New Zealand Wine
Altogether Unique.

Freshwater Farm Planning for Viticulture

Mitigating risks to freshwater from viticulture

Enhancing our reputation and ensuring our sustainability

Version 1.1 released 10 September

A precious resource and a taonga, water is critically important to New Zealand's wine industry. Minimising our impact on water quality is key to ensuring our water supply remains both secure and clean for the future. Water is a key component of the New Zealand wine industry's Environment Strategy. Our industry Environment Strategy goal for freshwater is to be a world leader in efficient water use and the protection of water quality. Impact on water from viticulture and other primary sector farming activities is coming under increasing scrutiny from government regulators within New Zealand and gatekeepers to our offshore markets. Consequently, it is crucial that we continue to apply creative thinking and innovative solutions across our industry to protect this precious resource.

This document provides NZW members with guidance on how to manage the key risks posed by viticulture on our freshwater ecosystem. The positive actions proposed here will help members to enhance their efforts to protect freshwater quality and ease the transition to a regulatory environment which requires freshwater farm planning. Year by year, bit by bit, the positive actions we take will leave our industry, our world and our wine better for it.

These guidelines have been written in the context of the rules and regulations as they stand as at August 2024. If, and when there are changes to any regulations relating to freshwater farm planning these guidelines will be updated accordingly.

Dr Edwin Massey
GM Sustainability
New Zealand Winegrowers

Contents

Why do we need Freshwater Farm Plans? 4

What is a Freshwater Farm Plan? 4

What your Freshwater Farm Plan will cover 5

Understanding Freshwater Farm Plan definitions 7

Grape growing soils in New Zealand 9

Sediment loss in vineyards - risks and mitigations 10

Fertiliser loss from vineyards - risks and mitigations 13

Calculating quantities of phosphate fertiliser for application to sedimentary and ash soils 15

New developments and redevelopments 17

Sheep grazing 17

Drains 19

Riparian planting 21

Disclaimer:

This is a guidance document prepared by New Zealand Winegrowers Incorporated (**NZW**) for use by its members only, to help them identify the risks to freshwater on their sites and how to manage and mitigate those risks, which members will be required to do in their Freshwater Farm Plan (**FWFP**). Material may not be published or reproduced without the permission of NZW. This document represents NZW's general understanding and, while all due care and attention has been taken, it is not intended to be the definitive source nor is it intended to be a substitute for detailed advice in specific cases. It is important that all members understand the risks to the environment that are specific to their site. This information is provided strictly on the basis that NZW, and its officers, employees and agents, disclaim any liability of any kind for any inaccuracy, error, omission or other flaw in the information contained in this document, and for any loss and/or damage that may arise from reliance on the information presented.

Why do we need Freshwater Farm Plans?

70% of New Zealand's water is degraded*.

When not managed well, primary sector activities such as applying pesticides, fertilisers, clearing/draining/modifying land, and intensive farming/growing can be significant contributors to freshwater degradation and have adverse effects on biodiversity.

New Zealand's soils are highly erodible which contributes significant sediment and nutrients to waterways.

Our free trade agreements and securing market access are contingent on us enhancing our reputation for sustainability including the steps we are taking to improve the quality of our freshwater.

We want healthy water bodies that everyone can enjoy.

What is a Freshwater Farm Plan?

An environmental risk-management tool – to help you recognise on-vineyard environmental risks and sets out a programme to manage them.

One size does not fit all – there are regional risks and challenges as well as risks that are unique to a property and will differ depending on the site-specific characteristics, landscape and environmental conditions.

A Freshwater Farm Plan takes into account the local climate, soils, the type of farming activity, and the goals and aspirations of the land user.

---

* *Ministry for the Environment/Stats NZ https://environment.govt.nz/assets/publications/river-water-quality-state-and-trends.pdf*

Your Freshwater Farm Plan will:

For grape growers the main contaminants that Freshwater Farm Plans need to address are:

Nitrate

- High levels of nitrate in groundwater (drinking water) can affect human health.
- Nitrate in surface water (streams and rivers) promotes aquatic weeds that in turn can negatively impact other aquatic life by depleting oxygen levels. Prolific weed growth can also block waterways and interfere with fish passage.

Phosphate

- Most phosphate enters our rivers attached to sediment via runoff. Phosphorus is a nutrient that promotes aquatic weed growth which can block waterways and interfere with fish passage.

Sediment in waterways

- Sediment turns water murky, blocks fish gills, smothers the habitats that fish live in and promotes slime algae growth. Sediment often has phosphate attached to it.

E. coli

- E. coli in water is a strong indicator of sewage or animal waste contamination. Sewage and animal waste can contain many types of disease-causing organisms and consumption may result in severe illness. E. coli can be transported considerable distances and end up in aquifers that people use for water supply.

---

* *See page 7*

Walk-in-the-rain vineyard survey

Growers will need to undertake vineyard-scale assessments of erosion risk, and areas of sediment loss and nutrient loss through runoff and leaching from the vineyard. Those that graze sheep on their vineyard/s must also evaluate possible loss of excreta and pathogens from their vineyard, particularly during winter months of high rainfall and increased runoff.

Completing an erosion and sediment/runoff management plan:

Step 1:

Complete a walk-in-the-rain vineyard survey to assess where water accumulates and runs off your property.

Step 2:

Using a mapping solution such as Google Earth, map the vineyard with waterways (including surface drains) that are ephemeral, intermittent, or perennial, marking the direction of flow, and marking areas where water might accumulate at any time.

Step 3:

Take photos and videos of these areas during rain – they will be useful for your Freshwater Farm Plan.

- Note: You will be required to share with your plan certifier and auditor, photos of CSAs before mitigations were put in place, and what they look like after mitigations have been actioned.

Step 4:

Document and implement mitigations/control measures to contain sediment and nutrient runoff and reduce erosion. Take photos.

Understanding Freshwater Farm Plan definitions

Critical Source Areas (CSAs)

Critical Source Areas (CSAs) are overland flow paths that can accumulate and convey water (and contaminants) to waterways. Even if you don't have a waterway near your property, there can be low points where rainwater flows, carrying sediment, nutrients, and animal excreta. For example, water could run off a vineyard and down a road to a drain. CSAs can also be direct flows of contaminants, for example stock in streams or grazing next to a waterway that has no buffer.

An example of a CSA - surface water containing sediment and nutrients flowing from a vineyard into a drain.

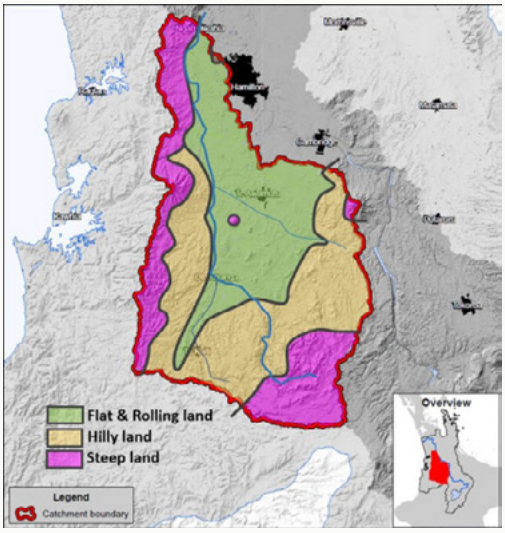
Certain free-draining soil types also pose a high risk of contaminants leaching to ground water.

CSAs can be small in size, but often contribute large proportions of sediment and/or nutrients.

In any catchment or vineyard, identification of CSAs is a necessary first step in freshwater farm planning and pollution control.

Land Units (LUs)

In a Freshwater Farm Plan the vineyard will be divided into Land Units (LUs). LUs are areas that have the same, or similar, soil type or topography. They are an area of contiguous or non-contiguous land with similar biophysical features. This may be soil type or structure, or propensity to drain well or not drain well, or propensity to erode/shed sediment, or of similar slope.



An example of Land Units (LUs) marked out on a farm
Sourced from Waikato Regional Council

Categories of waterways

Perennial

A waterway that always has water in it.

Intermittent

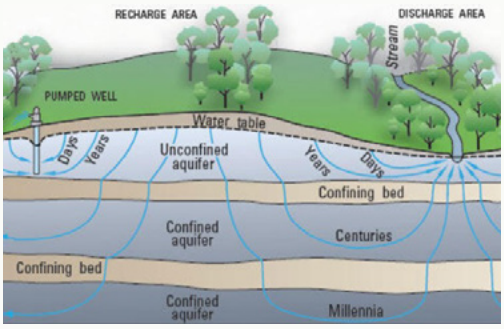
A waterway that is a temporary or seasonal river or stream and that ceases to flow every year, or at least twice every five years.

Ephemeral

A waterway that is a dry stream bed/water course and that flows as a river or stream after periods of rainfall.

Groundwater

Water that flows or collects beneath the ground. Groundwater originates from rainwater or snow melt and soaks into the ground, filling small empty spaces in soil, sediment and porous rock. Groundwater in an unconfined aquifer can make its way back to the surface.



Sourced from U.S. Geological Survey

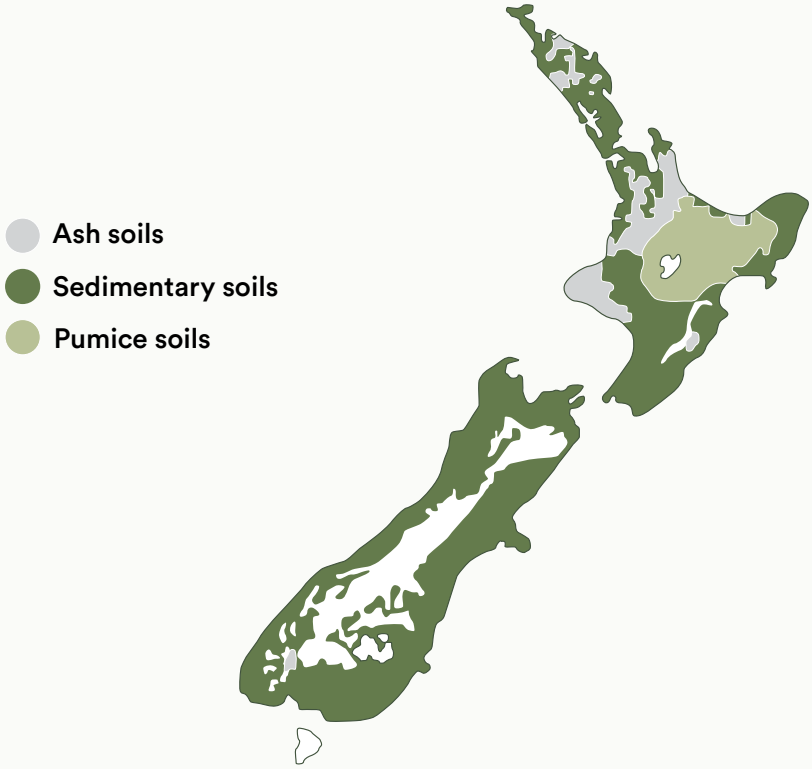
Grape growing soils in New Zealand

Sedimentary soils

Most grape growing regions in New Zealand are in areas where the soil types are sedimentary. Exceptions include parts of Auckland, Northland and Hawke's Bay that might have vineyards on ash soil. Sedimentary soil is highly erodible because the chemical forces that bind soil particles together are weak. Consequently, soil aggregates have propensity to break apart under heavy or persistent rainfall.

In many locations, sediment runoff is a significant environmental risk to waterways and action is required to prevent it from leaving the vineyard. When sediment reaches waterways, it can smother aquatic environments, clog fish gills, and kill aquatic species. Sediment also provides substrate for aquatic weeds to grow, suppressing more desirable native aquatic species. When aquatic weeds proliferate, they deprive the water of oxygen, cause eutrophic conditions (rot), and kill fish and invertebrates.

It is important to know the soil types and their physical and chemical properties in your vineyard so you can manage them accordingly.



Sediment loss in vineyards - risks and mitigations

Risk: Bare soil in vineyards = sediment, nutrient runoff, and erosion risk.

Most vineyards are sprayed-out or cultivated under vines. Many vineyard roads and tracks are bare of vegetation. Generally, a third of the vineyard is bare soil. Bare soil is at risk of being blown away by wind or washed away by rain. Phosphate attaches to sediment and is carried off the property in surface runoff. It is mainly through surface runoff that sediment (including nutrients like phosphate and nitrate, and animal excreta from sheep grazing in vineyard) leaves the vineyard and is at risk of entering waterways where it will impact freshwater quality and aquatic ecosystems.

Mitigations

- Complete a walk-in-the-rain vineyard survey and ascertain where water runs, where it collects or ponds, where it runs off your property, and where it connects with other waterways. Take photos and create a plan to mitigate the risk.
- Determine mitigations to alleviate surface runoff leaving the vineyard, for example: plan to plant low growing species around the vineyard boundary or allow grass sward (at least 2m wide) to grow during winter around the boundary. Winter is when surface runoff is most likely to occur.
- Refrain from spraying out fence lines as they provide a filter for runoff.
- Plant the edges of drains and waterways in low growing species like *Carex secta* or Gossamer grass *(Anemanthele lessoniana)*. These species tolerate wet and dry conditions and fold over in a flood allowing water to flow. They will also form a buffer and filter out sediment and nutrients, reducing the risk of it leaving your property.

Risk: Compacted soil = surface runoff risk

Frequently driving vineyard machinery in vine rows can lead to soil compaction, leading to water being unable to infiltrate into the soil profile. This causes rainfall runoff, which usually carries sediment and nutrients with it. If the runoff is not contained on the property there is a high risk that it will end up in a waterway and have a negative impact on freshwater quality and aquatic ecosystems.

An emphemeral steam running through a vineyard carrying sediment.

Un-sprayed fence line acting as a buffer zone to collect sediment and nutrients that run off the property.

Gossamer grass buffer

Carex secta *riparian planting*

Mitigations

- Complete a walk-in-the-rain vineyard survey and ascertain where water runs, collects, connects with other waterways, or runs off your property. Take photos and make a plan to mitigate the risk.
- Plant low growing species around the vineyard boundary or allow grass sward (at least 1m wide) to grow during winter around the boundary.
- Refrain from spraying out fence lines as this provides a filter for runoff.
- Avoid driving on soils that are saturated to avoid compaction.
- Plant the edges of drains and waterways in low growing species like *Carex secta* or Gossamer grass *(Anemanthele lessoniana)*. These species tolerate wet and dry conditions, and fold over in a flood allowing water to flow. They will also form a buffer and filter out sediment and nutrients, preventing it from leaving your property.
- Sow deep-rooting species like chicory or plantain to break up compacted soil and add stability to the soil particles.

TIP:

Winter is when surface runoff is most likely to occur.

Risk: Contoured land with exposed sub-soil = erosion risk

Sediment runoff is a significant environmental risk that requires taking action to help contain sediment and prevent it from leaving the vineyard. When sediment reaches waterways, it can smother aquatic environments and clog fish gills, killing aquatic species. Sediment also provides substrate for aquatic weeds to grow, suppressing more desirable native aquatic species. When aquatic weeds proliferate, they deprive the water of oxygen, cause eutrophic conditions (rot), and kill fish and invertebrates.

Compacted wheel ruts, runoff and sediment flow

Compacted wheel ruts, runoff and sediment flow

Mitigations

- Apply compost under vines to add organic matter that will encourage soil biota and improve soil structure. Organic matter also improves the soil's ability to retain nutrients in the soil.
- Sow deep-rooting species like chicory or plantain to break up compacted soil and add stability to the soil particles.
- Sow an annual crop for example black oats, and mow under vines with a side-throw mower to build up organic matter and carbon under vines. Alternatively, crimp to provide ground cover, habitat and carbon for soil biota, enabling roots to be retained to strengthen soil structure.

Inter-row species crimped

Risk: Sprayer washdown process

Mitigations

- Ensure washdown areas are situated away from waterways, drains, and CSAs.
- Ensure that emptying excess and unused sprays from sprayers" is done a long way from any waterway or CSA.

Fertiliser loss from vineyards - risks and mitigations

Risk: Poorly timed fertiliser application, excessive fertiliser or fertigation rates = nutrient loss risk

Nitrogen

Nitrogen is highly soluble and in well-drained soils it can leach into aquifers (ground water), drains, and streams and rivers. In poorly drained soils it is at risk of runoff into waterways. When nitrate leaches into groundwater it can persist for many years and travel long distances. Where groundwater emerges as springs, it can be a source of contamination in streams and lakes.

Transport of nitrate via groundwater is the main pathway by which nitrogen is carried from agricultural land into surface water bodies. Soil cultivation releases large quantities of nitrogen which can cause nitrate leaching.

Patches of animal urine contain nitrogen and can be a major source of nitrate leaching, for example from sheep grazing in vineyards.

River clogged with slime and aquatic weeds

Stream clogged with aquatic weeds

Stream clogged with slime

Phosphate

Phosphate ions are chemically attracted to soil particles and bond tightly to them. When soil leaves the vineyard in surface runoff or leaching, phosphate is carried with it.

A significant amount of the phosphorus in our rivers is a result of erosion and fertiliser use. Over time the phosphate that is bound to sediment dissolves and becomes available for aquatic plants and algae growth. Phosphorus concentrations in a stream, river or lake can cause rapid weed growth or algal blooms which choke aquatic life and cause long-term damage to the health of a waterbody.

Mitigations

TIP:

Fertiliser - Right place, right time, right amount, right product.

- Regular soil testing enables you to establish trends*.
- If you use copper sprays, it is a SWNZ requirement to test soils to monitor any buildup of copper.

* *Find soil sample protocol at: https://www.fertiliser.org.nz/download/166737/Sampling%20Pastoral%20Arable%20and%20Horticultural%20Soils_Final.pdf*

Nitrogen

Fertiliser that contains nitrogen will leach if applied at the wrong time, i.e. when plants aren't taking it up, or when applied in amounts greater than a plant's requirements. **Follow these tips:**

- Do not use nitrogen fertilisers until **one month after budburst**. After budburst, vines take a month to 'wake up' from winter dormancy, during which time they rely solely on stored reserves. Only after a month post-budburst do roots start exploring the soil for nutrients – only then will they use any nutrients in the root zone.
- **Post-harvest applications** are acceptable if vines still have green foliage and haven't gone into senescence or winter dormancy.
- It is preferable to stagger fertiliser applications **throughout the growing season** than to apply a large amount in one application if it exceeds the vines' capability to use it.
- For **new developments/redevelopments and cultivation**, cultivate the minimum amount of land, leaving the margins of the block uncultivated. The margins will act as a buffer zone and collect runoff. Re-grass the cultivated areas as soon as possible after planting.
- Do not use nitrogen fertiliser before, or during the **cultivation phase**, or at the **planting stage** of new/redevelopments. The act of cultivation will release enough nitrogen.
- Newly planted vines take at least three weeks to 'wake up'. When the vines have a few leaves, feed with a small application of nitrogen fertiliser.

Phosphate

Phosphate is mainly applied by broadcast, so must be spread when there is no green tissue, for example after harvest, during winter, or in spring before budburst. This is the time of highest rainfall in New Zealand's grape growing regions, and therefore the risk of it running off the vineyard is at its greatest. **Keep in mind the following principles when applying phosphate fertiliser:**

Surface runoff with sediment in it running off a vineyard.

- Sedimentary and ash soils have **low anion storage capacity** which means they don't 'store' phosphorus well. Phosphorus levels need regular topping up in smaller quantities.
- It is recommended that **vineyard soil is sampled annually** after grapes have been harvested, or at least prior to any phosphorus fertiliser applications. Sampling should be carried out at a depth of 15cm.
- Up to 50% of **phosphate will bind with soil particles** within 3-5 days of application.
- **Stock** cannot be grazed after applying phosphate until at least one month has passed since application or at least 25mm of rain has fallen.
- It is important to **avoid applying phosphate immediately before a rain event** to prevent surface runoff.
- **Do not apply phosphate to soils that are already saturated** as this will increase the risk of runoff during a rain event.

Calculating quantities of phosphate fertiliser for application to sedimentary and ash soils

Olsen P (plant available phosphorus) test

- The Olsen P optimum band for viticulture on sedimentary and ash soils is 20-30 mg/L or mg/kg.
- Olsen P levels should be maintained at the lower end of the ideal band for sedimentary and ash soils.
- When testing land that has been fertilised with Reactive Phosphate Rock (RPR) the Olsen P test cannot detect RPR residues, even though these will provide phosphorus to the vines. To account for this, multiply the Olsen P test result by 1.5. For example: If the Olsen P result is 20, then for a soil fertilised with RPR, this is the equivalent of an Olsen P of 30.
- Best practice is to apply phosphorus fertiliser annually (if required). Alternatively, it may be applied every two years.
- If a large volume of phosphorous fertiliser is required, applications should be split to reduce the risk of runoff.
- Slow-release RPR is recommended for soil that has a pH of <6, in order for it to be broken down. Slow-release RPR is suitable for areas that have a high risk of runoff.
- The Code of Practice for Fertiliser Nutrient Management will help identify ways to assist with fertiliser P management. The Code is available here.

Fertiliser being broadcast

TIP:

NZW has a phosphorus fact sheet and a Phosphate Fertiliser Calculator to help calculate phosphate fertiliser quantities for applying to a vineyard. The Phosphate Fertiliser Calculator has calculations for:

- Single Super Phosphate
- Triple Super Phosphate
- Reactive Phosphate Rock (RPR)

Calculating ‘maintenance’ applications of phosphate fertiliser

When grapes are harvested, 0.5kg of phosphorus per tonne of grapes harvested is removed from the vineyard.

Worked example:

If your harvested crop was 15 tonnes per hectare, 7.5 kg/ha of phosphorous is required to replace the phosphorous that was removed from your vineyard:

15 tonnes/ha x 0.5kg P/ha = 7.5kg phosphorous/hectare

Fertiliser calculation:

Single Super Phosphate contains 9% phosphorus:

Therefore 7.5 kg/ha divided by 0.09 (9%) = 83kg/ha superphosphate is required to replace the amount exported with grapes.

Phosphorus calculation for sedimentary and ash soils

Calculation for a ‘capital’ phosphorus application

The optimal range for Olsen P on sedimentary and ash soil is **20-30**.

Sedimentary soil

To lift Olsen P by 1 point you need to apply **10kgs/ha** of P

Worked example:

Olsen P is at 19 and you want to lift it to 20.

You are applying Single Super Phosphate (SSP) which contains 9% Phosphorus.

10 kg/ha P / 0.09 (9%) = 111.11 Kg/ha Super

Therefore 111 kg/ha of Super will lift P by 1 point.

Ash soil

To lift Olsen P by 1 point you need to apply **22kgs/ha** of P

Worked example:

Olsen P is at 19 and you want to lift it to 20.

You are applying single super phosphate (SSP) which contains 9% phosphorus (P).

22 kg P/ha divided by 0.09 (9%) = 244.44 Kg/ha Super

Therefore 245 kg/ha of Super will lift P by 1 point.

New developments and redevelopments

Risk: New developments and cultivated soil = wind erosion, sediment runoff, nitrogen leaching

- Cultivated, bare soil is at risk of wind erosion and runoff. Often, vineyards are prepared for planting at a time when equinox winds are blowing, increasing the risk of wind erosion. When topsoil (fine silt particles) blows off the vineyard it can later be washed into waterways leading to sedimentation which can have phosphate attached to it.
- Best practice is to only cultivate vine rows and inter-rows, leaving the headlands and perimeter intact so they can act as a buffer, filtering sediment and nutrients and preventing them from running off the vineyard.
- Best practice is to sow inter-row sward as soon as possible.
- It is preferable to stagger fertiliser applications throughout the growing season.
- Cultivating soil releases nitrogen, so avoid using nitrogen fertiliser before, or during the cultivation phase, or at the planting stage of new/redevelopments.
- Newly planted vines take at least three weeks to 'wake up'. Once vines have a couple of leaves it is suitable to feed them with a small amount of nitrogen fertiliser.

Best practice - new development where the headlands have been left uncultivated to provide a buffer to capture sediment and nutrients.

Sheep grazing

Risk: Vineyard sheep grazing = erosion, nutrient loss, and E. coli contamination

- Sheep excrement contains phosphorus and E. coli, while sheep urine contains nitrate. Phosphate, nitrate, and E. coli can end up in waterways through runoff and leaching.
- Be aware of stocking rates – too many sheep in a cramped environment will overload the vineyard with excrement at a rate greater than grasses can take it up.
- Move sheep frequently before the grass is grazed too short. When grass is grazed short, its recovery is delayed - especially in winter when it is not actively growing and taking up the nitrogen from excrement.
- Be aware of stock camps, particularly around water troughs – move water troughs frequently as these can be CSAs. Keep troughs away from drains/ waterways, uphill, and away from flow paths.
- Leave long sward buffer zones ungrazed around your vineyard perimeter and near waterways so it can trap sediment in runoff.

Case study

An example demonstrating the effectiveness of a sward buffer zone can be found in a study undertaken by Manaaki Whenua on sheep grazing fodder crops on rolling hills*. Sheep were grazed on winter crops with a 20m sward buffer, and grazed without a buffer. Surface runoff water was collected at the lowest point in the paddock and analysed. In the treatment with a 20m buffer, sediment was reduced by 55%, phosphate was reduced by 48%, nitrate was reduced by 38%, and E. coli by 63%.

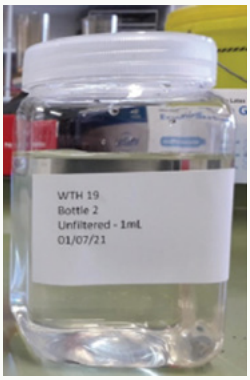
Catchment 19

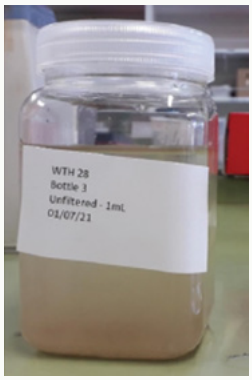
Area: 0.81ha

Catchment 28

Area: 1.17ha

Catchments of similar soil type and topography





Runoff collected from each treatment. Photo on left from treatment that had a 20m sward buffer; photo on right had no buffer.

* *Reducing the impacts of sheep winter forage crop grazing on water quality., May 2023. C. Ghimire, et al.*

Drains

Drains are the tributaries of larger river catchments and are sensitive receiving environments for aquatic life and biodiversity. In many cases they are the only remaining habitat for some of our indigenous freshwater flora and fauna. The regular clearing and cleaning of drains removes fauna, destroys habitat and degrades freshwater quality.

> Think of drains as streams.

Vineyards commonly have **informal flow paths** that are low areas or depressions on the landscape. They are the routes taken by water during and shortly after rainfall, and have a tendency to contribute high levels of fine sediment to nearby drains.

Erosion and sedimentation in a sprayed-out drain

Risk: All drains are CSAs

Bare ground adjacent to drains, such as vineyard tracks/gateways, can be a source of fine sediment, as may artificial water races (well-defined, straight and channelised waterways – either located in the vineyard or on the roadside). Some of these are mostly dry, and some are perennially wet. Often, they are sprayed out and maintained as bare earth, which presents a significant risk of moving high levels of fine sediment to larger waterways.

Informal flow in a vineyard

Mitigations

- Maintain sward in drains – this can be left long during winter months to act as a filter in the rain season and mown or cut short during times of high fire risk.
- For deeper drains that have more frequent flows or bigger volumes of flow, the bottom of the channel can be sprayed out, but the sides left with vegetation growing to filter sediment and help maintain the integrity of the sides. Erosion within the drain will add to sedimentation of waterways.
- At a minimum, allow grass to grow around the perimeter of the vineyard for example on fence lines, as this will help to filter out any surface runoff from within the vineyard.

Sprayed out roadside drain – bare soil is a critical source area.

Below is a good example of shallow drain management. It is shaped so that it can be mown, so that in summer the grass can easily be kept short to reduce fire risk.

Grassed shallow drain

Best practice – planted buffer and sward growing on sides of the drain

Grassed fence line and swale providing a buffer to filter any runoff from the vineyard

Carex secta *planted on the edge of a drain*

Ephemeral drain planted in flaxes

Riparian planting of ephemeral drain

Riparian planting

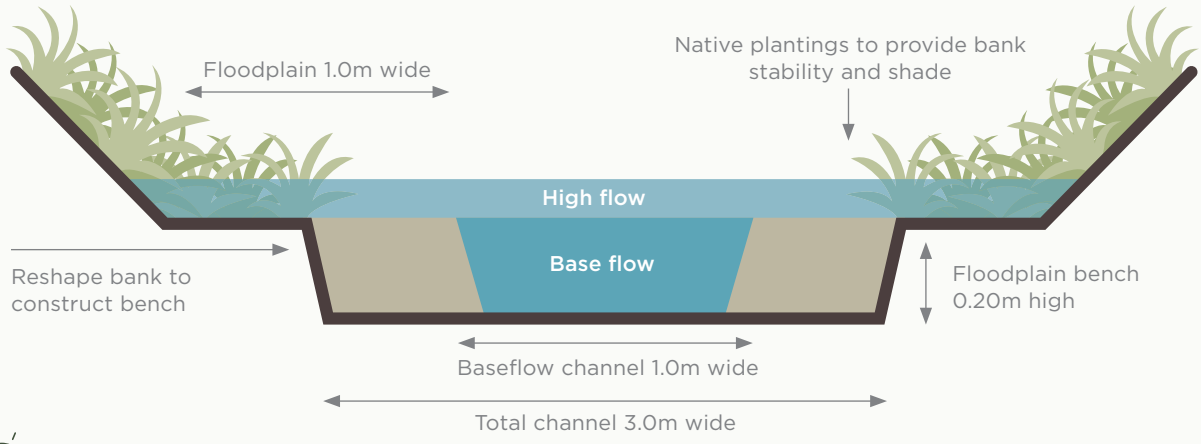
Riparian planting acts as a filter to trap contaminants, such as nutrients and sediment, before they enter a waterway. This helps protect and improve water quality and maintain the habitat for creatures living in the ecosystem.

The benefits of riparian zone planting include:

- Improved streambank stability
- Shade to decrease water temperatures – this reduces weed and algae growth and provides stable temperatures for aquatic life
- Slowing the rate at which some sediments, nutrients and bacteria enter waterways
- Improved habitat quality for fish, insects, birds and aquatic plants
- Increased biodiversity
- Improved landscape aesthetics

For deeper drains consider having a two-stage channel (see diagram of a two-stage channel below) where the main flow channel is kept clear of growth while the next level is planted with *Carex secta* that will fold over in a flood. The top level may be planted in flaxes and trees to give shade and help stabilise the bank.

Two-stage channel design



TIP:

Check with your Regional Council whether resource consent is required before undertaking any work on drains. A resource consent is likely to be required if the construction of new drains or the cleaning of existing drains affects the banks or bed of a river, stream or lake, or occurs within or near to a wetland*.

* *https://www.groundrules.mpi.govt.nz/ (sourced 4 June 2024)*

Council stopbanks

It is not permitted to plant on or around the stopbank structure.

Sides and dams

It is not permitted to plant sides of dams.

Preferred species

It is preferable to avoid planting flaxes on the edge of drains. When floodwater flows through the drain it can scour out the roots of flax plants which can become dislodged directly into the main flow path, blocking it and creating a flooding risk.

TIP:

Carex secta is the recommended species for the edges of drain or streams/rivers.

Two-stage channel with Carex secta *planted on first level and flaxes and trees on the top level*

Riparian fencing

Wetlands, springs, and surface water bodies require management to avoid damage to the bed and margins of the water body, and to avoid the direct input of nutrients, sediment and microbial pathogens from animal excrement.

When grazing livestock in vineyards, regional councils will most likely require intermittent and flowing streams to be fenced where stock have direct access to the waterway. The general rule is to fence at least 3m back from the edge of waterways and allow grass to grow long to provide a buffer zone to filter excrement, sediment and nutrients from surface runoff. This also prevents stock access to the actual waterway preventing streambank erosion, pugging and contamination.

Riparian planting on a perennial waterway

Before and after riparian planting. Photo on left taken in 2011. Photo on right of the same waterway taken 2024.

New Zealand Wine
Altogether Unique.