WATER STORAGE *on orchard*

BROUGHT TO YOU BY THE WATER STRATEGY WATER STORAGE WORKING GROUP

An increasing number of growers are investing in water storage for a range of reasons, including:

1 WATER SECURITY

Storage can ensure access to water for frost protection and plant survival when you need it.

2 BUSINESS RESILIENCE

Stored water can help with orchard management through long dry spells and heat waves, or an unexpected disruption to supply.

3 WATER HARVESTING

Water can be captured when it's most available and stored for later use.

4 WATER QUALITY CONTROL

Impurities can be removed from stored water before orchard application.

HERE'S SOME PROS AND CONS TO HELP YOU CONSIDER WHETHER WATER STORAGE IS A GOOD OPTION FOR YOU.

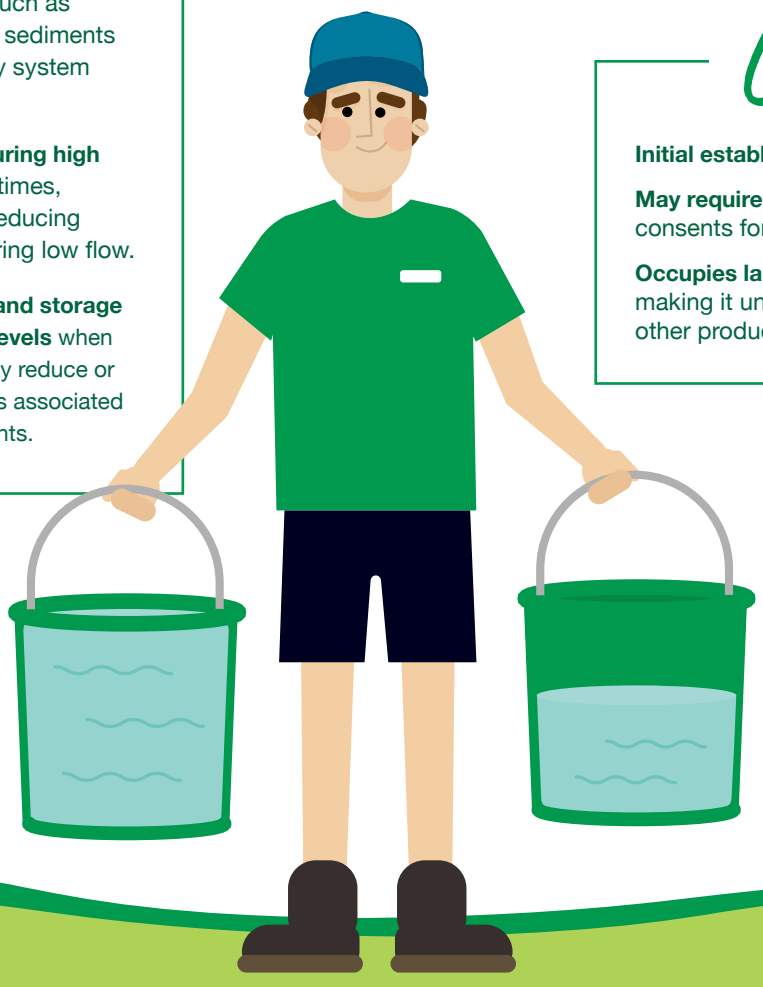
Pros

More control – you'll have the volume of water you need, when you need it.

Can settle-out impurities such as iron, fine sand/pumice and sediments – avoiding fruit and delivery system damage.

Allows water harvesting during high flows and consented take times, optimising allocation and reducing pressure on waterways during low flow.

Can enable the collection and storage of water within legal take levels when it's readily available. This may reduce or avoid costs and complexities associated with some water take consents.



Cons

Initial establishment work and costs.

May require earthworks or other consents for establishment.

Occupies land area on your property, making it unavailable for growing or other productive use.

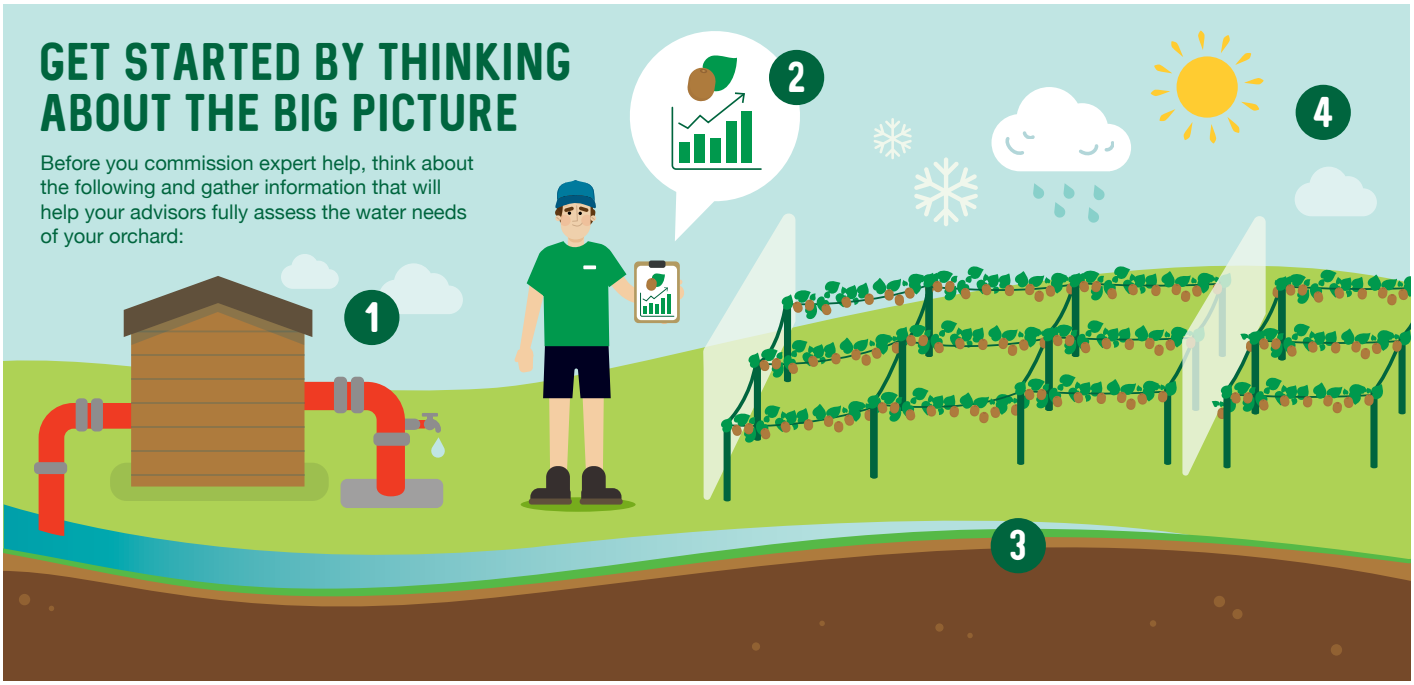
How much water do you need to store?

The first question to ask is whether you need irrigation or water storage at all.

Many orchards with regular rainfall and good soil moisture retention have operated well without irrigation in the past. But after two consecutive dry seasons and predictions of more to come, it may be timely for some growers to invest in irrigation systems or water storage to protect their high value kiwifruit crops. Irrigation systems can also be a useful tool for optimising production by more closely managing soil moisture and fertiliser delivery.

Specific water requirements will vary for each orchard, but kiwifruit needs are generally at least 3mm per hour/ha for frost fighting and around 4mm+ per day (40m³ per day/ha) for irrigation in the heat of summer.

A water consultant and/or engineer will be able to advise you on application rates, storage options, and help you to design for success.



1. WATER SOURCE AND ALLOWABLE TAKE VOLUME

- Are you using surface water, ground water or a community water scheme? Each option brings different factors that will need to be considered, including:
  - consent conditions or permitted take limits
  - environmental impacts such as on fish life in a stream
  - water quality including mineral or sediment content
  - consistency of water availability especially for surface water takes during dry weather.
- What does your current council water consent allow you to take? Knowing your water requirements and what you are allowed to take at any point in time is an important step in identifying how much storage you will need.

2. PURPOSE AND TIMING OF WATER USE

- Are you concerned about frost protection, or are you on a frost protected site, but keen to safeguard production in a dry year?
- Or, is your main aim to optimise production and increase yield on your vines?
- Are you caring only for mature vines, or will you have new plants that need water for the first few years?

3. SITE OPPORTUNITIES AND CONSTRAINTS

This will impact on your water storage decisions. Complete a site review to gather up information on your orchard's:

- soil type
- elevation changes
- climate
- orchard set-up
- space available for storage
- distance from water source to application

4. WEATHER DATA

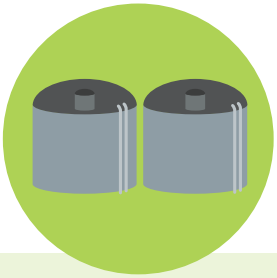
Having a good history of weather data for your orchard is critical for assessing your storage needs for frost protection. How low do temperatures go on your site? How many consecutive days of frost are typical? What is the extreme?

5. FUTURE PLANS

Are you planning any expansions or changes to your orchard that could impact water needs? Factor this into your design to make sure that the infrastructure you invest in will meet the needs of your orchard now and for the life-span of the system.

Water storage options

There are several ways to store water for orchard use. Some of the most common are outlined below.



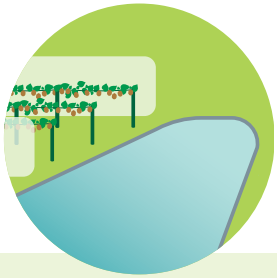
TANKS

Capacity:
Many options from <10m^3 to >30,000L (30m^3).

Material:
Plastic, concrete or coated steel, depending on budget, placement and sizing.

Construction:
Above or below ground.

- Often lower cost for smaller volumes than other options.
- Many tank types are movable, providing greater flexibility than other options.
- Tanks have less water holding capacity than other options.



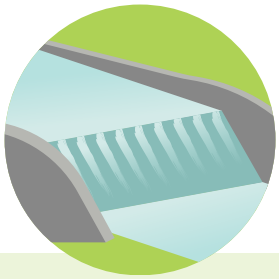
PONDS

Capacity:
Many options up to >1,000,000m^3 depending on placement and topography.

Material:
Often lined with clay or artificial liners to avoid leakage.

Construction:
Man-made design to capture, distribute and store water.

- Ponds allow flexibility with shape, size and placement, and can be suitable for multi-day supply.
- Large ponds may require resource or building consents prior to construction.



DAMS

While dams have been widely used in the past, they will be a less suitable option for most new developments as they are unlikely to meet modern standards of waterway care.

Construction:
Man-made barrier to hold back water within an existing water source, such as a river. All building work must comply with the Building Code.

- Only a viable option for properties with suitable topography and access to stream or river.
- New Zealand dam regulations are currently under review with standards likely to become more stringent as a result.

COMMUNITY WATER SCHEMES

Through a scheme, a group of water users can combine their individual water allocations to allow for more efficient water use through co-ordinated management. Being part of a water scheme can help growers access water when they need it, especially if others with allocation are not using it at that time – acting as a type of storage.

Capacity:
Can be any size depending on consent and infrastructure constraints.

Costs:
Community schemes vary in how they operate and how they charge for water. Sometimes funding can be available to assist with establishment. To be successful, community water schemes require strong leadership and governance from those involved.

Construction:
Includes shared infrastructure such as storage and transfer systems (pipes and pumps) to collect and distribute water from a river, groundwater bore or other source.

Find out more:

- Ask the council that manages your consent for a list of water schemes in your area.
- Talk to other water users in your area to find out if a community scheme exists or if there is interest/ need to create one.

Which option suits your site?

Not all water storage options will be suitable for your particular situation.

A water consultant or engineer will be able to help you determine what kind of storage best suits your site and water needs.

KEY CONSIDERATIONS:

LOCATION

Do you have the physical space available for your preferred water storage option? In some cases, you may need to convert productive land into water storage.

In some places, a particular type of storage system may create potential environmental impacts that will need to be minimised. In others, the right storage option and design may offer environmental benefits such as through sediment trapping or biodiversity enhancement.

COST

Installing a water storage system comes at a significant cost. Initial investment for design, consenting and infrastructure will be required as well as long term operating and maintenance costs. However, having an available, reliable supply of water in dry conditions will pay its way by enabling you to produce high quality fruit.

CONSENTS AND REGULATION

Consent requirements vary by region and by storage method. The consent process can take significant time to navigate. Think about starting this process early and consider engaging a consultant who is familiar with the process to help you work through this.

A range of national and local regulations may restrict what methods and areas you can use for water storage. For example, works in and around wetlands are restricted to protect these sensitive areas. Make sure you check with your local council to find out what rules would apply to your water storage plans before you start works.

TOP TIPS FOR WATER STORAGE SUCCESS

- Ask other growers what they've done and if you can, visit other orchards that are already using the system(s) you're considering. Ask those growers what the challenges and benefits have been for them.
- Get advice from credible water engineers, planning and irrigation experts. Using the right experts at the right time can help you navigate through the process from planning and design, to council approvals, installation and ongoing management.
- Consider all the options carefully; make sure you understand all the pros and cons before making your decision and get multiple quotes before choosing your preferred supplier(s).
- Whatever option you decide on, remember to check with your local council for consent requirements before you start work.

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