Selwyn District Council

Water Conservation and Demand Management Plan

September 2023

www.selwyn.govt.nz

1 Demand Management Overview

The objective of this Water Conservation and Demand Management Plan (WCDMP) is to provide an overview of mechanisms employed by Selwyn District Council (Council) to monitor, conserve and manage demand for water. It also documents when water restrictions will be triggered. This plan is part of the strategy how Council will give effect to Te Mana o te Wai. It priorises the health and wellbeing of the water supply by ensuring demand is managed especially during period of high-water use.

Reference should be made to water safety plans for scheme specific information and details of specific water supplies.

1.1 Capacity Assessment and growth

A water supply capacity assessment is undertaken for all of the community drinking water supplies. These assessments have been completed to varying levels of detail relative to the nature of the supply, known issues, and anticipated growth pressures. The capacity assessments include hydraulic models for larger/complex schemes which may have significant growth projections. The models have been built and calibrated to international best practice to carry out the '30 year Water Infrastructure Master Planning'.

Master planning provides an assessment of the sizing and timing of new infrastructure for new water sources, treatment systems and pipelines to service growth. Part of the master planning requires a water balance to be developed to forecast growth, using historical peak demand per household. The water balance forecasts the peak instantaneous flow per year versus the water resources available to determine the staging of system upgrades. Ideally the source staging assumes that one source/method of extraction is redundant for each water supply, to take into consideration maintenance of infrastructure, planning/timing of new sources and security of supply i.e. to maintain average/peak demand.

Population projections are based on Council 'Household Projections 2021 to 2051' and have been applied to the latest connection figures for each township, as provided by SDC.

1.2 Operation and Maintenance

Unallocated Demand and Non-revenue Water

Council sources and treatment systems include provision for manual or automated flushing based on certain source water quality and/or compliance parameters, such as time from start-up, UV dose, turbidity , UVT and chlorine residual. Similarly, there is a requirement for regular maintenance and flushing within the network and at reservoirs which represent usage that is not domestic or commercial metered demand (for on-demand schemes) or allocated demand (for restricted schemes). Night time flows, alarmed high flow rates and changes in usage which might represent leakage are monitored by Council and maintenance contractor staff and actively investigated.

Leak Detection Programme

The water loss within the reticulation for each scheme is then calculated and from a leak reduction programme is then developed and implemented. Leak reduction involves reducing levels of leakage in the water supply network. Leak reduction can provide significant savings on total average flow in the water networks, therefore while it does not target peak demand, there are significant cost savings in total demand reduction.

The main advantages of this approach are that it:

- Does not rely on customer participation to be successful;
- Reduces operational costs; and
- Provides information on the condition of the network.

The main disadvantage is that work can disrupt supply to customers.

Council engages a consultant to carry out water balance calculations across the schemes. A water balance is a 'top-down' approach for identifying where water supplied into a water supply distribution network is utilised, and is typically used to establish the level of water loss occurring in a water supply network. National and international adopted definitions, performance indicators and practices for calculating a water balance have been used in this exercise. An explanation of each of the main components of the water balance is covered in the report including overview of the information, processes and findings associated with the analysis.

Reduced Pressure

Council operates its water supplies at a moderate pressure (generally between 350 to 450kpa) which reduces the impact of water leaks.

Council automatically adjusts the reticulation target pressure on some schemes based on reservoir level. That is, as the water level in the reservoirs drop so does the target pressure the pump station tries to meet. This setup helps to preserve reservoir storage and system failure by reducing water use by lowering the operating pressure.

An example of where this may be used is when, in summer, water demand is greater than the supply. Once the reservoir drops below 50% the operating pressure of the system is reduced to conserve water whilst maintain minimum flows and system pressures for potable use and firefighting requirements.

The advantage of this approach is that it does not require customer participation to achieve results. However, it does impacts the level of service received by the ratepayer.

Renewal Programme

The annual water mains renewal programme helps to maintain the infrastructure in a good condition and mitigate potential water losses in the network.

The water mains renewal programme is a key component of Council's Annual Plan, with a significant annual investment allocated to replacing pipes identified as being in poor condition.

1.3 Regulatory

Water Supply Bylaw 2008

The water supply bylaw was written for the purposes of managing, regulating against, or protecting from damage, misuse, or loss, or for preventing the use of; the land structures, or infrastructure associated with the water supply. It also allows Council to apply water restrictions, restrict and or meter the supply to reduce unnecessary and unauthorised water use and loss, and fix leaks where the owner does not do so.

Owners must not allow water to run to waste from any pipe, tap, or other fitting or allow leaks to continue unchecked or unrepaired, and allow the unattended operation of hoses. Owners are also required to maintain devices that have been installed for the purposes of water demand management. Failure to comply with the bylaw can result in an infringement notice or fine.

District Plan

The Selwyn district plan recognises the value of water resources. In the townships contained in the Selwyn District, the District Plan uses the following basic strategy to address issues relating to water:

Water Quality

The District Plan focuses on maintaining and improving water quality because:

- It is the most significant water issue in Selwyn District; and
- It is not easily managed through controlling discharge permits alone.

The District Plan does this by:

- Requiring any proposed activity to demonstrate that it can be supplied with water supplies, and

effluent and stormwater treatment and disposal, without adversely affecting the environment.

- Requiring activities to have reticulated sewage treatment and disposal where the Regional Council will not issue discharge permits for onsite effluent disposal.
- Rules to manage effects of activities along the edge of waterbodies – earthworks; structures; hazardous substances.
- Rules to manage effects of erecting structures across waterbodies and permanent moorings.
- Rules to take esplanade strips to protect the natural character of waterbodies, and esplanade reserves to allow public access along specifically identified waterbodies.
- Voluntary programmes to enhance vegetation planted along waterbodies and the opportunity to use esplanade reserves, strips and planting to improve amenity and natural character.
- Focusing on water quality, the Plan provisions should also help:
    - To maintain and enhance the ecological habitat values of the waterbodies and riparian margins; and
    - To protect or enhance the values of sites of mahinga kai, waahi tapu and waahi taonga.

In the rural areas of the District, the District Plan uses the following basic strategy to address issues relating to water.

Ground and Surface Water

- Most of these issues are managed by Environment Canterbury
- The District Plan:
    - Requires people to keep the zones of influence from wells and septic tanks within property boundaries.
    - Manages activities near waterbodies to reduce the risk of accidental discharges.

Riparian Margins and Waterbodies

- Provisions to manage activities likely to affect the natural character of riparian margins (earthworks, structures, tree planting and hazardous substances).
- Policies and rules to create esplanade strips to protect the natural character of waterbodies.

Activities on the Surface of Water

- Policies and rules to manage the use of motorised craft on small and medium lakes.
- Policies and rules to manage structures across the surface of water and permanent moorings.
- Monitoring activities on the Waimakariri and Rakaia rivers.

Water Restrictions

Water restrictions enable reduction of peak flows with quick implementation. The main disadvantage is that they are entirely reliant on residents participating and after a restriction is lifted residents return to their normal behaviour. Restrictions are used to reduce demand by implementing various levels of restrictions.

In summer water consumption in the Selwyn District can increase significantly due to the warmer weather. Many of the Council's water supplies would struggle to meet demand should water conservation and demand management not be implemented. Without the WCDMP issues such as the following might be experienced:

- Depletion of reservoir storage;
- Pressure drops throughout the reticulation;
- Exceeding resource consent limits for source water extraction;
- Source water levels reducing below extraction limits/infrastructure constraints (e.g. level of pump in well or depth of well); and
- Reduced firefighting capacity.

The objectives of the water restrictions are to:

- Inform residents of the introduction of water restrictions;
- Reduce water consumption in the target areas immediately/in the short term;
- Modify water consumption behaviour in the long term; and
- Enable residents to gain an increased understanding of the factors contributing to the current water demand issues.

Letters, emails, texts, media releases and updates to the Council website were used as a medium of communication for residents.

The following table outlines details of four levels of restrictions for water supplies under SDC's control. Water restrictions can be initiated by the Group Manager Infrastructure & Property or as delegated to staff. Water restriction level changes and escalation are discussed further in Section 2.7

Table 1 Water Restriction – Action Levels

Levels	Actions
Level 1	• *No watering of lawns by irrigation, hose or sprinklers, is permitted between the hours of 6am to 9am and 4pm to 9pm* • *Garden watering (not lawns) by hand is permitted at any time* • *There is a requirement to decrease demand especially during peak periods.*
Level 2	• *No watering of lawns or gardens, by irrigation, hose or sprinklers, is permitted between the hours of 6am to 9am and 4pm to 9pm* *(Note. If watering during the daytime we recommend choosing a cooler day to reduce evaporation.)* • *Garden watering (not lawns) by hand (such as watering can (not a hose)) is permitted at any time* • *There is a requirement to decrease demand especially during peak periods*
Level 3	• *No watering of lawns is permitted* • *No watering of gardens, by irrigation, hose or sprinklers, is permitted.* • *Hand garden watering (not a hose) is permitted at any time, but total ban on domestic sprinklers and irrigation* • *There is a requirement to decrease demand*
Level 4	• *Total ban on all external non-essential use of water* • *Consumers may carry water using a bucket, watering can or similar to maintain plants as necessary*

Rating Structure

There is a district rate for all urban water supplies. Council meter all "on demand" properties. Water metering and charging on a volumetric basis highlights to users the cost of water use.

1.4 Water Management

Water Metering

Water metering has been introduced in many townships, this has enabled consumers to place an appropriate value on clean safe water. Adopting a volumetric pricing charge encourages people to reduce their water use. The advantages of this approach are:

- Fair and equitable user pays system;
- Efficient use of water promoted; and

- Incentive for property owners to fix their leaks.

The disadvantage of this approach are the costs of meter purchase, installation, reading and maintenance.

It has however shown a marked improvement to consumption since the introduction of water metering with consumption dropping in some areas where development hasn't taken place. It's hard to determine in the supplies where growth is still high as people are still trying to establish gardens and lawns from new builds.

Water Balance Monitoring

Council has used a water balance approach to measure estimated water loss within the network. The water balance can be also be used to monitor the amount of non-revenue water flowing within the network.

A water balance is calculated each year. This enables Council to monitor non-revenue water and water loss over time. Calculating the percentage of real water loss is also a key performance indicator as per legislative requirements, which is reported within the annual report.

This water balance will also enable leak detection work to be prioritised.

Water Network Monitoring

SCADA is utilised to continually monitor water consumption in relation to consented water takes allowance and system performance. In particular Council monitors:

- Abstraction Rates
- Reservoir Levels
- Network Pressures

In conjunction with SDC staff monitoring, SCADA alarms are set so to alert staff when certain events take place. For example, if a reservoir drops to a certain level, or pressure within the reticulation is too high/low. SDC will continue to monitor water network via SCADA and add more monitoring points when appropriate.

Environmental Monitoring

SDC monitors environmental attributes, these include:

- Groundwater Levels
- River Flow levels

Environmental attributes are monitored by SDC as these impact on abstraction limits and system performance.

Restricted supplies

Where Council supplies water to a large property (generally over 2500m^3) a restricted supply is provided. This allows Council to provide a set volume of water per day by restricting the flow rate to that property.

1.5 Education and Information Initiatives

Selwyn District co-ordinate a number of Educational and Information initiatives to influence water use choices and raise community understanding of water related issues. Educational campaigns are used by Council annually to reduce water demand. Education programmes are implemented to engage the community and take a proactive approach to water demand management. The benefits of this approach is that it can increase consumers understanding of their water use and the Councils assets and operations.

Types of Education

There are many different ways to carry out water conservation education with the effectiveness depending on the target audience, these include, but aren't limited to:

- Signs in public places such as shop windows which describe water issues and the need to conserve water
- Development of a school education programme
- Social media campaign
- Newspaper articles

The most important message to get across is why and how to conserve water. The benefits of an education program is to:

- Instil good habits in water users;
- Increase public awareness of environmental constraints and influences; and
- Reduce peak and total daily demand.

The main disadvantage of this approach is that it can be difficult to induce behavioural change without financial incentives. Educational programs may also have intangible benefits that are difficult to measure such as growing awareness of water issues.

The other challenge that Council face is that there is a traditional mind-set of abundant water. Council will compete with the perception of plentiful water and water wastage that is created by the public seeing farm irrigation nearby.

Targeted Water Audits

Analysis of water meter data has shown that there are schemes where a small number of users utilise a significant portion of the available water. Council staff may offer targeted advice to reduce water use.

2 Water Conservation and Demand Management Plan

Section 1 provides an overview of demand management activities undertaken by SDC. However, the two most effective methods to actively reduce water consumption in times of drought or water shortage include pressure management and water restrictions.

Water conservation and demand management addresses environmental flow and peak demand management issues (including drought) by providing levels that will trigger implementation and subsequent de-escalation of a response.

The roles and responsibilities of the stakeholders belong to:

Table 2 External Stakeholders

Stakeholder	Roles
Canterbury Regional Council (ECan)	– Provide overview of the river and ground water management – Provide stakeholders with information – Ensure resource consents are being met
Public Health Unit / Taumata Arowai	Not involved in day to day operations but will need to be notified if notifiable and or emergency situation arises
FENZ	– Provide stakeholders with information

The roles and responsibilities within Council belong to:

Table 3 Council Roles and Responsibilities

Selwyn District Council	Roles
Water Services Delivery Team	– Monitor water use – Renewals programming – Organise setup and implementation of contingency measures when required – Monitor water use alert levels and communicate timing for Alert Levels to be implemented and removed – Coordinate review of summer water use campaign and any drought response required – Coordinate review of water use campaign and any drought response required
Water Services Asset Management Team	– Consider recommendations made in these reviews and consider asset upgrades – Infrastructure Master Planning and Asset Management Planning – Rating
Communications Team	– Maintain communication with internal and external stakeholders – Educational programme implementation

CORDE Limited	– Monitor water use – Adjust and manage network to best meet demand requirements – Provide assistance to the operations team as required. – Leak Detection

2.1 Monitoring

The Delivery Team in conjunction with CORDE carries out monitoring of the demands on all systems including abstraction, consumption, reservoir levels, network pressures and flows.

At the beginning of summer, around November each year, assuming that trigger levels have not been reached already, the team will undertake an assessment of summer climate outlook. This will involve checking long term forecasts and outlook predictions made by NIWA.

2.2 Summer Climate Outlook Monitoring Data Sources

Data is sourced primarily from the following sources/websites:

- Council SCADA System
- Canterbury Regional Council - http://ecan.govt.nz
- NIWA - http://www.niwa.co.nz
- Metservice - http://metservice.com

2.3 Triggers

Triggers guide staff when to initiate water demand management actions. Without these triggers resources may be used too early or not implemented soon enough. Regular review of these triggers is important as climatic conditions, resource consent conditions, groundwater levels and surface water flows may change over time.

The following table describes key triggers that would instigate a demand management action.

Table 4 Trigger Levels

Trigger	Description
A	Demand within 95% of or exceeds daily flow consent limits
B	Pressure drops below 250kPa for more than 1 hour on two days within a week due to lack of source capacity
C	Reservoir levels drop below 40% for more than 3 hours on two days within a week
D	Groundwater monitoring bores reach trigger levels – refer to Consent Specific Water Demand Management Trigger Levels Table
E	River gauging site reaches trigger levels – refer to Consent Specific Water Demand Management Trigger Levels Table
F	Water abstraction capacity reduced to a level where average daily demand cannot be met

2.4 Scheme trigger overview

The following table identifies which triggers are relevant to each scheme.

Table 5 Scheme Specific Triggers

Scheme	Triggers	Scheme	Triggers
Acheron	A,C,F	**Hartley's**	A,C,E
Arthur's Pass	A,B,C,F	**Prebbleton**	A,B,F
Castle Hill	A,B,C,F	**Rakaia Huts**	A,B,C,F
Darfield	A,B,C,F	**Rolleston**	A,B,C,F
Dalethorpe	A,C,E	**Sheffield/Waddington**	A,B,C,E,F
Doyleston	A,B,C	**Southbridge**	A,B,C,F
Dunsandel	A,B,C,F	**Springfield**	A,B,C,E,F
Hororata	A,C,F	**Springston**	A,C,F
Jowers Road	A,C,F	**Tai Tapu**	A,B,C,F
Kirwee	A,B,C,F	**Taumutu**	A,B,C,F
Lake Coleridge	A,B,C,F	**Te Pirita**	A,C,F
Leeston	A,B,F	**Templeton (Claremont)**	A,B,C,F
Lincoln	A,B,C,D,F	**West Melton**	A,B,C,F

2.5 Consent Specific Water Demand Management Trigger Levels

The following table relates to Triggers D and E.

Table 6 Scheme Specific Triggers

Scheme	RC Number	Measuring Point	Trigger Level	Action Taken
Darfield	CRC143985	Bore L35/0171	Bore level 47 m BGL	Start to implement the measures as outlined in Demand Management Plan
		Bore L35/0163	Bore level 83.8 m BGL	Start to implement the measures as outlined in Demand Management Plan
		Bore L35/0806	Bore level as defined by correlation report for trigger level in bore L35/0806	Start to implement the measures as outlined in Demand Management Plan
MHRWS - Dalethorpe	CRC173785	Hawkins River @ Willow-Dalethorpe Road	Mean flow below 46 l/s	Start to implement the measures as outlined in Demand Management Plan
			Mean flow below 35 l/s	Shall not take a volume exceeding 562 m^3/day and continue to implement the measures as outlined in Demand Management Plan
Sheffield	CRC173786	Hawkins River @	Mean flow below 46 l/s	Start to implement the measures as outlined in

Scheme	RC Number	Measuring Point	Trigger Level	Action Taken
		Willow-Dalethorpe Road		Demand Management Plan
			Mean flow below 35 l/s	Shall not take a volume exceeding 909 m^3/day
			Mean flow below 24 l/s	Shall not take a volume exceeding 808 m^3/day
			Mean flow below 21 l/s	Shall not take a volume exceeding 707 m^3/day
Springfield	CRC991058	Waimakariri River @ Old Highway Bridge	Flow greater than 41,000 l/s but less than 63,000 l/s	The maximum rate of take during the next 24 hours shall be equal to the rate on attached graph (CRC990158B) that correlates to the flow in the Waimakariri River
			Flow at, or less than 41,000 l/s	For next 24 hours, shall not take a volume exceeding 245 m^3/day Start to implement the measures as outlined in Demand Management Plan
	CRC155932	Kowai River @ above Selwyn District Council Upper Intake	Flow greater than 425 l/s but less than 2,000 l/s	Start to implement the measures as outlined in Demand Management Plan
			Flow less than 425 l/s	Fully implement the measures as outlined in Demand Management Plan

2.6 Water Restriction Trigger Escalation Levels

Water Restrictions at a level defined in Section 1.3 will be triggered by one or more of the events identified in Section 2.3. It is not uncommon for water restrictions to jump levels depending upon the severity of the demand constraint. For example, a storm impacting surface water extraction where there is no alternative source, might immediately result in Level 4 restrictions. However, if water levels within a ground water source (with supporting history of recharge/GW level recovery) were declining at a slow rate over summer, staged implementation of restrictions might occur depending upon the speed of change and confidence in history of aquifer recovery under similar conditions.

When the trigger level (as defined in Section 2.3) is reached, Council staff will adopt a risk based approach to the level of water restrictions imposed, the duration restrictions are in place and subsequent de-escalation or removal. This approach will be documented and communicated to customers where appropriate.

2.7 Communications

As defined in Section 1.3, letters, emails, texts, media releases and updates to the Council website are used as a medium of communication for residents.

Some example/key messages which may be publicised with the water restrictions are:

- Water restrictions are now being introduced.
- The level of water restriction applied, a description of what that level means/requires and why it is being applied.
- Residents are being urged to immediately reduce their water usage (wording may include at peak

times or other defined period depending upon reason for water restriction)

- Water consumption is already high and is increasing significantly, mainly from residential water use for garden and lawn watering
- Water supplies in some locations are struggling to meet demand, in some cases resulting in significant pressure drops and depletion of reservoir storage
- A range of factors is contributing to the high demand including extreme weather conditions, low river flows, and continuing growth in some residential areas
- Council is working on improvements to increase capacity for a number of supplies

All communications regarding water restrictions must be reviewed and approved by the Executive Director - Infrastructure and Property prior to issue.