Eely Point Recreation Reserve
Tree Succession Plan

Date: 4th August 2025

Prepared by: Lee Rowley
lee.rowley@tendtrees.co.nz
Senior Consultant Arborist
021638976

Reviewed by: David Spencer
david.spencer@tendtrees.co.nz
Principal Consultant
0273223833

Client Contact: Dominic Harrison
dom.harrison@qldc.govt.nz
Parks and Reserves Planner, Community Services

Brief:

This succession plan outlines a strategic approach for the systematic removal and replacement of conifers within Eely Point Recreation Reserve with native and suitable exotic species. By enhancing biodiversity, improving soil health, and engaging the community, this plan aims to transform the shelter while retaining the reserve as a resilient and vibrant public space that reflects both ecological and cultural values.



Table of Contents

1. Introduction 3
   - Current Role of the Conifer Plantation 3
   - Ecological Impact of Wilding Conifers 3
   - Management of Willow and Poplar Regrowth 3
   - Purpose of the Tree Succession Plan 4
   - Immediate Need for Action 4
2. Key Challenges 5
   - Gradual vs. Large-Scale Removal Approaches 5
   - Planting Conditions and Soil Challenge 5
   - Reinvasion Risks 5
   - Public Perception 5
   - Funding and Resource Limitations 5
3. Succession Plan Outline 6
   - Zoning, Stages and Phases 6
   - Activity by Zone 8
   - Initial Focus and Early Stages 9
4. Removal and Control Strategy 10
   - Methods of Tree Removal 10
   - Ground Control 11
   - Timing and Safety Considerations 11
5. Replanting Strategy 12
   - Soil Enhancement and Preparation 15
   - Long-Term Maintenance and Monitoring 15
   - Alternative Planting Methodologies 16
6. Monitoring and Adaptive Management Strategy 17
7. Conclusion and Recommendations 18
   - Expected Outcomes 18
   - Key Recommendations for Plan Implementation 19
8. Appendices 20



1. Introduction

The conifer plantation at Eely Point Recreation Reserve forms an iconic backdrop to Wanaka and supports the reserve's functionality. However, as these trees age and their ecological impacts become more pronounced, there is a growing need to transition toward a more sustainable and diverse landscape that aligns with the district's long-term ecological objectives.

Current Role of the Conifer Plantation

Covering approximately 3 hectares, or 24% of the reserve, the conifer plantation plays a critical role in providing wind protection, creating shelter for recreational activities, improving the reserve's usability, safeguarding existing vegetation and wildlife, and offering essential shade in summer.

However, these conifer species contribute to ecological harm, including diminished biodiversity, soil degradation, and challenges to long-term sustainability. Notably, the Radiata pines are nearing the end of their Safe Useful Life Expectancy (SULE[2]), heightening the risk of tree failures within the reserve.

Ecological Impact of Wilding Conifers

The spread of pest species, such as wilding conifer within the Queenstown Lakes District, has led to significant ecological imbalances through biodiversity loss. The dense canopy of these trees blocks sunlight, suppresses understory growth and disrupts natural regeneration processes, significantly reducing native flora and fauna.

Douglas fir (*Pseudotsuga menziesii*), a longer-lived evergreen, and Radiata Pine (*Pinus radiata*), a fast-growing species with a lifespan of less than 100 years, are often categorised as pest species by regulatory authorities due to their potential to spread invasively and establish as wilding trees.

Managing potential seed sources across the district will help prevent the spread of wilding pest species into nearby natural areas. Conifer control measures within Eely Point lack a comprehensive strategy to systematically manage these species over time.



Management of Willow and Poplar Regrowth

In addition to conifers, regrowth from Willow and Poplar is prevalent within the reserve, particularly along the northern lakeshore. While mature, established trees of these species are valued, their unmanaged spread requires attention.

Controlling this spread involves removing small self-seeded saplings to prevent further spread and dominance, whilst leaving fully mature and established trees.

[2]refers to the estimated period a tree can be safely and beneficially retained in its environment, considering factors like health, structural stability, and site conditions.

Purpose of the Tree Succession Plan

The primary aim of this tree succession plan is to provide a clear, actionable framework for the systematic removal of conifers and other spreading plant species from Eely Point and their replacement with more suitable species. The plan outlines specific actions, timelines, responsibilities, and resources required to achieve project goals over the coming decades.

A strategic approach involving Zones, Stages, and Phases has been developed to gradually remove and reintroduce a diverse range of plant species to enhance the reserve's ecological resilience. By replanting with a mix of native and suitable exotic species, the plan aims to restore ecological balance, improve soil health, and create a sustainable landscape that offers aesthetic, recreational, and cultural benefits.

This succession plan aligns with regional and national strategies, such as the New Zealand Wilding Conifer Management Strategy, Otago Pest Management Plan 2019-2029 and the Eely Point Development Plan, which advocates for removing pest species to protect ecosystems. Additionally, the plan supports the broader environmental goals of Queenstown Lakes District Council (QLDC), including enhancing public spaces and ensuring the sustainable management of natural resources for future generations.

Importantly, the plan recognises the need for a gradual, carefully managed removal process to mitigate the risks associated with tree removals, such as wind load changes, ensuring that the overall landscape and framework of trees within the reserve remain stable throughout the transition.

Immediate Need for Action

Immediate action is required to prevent further ecological degradation and restore Eely Point to a more natural and resilient state. Conifer species are damaging the reserve's current landscape and threatening the broader ecological integrity of the region. Ageing tree populations also require proactive and ongoing management.

The phased approach outlined in this succession plan spans several decades, making timely action essential. Delaying the start will exacerbate existing issues and increase risks to visitors as the maturing conifers, especially the Radiata Pine, near the end of their safe useful life.



2. Key Challenges

Gradual vs. Large-Scale Removal Approaches

One of the primary challenges facing the succession plan is balancing the need for conifer removal with the potential impacts on the reserve's existing trees and public safety. Large-scale removal poses risks, such as sudden changes in wind dynamics, which can destabilise remaining trees and expose them to damage. While trees naturally adapt their structure to withstand wind over time, through a process called thigmomorphogenesis[3], sudden exposure to increased wind can result in branch or complete tree failure. A gradual, staged approach mitigates these risks by allowing trees and landscapes to adapt over time while transitioning to a more diverse canopy.

The staged removal approach also helps manage water retention, as trees play a crucial role in intercepting rainfall through their canopies. This slows down the rate of rainfall, allowing water to gradually infiltrate the soil and reduce the risk of soil erosion and surface flooding. When large numbers of trees are removed all at once, this natural water interception is lost, leading to increased surface runoff, potentially overwhelming stormwater systems. Furthermore, removing many trees, particularly those providing wind protection, may temporarily affect the reserve's usability and amenity provided by the existing vegetation.

Planting Conditions and Soil Challenge

Monoculture established by conifers can significantly impact biodiversity. The dense canopy restricts understory growth, reducing light availability and moisture. These factors can present challenges for the establishment of new trees and the reintroduction of diverse plant species.

While conifer soils can support the re-establishment of many plant species, having a pH range similar to that of native beech forests, some areas can exhibit compacted or nutrient-limited conditions due to long-term monoculture. Compacted, nutrient-poor soils need enhancement through the application of organic amendments, such as compost, mulch or biochar, to improve soil quality. These interventions will help improve soil structure, encourage microbial activity and increase nutrient availability.

Reinvasion Risks

Eely Points exposed location on the peninsula increases the risk of reinvasion from wilding species, as well as a potential seed source for surrounding natural areas. Conifer, Willow and Poplar seeds can travel significant distances, spreading rapidly and undermining control efforts. Continuous reserve monitoring will be essential to quickly identify new seedling growth.

Public Perception

Managing public perception of the succession plan is essential, particularly when visible changes, such as extensive tree removals, are underway. The public may have emotional or cultural connections to the existing landscape, so communicating the project's long-term benefits is important.

Funding and Resource Limitations

Securing sustainable funding is essential for the ongoing implementation of the succession plan. The project's long-term scope, involving removal and replanting over several decades, necessitates consistent financial support.

[3] the response of plant cells to mechanical stimulation. For example, the thigmomorphogenetic response of trees in windy environments is to grow shorter, with thicker trunks and stronger roots.

3. Succession Plan Outline

The succession plan *(Appendix 1 - Succession Plan Maintenance Schedule)* outlines the systematic removal and thinning of conifers along with Willow and Poplar regrowth from Eely Point through a structured approach involving distinct **Zones**, **Stages**, and **Phases**. This gradual approach ensures that wind protection for remaining trees and public safety is carefully managed, reducing the risks associated with increased wind exposure.

A key focus of the plan is to reintroduce a diverse mix of native and exotic species to enhance biodiversity and create a more resilient, ecologically balanced landscape. Tall-growing, desirable conifers will be strategically planted to preserve the crucial windbreak function currently provided by the existing conifers, using their shelter to protect and support the successful establishment of new plantings.

Continuous monitoring of wind impacts, tree health, stability, and the establishment of new plantings will guide adaptive management decisions. Ongoing assessments will inform necessary adjustments to both removal and planting strategies as needed, ensuring the plan remains flexible and responsive to changing conditions.

Zoning, Stages and Phases

Using LiDAR mapping and site assessments, the conifer removal strategy has been divided into ten distinct **Zones** based on existing canopy gaps, groupings and their role in providing wind protection. Each Zone is then assigned **Stages** and **Phases** to determine the sequence of removal and replanting efforts.

Each Stage represents a ten-year cycle, while each Phase corresponds to one year. This structured approach allows for gradual, manageable progress, as well as monitoring and reassessment. The table below shows the structure of the **Zone**, **Stage** and **Phasing** used to form the Maintenance Schedule. The overlay map, *Figure 1,* shows the ten Zoning areas:

Table 1: Succession Plan Maintenance Schedule

	Stage 1 (Years 1-10)										Stage 2 (Years 11-20) *etc...*									
	Phases (years)										Phases (years) *etc...*									
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
ZONE 1																				
ZONE 2																				
ZONE 3 *etc..*																				



Figure 1: Zoning Overview

Zoning, Stages and Phases (cont.)

The detailed Maintenance Schedule (*Appendix 1 - Succession Plan Maintenance Schedule*) outlines key milestones and timeframes, covering a 60-year period.

While the proposed timeline is flexible and can be adjusted to accommodate budgetary constraints or other considerations, the overall structure of the schedule should be adhered to. This phased approach allows sufficient time for newly planted shelter species to establish and mature, ensuring that replacement trees provide adequate cover before subsequent removals.

The reserve will maintain a continuous flow of operations by staggering maintenance activities across multiple zones. This approach ensures that trees in one Zone adapt to increased wind exposure while work progresses in other areas, balancing the landscape's transition.

The 60-year timeframe is regarded as the minimum duration needed to balance the removal of conifers and the establishment of a diverse, multi-species shelter. Accelerating this process risks undermining the reserve's windbreak functions, damaging the structural integrity of remaining trees, and impacting the overall usability and amenity values of the reserve.

Activity by Zone

Each Zone will undergo a structured sequence of activities designed to manage removal, replanting and long-term management. Descriptions of activities are identified in the following table:

Table 2: Maintenance Schedule Activities

Activity	Description	Timeline	Key Activities	Monitoring & Evaluation
Removal Period	Systematically thin out conifers in phases to reduce wind load gradually.	Est. 60 years from starting year	Select trees for thinning; Leave trees to acclimate to new wind exposure. Ensure safe public access during operations	Inspect trees for wind damage; Adjust removal strategy if needed. Monitor soil erosion; Reevaluate shelter effectiveness
Rest Period	Pause operations to allow remaining trees to adapt to new conditions.	Allow three years rest minimum between removal phases.	Minimal intervention; Inspect trees regularly.	Record tree health; Plan for next removal phase.
Planting	Introduce native and exotic species in cleared areas, ensuring they are suited to local conditions.	During rest periods.	Prepare soil; Plant tree species; Install protective measures for young plants.	Monitor plant growth; Replace failed plants.
Weed Control	Regularly remove new wilding seedlings and maintain new planting areas.	During rest periods.	Identify and remove new wilding seedlings; Inspect new planting health.	Track seedling recurrence; Evaluate success of new tree plantings
Assessment/Monitoring	Assess overall success and plan the next removal period. Review planting progress and long-term maintenance requirements	Prior to each removal period. During & after planting seasons	Conduct a comprehensive review; Plan for ongoing maintenance. Involve key stakeholders	Document long-term outcomes; Adjust management strategies if needed.

Initial Focus and Early Stages

The first stage (Stage 1: Years 1–10) of the succession plan will prioritise key goals, including sapling control on the Lakeshore Peninsula and addressing focal areas identified in the Eely Point Development Plan, such as Zone 5. Initial efforts will also focus on removing individual conifers. These early focus areas are highlighted on the map below.

Individual conifers scattered throughout the reserve can be removed at any point during the process, as they do not significantly impact wind dynamics. However, certain trees, such as the Ponderosa Pines near the BBQ areas of Zone 7 and Zone 2, hold notable amenity value due to their contribution to the landscape and shade provision. These trees will remain until they reach the end of their Safe Useful Life Expectancy (SULE), despite their potential as wilding seed sources.

The individual conifers identified on the map below, primarily Douglas Fir, are considered low-value and suitable for early removal.

For Willow and Poplar trees, removal efforts will only target saplings and self-seeded vegetation. Mature and established species will be retained for their visual appeal and functional benefits.



Figure 2: Initial Focus Areas

4. Removal and Control Strategy

Methods of Tree Removal

Removing Conifers and other dominant spreading plants will employ mechanical felling, arboricultural dismantling and ground control methods. This approach ensures safe and efficient removal while minimising environmental impacts and maintaining public safety.

5.1.1 **Mechanical Felling**
Conifers will be felled using mechanised equipment in low public use zones where access allows, and large quantities of trees can be removed quickly. Felling will be staged carefully to avoid damaging nearby trees and vegetation.

5.1.2 **Arboricultural Dismantling**
Arboricultural dismantling will be employed in sensitive zones near valued trees, newly planted trees, public areas or structures. This method involves manually sectioning trees in a controlled manner, reducing the risk of collateral damage and ensuring precision in constrained spaces.

5.1.3 **Ground Control**
Operational teams will carry out manual ground control, such as removing saplings with loppers, hand saws, and small mechanical tools, as well as applying herbicide where applicable.

5.1.4 **Materials and Debris**
Timber will be removed from the site. Branches will be processed into wood mulch of appropriate grade to assist with replanting efforts. The mulch will either be spread directly around planting areas to enhance soil moisture retention and suppress weeds or left in piles to age before further use. Any excess mulch that exceeds on-site requirements will be transported off-site.

5.1.5 **Tree Stumps**
In high-visibility or heavily frequented public areas, tree stumps will be either ground down or mechanically removed to improve aesthetics and ensure safe access for both users and equipment. In lower-priority zones, stumps will be cut low to the ground, and planting will be established around them, allowing for natural decomposition over time.



Ground Control

Ongoing efforts after the initial removal will focus on managing regrowth and preventing conifers, Willow and Poplar reinvasion. Ground crews will conduct regular inspections of replanting zones to identify and promptly remove new unwanted regrowth.

Targeted herbicide treatments or manual control methods will be employed to prevent re-establishment. Herbicide applications will be carefully managed to minimise environmental impacts, with applications timed for optimal weather conditions. Regular follow-up treatments will address any regrowth, with the frequency of treatment adjusted based on monitoring results. The goal is to reduce herbicide use over time while maintaining effective control.

Control measures and strategies will be adjusted as needed to ensure the long-term success of restoration efforts. Engaging the community and working groups in wilding removal days will provide additional support and increase awareness of the importance of ongoing control of self-seeded vegetation.

Timing and Safety Considerations

The timing of removals will be critical to minimise disruption and ensure public safety. Operations will be scheduled during off-peak times, such as early mornings, weekdays or low-tourism seasons, to reduce impacts on recreational users.

Safety protocols will include path closures, signage and barriers to keep the public away from active work areas. Protective barriers will safeguard sensitive vegetation and waterways. Low-impact machinery will be used where possible, and pre-removal assessments will help identify and mitigate potential risks or issues. Regular communication will inform reserve visitors about the schedule and purpose of removal operations.



5. Replanting Strategy

Following removals, site preparation and replanting will align with optimal seasonal conditions, focusing on Autumn and Spring when the climate is most conducive to successful establishment. Tree planting will remain consistent throughout the duration of the project, with a primary focus on introducing new plants and organic matter to enhance soil conditions, create shelter, and establish microenvironments that support further ecological restoration.

Objectives and Approach
The replanting strategy focuses on:

- Rapid introduction of pioneer and secondary species to create shelter, improve soil conditions, and establish microenvironments.
- A 50% native and 50% exotic species mix to balance ecological restoration with functional shelter.
- A multi-layered canopy structure combining closed-canopy forest, open woodland, and clearings to enhance ecological diversity, visual appeal, recreation and movement through the reserve.
- Strategic retention of existing conifer groups to provide temporary shelter until new plantings are established.

Several zones suitable for early planting have already been identified in *Appendix 1 - Succession Plan Maintenance Schedule*, and planting in these areas should commence as soon as possible, building on progress achieved through community and council planting programmes.

Planting Phases
Replanting is divided into two phases to ensure progressive restoration and adaptability.

5.1.1 Initial and Secondary Planting (Early to Mid-Stages)

Planting will commence immediately after conifer removal in designated zones. Pioneer species, such as Kānuka, will stabilise soil, improve nutrient cycling, and create microenvironments to support restoration efforts. Concurrently, and inspired by successes in the reserve already, secondary planting will introduce taller native trees, including Kōwhai, Beech, along with carefully selected exotic species. These secondary trees will contribute vertical structure, accelerate canopy development, and establish shelter to replace the existing conifer plantation.

5.1.2 Final Planting (Later Stages)

The final phase will prioritise filling gaps, introducing additional species to boost habitat value, and replacing any failed plantings. This stage ensures that restored zones become ecologically diverse and provide essential shelter. Retained conifer groups will be removed as the new plantings develop sufficient shelter, in alignment with the succession plan's long-term goals.

Appendix 2 - Species Selection Guide outlines potential species, ranging from tall, fast-growing trees that can replace existing shelter and preserve the current character of the reserves, to native species that will boost biodiversity and cultural value of the site.

The map below illustrates the strategic placement of planting styles and preservation of valued trees.


Forest
Tall growing conifers such as Redwoods mixed with native hardwoods like Beech, forming a closed forest canopy
Existing Trees
Retention of established lakeside Willows & Poplars for season colour and variety
Mixed Woodland
Blend of native and exotic species, creating a more open, diverse canopy and spacious woodland setting
Shade
Retention of key trees for lakeside shade and shelter
Planting Strategy
Woodland Open Canopy
Forest Closed Canopy
Established Tree
50% Native
50% Exotic
Targeted Tree Planting Distribution

Species Selection and Planting Design

Where possible, native plantings should utilise species naturally found in the Upper Clutha region that have local provenance and are eco-sourced.

Recommended spacing ensures optimal growth:

- Large trees (e.g., Native Beech): 2–3 meters apart to allow dominance.
- Shrubs and smaller trees (e.g., Kānuka): 1 meter apart for effective establishment.
- Grasses and ground covers: 500–800 mm apart for quick coverage.

Planting locations will accommodate existing infrastructure and the usability of the reserve, ensuring new plantings do not obstruct access or hinder recreational activities.

It is essential to recognise that the primary role of early planting is to improve soil conditions and support long-term restoration. Even if trees are damaged or lost during later removal periods, the soil and ecological benefits from the initial plantings remain intact, ensuring continued progress. Where damage is anticipated and unavoidable, lower-value pioneer species should be prioritised over secondary species.

Replanting Strategy Summary

The replanting strategy combines ecological restoration with functional design. By using pioneer and secondary species, keeping selected conifers for temporary shelter, and aligning plantings with optimal seasons, the approach ensures progressive restoration. The resulting multi-layered canopy will boost biodiversity, offer better wind protection, and create an enjoyable, resilient landscape.





Soil Enhancement and Preparation

Improving soil conditions is essential for the successful establishment of new plantings. Applying organic materials such as mulch, compost, biochar and mycorrhizal inoculation will enhance soil structure, improve water retention and increase nutrient availability.

Soil conditioning will involve tilling or screefing to break up compacted layers. This process will be followed by incorporating organic matter and applying mulch around plant bases to conserve moisture, suppress weeds, and regulate soil temperature. These practices are essential for improving root establishment and promoting overall plant health.

Soil nutrient levels will be monitored throughout the replanting phases to identify deficiencies. Based on these assessments, targeted applications of fertilisers or additional organic amendments will be made to optimise plant growth conditions. For guidelines and best practices related to soil conditioning and nutrient management, refer to ***Appendix 3 - Soil Enhancement Techniques and Best Practices***.

Long-Term Maintenance and Monitoring

Ensuring the success of replanting efforts requires consistent monitoring and adaptive management to respond to challenges as they arise. This adaptive approach ensures that replanting efforts remain resilient and effective, supporting the long-term restoration goals.

Newly planted areas will be inspected regularly to monitor plant health, check for signs of stress or failure and manage wilding species that may compete with new growth. Maintenance will include watering, mulching and replacing any failed plants.

Protective measures, such as tree guards, plant shelters, targeted weed control and public awareness, will safeguard young plants from damage and activities like frisbee golf. Adjustments will be made based on observed impacts to ensure plant survival and success.



Alternative Planting Methodologies

One potential approach to enhance the replanting strategy within the reserve is the **Miyawaki method**, a technique for creating dense, fast-growing and ecologically resilient forests. This method involves planting native species in close proximity, closely mimicking natural forest regeneration processes.

The Miyawaki method encourages plant growth much faster than traditional planting techniques, with vegetation maturing up to 10 times quicker. This acceleration can significantly reduce the time needed to establish functional shelter and achieve soil restoration.

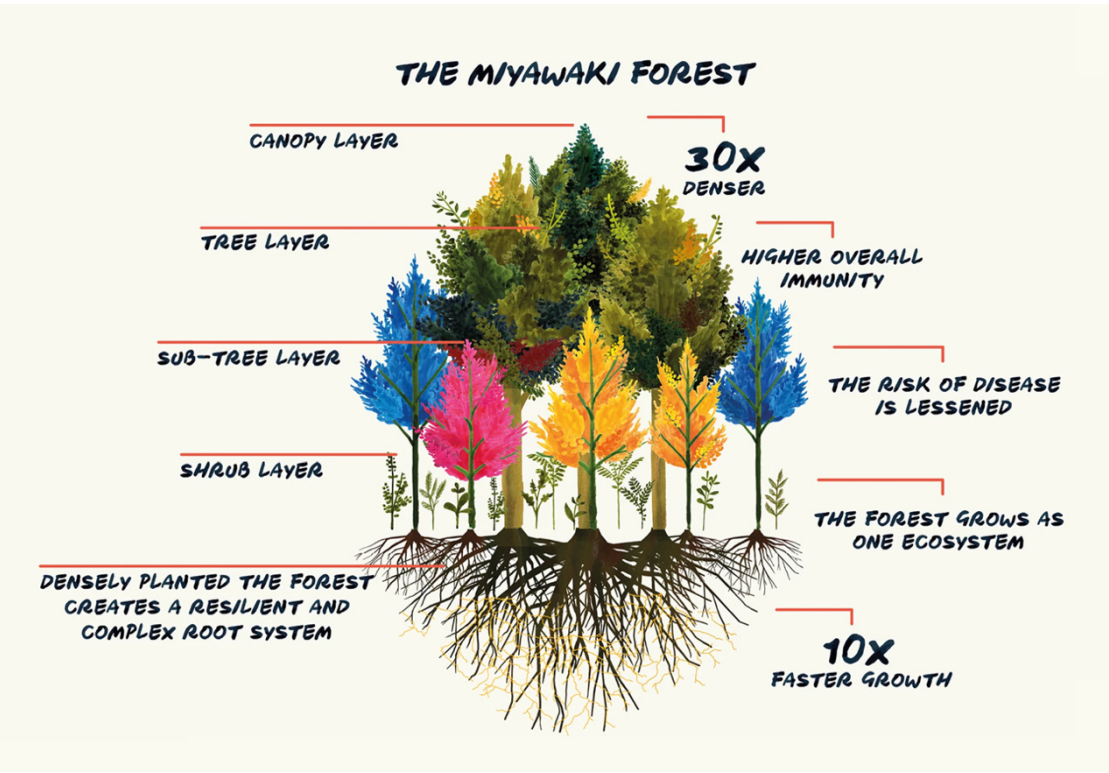
A critical element of this method is **thorough site preparation**, which involves digging deep and wide pits and enriching the soil with biomass such as compost before planting. These organic additions enhance soil fertility, promote microbial activity and improve soil structure. By enriching the soil beforehand, the root systems of newly planted species benefit from optimal conditions for rapid growth, efficient water retention and improved nutrient absorption. The close planting means plants grow taller quicker as they compete for available light.

Once established, Miyawaki forests require less maintenance due to their density. The compact planting improves moisture retention, suppresses weed growth and provides resistance to environmental stressors, such as drought or pests. This self-sustaining characteristic makes the Miyawaki method a cost-effective and efficient solution when combined with more conventional planting techniques.

The benefits of using the Miyawaki method can be seen in this video by Kent County Council (UK), where they explored techniques to improve tree establishment and survival rates, supporting the expansion of urban tree cover: https://www.youtube.com/watch?v=0VizWfEIW1U

While the Miyawaki method's high planting density is not suitable for the entire replanting area, it could be advantageous in isolated pockets. By selectively implementing this technique or other alternative methods, the site can facilitate swift restoration in essential areas.





6. Monitoring and Adaptive Management Strategy

The success of the Eely Point Tree Succession Plan relies on a robust monitoring and adaptive management strategy. This approach ensures flexibility and responsiveness as conditions change throughout the removal process, replanting and restoration efforts. Progress will be tracked using technologies like Geographic Information Systems (GIS) and LiDAR, providing critical data to inform decisions about further removal and planting.

Key metrics, including tree health, growth rates, soil quality and the effectiveness of control measures, will inform necessary adjustments to ensure the plan's objectives are met. Wind load impacts will be closely monitored throughout each stage to assess whether more extensive or cautious removal strategies are appropriate.

Regular evaluations, including in-depth assessments every three years, will track biodiversity gains, soil improvements, and the overall success of replanting phases.

Effective communication strategies, such as visual examples and signage, will educate the community about the plan’s ecological benefits. Emphasis will be on the importance of conifer removal for the reserve’s long-term health and sustainability.

Ongoing stakeholder consultation will ensure the plan reflects community values and responds to public feedback. By involving stakeholders in the decision-making process, the project can build a broad base of support that helps drive its success, fostering a sense of ownership and stewardship within the community.



7. Conclusion and Recommendations

The succession plan for Eely Point Recreation Reserve provides a comprehensive framework for systematically removing undesirable and ageing tree species and replanting with a diverse mix of native and suitable exotic species. Aligned with the QLDC Tree Policy, the plan prioritises biodiversity and ecological resilience through phased tree removal and immediate succession planting to maintain canopy cover and enhance the reserve's long-term ecological health.

The success of this plan relies on a coordinated approach that includes thorough planning, community engagement, ongoing monitoring, and adaptive management. With effective implementation, the reserve can transform into a resilient and diverse landscape, reflecting the natural beauty and cultural significance of the area. This approach will safeguard the reserve for future generations, creating a lasting legacy of ecological restoration.

Expected Outcomes

7.1.1 Restoration of Biodiversity

The systematic removal of conifers and control of undesired plant species will facilitate the re-establishment of native plant species, enhance habitat for local fauna, and promote biodiversity. This will create a more balanced and thriving ecosystem aligned with regional conservation goals. To complement the restoration, selected exotic species will also be introduced to maintain the reserve's shelter, diversity, colour and character.

7.1.2 Improved Soil Health

Soil enhancement measures will rehabilitate the degraded soil conditions caused by decades of conifer dominance. Improved soil health will support the successful establishment of new plantings and contribute to a more resilient landscape.

7.1.3 Enhanced Recreational and Aesthetic Value

The reserve's transformation will improve its visual appeal, providing a more diverse and dynamic landscape that enhances the visitor experience. New plantings will create further seasonal interest, enhance the aesthetic appeal, and provide natural windbreaks that will protect the reserve and surrounding area.

7.1.4 Strengthened Community Engagement and Stewardship

The project will involve the community and key stakeholders, fostering a sense of ownership and stewardship. This inclusive approach will ensure that the reserve remains a cherished public asset that reflects community values and priorities.

7.1.5 Adaptive Management for Long-Term Success

Ongoing monitoring and adaptive management will ensure the plan remains responsive to new challenges and opportunities. This approach will allow for continuous refinement of management practices, ensuring that the reserve is resilient to changing environmental conditions and can thrive well into the future.

Key Recommendations for Plan Implementation

7.2.1 Secure Funding for Long-Term Implementation

The plan's success depends on securing sustainable funding sources. QLDC should pursue a multifaceted approach to funding, including government grants, local fundraising initiatives, and partnerships with businesses and community organisations. Collaborating with initiatives like **Trees That Count**, which connects businesses to native tree planting projects, can amplify resources. Contingency plans should be established to address potential funding gaps, ensuring continuous progress.

7.2.2 Plan for Long-Term Maintenance and Adaptive Management

To ensure the transformation is sustainable, long-term maintenance plans must be established, with adaptive management strategies that can respond to changing conditions. A dedicated team should oversee the project, adjusting the plan as needed.

7.2.3 Implement Robust Monitoring and Reporting Mechanisms

Effective monitoring and reporting are essential to tracking progress, measuring success, and guiding management decisions. Monitoring protocols should be established, utilising GIS tools, site evaluations, and regular stakeholder feedback sessions.

7.2.4 Develop a Public Communication Strategy

A clear and proactive communication strategy should be developed to manage public perception and educate the community about the plan's benefits. This strategy should include regular updates and educational materials that highlight the ecological, cultural, and recreational improvements the project will result in.

7.2.5 Promote Community Involvement in Planting and Maintenance Activities

Encouraging community participation in planting days and ongoing maintenance activities will enhance public support and contribute valuable volunteer resources. Educational programs that involve schools and youth groups should be considered to inspire the next generation of environmental stewards.



8. Appendices

Appendix 1 - Succession Plan Maintenance Schedule (Spreadsheet)
Appendix 2 - Species Selection Guide
Appendix 3 - Soil Enhancement Techniques and Best Practices

References and Supporting Documentation

1. Wanaka Lakefront Development Plan Eely Point Recreation Reserve (Eely Point Development Plan)
   A comprehensive plan detailing the long-term vision for Eely Point Recreation Reserve, including landscape enhancements and management strategies that align with the goals of the succession plan.

2. New Zealand Wilding Conifer Management Strategy 2014
   A national strategy that outlines best practices for wilding conifer control across New Zealand, emphasising collaborative approaches, funding mechanisms, and long-term management goals.

3. Otago Regional Council Wilding Conifers
   https://www.orc.govt.nz/environment/biosecurity-and-pests/plant-pests/wilding-conifers/

4. Otago Pest Management Plan 2019-2029
   https://www.orc.govt.nz/your-council/plans-and-strategies/regional-pest-management-plan/



Appendix 1: Eely Point Tree Succession Plan - Maintenance Schedule

August 2025 v1

Zone	Activity	Start Date	Completion	*Stage 1 (Year 1-10) Phases (years) 1 2 3 4 5 6 7 8 9 10	Stage 2 (Year 11-20) Phases (years) 1 2 3 4 5 6 7 8 9 10	Stage 3 (Year 21-30) Phases (years) 1 2 3 4 5 6 7 8 9 10	Stage 4 (Year 31-40) Phases (years) 1 2 3 4 5 6 7 8 9 10	Stage 5 (Year 41-50) Phases (years) 1 2 3 4 5 6 7 8 9 10	Stage 6 (Year 51-60) Phases (years) 1 2 3 4 5 6 7 8 9 10
				yr1 2 3 4 5 6 7 8 9 10	11 12 13 14 15 16 17 19 19 20	21 22 23 24 25 26 27 28 29 30	31 32 33 34 35 36 37 38 39 40	41 42 43 44 45 46 47 48 49 50	51 52 53 54 55 56 57 58 59 60
LAKESHORE PENINSULA	*Activity*	*Start Date*	*Completion*	**Stage 1: Early removals will focus on operational access, smaller diameter trees, trees with defects, and those reaching the end of their life cycle, as well as removals for focal area identified in the Wanaka Lakefront Development Plan Eely Point Recreation Reserve*					
Narrative: Remove all smaller regrowth/saplings of Willow and Poplar. Continue ground control until full eradication. Balance replanting with open areas for views.	Removal Period	Year 1	**100% by Stage 1**	50% 50%					
	Rest Period								
	Planting	Year 1							
	Weed Control								
	Assessment/Monitoring								
INDIVIDUAL CONIFERS	*Activity*	*Start Date*	*Completion*						
Narrative: Removal of all individual Conifers, predominantly Douglas Fir. Removal will create further planting opportunities and reduce suppression of lakeside Willows. Key trees by BBQ areas to remain until trees reach end of safe useful life.	Removal Period	Year 1	**100% by Stage 1**	20% 20% 20% 20% 20%					
	Rest Period								
	Planting	Year 1							
	Weed Control								
	Assessment/Monitoring								
ZONE 1	*Activity*	*Start Date*	*Completion*						
Narrative: Opportunities to plant early. The area to be planted with non-pest conifers such as Redwood, creating a Redwood forest. The area has minimal impact on reserve wind dynamics, and removal can take place in a shorter timeframe if new plantings are establishing well.	Removal Period	Year 9	**100% by Stage 3**	10%	15% 15%	20% 20% 20%			
	Rest Period								
	Planting	Year 1							
	Weed Control								
	Assessment/Monitoring								
ZONE 2	*Activity*	*Start Date*	*Completion*						
Narrative: Key shelter, gradually remove and replace over time. Creating lightwells to plant replacement trees and shelter.	Removal Period	Year 9	**100% by Stage 6**	5%	5% 5%	5% 5% 5%	10% 10%	10% 10% 10%	10% 10%
	Rest Period								
	Planting	Year 10							
	Weed Control								
	Assessment/Monitoring								

Zone	Activity	Start Date	Completion	*Stage 1 (Year 1-10) Phases (years) 1 2 3 4 5 6 7 8 9 10	Stage 2 (Year 11-20) Phases (years) 1 2 3 4 5 6 7 8 9 10	Stage 3 (Year 21-30) Phases (years) 1 2 3 4 5 6 7 8 9 10	Stage 4 (Year 31-40) Phases (years) 1 2 3 4 5 6 7 8 9 10	Stage 5 (Year 41-50) Phases (years) 1 2 3 4 5 6 7 8 9 10	Stage 6 (Year 51-60) Phases (years) 1 2 3 4 5 6 7 8 9 10
				yr1 2 3 4 5 6 7 8 9 10	11 12 13 14 15 16 17 19 19 20	21 22 23 24 25 26 27 28 29 30	31 32 33 34 35 36 37 38 39 40	41 42 43 44 45 46 47 48 49 50	51 52 53 54 55 56 57 58 59 60
ZONE 3	*Activity*	*Start Date*	*Completion*						
Narrative: Start by removing older hazardous Pines, evidence of tree failures, and tree defects within the group. Opportunities to plant early and support QLDC's existing planting.	Removal Period	Year 5	**100% by Stage 5**	5% 5%	10% 10%	10% 10% 10%	10% 10% 10%	10% 10%	
	Rest Period								
	Planting	Year 1							
	Weed Control								
	Assessment/Monitoring								
ZONE 4	*Activity*	*Start Date*	*Completion*						
Narrative: Stage 1: Remove a larger portion of conifers to allow more light within the memorial site to support existing planting. Then, gradually remove and replace the remaining conifers over time.	Removal Period	Year 5	**100% by Stage 6**	30% 10%	5% 5%	5% 5% 5%	5% 5% 5%	5% 5% 5%	5% 5%
	Rest Period								
	Planting	Year 6							
	Weed Control								
	Assessment/Monitoring								
ZONE 5	*Activity*	*Start Date*	*Completion*						
Narrative: Gradually opening the view shaft to the lake, starting from the middle, with a focus on removing all trees by the end of Stage 1. View shaft aligns with the development plan.	Removal Period	Year 1	**100% by Stage 1**	20% 40% 40%					
	Rest Period								
	Planting	Year 2							
	Weed Control								
	Assessment/Monitoring								
ZONE 6	*Activity*	*Start Date*	*Completion*						
Narrative: Begin by removing older hazardous pines, as there is evidence of tree failures and defects within the group.	Removal Period	Year 13	**100% by Stage 5**		10% 10%	10% 10% 10%	10% 10% 10%	10% 10% 10%	
	Rest Period								
	Planting	Year 14							
	Weed Control								
	Assessment/Monitoring								

Zone	Activity	Start Date	Completion	*Stage 1 (Year 1-10) Phases (years)										Stage 2 (Year 11-20) Phases (years)										Stage 3 (Year 21-30) Phases (years)										Stage 4 (Year 31-40) Phases (years)										Stage 5 (Year 41-50) Phases (years)										Stage 6 (Year 51-60) Phases (years)									
				1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
				yr1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	19	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
ZONE 7	*Activity*	*Start Date*	*Completion*																																																												
Narrative: Gradually remove and replace over time. Opportunity to plant an avenue of deciduous trees along the access road. Opportunity to plant early and support QLDC's existing planting along the northern edge of the group.	Removal Period	Year 13	**100% by Stage 6**													5%					5%																																									
	Rest Period																																																														
	Planting	Year 1																																																												
	Weed Control																																																												
	Assessment/Monitoring																																																											
ZONE 8	*Activity*	*Start Date*	*Completion*																																																											
Narrative: Gradually remove and replace over time. Opportunity to plant an avenue of deciduous trees along the access road.	Removal Period	Year 13	**100% by Stage 5**													10%				10%				10%				10%				10%				10%				10%				10%				10%				10%									
	Rest Period																																																												
	Planting	Year 14																																																												
	Weed Control																																																												
	Assessment/Monitoring																																																											
ZONE 9	*Activity*	*Start Date*	*Completion*																																																										
Narrative: A relatively small number of conifer trees in this zone compared to others. The area is well protected from winds. Opportunity to remove all conifers to open the area for replanting with predominantly native species.	Removal Period	Year 5	**100% by Stage 1**					100%																																																					
	Rest Period																																																												
	Planting	Year 6																																																											
	Weed Control																																																											
	Assessment/Monitoring																																																											
ZONE 10	*Activity*	*Start Date*	*Completion*																																																										
Narrative: Retain for shelter of new planting within Zone 9. Remove when shelter is no longer required or trees reach the end of their safe useful life.	Removal Period	Year 53	**100% by Stage 6**																																																									
	Rest Period																																																												
	Planting	Year 54																																																											
	Weed Control																																																											
	Assessment/Monitoring																																																											

Appendix 2 -Species Selection Guide

A comprehensive guide to the native and suitable exotic species that will be used in replanting efforts, including information on their ecological roles, growth characteristics, and suitability for different conditions within Eely Point. Including a list of native species suitable for the Upper Clutha Basin.

Species	Type	Ecological Role	Growth Characteristics	Suitability
Pioneer Native Species (non-exhaustive)				
Olearia avicenniifolia (Tree Daisy)	Native	Provides shade and wind protection for slower-growing species	Grows 2-4m; fast-growing shrub tolerates harsh conditions	Suited to dry, rocky sites, provides quick cover for exposed areas
Kunzea serotina (Kānuka)	Native	Provides early shelter, nitrogen-fixing, creates microenvironments	Grows 10-15m; thrives in dry, rocky, low-nutrient soils	Excellent for stabilising soil in rocky outcrops, supports succession
Phormium cookianum (Mountain Flax)	Native	Stabilises soil, attracts nectar-feeding birds	Grows 1-2m; tolerates dry to moist, rocky soils	Ideal for rocky slopes, erosion control in non-wetland areas
Ozothamnus vauvilliersii (Tauhinu)	Native	Coloniser, provides cover in exposed areas	Grows 1-2m; tolerates dry, windy conditions	Perfect for dry, rocky outcrops post-conifer removal
Secondary and Tertiary Native Species (non-exhaustive)				
Sophora microphylla (Kōwhai)	Native	Attracts native birds, provides habitat and visual interest	Grows 8-12m; prefers well-drained, moist soils	Enhances biodiversity, medium canopy in moist, rocky areas
Olearia lineata (Thin Leafed Tree Daisy)	Native	Provides quick cover, supports dry-site succession	Grows 4-6m; adapted to dry, rocky conditions	Ideal for dry, exposed rocky sites post-conifer removal
Aristotelia serrata (Wineberry/Makomako)	Native	Provides food for birds with berries, adds medium canopy	Grows 5-10m; prefers moist, well-drained soils	Excellent for forest margins in moist, sheltered areas
Carpodetus serratus (Putaputaweta)	Native	Contributes to biodiversity, tolerates shaded areas	Grows 6-10m; thrives in moist, well-drained soils	Ideal for secondary planting in moist, shady spots
Griselinia littoralis (Kapuka/Broadleaf)	Native	Provides medium canopy cover, habitat for birds	Grows 6-10m; tolerates wind and rocky soils	Great for filling canopy gaps, hardy against wind
Pittosporum tenuifolium (Kōhūhū)	Native	Creates microclimates, stabilises soil	Grows 5-10m; tolerates wind and poor soils	Provides shelter for delicate species in moist areas
Plagianthus regius (Lowland Ribbonwood)	Native	Fast-growing, provides shade and habitat, stabilises soil	Grows 10-20m; prefers moist, fertile soils	Ideal for quick shelter in moist, well-drained areas
Melicytus ramiflorus (Māhoe)	Native	Improves soil, attracts birds with berries, dense canopy	Grows 5-10m; fast-growing in moist conditions	Provides dense cover in sheltered, semi-shaded areas
Cordyline australis (Tī Kouka/Cabbage Tree)	Native	Attracts birds, adds structural diversity	Grows 8-15m; tolerates moist, rocky soils	Suitable for moist, rocky areas, supports fauna
Pseudopanax crassifolius (Horoeka Lancewood)	Native	Adds structural diversity, transitions to canopy tree	Grows 4-6m; tolerates moist, well-drained soils	Ideal for mid-succession, unique juvenile form
Coprosma propinqua (Mingimingi)	Native	Stabilises soil, attracts birds with berries	Grows 4-6m; tolerates dry to moist soils	Versatile for rocky, exposed to semi-shaded sites
Exotic Species (non-exhaustive)				
Platanus varieties ie. x acerifolia (London Plane)	Exotic Deciduous	Provides broad canopy cover, aesthetic and structural balance	Grows up to 30m	Ideal for shade and structure in high-use public areas
Tilia x europaea (Lime)	Exotic Deciduous	Adds seasonal interest and shelter	Grows up to 25m	Suitable for aesthetic value and providing valuable shelter
Quercus varieties ie. robur ‘Fastigiata’ (English Oak)	Exotic Deciduous	Provides structural form and wind resistance	Grows up to 20m; fastigiate form	Ideal for exposed areas, offering wind tolerance and visual appeal
Ulmus varieties ie. procera (English Elm)	Exotic Deciduous	Provides wind tolerance and broad canopy	Grows up to 35m	Suitable for large areas where shade and shelter are needed
Fagus sylvatica (European Beech)	Exotic Deciduous	Adds structural diversity and dense shade	Grows 25-30m; slow-growing	Ideal for adding long-term shade and visual structure

Appendix 2 -Species Selection Guide

Species	Type	Ecological Role	Growth Characteristics	Suitability
Carpinus betulus (European Hornbeam)	Exotic Deciduous	Provides dense hedge and structural shelter	Grows 20-25m; dense foliage	Suitable for structured hedges and windbreaks in urban gardens
Betula varieties ie. utilis (Himalayan Birch)	Exotic Deciduous	Tolerates a range of soils and conditions, provides fast-growing shelter	Grows 15-20m; fast-growing	Ideal for open areas requiring quick canopy cover and soil stabilisation.
Acer varieties ie. platanoides (Norway Maple)	Exotic Deciduous	Provides broad canopy cover, seasonal interest, and habitat for urban wildlife	Grows 20-25m; fast-growing, tolerates a range of soils and urban conditions	Ideal for urban settings, parks, and large gardens requiring shade and aesthetic appeal
Aesculus varieties ie. hippocastanum (European horse chestnut)	Exotic Deciduous	Adds structural diversity, provides shade, and supports pollinators with flowers	Grows 20-30m; prefers moist, well-drained soils, moderately fast-growing	Suitable for large open spaces, parks, and avenues where shade and visual impact are desired
Juglans regia (English walnut)	Exotic Deciduous	Provides food (nuts) for wildlife and humans, adds structural diversity	Grows 15-25m; prefers deep, fertile, well-drained soils, moderately slow-growing	Ideal for large gardens, or open areas where nut and shade are valued
Native Shelter Species (non-exhaustive)				
Fuscospora cliffortioides (Mountain Beech)	Native	Provides canopy cover, habitat for fauna	Grows 15-20m; prefers well-drained, rocky soils	Excellent for exposed, rocky areas, wind-tolerant
Fuscospora fusca (Tawhai Raunui, Red Beech)	Native	Forms long-term canopy, dense foliage for wind shelter	Grows 25-35m; suited to moist, well-drained soils	Perfect for wind-resistant canopy in moist areas
Podocarpus laetus (Tōtara)	Native	Dense foliage for windbreaks, biodiversity enhancement	Grows up to 20m; slow-growing, adaptable	Long-lived shelter for rocky, well-drained sites
Pectinopitys ferruginea (Miro)	Native	Part of podocarp forests; food for birds	Grows up to 20m; slow-growing	Large tree; slow-growing; well-drained soils
Prumnopitys taxifolia (Matai)	Native	Dense, long-lived windbreak and habitat	Grows 20-25m; slow-growing, adaptable	Durable shelter for moist, rocky areas
Hoheria glabrata (Lacebark)	Native	Fast-growing, provides early canopy and wind protection	Grows 8-10m; prefers moist, well-drained soils	Quick shelter for moist, rocky sites, supports succession
Suitable Exotic Shelter Species (non-exhaustive)				
Sequoiadendron giganteum (Giant Redwood)	Exotic Shelter Tree	Creates iconic, towering landscape features, provides strong wind protection	Grows over 60m; highly wind-tolerant	Ideal for creating iconic and functional shelter in large open areas
Sequoia sempervirens (Coast Redwood)	Exotic Shelter Tree	Provides wind protection, grows rapidly in suitable conditions	Grows 50-70m; very long-lived	Suitable for large spaces where fast-growing, tall windbreaks are needed
Abies varieties ie. grandis (Grand fir)	Exotic Shelter Tree	Strong windbreak species with symmetrical, tall structure	Grows up to 75m	Ideal for large landscape areas requiring dense, tall shelter
Picea varieties ie. abies (Norway Spruce)	Exotic Shelter Tree	Provides dense shelter and is effective at blocking wind	Grows up to 35-55m; prefers cooler climates and well-drained soils, fast-growing	Excellent for areas requiring fast-growing, high shelter, especially in cooler regions
Cedrus varieties ie. deodara (Deodar Cedar)	Exotic Shelter Tree	Fast-growing, evergreen, coniferous tree that provides excellent wind shelter	Grows 40-50m	Ideal for wide open areas requiring strong shelter
Eucalyptus varieties ie. nitens (Shining Gum)	Exotic Shelter Tree	Provides rapid shelter, stabilises soil, attracts pollinators	Grows 20-30m; fast-growing, tolerates frosts to -14°C, requires well-drained soils	Ideal for cold, drier regions, offering quick, tall shelter in well-drained sites
Cupressus × leylandii (Leyland Cypress)	Exotic Shelter Tree	Provides fast-growing, dense shelter and wind protection	Grows up to 20-30m; very fast-growing and adaptable to a range of soils and climates	Ideal for quick shelterbelt establishment, and could be removed later if undesirable
Chamaecyparis lawsoniana (Lawson's Cypress)	Exotic Shelter Tree	Creates dense foliage suitable for wind protection and screening	Grows up to 30-50m; prefers well-drained soils and cooler, moist environments	Great for providing a tall, dense windbreak in areas that experience cooler, moist climates
Cupressus macrocarpa (Monterey Cypress)	Exotic Shelter Tree	Fast-growing, tall, and hardy windbreak species	Grows up to 30m	Perfect for exposed windy areas
Cupressus arizonica (Arizona Cypress)	Exotic Shelter Tree	Offers good wind resistance and dense foliage for shelter	Grows up to 15-20m; drought-tolerant, thriving in dry soils and hot climates	Best for dry, arid regions where strong windbreaks are required
Populus varieties ie. nigra (Black Poplar)	Exotic Shelter Tree	Fast-growing, stabilises soil, provides quick canopy cover and wind protection	Grows 20-30m; very fast-growing, thrives in moist, fertile soils	Suitable for riparian zones, shelterbelts, or areas needing rapid shelter and soil stabilisation

Appendix 2 -Species Selection Guide

Native plant species suitable for Upper Clutha basin/Eely Point

Tall Trees 15m to 25m
Fuscopora cliffortioides (Tawhairauriki/Mountain beech)
Fuscopora fusca (Tawhairaunui/Red Beech)
Kunzea seritona (Kānuka/Makahikatoa)
Metrosideros umbellata (Southern Rata)
Pectinopitys ferruginea (Miro)
Plagianthus regius (Lowland Ribbonwood)
Podocarpus laetus (Tōtara)
Prumnopitys taxifolia (Matai)

Medium size trees 8m to 10m	
Aristotelia serrata (makomako wineberry)	Olearia hectorii (hectors tree daisy)
Carpodetus serratus (putaputaweta/marble leaf)	Pennanta corymbosa (kaikomako)
Coprosma linariifolia	Phyllocladus alpinus (mtn toatoa)
Cordyline australis (tī kouka/cabbage tree)	Pittosporum tenuifolium (kōhūhū)
Fuchsia excorticata (kotukutuku)	Pseudopanax arboreus (five finger)
Griselinia littoralis (kapuka/broadleaf)	Pseudopanax crassifolius (horoeka lancewood)
Hoheria glabrata (lacebark)	Pseudopanax ferox (horoeka/fierce lancewood)
Melicytus lanceolatus (narrow leafed māhoe)	Sophora microphylla (kōwhai)
Melicytus ramiflorus (māhoe)	

Small Trees to large shrubs 4m to 6m
Aristotelia fruiticosa (mtn wineberry)
Coprosma lucida (shining karamu)
Discaria tomatou (matagouri)
Leptospermum scoparium (mānuka)
Melicope simplex (poataniwha)
Myrsine australis (ed mapou/red matipo)
Olearia avicenniifolia (tree daisy)
Olearia fragrantissima (scented tree daisy)
Olearia lineata (thin leafed tree daisy)
Pseudopanax colensoi var ternatus (three finger)

Small Shrubs	
Carmichaelia kirkii	Lophomyrtus obcordata (rohutu)
Carmichaelia petriei (native broom)	Melicytus alpinus (porcupine plant)
Coprosma brunnea	Myrsine divaricata (weeping mapou)
Coprosma crassifolia	Neomyrtus pedunculata (rohutu)
Coprosma dumosa	Olearia bullata
Coprosma intertexta	Olearia fimbriata
Coprosma propinqua (mingimingi)	Olearia nummulariifolia
Coprosma rigida	Olearia odorata
Coprosma rotundifolia	Ozothamnus vauvilliersii (tauhinu/cottonwood)
Coprosma rugosa	Pittosporum divaricatum
Coprosma virescens	Teucrium parvifolium
Coprosma wallii	Veronica cupressoides (hebe)
Corokia cotoneaster (korokia)	Veronica salicifolia (hebe)
Gaultheria crassa (false beech)	





This appendix outlines the soil enhancement techniques that will be employed throughout the restoration process in Eely Point, focusing on reversing the negative impacts caused by long-term conifer dominance. Best practices are included for improving soil health, addressing nutrient deficiencies, and preventing soil erosion to support the successful establishment of new plantings.

1.1 Soil Amendments

Amending the soil is a critical step in restoring the fertility and structure needed for successful plant growth. The following guidelines provide recommendations for organic amendments, including compost, mulch, and biochar.

Compost

Timing: Applied during early planting phases to enhance soil structure and moisture retention.
Benefits: Improves aeration, water retention, and nutrient availability, particularly in soils degraded by conifer needle litter.

Compost improves soil structure, increases organic matter, and promotes microbial activity. Application rates should range from 10-20cm in depth. Compost should be incorporated into the soil during initial site preparation, especially in areas where soil compaction or low organic content is evident.

Mulch

Timing: Applied after planting to maintain moisture and reduce temperature fluctuations.
Benefits: Helps maintain soil temperature, improves water retention, and protects soil from erosion.

Mulch provides soil insulation, reduces water evaporation, and suppresses weed growth. A layer of mulch (5-10cm deep) should be applied around new plantings but kept clear from the plant stem to prevent rot.

Biochar

Timing: Incorporated into soil during the preparation of planting zones.
Benefits: Increases water-holding capacity, enhances soil microbial diversity, and provides a long-term carbon sink.

Biochar is a long-lasting carbon-rich material that improves nutrient retention and microbial health in soils. It should be mixed with compost at a rate of 5-10% by volume.

Mycorrhizal Inoculation

Timing: Applied during planting to enhance root development.
Benefits: Promotes nutrient uptake and plant resilience.

Mycorrhizal fungi form symbiotic relationships with plant roots, improving nutrient and water absorption. Inoculants should be applied directly to the root zones during planting.

Compost Tea

Timing: Applied during planting and throughout the growing season
Benefits: Enhances soil microbial activity and nutrient availability.

Compost tea is a liquid amendment that boosts beneficial microorganisms in the soil, promoting plant health. It should be applied as a soil drench or foliar spray.



1.2 Soil Conditioning

Soil conditioning is an essential part of site preparation for planting, ensuring that the ground is adequately prepared to support root establishment and overall plant health. The following protocols outline the key steps in soil conditioning.

Tilling and Screefing

Tilling: Mechanical tilling will break up compacted layers of soil, enhancing aeration and improving water infiltration.
Screefing: Involves removing the surface cover to expose the soil, allowing for better root penetration and nutrient absorption. This method is particularly useful in areas that have accumulated heavy organic debris or conifer needle litter.

Soil conditioning involves both tilling, which breaks up compacted soil and incorporates organic matter and screefing, which clears surface vegetation or organic debris (needles and cones) to expose the soil. Organic matter such as compost and biochar should be incorporated into the soil during tilling to improve soil structure, nutrient levels and microbial activity. This provides a more favourable environment for plant roots to establish and grow.



1.3 Nutrient Management

Nutrient management is essential to counteract the nutrient depletion caused by years of conifer dominance. The following strategies will support plant establishment by addressing soil nutrient deficiencies:

Slow-Release Fertilisers

Application Rates: Based on soil testing, slow-release fertilisers should be applied at 50-100g per square metre, depending on the species being planted.
Monitoring: Soil nutrient levels should be monitored every 6-12 months to track the progress of soil fertility recovery. Soil samples should be analysed for macronutrients (N, P, K) and micronutrients such as calcium, magnesium, and sulphur.
Corrective Actions: If soil testing reveals deficiencies in key nutrients, targeted amendments such as lime for pH adjustment or organic matter for improving microbial activity should be implemented.

Organic or slow-release fertilisers will be applied to provide essential nutrients gradually over time. Nitrogen, phosphorus, and potassium (NPK) fertilisers should be used based on soil test results, with applications tailored to meet the needs of different species.

Cover Crops

Benefits: Increases organic matter, improves soil structure, and prevents nutrient leaching during periods of soil disturbance.

Planting cover crops such as clover or grasses can improve soil fertility by fixing nitrogen and preventing erosion. These crops should be sown during rest periods between tree removals and replanting phases.



1.4 Watering and Irrigation

Proper watering and irrigation are crucial for the successful establishment of new plantings, particularly in the early stages of restoration. The following strategies ensure optimal moisture levels for plant growth while conserving water resources:

Drip or Irrigation Lines

Timing: Where practical, Drip irrigation systems will be used regularly during the first 2-3 years of establishment, especially during dry periods.
Benefits: Provides targeted watering, reduces water waste, and ensures that young plants receive the moisture they need to establish strong root systems.

Drip irrigation systems will be installed where feasible and existing water supplies exist, delivering water directly to the roots of newly planted species. This method reduces water loss from evaporation and ensures efficient use of water.

Watering Schedule

Timing: Watering should be done early in the morning or late in the afternoon to minimise water loss through evaporation.
Monitoring: Soil moisture sensors can be used to monitor the effectiveness of the watering schedule and prevent overwatering.

A regular watering schedule will be maintained for newly planted trees and shrubs, particularly during the first two growing seasons. Watering should be more frequent during the dry summer months, with adjustments made based on weather patterns and soil moisture levels.

Mulching for Moisture Retention

Benefits: Reduces the frequency of irrigation, improves water retention in the soil, and provides additional protection against temperature fluctuations.

The application of mulch around new planting areas will help retain soil moisture and reduce the need for frequent watering. Organic mulches, such as wood chips, can slow the evaporation of water from the soil.

Water-Saving Measures

Benefits: Minimises water usage while ensuring plant health and resilience in drier areas.

Drought-resistant and native species that are adapted to local moisture conditions will be prioritised for planting in areas with limited water availability. This reduces the need for extensive irrigation and ensures long-term sustainability.



1.5 Erosion Control Measures

Preventing soil erosion is crucial during tree removal and replanting phases. Erosion not only depletes soil nutrients but also damages the landscape, making it difficult for new plantings to establish. The following techniques will ensure soil stability throughout the restoration process:

Temporary Ground Covers

Timing: Applied immediately after tree removal and before new plantings to stabilise the soil surface.
Benefits: Provides temporary protection against erosion while improving soil health through root development.

Planting quick-growing grasses or using biodegradable mats will help stabilise soil during periods of tree removal. These ground covers prevent soil displacement from wind and rain, reducing erosion risks while allowing for future replanting.

Silt Fences and Erosion Barriers

Application: Installed in areas prone to soil displacement or runoff, particularly on slopes or near water bodies.
Benefits: Keeps soil on-site and prevents it from being washed into surrounding areas, thus protecting local ecosystems and water quality.

These barriers should be installed around areas where heavy machinery is used or where soil is likely to be disturbed during removal activities. Silt fences prevent soil runoff into waterways or adjacent areas. Erosion Barriers could consist of felled logs strategically place and backfilled with soil/mulch and planted.

Stabilisation Plantings

Timing: Planted as soon as possible after tree removal to stabilise soil before other species are introduced.
Benefits: Provides long-term erosion control and improves soil structure, ensuring successful establishment of subsequent plantings.

Early-stage pioneer species, such as Kānuka or erosion-resistant grasses, should be planted in areas susceptible to soil erosion. These plants are quick to establish and help anchor the soil with their root systems.

