

Waiohotu Forest

Torlesse Pine Company Ltd FSC Forest Management Plan

For the period July 2018 – July 2023



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1. INTRODUCTION

Foundation Principle

Torlesse Pine Company Ltd (TPC) is committed to adopt the Forest Stewardship Council (FSC) Principles and to meet their Criteria and the FSC standards of good forest management. These standards include ecological, social and economic parameters.

Torlesse Pine Company Ltd is committed to the PF Olsen FSC Group Scheme that is implemented through the Group Scheme Member Manual and associated documents.

About this plan

This document provides a summary of the forest management plan and contains:

- Management objectives;
 - A description of the land and forest resources;
 - Environmental safeguards;
 - Identification and protection of rare, threatened and endangered species;
 - Rationale for species selection, management regime and harvest plan and techniques to be used;
 - Appropriate management of unstocked reserve areas;
 - Maps showing plantation area, legal boundaries and protected areas;
 - Provisions for monitoring and protection.
-

The Landscape Context

2. The Forest Land

Overview

This section describes the physical and legal attributes of the land on which the forest is located. Included in this section are discussions of:

- Location and access
- Topography
- Soils
- Climate
- Legal ownership and tenure

Legal ownership

The legal description of the land on which the forest is situated is:

Pt Lot 1 & Pt Lot 3, DPS 7267, Whaitikuranui 2E2 West 3C, Blocks III & IV, Patetere SD XV, COT 22C/145 and 53B/621, Valuation #: 05411-05500 and 05411-05200

The farm is freehold over which TPC holds a registered forestry right

Location and access

Waiohotu Forest is located off Harwoods Road near Tirau in the South Waikato. It is located as a forestry right on the Coats Family Farm. Internal farm roads provide access to all parts of the forest.

The location of the forest in relation to potential markets is listed in Table 1 below and shown in Map 1 (on page 8).

Table 1: Distances from forest to log markets

Potential Market or Export Port	Distance from Forest (km)	Log Market
Port of Tauranga	50	Export
Waipa Sawmill	45	Domestic
Kinlieth	35	Pulp

Topography

The topography of the forest land is flat/rolling to moderately steep. Ground based, and possibly small hauler log extraction methods will be utilised at harvesting.

Altitude is 50 to 150 m.

Soils

Soils are predominantly yellow-brown loams and suitable for production forestry. The forest has approximate Land Use Classification percentages as follows:

- Ile3 10%
- IIs1 10%
- IIIw1 10%
- Vle1 50%
- VIle6 20%

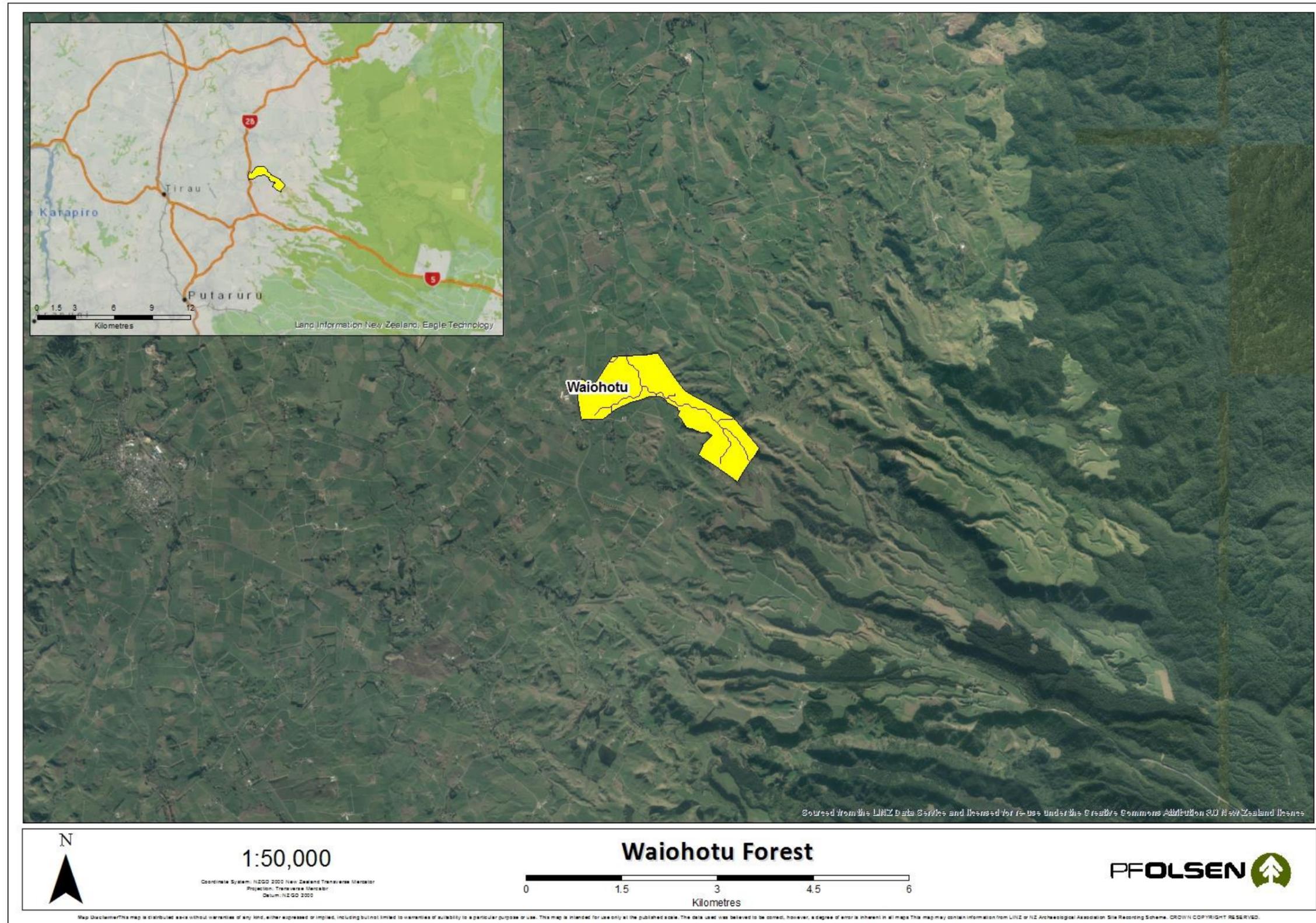
Climate

Rainfall: The average rainfall at nearby Tirau is about 1,300 mm/yr and is relatively well distributed during the year.

Frosts are common with around 50 ground frosts per year.

Temperature: The mean annual temperature is around 13.8°C.

Map 1 - Forest Location Map



3. The Broader Landscape

Ecological landscape

The woodlots are located on a dairy farm with little ecological relevance. A small area of native trees is located in the Pond Sidling area of about half a hectare. It has some tawa and rewarewa, but due to its small size and fragmentation from other areas it is of low ecological value. It will however be protected.

A small raupo dominated wetland and dammed pond are also adjacent to Pond Sidling. These areas while small represent rare remnant and will be protected by the farm owner. Dabchick have been observed in the pond.

A clean spring fed stream by dairy farm standards runs through the property. It has been fenced from cattle and some native plants established. This is managed by the farm owner and is not part of the FMU.

The forest boundaries are split between the Hinuera and Tokoroa ecological districts as seen in Figure 1.

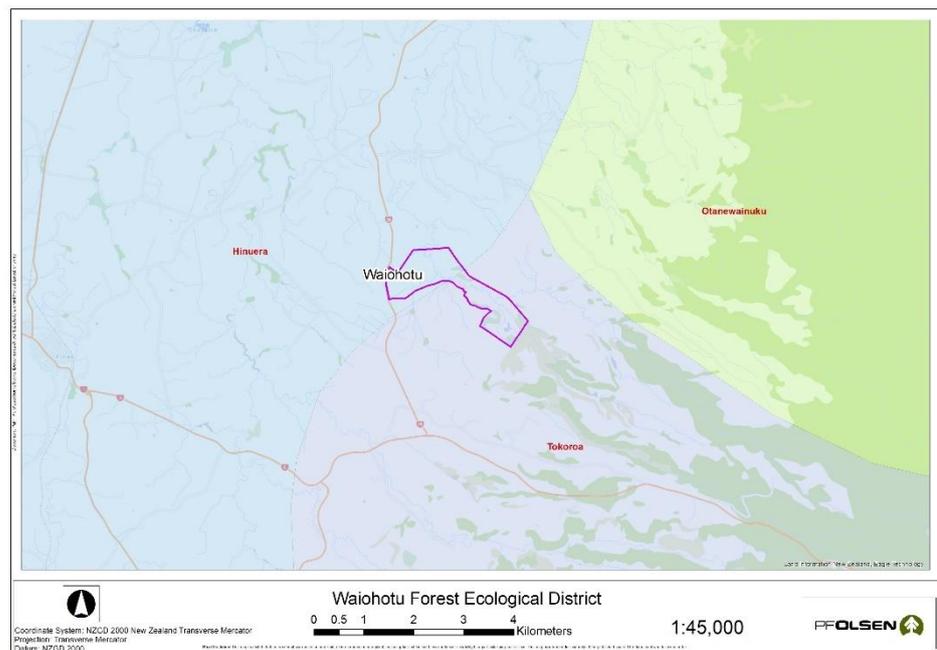


Figure 1: Waiohotu Forest Ecological Districts

Historic and archaeological sites

Records of known archaeological and historical places are maintained in the NZ Archaeological Association (NZAA) Site Recording Scheme. The Archaeological Site Probability model published by the Department of Conservation¹ provides further guidance on the probability of pre-European archaeological evidence existing based on the geographical location of the forest and historical occupation of the local area.

No archaeological sites are known within or nearby the forest.

If a site is found or suspected on any block, the protocols specified in PF Olsen’s EMS, and any others specifically developed in conjunction with Heritage New Zealand (HNZ) and Iwi or other stakeholders must be observed. Where such circumstances require, an ‘Authority to Modify or Destroy’ will be sought from HNZ. Such authorities are similar in function to a resource consent and, if granted, normally come with conditions that must be met. The process to apply for authorities is documented in PF Olsen’s EMS.

Note also that Authorities to modify an archaeological site may sometimes be required from the local District Council and sites of cultural significance are often included in schedules of places and sites of significance in District Plans. Update checks for any sites will be required before any harvesting or related earthworks commences.

Threatened Environments Classification

The Landcare Threatened Environments Classification (TEC) is a measure of how much indigenous vegetation remains within land environments, its legal protection status, and how past vegetation loss and legal protection are distributed across New Zealand’s landscape. The TEC is a combination of three national databases:

- Land Environments New Zealand (LENZ)
- Landcover Database 2
- Protected Areas Network

The TEC uses indigenous vegetation cover as a surrogate for indigenous biodiversity, which includes indigenous ecosystems, habitats, and communities; the indigenous species, subspecies and varieties that are supported by indigenous vegetation; and their genetic diversity. It uses legal protection as a surrogate for the relative vulnerability of indigenous biodiversity to pressures such as land clearance, extractive land uses, and the effects of fragmentation. The TEC is therefore most appropriately applied to help identify places that are priorities for formal protection against clearance and/or incompatible land uses, and for ecological restoration to restore lost species, linkages and buffers.

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¹ Arnold, G.; Newsome, P.; Heke, H. 2004: Predicting archaeological sites in New Zealand. *DOC Science Internal Series 180*. Department of Conservation, Wellington. 24 p.

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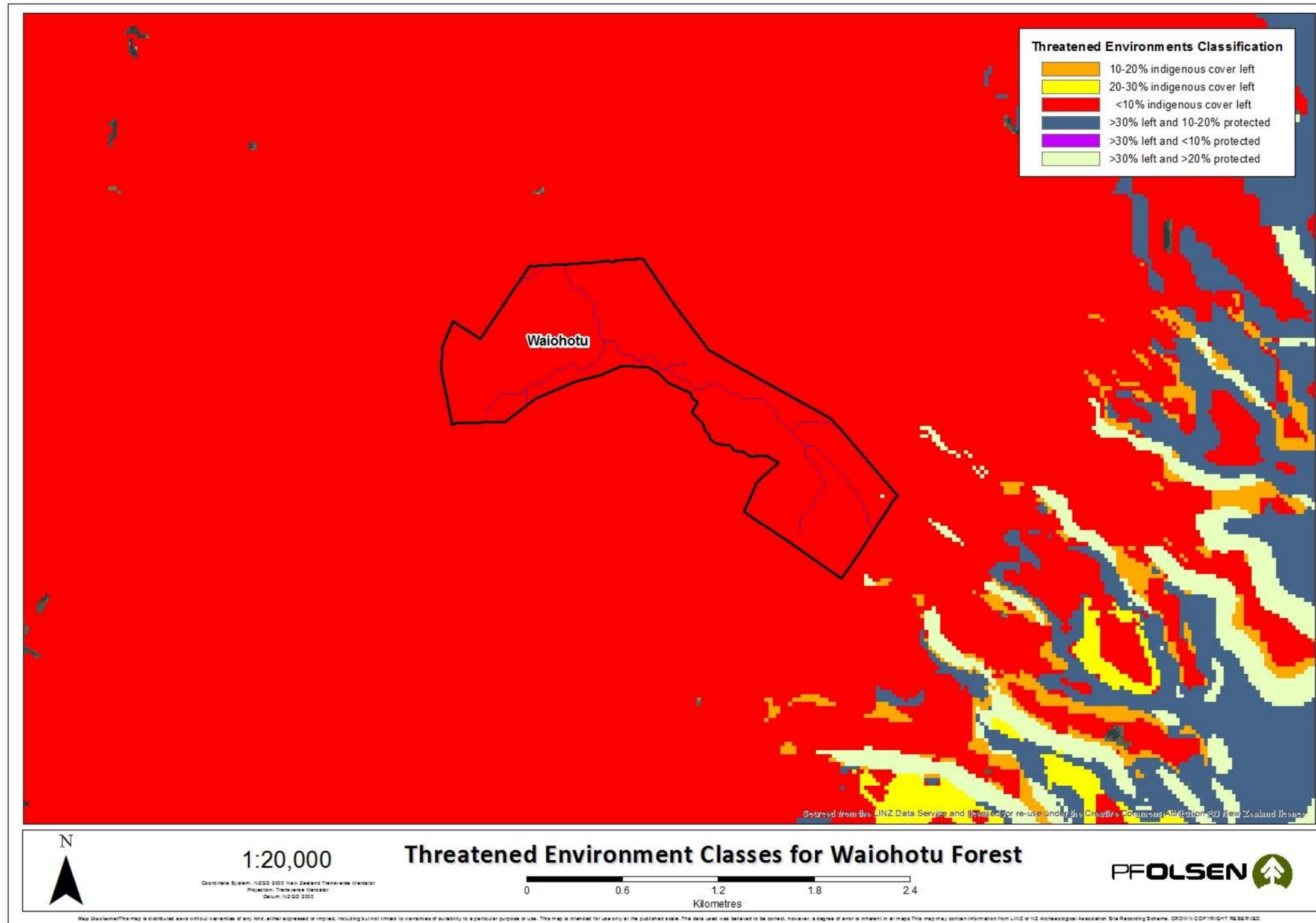
Waiohotu Forest falls under one of the Threatened Environments categories (Map 2). The majority of the forest’s area doesn’t have much of the original indigenous forest remaining (Category: < 10 % of indigenous cover left). These areas have been identified and classified and afforded the appropriate protective status.

Protective Status Table 2 shows vegetation types as required by the National Standard for Plantation Forest Management in New Zealand.

Table 2. Protective status of the ecological landscape

Ecological District or LENZ type:	Hinuera ED	LENZ F6.1	LENZ G4.1
Original (pre-Maori) percentage of ecosystem type in Ecological District	10,691 ha 100%	NA	NA
Natural ecosystem area remaining	59.5%	25.9%	+ / - 14%
Proportion of remaining natural ecosystem under protection:	0.6%	54.3%	+/- 3.2%
Protection by certificate holder	4.3 ha 0.004%		
Protected areas as a % of forest management unit (FMU)	27%		
Protected areas as a % of FMU by Ecological District if less than 10%, need to consider offsets	27%		

Map 2 – Forest Ecological Context



4. Socio-economic profile and adjacent land

Forest history As a small woodlot, Waiohotu Forest has no history of significance.

Current social profile The predominant land use within the Hinuera and Tokoroa Districts is pastoral farming in addition to horticulture. Forestry plantings are scattered throughout the province.

The forest is small and has little effect or relevance to the local community. It does provide an alternative land use and some wind protection for the farm that it is located on.

Table 3: Key statistics as summarised from Census² data

Census Category	Waikato	NZ
Ethnicity: European	77.4%	74%
Ethnicity: Māori	21.9%	14.9%
Formal qualifications	75.3%	79.1%
Unemployment	7.5%	7.1%
Dominant occupation	Managers	Professional
Median income	\$27,900	\$28,500
Family with children	39.3%	41.3%
Internet access	72.5%	76.8%
Home ownership	62.7%	64.8%
Employed in agriculture, fishing & forestry	10.3%	5.7%

Associations with Tangata Whenua Local Tangata Whenua have been previously consulted and are not concerned with the woodlots due to their small size and low intensity.

Tenure & resource rights There are no current resource consents or HNZ authorities that apply to Waiohotu Forest.

Neighbours Neighbours to the forest estate boundaries have a special interest in the management of the forest. Activities within the forest may positively or negatively impact upon their quality of life or businesses in a number of ways, while inappropriately managed operations could create risks of adverse health, safety and environmental hazards.

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² http://www.stats.govt.nz/Census/2013-census/profile-and-summary-reports/quickstats-about-a-place.aspx?request_value=13853&tabname=Business#

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Neighbours may use the forests for recreational purposes or place reliance on the forests for provision of water quality or quantity services. Boundary issues such as weed and pest control, access and boundary alignment issues may also involve neighbours.

Forest neighbours have previously been consulted and due to the small size and low intensity of the woodlots and that they are not due for harvest have no current concerns. The farm owner keeps in contact with neighbours and resolves most issues.

Regulatory Environment & Risk Management

5. The Regulatory Environment & Risk

Regulatory considerations

Forestry operations throughout New Zealand are undertaken within the context of a regulatory framework that aims to ensure wider economic, social and environmental goals are achieved for the populace as a whole.

Failure to meet regulatory requirements is a key business risk that must be managed. The following section summarise key regulatory requirements and risk management controls exercised over forestry operations in the forest.

Health and Safety at Work Act 2015

Leadership, a constant focus on health and safety, and the strong message that safety rates as the number one priority ahead of any other business driver are all highly important for PF Olsen management. The company also takes the following steps to ensure worker health and safety:

- Contractor selection process including emphasis on:
 - safety systems and track record;
 - worker skills and training; and
 - equipment type and standard.
 - Work planning.
 - Contractor induction.
 - Monitoring, including random and reasonable cause drug testing, safe work practices and PPE.
 - Incident investigation and reporting, including investing in software, training and processes development to enable good transparency on lag and lead indicators.
 - Regular reporting to and interaction with the Client on matters related to safety.
 - Regular (annual) review and update of the critical risks as identified in PF Olsen data sets and from Industry indicators. Such a review shall focus on incidents that have caused harm and/or loss, any known cause factors and mitigations and revised controls.
-

Resource Management Act (RMA) 1991

Waiohotu Forest is subject to the provisions of the Resource Management Act (RMA) 1991. The RMA sets up a resource management system that promotes the sustainable management of natural and physical resources and is now the principal statute for the management of land, water, soil and other resources in New Zealand. The organisations relevant to Waiohotu Forest are listed below:

Table 4: Regional and District Councils under Waiohotu Forest

Regional Councils ³	District Councils ⁴
Waikato Regional Council	South Waikato District Council

Under the RMA, each Council has its own planning documents and associated rules that have been developed through public process. Any forestry operations must comply with the rules relevant to the Council area in which the operations are to take place.

At the time of formulation of this Management Plan, it was just announced that many individual Council rules will be superseded by a new instrument under the RMA, the ‘National Environmental Standard for Plantation Forestry’ (NES-PF), designed explicitly to assist streamlining, efficiency and consistency in the application of environmental law to the forest industry (see next section). The contact details for the relevant councils can be seen in [Appendix 1](#).

National Environmental Standard for Plantation Forestry (NES-PF)

Coming into law on 1 May 2018, the NES-PF is a whole new rule hierarchy that applies the same rule set uniformly across most forestry operations in all parts of New Zealand. Operations will come under the legal force of this RMA instrument, though local Councils will retain the ability to regulate specific areas outside the NES-PF, e.g. Significant Natural Areas, Outstanding Landscapes, giving effect to the Coastal Policy Statement etc.

The underpinning the structure of the NES-PF is a rule hierarchy linked to the erosion susceptibility of the lands upon which forestry operations are to be conducted.

Work commissioned by the Ministry of Primary Industries led to the creation of a national spatial map, the ‘Erosion Susceptibility Layer’ (ESC) that classifies all of New Zealand into a series of four classes of erosion susceptibility from low (green) to very high (red).

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³ Regional Councils responsible for soil conservation and water and air quality issues

⁴ District Councils responsible for land use and biodiversity issues

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The stringency of the rules hierarchy, i.e. whether consents are needed and the degree to which Councils can apply discretion to the conditions attached to a consent, is then tied closely to the recognised erosion susceptibility of the lands involved and the risks created by the operations.

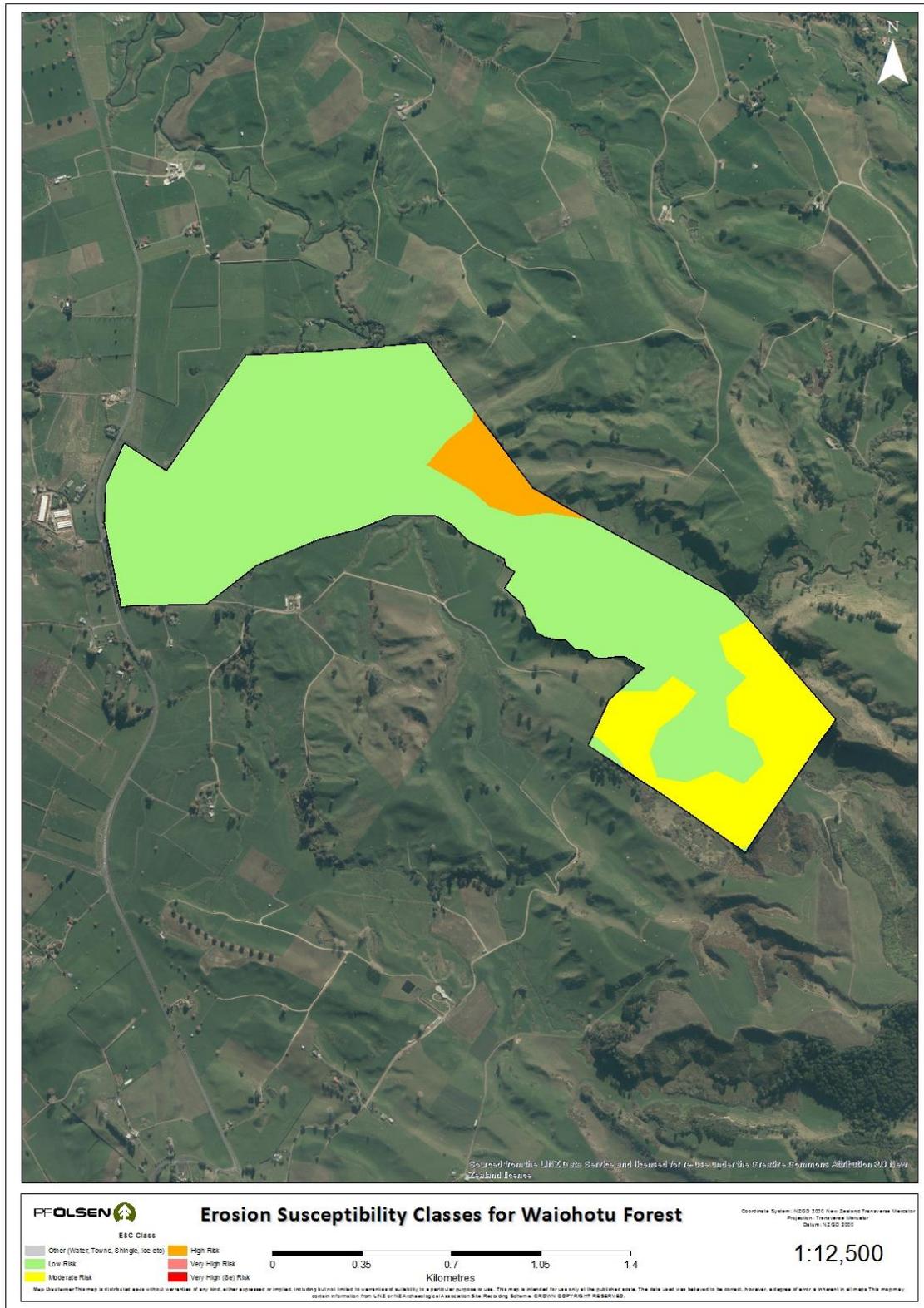
In the case of Waiohotu Forest, Table 5 indicates the proportion of the forest by the respective ESC classes.

In broad terms, harvesting, roading (earthworks) and new afforestation operations will need consents in the red zone. Earthworks will need consents in orange, and in the green and yellow zones most operations will be permitted subject to conditions. The coverage of the erosion classes within the estate are illustrated in Map 4.

Table 5: ESC Classes (Erosion Risk) for Waiohotu Forest

	Low	Moderate	High	Very High	Very High (8e)	Undefined
Area (ha)	148.7	31.7	9.2			3.2
Area (%)	78.4	16.7	4.8			6.6

Map 4 – National Environmental Standard Erosion Susceptibility Classes in Waiohotu Forest



Heritage New Zealand Pouhere Taonga Act 2014

Under the Heritage New Zealand Pouhere Taonga Act 2014 it is the landowner’s responsibility to identify any historic sites on their land prior to undertaking any work which may disturb or destroy such sites. Records of archaeological and historical places are maintained in the NZ Archaeological Association (NZAA) Site Recording Scheme <http://www.archsite.org.nz/>.

If a site is found or suspected on any block, protocols specified in PF Olsen’s EMS, and any others specifically developed in conjunction with Heritage NZ, archaeologists and Iwi or other stakeholders, will be observed and the necessary Archaeological Authorities obtained with Heritage NZ and if necessary the local Territorial Authority.

These responses may include, but are not limited to:

- Map and ground surveys to identify, mark and protect known heritage sites.
- Iwi consultation and surveys for unknown sites.
- Archaeological Authorities to modify sites if required.

Accidental Discovery Protocols to stop work and engage experts if sites are discovered during operations.

Consents & authorities held

There are no current resource consents or HNZ authorities that apply to Waiohotu Forest.

Emissions Trading Scheme

Forests in New Zealand are governed by rules related to New Zealand’s Kyoto commitments to reduce the nation’s carbon footprint and contribution to associated climate change.

The forest was planted on “Kyoto compliant” land that was vacant as at 31st December 1989. These forest areas have not been registered to participate in the NZ Emissions Trading Scheme and are not subject to the accrual of emissions credits and liabilities under that scheme.

Other relevant legislation

There are numerous other statutes and regulations that impact on forest operations. Forest owners can be held liable for breaches of these Acts and may be held responsible for damage to third party property. Management processes seek to manage and minimise these risks.

Other relevant legislation is listed in [Appendix 2](#).

6. Commercial Risk Management

Market access retention

It is a major focus of the Property Manager to ensure contracted products are delivered on time and in specification to ensure Torlesse Pine Company Ltd retains credible access to its markets.

Torlesse Pine Company Ltd maintains independent third party environmental certification for its estate under Forest Stewardship Council certification (FSC). PF Olsen Ltd acting under the instruction of its client will be responsible for the execution and maintenance of the required FSC certification elements of which this management plan forms an important component.

Log customer credit risk

There have been a number of NZ sawmills fail in recent years leaving log customers unpaid for the last month’s deliveries. The PF Olsen Investment Manager manages customer credit risk exposure and mitigation measures for export markets while PF Olsen manages these risks for domestic log customers.

Infrastructure damage or service disruption

Waiohotu Forest has no public tracks within the forest. Risks around these are managed by:

- Identification on maps and on the ground any utilities at planning stage.
 - Early engagement with utility owner to plan operations to minimise risks.
 - Operational execution of agreed plans with parties specifically qualified for the tasks involved when working close to utilities.
-

Pests and diseases

Pests and diseases are managed according to any statutory obligations and best practices as identified by scientific research and past experience, with the type and intensity of treatment (if any) subject to what is at risk and the age of trees (see [Section 13](#)).

7. Environmental Risk Management

Environmental risk

Environmental risk is managed by PF Olsen as appointed property manager, through a cascade framework from high level 'intent' determined by the Forestry Rights owner, through PF Olsen's own environmental policies, thence through defined and documented processes constituting an Environmental Management System (EMS), supported by monitoring and reporting. PF Olsen's policies and Torlesse Pine Company Ltd business objectives are considered to be well in alignment.

Environmental policy

PF Olsen Limited is committed to:

- *Sustainable forest and land management;*
- *Promoting high environmental performance standards that recognise the input of the community in which we operate;*
- *Supporting an environment of continuous improvement in environmental performance;*
- *Obtaining and retaining independent 3rd party forest certification in conformance with the Principles and Criteria of the Forest Stewardship Council and / or the Programme for Endorsement of Forest Certification as specified by forest owning clients, or in any case ISO:14001 Environmental Management Systems.*

In order to achieve these commitments **PF Olsen** (and PF Olsen Certification Scheme Members) will undertake the following:

- Where applicable to a particular forest, comply with the presiding **Certification Standards** as set out in any agreements between the forest owners and PF Olsen.
 - **Planning** of operations to avoid, mitigate or remedy degradation of **ecological, heritage** and **amenity** values;
 - Compliance with all relevant **legislation** and where appropriate exceed environmental statutory requirements;
 - **Training** for all employees and contractors to ensure an understanding of certification member's commitments to high standards of environmental performance, their responsibilities under the environmental legislation and to assist the implementation of sound environmental practices;
 - **Monitoring** environmental and socio-economic research and international agreements that may improve PF Olsen environmental and certification performance;
 - Regular environmental performance **audits** of operations;
 - Support for environmental **research**;
 - Undertake forest management in accordance with the principles and ethics of the **NZ Forest Accord** the **Principles for Commercial Plantation Forest Management in NZ**, and other relevant agreements, conventions and accords.
 - Promotion of the prevention of **waste** and **pollution** / efficient use of **energy**;
 - Due regard for the well-being of the **community**.
-

Objectives, targets and monitoring

PF Olsen’s objectives, targets and monitoring categorised across 5 key aspects of the business:

1. Economic
2. Legal
3. Social
4. Health & safety
5. Environment

A systematic management approach ensures these objectives and targets remain the cornerstone of PF Olsen’s business, backstopped by monitoring processes that form a regular review of practices. These are summarised in [Appendix 3](#).

EMS framework

The Environmental Management System (EMS) is an integrated set of cloud based, defined and documented policies, processes and activities that govern the physical implementation of forest management activities. The EMS applies a systematic approach certified to ISO:14001 standards to ensure that prevention of adverse and harmful impacts is effective.

The framework is reviewed annually with the input of an Environmental Management Group (EMG).

Environmental Code of Practice

As a member of the New Zealand Forest Owners Association, all operations carried out on the property should be undertaken in conformance to the NZ Forest Owners Association ‘New Zealand Environmental Code of Practice for Plantation Forestry’. This publicly available document sets out guidelines that underpin the requirements for sound and practical environmental management.

Forest Road Engineering Manual

As a member of the New Zealand Forest Owners Association, roading and engineering techniques employed within the forest should conform to the industry best practice as outlined in the New Zealand Forest Owners Association publication, ‘NZ Forest Road Engineering Manual’, published 2012.

Assessment of environmental risks

Environmental risks arising from forest operations are assessed and managed on a site-by-site basis prior to execution. The relative probability and magnitude of adverse effect attributable to any particular operation on any particular site is highly variable.

At a high level, ‘risks’ are presented as consuming services summarised for a typical plantation life cycle in [Appendix 4](#). As a broad assessment over the total Waiohotu Forest, the **potential** for adverse impacts across the range

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of operations and forest sites is indicated in the Environmental Assessment matrix below (Table 6), which summarises the identified risks across ‘key management aspects’.

The level of potential risk has been evaluated in the matrix as high ‘H’, medium ‘M’ or low ‘L’, or not applicable ‘NA’ and is thus indicative of the level of care that might need to be applied to ensure the potential for adverse effects is minimised.

Table 6: Risk assessment for key aspects involved in forest management activities

Forestry Operational Activities	Environmental Values / Issues matrix												
	Erosion & Sediment Control	Water Quality	Soil Conservation & Quality	Air Quality	Aquatic Life	Native Wildlife	Native Vegetation	Historical & Cultural Values	Landscape & Visual Values	Neighbours	Public Utilities	Recreation Values	Threatened Species
Harvesting	H	H	H	NA	L	L	H	H	L	H	L	L	H
Earthworks	H	H	H	NA	L	L	L	H	L	L	L	L	L
Slash Management	L	L	L	NA	L	L	L	NA	L	L	L	L	L
Stream Crossings	H	H	L	NA	H	L	L	NA	NA	L	L	H	NA
Mechanical Land Preparation	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	L
Burning	L	L	L	H	L	L	L	NA	H	H	L	H	L
Planting	NA	NA	NA	NA	NA	L	L	H	L	L	L	L	L
Tending	NA	L	NA	NA	L	L	L	NA	L	L	L	L	L
Fertiliser Application	NA	H	NA	L	H	L	L	L	NA	L	L	L	M
Agrichemical Use	NA	H	L	L	H	L	H	L	L	H	L	H	H
Oil & Fuel Management	NA	H	L	NA	H	L	L	L	NA	L	NA	L	L
Waste Management	NA	L	NA	L	L	L	L	L	L	L	NA	L	L
Forest Protection	NA	L	NA	L	L	L	L	L	L	L	NA	L	NA

Hazardous substances management

Hazardous substances are any substances, which may cause adverse environmental impacts and/or injury or health problems if incorrectly handled or used. The hazardous materials which may be used within Waiohotu Forest are:

- Pesticides:
 - Herbicides – for commercial and ecological weeds;
 - Fungicides – for forest fungal disease control; and
 - Vertebrate or Invertebrate Toxins – used for control of pest mammals (e.g hares and possum or wasps).

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- Fuels and oils.
- Fire retardants – (only ever used if there is a fire).
- Surfactants – to increase herbicide efficacy.

Transportation, storage and labelling of these hazardous materials must all comply with the provisions of legislative controls under the Environmental Protection Agency (EPA) and the NZS 8409:2004 Management of Agrichemicals code of practice. During actual usage, the highest risks are associated with chemical trespass or bulk fuel spillages.

These risks are managed by:

- Neighbour consultation over planned spray operations.
- Careful planning and timing of any aerial operations having regard to wind and spray drift.
- Unsprayed buffer strips on neighbour boundaries and riparian or other protected reserves.
- GPS flight path control and records.
- Monitoring and recording of weather conditions during the operation, including using smoke bombs and photos/video.
- Moving contractors into the use of double skinned bulk fuel storage tanks as the preferred method of containment for all larger capacity tanks.
- Tracking of all active ingredient usage within the estate.

Risk management includes active involvement in and review of technologies and research into alternative methods for the control of weeds, pests and diseases where these are effective and efficient. Fuel use is directly related to the machinery used in forestry operations and the market locations. Using modern efficient machine technology is still the primary area where efficiency gains can be made. There is a steady programme to transfer chain bar oils to vegetable based low toxicity oils.

Highly hazardous chemicals

There are five agrichemicals that have been classified ‘highly hazardous’ (HH) by FSC that are used in forestry and conservation operations within PF Olsen group certified forests (Table 7). All these five have recently been added to FSC’s HH list. Special derogations to continue usage of these chemicals, subject to conditions, are being applied for by PF Olsen as FSC Group Manager in conjunction with the wider NZ certified industry. The derogation process is run according to specific policies put in place by FSC, including extensive canvassing of stakeholder views.

All the classes of formulations used are registered and legally approved for in use New Zealand by the NZ Environmental Protection Agency, subject to various controls, and for the purposes to which they are applied as listed below.

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Table 7: FSC Highly Hazardous chemicals used or potentially used in Waiohotu Forest

Active Ingredient	Purpose	Common Usage
Copper based Products	Fungicide	Needle cast control
Picloram	Herbicide	Establishment weed control
Carbaryl	Insecticide	Localised wasp control
Cholecalciferol	Vertebrate pesticide	Localised possum control
Pindone	Vertebrate pesticide	Rabbit and hare control
<i>Use subject to Animal Health Board emergency provisions only</i>		
Sodium Cyanide	Vertebrate pesticide	Animal Health Board only, ground based possum control
Sodium Monofluoroacetate (1080)	Vertebrate pesticide	Animal Health Board only, extensive aerial possum control

The Managed Plantation Estate

8. Commercial Plantation Estate

Productive Capacity strategy

Forest management is carried out to ensure the productive capacity of the Waiohotu Forest is not compromised. This encompasses multiple aspects that include:

- [Pests and weeds](#) and [forest health](#) - can reduce productivity,
- [Inventory](#) - to feed into growth estimation, a core step in timing silviculture and formulating the cutting strategy,
- [Silviculture](#) - to enhance the value of the resource,
- [Harvesting](#) - achieving a successful harvest in terms of the forest owner’s health and safety, environmental and commercial objectives.

Forest area

The net stocked areas have been measured from a map produced by PF Olsen (Map 5). The estimated net stocked areas of each stand are set out in Table 8 and Figure 2.

Table 8: Waiohotu Forest Area (Ha)

Gross area	Net stocked area	Reserves
20.2	15.9	4.3

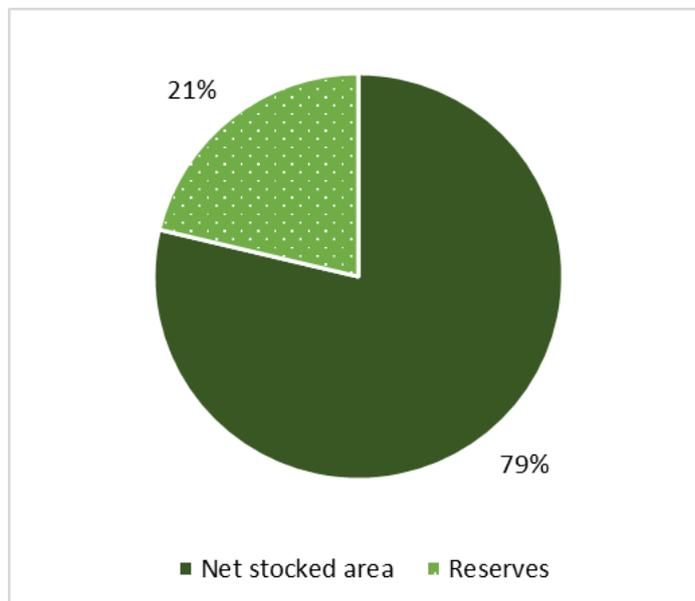


Figure 2: Waiohotu Forest Area (ha)

Current Species

The species grown at Waiohotu Forest is *Pinus radiata* (radiata pine), *Cupressus lucitanica* and *Eucalyptus fastigata*. These species have been chosen to best meet the management objectives set out above and in section 2 given the characteristics of the forest land as described in section 3.

Treestocks established in the forest are summarised in Table 9.

Table 9. Waiohotu Forest species mix

Species	Area (ha)	Area (%)	Year Planted
P.rad	15.0	94.3	1997-1999
C.lus	0.5	3.1	1997/1998
E.fas	0.4	2.5	1998

Productivity Indices

Site index is a measure of productivity of a site in terms of height growth of radiata pine. The parameter used is the mean height in metres of the largest 100 trees per hectare at age 20 years. Equations exist to predict this height given a measured height at any age.

The 300 index is another measure of productivity of a site based on stem volume growth (mean annual increment) of 300 stems per hectare.

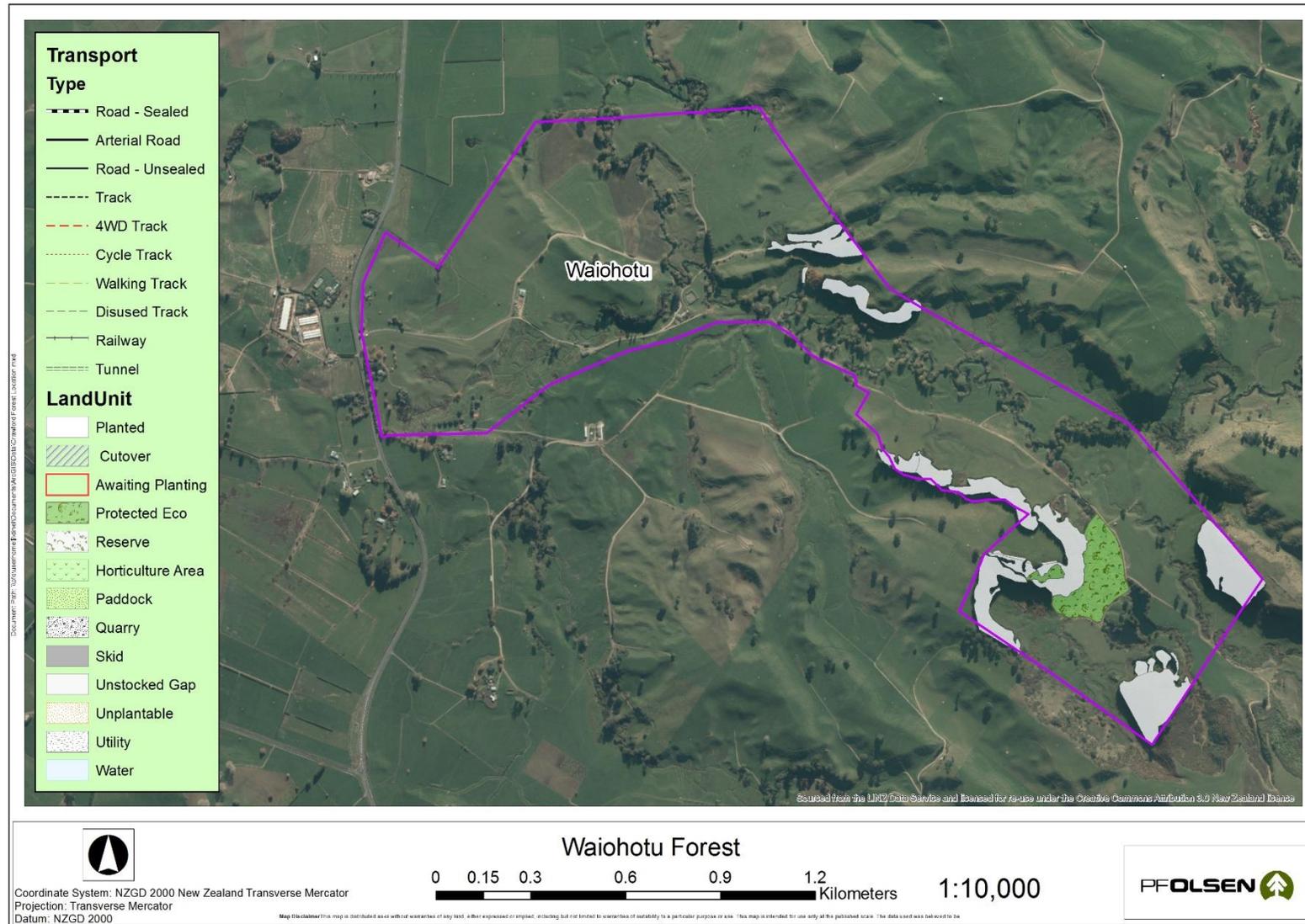
The site index for Waiohotu Forest is approximately 36 m.

The 300 index for Waiohotu Forest is between 27.5 – 32.5 m³ / ha / year.

Current Crop Status

Measurement data from the most recent inventory is usually stored in PF Olsen databases and summarised in reports to provide the current status of the stands. Although, no measurements have been recorded in Waiohotu Forest to this date.

Map 5 – Forest Stands Map



9. Commercial Crop Establishment and Silviculture

Introduction

The choice of species is the most important issue in plantation forestry. The species must be suitable for the site and meet the objectives of Torlesse Pine Company Ltd. Also important is to ensure that the planting material is of good quality.

Forest operations are implemented to ensure a good quality crop and maximum growth. These operations include land preparation, establishment, weed control, pest and disease control, fire protection, pruning and thinning and general property maintenance.

Forest management goals

The Waiohotu Forest owners are committed to ensure that the forest will be managed to:

- Grow trees and produce logs for the manufacturing of different wood products in New Zealand and overseas with a focus on 'fit for purpose' log production;
- Ensure that the productivity of the land does not decline;
- Ensure that environmental values are identified and maintained;
- Ensure that historic sites are identified and protected;
- Ensure that other forest values and products are identified, protected and where possible enhanced;
- Ensure that the forest estate's contribution to carbon cycles is maintained or enhanced;
- Harvest the trees as close as possible to their economic optimum age and achieve the best possible financial returns to the owners;
- Replant following harvesting where agreements require;
- Meet all statutory requirements and comply with forest industry best practice;
- Provide recreational opportunities where practical;
- Act as a good corporate citizen and neighbour; and
- Ensure all forest management practices are consistent with the principles of the Forest Stewardship Council and NZS AS:4708:2014

These goals are further detailed in 'PF Olsen Key Aspects - Objectives, Targets and Monitoring' in [Appendix 3](#).

Crop Species

In Waiohotu Forest, the main crop species grown is Radiata pine with the inclusion of some smaller stands of *Cupressus lucitanica* and *Eucalyptus fastigata*. Alternative species have been considered but did not meet the Herewahine Trust objectives.

Radiata pine, when intensively managed, will produce a range of different log types suitable for various processing options. The pruned butt log can be used to make knot-free veneer or decorative timber. The unpruned logs can be used for structural timber, for veneer or for feedstock for finger jointing. The small logs and those with defects and excessive knots can be used for pulp and paper, MDF and other reconstituted wood products such as tri-board and particle board.

Radiata pine is the most common species processed in New Zealand and export markets are well developed for both finished products and logs.

In New Zealand, radiata pine is also the main focus in terms of research and development. Past research and development has resulted in improvements in growth, form and wood characteristics as well as development of a range of finished products, building codes and timber standards.

Pre-establishment considerations

Prior to re-establishment of the tree crop, a review will be conducted to identify whether there are any rare, threatened or endangered species of flora or fauna within the area to be planted and what, if any, adjustments in planning may be required. A plantation crop is likely to confer beneficial habitat buffering rather than cause adverse effects.

Unwanted pine spread

Re-establishment programmes will include a spread risk assessment using the Wilding Spread Risk Calculator to inform decisions about replant boundaries and monitoring or other control strategies if required. There is no intention to plant or replant in other species with known high spread risk. The use of the Calculator is also a requirement under the NES-PF and this will be adhered to.

Re-establishment

Re-establishment after the harvest will aim to use high quality tree stocks suitable for the site and market. This will be discussed with the land owner closer to harvest. At this point there are no plans regarding re-establishment.

Tree nutrition

The soils in Waiohotu Forest are not likely to be deficient in nutrients for healthy tree growth. However, there are soils within New Zealand that are deficient in one or more nutrients. The most common nutrient deficiencies are likely to be:

- **Phosphate** – Upper North Island, Marlborough and West Coast have marginal available phosphate concentrations. This is often associated with clay soils.
- **Magnesium** – Magnesium deficiency is a particular problem of the Central North Island and is associated with the phenomenon known as mid crown yellowing where the middle of the tree crowns turns a yellow colour. Heavily pruned trees and some seedlots are more predisposed to the deficiency than others.
- **Boron** – Boron deficient trees can suffer dieback from the terminal buds and this symptom is closely associated with moisture stress and drought. Trees growing on the drier East Coast of both Islands and on the pumice soils of the Central North Island are prone to boron deficiency.

Foliar samples will be taken if nutrient deficiency symptoms are seen or expected. Fertiliser will only be applied if the health and the growth of the trees are significantly affected.

Site productivity and tree nutrition are actively researched components of industry research programmes in which PF Olsen is an active stakeholder and all harvesting entities are a financial contributor through the Forest Research Levy Fund.

10. Harvesting Strategy and Operations

Harvesting strategy

The harvesting strategy employed at Waiohotu Forest will be to harvest the forest as close as possible to their optimum economic age as practical. This is the age at which the growth in volume and improvement in quality is offset by the cost to maintain the forest for another year. The optimum rotation length for radiata pine is expected to be within 25 to 30 years, while the optimum rotation lengths for eucalyptus and cypresses is 20 – 40 years and 35+ years, respectively.

Of importance in this assessment is the actual growth of the tree crop, the market for the wood at the time of the harvest and the outlook then for the near future. These factors, together with logistics such as the availability of suitable harvest contractors and the requirements of resource consents, will determine the actual harvest time.

Harvesting is not planned to take place during the 5-year period of this management plan, although this may change depending on the markets, growth (possible inventory) and the land owners motivations.

Planning and preparing for harvest

Forward planning is essential when considering harvesting activities. Harvest planning should ideally commence two years before harvesting to enable roading infrastructure to be developed and any resource consents, archaeological surveys, etc. to be undertaken. This reduces the chance of hold-ups to the commencement of harvesting, which can be costly when log prices are fluctuating.

Harvest planning is conducted within a detailed structured framework controlled within the PF Olsen FIPS system. Planners are guided through a total of 100 elements involving environmental, cultural, community, infrastructural, and safety issues that must be addressed as well as direct operational and economic considerations, prior to the issuing of final prescriptions.

Harvesting operations will be undertaken by contractor and supervised by the forest manager.

Infrastructure

The roading and other infrastructure work proposed for the areas to be harvested in the first year are detailed in the Annual Cutting Plan. Forest infrastructure includes roads, tracks, landings, bridges and culverts.

Typically, infrastructure within an early- to mid-rotation age 'greenfields' forest is limited to access for a 4WD vehicle. During harvest planning,

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upgrades of existing roads/culverts/bridges and planning for new roads, landings and crossings will be identified and scheduled. The type of infrastructure designed and constructed is influenced by topography, harvest duration and intensity of use.

Once established, these require maintenance. The PF Olsen Asset Hazard Register is a GIS-linked database of forest assets that includes bridges, culverts and crossings under resource consent. This provides the framework for a record of the asset attributes, and its associated maintenance schedule, some of which are required under consent conditions.

Contractor management

Prior to engaging a new contractor, a comprehensive review of the contractor’s safety systems, safety record, systems of work organisation and equipment is carried out. With regard to crew configuration, where topography and terrain allows, mechanised felling, extraction and processing is a mandatory requirement. PF Olsen as the Property Manager must be satisfied on this review, regardless of the tendered price.

Upon appointment all new contractor crews undergo a comprehensive safety and environmental induction, while PF Olsen Ltd, in conjunction with its contractors and NZQA training providers NorthTech, runs a comprehensive programme of training to ensure the workforce is competent for the work they are required to perform. The formal NZQA qualifications are supplemented periodically by internally run training courses including those on environmental matters.

All contractors are subject to quarterly monitoring audits and random drug testing. A full safety systems audit is scheduled and carried out annually. Full crew re-inductions take place every 5 years.

Weekly crew visits and monthly (or fortnightly according to risk) KPI assessments including environmental audits pick up corrective actions and follow-up on those. WorkSafe undertakes audits on an unannounced basis from time to time.

11. Forest Inventory, Mapping and Forest Records

Inventory

Forest growth and development is monitored through forest inventory. Forest inventories providing stand information are required at different times and for different reasons throughout the life of the rotation:

- Pre-assessment: for silviculture rate setting and validating operational timing vs silvicultural targets;
 - Quality control: to check contractor's performance and update stand records;
 - Mid-crop: to collect measurement inputs for growth modelling;
 - Pre-harvest inventory is scheduled for stands around age 24, to collect measurement data on the crop. This is used for harvest planning, marketing and revenue estimation;
 - New technologies may see some of this information gathered and analysed using remote sensing in the future.
-

Mapping

All mapping of Waiohotu Forest is in digital format and is constantly updated in a Geographic Information System (GIS) that is linked to FIPS. The GIS system spatially records a vast array of forest data, from stand and legal boundaries, to reserves, rivers, roads, infrastructure, topography and soils.

Accurate mapping also assists budgeting, planning, calculation of future revenue/tree crop value, calculation of payments, infrastructure location, and harvest planning.

New plantings are remapped from new aerial photography around age four (when the trees are visible on aerial photography) to accurately determine boundaries and areas and also around two years prior to harvesting to assist with harvest planning.

Forest Records

Detailed records of each stand's silvicultural management history, productivity, inventory and other attribute data are compiled and maintained in a stand records database and Geographic Information System (GIS). These records form the basis for informing silvicultural scheduling, harvesting schedules and other management activity. Waiohotu Forest maintains its records on an excel spreadsheet and paper copies.

Non-commercial Estate Management & Protection

12. Protected Forests, Habitats, Ecosystems and Species

Introduction

Indigenous biodiversity management in or associated with exotic forests is a normal component of everyday forest management. Environmental certification systems place obligations upon the forest manager to be aware of and, where required, enact procedures to assist with the maintenance and protection of important biodiversity where they are able.

Exotic forests can and do provide a level of biodiversity, though this is often enhanced by natural forest ecosystem remnants embedded within the plantation matrix. These are often the most important contributor to the total of the productive landscape's biodiversity. However, rare and threatened species can also be found associated with exotic forests and may require special attention for management.

Protected ecosystems

PF Olsen's Conservation and Ecology Manual provides detailed guidance and specification on the application and execution of ecological management targets and actions, as are broadly laid out in the Environmental Management System (EMS). Programs for ecological management are specified and monitored in FIPS Ecological Management module.

The full list of protected ecosystems is listed in Section 9. While protection from operational damage and other influences is afforded all areas, in accordance with the EMS and the ecological rankings pertaining to each area, only those with a 'full' and 'special' ranking will be prioritised for more active interventions (Table 10).

Under these criteria, management aims to protect the 'passive' ranked stands where practical and avoid any loss of area during reestablishment. 'Limited' status stands are to be protected from damage during harvest and reestablishment and are to have pest control undertaken where ancillary to adjacent plantation stands or able to be practically coordinated with adjacent landholders. All areas are to be protected from fire.

The protected ecosystems are recorded and ranked on the basis of ecological criteria reflecting the stands representativeness, rarity of species, size and connectivity, function and landscape values. Relative value in terms of the 'ecological landscape' (Section 4) also informs that process.

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Actions are prioritised according to the ‘Protection Category’ status allocated to the areas from the assessments and classifications undertaken. The management implications pertinent to each status are summarised in the table below. Prioritisation of work effort will also be based on the principle of ensuring successful and maintainable outcomes at limited scales as a priority over wide scale but marginally beneficial outcomes.

In the case for Waiohotu Forest, no work is planned in the small terrestrial and wetland ecosystems (except possum control).

Table 10: Protected Ecosystems Management Categories

Protection Category	Primary Management Objective	Activity Level	Monitoring
Passive	Minimise non-essential damage, maintain area.	Fire protection.	Area- with adjacent stand assessments.
	Observe RPMS obligations.	3rd party arrangements re: pests, apply RPMS.	Pests- to meet RPMS.
			General forest health survey.
Limited	Protect from non-essential damage, maintain area, maintain function (where practical).	Fire protection.	Sample forest condition monitoring.
	Observe RPMS obligations.	3rd party arrangements re: pests, apply RPMS. Associated maintenance pest control.	Low level pest monitoring where relevant. Sample related fauna if relevant.
Full	Protect from all controllable damage, maintain area and function.	Fire protection.	Area monitoring.
	Improve quality.	Specific management.	Forest condition monitoring.
	Observe RPMS obligations.	Targeted pest control, 3rd party arrangements re: pests.	Pest monitoring where relevant, related fauna monitoring if relevant.
Special	Restoration if practical.	As above, plus fencing, covenanting, co-management agreements and funding where practical.	As above, plus as defined in any restoration agreement.

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Table 11 details the areas in each protection category within Waiohotu Forest, categorised by protective function.

Table 11: Protected ecosystems management categories by function and area

Protective Function	Protective Category		Total Area
	Limited	Passive	
Erosion Control			
Landscape / Amenity			
Non-specific			
Rare Species			
Riparian Ecosystem			
Terrestrial Ecosystem		0.3	0.3
Wetland Ecosystem	4.0		4.0
Total Area (ha)	4.0	0.3	4.3

Management and riparian setbacks

A standardised GIS-based stream classification system based on NIWA’s River Environment Classification (REC) has been used to develop a rationale for defining riparian management with a set of rules in the EMS that apply to operations occurring near the riparian corresponding with each stream category. Categorisation of each stream reach is done by the physical characteristics of the particular reach, e.g. underlying geology, streambed slope, climate, and reach order.

It also provides the minimum set-backs upon establishment or reestablishment of forest after harvest where riparian setbacks had not existed before. The morphology of streams can mean that the minimum set back is wider in many instances.

Table 12 summarises the stream categories within the Waiohotu Forest. The total length of waterways within the forest is 5.43 kilometres.

Table 12: Length of stream by REC class

REC Class	Length (m)	Length (km)
VSmall_Low_Wet_Soft	494.8	0.49
Med_Low_Wet_Soft	923.2	0.92
Large_Low_Wet_Hard	594.8	0.59
Large_Low_Wet_Soft	2,582.8	2.58
Small_Low_Wet_Soft	652.2	0.65
Small_Low_Wet_Hard	177.6	0.18
Total	5,425.4	5.43

Rare and threatened species

Where a range distribution suggests the possibility of rare fauna existing, surveys are undertaken for those species. Any appropriate management responses are devised in conjunction with conservation authorities. Protection requirements are also reassessed at the time of re-establishment or land handback where additions to riparian or buffering setbacks are often recommended.

Records of sightings and locations are collected and reported in FIPS. Over time this has enabled the build-up of a spatial distribution picture of species within different geographical locations. These records are made available to conservation authorities.

A listing of key species of interest is held by all contractors and staff along with species sighting forms and a request to report such information.

To date, the only rare species sighted within Waiohotu forest has been two sightings of Dabchicks within the wetland reserve. These birds are classified as Nationally Vulnerable.

Fish

PF Olsen uses the Freshwater Environments of New Zealand (FWENZ) models to inform the potential for threatened fish species that may be present in streams affected by operations and if necessary any response to such a presence. The Fish Spawning Indicator published by NIWA to accompany the NES-PF is also used, particularly for works over/in stream beds.

Primary management actions in relation to fish, in addition to those already covered under water quality are:

- Development and maintenance of a register of crossings and an inspection routine to ensure fish passage,
- Sound design and construction of all new stream crossings,
- Timing of in bed crossing construction to avoid peak spawning period,
- Minimising damage to streamside environments and provision of setbacks where they were not originally present,
- Identification of, and avoidance and/or buffering of waterbodies during aerial spraying for replanting and *Dothistroma* control or aerial fertilisation if ever required,
- Protection of any wetlands identified within the plantation matrix.

Avifauna

While the local lists of threatened bird species are much more extensive, most of those species habitats are shore, sea, estuarine and river bed focussed. Of the forest birds, many of the more common species listed can be expected to be regularly within or transient through the plantation forest.

Primary management actions in relation to avifauna are:

- Adherence to industry protocols developed for management of NZ falcon kiwi, bats and shortly, lizards.
- Inclusion of threatened species sightings into the PF Olsen sightings database, and subsequently into the NZ Forest Owners NatureWatch – Biodiversity in Plantations Project⁵,
- Minimising damage to natural forest areas and any small wetlands and scrublands during harvest and reforestation, particularly any gully systems that already form natural corridors through the larger plantation areas,
- Promotion of the development of improved riparian corridors after harvest,
- Co-operation with neighbouring landowners undertaking vertebrate pest control within the wider area.

Anticipated activities

In line with the prioritisation approach described previously, key areas of work related to protected ecosystems within Waiohotu Forest over the next 5 years expected to be:

- Maintenance of threatened species records database and integration into industry NatureWatch ‘Biodiversity in Plantations’ project.

CITES species

CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international agreement between governments.

Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten the survival of the species in the wild, and it accords varying degrees of protection to more than 34,000 species of animals and plants. The full list of New Zealand CITES listed species are available in the EMS, or [online](#) on the Department of Conservation website..

⁵ <http://naturewatch.org.nz/projects/biodiversity-in-plantations>

13. Property Management and Protection

Statutory pest obligations

Pest management within Waiohotu Forest is subject to statutory obligations under the Regional Pest Management Plan administered by the Waikato Regional Council.

The strategy applies to both pest plants and animals and categorises them, in terms of management objectives. The categories, objectives and land owner obligations are summarised the Regional Pest Management Strategy Plan in [Appendix 5](#). These plans are maintained online by the relevant Regional Council.

Plant Pests

The overall objective in managing plant and animal pests is to:

- Meet statutory obligations under the Regional Pest Management Strategy,
- Reduce their direct impacts on both plantations and indigenous biodiversity values,
- Ensure that any impacts on neighbouring properties are promptly dealt with,
- Monitor the abundance and distribution of these species within Ponaua Forest.

The major plant species potentially threatening production values within the forest can be seen in [Appendix 5](#).

Pest control

The main animal pests in Waiohotu Forest is the introduced possum. Possum attack the growing tips of both plantation and native trees, causing stem malformation and die back. Possums are also a threat to neighbouring property owners who are farmers as they can carry and spread tuberculosis to domestic stock. Possum control will be undertaken as required. This is generally undertaken by the farm manager by night shooting.

Animal pests in Waiohotu Forest will be controlled using ground control methods as required, which prevent impacts on non-target species. The forest manager will coordinate operations with organisations such as the Regional Council and the Department of Conservation to achieve effective and efficient control with in the forest area and on neighbouring land, where required.

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Diseases which can affect the forest trees and adjacent native vegetation are monitored periodically and once a year by a professional independent forest health assessor on a sample forest basis. Most diseases cause little damage and do not require control. The exception is *Dothistroma*, a fungus which, attacks pine needles. This fungus is controlled using a copper-based fungicide, but only when the infection reaches a critical level.

Dothistroma infection can also be controlled through silviculture by timely thinning and pruning operations, which increases air movement and lowers humidity levels.

Fire prevention and control

With the weather patterns normally experienced in New Zealand during the period late spring/summer, fire can be a real threat to the forest. This can be minimised by:

1. Having an effective fire plan.
2. Active prevention measures which include restrictions on allowable access, fire prevention signage, publicity when fire danger increases, access to adequate water sources, and selective forest grazing to reduce fuel within stands.
3. Effective detection systems include good communication systems, mapping, and fire plan alert procedures.
4. A close link with the relevant fire authorities, and an understanding of equipment and trained manpower requirements.
5. Good forest management that recognises the influence of terrain, roading network and accessibility, and fuel build-up from silvicultural practice, that will influence fire prevention and control measures.

Fire authority responsibilities

The legal responsibility for fighting forest fires lies with the respective territorial land authorities where the forest is situated. In the case of Waiohotu Forest the Rural Fire Authority (RFA) is the South Waikato District Council.

In the event of a fire that starts within the forest, the RFA is responsible for attending and providing the resources to extinguish the fire. Where a fire starts outside the forested area and moves into the forest, the RFA has recourse to the Rural Fire Fighting Fund to compensate for firefighting costs.

There is a close liaison with the RFA in terms of developing the fire plan and the maintenance of good communication relative to potential risks and fire danger ratings.

A fire plan has been submitted to the South Waikato District Council.

Public liability insurance

It is recommended that Torlesse Pine Company Ltd maintain public liability insurance cover with a firefighting extension, to indemnify against unforeseen adverse activity both within the forest area and adjoining land tenure. In the case of fire spreading from Waiohotu Forest onto adjoining land, Torlesse Pine Company Ltd would be liable for the firefighting costs and any damage to property.

Fire insurance

Regarding the location of the forest and the high public activity around the fringes, there will always be the potential for fire. If a fire originates within the forest, the owners will ultimately be liable for suppression costs. A major fire may cost many thousands of dollars to extinguish, with the main costs being the use of heavy machinery, helicopters, and manpower.

Other Benefits from the Forest

14. Recreation, Forest Products and Other Special Values

Introduction

Forest plantations may also provide for non-timber forest products that enhance the economic well-being of the owner or legitimate forest users. Non-timber products are an important means of maximising the production capacity of the forest whilst maintaining environmental and social values. The forest management plan provides procedures for developing and managing these resources.

Forests can also provide many other special values, which are also provided for and managed through the forest management plan.

Recreational usage

All access is controlled through a permit system; though this control is sometimes delegated to some (usually hunting) clubs with Iwi affiliations and customary right usage of their lands or otherwise strong controls over membership.

Primary requirements in management of such forest usage are:

- Access subject to non-conflict with current operations and any other safety requirements,
- Acceptable fire danger status,
- Access provided to defined areas other than those freely open to the public,
- Appropriate liability and fire insurance to be carried by permittees,

The forest is open for legitimate use subject to entry by permit. No current permits have been issued.

Non-timber forest products

Stock shelter is the only non-timber forestry product that is currently or has been produced within Waiohotu Forest.

Other special values

In the regional landscape context, Waiohotu Forests plantations and indigenous ecosystems in combination provide well-defined 'environmental services'. These include:

- Enhanced water quality, and buffering of regionally significant water bodies from agricultural and urban generated nitrification;
- Soil stabilisation and conservation;
- Providing a buffer against flooding during storms;

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- Temperature moderation in waterways for maintenance of aquatic life including threatened native species and world-renowned sports fisheries;
- Enhance wildlife and plant habitat leading to increased biodiversity;
- Expanded habitat opportunities for some declining and or threatened fauna;
- Carbon sequestration and buffering of the effects from a nationally adverse carbon generation footprint.

In recent times some of these environmental services have acquired quantifiable and significant financial value (nitrogen and carbon in particular).

Over the term of this plan, the regulatory environment will continue to be actively monitored and where possible efforts made to secure the introduction of properly structured market mechanisms to ensure forestry is not dis-incentivised, relative to other land uses.

Other environmental services will continue to be supplied or enhanced based on good corporate citizenship and responsible environmental management.

Public access roads

There is only one public road along the West Boundary of the Forest, although there are no forest stands near this location. All signage of roads and tracks must be followed and those using the routes will still require a permit if there is any intention to access the forest from the road routes.

These public road locations are publicly viewable in the Walking Access Commission website⁶. Any users are expected to abide by the Outdoor access code⁷ published by the Walking Access Commission.

⁶ https://www.wams.org.nz/wams_desktop/index.html

⁷ <http://www.walkingaccess.govt.nz/walkways-and-access/outdoor-access-code>

Looking Ahead

15. Monitoring

Introduction

To ensure that the management objectives identified in this plan are being achieved various monitoring exercises outside normal operations management have been developed. Monitoring results are summarised and reported to Herewahine Trust as and when required and are also, where appropriate, made publicly available through the PF Olsen webpage.

Values monitored

Management inspections are undertaken regularly. The direct forest monitoring framework implemented and applicable to Waiohotu Forest is tabulated below.

Table 13: Environmental process monitoring framework

Monitored Element	Components	Data Source	Data Medium	Reporting / Website Frequency
Chemical Usage	- A.I Usage - Area Overuse	- Operational Supervisors	- FIPS - <u>Form</u>	- On Demand - Annual
Client Satisfaction	- Post-operation client survey	- Clients	- Survey Form	- Post-operational - Annual
Consultation Activity	- Complaints - Other Interactions	- Operational Supervisors - Planners	- FIPS - <u>Form</u> - <u>Meeting Minutes</u>	- Annual - Annual
Environmental Incidents	- Incident Number - Categories	- Operational Supervisors	- FIPS - <u>Form</u>	- On Demand - Annual
Environmental Goals	- All	- Environmental Management Group	- Meeting Minutes	- Annual
Environmental Training	- Courses - Numbers - Names	- Staff	- FIPS - NZQA	- Annual - Individual
Flora & Fauna	- Species & Status - Frequencies - New Finds	- Operational Supervisors - Public - Crews	- FIPS - <u>Form</u> - <u>Naturewatch</u>	- On Demand - Annual
Forest Estate Structure	- Area: Plantation & Protected Ecosystem - Age-class - Species - Forest Type - Protection Status	- Management Plans - Stand Records	- FIPS Stand Records	- On Demand - Annual

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Monitored Element	Components	Data Source	Data Medium	Reporting / Website Frequency
Forest Growth	- PSP Protocols - Periodic Inventory - ISO 9001	- Contractors	- Volume Reconciliations - Estate model	- Periodic-annual - Not on web
Forest Health	- Disease & health	- NFH Surveillance Program ⁸	- Document	- Periodic-Annual - Not on web
FSC Membership	- Block - Location - Name	- Certifying Body	- Certificate	- On Demand - Annual
Health & Safety Statistics	- LTI / MTI / TIFR - Accidents & Incidents - Initiatives	- Operational Supervisors	- Noggin	- Monthly - Annual
High Conservation Value Forests	- Condition Trends - Photopoint Monitoring	- Contractors - Supervisors	- Spreadsheet	- Annual
Internal Audit CAR Activity	- Frequency * - Category	- Auditors(ees) - Operational Supervisors	- Noggin	- Annual
Log Production	- Total Logs - FSC Certification	- Log dockets at harvest	- Woodtrack	- On Demand - Annual
Operational Monitoring	- Audit Trends - Cause Analysis	- Operational Supervisors	- FIPS - <u>Form</u>	- Monthly - Annual
Pests	- RTC / RTI - Kill Returns - Other	- Contractors - Supervisors - Permitees	- FIPS - Various	- Annual - Where Relevant
Protected Ecosystem Condition	- Condition Trends - Photopoint Monitoring	- Contractors - Supervisors	- Spreadsheet	- Bi-annual if restoration initiated
Recreational & Non-Timber	- Permits Issued	- Branch Offices - Forest Security	- FIPS	- Annual
Resource Consents	- Number - Compliance	- Operational Planners	- FIPS	- Monthly - Annual
Social Survey	- Demographics, - Values - Work Conditions	- Contractors	- Survey form	- 3 yearly
Stream Monitoring	- Clarity +/- other specific - Full NOF	- Supervisors - Contractors - BOPRC	- Various	- Operational - BOPRC S.o.E.

⁸ Forest health inspections are undertaken annually, by an independent specialist forest health assessor, through the NZ Forest Owners Association forest health scheme.

Other monitoring Budget versus expenditure is monitored through the PF Olsen FIPS system and presented to Torlesse Pine Company Ltd when requested. This information is not made public.

Other operational standards are monitored through a variety of concurrent and post operational assessment procedures that cover all critical aspects of the business of the forest. This information which includes log manufacturing quality performance, safety performance, financial and budget performance as well as stakeholder feedback and client satisfaction surveys and other private or commercially sensitive is not made public.

However, the framework around this monitoring is tabulated in [Appendix 3](#).

16. Industry Participation and Research

- NZFOA and FGLT** Torlesse Pine Company Ltd primary means of participating as part of the forest owner community, and to gain industry intelligence and access to research findings is via:
- Membership of New Zealand Forest Owners' Association Inc. (NZFOA) <http://www.nzfoa.org.nz/> and representation through its Property Manager on the Executive Board and working committees of NZFOA.
 - Payment of a commodity levy (currently 27 cents/tonne or JAS) to the Forest Growers' Levy Trust (FGLT). <http://fglt.org.nz/>. The FGLT uses these funds to finance pan-industry good programmes and contracts NZFOA to carry out this work.
-

Research A little over 50% of the funds raised by FGLT are allocated to forestry research projects. These funds are supplemented by NZ Government research for industry funds that are bid for on a contestable basis every few years.

Application of research is via knowledge gained in workshops, uptake by contractors, commercial providers and better genetics. PF Olsen's direct involvement with other research bodies such as FFR contributes to and benefits Torlesse Pine Company Ltd through early application of good ideas and research findings.

FISC The Forest Industry Safety Council (FISC) was set up in early 2016 following an independent review of safety in the forest industry. FISC is a forum for exchange of safety improvement initiatives, and to develop resources for forest managers and contractors. These resources are primarily delivered via the Safetree website <http://safetree.nz/>. FISC is financed jointly from FGLT and government, primarily Accident Compensation Corporation (ACC).

PF Olsen's continued support of FISC in the form of senior staff involvement in the OAG and TAG committees ensure Torlesse Pine Company Ltd interests are considered and that outcomes are understood and applied in practice.

17. Future Planning

Introduction

This plan pertains to the management of Waiohotu Forest and will be adhered to for the next 5 years. Any deviation from this plan will be justified only on the basis that the changes do not adversely affect the environment. Any changes, which are contrary to the policies contained in this management plan, will require a full review of this plan. The next review date for this plan is July 2023.

Deviations from this plan will be justified on the basis that the changes do not adversely affect the environment and are necessary or beneficial to achieving the management goals and objectives.

The forest management plan is used for both medium and long-term planning.

Operation plans

Short term tactical planning is accomplished through development of annual operations plans in conjunction with detailed budgeting. These plans are prepared in accordance with this Management Plan. Harvesting operations are also planned on a block by block basis because of the level of detail required.

This operation plan and associated budget are subject to approval by Torlesse Pine Company Ltd at the beginning of each financial year.

Associated management plans

Associated with this plan are forest agreement specific plans covering the descriptive and management detail pertinent to each forest. These plans contain primary descriptive data for the specific forest and details of planned silvicultural objectives. These plans are maintained by the investment manager for Torlesse Pine Company Ltd.

Stakeholder consultation

Consultation with key stakeholders has been enabled as part of the development of this plan which will be publicly available on the PF Olsen Certification website. Feedback from stakeholders (and others as they become apparent) is monitored, including actions undertaken to resolve disputes and issues and may inform changes in operational practice or future plan reviews.

18. Register of Plan Change and Review

Introduction

This plan pertains to the management of Waiohotu Forest and will be reviewed on an annual basis. This section documents specific changes made during each review.

Change	Date	Section/Page

Appendix 1 - Contact details for Regional and District Councils with jurisdiction over Waiohotu Forest

Council	Phone	Email	Website
Waikato Regional Council	0800 800 401	Website Enquiry	https://www.waikatoregion.govt.nz/
South Waikato District Council	07 885 0340	info@southwaikato.govt.nz	http://www.southwaikato.govt.nz/

Appendix 2 - Other Relevant Legislation

Commercially Relevant Statutes & Regulations
Accident Compensation Act 2001 #49
Animal Welfare Act 1999
Biosecurity Act 1993
Climate Change Response Act 2002
Conservation Act 1987
Crown Forest Assets Act 1989
Fencing Act 1978
Fire and Emergency New Zealand Act 2017
Forestry Rights Registrations Act 1983
Forests Act 1949
Freshwater Fisheries Regulations 1983
Hazardous Substances and New Organisms Act 1996
Health and Safety at Work Act 2015
Heritage New Zealand Pouhere Taonga Act 2014
Protected Objects Act 1975
Reserves Act 1977
Resource Management Act 1991 regulations
Soil Conservation and Rivers Control Act 1941
The Treaty of Waitangi Act 1975
Trespass Act 1980
Wildlife Act 1953

Relevant regulations to the above legislation also apply as well as various industry Accords, Codes of Practice as listed below:

Industry Accords & Codes
New Zealand Forest Accord
Principles of Commercial Plantation Forest Management
New Zealand Environmental Forestry Code of Practice
New Zealand Code of Practice for the Management of Agrichemical
Climate Change Accord
NZ Log Transport Safety Accord
Eliminating Illegal Forest Products in New Zealand
MoU Federated Farmers and Forest Owners Association and Farm Forestry Association
New Zealand Forest Road Engineering Manual

19. Appendix 4 - Significant Aspects of a Plantation Forest Life Cycle



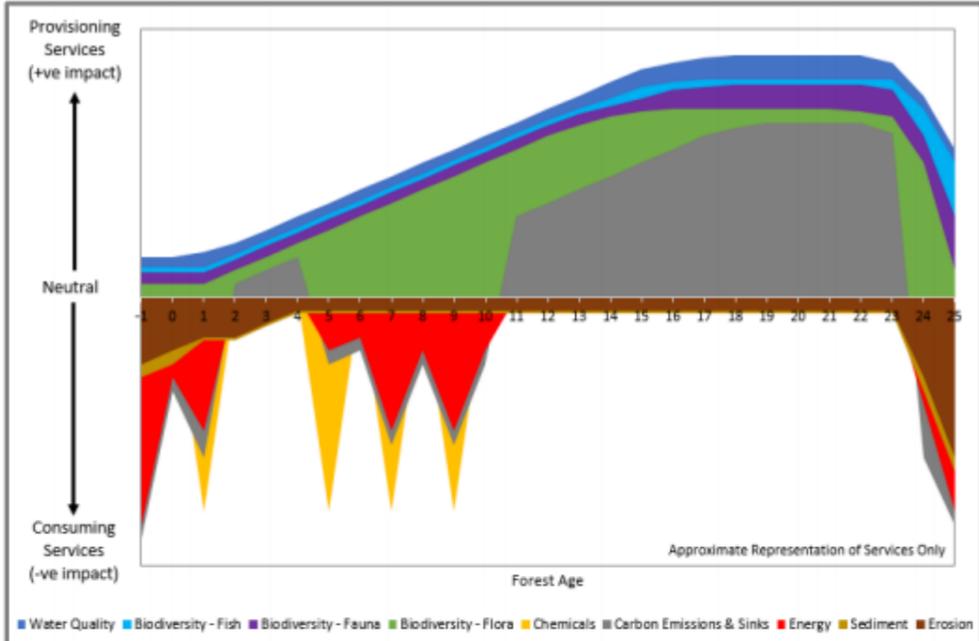
SIGNIFICANT ASPECTS OF A PLANTATION FOREST LIFE CYCLE

Provisioning and Consuming Services

Provisioning Services (+ves)

1. **Biodiversity — Fauna:** plantation forests are home to a wide range of native and endemic species, including kiwi, New Zealand falcon, fernbird, weka, kokako, geckos, skinks, frogs, and short- and long-tailed bats.
2. **Biodiversity — Fish:** streams provide habitat for a range of native fish species, including Giant and Banded Kokopu, Long-finned Eel, Koura and whitebait species.
3. **Biodiversity — Flora:** plantation forests host a variety of native plants. Pioneering plants (ferns, coprosmas, manuka etc.) eventually form the sub-canopy layer under the production species. In addition riparian zones, wetlands, native reserves and other natural areas add a native flora component to the overall forest matrix. These are often protected under Regional/District Council plans, the NZ Forest Accord, management agreements, or as part of forest certification schemes.
4. **Carbon sinks:** trees absorb carbon dioxide from the atmosphere and convert it into oxygen. Trees store the absorbed carbon, even after they are harvested.
5. **Water quality:** once canopy closure is achieved the in-stream temperature stabilises. Riparian zones and the plantation trees stabilise the land, reducing and removing excess nutrient loads. This in turn provides a better quality of habitat for fish and freshwater insects.
6. **Clean air**
7. **Employment,** especially at the time of harvest, both within the forest and ancillary services such as transport and processing
8. **Recreation opportunities** such as hunting, walking, mountain biking, hunting, orienteering, horse riding, motor sport events,





Approximate Representation of Services Only

Forest Age

■ Water Quality ■ Biodiversity - Fish ■ Biodiversity - Fauna ■ Biodiversity - Flora ■ Chemicals ■ Carbon Emissions & Sinks ■ Energy ■ Sediment ■ Erosion

Aspect	Provisioning / Consuming Services	Frequency	Impact Level	Control Level	Time of Impact	Control Methods
Biodiversity	Fauna	Low	Variable	Medium	Land prep, roadworks & harvesting	Protection, BEP's, buffer zones, timing of operations, monitoring, species management plans
	Fish	Low	Variable	Partial	Land prep, roadworks & harvesting	Protection, BEP's, buffer zones, timing of operations, monitoring, species management plans, fish passage
	Flora	Low	Variable	Partial	Harvesting	Protection, BEP's, buffer zones, timing of operations, monitoring, species management plans, weed control, remedial/enhancement planting
Ecosystem Health	Pests & Weeds	High	Variable	Medium	Ongoing	Control based on identification of weed/pest and associated threat. Chemical (aerial or ground-based), mechanical, biocontrol, trapping, species/management selection. Research into non-chemical alternatives
	Carbon Emissions & Sinks	Oscillating	Medium	Low	Land prep, silviculture, spraying, roading & harvesting	Use of bio oils and lubricants, try to minimise machine movements, replanting new crop after harvest
	Chemicals	Infrequent	High	High	Land prep & ages 5-10 years	Research into amounts used and chemical types, limit spray drift
	Energy	Medium	Low	Low	Any operation involving machinery	Invest in / research energy efficient machinery and technology
Soil & Water	Erosion	Intermittent	High	High	Until canopy closure (-1 to 5 years), extreme weather events, harvesting	Hydroseeding, mulching, BEP's, appropriate earthwork engineering, check sites after weather events, replanting new crop after harvest
	Sediment	Continuous but Low	Medium	High	Until canopy closure (-1 to 5 years), extreme weather events, harvesting	Use of sediment control traps, appropriate earthwork engineering, check sites after weather events, replanting of new crop after harvest
	Water Quality	Low	Variable	High	Extreme weather events, harvesting	Use of sediment control traps, appropriate earthwork engineering, buffer/riparian zones, protection of wetlands, remedial planting, replanting new crop after harvest
Social	Recreation	Medium	Variable	Medium	Variable, dependent on forest and location	Access provided through forest permit system to ensure user and operational safety. Permits allow monitoring of forest usage and hunting kill returns
	Employment	High	Variable	High	Ongoing, peak at harvest/replant	Seek to provide continuity of employment for high performing contractors, provide training opportunities to engage and retain a professional and capable workforce

Consuming Services (-ves)

1. **Carbon Emissions:** heavy machinery and chainsaws during land prep, thinning and harvesting operations (fuel/oil use)
2. **Chemicals:** *Dothistroma* control and weed control
3. **Energy:** energy is released during any forestry operation involving machinery
4. **Erosion:** caused by harvesting, roading and land prep operations, plus extreme adverse weather events
5. **Sediment:** caused by harvesting, roading and land prep operations, plus extreme adverse weather events



Appendix 5 - Regional Pest Management Plan for Waikato Region 2014 - 2024

Table 2: Animal species to be managed under this plan

Animal	Pest (y/n)	Production threat	Environmental threat	Public threat	Reference in the plan
Argentine ant	n		✓	✓	6.2.1
Asian paper wasp	y	✓	✓	✓	6.18.1
Australian paper wasp	y	✓	✓	✓	6.18.1
Brown bullhead catfish	y		✓		6.9.1
Canada goose	n	✓	✓		6.4
Common wasp	y	✓	✓	✓	6.18.2
*Darwin's ant	n		✓	✓	6.2.2
Feral cat	y		✓		6.6
Feral goat	y	✓	✓		6.7
Feral pig	y**	✓	✓		6.8
Gambusia	y		✓		6.9.3
German wasp	y	✓	✓	✓	6.18.2
Hedgehog (European)	y		✓		6.5
Koi carp	y		✓		6.9.2
Lesser banded hornet	n		✓	✓	6.19.1
*Little fire ant	n	✓	✓	✓	6.3.1
Magpie	y		✓	✓	6.10
Median wasp	n		✓	✓	6.19.2
Mustelids: ferret, stoat, weasel	y	✓	✓		6.11
Perch	n		✓		6.9.5
Possum	y	✓	✓		6.12
Rabbit	y	✓	✓		6.13
Rainbow lorikeet	y		✓		6.14
Rats	y		✓	✓	6.15
Red imported fire ant	n	✓	✓	✓	6.3.2
Rook	y	✓			6.16
Rudd	n		✓		6.9.7
Tench	n		✓		6.9.6
*Tropical fire ant	n	✓	✓	✓	6.3.3
Wallaby	y	✓	✓		6.17
Wild deer	y**	✓	✓		6.20
Wild goldfish	y		✓		6.9.4
Wild red-eared slider turtle	y		✓		6.21
*Yellow crazy ant	n	✓	✓	✓	6.3.4
Yellow flower wasp	n		✓	✓	6.19.3

*Although these ant species are not yet in the Waikato region, they are harmful animals that could have considerable negative impacts on the region's biodiversity.

**Only within the Hunua Ranges Pest Management Area.

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Pest plant	Production threat	Environmental threat	Public threat	Reference in the plan
Exclusion pest plants				
Bat-wing passion flower		✓		5.7
Broom corn millet	✓			5.10
Freshwater eel grass	✓	✓		5.21
Fringed water lily		✓		5.22
Horsetail	✓	✓		5.26
Hydrilla		✓		5.27
Kudzu vine	✓	✓		5.31
Marshwort		✓		5.34
Eradication pest plants				
African feather grass	✓	✓		5.2
Cathedral bells		✓		5.12
Chilean flame creeper	✓	✓		5.14
Evergreen buckthorn		✓		5.20
Horse nettle	✓			5.25
Lantana	✓	✓	✓	5.32
Knotweed: Chinese		✓		5.29
Knotweed: Japanese and giant knotweed	✓	✓		5.30
Manchurian wild rice		✓		5.33
Mile-a-minute		✓		5.38
Nassella tussock, fine stemmed needle grass, Chilean needle grass	✓	✓		5.41
Noogoora bur	✓			5.42
Purple loosestrife		✓		5.46
Rhododendron ponticum		✓		5.50
Sagittaria		✓		5.52
Sea spurge		✓		5.54
Senegal tea		✓		5.55
Spartina		✓		5.56
Thistle: variegated	✓			5.59
Water poppy		✓		5.62
White bryony		✓		5.63
Progressive containment pest plants				
Alligator weed	✓	✓		5.3
Banana passionfruit		✓		5.6
Boneseed		✓		5.8
Chocolate vine		✓		5.15
Climbing asparagus		✓		5.16
Climbing spindleberry	✓	✓		5.17
Contorta pine	✓	✓		5.18
Darwin's barberry	✓	✓		5.19

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Giant gunnera		✓		5-23
Mexican devil	✓	✓		5-35
Mignonette vine		✓		5-37
Mistflower		✓		5-39
Moth plant		✓	✓	5-40
Old man's beard		✓		5-43
Pampas	✓	✓		5-44
Tutsan	✓	✓		5-60
Velvet leaf	✓			5-61
Wild ginger (kahili and yellow)		✓		5-64
Woolly nightshade	✓	✓	✓	5-68
Yellow flag iris	✓	✓		5-69
Sustained control pest plants				
Australian sedge	✓			5-5
Broom	✓	✓		5-9
Gorse	✓	✓		5-24
Privet		✓	✓	5-45
Purple nutsedge/nutgrass	✓			5-47
Ragwort	✓			5-48
Thistle: nodding and plumeless	✓			5-58
Site-led pest plants				
Asparagus: bushy and fern		✓		5-4
Californian bulrush		✓		5-11
Cherry: Japanese and rum		✓		5-13
Japanese walnut		✓		5-28
Mexican water lily		✓		5-36
Reed sweetgrass		✓		5-49
Royal fern		✓		5-51
Saltwater paspalum		✓		5-53
Strawberry dogwood		✓		5-57
Wild kiwifruit	✓	✓		5-65
Wilding conifers	✓	✓		5-66
Willow: grey and crack		✓		5-67