Wellington Water

Drought Management Plan

Wellington Metropolitan Area

Our water, our future.

Document History and Status

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Revision Details

Revision	Details
A	Initial draft completed by Connect Water
B	Updated draft with comments from Wellington Water
C	Updated draft
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E	Submitted to 3WDMC for approval, 9 June 2022
F	Amendments associated with 3WDMC approval on 9 June 2022
G	Amendments following SLT meeting (review FAQ alignment with website and Improvement Plan alignment with Statement of Intent)

Contents

1 Introduction

1.1 Definition of a drought

Droughts are naturally occurring events and are typically characterised by a prolonged period of abnormally low rainfall, leading to a shortage of water.

Droughts can be of differing duration and intensity, for instance a short event after a hot dry summer, compared with a drought over several years where persistent low rainfall may result in a lack of replenishment of water resources. Potential consequences of a drought depend on the severity and duration, and can include economic, environmental, and social impacts.

In New Zealand, agricultural droughts refer to conditions that result in adverse plant responses, which can range from reduced crop and forage yields to total crop or forage failure. Due to the impact on agriculture, the Ministry for Primary Industries (MPI) declare when a dry period is classed as an adverse event and subsequently provide support[1]. This declaration takes into account the climatic conditions as well as a number of impact-based criteria.

This document addresses water resource droughts, i.e. where the risk to the supply / demand balance may approach or exceed Wellington Water's Level of Service. These are typically more extreme than the agricultural droughts that occur in New Zealand.

1.2 Regulatory Framework

There is no national regulatory requirement in New Zealand for water suppliers to provide a Drought Management Plan (DMP). However, it is noted that a DMP is now a requirement in the Greater Wellington Regional Council (GWRC) Natural Resources Plan and will apply to future water take consents and renewals. Wellington Water also recognise that it is good practice to have a plan in place to appropriately manage water security risks to the wider community.

This DMP has been developed based primarily on the regulatory framework in other jurisdictions such as the UK and Australia.

1.3 Purpose of this Drought Management Plan

The purpose of the plan is to set out the actions Wellington Water would take when a drought occurs or threatens to occur. It provides a framework for us to make the necessary decisions for the management of water resources and demand during drought conditions. Because of the uncertainty brought about by different droughts, it is not possible to be entirely prescriptive of the actions needed. However, this document sets out a framework of actions that will be considered in response to a range of different drought conditions.

The DMP has been developed for the Wellington metropolitan area and is applicable to the unique operating systems, climate and regulatory requirements. A similar process is followed for South Wairarapa District Council, however the risk indicators and guideline values used are unique to the individual networks.

This DMP is developed based on, and supersedes, the previous Summer Water Demand Management Plan (SWDMP) - Risk Assessment Framework approved by the Wellington Water

[1] NIWA https://niwa.co.nz/natural-hazards/hazards/droughts

technical oversight committee (three waters decision making committee, or 3WDMC) in 2015. The DMP describes how Wellington Water manage supply and demand during the summer months, based on indicators and guideline values, and applying a flexible risk-based approach. This DMP will:

- Provide a risk-based framework for the management of water resources to maintain the security of supply for the Wellington metropolitan area during periods of water shortage;
- Allow Wellington Water to maintain the risk of water supply shortfall as low as practicably possible within network, community expectation, and water resource constraints;
- Describe how Wellington Water will preserve and manage water sources as drought conditions progress;
- Describe how residential and commercial users will be encouraged to conserve water and use it wisely;
- Outline a plan for restricting the use of the municipal water supply when required to maintain security of supply;
- Identify the demand reduction expected to be achieved through water use restrictions;
- Identify actions that will be considered during periods of severe drought to maintain essential water services.

The Drought Management Plan has been developed with technical support from Connect Water.

2 Network overview

2.1 Our sources of water

The water supply to the four cities in the Wellington metropolitan area comes from three sources:

1. Headwaters of the Hutt River, abstracted from an intake at Kaitoke weir, stored in the Macaskill Lakes to supplement supply during summer and treated at the Te Marua Water Treatment Plant (WTP).
2. Wainuiomata and Orongorongo catchments, abstracted from river intakes and treated at the Wainuiomata WTP. The Wainuiomata WTP does not have stored water to supplement supply during summer.
3. Hutt Valley artesian system extracted from the Waiwhetu aquifer and treated primarily at the Waterloo WTP, although there is a standby WTP at Gear Island, Petone.

The breakdown of supply from each WTP on an annual basis is approximately:

- 45% from Te Marua WTP;
- 45% from Waterloo WTP; and
- 10% from Wainuiomata WTP of 10%.

Figure 2-1 shows the extent of the water supply network, including supply zones, treatment plants and the main distribution pipes, pumps and reservoirs. Further information on water sources and strategy relating to the water supply network can be found in the Regional Service Plan Part 2 – Three Waters Network.

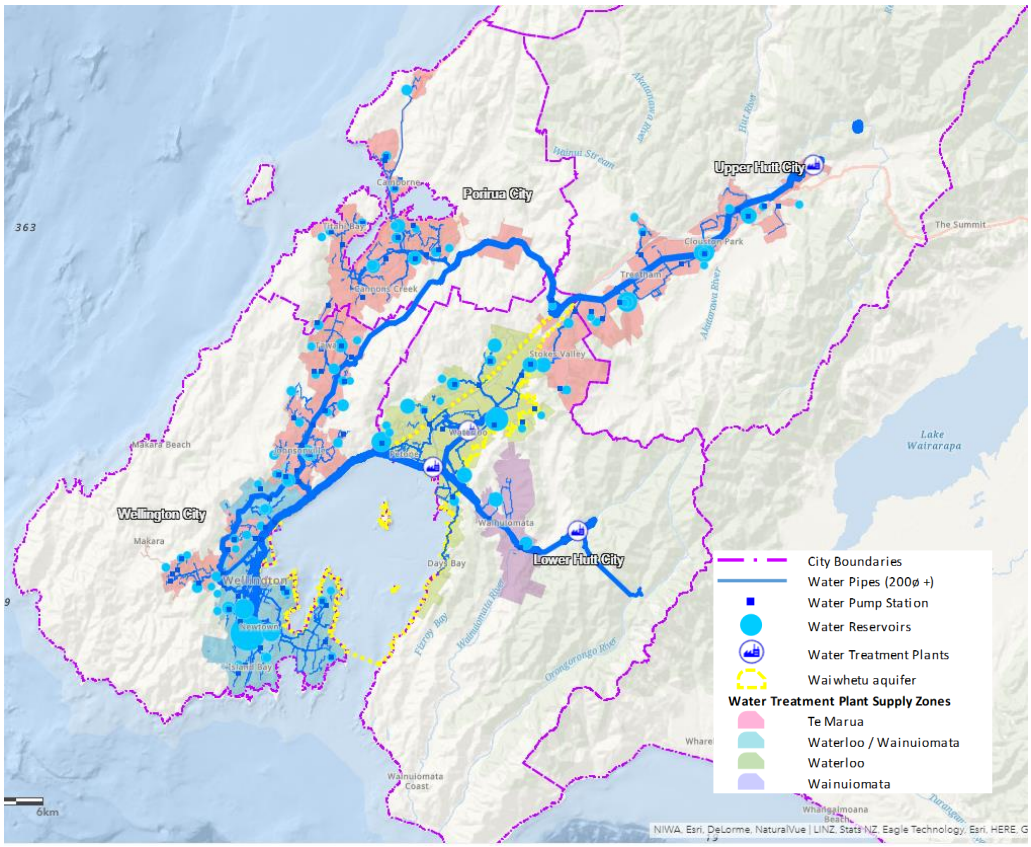


Figure 2-1. Wellington metropolitan water supply

An important aspect of the context for drought management in the Wellington metropolitan area is the relatively frequent rainfall experienced – even during summer. Development of the network since the late 1800's recognises this and relies to a large extent on run-of-river supplies. The network is vulnerable to extended dry periods lasting longer than about 3 months. This is different to many water supplies around the world that experience multi-year droughts and rely on large storage volumes and/or water produced from non-rainfall dependent sources such as seawater desalination.

2.2 How droughts affect supply and demand

2.2.1 Water supply

All existing sources of water rely on rainfall at different times of the year to provide the required quantity of water for treatment and distribution to the community. The response to rainfall is different for each of these sources, and hence they demonstrate different types of drought vulnerability. The drought response for each type of source is described below.

Surface water sources – rivers respond relatively quickly to high or low rainfall situations. This means that the river flows can decline and also recover quickly. Abstraction volumes from the rivers are restricted by resource consent limits and reduce to zero as rivers recede. The Wainuiomata and Orongorongo rivers tend to recede more quickly than Te Awa Kairangi / Hutt River. This results in the Wainuiomata WTP having to shut down in the driest part of most summers.

Aquifer storage – water stored in the Waiwhetu aquifer responds more slowly to changes in rainfall compared with surface water sources. This is because there is a long lag time between rain falling in the catchment and percolating through to the aquifer system. The aquifer is used more during the summer as surface water source availability reduces. Abstraction averaging around 80 ML/d for 90 days can typically be sustained before the aquifer reaches safety levels set to minimise the risk of salt-water intrusion. Abstraction is reduced at this point.

Lake storage – Macaskill Lake storage is preserved as much as practicable during summer to make sure water is available should dry conditions persist for longer than expected. Abstraction from the lakes increases during a drought to supplement declining surface water supplies and aquifer storage. Enough water is stored in the lakes to provide an average of around 40 ML/d for 90 days.

2.2.2 Demand for water

We currently (2022) supply around 162 ML/d on average to Upper Hutt, Lower Hutt, Porirua and Wellington. In a typical summer this increases to an average of nearly 180 ML/d and a maximum of around 200 ML/d. High demands put increased pressure on water resources resulting in lower river and aquifer levels and an increase in use of stored water from the Macaskill lakes. This reduces drought resilience by reducing the volume of water available at the end of a dry summer when it is needed the most.

High demands also reduce the supply headroom, which can approach the capacity of the network. When this occurs, it becomes difficult to deliver the volume of water required. This increases the likelihood of otherwise minor operational issues causing an acute water shortage situation.

The water supply network currently serves a resident population of approximately 430,000 people. This is expected to grow to more than 580,000 people by 2050. Demand for water is expected to continue to grow unless demand management initiatives such as residential metering can improve water use efficiency.

2.2.3 Supply and demand balance

Wellington is fortunate in that regular rainfall typically occurs throughout the year – dry periods rarely extend longer than 1-2 months. Compared with other major cities, the Wellington metropolitan water supply has very little storage and is therefore vulnerable to extended dry periods lasting 3 months or more.

While supply becomes limited during a drought, demand tends to increase. As a drought becomes more severe, demand can increase further as people use more water for garden watering and other outdoor uses. The balance between supply and demand is managed carefully to make sure there is a low risk of water shortage. This is achieved by initiating demand management and supply management actions at appropriate times during a drought. The different actions that can be implemented are outlined in section 6.

3 Level of service

The drought resilience Level of Service (LoS) describes the standard of service that water supply customers can expect to receive. Important aspects of the standard of service include the likelihood of water shortage occurring and/or the severity of restrictions that will be applied as supply availability reduces during a drought.

3.1.1 Likelihood of shortfall

Wellington Water's existing drought resilience LoS is to provide sufficient water to meet normal demand except in a drought with a severity of greater than or equal to 1 in 50 years (assessed as an annual shortfall probability no greater than 2%). The LoS standard is an important measure of network performance as it signals the timing for major interventions such as constructing a new water source or initiating a large demand management programme. The LoS is adopted by the Greater Wellington Regional Council (GWRC) as owner of the bulk water supply network, and is published in the GWRC Long Term Plan.

The combined effects of high growth, rising consumption and increased leakage has caused the drought resilience of the water supply network to move outside the target level of service. This deviation is expected to continue until a major supply upgrade or demand reduction intervention is implemented (expected by 2030). Until this occurs, water use restrictions and other mitigation measures are expected to be required more frequently and/or with greater severity than normal.

3.1.2 Supply availability and minimum residential service standard

The water supply available for community consumption declines as a summer progresses and catchments become increasingly dry. The supply availability and corresponding maximum demand under four plausible scenarios is provided in Table 3-1[2].

[2] Application of a slight increase in water loss allowance for the late summer and extreme case scenarios reflects the potential for very dry ground to result in pipe movement and therefore increased leakage.

Table 3-1. Water supply availability and corresponding maximum demand

	Units	Best Case	Peak Period Typical Case	Later Summer Expected Worse Case	Extreme Case
Expected restriction level	Level	1	1-2	3	4
Total available supply (including network limitations)	ML/d	220	200	160	130
Max commercial demand	ML/d	37	37	39	39
Water loss allowance	ML/d	40	40	45	45
Max residential demand	ML/d	143	123	76	46
	L/person/d	310	265	165	100

The above water supply availability has been used to determine household availability in relation to use of showers, laundry and outdoor water[3]. This is the basis for the residential service standards described in Table 3-2. The minimum residential service standard in an extreme case drought is 100L/p/d which is sufficient to meet basic health and sanitation needs[4].

Table 3-2 Residential service standards

	Units	Best Case	Peak Period Typical Case	Later Summer Expected Worse Case	Extreme Case
Expected restriction level	Level	1	1-2	3	4
Max residential demand	ML/d	143	123	76	46
	L/person/d	310	265	165	100
	L/household/d	900	775	480	290
Daily showers	Minutes/person	4	4	4	2
Weekly laundry	Loads/household	10	10	9	3
	Loads/person	3	3	3	1
Weekly outdoor use	Minutes/household	180	120	0	0

[3] Refer 3WDMC paper: Drought Customer Service Standard (Wellington Water ref: ACT142-2083085261-2009)

[4] Note: the expected volume of water available to residential customers in an extreme drought is comparable with other utilities (e.g. South East Queensland Water Regulation 2016 which includes an essential minimum supply volume of 100L/p/d for residential and non-residential use).

4 Preparing for a drought

It is rare for any two droughts to present in the same way. The approach taken at Wellington Water is to prepare and plan for a range of possibilities. We prepare for droughts by:

- Continuous monitoring of water supply/demand trends and any emerging risks.
- On-going engagement with the community about supply availability and the need for conservation.
- Operating the water supply network to maximise drought resilience during summer.
- Timely application of water use restrictions to reduce the risk of shortfall.
- Planning for extreme events and emergencies.
- Continuously improving our processes by learning from past events and the experiences of others.
- Documenting our approach in this DMP.

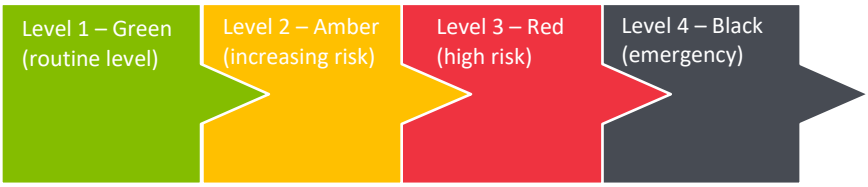
5 Flexible and adaptive approach to managing risk

In a drought situation the severity of the drought is not known until after the event. For this reason we apply a flexible and adaptive approach to assessing risk. The key components of the risk assessment framework are:

- **Four levels of risk** (Level 1 - Green, Level 2 - Amber, Level 3 - Red and Level 4 - Black).
- **Drought risk indicator approach**, where guideline values and expert judgement are applied to a portfolio of risk indicators – rather than the use of inflexible trigger points.
- **Drought Management Group** (DMG) that meets regularly over summer months, reviews risk indicators and determines the overall level of risk. The group expands as needed to ensure resources and oversight are proportional to the level of risk.

5.1 Four levels of risk

Four ranges are used to describe the level of risk and therefore restrictions that are applied. The four levels are used to help guide our response and make sure a measured and proportional approach is applied as the risk of supply shortage increases. These are:



Risk Level 1 comes into effect automatically during daylight saving each year for the majority of the Wellington metropolitan area[5]. Level 2 and above is implemented as needed. Level 2 has been reached many times since 1985 (all occurring since 2008). Level 3 has only been reached once in

[5] Except for Upper Hutt City which remains at Level 1 all year round.

2013 when a drought occurred when only one of the Macaskill Lakes was available. Level 4 has not been reached to date.

5.2 Drought risk indicator approach

The drought management process needs to provide a flexible framework of options that will allow us to respond most effectively to a drought for a wide range of situations. Our drought management process has been developed for our region; it is relevant and realistic for our unique operating systems and circumstances.

We consider the development of a drought to have four key stages: normal, prolonged dry weather, actual drought and drought recovery. Each stage requires a different response, so drought guidelines are used to help identify when we should change from normal operation and take proportional action. Inevitably, this will lead to the introduction of demand management and supply management drought intervention measures that are available. These guidelines are used to inform decision making to make sure that measures are introduced in a timely fashion, but are appropriate and only implemented when they are required to manage the level of risk.

We developed a new risk assessment framework for the Summer Water Demand Management Plan (SWDMP) in 2015 which has been further refined over the years since. The output of the SWDMP was four risk levels (Green = level 1, Amber = level 2, Red = level 3, and Black = level 4) and guidelines around the appropriate timing for supply and demand interventions.

The risk indicators, guideline values and risk levels identified in the SWDMP are applicable and appropriate for assessing drought risk and implementing drought management actions on a case-by-case basis. The risk indicator approach has been incorporated into this DMP and supersedes the previous SWDMP. The key risk indicators and guideline values are outlined in Table 5-1. A dashboard is maintained to monitor the ongoing status of indicators and support communications (refer Appendix E).

These guidelines provide a framework for taking actions to balance supply and demand during a drought. As each drought is unique, the combination of factors needs to be considered. The relative importance of risk indicators changes depending on the situation. For this reason, a Drought Management Group (DMG) has been established to review the individual risk indictors and make an overall assessment of the level of risk. It is important to note that drought response measures such as water use restrictions are linked to the level of risk, but that individual risk indicators are not. The risk indictor approach recognises that interactions between indicators is complex and dynamic, and therefore requires expert judgement to appropriately assess risk. This is also the reason values in Table 5-1 are referred to as “guidelines” rather than “triggers”. The composition of the DMG and roles/responsibilities is discussed in the following section.

Table 5-1. Key risk indicators and guideline values applied within this Drought Management Plan

Risk Indicator	Description	Typical Level 1 (Green)	Typical Level 2 (Amber)	Typical Level 3 (Red)	Level 4 (Black)
Macaskill Lake storage (actual)	Percentage of remaining usable storage. The risk associated with the remaining storage volume varies as the summer progresses.	>=80% for Aug-Oct >=70% for Jan & Jul >=60% for Feb & Jun >=50% for Mar-May	<80% for Aug-Oct <70% for Jan & Jul <60% for Feb & Jun <50% for Mar-May	<70% for Aug-Oct <60% for Jan & Jul <50% for Feb & Jun <40% for Mar-May	<30%
Macaskill Lake storage (predicted)	Probability curves for combined lake storage over the next three months based on the latest NIWA seasonal climate outlook and Karaka model prediction. This is used to assess the likelihood of the storage reaching restriction or critical levels.	As above using Karaka model 2% storage curve	As above using Karaka model 2% storage curve	As above using Karaka model 2% storage curve	As above using Karaka model 2% storage curve
Macaskill Lake net outflow	7-day average of net lake outflow (outflow less inflow). A high storage depletion rate is an indicator of elevated risk.	<=25ML/d	>25ML/d	>50ML/d	N/A
River abstraction	14-day average combined abstraction from river intakes. River depletion is typically the first indicator of drought and increasing risk.	>=80ML/d	<80ML/d	<40ML/d	0ML/d
Waiwhetu aquifer level	Aquifer level measured at McEwan Park. Aquifer pumping is actively managed to prevent saline intrusion by keeping the pressure above predetermined safety limits.	>=2.5mAD	<2.5mAD	<2.3mAD	<2mAD

Risk Indicator	Description	Typical Level 1 (Green)	Typical Level 2 (Amber)	Typical Level 3 (Red)	Level 4 (Black)
Water demand	7-day and 1-day average water demand is monitored to determine if consumption is within expectations. Higher than expected demand increases risk by depleting aquifer and lake storage at a greater. Guideline values for this indicator assume Wainuiomata WTP is operational. WTP headroom would take priority if this was not the case.	<=170ML/d	>170ML/d or >190ML/d (1-day ave)	>190ML/d (7-day ave) or >200ML/d (1-day ave)	>220ML/d
Water Treatment Plant headroom	Production surplus available today and predicted in 7 days (assuming no rain). If WTP headroom becomes too low then the risk of acute shortfall increases (i.e. unable to meet peak demand).	>120%	<120%	<105%	<100% (i.e. supply shortfall)
Wainuiomata WTP production	Wainuiomata WTP has no raw water storage and is forced offline when the river supply reaches around 10ML/d. This increases demand on groundwater take and creates a step change in the level of risk.	>=15ML/d	<15ML/d	<10ML/d (Wainuiomata WTP going offline is only sufficient to justify Level 3 if remaining supplies are not sufficient to meet demand)	N/A

Risk Indicator	Description	Typical Level 1 (Green)	Typical Level 2 (Amber)	Typical Level 3 (Red)	Level 4 (Black)
Network outages and emerging risks	Significant asset performance issues and emerging risks (e.g. critical treatment/distribution asset failure, increasing trend in cyanobacteria or associated taste compounds/toxins, etc).	Assessed on a case by case basis	Assessed on a case by case basis	Assessed on a case by case basis	Assessed on a case by case basis
Weather forecast	Forecast for significant rainfall (e.g. > 20 mm within next 5 days) is used to inform the timing of interventions such as water use restrictions. This includes managing perception risks associated with poorly timed external communications.	Assessed on a case by case basis	Assessed on a case by case basis	Assessed on a case by case basis	Assessed on a case by case basis

Risk Indicator	Description	Typical Level 1 (Green)	Typical Level 2 (Amber)	Typical Level 3 (Red)	Level 4 (Black)
Leak repair performance	The size of the leak repair backlog and the average repair time is reviewed and used to inform communications. Poor leak repair performance is acknowledged in our communications to limit credibility risk. Elevated supply/demand risk is also used to signal a need to improve leak repair performance where possible. It is noted however, that this is a complex area with many constraints, and short-term improvements in capability are typically not achievable.	Assessed on a case by case basis	Assessed on a case by case basis	Assessed on a case by case basis	Assessed on a case by case basis

Risk Indicator	Description	Typical Level 1 (Green)	Typical Level 2 (Amber)	Typical Level 3 (Red)	Level 4 (Black)
NIWA Drought Index	NIWA New Zealand Drought Index (NZDI) for Wellington. Provides a nationally consistent approach to answering the question "how dry is it"? There are four thresholds (0.75, 1.00, 1.25, 1.50, and 1.75) corresponding to dry, very dry, extremely dry, drought and severe drought respectively. The NZDI is not linked directly to water supply/demand risk, but provides additional information on the severity of the drought. This informs communications and timing of interventions.	Assessed on a case by case basis	Assessed on a case by case basis	Assessed on a case by case basis	Assessed on a case by case basis
Time since last change	Where possible risk levels are not changed more than once in a 2-week period, unless an extreme event has occurred. This relates to practical considerations regarding external communications.	Assessed on a case by case basis	Assessed on a case by case basis	Assessed on a case by case basis	Assessed on a case by case basis

5.3 Drought Management Group

A Drought Management Group (DMG) has been established to manage our response to drought. The membership of the group increases as the drought risk increases. The DMG meets on a regular basis during summer and has the following responsibilities:

- Monitor drought risk indicators, assess the level of risk and recommend changes to the risk level in a timely manner.
- Provide information and advice to support internal/external communications.
- Complete non-emergency post event reviews.
- Make sure that the Drought Management Plan is kept up-to-date to reflect ongoing improvements.

Table 5-2 shows how the composition of the DMG is expanded as risk increases. Depending on the context, additional members may join the group in the lead up to a change in risk level. The objective is to provide an appropriate level of escalation and resources as risk increases from Level 1 through to Level 3. Level 4 is an incident situation and will be managed through the Wellington Water Emergency Management Structure.

Table 5-2 Drought Management Group composition

Group	**Level 1 – Routine restrictions (daylight savings odds/evens watering)**	**Level 2 – Sprinkler & irrigation system ban**	**Level 3 – Outdoor water use ban (domestic only or total)**	**Level 4 – Emergency water take and/or supply rationing** (refer Wellington Water Emergency Management Structure)
	Drought Management Group expands as risk level increases			
Network Management	Network Controller, Senior Production Controller	Manager Treatment	Group Manager	
Chief Executive's Office		Manager Risk and Assurance (or Incident Controller)	Director of Regulatory Services	
Network Development and Delivery	Chief Advisor Drinking Water, Engineer (network specialist), Network Analyst, Programme Lead (capital works)	Programme Manager (sustainable water supply and demand)		
Customer Operations	Customer Services Engineer	Customer Resolution Facilitator (optional)	Customer Resolution Facilitator	
Network Strategy and Planning	Senior Advisor Strategy			
Business Services	Senior Communications Advisor		Manager Communications and Community Engagement	

5.3.1 DMG roles and responsibilities

The Group Manager Network Management is accountable for treatment and delivery of safe drinking water. The key responsibilities within the DMG to support this outcome during a drought are:

- **Network Controller** – chair of DMG and responsible for decisions to change risk level (unless an incident has been declared), initiate requests to councils to impose restrictions through Bylaw provisions and notify SLT/councillors/client council representatives.
- **Manager Risk and Assurance** (or Incident Controller) – monitor level of risk and declare an incident if Level 4 is required, or if considered appropriate for other reasons.
- **Chief Advisor Drinking Water** – ongoing technical oversight.
- **Engineer Network Engineering** – maintain risk indicator dashboard and draft risk assessment to inform DMG meetings.
- **Senior Production Controller** – implement water treatment plant supply strategy to optimise network performance for drought resilience.
- **Manager Treatment** – communicate with GWRC environmental regulation on resource consent issues (e.g. aquifer discretionary use and emergency provisions in the Resource Management Act and Natural Resources Plan).
- **Senior Advisor Communications** – develop and deliver external communications including community engagement, notify Customer Hub of significant issues to support customer contact resolution, and notify Internal Communications Advisor for communications to all staff.
- **Director of Regulatory Services** – communicate with Taumata Arowai in relation to Water Services Act requirements.
- **Other members** – provide advice from respective areas to tension risk assessments with different perspectives (includes input from Network Management Group, Strategy, Programme Management, Customer Operations).

5.3.2 DMG meeting agenda

The standing agenda for DMG meetings will include the following:

1. Risk indicator dashboard – review status of risk indicators relative to guideline levels.
2. Looking ahead – other issues potentially affecting risk (e.g. outages for capital works/planned maintenance, adverse leakage trends, catchment management activities, adverse weather predictions, scenarios for any emerging risks, etc).
3. Determine overall risk level.
4. Mitigation measures – determine appropriate mitigation measures (network operations and maintenance and demand management), as well as key internal/external communication messages (refer DMP section 6).
5. Agreed actions
6. Timing for next meeting

DMG meetings are held regularly over the summer period which is typically from October through to April. The timing for DMG meetings is adjusted as the risk level changes and may be monthly, weekly or daily if required.

5.3.3 When a drought becomes an incident or emergency

In a severe drought situation, all water sources would be in a vulnerable state and there would be a risk that demand could exceed the available supply. In this situation the Wellington Water Emergency Management Team (EMT) may be activated. The Incident Controller is part of the DMG and will decide if/when it is appropriate to declare an incident. If this occurs the Incident Controller assumes responsibility for managing the incident and will follow emergency management

procedures. To maintain continuity, many of those involved in the DMG would also form part of the EMT.

Depending on the severity of the situation the EMT may request support from the Wellington Region Emergency Management Office (WREMO), including coordination and prioritisation of regional resources. If there is potential for a disruption to supply of 8 hours or more then Taumata Arowai will also be contacted as required by the Water Services Act.

6 Risk mitigation measures

There are a range of supply and demand side interventions available during a drought with the aim of balancing the constraints of the water source (supply side) with the needs of the community (demand side). This section outlines the different demand management and supply management actions available, and the timing of these actions.

6.1 Network operations and maintenance

This section outlines the actions we are taking, as a water supplier, to lead by example and minimise water demand.

6.1.1 Prioritise leak repairs

Leakage reduces network performance by contributing directly to baseline demand, leaving less water available for productive use. Some leakage is inevitable in any water distribution network, however the issue has become significant in the Wellington metropolitan area following the Nov 2016 Kaikoura earthquake.

Leaks in the network are identified proactively through active leakage management techniques. This includes analysis of night flows to District Metered Areas (DMA), mass balances at zone or regional level and active leak detection using acoustic monitoring equipment (listening for leak noises), drone-based thermal imaging and other specialist techniques. Leaks are more difficult to locate during the summer when demand is high therefore year-round proactive leak detection is important.

Leaks are also identified reactively through community reports of visible leaks. Visible leaks have an additional negative impact on organisational credibility – especially when water use restrictions are in place and there are long delays in completing repairs.

Leaks should be repaired in a timely manner at all times, however during a drought there should be an increase in investment and reprioritising of resources to improve performance. It is acknowledged that the current level of resourcing and organisational capacity is insufficient to meet reasonable performance expectations.

We are committed to improving our leakage management practices so that leaks are identified and repaired within a reasonable time. We are also committed to building capacity to enable an increase in performance during droughts. There is not sufficient funding to achieve this in the current investment period (2021-23), however a case for additional funding is being prepared. The case will identify leakage performance targets and will be included in our advice supporting the next investment period starting in 2024.

6.1.2 Hydrant testing/network flushing

Testing of hydrants is required to make sure that they operate effectively. This requires running hydrants to waste for short periods while testing the flow rate is achieved. Hydrants are also flushed

periodically to remove sediment build-up in the pipe network. This activity will be put on hold (or be minimised) during increased risk levels and re-started once the risk returns to Level 1.

6.1.3 Water patrols

Water patrols are used to remind people of the requirements of water supply bylaw restrictions where there are breaches. During Level 1 this is primarily reactive in response to reported breaches. During increased risk levels proactive water patrols are used to identify inappropriate water use and issue reminders.

6.1.4 Supply management actions

Supply management actions are the measures that we can employ to maintain supply during a drought period, over and above the activities that we ordinarily undertake. During winter months water source selection is continuously and automatically adjusted to deliver water at the least cost. During summer we intervene with this optimisation system and manage supply selection according to the following priority:

1. Run-of-river surface water (maximise within consent limits).
2. Waiwhetu aquifer storage (operate as required within saline intrusion and annual water take consent limits).
3. Macaskill Lakes storage (minimise usage).

This approach to prioritise sources aims to meet demand by fully utilising river sources and minimising use of Macaskill lake storage. Since the duration of a drought cannot be predicted, lake storage used early in a drought cannot be recovered until the drought has ended. Preserving lake storage is therefore central to managing water sources during a drought.

Waiwhetu aquifer

As the most drought resilient water source, the Waiwhetu aquifer will act as a buffer against dry periods when surface water sources are at risk. The aquifer pressure is normally maintained above 2.3 mAD measured at the Petone/Seaview foreshore. Additional abstraction in the range 2.3-2.0 mAD is permitted in the resource consent, however operation in this range is only allowed at the discretion of the Greater Wellington Regional Council (GWRC) Manager Consents Management.

Operation of the Waiwhetu aquifer within the discretionary limit provides additional yield that will be essential in a severe drought, however it also requires an enhanced level of monitoring to make sure the risk of saline intrusion is managed appropriately. This additional water is only available if a Level 3 residential outdoor water use ban has been implemented and the indicators of saline intrusion risk are within safe limits. Detailed guidelines for operation of the Waiwhetu aquifer in the discretionary range have been jointly developed by Wellington Water and GWRC (refer Appendix B).

Macaskill Lakes

The Macaskill Lakes are typically our last supply-side measure during a drought. The two lakes have a combined useable capacity of 3,350 million litres, however the actual level in the lakes at the start of a drought depends on the health of Hutt River before the drought. As a drought proceeds, and run-of-river sources diminish, lake water is used progressively to supplement supply. The need to preserve lake storage is balanced against other options such as increasing water restrictions to make sure lake storage lasts for the duration of the drought. This is important as this is the only source of stored water and therefore cannot be recovered until the drought has ended.

Wellington Water uses a tool developed in partnership with NIWA to assesses thousands of potential scenarios of storage depletion. The tool, called the Karaka model, utilises the latest information from the NIWA seasonal climate outlook and determines the likelihood of Macaskill Lake storage reaching critical levels over the next three-month period (refer example dashboard in Appendix E). This is used

as a leading indicator of how the drought may progress and supports timely interventions to minimise future risk.

Emergency water take

In an extreme drought situation Taumata Arowai may declare a drinking water emergency under the Water Services Act. If this occurred, then the Emergency Powers available include the ability to grant an exemption to Part 3 of the Resource Management Act (including restrictions relating to the take of water).

An alternative option for emergency water take is through the emergency provisions in the Resource Management Act (section 330) followed by retrospective consent application under the Natural Resources Plan (rule WH.R1) to take water below minimum flows for the health needs of people in a community drinking water supply. Depending on the nature of the situation this option may be preferable.

The emergency take of water outside consent limits would only be considered as a last resort, where all practicable demand management measures were in place and there was imminent risk of supply shortfall.

6.2 Demand management actions

Demand side measures are implemented from the start of daylight saving and are adjusted depending on the level of risk assessed by the DMG. The demand management actions are discussed below and include both residential and non-residential water restrictions.

6.2.1 Residential water restrictions

Water restrictions are used to reduce overall water demand. Domestic water restrictions are introduced during the daylight saving period and increased as needed depending on the assessed level of risk. The assessed level of risk always includes uncertainty, and caution must be applied regarding how severe the remainder of the drought will be. Restrictions are therefore implemented more frequently than the 1 in 50-year level of service may otherwise imply. As a drought becomes more severe, restrictions of increasing severity are applied to prevent supply shortfall. Using this approach, a drought exceeding the LoS can be managed – although at a progressively reduced service standard. The stages of domestic water restrictions are described below.

- **Level 1 Alternative day water restrictions** – this means even numbered houses can use sprinklers and irrigation systems only on even numbered days between 6 – 8am and 7 – 9pm. The same rules apply for those who live in odd numbered houses on the odd numbered days. Handheld watering devices can be used at any time, on any day as long as they are attended.
- **Level 2 Sprinkler ban** – there is a ban on sprinklers, irrigation systems and unattended hosepipes for all households. Handheld watering devices can be used at any time, on any day as long as they are attended.
- **Level 3 Outdoor water use ban** – there is a ban on all residential outdoor water use.
- **Level 4 Supply rationing** – this is an emergency situation and required as a last resort. Remaining supplies would be prioritised to sustain human health and maintain essential services.

Table 6-1 provides a summary of these restriction levels with an overview of the key residential actions to be implemented at each level. The current restriction levels and links to supporting resources are provided via the Wellington Water website - Residential water restrictions. Frequently asked questions (FAQs) regarding water restrictions are outlined in Appendix D.

Table 6-1. Summary of residential restrictions

Restrictions		Expected demand reduction	Notes
No restrictions	No restrictions implemented[6]	Normal demand (unrestricted)	Period of routine monitoring of water resources.
Level 1	Alternate day watering	Reduction in peak demand from smoothing garden watering across alternate days.	Awareness-raising of declining water resource situation to promote efficient use of water. Routine water conservation campaign with customers.
Level 2	Sprinkler and irrigation system ban (including unattended hosepipes)	5% reduction on normal (unrestricted) summer demand*	Restrictions apply to domestic customers. Enhanced water conservation campaign with customers.
Level 3	Outdoor water use ban	10% reduction on normal (unrestricted) summer demand*	Restrictions apply to domestic customers. Enhanced water conservation campaign with customers.
Level 4 – Emergency provisions	Refer to Emergency Response Plan	As required to achieve the minimum residential service standard of 100L/p/d (refer section 3.1.2)	Restrictions apply to all domestic customers. Enhanced water conservation campaign with customers. Available supply may need to be rationed to achieve equitable distribution.
Lifting restrictions	All restrictions are lifted		Awareness-raising of improving water resource situation and lifting of restrictions

* calculated as a reduction in total demand less an allowance for leakage that cannot be controlled via restrictions

6.2.2 Non-residential water restrictions

Implementing non-residential water restrictions is an important part of managing demand during a drought as all consumers should take steps to reduce water use if there is a threat to the water supply. Whereas residential restrictions target the discretionary use of water, applying restrictions to non-residential consumers can result in economic impact. Non-residential water restrictions are therefore only applied when necessary to make sure that businesses can continue to operate for as long as possible.

[6] Except for Upper Hutt City which has year-round alternate day watering.

There are cases where non-residential and residential restrictions can appear inconsistent. An example is the use of hosepipes to clean windows or buildings. While in a residential setting it is appropriate to minimise this activity during a drought, non-residential restrictions would mean that people who clean windows or wash houses for a living would not be able to operate their business. The overall water saved from limiting some of these non-residential activities (when water efficient equipment is used) can be relatively minor and out of proportion with the economic impact. Non-residential water restrictions aim to target discretionary or wasteful uses of water, while enabling businesses to continue to operate.

Table 6-2 outlines a list of potential non-residential restrictions that may be implemented in risk levels 3 or 4 if necessary.

Table 6-2. Potential categories of non-residential water restrictions

Non-residential restriction categories
Public garden watering
Watering outdoor plants / landscaping on commercial premises
Filling or maintaining a non-residential swimming or paddling pool
Irrigation of sports grounds, playing fields and golf courses
Cleaning of non-residential premises
Filling or maintaining a pond, fountain, water features and outdoor aquariums (including wildlife ponds)
Watering of plants grown for commercial purposes (turf, nurseries, etc)
Use of water in construction
Cleaning of industrial plant
Cleaning the windows of non-residential premises
Cleaning commercial vehicles, boats, aircraft or railway rolling stock (including washing of buses, taxis, food transport trucks, emergency services and refuse/recycling collection vehicles)
Commercial car washes (with different levels of water recycling)
Irrigation of crops for food production (for human or animal consumption)
Irrigation to protect root stock
Cleaning hard surfaces and/or cleaning for health and safety purposes

Non-residential restrictions impact customers in different ways, and where necessary exemptions may need to be issued. There is currently no system to apply for exemptions and the development of a system is outlined in the improvement plan (section 8).

Exemptions could take the form of permitting a particular activity or exemptions provided for specific non-residential customers. What our customers could expect from an exemption system is outlined below:

- A transparent system that provides a consistent approach to evaluating whether and how water use restrictions will be implemented,
- A range of different types of exemptions will be available to suit the different requirements (e.g. discretionary universal exemptions and discretionary concessional exemptions),
- Individual customers will need to apply through the system to demonstrate they meet the rules or terms of conditions,
- Advance notice will be given to all customers to make sure they are aware that Wellington Water may consider implementing non-residential restrictions – this enables contingency planning to minimise financial risks,
- Exemptions will be granted on a time basis, where practicable, with regular review.

6.3 Communications

6.3.1 Enhanced community engagement and conservation messaging

The level of engagement and communication with the Wellington community depends on the drought risk level. As restriction levels increase, there will be increasing frequency of messaging and use of additional communication channels. The Communications and Community Engagement team is accountable for delivering all messages to the community.

Winter conditions and domestic water restrictions (green to amber restrictions) will be communicated to the community through the Wellington Water Website (refer link), council websites, social media including Facebook and Instagram, out of home and digital media advertising, met service, proactive media releases, engagement with journalists, letter drop flyers and traditional radio/print channels. We have an 'always on' advertising approach during green risk level to focus on increasing awareness of water restrictions. As we move up risk levels, the water restrictions advertisements are geotargeted and pre-prepared to ensure communications are reactive. Restriction level graphics used by the Wellington Water communication team are attached as Appendix C.

Managing future demand through water efficiency initiatives is another area that will require influencing and changing the behaviour of the community. One tool we have established to increase community awareness and encourage individual responsibility through water conservation and efficient water usage is our educational campaign, 'Love Every Drop'. This educational resource can help customers understand how they use water and encourage them to reduce their demands on the system, particularly when supply is low.

Our strategy over the next 50 years will involve a combination of understanding our community better and influencing the community and creating behaviour changes. We are actively increasing our knowledge of customer needs through a customer governance group and customer hub.

There has been a gradual community uptake of conservation measures such as water efficient habits, household fittings/appliances and collection of rainwater for non-potable use. Community engagement and conservation messaging encouraging the uptake of these measures will continue to be prioritised during a drought.

6.3.2 Internal and external communications process

The key aspects of the internal/external communications process are:

- A Comms representative should be present at every Drought Management Group meeting.
- Comms should engage with subject matter experts in the early stages of Summer Demand and Water Restrictions campaign development.
- Maintain clear responsibilities for information sharing, including:
    - Chair of the DMG (Network Controller) is responsible for requesting approval to implement/change the water restriction level from council officers with delegated authority[7]. It has been agreed with councils that such requests should include the words "immediate action is required" to trigger relevant Bylaw provisions.
    - Chair of the DMG (Network Controller) is responsible for informing the Wellington Water Senior Leadership Team, councillors, client council representatives and Wellington Water Comms following council approval to change the restriction level.

[7] Chief Executive for Wellington City and Porirua City, Infrastructure Manager for Hutt City and Upper Hutt City

- Wellington Water Comms is responsible for informing Council Comms, the Wellington Water Internal Comms Advisor and the Customer Hub of any changes to the restriction level.
- Wellington Water Internal Comms Advisor is responsible for updating internal communications channels and informing internal staff of the water restriction changes via all staff email.
- Customer Hub is responsible for responding to public enquiries.

6.3.3 Communication with Greater Wellington Regional Council

Greater Wellington Regional Council (GWRC) Environmental Regulation have expressed a desire to have greater visibility over Wellington Water decision-making processes around drought management – including when restrictions are put in place. This relates to discretionary aspects within water take consents where GWRC must determine if community impacts from water use restrictions are in proportion with environmental impacts. To support this request and increase transparency, Wellington Water provides the risk indicator dashboard described in section 5.2 to GWRC consents weekly (refer example in Appendix E).

7 Post-drought actions

This section describes how we identify the end of a drought, and how the post-drought review process will be used to inform future drought management.

7.1 Identifying the end of a drought

A return to normal Level 1 conditions occurs when there has been sufficient rainfall to saturate the catchments, increase base flows in the rivers and generate an increasing trend in aquifer and lake storage. This usually occurs in March however can occasionally extend into April or May. Identifying the end of a drought is usually not ambiguous and is characterised by a return to normal weekly rainfall patterns. The Wellington metropolitan area has not experienced the multi-year droughts common in some parts of the world (e.g. Australia).

When the risk returns to Level 1, restrictions are typically lifted in one step with immediate effect – rather than stepping down risk levels incrementally.

7.2 Annual and post-drought reviews

The DMG will complete an annual review at the end of each summer and/or a post-drought review within 3 months of returning to risk Level 1. The purpose of these reviews is to assess the effectiveness of the DMP processes and build on lessons learnt. The agenda for the annual/post-drought review includes the following:

1. Summary of key events
2. What worked well and what were the issues?
   - Risk indicators and dashboard – did we get the right signals?
   - DMG – did we have the right composition and were roles clear?
   - Were processes followed and were they adequate?
   - Interventions (supply management, restrictions, community engagement) – how effective were they?

3. Communications – were internal/external communications timely and appropriate?
4. DMG meeting frequency and standing agenda (refer section 5.3.2) – could this be improved?
5. Lessons learnt from droughts in other areas
6. Looking ahead
    - What are we expecting next summer?
    - What can we do over winter to prepare?
    - When will be the DMG meet next?
7. Recommendations for improvements

Any recommendations for improvements to the DMP will be reviewed by the Drought Management Group and either implemented through operational processes or added to the improvement plan (refer section 8.2).

If the drought resulted in an incident being declared, then the EMT will determine if a Post Event Response Team (PERT) should be convened. If PERT is convened, then this group will assume responsibility for completing the post-drought review. Additional functions of PERT include identifying short/long term options to resolve issues and maintain appropriate stakeholder communication during the review.

The records of Annual/post-drought reviews are stored in the Risk Management area of the document management system.

8 Continuous improvement

This DMP is a living document, updated on an ongoing basis as new information becomes available. Updates and recommended improvements that are highlighted during the annual/post-drought review and by the Post Event Response Team (PERT) should be incorporated throughout the document. Improvements that require scheduling for resource or timing considerations are described below and summarised in the Improvement Plan.

8.1 Areas for improvement

A review of this DMP was completed by Connect Water as part of the development of this DMP in 2022. This section identified the gaps and areas of improvement to inform an action plan for Wellington Water. The following points summarise the recommended areas for improvement:

8.1.1 Level of Service

The adequacy of the existing 1 in 50 year Level of Service for drought should be reviewed. Other water utilities tend to operate to higher Levels of Service for drought. For example, Watercare states a Level of Service equivalent to 1 in 200 years, water companies in the UK are potentially moving to a 1 in 500 year drought standard and water utilities in South East Queensland are required to meet a (restricted) customer Level of Service in a 1 in 10,000 year drought event. The existing LoS also assumes normal (unrestricted) demand continues until shortfall occurs, whereas in practice restrictions are applied progressively to prevent shortfall.

It is recommended that the LoS be reviewed as part of the consultation associated with the 2024 investment process. The review should consider the adequacy of the existing drought standard as well as describe the expected frequency, duration and severity of water use restrictions. This DMP could be used to support consultation with the community about the risks and uncertainties regarding customer standards and customer expectations.

8.1.2 Active leakage control

It is acknowledged that the existing level of resourcing and organisational capacity for leak location and repair is insufficient to meet reasonable performance expectations. There is also a need to be able to reprioritise resources and increase performance further during drought periods. There is not sufficient funding to achieve this in the current investment period (2021-23), however a case for additional funding is being prepared. The case will identify leakage performance targets and will be included in our advice supporting the next investment period starting in 2024.

8.1.3 Water use restrictions and exemptions

This DMP identifies a range of potential non-residential water restrictions that could be implemented, together with exemptions and concessions. Further development of these potential restrictions is recommended by careful consideration, including consultation with affected parties.

Similarly, it is important to identify situations where exemptions to water use restrictions are appropriate. This could be through a combination of automatic exemptions for special categories of water use and/or through a system to issue permits on a case-by-case basis.

It is recommended that non-residential restrictions and associated exemptions be developed for risk levels 3 and 4 to improve the efficiency of response when they are required. The potential restrictions shown in Appendix F should be used as a basis for consideration.

8.1.4 Non-potable water sources

In some cases, it might be possible to provide sources of non-potable water so businesses can continue to operate during periods of restrictions. For example, non-potable water could be used for dust suppression at construction sites.

It is recommended that the potential use of non-potable water sources be investigated to improve understanding of constraints and opportunities.

8.1.5 Network operations and maintenance

During a drought and when restrictions are imposed, it is important that customers see that Wellington Water is also using water efficiently. Key areas are covered in section 6.1, however there is a lack of sufficient detail to ensure a consistent approach is applied.

It is recommended that additional detail is developed around how operational practices are changed as the risk level increases. This includes prioritising leak repairs, hydrant testing/network flushing, water patrols and supply management actions.

8.1.6 Emergency response planning

It is noted that a severe drought can become an incident and require management through the Emergency Operations Centre (refer section 5.3.3). The existing emergency response procedure for this type of incident is not well defined. It is recommended that the relevant emergency response procedure be reviewed and updated.

8.1.7 Ongoing improvements

The Wellington Water Drought Management Group (DMG) should complete an annual review of this DMP document and reflect on the past summer. Updates to this DMP and recommendations for improvement should be incorporated as necessary.

Similarly if an incident occurs as the result of a drought, the Post Event Response Team (PERT) should complete a post-drought review as outlined in Section 7.2. Recommendations for improvements to

the DMP will be reviewed by the Drought Management Group and either implemented immediately or added to the improvement plan in section 8.2.

Connect Water reviewed and compared the drought response of other water utilities to inform development of this DMP (2022) based on the reports listed below[8].

- Recommendations of the Aurecon review of Watercare
- UK Water Industry Research – Managing through drought: code of practice and guidance for water companies on water use restrictions – 2013 (incorporating lessons from the 2011 – 12 drought)
- Water conservation in Greater Sydney

As part of the annual/post-drought review, the DMG will keep up to date on lessons learnt from other drought events.

[8] Connect Water technical memo: Drought Management Plan Review and Transferrable Lessons (Wellington Water ref: ACT77-877899820-249)

8.2 Improvement plan

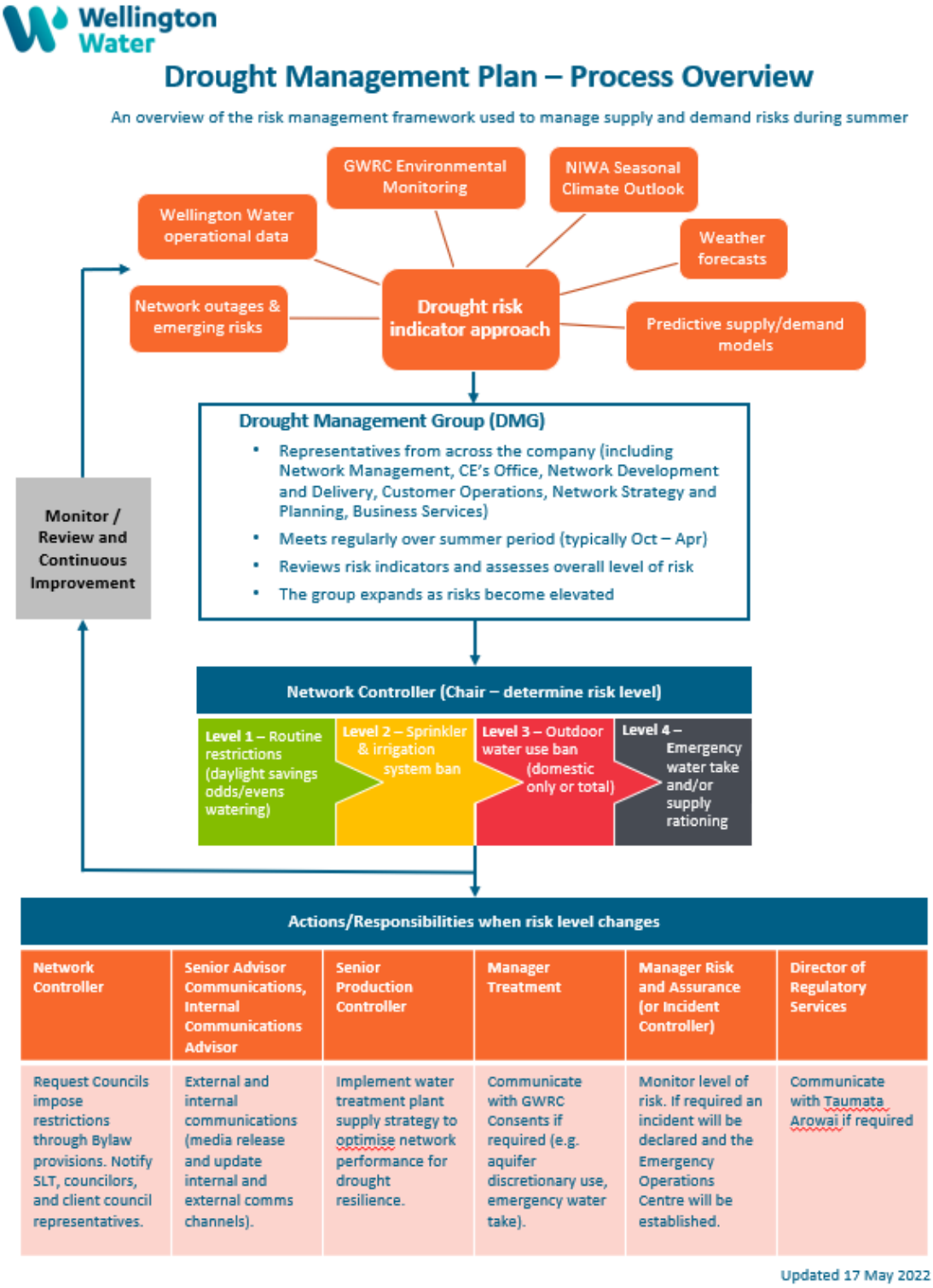
Table 8-1 summarises the improvement opportunities that have been identified, how they are being addressed and whether they are currently funded.

Table 8-1 Improvement plan

Improvement area	Description	How is this being addressed?	Funding status
Communicating risk and uncertainty	Develop a plan of how best to communicate levels of risk to the community.	Within scope of existing water supply/demand investigations. Include relevant advice to client councils and/or National Transition Unit for the 2024 investment process.	Funded
Level of Service	Review adequacy of the existing drought resilience level of service and include description of the expected frequency, duration and severity of water use restrictions.	Within scope of existing water supply investigations. Include relevant advice to client councils and/or National Transition Unit for the 2024 investment process.	Funded
Active leakage control	Improve leak location and repair capability. Also develop additional capacity so that resources can be reprioritised to increase leak management performance during a drought.	There is not sufficient funding to achieve this in the current investment period (2021-23), however a case for additional funding is being prepared. The case will identify leakage performance targets and will be included in our advice supporting the next investment period starting in 2024.	Not funded
Non-residential water restrictions and exemptions	Develop non-residential water restrictions and exemptions for risk levels 3 and 4. The structure of potential water restrictions shown in Appendix F should be used as a basis for consideration.	Propose investigation for funding from 2024.	Not funded
Non-potable water sources	Investigate the feasibility of making non-potable water available during drought events (e.g. for dust suppression).	Propose investigation for funding from 2024.	Not funded
Network operations and maintenance	Develop additional detail covering how operational practices are changed as the risk level increases. This includes prioritising leak repairs, hydrant testing/flushing, water patrols and supply management actions.	Progress documentation of process improvements through DMG and existing operational resources.	Funded
Emergency response planning	Review and update the emergency response procedure relating to a severe drought.	In progress with completion expected in 2022.	Funded
Consultation with the community	A number of these improvements and opportunities require consultation and engagement with the community. This should be	Include relevant advice to client councils and/or National Transition Unit for the 2024 investment process.	Not funded

Improvement area	Description	How is this being addressed?	Funding status
	carried out in a coherent and structured way.		
Annual/post-drought review	Various recommendations from the most recent Annual/post-drought review. Refer minutes in the Risk Management area of the Wellington Water document management system.	Implement improvements before the next summer using existing operational resources and DMG oversight.	Funded
Wellington Water website	Review alignment between the FAQ's in Appendix D and the Wellington Water website.	Implement improvements before the next summer using existing operational resources and DMG oversight.	Funded

Appendix A: Drought Management Plan Process Overview



(Wellington Water ref: ACT0-1483891610-92).

Appendix B : Guideline for discretionary abstraction from the Waiwhetu aquifer

REFER WELLINGTON WATER REF FOR FULL DOCUMENT WITH APPENDICIES

(Wellington Water ref: ACT26-1350569271-1078).

Guideline for discretionary abstraction from the Waiwhetu aquifer Version 7: 5/11/2020

Purpose

This guideline describes the process that Wellington Water and Greater Wellington Regional Council expect to follow for operation of the Waiwhetu aquifer in the range 2.0-2.3m measured at the Petone/Seaview foreshore (referred to as the 'discretionary range'). Operation in this range is provided for in condition No. 8 of consent WGN970036 [33820 and 33821]. The intent of this condition is to manage saltwater intrusion risks. The condition states:

> 8.[3] If the 24 hour mean groundwater level at McEwan Park (site number 1428009) water level monitoring station, or any other official Wellington Regional Council water level monitoring station in the Petone and Seaview areas, is less than +2.3m relative to mean sea level, the permit holder may only abstract water at the discretion of the Manager, Consents Management, Wellington Regional Council. The permit holder shall notify the Manager, Consents Management immediately if the 24 hour mean 2.3m level is reached.

The purpose of this guideline is to improve clarity and decision-making efficiency when operation of the aquifer in the discretionary range is needed to maintain supply to the Wellington metropolitan area. This guideline does not cover all possibilities and does not commit Greater Wellington Regional Council or Wellington Water to any actions or timeframes.

Situations where discretionary abstraction may be required

Wellington Water aims to provide a safe water supply, minimise impacts on the environment and provide resilient networks to support the community. Loss of supply exposes the community to significant public health risks, so all practicable steps are taken to prevent this occurring. A risk management framework is used to assess the overall risk of supply shortfall and trigger appropriate interventions including demand management (refer ATTACHMENT 1). As the risk level increases there is a progressive increase in requirement for the community to reduce demand. This is achieved through water use restrictions and reinforced by community engagement (media releases, marketing, etc). The risk levels are:

Level 1 - Routine restrictions (daylight savings odds/evens watering)

Level 2 - Sprinkler & irrigation system ban

Level 3 - Outdoor water use ban (domestic only or total)

Level 4 - Emergency consents and rationing

The situations where discretionary use of the aquifer may be required and the approach to demand management is described in Table 1.

Table 1 Approach to demand management

Situation	Approach
1. Significant drought	Request discretionary use in combination with Level 3 restrictions (i.e. at least domestic outdoor water use ban).
2. Water shortage combined with significant community wide issue (e.g. pandemic lock-down, natural disaster, etc)	Request discretionary use with Level 2 restrictions (i.e. sprinkler and irrigation system ban) to prevent a more significant supply shortage occurring during a heightened level of community stress.
3. Major network outage or impairment	Consider on a case by case basis.

Moving to a domestic outdoor water use ban during a drought is a major step for Wellington Water and the community because the impacts are significant (i.e. gardens may die). This is considered an appropriate safeguard to ensure that discretionary abstraction is not over-used, and is only sought when there is a genuine need to protect the community water supply.

Discretionary abstraction from the aquifer also fits within a context of multiple sources of water used to meet system demand. During a drought when there is increased risk of supply shortfall, water sources will be prioritised in the following order:

i. Run-of-river surface water (maximise within consent limits)
ii. Waiwhetu aquifer (above 2.3m if possible, then discretionary)
iii. Macaskill Lakes (minimise use)

The above approach to prioritising sources aims to meet demand by fully utilising river sources and minimising use of Macaskill lake storage. The duration of a drought cannot be predicted so any lake storage used cannot be recovered until after the drought has ended. Preserving lake storage is therefore critical to preventing a more serious situation occurring.

Activation of the Community Infrastructure Resilience (CIR) network has not been considered here. CIR would only be available in an emergency situation which is beyond the scope of this guideline.

Saline Intrusion Risk Management Framework and HAMT

As aquifer pressures reduce, the risk of saline intrusion from the offshore part of the aquifer increases. Aquifer pressures are actively managed by Wellington Water through abstraction rate adjustment to meet consent requirements.

To address the need for greater clarity of expectations when operating the aquifer in the discretionary range, Greater Wellington Regional Council has prepared a saline intrusion risk management framework (refer ATTACHMENT 2). The framework describes risk indicators and required responses for both GWRC and Wellington Water. While compliance with the requirements of the framework is not mandatory, it represents mutually agreed good practice. Implementation of the framework is the responsibility of the **Hutt Aquifer Management Team (HAMT)** which has a key advisory, technical and science oversight function.

Information to be provided by Wellington Water

Wellington Water will work together with Greater Wellington Regional Council to implement the requirements of the Waihwetu Aquifer Saline Intrusion Risk Management framework.

Table 2 Information to be provided by Wellington Water summarises the information and supporting reports that will be provided by Wellington Water to the Greater Wellington Regional Council resource consent compliance officer as part of any request to abstract water from the Waiwhetu aquifer in the range 2.3-2.0m (measured at the Petone/Seaview foreshore).

Table 2 Information to be provided by Wellington Water

Information	Comment
1. Resource consent	Water permit WGN970036 [33820 – Waterloo, 33821 – Gear Island].
2. Request	Wellington Water requests permission from the Manager, Consents Management at Wellington Regional Council to abstract water from the Waiwhetu aquifer in the range 2.3-2.0m (measured at the Petone/Seaview foreshore). It is expected that this will be needed for a period of up to [insert timeframe] weeks. Note: this is permitted only at the discretion of the Manager, Consents Management (condition 8 of the resource consent).
3. Summer Demand Risk Assessment Report with the following. 3.1. Situation summary with overall level of risk 3.2. Water demand trend 3.3. Trends showing water available from all sources (Hutt, Wainuiomata/Orongorongo, Waiwhetu aquifer, Macaskill Lakes) 3.4. Description of network outages and emerging risks	Wellington Water to attach report. Additional commentary provided here if needed.
4. Hutt Aquifer Saline Intrusion Risk Management Report (prepared by the HAMT) containing the following. 4.1. Groundwater levels (foreshore and Taita Intermediate) 4.2. Onshore and offshore hydraulic gradients 4.3. Conductivity results 4.4. Water quality laboratory analyses	Wellington Water to attach report. Additional commentary provided here if needed.

4.5. Abstraction trends from Waterloo and Gear Island 4.6. Flow in the Hutt River at Taita Gorge 4.7. HADC model foreshore aquifer level predictions	
5. Water use restrictions in place and any changes expected.	Wellington Water to provide commentary.
6. Community engagement completed (type and frequency) and any changes expected.	Wellington Water to provide commentary.
7. What are the alternatives to operating the aquifer in the discretionary range and associated consequences (e.g. increase marketing to further reduce demand, use more lake storage with increased likelihood of a severe shortage if the drought continues, increase to total outdoor water use ban with impact on commercial businesses, increase to risk level 4 – water supply emergency notified to Regional Public Health and Territorial Authorities, etc)?	Wellington Water to provide commentary.
8. Is restriction of other users of the aquifer needed to protect the public supply? Note: there is a condition on all water permits in Lower Hutt which states there could be rostering or a requirement to reduce or cease their take if GWRC directs them to when the aquifer reaches 2.3m.	Wellington Water to provide commentary.
9. The requested timeframe for implementation (likely to be around 3 days)?	Wellington Water to provide commentary.
10. Recommendation from GWRC Environmental Science (supported by HAMT)	GWRC Environmental Science recommendation to Environmental Regulation.
11. Decision from Manager, Consents Management, Wellington Regional Council	GWRC Decision: abstraction from the Waiwhetu aquifer at foreshore levels of 2.3-2.0m for a period of up to [insert timeframe] weeks **is/is not** approved. Include additional requirements if necessary.

Considerations for Greater Wellington Regional Council

Greater Wellington Regional Council will manage the risk of aquifer saline intrusion using the conditions imposed in resource consents and the supported by the Waihwetu Aquifer Saline Intrusion Risk Management framework. A request by Wellington Water to operate the aquifer in the discretionary range will be compared against the requirements of the framework.

The HAMT will be convened and administered by GWRC to provide technical/science oversight and advice to support decision-making as necessary. It will comprise operational, technical and regulatory representatives from Wellington Water and GWRC. HAMT will be chaired by GWRC, and members will be confirmed annually prior to November. The scope and size of HAMT and the frequency of meetings will be scaled as needed depending on the issues to be addressed. External specialist advisors will be added to HAMT if/when required.

Appendix C : Water restriction communication graphics

Appendix D: Water restriction FAQs

Water Restriction Frequently Asked Questions (FAQs)

FAQ	1. Alternate day watering	2. Sprinkler and irrigation system ban	3. Outdoor water use ban	4. Emergency provisions
Can I still water my garden?	Yes you can, but only every other day. If you live in an even numbered house, you can use sprinklers or irrigation systems only on even numbered days between 6-8am and 7-9pm. If you live in an odd numbered house, the same rules apply for odd numbered days. You can use handheld watering devices any time, on any day, so long as you don't leave them unattended.	Yes, you can still water your garden using a handheld device only, any time of day, so long as you don't leave it unattended. At Level 2 there is a ban on sprinklers and irrigation systems.	No, unless you use grey water collected from your bath, shower, washing machine or kitchen sink, and water by hand.	No.
Can I still wash my car?	Yes you can, — we recommend washing your car using a bucket and a trigger nozzle on a hose on the lawn so that any run-off is absorbed into the ground.	Yes you can, — we recommend washing your car using a bucket and a trigger nozzle on a hose on the lawn so that any run-off is absorbed into the ground.	No, unless you use grey water collected from your bath, shower, washing machine or kitchen sink, and water by hand.	No.
My neighbour is using their sprinkler – should they be?	Only if it is between 6-8am and 7-9pm, on odd/even days of the month (depending on their house number).	No. If you are concerned about your neighbour's watering, you can contact your local council.	No. If you are concerned about your neighbour's watering, you can contact your local council.	No.
The bowling club/sports club/council is still watering their lawn, is that right?	Water restriction levels 1, 2 and 3 apply to residential properties only. Unless advised otherwise they do not apply to sports clubs used by the public or commercial businesses, and in this situation they are exempt. Commercial businesses are directly responsible for their water consumption, most are metered and pay for the water they use. Some golf courses and sport grounds have their own bores that they get their water from, which means they are not using mains water. Councils take steps to conserve water during summer, such as watering at night so the soil better retains the moisture. Councils want to play their part in conserving water as much as possible, but at the same time they don't want our parks and gardens to die, as it would mean that the grass would need to be re-sown. This would put winter sports at risk and incur a significant cost to ratepayers to repair community assets. If you have any concerns about unattended watering please let us know or contact your local council.	Water restriction levels 1, 2 and 3 apply to residential properties only. Unless advised otherwise they do not apply to sports clubs used by the public or commercial businesses, and in this situation they are exempt. Commercial businesses are directly responsible for their water consumption, most are metered and pay for the water they use. Some golf courses and sport grounds have their own bores that they get their water from, which means they are not using mains water. Councils take steps to conserve water during summer, such as watering at night so the soil better retains the moisture. Councils want to play their part in conserving water as much as possible, but at the same time they don't want our parks and gardens to die, as it would mean that the grass would need to be re-sown. This would put winter sports at risk and incur a significant cost to ratepayers to repair community assets. If you have any concerns about unattended watering please let us know or contact your local council.	Water restriction levels 1, 2 and 3 apply to residential properties only. Unless advised otherwise they do not apply to sports clubs used by the public or commercial businesses, and in this situation they are exempt. Commercial businesses are directly responsible for their water consumption, most are metered and pay for the water they use. Some golf courses and sport grounds have their own bores that they get their water from, which means they are not using mains water. Councils take steps to conserve water during summer, such as watering at night so the soil better retains the moisture. Councils want to play their part in conserving water as much as possible, but at the same time they don't want our parks and gardens to die, as it would mean that the grass would need to be re-sown. This would put winter sports at risk and incur a significant cost to ratepayers to repair community assets. If you have any concerns about unattended watering please let us know or contact your local council.	In an extreme drought emergency there will be water restrictions for non-residential purposes. This is to make sure there is enough water to sustain human health and maintain essential services. The specific activities to be restricted will depend on the amount of water available at the time and will be advised by public notification.

FAQ	1. Alternate day watering	2. Sprinkler and irrigation system ban	3. Outdoor water use ban	4. Emergency provisions
My business relies on outdoor water use (house cleaners, nurseries etc.), what can I do?	You can continue to operate as normal, however we ask that you are pragmatic and responsible when watering.	You can continue to operate as normal, however we ask that you are pragmatic and responsible when watering.	Unless advised otherwise you can continue to operate, however we ask that you keep water use to a minimum.	In an extreme drought emergency there will be water restrictions for non-residential purposes. This is to make sure there is enough water to sustain human health and maintain essential services. The specific activities to be restricted will depend on the amount of water available at the time and will be advised by public notification.
Why are there restrictions when we've had so much rain?	There are a number of reasons why outdoor water restrictions are in place. Demand for water during daylight saving months increases, as people use more water outdoors in their gardens. The warmer, drier conditions also means that river levels drop and supply from rivers goes down. There are a limited number of reservoirs in the metropolitan Wellington region (and we have two storage lakes at Te Marua), and once these are full it doesn't matter how much it rains during winter they cannot collect any more water. This stored water needs to last the whole summer. There may be necessary repair or upgrade work being done to some of our treatment plants to make sure we are able to supply safe drinking-water that can also impact on supply availability. Outdoor water restrictions are in place across Wellington, Lower Hutt and Porirua during daylight saving months, and all year round for Upper Hutt and South Wairarapa, to help conserve water in preparation for the peak of Summer, when we normally need to use water from the storage lakes (typically late Jan/Feb/March, and into April).	There are a number of reasons why outdoor water restrictions are in place. Demand for water during daylight saving months increases, as people use more water outdoors in their gardens. The warmer, drier conditions also means that river levels drop and supply from rivers goes down. There are a limited number of reservoirs in the metropolitan Wellington region (and we have two storage lakes at Te Marua), and once these are full it doesn't matter how much it rains during winter they cannot collect any more water. This stored water needs to last the whole summer. There may be necessary repair or upgrade work being done to some of our treatment plants to make sure we are able to supply safe drinking-water that can also impact on supply availability. Outdoor water restrictions are in place across Wellington, Lower Hutt and Porirua during daylight saving months, and all year round for Upper Hutt and South Wairarapa, to help conserve water in preparation for the peak of Summer, when we normally need to use water from the storage lakes (typically late Jan/Feb/March, and into April).	There are a number of reasons why outdoor water restrictions are in place. Demand for water during daylight saving months increases, as people use more water outdoors in their gardens. The warmer, drier conditions also means that river levels drop and supply from rivers goes down. There are a limited number of reservoirs in the metropolitan Wellington region (and we have two storage lakes at Te Marua), and once these are full it doesn't matter how much it rains during winter they cannot collect any more water. This stored water needs to last the whole summer. There may be necessary repair or upgrade work being done to some of our treatment plants to make sure we are able to supply safe drinking-water that can also impact on supply availability. Outdoor water restrictions are in place across Wellington, Lower Hutt and Porirua during daylight saving months, and all year round for Upper Hutt and South Wairarapa, to help conserve water in preparation for the peak of Summer, when we normally need to use water from the storage lakes (typically late Jan/Feb/March, and into April).	This situation is unlikely to occur unless we experience an extreme drought or a significant failure in the water supply system (e.g. unplanned water treatment plant outage).
Can the kids still play in the sprinkler?	Only between 6-8am or 7-9pm, on odd/even days of the month (depending on their house number).	No. Sprinkler use is banned. But you can spray them with a handheld hose – preferably using a trigger nozzle. Use of water balloons is also ok.	No. Sprinkler and hose use is banned.	No.

FAQ	1. Alternate day watering	2. Sprinkler and irrigation system ban	3. Outdoor water use ban	4. Emergency provisions
Can I still fill my pool?	Yes.	Yes, but you must be holding the hose as it fills the pool – any unattended water use is not permitted. We ask that people are as pragmatic and responsible as possible and consider using public pools as an alternative.	No.	No.
Can I still waterblast my own home?	Yes.	Yes – assuming you are holding the waterblaster.	No.	No.
What are some other ways that I can water my garden?	You can water you garden with grey water collected from your bath, shower, washing machine or kitchen sink.	You can water you garden with grey water collected from your bath, shower, washing machine or kitchen sink.	You can water you garden with grey water collected from your bath, shower, washing machine or kitchen sink.	You can water you garden with grey water collected from your bath, shower, washing machine or kitchen sink.

Appendix E : Risk Indicator Dashboard

The live risk indicator dashboard is maintained in the Infrastructure Data reporting system.

Wellington Water ref: (e.g. for 2021/22 summer):
https://app.infrastructuredata.nz/WTD/Dashboards/2135?from=2021-10-01%2000:00&to=2022-05-01%2000:00

Example risk assessment dashboard

Infrastructure Data

Wellington Water

WW - Overview
Summer Demand Management - Wellington metropolitan area

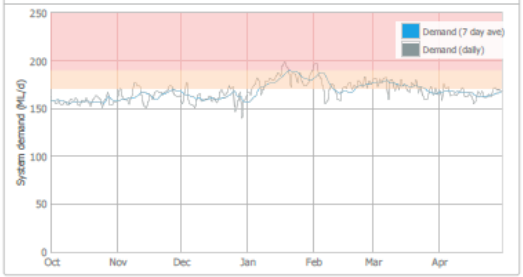
Wellington Water
Page 1 of 2

Covers the period of 01/10/2021 to 01/05/2022

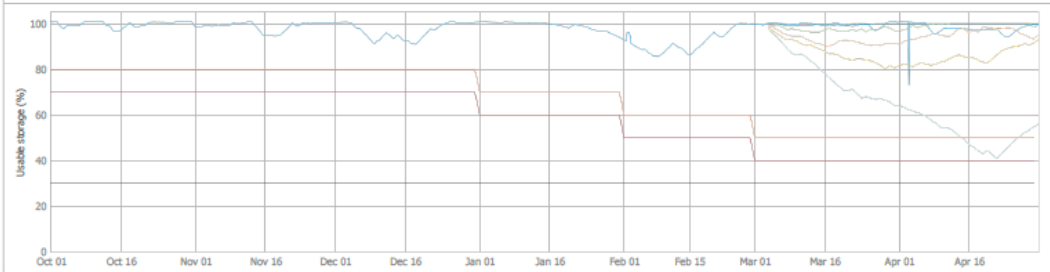
Overall situation

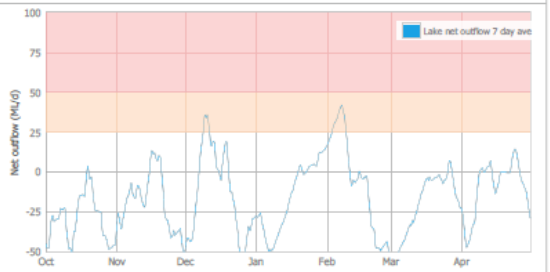
Summer Demand Risk Meetings are complete for the 2021-2022 Summer Period:
Overall level of risk is Green (Level 1 - Routine). The weekly dashboard report will continue to be sent out over the winter period however the commentary in this section will not change. The WTP risks and Karaka Model results will also not be updated. The drought risk management meetings will commence again in October in preparation for the 2022-2023 Summer Period.
Standing Actions:
1. **Communications and Engagement Team** - Retain Level 1 restrictions (routine odd/evens watering restrictions) for the relevant councils.
2. **WTP Team** - Return to the Optimiser (least cost method) operating mode, but maintain preparedness by preserving Macaskill lake storage as much as practicable and monitor aquifer abstraction 12 month average trend.
3. **Summer Demand Risk Committee** - Commence weekly reviews again in October 2022.

Water Demand

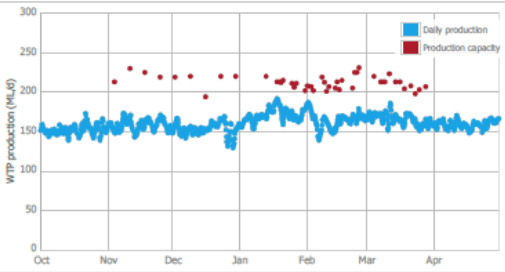


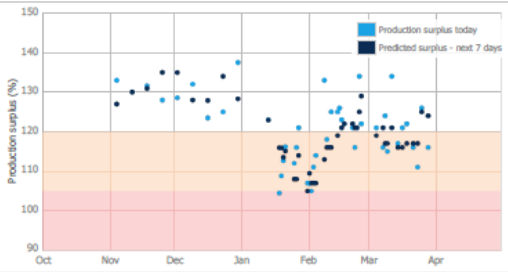
Macaskill Lake storage and Karaka Model prediction (percentiles - 1, 5, 10, 20, 30) - LAST UPDATED MARCH 2022



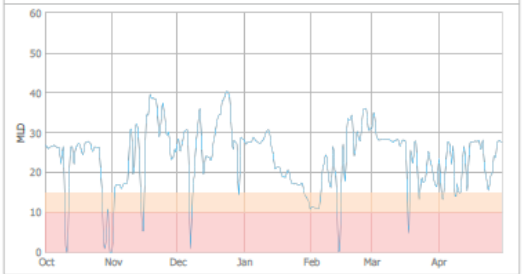


Treatment plant headroom





Wainuiomata WTP production



Example risk assessment dashboard (ctd)

Infrastructure Data

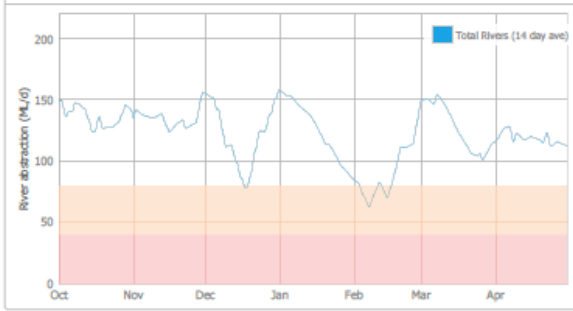
Wellington Water

WW - Overview
Summer Demand Management - Wellington metropolitan area

Wellington Water
Page 2 of 2

Covers the period of 01/10/2021 to 01/05/2022

River abstraction (Te Marua + Wainuiomata WTP's)

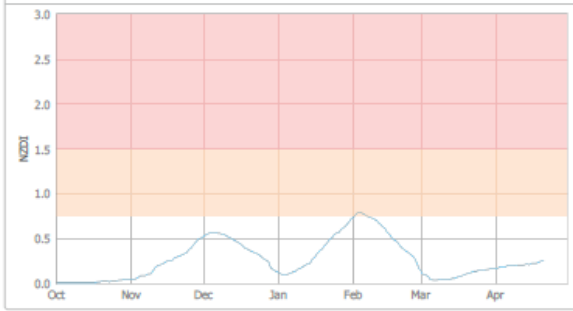


Aquifer level (McEwan Park)

Network outages and emerging risks - LAST UPDATED MARCH 2022

WTP & Network Risks will not be updated again until October 2022:
Waterloo WTP - Approximately 100ML/d max available.
Gear Island - 28 ML/d available if required.
Te Marua WTP - Split stream automation is available, normal supply capacity can be increased from 85ML/d to 100ML/d when river conditions are suitable.
Wainuiomata WTP - Approximately 30ML/d available when conditions are suitable.

NIWA Drought Index for Wellington



Appendix F : Water Restriction Exemptions (under development)

The Tables below outline the restriction levels implemented throughout a drought and example exemptions that may be developed further by Wellington Water. This table is under development and is not currently used during restriction periods. All text regarding example exemptions are based on UK best practice and require interpretation before being applied to the Wellington context.

Restriction level	Description	Summary of potential exemptions for consideration and consultation with the community
No restrictions	No restrictions implemented	None required
Level 1	Alternate day watering implemented	None required
Level 2	Sprinkler and irrigation system ban. Including irrigation systems and unattended hosepipes.	At Level 2 outdoor watering is permitted by hand (i.e. with a hosepipe or watering can). Potential cases for exemption include: On the grounds of disability. Use of approved drip or trickle irrigation systems that are fitted with pressure reducing valve (PRV) and timer. To water food crops at domestic premises or private allotments. To water newly laid turf for the first 28 days. To water newly brought plants for the first 14 days.
Level 3	Outdoor water use ban	At this stage all outdoor water use is banned for residential customers, apart from instances such as for health or safety purposes. Some restrictions may be introduced for non-residential customers, including exemptions.
Level 4 – Emergency provisions	Refer to Emergency Response Plan	Major restrictions on all customers. Restrictions to a range of non-residential customers will be introduced.
Lifting restrictions	All restrictions are lifted	None required

A number of different categories of non-residential water restrictions were identified in Table 6-2 (section 6.2.2). Potential exemptions to these restrictions should be developed. Some suggestions are provided, based on best practice followed by the UK water industry (UK Water Industry Research, 2013).

Non-residential water restrictions could be introduced from the introduction of Level 3 restrictions. They could be introduced on a selective basis, i.e. those with potentially the greatest benefit and

least impact could be introduced first, with additional restrictions introduced as the drought deepens.

Non-residential Restriction Category	Potential exemptions for Wellington Water to consider	Notes
Watering of public gardens	Watering of public gardens with a very high amenity or similar values.	• Watering of public gardens may be possible with non-potable water, if this can be made available.
Watering outdoor plants and landscaping on non-residential premises	The purpose specified does not include watering plants that are: a. Grown or kept for sale or commercial use; or b. Part of a National Plant Collection or temporary garden or flower display	Other potential exemptions to consider: • Use of an approved drip or trickle irrigation system fitted with a PRV and timer • Watering newly-bought plants (potentially for a period of up to 28 days)
Filling or maintaining a non-residential swimming or paddling pool	The purpose does not include filling or maintaining a pool that: a) Is open to the public; b) Where possible necessary in the course of its construction; c) Is designed, constructed or adapted for use in the course of a programme of medical treatment; d) Is used for the purpose of decontaminating animals from infections or disease; e) Is used in the course of a programme of veterinary treatment; f) Where fish or other aquatic animals are being reared or kept in captivity; g) Is for use by pupils of a school for school swimming lessons.	Other potential exemptions to consider: • Swimming pools serving industrial training if this is considered justified • Swimming pools with covers; • Pools with religious significance; • Pools fitted with approved water conservation or recycling systems; • Pools that are subject to significant repair and renovation • Definition of a public pool, i.e. if it may only be used by paying members of an affiliated club or organisation.
Irrigation of sports grounds, playing fields and golf fairways	Potential exemptions to be considered for sports grounds and playing fields based on amenity and health and safety purposes.	• Non-potable water may be made available in order to enable sports grounds and playing fields • It may be important to continue to water sports ground to enable the grounds to be maintained and to protect the playing surfaces.

Non-residential Restriction Category	Potential exemptions for Wellington Water to consider	Notes
		• Note only the watering of golf fairways would be restricted, not greens • Sharing of best practice in terms of volumes required for watering
Cleaning of non-residential premises	a) Cleaning of any exterior part of a non-residential building or a non-residential wall for health or safety reasons b) Cleaning part of a building or structure for the removal of graffiti	Businesses which exist to clean residential or non-residential buildings using hosepipes could be exempt under a certain water efficiency threshold.
Filling or maintaining a pond, fountain, water features and outdoor aquariums (including wildlife ponds)	Potential exemptions for filling or maintaining a pond in which fish or other aquatic animals are being reared or kept in captivity.	Consider whether an exemption should be made for filling a pond using a hand-held container.
Watering of plants grown for commercial purposes (turf, nurseries, etc.)	Exemptions should be made for commercial growers who operate efficiently.	Non-potable water may be made available in order to enable the watering of plants for commercial purposes to continue.
Use of water in construction	a) Water used for the purposes of construction is exempt b) Suppressing dust where required to comply with Resource Consent conditions or for health and safety	Non-potable water may be made available for dust suppression at construction sites.
Cleaning of industrial plant	Cleaning of industrial plant using a hosepipe for health and safety reasons is exempt.	
Cleaning windows of non-domestic premises	a) Cleaning of windows using water-fed poles for window cleaning at height is permitted for health and safety purposes. b) Cleaning of windows for the removal of graffiti.	This exemption should also apply to businesses cleaning the windows of domestic premises.

Non-residential Restriction Category	Potential exemptions for Wellington Water to consider	Notes
Cleaning any vehicle, boat, aircraft or railway rolling stock (including washing of buses, taxis, food transport trucks, emergency services and garbage vehicles)	a) Cleaning vehicles for health or safety reasons b) Cleaning using low water use technologies c) For the purpose of the removal of graffiti d) For the purposes of bio-security	Consider an exemption for businesses who clean vehicles using hosepipes.
Commercial car washes (with different levels of water recycling)	a) Operating a mechanical vehicle-washer for health or safety reasons b) Operating a vehicle washer which recycle water	Vehicle washers that recycle water are likely to be more efficient than washing a vehicle by hand. Develop a minimum use / wash target that can receive an automatic exemption.
Irrigation of crops		Identify any customers which use mains water for the irrigation of crops and the potential impact of restrictions to this activity.
Cleaning hard surfaces and/or cleaning for health and safety purposes	a) Cleaning for health or safety purposes b) For the removal of graffiti	Consider a potential exemption where low water use technologies are used.

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