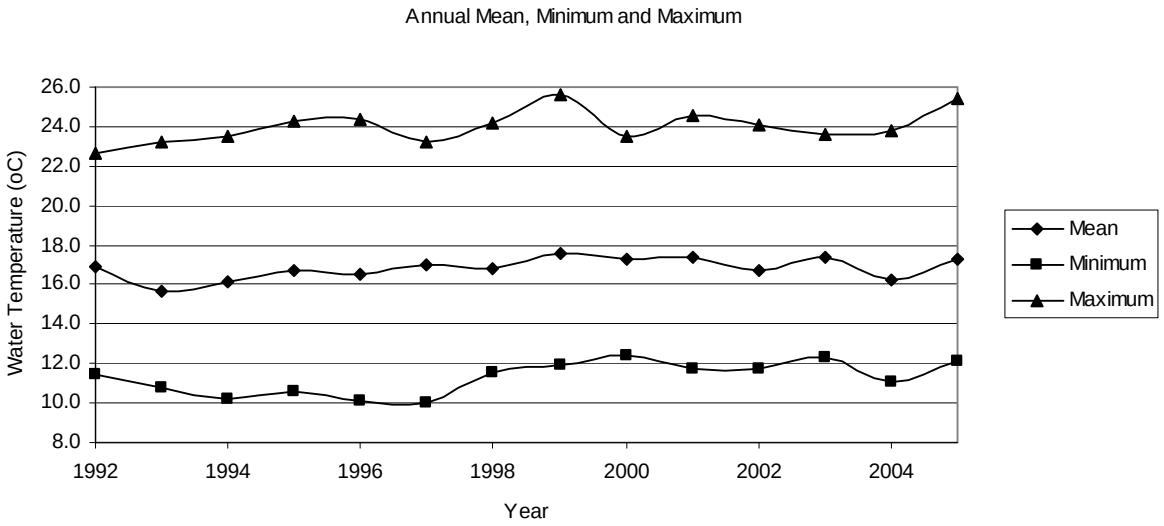
Mean Annual Water Temperature	16.8 °C	Mean Summer Water Temperature	19.2 °C
Median Water Temperature	16.5 °C	Mean Autumn Water Temperature	18.5 °C
		Mean Winter Water Temperature	13.8 °C
		Mean Spring Water Temperature	15.2°C
Minimum Water Temperature	10.0 °C	Min. Water Temperature (Mean Annual)	11.3 °C
Maximum Water Temperature	25.6 °C	Max. Water Temperature (Mean Annual)	24.0 °C

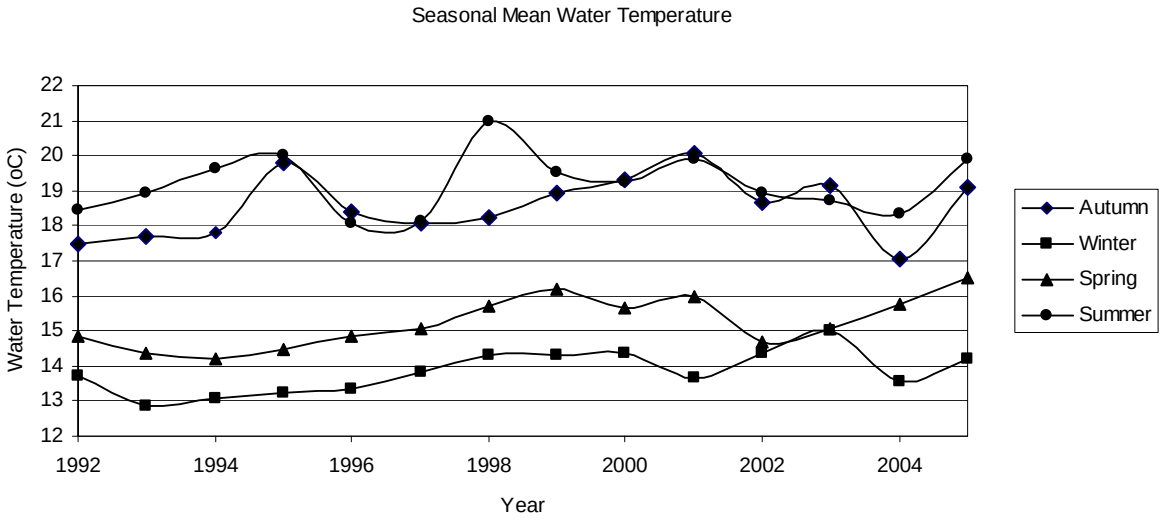
Monthly Statistics (°C)

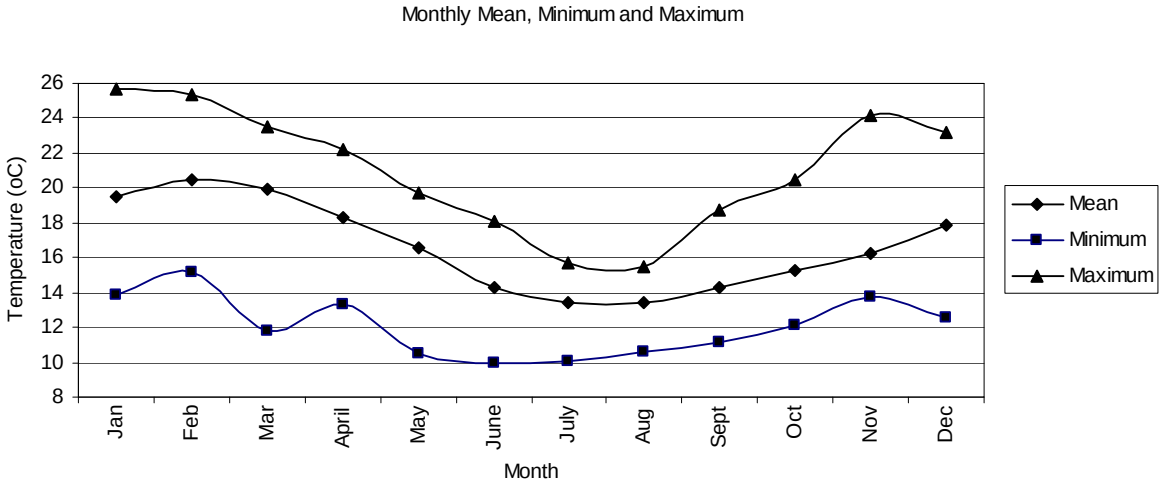
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum	13.8	15.2	11.8	13.3	10.5	10.0	10.1	10.6	11.2	12.1	13.7	12.5
Median	19.5	20.7	20.0	18.4	16.7	14.3	13.5	13.5	14.4	15.2	16.2	17.9
Maximum	25.6	25.4	23.5	22.2	19.7	18.1	15.7	15.5	18.7	20.5	24.2	23.2
Mean	19.5	20.5	19.9	18.3	16.6	14.3	13.4	13.5	14.3	15.3	16.3	17.9

Annual Summary

	Water Temperature (°C)	Extreme Water Temperature (°C)			
Year	Mean	Minimum	Date	Maximum	Date
1992	16.9	11.5	13/09/1992	22.6	20/02/1992
1993	15.7	10.8	10/07/1993	23.3	21/01/1993
1994	16.1	10.2	10/07/1994	23.5	26/02/1994
1995	16.7	10.6	24/07/1995	24.3	18/02/1995
1996	16.5	10.1	10/07/1996	24.3	4/02/1996
1997	17.0	10.0	26/06/1997	23.3	4/01/1997
1998	16.8	11.5	21/08/1998	24.2	21/11/1998
1999	17.5	11.9	29/07/1999	25.6	20/01/1999
2000	17.3	12.4	17/06/2000	23.5	22/01/2000
2001	17.4	11.7	21/07/2001	24.6	22/02/2001
2002	16.7	11.8	15/07/2002	24.1	31/01/2002


Annual Mean, Minimum and Maximum
Water Temperature (oC)
26.0
24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
1992
1994
1996
1998
2000
2002
2004
Year
Mean
Minimum
Maximum


Seasonal Mean Water Temperature
Water Temperature (oC)
22
21
20
19
18
17
16
15
14
13
12
1992
1994
1996
1998
2000
2002
2004
Year
Autumn
Winter
Spring
Summer


Monthly Mean, Minimum and Maximum
Temperature (oC)
26
24
22
20
18
16
14
12
10
8
Jan
Feb
Mar
April
May
June
July
Aug
Sept
Oct
Nov
Dec
Month
Mean
Minimum
Maximum

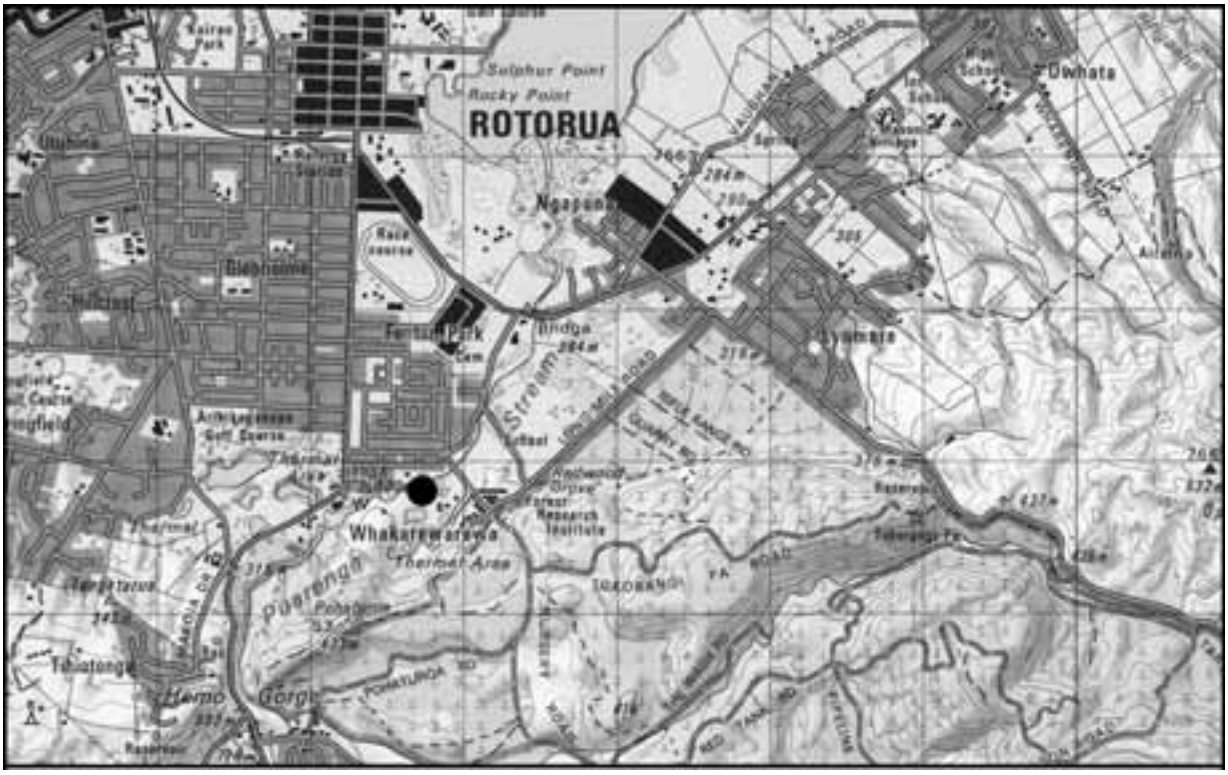
Environment Bay of Plenty
Water Temperature Recording Station

Parameter	Water Temperature	Station	Path
Site Number	2039	NZMS 260 Reference	U16:957 328
Recorder Type	EDSC Temp. probe		
Start of Record	April 1988	Data Capture Rate	80%
Data Summary From	April 1988	To	December 2000
Data Audited From		To	

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

The Roto-A-Tamaheke at Path water temperature recorder was installed by NIWA for the Rotorua Geothermal Monitoring Programme. On 2 November 1992 an EDSC temperature probe (0 - 100°C range) was installed and connected to a Kainga datalogger. Prior to this time several types of temperature recorders and loggers were run at the site (see local recording authority for details). The site was handed over to Environment B.O.P in July 1992. In July 1993 data collection and processing was contracted to NIWA, Rotorua.



SITE LOCATION
Water Temperature at Path

Environment Bay of Plenty
Water Temperature Summary

Date Compiled	March 2007	Site Number	2039
Compiled by	G R Ellery	Station	Path
Equipment Type	EDSC Temp. probe		
NZMS 260 Reference	U16:958 328	Period of Summary	1989 to 2000

Statistical Summary

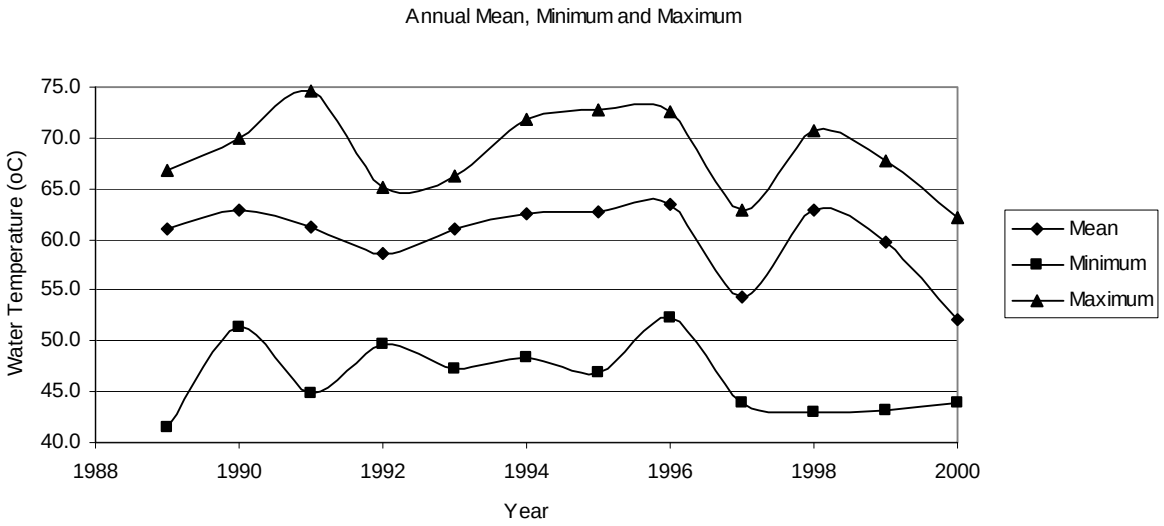
Mean Annual Water Temperature	60.5 °C	Mean Summer Water Temperature	60.2 °C
Median Water Temperature	61.1 °C	Mean Autumn Water Temperature	60.5 °C
		Mean Winter Water Temperature	59.6 °C
		Mean Spring Water Temperature	60.4 °C
Minimum Water Temperature	41.5 °C	Min. Water Temperature (Mean Annual)	46.4 °C
Maximum Water Temperature	74.6 °C	Max. Water Temperature (Mean Annual)	68.6 °C

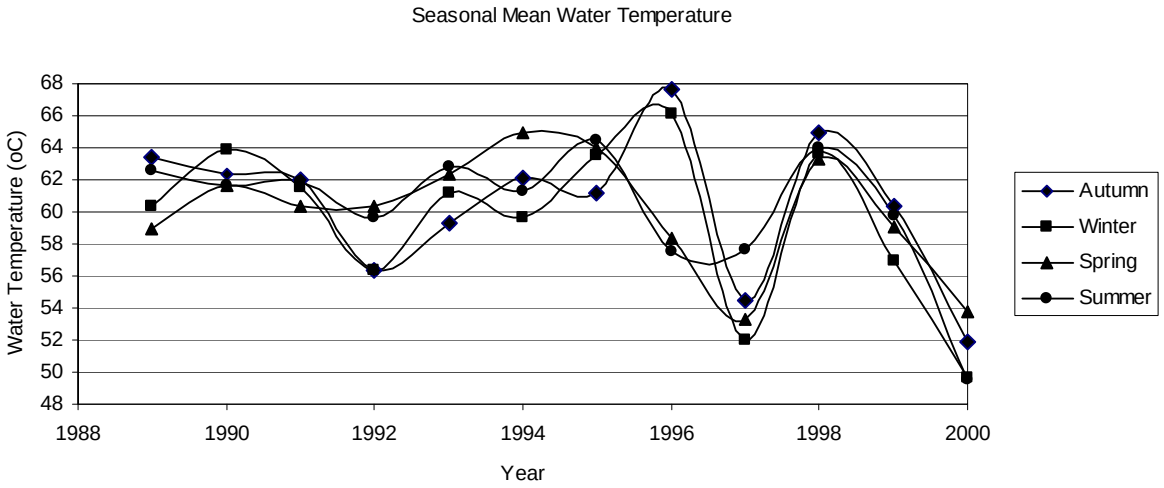
Monthly Statistics (°C)

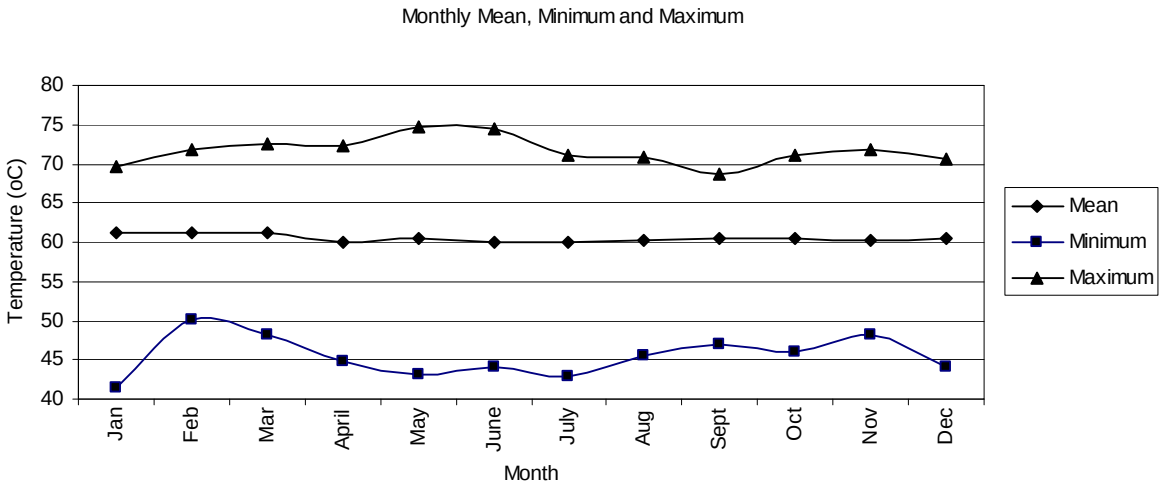
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum	41.5	50.1	48.1	44.9	43.2	44.0	43.0	45.5	46.9	46.1	48.2	44.1
Median	61.6	60.5	61.9	60.9	61.2	60.6	61.0	61.3	60.8	60.8	60.3	61.8
Maximum	69.6	71.8	72.6	72.3	74.6	74.4	71.2	70.8	68.7	71.2	71.9	70.7
Mean	61.3	61.1	61.1	60.0	60.4	60.0	60.1	60.2	60.4	60.4	60.3	60.6

Annual Summary

	Water Temperature (°C)	Extreme Water Temperature (°C)			
Year	Mean	Minimum	Date	Maximum	Date
1989	61.0	41.5	3/01/1989	66.9	15/04/1989
1990	62.9	51.3	15/10/1990	69.9	26/12/1990
1991	61.3	44.9	21/04/1991	74.6	13/05/1991
1992	58.7	49.7	15/08/1992	65.2	19/10/1992
1993	60.9	47.3	16/05/1993	66.2	16/12/1993
1994	62.5	48.4	11/06/1994	71.9	27/11/1994
1995	62.7	46.8	29/05/1995	72.7	27/05/1995
1996	63.5	52.3	20/11/1996	72.6	13/03/1996
1997	54.3	44.0	2/06/1997	62.9	3/01/1997
1998	63.0	43.0	9/07/1998	70.8	6/08/1998
1999	59.8	43.2	1/05/1999	67.7	27/01/1999
2000	52.0	44.0	19/06/2000	62.1	1/01/2000


Annual Mean, Minimum and Maximum
Water Temperature (oC)
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
1988
1990
1992
1994
1996
1998
2000
Year
Mean
Minimum
Maximum


Seasonal Mean Water Temperature
Water Temperature (oC)
68
66
64
62
60
58
56
54
52
50
48
1988
1990
1992
1994
1996
1998
2000
Year
Autumn
Winter
Spring
Summer


Monthly Mean, Minimum and Maximum
Temperature (oC)
80
75
70
65
60
55
50
45
40
Jan
Feb
Mar
April
May
June
July
Aug
Sept
Oct
Nov
Dec
Month
Mean
Minimum
Maximum

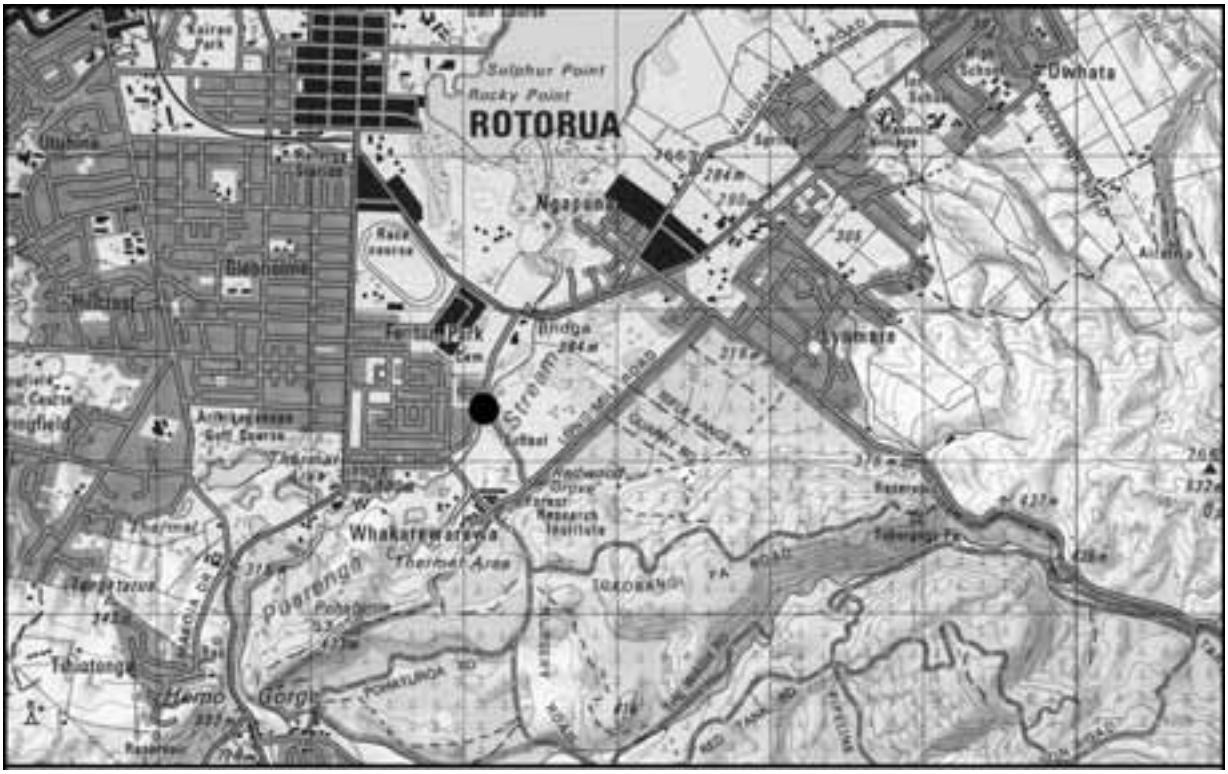
Environment Bay of Plenty
Water Temperature Recording Station

Parameter	Water Temperature	Station	F.R.I.
Site Number	2026	Grid Reference	U16:962 333
Recorder Type	EDSC Temp. probe		
Start of Record	July 1991	Data Capture Rate	93%
Data Summary From	January 1992	To	December 1996
Data Audited From		To	

General Comments

Site is operated by Environment Bay of Plenty as part of its Natural Environment Regional Monitoring Network.

From July 1991 to July 1992 temperature is recorded by an unknown type of temperature probe connected to a L&S digital recorder. On 13 July 1992 a EDSC temperature probe was installed and connected to a Kainga datalogger. In July 1993 data collection and processing was contracted to NIWA, Rotorua.



SITE LOCATION
Water Temperature at F.R.I

Environment Bay of Plenty
Water Temperature Summary

Date Compiled	September 2001	Site Number	2026
Compiled by	GR Ellery	Station	F.R.I.
Equipment Type	EDSC temp. probe		
NZMS 260 Reference	U16:962 333	Period of Summary	1992 to 1996

Statistical Summary

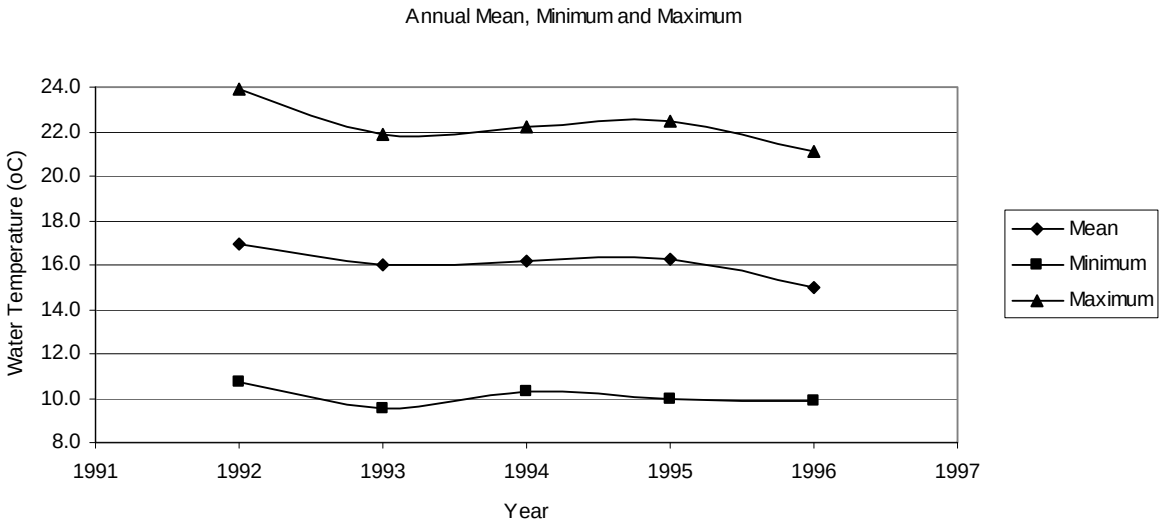
Mean Annual Water Temperature	16.1 °C	Mean Summer Water Temperature	18.9 °C
Median Water Temperature	16.1 °C	Mean Autumn Water Temperature	16.9 °C
		Mean Winter Water Temperature	13.2 °C
		Mean Spring Water Temperature	15.5 °C
Minimum Water Temperature	9.5 °C	Min. Water Temperature (Mean Annual)	10.1 °C
Maximum Water Temperature	23.9 °C	Max. Water Temperature (Mean Annual)	22.3 °C

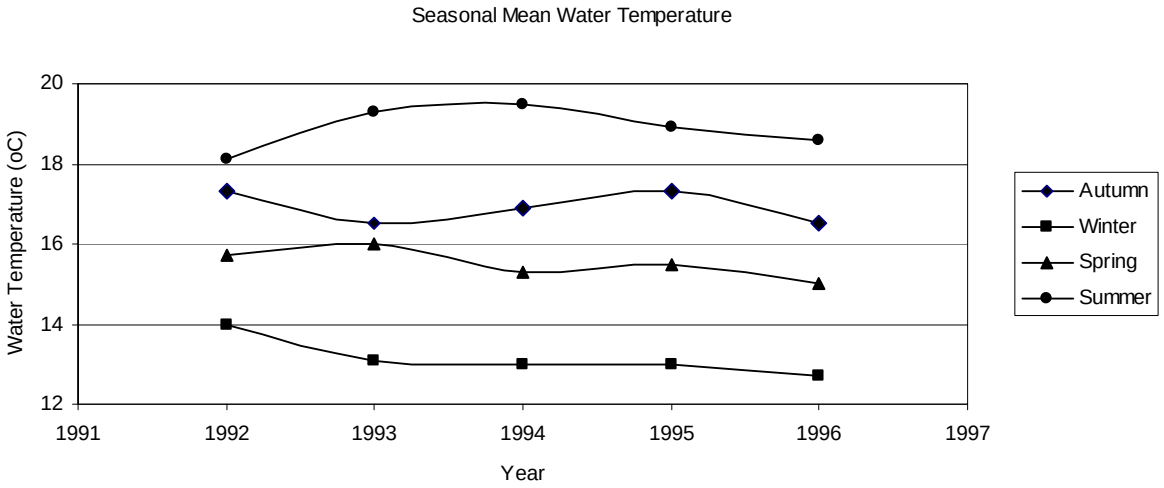
Monthly Statistics (°C)

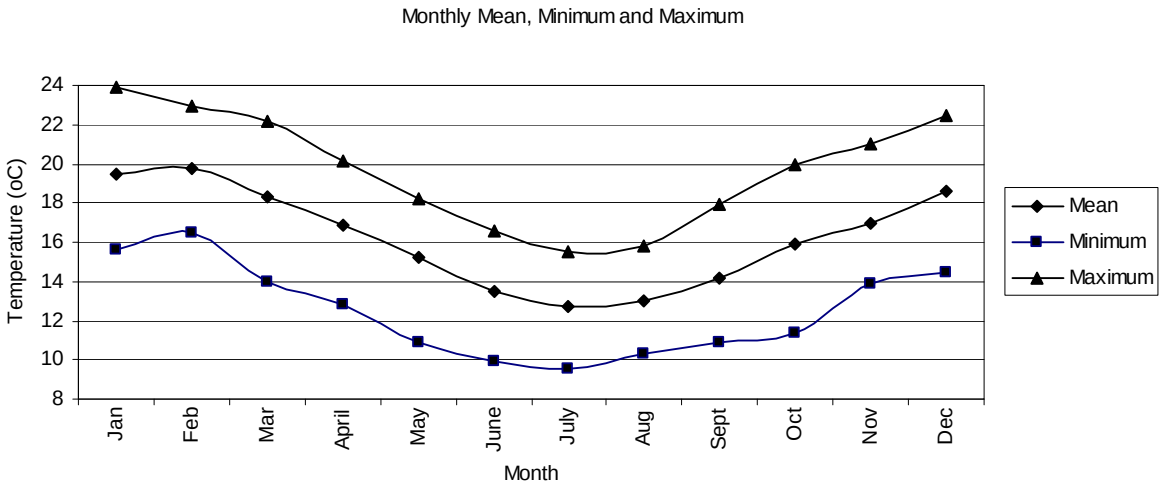
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum	15.6	16.5	14.0	12.8	10.9	9.9	9.5	10.3	10.9	11.4	13.9	14.5
Median	19.5	19.8	18.3	17.0	15.3	13.5	12.8	13.1	14.2	15.9	17.0	18.6
Maximum	23.9	22.9	22.2	20.1	18.2	16.6	15.5	15.8	17.9	20.0	21.0	22.5
Mean	19.5	19.8	18.3	16.9	15.2	13.5	12.7	13.0	14.2	15.9	17.0	18.6

Annual Summary

	Water Temperature (°C)	Extreme Water Temperature (°C)			
Year	Mean	Minimum	Date	Maximum	Date
1990					
1991					
1992	16.9	10.7	15/07/1992	23.9	11/01/1992
1993	16.0	9.5	3/07/1993	21.9	14/12/1993
1994	16.2	10.3	12/08/1994	22.2	9/01/1994
1995	16.3	10.0	3/07/1995	22.5	7/12/1995
1996	14.9	9.9	19/06/1996	21.1	11/01/1996
1997					
1998					
1999					
2000					


Annual Mean, Minimum and Maximum
Water Temperature (oC)
24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
1991
1992
1993
1994
1995
1996
1997
Year
Mean
Minimum
Maximum


Seasonal Mean Water Temperature
Water Temperature (oC)
20
18
16
14
12
1991
1992
1993
1994
1995
1996
1997
Year
Autumn
Winter
Spring
Summer


Monthly Mean, Minimum and Maximum
Temperature (oC)
24
22
20
18
16
14
12
10
8
Jan
Feb
Mar
April
May
June
July
Aug
Sept
Oct
Nov
Dec
Month
Mean
Minimum
Maximum