



TUKIPO SUB-CATCHMENT PLAN

TLC The Big Picture: Tackling the big issues sub-catchment by sub-catchment



CONTENTS

TUKITUKI CATCHMENT: THE BIG PICTURE	3
1. Introduction to The Big Picture	3
1.1. Purpose of The Big Picture	3
1.2. Freshwater status of the Tukituki catchment	4
1.3. Approach: creating priority actions in the Tukituki	4
2. Tukituki's Overall Big Picture	5
2.1. Summary of sub-catchment challenges and priorities	5
2.2. Outcome areas most sought by farmers (from workshops)	6
3. Sub-Catchment Context	7
3.1. Background	7
3.2. Sub-Catchment Context	8
3.3. Sub-Catchment Challenges and Key Focus Areas	9
3.4. Landscape Context	9
4. Summary of Challenges, Impacts and Priority Actions	12
5. Implementation	12
5.1. Implementation to meet priority actions	12
5.2. Enhance biodiversity	13
5.3. Water Quality	14
5.4. Planting decision support	14
5.5. Proposed Implementation Steps and Estimated Costs	15
6. Appendix 1: TLC On-Farm Action Planning Tool	16
7. Appendix 2: TLC Plant Selection Tool	17
8. Appendix 2: Highly Erodible Areas	18
8.1. Highly erodible areas using mapping	18
8.2. Farm planning using RUSLE	19
9. Appendix 3: Flow mapping to understand sites for sediment trapping	19
9.1. Identification of sites for edge of field mitigations (wetlands, dams, bunds)	19

TUKITUKI CATCHMENT: THE BIG PICTURE

1. Introduction to The Big Picture

1.1. Purpose of The Big Picture

In 2024 Tukituki Land Care (TLC) launched The Big Picture, a six-month project designed to create independent, science-based catchment plans for the 17 sub-catchments of the Tukituki River in Central Hawke's Bay. The initiative identified each sub-catchment's unique environmental challenges and developed practical, cost-effective solutions to address them. As TLC Chair Richard Hilson explained, "We tackled the big issues sub-catchment by sub-catchment, to piece together the bigger picture."

The project employed a comprehensive research approach that combined field investigations, insights from local farmers, and an in-depth analysis of existing studies and data on the Tukituki catchment. Environmental planning consultancy, Environment, Innovation and Strategy Ltd (EIS), led by Matt Highway, undertook this work.

This project reflects TLC's dedication to improving environmental health and farm productivity, paving the way for a sustainable future for the Tukituki community.



1.2. Freshwater status of the Tukituki catchment

Summary of State of the Environment reporting

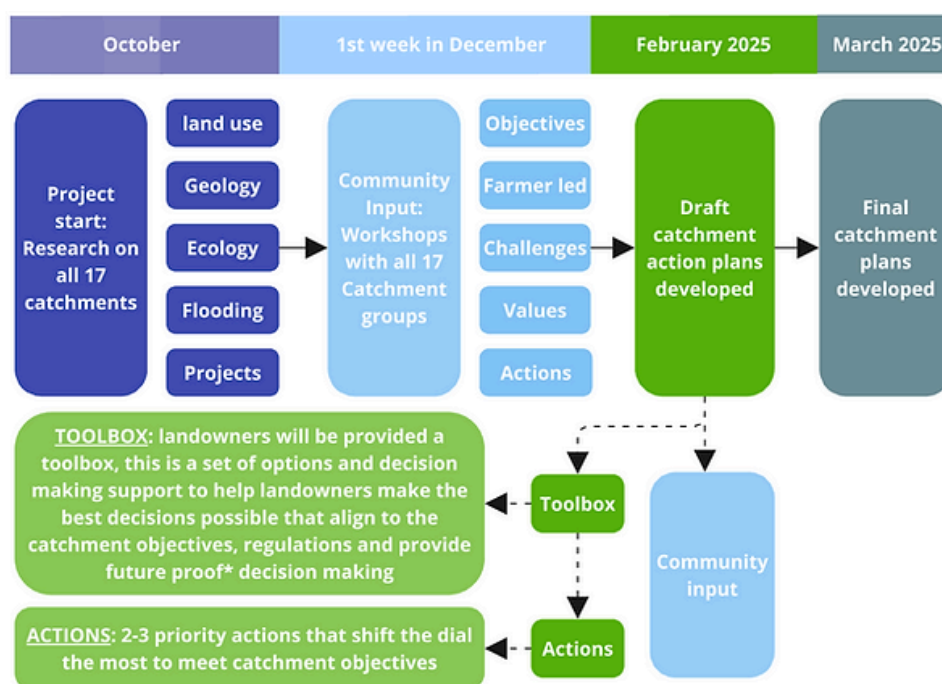
The Tukituki catchment faces water quality, land use, and climate challenges. The catchment, dominated by sheep and beef farming, has experienced significant modifications, leaving only about 10% of its land covered in indigenous vegetation. Water scarcity is a persistent issue, with decreasing river flows over the past three decades, exacerbated by droughts and climate change. Groundwater levels in the Ruataniwha Plains are under strict management to prevent further decline, but interannual variability and climate change pose ongoing risks.

Water quality is a major concern due to high levels of nitrogen, phosphorus, and sediment. The highest nitrogen concentrations in the region occur in streams draining the Ruataniwha Plains, and some areas exceed nitrogen targets by two to four times. Phosphorus and fine sediment issues, linked to erosion, contribute to poor water clarity and degraded aquatic habitats. Toxic algae, particularly *Phormidium* cyanobacteria, can proliferate in the river during low summer flows, posing a risk to both human and animal health. Despite these issues, the Tukituki River remains generally swimmable, except after heavy rainfall when contaminant levels rise.

1.3. Approach: creating priority actions in the Tukituki

The Big Picture project adopted a highly collaborative approach involving detailed catchment research, GIS mapping, and farmer engagement. Workshops were conducted with local farmers in each sub-catchment to better understand group dynamics, gather community values, and identify key issues and opportunities. Feedback from the workshops, survey results, and field investigations have been used to shape tailored sub-catchment plans aligning with the local communities' specific landscape context and aspirations.

As part of the implementation phase, TLC introduced "THR3E"—three actionable steps designed for farmers in each sub-catchment to implement over three years. The TLC Farmer Toolbox was also launched, providing practical resources to help landowners make informed decisions and maximise the impact of their efforts. Additionally, monitoring strategies are to be implemented, and demonstration sites will be identified to help showcase best practices, ensuring that the plans remain relevant and actionable.



2. Tukituki's Overall Big Picture

2.1. Summary of sub-catchment challenges and priorities

The Big Picture project team has worked with farmers to identify challenges and opportunities in each of the 17 sub-catchments. While each sub-catchment has an individual plan, it is the big picture of the people, the land and the water within the Tukituki that we are trying to collectively support. The approach is reminiscent of a jigsaw puzzle where many pieces fit together and form something greater than themselves as an individual piece. Figure 1 below shows how the Tukituki sub-catchments fit together as a big picture, showing the sub-catchments that are aligned in similar top priorities. Note that the image only shows the proposed highest recommended priority area for each sub-catchment, and all sub-catchments will have multiple outcomes they are seeking.

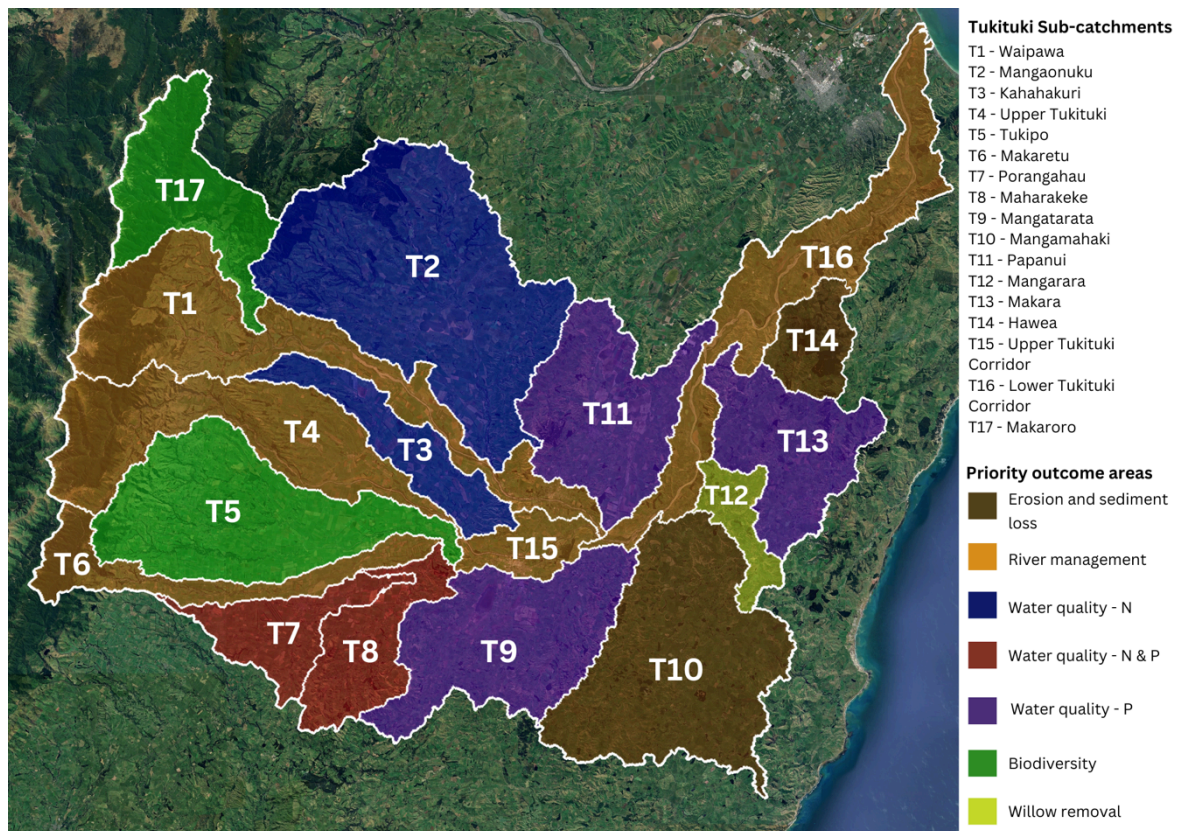


Figure 1 – Sub-catchment map for the Tukituki catchment. Coloured areas highlight the recommended priorities for each sub-catchment.

2.2. Outcome areas most sought by farmers (from workshops)

During workshops, farmers were asked to vote on a selection of outcome areas. Below are the top five outcomes:

- Support landowners with the knowledge to make informed decisions to improve the environment
- Improve the flood resilience of the catchment, including upstream and downstream to reduce effects on community in adverse weather events
- Protect and enhance the economic viability of the area
- Protect and enhance the quality, ecology, mauri of waterways and wetlands
- Represent farmers interests in future regional government setting of rules and regulations

TUKIPO CATCHMENT: CONTEXT AND CHALLENGES

3. Sub-Catchment Context

3.1. Background

The Tukipo sub-catchment spans approximately 22,000ha in Central Hawke's Bay, centered around Ashley Clinton. It is home to 70 landowners and 99 farms over 20ha, with a strong community committed to improving environmental outcomes while maintaining productive farmland. The Tukipo Catchment Care Group (TCCG) was formed in response to the Tukituki Plan Change and increasing regulatory requirements, recognising the need for a coordinated effort to address water quality and biodiversity challenges.

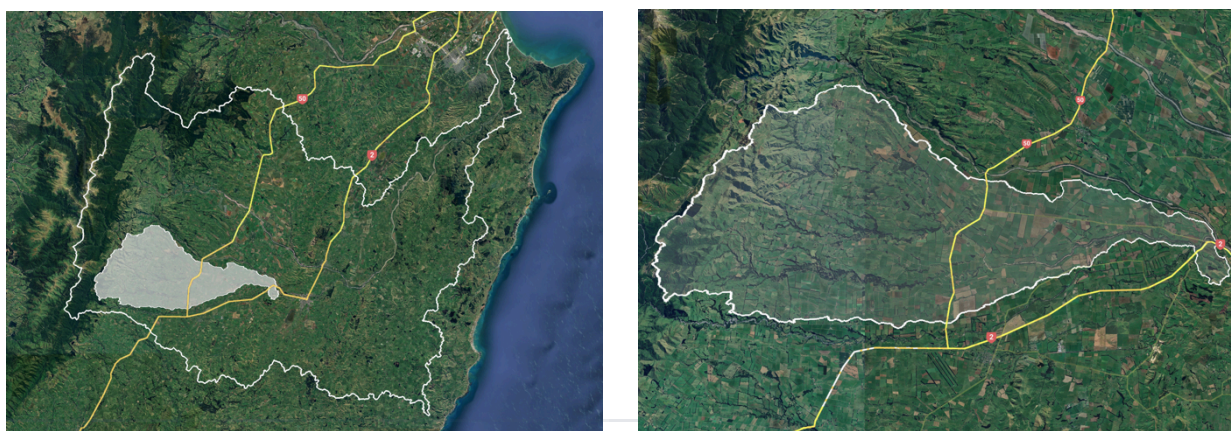


Figure 2 - Location of the Tukipo sub-catchment in the wider Tukituki catchment.

One of the sub-catchment's primary concerns is high nitrogen levels instream, which can impact water quality and ecosystems. This has also led to additional resource consenting requirements as part of Hawke's Bay Regional Council's (HBRC) Tukituki Plan Change. Phosphorus levels in waterways are also an issue, requiring targeted interventions such as waterway fencing, riparian planting and wetland development.

Over the past seven years, the group has significantly addressed these challenges. Supported by Jobs for Nature funding, TCCG has planted 75,000 native plants, installed 47 kilometres of riparian fencing, and completed 23 wetlands (fenced and planted), with 48 sites already approved and a goal of reaching 50.

The group has also established a community nursery offering funded plants plus free plant guards and weed mats to encourage landowner participation. These efforts have helped improve biodiversity, with increased bird sightings—including the return of Kaka—and stronger community connections.

3.2. Sub-Catchment Context

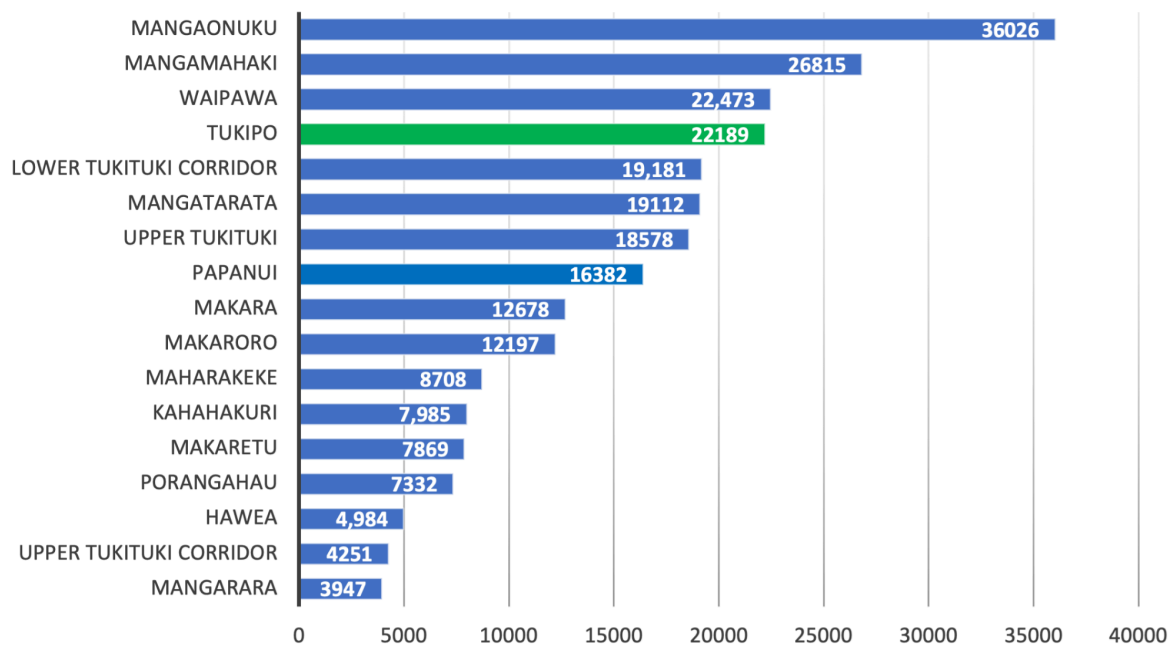


Figure 3 – Tukituki sub-catchment areas in hectares.

The Tukipo sub-catchment is 22,189ha in size which amounts to 8.88% of the wider Tukituki catchment. The Tukipo sub-catchment is one of the larger sized sub-catchments of the Tukituki, which is 250,000ha in total (Figure 3).

82% is in pasture, 6% is in indigenous forest, 5% is in arable and 3% is in exotic forest (Figure 4).

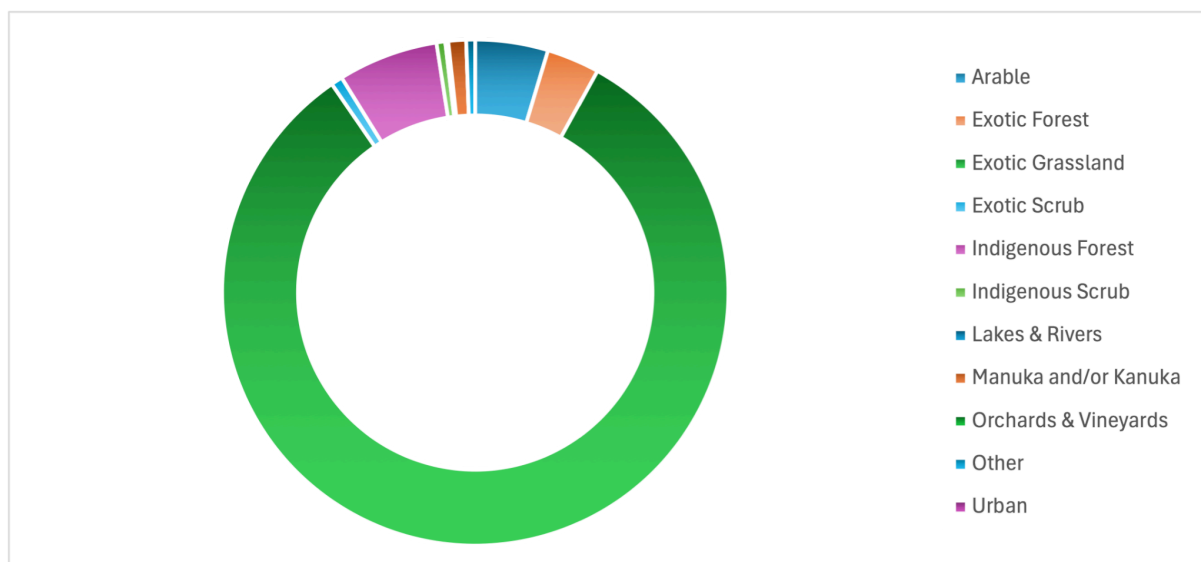


Figure 4 – Land use in the Tukipo catchment.

3.3. Sub-Catchment Challenges and Key Focus Areas

At the Tukipo sub-catchment workshop in December 2024, attendees highlighted the sub-catchment group's successes while identifying key areas for future focus. One of the biggest achievements has been the visible impact of pest control, with significant reductions in possums (due to HBRC's possum control scheme) and other pests and the sightings of Kaka by the community.

*Table 1 - Tukipo sub-catchment water quality indicators over a five-year rolling average. * The standard represents water quality levels based on the Tukituki plan or national standards. See [Link to the Tukipo dashboard](#)¹ for more information.*

Water Quality Parameter	Tukipo	Standard*
Nitrogen (DIN)	1.975 mg/ L	0.8
Phosphorus (DRP)	0.015 mg/ L	0.015
Bacteria (E.coli)	39.5 (count)	260
Freshwater invertebrates (MCI)	104.44 (index)	100
Sediment (Turbidity)	0.81 mg/ L	4.1 FNU (light)

Water quality in the Tukipo sub-catchment is the main concern, particularly with the high nitrogen levels. To combat these issues, the TCCG has focused on reducing nutrient runoff through stock exclusion, riparian planting, wetland development, and careful management of water pathways. While the wetland projects have proven successful, attendees at the workshop emphasised the importance of a better understanding of how these interventions work. For example, there was a desire for more education and engagement around sediment traps—another intervention designed to prevent contaminants from entering waterways.

With two-thirds of the project funding spent and 18 months remaining, the group is now looking ahead. Landowners are now eager to embrace more proactive, community-driven efforts that create long-term ecological and economic benefits. However, a challenge highlighted during the workshop was that community engagement has been less robust below State Highway 50, which has limited participation from landowners in this area. Strengthening engagement in this part of the sub-catchment will be essential to ensure that restoration and water quality improvements continue to grow across the sub-catchment.

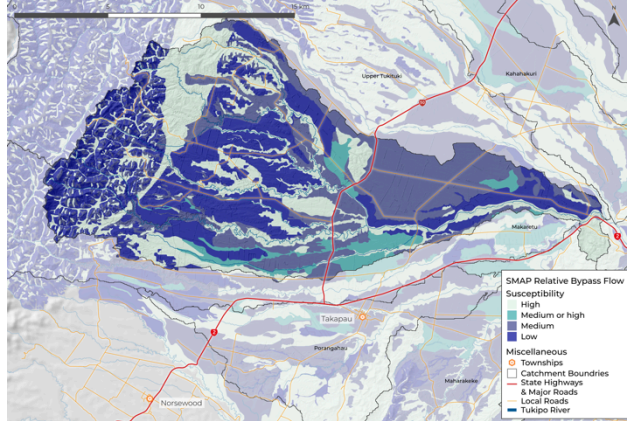
3.4. Landscape Context

The Tukipo sub-catchment is characterised by free-draining geology and soils, particularly in the upper sub-catchment, leading to a high susceptibility to nitrogen leaching. The soils are relatively stable, though erosion is a concern, especially in areas with Allophanic soils, which

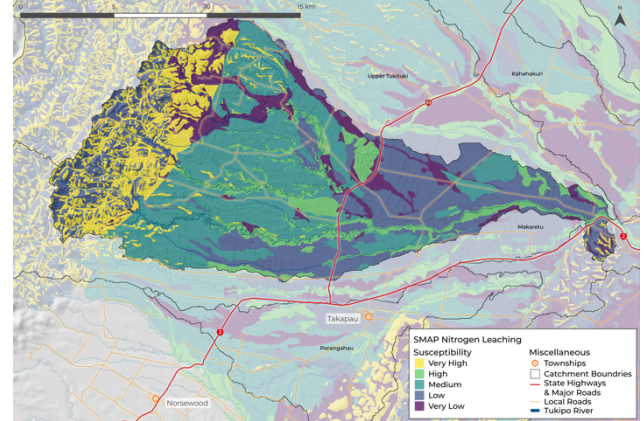
¹<https://www.hbrc.govt.nz/environment/farmers-hub/in-the-tukituki-catchment/tukituki-dashboard/tukipo-dashboard>

are resistant to water erosion but prone to phosphorus loss. The lower slopes of the sub-catchment contribute significantly to phosphorus runoff due to soil movement. The nitrogen leaching risk is high to very high across most of the sub-catchment, making nutrient management a key concern.

SMAP Relative Bypass Flow Susceptibility - Tukipo

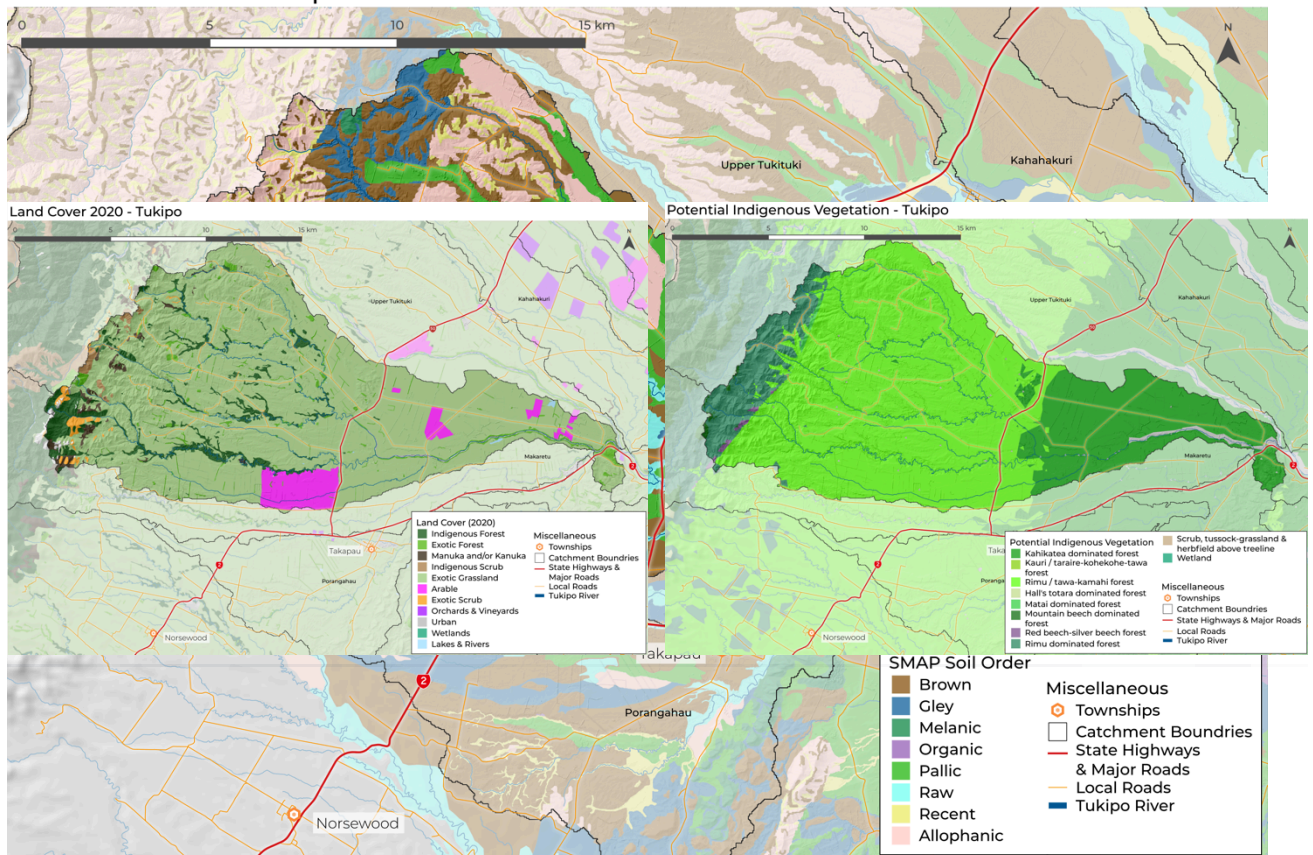


SMAP Nitrogen Leaching Susceptibility - Tukipo



Riparian vegetation varies in quality, with sections of the Tukipo stream exhibiting gaps in vegetation cover, reducing shading and increasing erosion risks. The combination of highly erodible soils in the hill country, a lack of sufficient riparian protection in some areas, and high nitrogen leaching potential presents significant challenges for maintaining water quality in the sub-catchment.

SMAP Soil Order - Tukipo



The Tukipo sub-catchment supports a diverse and ecologically significant biodiversity landscape shaped by its varying land cover, riparian environments, and potential indigenous vegetation. The area features extensive indigenous and exotic forests and long corridors of tree-lined gullies that provide crucial habitat connectivity for native wildlife. The indigenous forest remnants, along with areas of exotic scrub support species such as the native Long-Tailed Bat (*Chalinolobus tuberculatus*) and the endangered North Island Kaka (*Nestor meridionalis septentrionalis*), both of which rely on forested areas for roosting and foraging.

The potential Indigenous vegetation map (Figure 5) suggests that, before human modification, the region was once dominated by various native forest types, including rimu-tawa-karahi forests, kahikatea swamp forests, and mountain beech forests.

The presence of these historical vegetation patterns offers a roadmap for restoration efforts, where reforestation and riparian planting could further strengthen biodiversity resilience.

There is significant potential to enhance biodiversity within the sub-catchment. Existing native vegetation, waterways, and sheltered gullies provide a strong foundation for restoration efforts. Continuing actions such as protecting existing forest patches, planting along waterways, and fencing off sensitive areas can further support native wildlife while also improving soil health, erosion control, and water retention.

TUKIPO SUB-CATCHMENT: OPTIONS ACTIONS AND RECOMMENDATIONS

4. Summary of Challenges, Impacts and Priority Actions

Objective area	Enhance biodiversity	Water quality	Informed decision making to implement good practice planting
Challenge	Introduced predators (stoats, rats, possums, feral cats) are threatening native wildlife populations.	High DIN levels, but little information about where it is coming from or how to manage it.	Planting is a key activity that increases biodiversity, reduces soil loss, builds ETS revenue, and increases flood resilience. However, information is lacking to support farmers
Impact	Declining native wildlife numbers, disrupted ecosystems, and reduced seed dispersal for regenerating forests.	Waterway health reduced. Decline in aquatic biodiversity Regulation risks.	Planting can support many positive outcomes. The impact of uninformed decision-making is that objectives are met and resources are wasted.
Priority action	Focus on expanding the connection of biodiversity corridors through apply for funding, predator control and habitat restoration.	Implement high priority good practice on farms through farm planning. Focus on understanding water quality in different areas/ springs and manage nitrate through constructed or enhance wetland areas	Build and communicate a decision support tool for planting to meet multiple outcomes. Support farmers to make appropriate decisions through effective communication and training

Figure 6 – Summary of the challenges, impacts and recommended priority actions for the Tukipo sub-catchment, farmed against the three major objective areas.

5. Implementation

5.1. Implementation to meet priority actions

The TCCG has made significant progress in improving water quality and biodiversity through riparian planting, wetland restoration, and community engagement. However, ongoing challenges include high nitrogen levels in spring and waterways, and the need for stronger landowner participation below State Highway 50.

The primary objective for the sub-catchment is to enhance biodiversity corridors through pest control and habitat restoration, which will strengthen ecological connectivity. Another outcome area for the sub-catchment is to reduce Dissolved Inorganic Nitrogen (DIN) levels by implementing targeted interventions in high-nitrogen seepage springs and waterways. The components are high priority options for the sub-catchment.

5.2. Enhance biodiversity

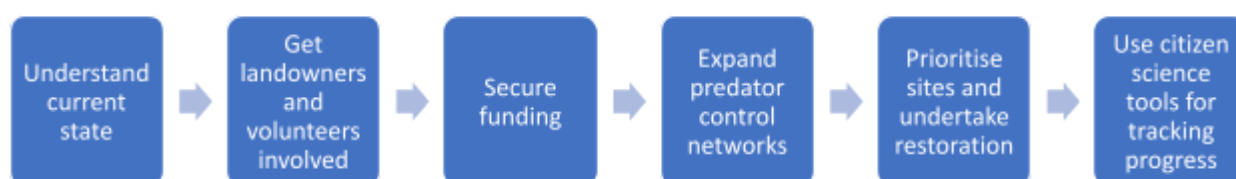
Declining native wildlife numbers, disrupted ecosystems, and reduced seed dispersal for regenerating forests highlight the urgent need for effective predator control. Without clear data, efforts to manage predators can be inconsistent, limiting their effectiveness. A sub-catchment-wide Predator-Free & Biodiversity Corridor Project will help by linking predator trapping with habitat restoration efforts.

TCCG already has some valuable native bush, tree-lined gullies, and wetlands that provide food and shelter for species like the native long-tailed bat and the endangered North Island kaka.

With the sub-catchment community eager to expand these biodiversity corridors, the below actions can support the enhancing of biodiversity within the sub-catchment.

- To support predator control and habitat restoration efforts, securing funding and resources is essential.
- Grants and funding opportunities from organisations such as Biodiversity Hawke's Bay can provide the necessary support for these initiatives.
- Expanding predator control networks is another key priority, which involves setting up and maintaining trapping programmes in important biodiversity areas, including riparian zones, bush remnants, and wetland margins.
- Engaging landowners and volunteers is crucial to the success of these efforts, and this can be achieved through community workshops and meetings, with a particular focus on landowners below SH50.
- To track progress effectively, citizen science tools should be utilised, encouraging locals to log predator numbers and bird sightings on platforms such as iNaturalist, eBird, and TrapNZ.
- Identifying priority restoration sites is also important, and mapping tools can help determine the best locations for planting and habitat restoration.
- Ensuring the right native species are planted is essential, which can be achieved by working with local nurseries and using resources like the TLC Plant Selection Tool (Appendix 2) to select species that support native wildlife.
- Finally, ongoing monitoring and community engagement should be maintained through regular updates via newsletters, Facebook, and local meetings, sharing data on pest control, bird sightings, and progress on planting projects.

In summary:



5.3. Water Quality

Managing nitrogen loss and improving water quality doesn't mean sacrificing farm productivity. With the right practices, farmers can reduce nutrient runoff, improve soil health, and keep water clean while maintaining strong yields.

Simple farm management changes can have a big impact, such as:

- Testing soil nitrogen levels to fine-tune fertiliser use.
- Planting deep-rooted pasture species that soak up excess nitrogen.
- Using precision irrigation techniques to prevent nutrient leaching.

Subsequently, constructed or enhanced wetlands are one of the most effective ways to trap and filter nitrates before they reach waterways. Research shows that well-placed wetlands can reduce nitrate levels by 50–70%—or even more in some cases.

Flatter paddocks with poor draining soils are particularly well-suited for wetlands, as these areas naturally slow down water flow and help break down nitrates. The TLC Highly Erodible Areas tool (Appendix 3) can help identify the best sites for wetland development.

To get the most benefit, it's important to test water from springs and seepage areas for nitrate levels and then prioritise wetland placement where it's needed most. Combining wetlands with riparian plantings of deep-rooted species like *Carex* and *Juncus* helps absorb even more nitrogen, reduces erosion, and strengthens riverbanks.

The below actions can support the implement of GMP on farms with the ability to DIN levels across the sub-catchment:

- Identify and map high-nitrogen areas to pinpoint where wetlands or edge of field mitigations will work best.
- Use decision-support tools to guide planting and farm management choices (Appendix 2).
- Set up demonstration sites to show real-world examples of successful wetland and riparian projects.
- Share practical guides and case studies so farmers can see how these measures work and why they're worth doing.

5.4. Planting decision support

Planting plays a key role in improving farm resilience, reducing erosion, and managing nitrogen runoff. But to get the best results, it's important to match the right trees and plants to the right location—whether that's along a waterway, on an eroded hillside, or in a wetland.

To make this easier, TLC has developed a Plant Selection Tool (Appendix 2) to help farmers and landowners select the best species for their specific needs. This tool will help meet objectives for planting and ideally reduce costs by planting the right trees in the right places

for each project. Note that this tool is updatable and can be further refined to support landowners in the Tukituki.



Figure 7 – Farmers in the Tukituki are planting a wide range of landscapes from wetlands to hill country erosion areas.

5.5. Proposed Implementation Steps and Estimated Costs

Before implementation can be planned or costed, TCCG and associated farmers should digest this report and work with TLC on the next steps and implementation priorities. TLC have a range of tools developed through The Big Picture project that will enable efficient planning and decision making to occur, independent of which outcome areas are selected.

APPENDICES

6. Appendix 1: TLC On-Farm Action Planning Tool

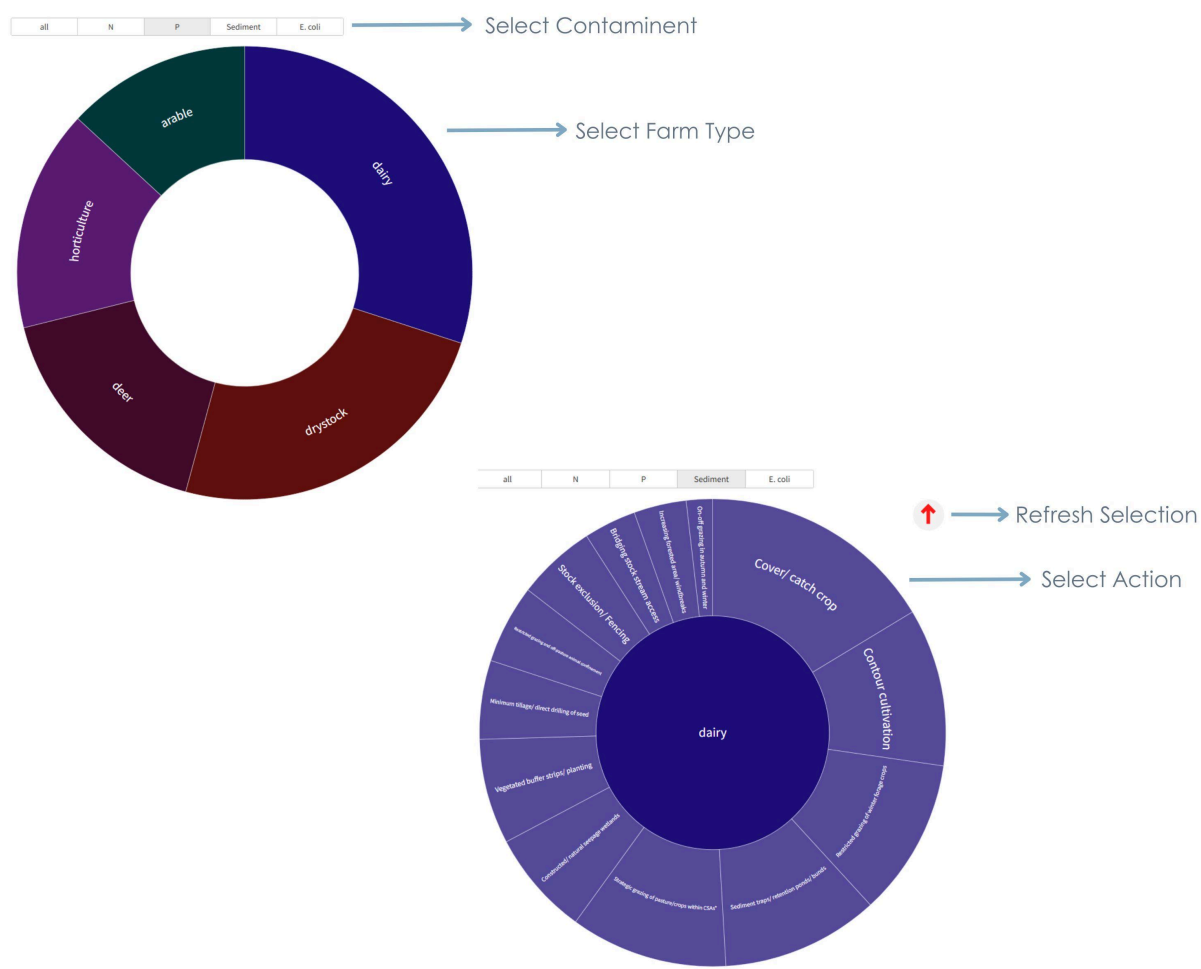
This decision-support tool is designed to help farmers identify and prioritise cost-effective environmental actions on their farms. Use the filters to explore mitigation options by contaminant and farm type.

The larger the section, the greater the impact and cost-effectiveness of the mitigation. Recommended actions are displayed in descending order, starting from the top and progressing clockwise around the circle.

How to use the tool:

Visit the TLC Farmer Toolbox at www.tukitukilandcare.org/toolbox, select the On-Farm Action Planning Tool and follow these steps:

1. Select a contaminant.
2. Choose your farm type.
3. Select an action to view more details.
4. Click the red arrow to reset your selections.



7. Appendix 2: TLC Plant Selection Tool

This decision-support tool is designed to help farmers choose the right plants for on-farm environmental projects by matching the planting zone and soil type with suitable species.

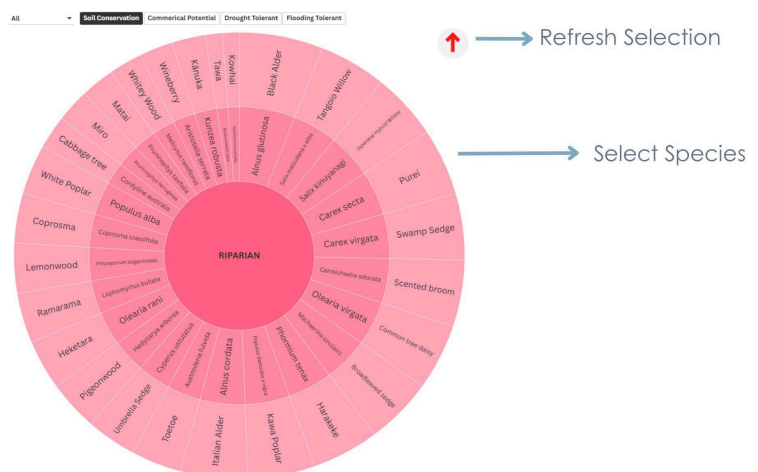
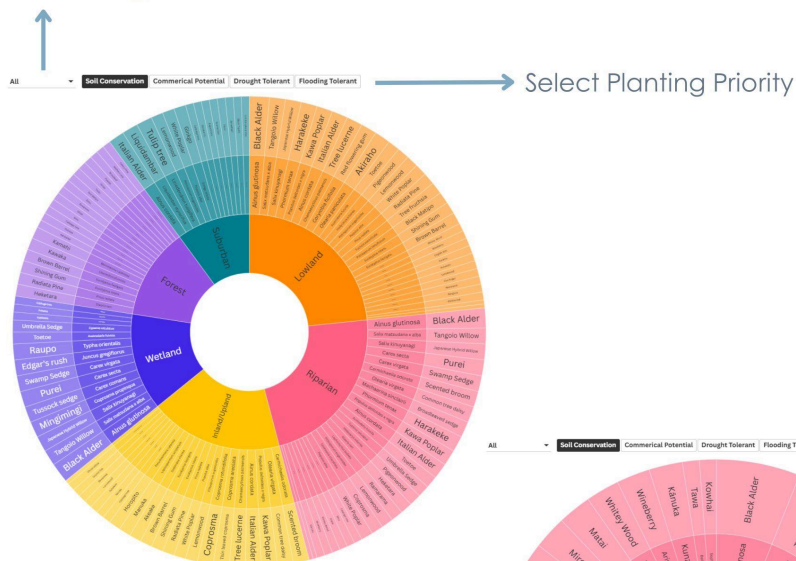
Use the filters to explore options based on your specific conditions and requirements. The larger the section, the better suited the plant is to the selected environment. Recommended plants are displayed in descending order, starting from the top and progressing clockwise around the circle.

How to use the tool:

Visit the TLC Farmer Toolbox at www.tukitukilandcare.org/toolbox, select the Plant Selection Tool and follow these steps:

1. Select the planting zone from the drop down list.
2. Select your planting priority.
3. Select a species for more information.
4. Click the red arrow to reset your selections.

Select Planting Zone



8. Appendix 2: Highly Erodible Areas

8.1. Highly erodible areas using mapping

Each sub-catchment in the Tukituki has been mapped using LiDAR and the revised universal soil loss equation (RUSLE) has been applied. The equation, described in IECA as having the following form: $A=R \cdot K \cdot LS \cdot C \cdot P$ where A is the annual soil loss due to erosion (t/ha year); R the rainfall erosivity factor; K the soil erodibility factor; LS the topographic factor derived from slope length and slope gradient; C the cover and management factor; and P the erosion control practice factor. The limitations of RUSLE are that it only accounts for soil loss through surface erosion (sheet and rill erosion) and ignores the effects of gully erosion.

This model enables understanding of the highest risk areas within the sub-catchment, where soil loss is mostly likely and where to prioritise soil conservation measures.

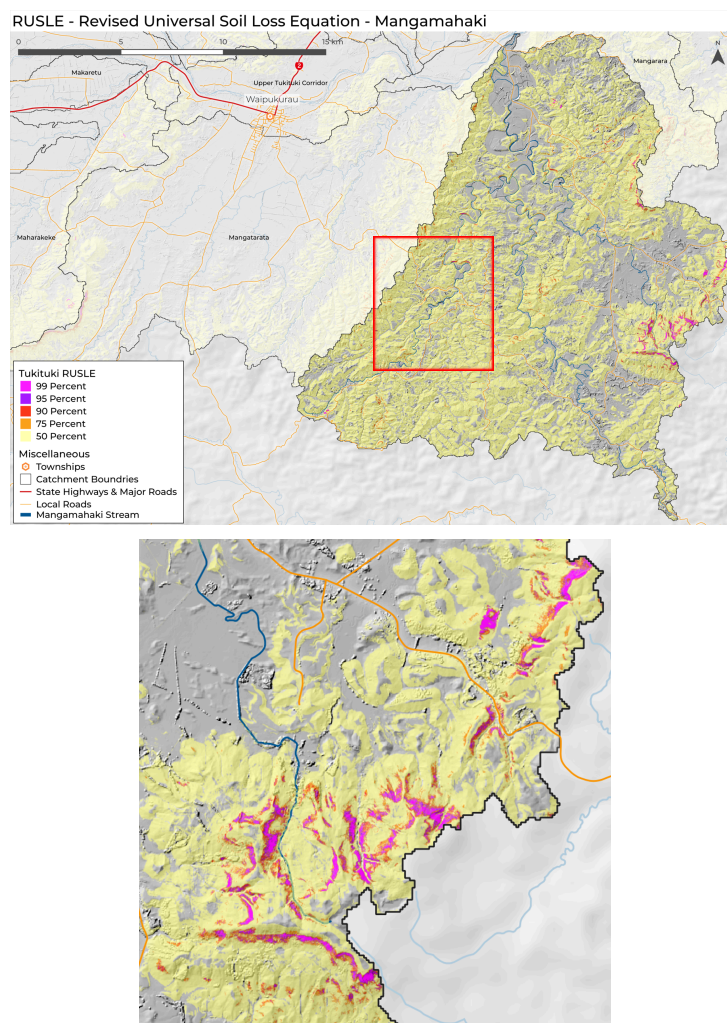


Figure 8 – RUSLE model at sub-catchment scale. High risk erosion is mapped at 99%, 95%, 90%, 75% and 50%, throughout the Tukituki catchment.

8.2. Farm planning using RUSLE

As HBRC's high resolution LiDAR data set enables high resolution mapping and prioritisation of action at Tukituki, sub-catchment and farm scale. If erosion, sediment or phosphorus is a priority for the sub-catchment, using this model will help find the areas to prioritise.

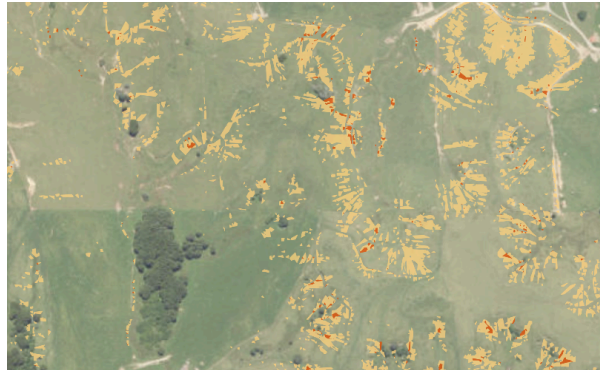


Figure 9 – From a farm planning point of view the RUSLE can be used to prioritise areas to implement soil conservation measures.

9. Appendix 3: Flow mapping to understand sites for sediment trapping

9.1. Identification of sites for edge of field mitigations (wetlands, dams, bunds)

Topographic Wetness Index (TWI) is a measure of how likely an area is to accumulate and retain water based on its slope and contributing upslope area. TWI identifies wet or poorly drained areas in a landscape, making it useful for understanding placement of edge of field² mitigations like bunds and wetlands.

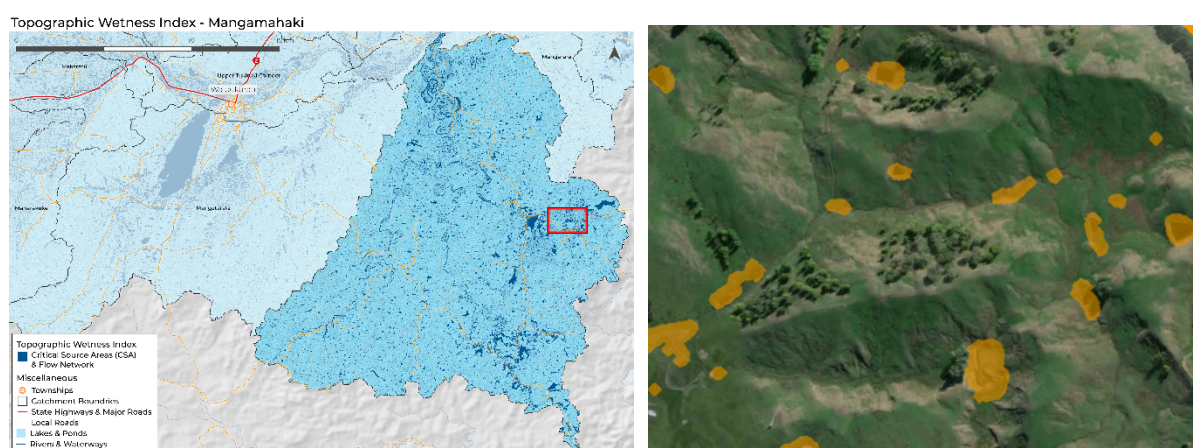


Figure 10 - TWI example in a sub-catchment. Using the data layers supplied by EIS will enable exploration of the data using GIS or Google Earth.

² Edge of field tactics are a group of mitigations that operate downstream of a contaminant source, and capture water to treat it. They are normally placed in overland flow path channels before water enters main waterbodies.

TWI can be a very useful tool in catchment and farm planning for those wanting to implement over and above farm actions. It does need ground truthing but can be useful in finding appropriate sites, with an estimate of water accumulation areas and volumes.

It is important to note that the edge of field mitigation needs to suit the outcome each sub-catchment is seeking. TLC will have to be aware of single focus edge of field, which has become a common narrative in New Zealand. For example, promotion of single solutions like installing only constructed wetlands or detention bunds (detainments bunds) was common in freshwater management during the 2010s.



Figure 11 – Examples of edge of field mitigations, from large detention bunds, large wetlands through to in-line or off-line sediment traps.