



Auckland Metropolitan Drought Management Plan

February 2020




Document Control

Document Responsibility

Requests for change to this document are to be submitted to the Water Resources Manager and recommended by the Head of Water Value. All changes are to be approved by the Chief Operations Officer, Chief Corporate Affairs Officer and Chief Customer Officer prior to release.

Recommended for Issue

Title	Signature	Date
Head of water value		24/2/2020

Authorised for Release

Title	Signature	Date
Chief operations officer		24/2/2020
Chief customer officer		24/2/2020
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Distribution

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Water resources manager	v1.0
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Head of production	v1.0
Head of service delivery	v1.0
Head of risk and resilience	v1.0

Amendment Register

Version	Description of Changes	Changed By	Date
V1.0	Updated water savings Reworded and shortened plan significantly	Roseline Klein Head of water value	15/02/2020

V1.1	Updated Figure 1 Drought response trigger levels with current water demand for increased accuracy (no signatures required)	Roseline Klein Head of water value	23/04/2020
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Executive Summary

For Watercare, a hydrological drought declared in Auckland qualifies as an incident. It is to be managed following Watercare's Incident Management Plan (IMP). This Drought Management Plan (DMP) complements the IMP by providing the approach and restrictions for Watercare to trigger in case of a drought, leading to the need to conserve water resources and work with customers effectively towards this outcome. Auckland Council retains the legislative powers to impose bylaws necessary to enact restrictions on water use and trigger the implementation of the plan.

This DMP focuses primarily on Watercare's Auckland metropolitan area. The metropolitan area covers most of the region, sourcing its water from the Waitakere ranges and Hunua ranges dams, the Onehunga aquifer and the Waikato river. Non-metropolitan areas that use groundwater or springs for their water supply are not included in this DMP because they have been assessed and found to be independent of short-term climate variability. Those sources provide water to Helensville, Warkworth, Snells-Algies, Muriwai, Bombay and Waiuku. Watercare's current run of river takes in the Rodney region, mainly the Hoteo river supplying Wellsford, are not typically restricted during periods of low river flow. However, trigger points and actions have been developed to ensure supply in extreme events or during the enactment of regulatory constraints. These are documented in separate DMPs for those supplies.

Reviews of practices and principles internationally and nationally were used to identify appropriate restrictions for Auckland which, if implemented individually or together could deliver meaningful savings to conserve water resources.

Three levels of water restrictions have been defined for the following categories:

- Residential, commercial and public lawns and gardens (including garden centres)
- Playing fields (e.g. golf courses, hockey turfs, bowling greens)
- Fountains and water features
- Hard surfaces
- Vehicle and boat washing
- Building and window washing
- Swimming pools, spas, and recreation
- Tanker supplies
- Construction and renovation
- Large users - Industrial and commercial customers
- Agricultural and horticultural users

Overall savings estimates are:

- Level 1 restrictions: winter 0-3%, summer 5-10%
- Level 2 restrictions: winter 3-5%, summer 10-16%
- Level 3 restrictions: winter 12-25%, summer 24-30%

The response to a hydrological drought within Watercare involves Operations (definition of a drought for the Auckland Metropolitan region), Customer (options available to mitigate the impacts of the drought) and Communications (communication of the mitigation options). This document is subject to ongoing reviews to determine the most efficient way to response to droughts.

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1. Glossary

The following table provides explanations of terms and abbreviations used specifically in this Drought Management Plan. Please also refer to the definition of terms section in the Incident Management Plan (IMP) for other common terms used in this document. The IMP can be found on the Watercare Intranet.

Table 1: Definition of Terms

Critical Customers	Customers, such as dialysis patients, who rely on water availability more than most.
Key and strategic Customers	Strategic customers, such as hospitals, retirement villages and schools, who rely on water availability. Key customers are our highest use customers.
Hydrological drought	A shortage in rainfall that has caused or threatens to cause a deficiency in water supply that may lead to an imbalance between supply and demand. This is not to be confused with an agricultural drought, declared when the soil moisture availability to plants has dropped to such a level that it adversely affects the crop yield.
Incident Management Plan (IMP)	The IMP has been designed to assist Watercare Services Limited (Watercare) respond to any event, which has potential to negatively impact achievement of Watercare's operational and strategic objectives. This Incident Management Plan (IMP) sets out responsibilities and give guidance for matters to consider in an Incident. This plan helps avoid confusion and wasted effort and is designed to guide management in the planning of responses.
Incident management team (IMT)	The IMT will be responsible for managing the response, recovery and resumption phases of Level 2 and 3 incidents. Core responsibilities include: <ul style="list-style-type: none"> • Taking actions to assume control of any situation • Providing leadership during incidents • Evaluating the extent and impact of the incident • Determining priorities within the organisation • Directing recovery activities • Managing resources including materials, equipment, staff and funding • Coordinating and maintaining internal and external communications • Restoring functions as quickly as possible to minimise loss or damage The roles and responsibility of the IMT are listed at Appendix 4 of the Incident Management Plan. The IMT will be scaled to address the size and complexity of the incident.
Integrated Source Management Model (ISMM)	ISMM is the tool used by the Watercare to support weekly source abstraction decision making, along with long term planning. This model is designed to ensure that Watercare operates at the lowest possible cost

	while maintaining agreed security of supply.
Mains water	Mains water is water supplied to customers directly through a metered connection to the public water reticulation system, or supplied indirectly by tankered water taken from reticulation
Recycled water	Recycled water, sometimes referred to as grey water, refers to water first used for other purposes in the laundry, kitchen or bathroom but not including toilet water. In commercial activities, recycled water also includes water used in processes such as cooling that is not contaminated by sewage or other substances likely to cause a public health risk.
Security of Supply	The metropolitan water supply system is operated to meet demand during a drought with a 1% probability of occurring (a 1:100 year drought) with 15% residual TSS without demand restrictions being implemented.
Standpipe Collection	Water is supplied to residential customers by collection from designated hydrants.
Total system storage (TSS)	The quantity of water available in the metropolitan dam sources expressed in percentage
Voluntary and Mandatory water conservation measures	<p>For the purposes of this document, voluntary water savings measures are those measures that consumers are encouraged to take to conserve the water resource prior to the implementation of restrictions.</p> <p>Mandatory measures vary according to the imposition of Stage 1 to 3 restrictions as set out in this DMP. All restrictions are mandatory and all consumers are expected to comply with those restrictions. Council may use local bylaws to “underline” the mandatory nature of, and to enforce compliance with, the restrictions imposed at any particular stage.</p>

2. Droughts and trigger levels

2.1 Auckland's Drought Management Standards

A drought is considered to be a shortage of rain that has caused, or threatens to cause, a deficiency in water supplies that may lead to an imbalance between supply and demand. A shortage of rainfall will typically lead to low river flows, low replenishment of surface water reservoirs and slower recharge to groundwater resources. Each drought is different in duration, severity and the area over which its effects are felt. It is not considered appropriate to plan for a drought based solely on historic events since this assumes that future droughts will be a repetition of previous droughts.

The Auckland Metropolitan Region has adopted a 1:100 year drought security standard having a 15% residual capacity in the storage lakes during normal demand. This means that based on hydrological records, the total lake storage will be drawn down to 15% once in 100 years on average over the long term. This will happen in the case where no restrictions are implemented and normal operational abstraction decisions are made. However, this does not negate the need to have a DMP and restrictions on water use during droughts to ensure supply during conditions worse than the design standard.

Auckland's Metropolitan water supply lakes have a total combined capacity that equates to approximately 220 days of usage as of 2019. This relatively small storage capacity relates to the historic reliability of rainfall in the storage catchments. Factors such as climate change, the effects of El Niño/La Niña events, and positive Southern Annular Mode, can affect Auckland's climate, resulting in more severe droughts than those that 'normal operations' can sustain.

For the Metropolitan region, only the abstraction from the Waikato River has been assessed as reliable enough to be described as independent of short-term climate variability. However, this source is not the sole source of water for Auckland due to constraints from consented maximum take, potential low river flow restrictions, and infrastructure on site. Therefore it is important that sources that are affected by climate variability be managed prudently, to ensure that there are no significant risks of adverse public health effects, due to the lack of water for basic sanitary requirements in an event that is worse than 1:100 year drought.

Watercare utilises the Integrated Source Management Model (ISMM) to make abstraction decisions from the various sources that make up Watercare's conjunctive supply system for the Auckland Metropolitan Area.

In respect to cost, ISMM optimises the abstraction decisions by balancing the risk of shortfall for the cheaper stored water sources against the cost of more expensive non-storage sources. ISMM does this by assigning a value to risk. For normal operations this is calibrated to ensure that Watercare meets its drought standard of 1 in 100 years to 15% residual storage.

The abstraction guidance is reviewed weekly to adjust for operational constraints, source water quality and climate conditions. For example, if there are on-going periods of below average rainfall, but total system storage (TSS) is above average due to a wet winter, it may be decided to proactively reduce the risk profile and use more non-storage sources. During a drought, the frequency of monitoring of TSS and reporting increases so that appropriate management decisions can be made in a timely manner.

2.2 Target Trigger Levels

Watercare has a drought warning system in place for its bulk water storage system as shown in Figure 1. below. The combined total system storage level for its metropolitan supply lakes is routinely monitored on a weekly basis against the trigger levels and potential shortfall risk, as calculated by ISMM.

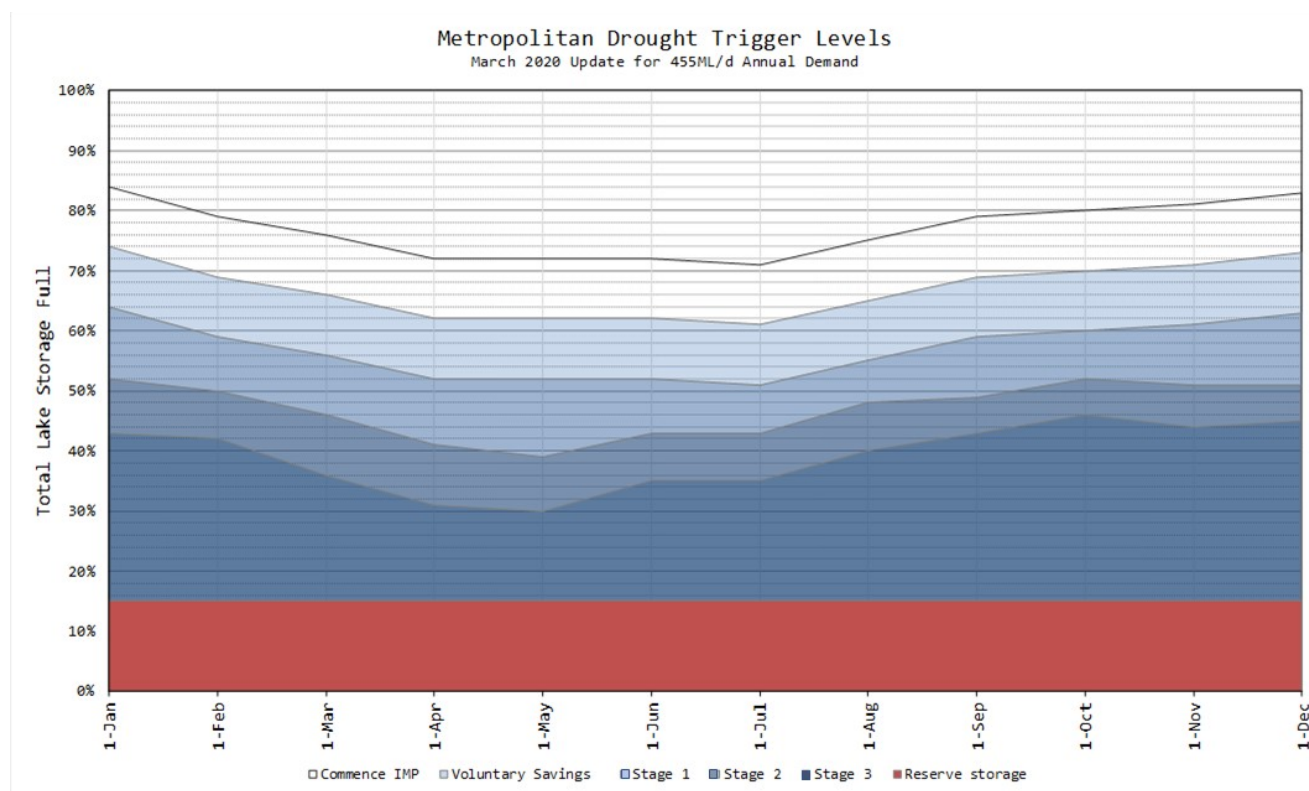


Figure 1: Drought Response Trigger Levels

Trigger levels for Watercare have been developed based on total system storage for the Auckland metropolitan region. These levels are based on the reduction in demand required to ensure there is no system failure due to shortage of water.

A number of assumptions were made in the calculation of these trigger levels. These include:

- Increased dry weather demand, including increase demand for tankered water for non-reticulated domestic use
- The Waikato Water Treatment Plant follows historic reliability of 90%
- Abstraction from the Waikato River is restricted by 15% during low river flows in line with Waikato Regional Council Regional Plan Variation during summer/autumn historic low flow periods
- Onehunga dry summer availability of 12,000m³/d (based on 2010 & 2013 experience)
- 2-6 weeks lead time to achieve savings
- Current maximum outputs of storage lakes & WTPs

These trigger levels cannot be over-prescriptive, as the decision as to whether or not to introduce various measures depends on the hydrological situation and weather forecast at the time, as well as the potential implications that the hydrological situation may have on the supply-demand balance.

The notional savings required at each trigger level are summarised in the table below.

Table 2: Phases of Drought Management

Phases of Drought Management			
Phase	Risk of Shortfall	Restrictions	Savings required*
Commence IMP	Not significant	Operational	0%
Commence voluntary Savings	Minor	Voluntary	0% to 5%
Stage 1 trigger	Minor	Mild	5%
Stage 2 trigger	Medium	Medium	10%
Stage 3 trigger	Major	High	15%
15% Residual Storage	Extreme	Critical	>20%

* expressed as % of projected monthly demand, in summer

The consequences of not achieving the desired savings during a water crisis are that:

- The water supply could run out, resulting in significant risks of adverse public health effects, such as those caused by the lack of water for basic sanitary requirements.
- Many businesses could cease to operate, creating adverse economic effects for the community and individual workers.

This plan is not intended to cover localised areas within the Auckland region where demand requires management following an incident to the local reticulation, but this does not preclude the procedures contained within this plan being used to manage localised events, or any regional event that requires a significant reduction in water supply consumption other than drought.

3. Incident management

3.1 Incident Management Plan (IMP)

This document has been designed to assist Watercare Services Limited (Watercare) respond to any event, which has potential to negatively impact achievement of Watercare's operational and strategic objectives including the management of water shortages and droughts. A drought is considered to be a 'non-normal' situation and will follow the process outlined within the IMP for escalation of an event. It is assumed that the readers of this DMP are familiar with the IMP.

A drought response can be categorised into phases of seriousness, each requiring actions to be taken that will ensure reductions in water use by the community. Reductions in use will be effected through the voluntary or mandatory savings detailed in this plan, once certain trigger levels have been reached. Mandatory savings are classified into three stages.

A Level 2 incident will be declared by Watercare once system storage has reached the first alert level (Commence IMP). At this point Watercare will increase situational monitoring and forecasting which may indicate that the event is worsening, a communications campaign for voluntary savings is to be under taken.

If drought conditions persist, the drought response will increase to mandatory restrictions; these restrictions will be staged in 3 levels. The ability to enact the necessary by-laws required for mandatory restrictions rests with the Auckland Council, with Watercare to recommend the necessary restrictions. At this point a level 3 incident will be declared in line with the IMP.

As each stage of restrictions is reached, planning is to be underway in preparation of reaching the next level of restrictions.

The decision to move from voluntary management to mandatory management is not a step which should be taken lightly. No mandatory measure will achieve the required savings unless the public support the measure. The risk of losing the good will and support of the public, by the imposition of mandatory measures, should be carefully considered. Therefore, mandatory measures will only be introduced if it has not been possible to achieve the required level of savings by voluntary means.

3.2 Objectives of the DMP

The purpose of this plan is to ensure a timely, customer centric and effective short-term response to the occurrence of water shortages, with the aim of minimising the impacts (social, economic, and environmental) of such shortages.

There are two components involved in securing an adequate water supply in times of drought:

- The provision of an adequate supply system to satisfy current and future demands over a range of climatic conditions ensuring that the risk of shortfalls in supply are within 'acceptable' levels.
- The specification of actions required when shortfalls in water supply occur as a result of drought.

The first component represents long term planning actions that determine the level of infrastructure development required to satisfy specified standards of supply.

The second component relates to management actions that are required to minimize the impacts of shortfalls in supply; the purpose of this plan. The DMP complements the long-term planning process where the short term response needs to be based on a good understanding of the longer term security of supply (i.e. knowledge of the likely frequency and severity of drought restrictions).

DMP objectives include:

- Provide timely warning of any water shortages which might occur during future drought events and to be prepared to deal with such shortages when they occur.
- Develop and implement an appropriate action plan to respond to water shortages.
- Identify all the necessary steps that need to be taken through a drought, including identifying clear trigger variables to instigate actions.
- Provide a basis for regular reviews of the plan as the system develops and information becomes available.
- Give direction for reviewing the plan during and following a drought; where its performance can be evaluated.
- Provide clear indicators to ensure that a reliable assessment of drought status is available.
- Ensure that a minimum supply is always provided (Note: AS/NZS 3500 stipulates adequate water to hygienically flush the bowl, but doesn't give a definitive quantity). The World Health Organisation recommends 70 litres per person per day to maintain sanitary requirements in the short to medium term.
- Ensure that the incident management team is aware of the stage of the drought and how severe the drought is likely to be.
- Ensure that the incident management team maintains information on current levels and patterns of demand and continually assess customer expectations in relation to desirable levels of service.

3.3 Implementation Strategy

The DMP will be implemented through the following steps:

Table 3: Sequential Plan of Action for Drought Management

Sequential Plan of Action for Drought Management	
Trigger	Action
Voluntary savings trigger level	<ul style="list-style-type: none"> Alert public to the imminent water shortages and possible need for restrictions in the future. Promote "voluntary restrictions" via media advertising campaigns to inform consumers about water conservation programs. Monitor storage volume response and perform regular forecasting of storage volume projections. Monitor flows daily and increase frequency of monitoring demands for high consumers.
Stage 1 trigger level	<ul style="list-style-type: none"> Implement Stage 1 Restrictions Introduce advertising campaign using all appropriate forms of media. Continue to monitor storage volume response and perform regular forecasting of storage volume projections. Investigate arrangements to bring available bores into service. Inform customers about possible pressure reductions and problems this may entail. Identify and plan for implementation of alternative emergency options e.g. rivers, Three Kings reservoir. Start to engage with Council to reduce Environmental Releases from reservoirs.
Stage 2 trigger level	<ul style="list-style-type: none"> Implement Stage 2 Restrictions Continue media advertising. Continue to monitor storage volume response and perform regular forecasting of storage volume projections. Highlight, where feasible, unusually high use on customers' bills. Lower the water supply system pressures, where feasible, to reduce water use.
Stage 3 trigger level	<ul style="list-style-type: none"> Implement Stage 3 Restrictions Continue media advertising. Continue to monitor storage volume response and perform regular forecasting of storage volume projections. Bring into service alternative emergency options e.g. rivers, Three Kings reservoir. Bring any available bore pumping infrastructure into service.
Implement other emergency supply options.	<ul style="list-style-type: none"> Implement other emergency supply options. Continue media advertising. Continue to monitor storage volume response and perform regular forecasting of storage volume projections.

This DMP has been prepared on the basis of full participation and support of the public.

3.4 Legal powers to invoke the DMP

With the establishment of the Auckland Council under the Local Government (Auckland Council) Act 2009, Council retains the sole ability to pass bylaws in respect to water supply. Traditionally drought events are managed through passing bylaws that restrict the use of water and a state of drought can also be enacted under the Civil Defence Emergency Management (CDEM) Act 2002, which recognises the importance of lifeline utilities, such as water, to the well-being of society.

3.5 Plan review and updates

This DMP shall be reviewed and updated every 24 months or as required, and after any event that requires all or parts of the DMP to be used. The DMP shall also be reviewed and updated every time the IMP is reviewed or updated.

Watercare's Water resources manager shall ensure that both the controlled hard copy document and the controlled intranet copy are updated upon approval of additions and alterations.

4. Water savings and restrictions

4.1 Rationale for restrictions

Residential, commercial and public lawns and gardens including garden centres

- These are external uses that are visible and can therefore be monitored (by the public, Watercare, aerial imagery etc), are non-essential, and high water use activities. Includes garden centres.

Playing fields (e.g. golf courses, hockey turfs, bowling greens)

- These are external uses that are visible and can therefore be monitored, contain non-essential components of use and are high water use activities. 7pm to 7am watering is proposed to minimise losses and to minimise the visibility of the activity.
- Sportfields provide a public good and there are health and safety concerns for people and animals (horse racing, polo) related to playing on hard surfaces. The intention is to maintain these benefits as long as possible. Applies equally to public and private sports facilities.

Fountains and water features

- These are external uses that are visible and can therefore be monitored, contain non-essential components of use and can be high water use activities.
- Turning off public fountains adds visibility and consistency to water conservation messages.
- Maintain environmental protection to ecosystems throughout a drought when they are stressed.

Hard surfaces

- These are external uses that are visible and can therefore be monitored, are non-essential uses and are high water use activities. Note that high pressure water blasters are typically highly water efficient.

Vehicle and boat washing

- These are external uses that are visible and can therefore be monitored, contain non-essential components of use and are high water use activities. Covers all form of vehicle (planes, trains, cars, buses, scooters, trailers, boats).
- Boat motor flushing is permitted at levels 1 and 2, to enable recreational use consistent with the restrictions on playing field watering. Watercare should seek to make non-potable sources available as soon as possible.
- Some car wash facilities do not use recycling systems. Whilst there will be a commercial impact on these operators, these rules will encourage them to invest in recycling systems, with a long term water reduction benefit. Note that there may be a financial impact on valet cleaning businesses from Level 2.

Building and window washing

- These are external uses that are visible and can therefore be monitored, are largely non-essential uses and can be high water use activities.

Swimming pools, spas, and recreation

- These are uses that are recorded on Council files and can therefore be monitored, contain non-essential components of use and can be high water use activities.
- Many utilities permit filling of paddling and temporary pools. These are high water use activities, and Aucklanders have access to free or cheap municipal pools and the sea so it is proposed that these activities are not permitted.

Tanker supplies

- Customers receiving water from tankers are subject to the same restrictions as Watercare's customers.
- Tankers provide water for essential uses and need to continue to supply.
- The Warkworth and Waiuku supplies are drought resistant and may continue to support communities outside Auckland subject to limitations on Watercare's infrastructure.

Construction and renovation

- Whilst non-potable supplies may be available there may be limited tankers available to provide this.
- Construction may be interrupted in Level 3 restrictions due to limitations placed on industrial customers (large users).

Large users - Industrial and commercial customers

- Rota cuts are not normally seen within a suite of water restrictions. They are normally seen as an emergency measure. However, there is precedent in the Waikato, where industrial users are required to restrict their water takes (compared to a consented volume) before other municipal users.
- Auckland may move through each band of restriction rapidly. Beyond Level 3 will be city-wide rota cuts, pressure reduction (with associated boil water notices) and/or the use of stand pipes to distribute water. Rota cuts of industrial users are considered preferable than a city-wide state of emergency.
- We have insufficient data to determine a threshold for large users for this restriction and more work on this is required by Watercare. Note, users will not know that they are affected. Watercare will need to contact them.

Agricultural and horticultural users

- These water uses are not well understood in Auckland. Efficient irrigation can be permitted for levels 1 and 2, but irrigators should be encouraged to permanently switch to other sources.

4.2 Exemptions

Residential, commercial and public lawns and gardens including garden centres

- New turf exemption (typical in UK and Australia) designed to minimise the impact on commercial growers, landscape firms and erosion of soil. For Level 1 and 2 restrictions new turf may be watered with a sprinkler for one week after it is delivered in accordance with a new turf watering plan [Watercare needs to develop this with the industry].
- Exemptions for medical reasons (people unable to operate a trigger nozzle)
- Exemptions for garden centres in Level 3, watering with a watering can allowed.

Playing fields (e.g. golf courses, hockey turfs, bowling greens)

- Watering to enable international sporting events to proceed will be permitted subject to an approved water use plan.

Fountains and water features

- Exemptions for medical reasons (people unable to operate a trigger nozzle).

Hard surfaces

- Graffiti removal permitted in Levels 1 and 2 to protect small businesses, property and community wellbeing.

Vehicle and boat washing

- Graffiti removal permitted in Levels 1 and 2 to protect property and community wellbeing.

Building and window washing

- Water efficient cleaning devices (window cleaning systems, for example) are exempt at Level 1, to protect small businesses.
- Graffiti removal permitted in Levels 1 and 2 to protect small businesses, property and community wellbeing.

Swimming pools, spas, and recreation

- All municipal pools for Levels 1 and 2, to ensure community well-being. Existing indoor municipal and commercial pools for Level 3. Existing pools used for human or animal medical treatments.
- Certification by a Chartered Professional Engineer that a pool needs to be filled for structural or health and safety reasons.

Tanker supplies

- Water supply to areas outside of Auckland may be permitted by Watercare from stated tanker filling stations.

Construction and renovation

- Where the proposed methods for water restrictions result in health and safety or environmental impacts.

Large users - Industrial and commercial customers

- Hospitals and schools.
- Domestic users (within apartment buildings with a single metered account, for example).
- Users who can demonstrate via a detailed water use plan that they will save more water than they would on the proposed rota cut schedule.

Agricultural and horticultural users

- Domestic use on agricultural and horticultural premises.
- Water use for animal drinking water. Some use for animal husbandry and wellbeing may also be exempt subject to an efficient water use plan.

4.3 Restrictions in three levels

Level of restriction	Residential, commercial and public lawns and gardens (including garden centres)	Playing fields (e.g. golf courses, hockey turfs, bowling greens)	Fountains and water features	Hard surfaces	Vehicle and boat washing	Building and window washing	Swimming pools, spas, and recreation	Tanker supplies	Construction and renovation	Large users - Industrial and commercial customers	Agricultural and horticultural users
Level 1 Expected savings: winter 0-3% summer 5-10%	- Watering permitted only as required using a hand held hose with a trigger nozzle, watering can or bucket, or an irrigation system with an automated weather adjustment, rain sensor or soil moisture sensor. - New turf may be watered for one week after it is delivered.	- Watering of sports fields and playing fields including artificial turf is permitted only as required, using a hand held hose with a trigger nozzle, watering can or bucket, or an irrigation system automated with a weather adjustment, rain sensor or soil moisture sensor. - Limited to between 7pm and 7am to minimise evaporative losses.	A hand held hose, bucket or watering can may be used to fill or top up fountains or water features if the fountain or water feature recirculates water; ponds or lakes supporting aquatic fauna or birdlife; and new ponds or lakes.	Cleaning of hardstanding (paths, roads, patios, decks etc.) or outdoor artificial surfaces is not permitted except spot cleaning for health and safety or biosecurity purposes with a high pressure water blaster or water from a bucket.	- May be washed using a bucket and hand held hose for rinsing, a high pressure cleaning unit, or at a commercial car or boat wash facility using a water recycling system. - Boat motor flushing is permitted only if a non-potable water source is not available.	- Cleaning only permitted with a bucket and hose with a trigger nozzle for rinsing, or a high pressure cleaning unit. - Graffiti removal permitted.	- Top up of existing pool or spa to replace water lost is authorised using a hand held hosepipe, bucket or watering can only. - Fill of new or renovated pool or spa pool (volume >500l) allowed only if permanent cover to reduce evaporation. - Paddling or temporary pools (holding less than 2,000l) may not be filled. - Water toys or water play using a hosepipe are not permitted.	- Tankers supplying the wider Auckland region only (refer exemptions) are permitted to fill from the Watercare system. - Customers receiving water from tankers are subject to the same restrictions as Watercare's customers.	- Replace potable water with non-potable sources wherever practicable. - No unattended hosepipes in site at any time. - Potable water may only be used to suppress dust if no other alternative source is available and in any case only by means of a hand-held hose with a trigger nozzle, watering can or a purpose built water tanker. - All potable water use (including dust suppression) is limited to health and safety; environmental protection reasons as required by resource consent conditions; or construction equipment requiring water for safe operation;	- Replace potable water with non-potable sources wherever practicable. - Subject to the same restrictions on use as all other customers.	- Replace potable water with non-potable sources wherever possible. - Irrigation watering permitted only as required using a hand held hose with a trigger nozzle, watering can or bucket, or an irrigation system with an automated weather adjustment, rain sensor or soil moisture sensor.

Level of restriction	Residential, commercial and public lawns and gardens (including garden centres)	Playing fields (e.g. golf courses, hockey turfs, bowling greens)	Fountains and water features	Hard surfaces	Vehicle and boat washing	Building and window washing	Swimming pools, spas, and recreation	Tanker supplies	Construction and renovation	Large users - Industrial and commercial customers	Agricultural and horticultural users
<p>Level 2</p> <p>Expected savings: winter 3-5% summer 10-16%</p>	<ul style="list-style-type: none"> - No lawn watering. - Garden watering permitted only as required using a hand held hose with a trigger nozzle, watering can or bucket, or a drip or trickle irrigation system with an automated weather adjustment, rain sensor, soil moisture sensor. - New turf may be watered for one week after it is delivered. 	<ul style="list-style-type: none"> - Watering of sports fields and playing fields limited to watering of the active strip / playing area only, as required using a hand held hose with a trigger nozzle, watering can or bucket, or a drip or trickle irrigation system with an automated weather adjustment, rain sensor, soil moisture sensor. - Limited to between 7pm and 7am to minimise evaporative losses. 	<ul style="list-style-type: none"> - A hand held hose, bucket or watering can may be used to top up existing ponds or lakes supporting aquatic fauna or birdlife. - Water cannot be used to fill or top up fountains and water features or new ponds or lakes. 	<p>Cleaning of hardstanding (paths, roads, patios, decks etc.) or outdoor artificial surfaces is not permitted except spot cleaning for health and safety or biosecurity purposes with a high pressure water blaster or water from a bucket.</p>	<ul style="list-style-type: none"> - Only clean for health and safety or biosecurity reasons. - A bucket and hand held hose may be used for rinsing or a high pressure cleaning unit used to wash the windows, mirrors, lights, registration plates and carry out spot removal of corrosive substances. - Use of a car or boat wash facility with an efficient water recycling system is permitted. - Boat motor flushing is permitted only if a non-potable water source is not available. 	<ul style="list-style-type: none"> - Cleaning only allowed with a bucket and hose with a trigger nozzle for rinsing, or a high pressure cleaning unit and only for health and safety, accident and emergency reasons. - Graffiti removal permitted. 	<ul style="list-style-type: none"> - Top up of an existing covered pool or spa which has a permanent cover is allowed using a bucket or watering can. - Pools and spas without covers may only be topped up if an engineer certifies that this is required for structural or health and safety reasons. - Newly constructed and not previously filled pool, or renovated pool of any size may not be filled. - Paddling or temporary pools (holding less than 2,000l) may not be filled. - Water toys or water play using a hosepipe are not permitted. 	<ul style="list-style-type: none"> - Limited to approved filling stations. - Tankers supplying the wider Auckland region for essential uses only are permitted to fill from the Watercare system. - Customers receiving water from tankers are subject to the same restrictions as Watercare's customers. 	<ul style="list-style-type: none"> - Replace potable water with non-potable sources wherever practicable. - No unattended hosepipes in site at any time. - Potable water may only be used to suppress dust if no other alternative source is available and in any case only by means of a hand-held hose with a trigger nozzle, watering can or a purpose built water tanker. - All potable water use (including dust suppression) is limited to health and safety; environmental protection reasons as required by resource consent conditions; or construction equipment requiring water for safe operation. 	<ul style="list-style-type: none"> - Replace potable water with non-potable sources wherever practicable. - Subject to the same restrictions on use as all other customers. 	<ul style="list-style-type: none"> - Replace potable water with non-potable sources wherever possible. - Watering permitted only as required using a hand held hose with a trigger nozzle, watering can or bucket, or an irrigation system with an automated weather adjustment, rain sensor or soil moisture sensor.

Level of restriction	Residential, commercial and public lawns and gardens (including garden centres)	Playing fields (e.g. golf courses, hockey turfs, bowling greens)	Fountains and water features	Hard surfaces	Vehicle and boat washing	Building and window washing	Swimming pools, spas, and recreation	Tanker supplies	Construction and renovation	Large users - Industrial and commercial customers	Agricultural and horticultural users
Level 3 Expected savings: winter 12-25% summer 24-30%	No lawn or garden watering is permitted.	No watering of sports fields or playing fields is permitted.	<ul style="list-style-type: none"> - A hand held hose, bucket or watering can may be used to top up existing ponds or lakes supporting aquatic fauna or birdlife. - Water cannot be used to fill or top up fountains and water features or new ponds or lakes. 	Cleaning of hardstanding (paths, roads, patios, decks etc.) or outdoor artificial surfaces is not permitted except spot cleaning for health and safety or biosecurity purposes with a high pressure water blaster or water from a bucket.	<ul style="list-style-type: none"> - Cleaning limited to windows, mirrors, lights and registration plates and spot cleaning for removing corrosive substances. - Boat motor flushing is permitted only using non-potable water sources. 	Cleaning only allowed with a bucket and hose with a trigger nozzle for rinsing, or a high pressure cleaning unit and only for health and safety, accident and emergency reasons.	<ul style="list-style-type: none"> - Top up an existing covered pool or spa which has a permanent cover allowed using a bucket or watering can only. - Pools and spas without covers may only be topped up if an engineer certifies that this is required for structural or health and safety reasons. - Newly constructed and not previously filled pool, or renovated pool, of any size, may not be filled. - Paddling or temporary pools (holding less than 2,000l) may not be filled. - Water toys or water play using a hosepipe are not permitted. 	<ul style="list-style-type: none"> - Limited to approved filling stations. - Tankers supplying the wider Auckland region for essential uses only are permitted to fill from the Watercare system. - The volume delivered to each property will be limited to the Auckland average per capita consumption per household resident. A reasonable allowance for animal drinking water is also permitted. - Customers receiving water from tankers are subject to the same restrictions as Watercare's customers. 	As for Levels 1 and 2 but an efficient water use plan is required for testing and flushing.	<ul style="list-style-type: none"> - Rota cuts (days when customers cannot use water) will be imposed and monitored. - All large users will be prohibited from using water one or more days per week. 	No potable water use allowed other than for domestic use and animal drinking water.

No unattended hosepipes for any purpose once restrictions are imposed.

These restrictions also apply to the use of water from cisterns and tanks filled from the municipal supply.

Whilst limited time of day restrictions are proposed, promoting watering when evaporation is limited should be recommended and could be required.

Rainwater and recycled water may be used for any purpose at any time, unless the rainwater tank is topped up or filled using the municipal water supply.

Consider defining essential uses from water tanks: as for human health requirements, watering of stock and animals, firefighting unless a non-potable source is available, for the safety, but not the cleaning, of vehicles and equipment, and for cleaning required as a result of an accident, fire, health hazard, safety hazard or other emergency (in accordance with the permitted methods and unless a non-potable source is available).

Vehicles includes all types of vehicle; cars, trucks, buses, rolling stock, trailers and boats.

Graffiti removal permitted in Levels 1 and 2.

5. Customer segmentation

5.1 Health Considerations (Health and Safety)

5.1.1 Critical Customers

When water supplies are extremely limited, stringent measures will be required to minimise the adverse effects on health. Critical customers need to be prioritised and may be supplied with tanker water – this can be in the form of mini tankers.

Critical customers include:

- Dialysis patients – list supplied by Auckland Regional Public Health Service (ARPHS)
- Hospitals
- Schools
- Private hospitals/Rest homes
- Fire service

5.1.2 General Public Health

The most likely adverse health outcome related to water restrictions would be an increase in the incidence of food and waterborne diseases. An increase in fire risk would also apply due to possible reductions in pressure.

These health effects would not be because the water is unfit to drink, but possibly due to inappropriate measures being undertaken by customers, particularly relating to a limited general understanding of food and water hygiene. Likely problems are:

- Use of non-potable water for drinking, cooking, food preparation and dishwashing. This includes inappropriate use of roof-collected rainwater;
- Relaxation of frequency and adequacy of hand washing;
- Excessive conservation measures voluntarily being taken.

It is envisaged that control of these issues will be achieved primarily by education, with emphasis on groups such as the elderly and schools, and in commercial premises by monitoring. The incident management team shall ensure that consumers are advised on health related issues.

Mitigation measures may include:

- Assisting in intensive public education on differentiating between potable and non-potable water in respect to use and storage;
- Assisting in intensive public education on the maintenance of hygiene when water is scarce.

5.2 Water Savings

5.2.1 Specific Commercial/Industrial users - Voluntary Savings

The incident management team might consider targeting specific commercial/industrial water users in an education programme of voluntary savings. The education programme might be part of the unified communications campaign. Tips for water saving measures would target specific users such as:

- Commercial Car Washing facilities.
- Commercial Kitchens / Restaurants & Hotels/Motels (dishwashers)
- Laundries/Laundromats
- Commercial Swimming pools/spas
- Industrial process washing and rinsing

5.2.2 Council Self-Imposed Restrictions

Public cooperation with voluntary savings will have a greater chance of success if Watercare and Auckland Council lead by example. The Auckland Council should consider directing staff to make an immediate reduction in water use at city facilities. Such measures might include:

- Landscape irrigation reduced, including park and golf course irrigation.
- Leak detection and repair program augmented (start with water audits on Council buildings, then target top 100 water users).
- Ornamental fountains turned off.
- Reduced cleaning of vehicles and facilities.
- Reduced flushing of streets, sewers, and storm drains.
- Restricting use of fire hydrants except for fire fighting.

5.2.3 Engaging the Services of Other City Agencies

The incident management team might also consider consultation with other City Agencies to encourage their support. Considerations might include:

- Police Department - Assist in closing illegally opened hydrants.
- Housing Authorities - Request plumbing leak surveys.
- Auckland Transport - Request fleet washing cutback.
- Ministry of Education - Initiate student water conservation education program.

5.2.4 Encouraging Commercial/Industrial Cooperation

The voluntary stage of water savings is a good time to encourage cooperation from major commercial and industrial users of water. The incident management team might consider ways of approaching these major users to encourage them to prepare a water consumption reduction plan, enabling each to reduce its water in stages based upon its average water consumption during the previous calendar year.

5.2.5 Implementation of Restrictions

If all of the council's efforts in using the voluntary management options outlined previously consistently fail to reduce demand, and storage levels and inflows are trending below the target, then mandatory management options will need to be introduced. Forward looking projections of storage response are an integral part of short term planning during a drought. Projections assist to anticipate the "likely" response based on current climatic conditions.

5.2.6 Mandatory Savings Measures

Restrictions generally apply to all properties connected to municipal water reticulation, almost all of which will be connected to a public sewerage system. It also applies to anyone taking water from the water reticulation system, such as tanker operators taking water for self-serviced properties, construction activities, etc.

In situations where public health and/or safety are potentially at risk, including firefighting, restrictions will not apply.

Use of recycled water and water from other private sources, such as rainwater tanks, is not under the control of local government bodies and will therefore not be restricted. Wherever recycled water or water from private sources is used, approved signage has to be displayed by those users.

During any event, the restrictions will need to be reviewed, confirmed, added to or modified over time based on the effectiveness in bringing about reductions in water consumption.

It should be noted that Stage 4 restrictions are regarded as an emergency situation and should be viewed as a last resort to be avoided at almost all costs owing to the deleterious effects that they could have on public health and safety and on the economy.

5.2.7 Water Tanks

The use of water from water storage tanks is unrestricted as long as the tank is not also connected to mains supply (some water tanks have the option of topping up with mains water when the water level in the tank gets too low – in these cases, water usage restrictions shall apply). However, levels 2 and 3 ask of households on rainwater tanks not connected to the network to follow the same restrictions as households solely supplied by the network.

5.2.8 Water Supply Augmentation – contingency plan

Alternative water supplies need to be considered and the list of alternative sources should be reviewed and updated as required.

5.2.9 Standpipes

Should the drought worsen and total storage reach the 15% reserve storage level, then the following steps will be used to effect standpipe collection:

- Standpipes will be installed on critical mains and will be located near public places;
- The public shall be notified of the location of standpipe facilities on the isolated distribution mains.
- All users of dialysis and other medical equipment dependent on the water supply shall be notified and systems put in place for alternate methods of a consistent potable water supply.

5.2.10 Policing

During the droughts in Australia, 2003-2010, it was found that for outdoor use, neighbours police each other and report transgressions. This may be followed up by visits from Council representatives and eventually the issuing of fines.

For indoor use policing may not be possible except through inspection of water bills to assess total average use per household. High use households may be visited by Council/Watercare staff to advise occupants on how to save water. This may not be practical unless more frequent water meter readings are implemented to replace the normal schedule.

6. Communications

The primary purpose of a communications campaign is to give consumers ownership of the situation and the appropriate solutions so that they can contribute to achieving the desired savings. Savings through imposing restrictions will only work if the community is aware of them and implement them. The responsibilities of the Communications Group are covered in the IMP and will include the following:

- **Key Authorities and Groups**

It will be necessary to conduct and record discussions between the key public authorities and groups from the early stages of drought prediction through until the final response stages

- **Key and strategic Customers**

Ensure key and strategic customers are identified and their requirements fully documented, so they are protected in the event of a drought. Strategic and key customers are those more affected than most others by a reduction in the quality and/or quantity of water, including:

- residential customers such as dialysis patients;
- commercial customers including hospitals, mortuaries, hotels etc., where the continuous supply of water is critical to their normal operations and where those operations have a direct interest in maintaining a healthy community;
- commercial and industrial customers who normally would consume significant quantities of water and would be expected to make considerable changes to their normal activities in order to achieve the desired savings (this group often needs more time to prepare).

- **The public**, to ensure that they:

- take ownership of water savings;
- are informed of the drought situation;
- know what they are required to do following the introduction of any restrictions included in this plan; and
- know how to reduce water use.

7. Recovery, Close-out and review

The incident management team will decide when steps can be taken to alleviate consumer consumption restriction. Alleviation will take place in accordance with total system storage reaching the trigger levels in

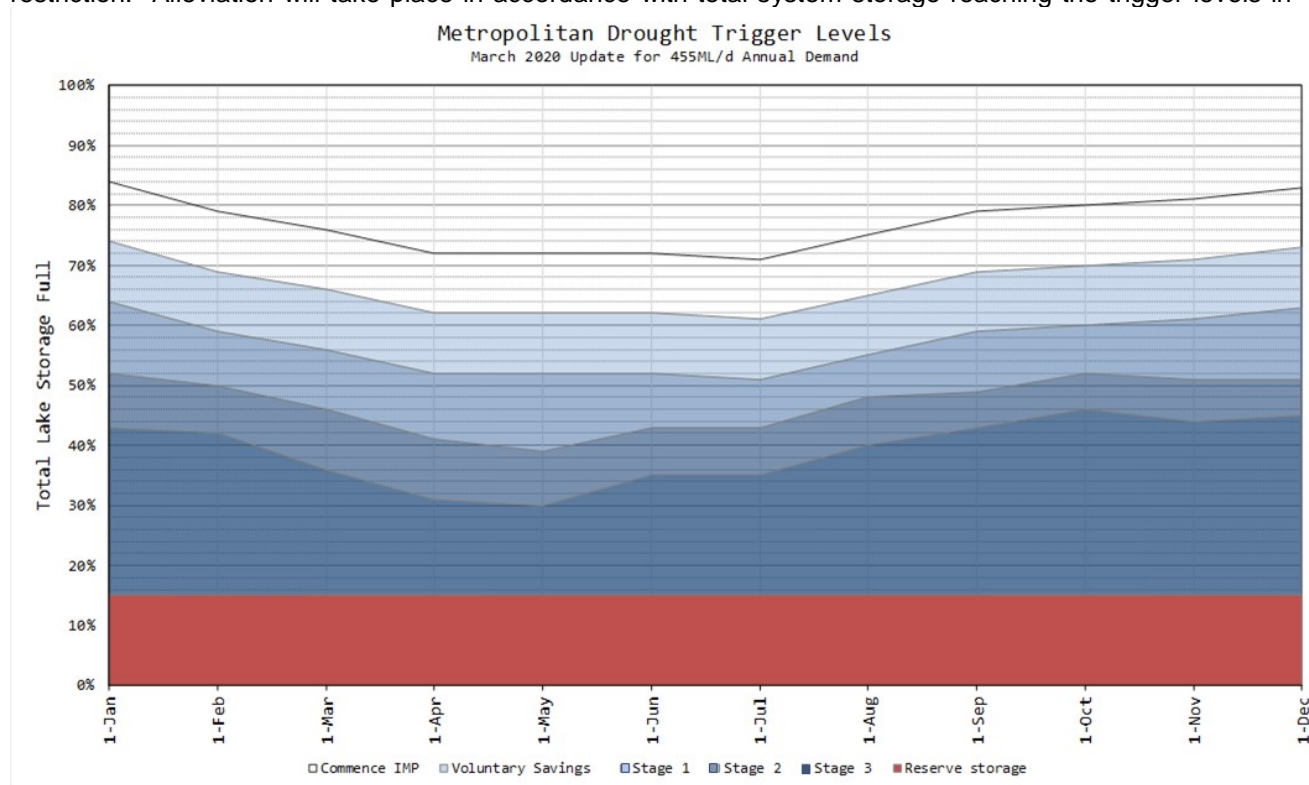


Figure 1: Drought Response Trigger Levels.

The introduction and removal of water restrictions is an exercise in public relations, and it is important to minimise the frequency (where practicable) in which restrictions are introduced and removed so that the messages sent to the community are clear and do not become confused. Therefore, the key issues to be evaluated when removing restrictions include:

- the time of year and therefore the effectiveness of removing restrictions;
- the short term climatic outlook;
- community acceptance of restrictions; and
- the likelihood that restrictions will have to be reintroduced over the subsequent months.

A risk based approach is preferred when evaluating whether to remove restrictions, with the likelihood of having to re-introduce restrictions over a pre-defined short term period being the key performance measure.

When the end to the drought event is declared by the incident management team, a full debrief will be conducted to review the overall success of the drought savings measures;

The incident management team shall ensure the following activities are conducted at the end of the drought:

- inform all customers that all water restrictions have been removed (formal declaration via the communications coordinator);
- produce a review report of the execution of the drought management plan so lessons learned can be documented and the DMP updated accordingly

Actions to be considered after a drought has occurred are summarised below. These include evaluating the appropriateness of the DMP trigger levels, the effectiveness of demand reduction and emergency supply augmentation options and the effectiveness of each level of restriction:

Table 4: Assessment of Trigger Level Response and Success

Evaluate Trigger Levels and Associated Actions		
Trigger Point Link	Description	Assessment Procedure
Voluntary Trigger	Voluntary Demand Reduction	Was the community responsive? Was there a significant reduction in demand? Was the trigger level appropriate?
Stages 1-3	Water Restrictions	Was the expected reduction in demand achieved for each stage? Were the trigger levels appropriate? Were policing methods effective; if so, how?
15% Reserve Storage	Implement other emergency supply options	To what level was demand reduced? What was the cost and practicality of carting water if undertaken? Were individual emergency options implemented too late?

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The table below summarises the assessment procedure for evaluating the impact of restrictions applied to customers, authority staff and supply systems. The intention is to learn from the methodologies that have been applied in order to minimise any future incidents of this nature.

Table 5: Assessment of Impact of Restrictions

Evaluate the Impact of Restrictions	
Users	Assessment Procedure
End Users	<ul style="list-style-type: none"> • Were the restrictions too severe? • Was the right mix of media used to disseminate information? • Was there enough warning of impending drought? If not, how could it be improved?
Environmental	<ul style="list-style-type: none"> • Were there any reported environmental impacts? • Were they assessed? • What methods have been put into place to rectify any environmental effects?

Authority Staff	<ul style="list-style-type: none">• Were many instances reported of restriction violations?• Was it possible to effectively enforce the restriction policy?• Was there sufficient staff available to monitor system performance?
Supply Systems	<ul style="list-style-type: none">• Did restrictions achieve expected levels of water savings?• Have supply systems been replenished? If so, how long did it take to achieve this level?• What procedures were put in place to achieve this?

Appendix 1: Augmentation of Water Supplies

In case of extreme drought conditions, augmentation of water supplies may be needed. The following information was initially gathered during the 1994 Auckland Drought and this list should be reviewed annually to ensure the information is current and complete. Since the '94 drought, one major water supply have been added, the Waikato River.

During the 1994 drought, Watercare Services Limited commissioned the following sources of bulk potable water:

Source	Annual Average Yield
Papatoetoe Aquifer	500 m3/d
Hays Creek Dam	6000 – 8000 m3/d

The following sources also need to be investigated to determine their potential, in terms of quality, quantity, cost and logistics:

Orewa River	Weiti River	Karamatura Stream
Wairau Creek	Lake Pupuke	Papakura Stream
Opanuku Stream	Oratia Stream	Lower Mangatawhiri
Mt Wellington Quarry	Heritage Park	Desalination
Western Springs	Pigeon Mountain	Roof water tanks
Mangere Mountain	Okura Stream	Sewage re-use
Hunua Stream	Swanson Stream	

The following area-specific water sources were investigated during the 1994 drought:

Auckland:

Source	Yield m3/d	Potable potential
Western Springs	8000 – 12000	Yes
Three Kings	3000 – 6500	Yes
Heritage Park	2500 – 10000	Yes
Lunn Avenue	2000	No
Southpark	2000 – 3500	Yes
Fisher Crescent	1700	Yes

North Shore: (numerous bores in the area)

Lake Pupuke	Unknown	Unknown
Paremoremo Prison bore	75% of prison water requirement	Unknown

Papakura District: Three bores 2500 m3/d (per bore) Yes

Waitakere: Some small lakes Unknown Unknown

Opanuku and Oratia stream Unknown Unknown