

TUTUKAU ROAD FOREST

Owned by
TUTUKAU LAND COMPANY LTD

Forest Management Plan

For the period 2014 / 2019



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1. INTRODUCTION

Principles and Criteria

Tutukau Land Company Ltd 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.

Tutukau Land 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.
-

2. Forest Investment Objectives

Provision of services

Tutukau Land Company Ltd’s objective is to obtain an economic return on investment while providing environmental benefits, including:

- Enhanced water quality;
 - Soil, stabilisation and conservation;
 - Providing a buffer against flooding during storms;
 - Shading waterways for aquatic life;
 - Enhance wildlife and plant habitat leading to increased biodiversity;
 - A reduction in greenhouse gases;
 - Economic and social benefits to the community and Tutukau Land Company Ltd.
-

Forest management goals

The forest is managed to:

- Grow trees and produce logs for the manufacturing of different wood products in New Zealand and overseas with a focus on describe primary products;
- 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;
- Harvest the trees as close as possible to their economic optimum age;
- Replant following harvesting; and
- Enter any other objectives specific to the forest area.

These objectives are delivered via the Quality Management System implemented by PF Olsen that includes ISO 9001 and ISO 14001 certification, and FSC environmental certification (when requested by the customer).

All activities within Tutukau Road Forest are subject to management within a framework set by PF Olsen’s environmental policies and Environmental Management System (EMS).

**Environmental
policy**

PF Olsen Limited Environmental Policy:

PF Olsen Ltd is committed to:

- *Sustainable forest and land management;*
- *Promoting high environmental performance standards that recognise the input from the community in which we operate;*
- *Where appropriate applying the Principles and Criteria of the Forest Stewardship Council across forest management.*

Substantial additional detailed policies are contained within PF Olsen’s Environmental Management System (EMS).

EMS framework

The EMS is a core document defining the policies, processes and procedures 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.

An Environmental Management Group (EMG) assists the Environmental Manager, who is responsible for ensuring that the EMS is maintained and implemented. Internal audits to ensure compliance with the EMS and to improve the procedures of the EMS are undertaken at least once every two years.

3. Forest Landscape Description

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.
-

Location and access

Tutukau Road Forest is located approximately 68 kms south of Rotorua and 30 kms north of Taupo. The forest is accessed off Tram road. Internal forest tracks lead to the top of the block, access along the top can be gained though the neighbouring farm, providing access to all parts of the forest.

The location of the forest in relation to potential markets is listed in the table below and shown in Map 1.

Table 1: Distances from forest to log markets

Potential Market or Export Port	Distance from Forest (km)	Log market
Tauranga	148	Export
Taupo	30	Domestic
Kinleith	40	Pulp

Topography

The topography of the forestland is steep to rolling hill country.

Almost the entire property will require logging by hauler. The altitude ranges from 480 to 630 metre above seal level.

The general aspect is east.

Soils Soils are steepland soils related to yellow brown loams and composite soils formed from a deep mantle of Taupo ash over more weathered ash on stable rock types. There is a potential for severe sheet erosion if heavy cattle grazing occurs. There is also a potential for moderate soil slip erosion. Production forestry is a suitable land use for these soil types.

Climate Rainfall: The average rainfall at nearby Wairakei Power station is about 1,253 mm and is relatively evenly distributed during the year.,

Temperature: The mean annual temperature is around 12.2 degrees Celsius.

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

Lot 2 DPS 65614 Blk VI TATUA S.D. 76.0 hectares

The tenure is freehold.

The ecological landscape

Almost all land in the Taupo-Atiamuri area was, in pre European times, covered in extensive podocarp forests, with black, red and silver beech forests in the upland, broken country to the east of Lake Taupo. Wetlands were also a common occurrence on the plains and valley floors in the region. These forests were the result of vegetative succession following the Taupo eruption of 186 AD, which completely destroyed all forests within an 80km radius.

Following Polynesian and European settlement, clearance of native forest occurred in the Central Volcanic Plateau region to provide land for agriculture and forestry. Today, only very little of the original forest cover remains intact, and tends to be restricted to the higher altitude and less accessible sites; sites less suited to intensive primary production. The Taupo-Atiamuri region is dominated by farmland and plantation forests, although conversion from forestry to agriculture in the last few years has accelerated. Indigenous remnants remaining are by and large very small and degraded.

The area surrounding Tutukau Road Forest is mostly highly modified pasture for agricultural grazing. The forest is immediately bounded by farmland and plantation forestry. The very small scattered indigenous remnants in the area are small highly modified secondary forest patches with poor connectivity and low ecological integrity.

Protective Status The following table shows vegetation types as required by the National Standard for Plantation Forest Management in New Zealand revised in 2013.

Table 2: Protective status of the ecological landscape

LENZ type:	LENZ F6.2
Original (pre-Maori) percentage of ecosystem type in Ecological District within land title:	342,713ha 100%
Natural ecosystem area remaining	323,178ha 94.3%
Proportion of remaining natural ecosystem under protection:	229,133ha 70.9%
Protection by certificate holder	0.4ha 0%
Protected areas as a % of management estate	2.4ha 3.6%
Protected areas as a % of the aggregated Group Scheme management estate by Ecological District	196.2ha 8.9%

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.

The table on the following page shows the threatened environments classifications as they pertain to Tutukau Road Forest.

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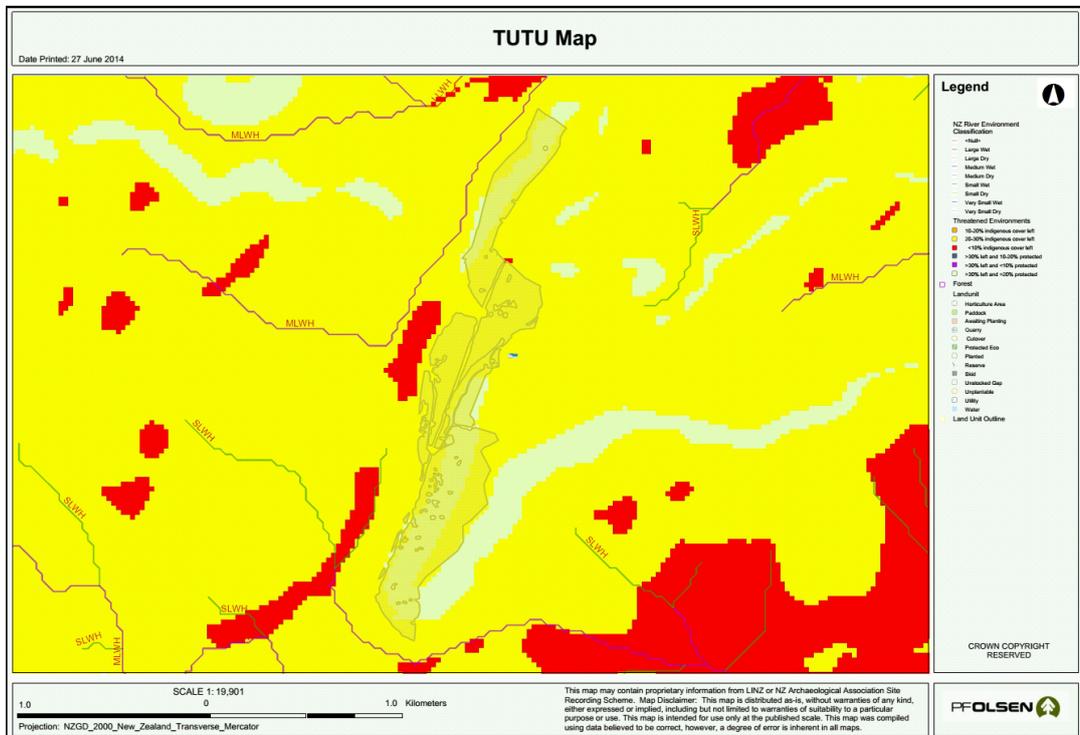
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Table 3: Reserve areas by Threatened Environments Classification

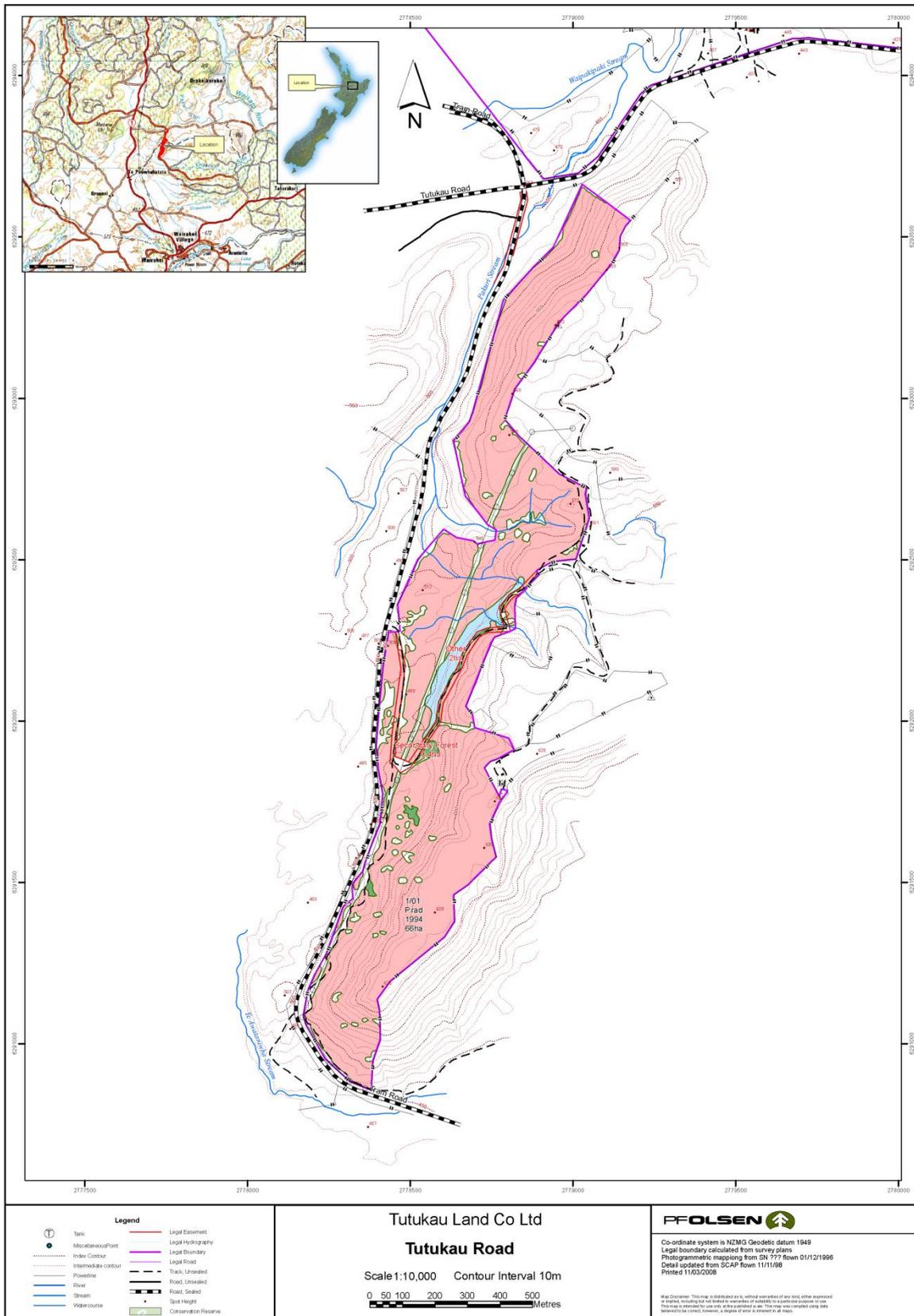
	Tutukau Road
<10% indigenous cover left	
10-20% left	
20-30% left	2.4ha 100%
>30% left and <10% protected	
>30% left and 10-20% protected	
>30% left and >20% protected	
TOTAL	2.4ha 100%

The TEC status of the small reserves reflects the history of intensive pastoralism in the area. The reserves thus have value due to their paucity in the overall landscape.

Forest by Threatened Environments Classification



4. Map 1 - Forest Location Map



5. Socio-economic profile and adjacent land

Forest history Prior to being established in trees, the property was used for pastoral farming.

Current social profile The Waikato region, in which Tutukau Road Forest falls, is one of the most populated in New Zealand (from Statistics NZ):

- 382,716 people
- 4th largest population out of the 16 regions in NZ
- 9.5% of New Zealand’s population
- Maori population size ranks 2nd out of the 16 regions in NZ

Combining data from the Atlas of Deprivation (Ministry of Health) and average income from statistics NZ, it is apparent that wealth varies widely across the large Waikato region. The area of the region where Tutukau Road Forest is located appears to be about in the middle of the scale between least deprived and most deprived. Age and family statistics for the Waikato region are very similar to the national averages.

Tutukau Forest is a small, currently passive, incremental contributor to the social profile of the area. The forests are very small in comparison to large forestry players in the region. The land and forests are privately owned and contribution to the local economy by way of added incremental employment and infrastructure is negligible.

Associations with Tangata Whenua The iwi associated with the lands of Tutukau Road Forest is Te Runanga O Ngati Tahu.

Tenure & resource rights A search of the Maori Land Online website returned no results.

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. 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.

The following table lists the forest neighbours and their primary activities. Some or all of these parties should be consulted when operations are proposed in forest areas adjacent to their boundaries.

Table 4: Forest neighbours

Owner/Occupier	Contact #	Location (See Location Map)	Activities	Other Notes
Department of Conservation – BOP		east		
Hancock Forest Management (NZ) Ltd		northwest	Forestry	
KJ and CW Gray		east	Farming	
Tatua East – The Maori Trustee		south	Farming	
Richard and Lianne Maxwell		west	Farming	

6. The Regulatory Environment

Regulatory considerations

In order to minimise the risk to forest owners, managers and contractors, it is important that relevant legislation and agreements are identified and appropriate measures put in place to ensure that breaches of legislation are avoided.

The following legislation and agreements summarise key regulatory and voluntary controls that currently apply to forest operations in the forest.

Resource Management Act

Tutukau Road 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.

Under the RMA, Tutukau Road Forest falls under the Taupo District Council for land management issues and the Waikato Regional Council for soil conservation and water quality issues.

District Plan

Tutukau Road Forest falls under the jurisdiction of the Taupo District Council. The current plan was made operative in October 2011.

Under the plan this block is zoned rural and forestry is a permitted land use.

Table 5: District Plan rules as they affect forestry

Rule Ref	Activity	Requirement
4.b.1.7	Forestry	Permitted- 10m setback from boundary (except where adjacent landuse is directly compatible with plantation forestry. E.g. is also plantation forestry. 25m setback from house on adjoining allotment.
4.e.6.1	Indigenous clearance	Discretionary- areas greater than 1 hectare. Within an SNA, the clearance of indigenous vegetation is permitted if: <ul style="list-style-type: none"> The vegetation is no higher than 3m tall. The clearance is the lesser of 700m² or 1% of the total allotment.

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Rule Ref	Activity	Requirement
4.b.1.9	Noise	Permitted- noise levels shall comply with maximum levels (55dBAL ₁₀ during day and 40dBAL ₁₀ during night). Note: The "best practicable option" provisions of Section 16 of the <i>Resource Management Act 1991</i> also apply.
4.b.1.19	Earthworks	Permitted- No dust nuisance beyond the boundary of the allotment.
4.b.1.21	Stormwater	Permitted- to be disposed off in a way that does not cause erosion to any other land.

Regional Plan The forest comes under the jurisdiction of Waikato Regional Council as the Regional Council.

The Waikato Regional Plan is operative in full.

Rules as they currently affect Tutukau Road Forest are:

Table 6: Regional Plan rules as they affect forestry

Rule Ref	Status	Requirements
3.9.4.11	Fertiliser use	Permitted.
4.2.8	Bridges	Permitted- 10m in length and associated bed disturbance and sediment discharge, subject to conditions.
4.2.9	Culverts	Permitted- culverts in the bed of a river for catchments not exceeding five hectares upstream of the culvert, and subject to conditions.
4.2.11	Fords	Permitted, subject to conditions in rule.
4.2.21	Water discharge standards	Suspended Solids Discharge Standards for Permitted Activity Rules in Chapters 4.2.
5.1.4.11	Replanting	Permitted- setback 5m from ephemeral stream. Spot cultivation can not occur within 2m of a stream bed.
5.1.4.11, 5.1.4.13 5.1.4.14, 5.1.4.15	Roading and tracking	Permitted- soil disturbance, roading and tracking, where area is not a high risk erosion area. See rule for definition of high risk. Works in a high risk erosion area are controlled, within stated limits and discretionary outside stated limits.
5.1.4.11, 5.1.4.13, 5.1.4.14, 5.1.4.15	Vegetation clearance	Permitted- Vegetation clearance of planted production forest. Controlled- clearance in riparian zones (excludes production forestry). Rule does not apply to vegetation clearance within high risk erosion areas that is being completed for erosion control.

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Rule Ref	Status	Requirements
5.2.5.4	Cleanfill	Permitted- small scale cleanfill disposal outside of high risk locations (see rule for definition of high risk areas). Not exceeding 2,500 cubic metres per annum. Note: rule does not for roading and tracking which are addressed by methods and rules in Section 5.1.4.
6.2.4.8, 6.2.4.9,	Agrichemical Application	Permitted- spot spraying using handheld equipment Permitted- widespread application of agrichemicals. Ground based application, 12 hours notification to parties within 50m of boundary. Aircraft application, spray plan notified 12 hours to three weeks to people likely to be affected.

Historic and archaeological sites

Under the Historic Places Act 1993 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, the protocols specified in PF Olsen’s EMS, and any others specifically developed in conjunction with HPT and Iwi or other stakeholders, must be observed. Where such circumstances require, an ‘Authority to Modify or Destroy’ will be sought from HPT. 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.

Checks of the NZAA website show no known records within any considerable distance of this block. Similarly a check of the Archaeological Site Probability model published by the Department of Conservation¹ suggests that this very inland location is unlikely to have sites present.

Consents & authorities held

There are no current resource consents or HPT authorities that apply to Tutukau Road Forest.

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.

The 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 balance of 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.

Environmental Code of Practice

All operations carried out on the property should be undertaken to the standards specified in the New Zealand Environmental Code of Practice for Plantation Forestry. This document sets out guidelines which ensure safe and efficient forest operations that meet the requirements of sound and practical environmental management.

Forest Road Engineering Manual

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.

Other relevant legislation

For a comprehensive list of relevant legislation refer to PF Olsen’s EMS. Forest owners can be held liable for breaches of these Acts and may be held responsible for damage to third party property. Appropriate protection should be taken to minimise these risks.

Other relevant legislation includes:

- Animal Welfare Act 1999.
- Biosecurity Act 1993.
- Climate Change Response Act 2002.
- Conservation Act 1987.
- Crown Forest Assets Act 1989.
- Fencing Act 1978.
- Forests Act 1949.
- Forest and Rural Fires Act 1977.
- Forests Amendment Act 1993.
- Forestry Rights Registration Act 1983.
- Freshwater Fisheries Regulations 1983
- Hazardous Substances and New Organisms Act 1996.
- Health in Safety in Employment Act 1992.
- Historic Places Act 1993.
- Injury Prevention, Rehabilitation and Compensation Act 2001.
- New Zealand Forest Accord.
- Noxious Plants Act 1978.
- Pesticides Act 1979.
- Reserves Act 1977.
- Resource Management Act 1991.
- Soil Conservation and River Control Act 1971.
- Trespass Act 1980.
- Wildlife Act 1953.

7. Forest Estate Description

Forest area The net stocked areas have been measured from a map produced by PF Olsen. The estimated net stocked areas of each stand are set out in the following table.

Table 7: Forest area (ha)

Gross area	Net stocked area	Area awaiting restocking	Reserves	Other
68.5	66.1	0	2.4	0

Unproductive areas include stocking gaps, roads and tracks, and other small unplanted areas. Total unproductive area has been derived by subtraction.

Current species The species grown at Tutukau Road Forest is *Pinus radiata* (radiata pine). This species has 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 the table below:

Table 8: Treestock Seedlot and GF Rating

Stand	Treestock
TUTU-01-01	GF 28, Seedlot 91/294

Productivity indices The two most common estimators of the productivity of a site are the Site index and 300 index.

Site index is a measure of productivity of a site in terms of height growth of radiata pine at age 20.

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

The site index for Tutukau Road Forest is approximately 33.
The 300 index for Tutukau Road Forest is approximately 31.

Tutukau Road Forest is at the higher end of site productivity in the general area for forestry sites.

Current crop status

Measurement data from the most recent inventory (2002) was summarised to give the current status of the crop. This is shown in the table below.

Table 9: Current crop status

Stand	Year planted	NSA (ha)	Total stocking (s/ha)	Basal area (m ² /ha)	Mean top Ht (m)	Mean DBH (cm)	Pruned stocking (s/ha)	Pruned height (m)
TUTU-01-01	1994	66.0	352	11.8	11.2			

8. Reserve areas and significant species

Introduction

Indigenous biodiversity management in or associated with exotic forests is an essential component of everyday forest management. Although exotic forests can provide a level of biodiversity, the reserve areas are usually the source of most indigenous biodiversity. Rare and threatened species can also be found associated with exotic forests and require special attention for management.

Reserve areas

Tutukau Road Forest contains 0.4 ha of regenerating secondary forest, composed of common low forest species such as mahoe and ponga tree ferns. The total area is split between three very small patches and none meet individually or cumulatively the NZ Forests Accord criteria. The areas are very small, isolated from other indigenous ecosystems and heavily modified. There is also a 2.0 ha block of planted poplars for soil erosion control. They have negligible ecological value and are difficult to protect from damage.

These areas will benefit from any ancillary pest and weed control undertaken for the benefit of the plantation as a whole.

The protected ecosystems are shown on the Forest Stands Map in Section 9.

Table 10: Protected ecosystems and reserve areas

Forest Geo Unit	Area	Reserve Type	Protective Status	Protective Function	HCV Status	Forest Type	LENZ		Ranking	Protection Cat
							Remaining %	Protected %		
TUTU										
Tutukau Road										
TUTU-SECF-01	0.4	02 Secondary Forest	Passive	Terrestrial Ecosystem	No Status	Broadleaved Hardwood	94.3	70.9	8	Passive
TUTU-OTHR-01	2.0	10 Other		Erosion Control	No Status	Exotic Species	0.0	0.0	0	Passive
	2.4									
TOTAL	2.4									

Riparian reserves

A standardised GIS-based stream classification system has been developed specifically for PF Olsen, based on NIWA’s River Environment Classification (REC) and Freshwater Environments of New Zealand (FWENZ) models. 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. Each stream category corresponds with a set of rules in the EMS that apply to operations occurring near the riparian reserve.

There are no streams classified under the REC system in Tutakau as it only contains ephemeral flowpaths and seeps. As potential flowpaths, this factor will be recognised at time of harvest.

Rare and threatened species

Two fern birds were sighted within the forest near the scenic reserve in 2001. Other than this, no rare or threatened species are known to exist nor are expected within Tutukau Rd Forest except possible Long Tailed Cuckoo due to the nature of the remnant vegetation and its status. The size of the native areas is too small to provide significant or permanent habitat opportunities for more important species.

Table 11: Rare species sightings

Sightings Report of Fauna on Estates Managed by PF Olsen Ltd						
		period	1/01/00	to	10/0209	
Local Govt District	ForestCode	SpeciesDesc	ThreatClassDesc	Number	DateSeen	Comments
Rotorua	TUTU	Fern Bird	Sparse	2	1/04/01	

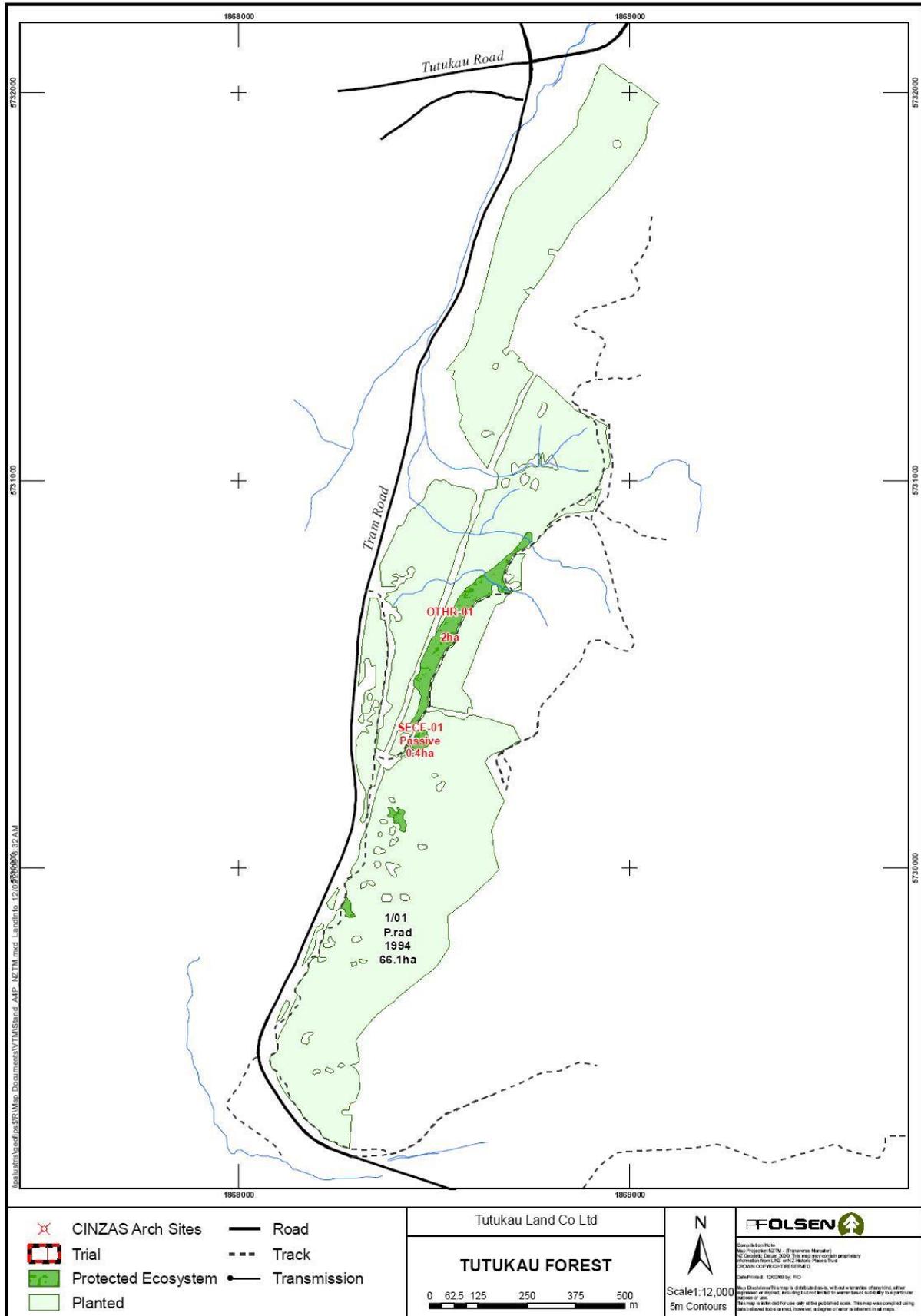
CITES species

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 at <http://www.doc.govt.nz/about-doc/role/international/endangered-species/cites-species/nz-cites-listed-species/>.

9. Map 2 - Forest Stands Map



10. Forest Products and Other Special Values

Introduction

Forest plantations can provide non-timber forest products and special values that enhance the economic wellbeing 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.

Environmental and Social cost-benefit analysis

Forests can deliver numerous social and environmental products, both positive and negative to varying degrees. These non-timber products can be difficult to quantify, unlike financial costs and benefits.

The table below rates the relative positivity and negativity of the more common social and environmental products produced by Tutukau Road Forest relative to the most likely alternative primary production system, pastoral drystock farming.

Table 12: Environmental and social cost-benefit analysis

Environmental or social product	Increasingly negative				Neutral			Increasingly positive			
	-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
Soil stabilisation										✓	
Erosion/soil loss				HP							MR
Water quality							✓				MR
Riparian shading						na					
Water quantity					MR	HP					
Carbon sequestration			HP								✓
Native wildlife habitat								✓			
Threatened fauna						na					
Native fish						na					
Air quality					HP		MR				
Native reserve protection										✓	
Landscape/visual			HP					MR			
Recreation							✓				
Commercial forest use										✓	
Firewood											HP
Local employment				MR				HP			

NB: where the ratings differ throughout a rotation, 'MR' is used to indicate the mid rotation (growing) stage of the forest, and 'HP' refers to during or post-harvest)

Non-timber forest products The are no non-timber products currently being produced or developed in Tutukau Road Forest.

Other special values The are no special values that have been identified in Tutukau Road Forest.

Recreational usage Tutukau Road Forest does not receive any recreational demand from the wider public.

The forest will continue to be open for legitimate use subject to entry by permit.

11. Environmental Risk Management

Assessment of environmental risks

Several areas of typical forest management have been identified as posing a possible environmental risk within Tutukau Road Forest. The Environmental Assessment Matrix below summarises the identified risks for Tutukau Road Forest. The level of risk has been evaluated in the matrix as high 'H' or low 'L', or not applicable 'NA'.

Prior to operations such as clearfelling, land preparation and production thinning, an assessment is undertaken to quantify the risk involved in carrying out the particular operation, and steps are implemented to manage the risks.

Table 13 Assessment of environmental risks arising from forestry operations

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

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 Tutukau Road Forest are:

- Pesticides;
- Fuels and oils;
- Fire retardants;
- Surfactants.

Transportation, storage and labelling of these hazardous materials must all comply with the provisions of the Health and Safety Manual, which is maintained under ISO 9001 certification and incorporate legislative controls under EPA and NZS 8409:2004 Management of Agrichemicals code of practice.

Furthermore, the forest manager is committed to reducing the use of hazardous substances as much as possible. This involves use of alternative methods for the control of weeds, pests and diseases where these are effective and efficient. The use of fuels and oils is minimised where possible. Fire retardants are only used when required and surfactants are only used to make more efficient use of specific herbicides.

FSC highly hazardous chemicals

There are four agrichemicals that have been classified ‘highly hazardous’ by FSC that are used in forestry and conservation operations within PF Olsen certified forests. Special derogations to continue usage subject to conditions are maintained by PF Olsen.

Table 14: Highly hazardous chemicals used by PF Olsen

Active ingredient	Purpose	Common usage
Terbuthylazine	Gorse and grass control to aid establishment	Once/twice per rotation
Hexazinone	Bracken, grass, pampas and blackberry	Some specific sites
Sodium cyanide	Possum control (ground-based)	Rare
Sodium Monofluoroacetate (1080)	Possum control	Rare; usually by Animal Health Board

12. Commercial Crop Establishment and Silvicultural Operations

Introduction

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 asset maintenance.

Crop species

In Tutukau Road Forest, the main crop species grown radiata pine.

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 fingerjointing. 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.

Alternative species have been considered, but these did not meet the Tutukau Land Company Ltd objectives.

Establishment

There is no establishment planned at Tutukau Road Forest during the period of this management plan.

Re-establishment will aim to use high quality treestocks suitable for the site and market. These will be investigated at time of establishment.

Pre-establishment forest flora and fauna

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. This may include the extension of an existing wildlife corridor or riparian area by increasing setbacks at the time of crop replanting. A plantation crop is likely to confer beneficial habitat buffering rather than cause adverse effects.

These considerations are covered by the afforestation checklist and riparian rules contained within the EMS.

Tending

Cost effective pruning and thinning operations are required to achieve the objectives of maximising forest value. The aim should be to have a final crop stocking of at least 350 stems per hectare pruned to at least 5.8 metres on average.

Traditional 3-lift tending regime

The traditional regime has been to prune to 6.5 metres in three lifts followed by a thin to waste. A common scenario would be:

First prune:

When the average tree height is 6 metres prune 360 to 400 s/ha to half tree height.

The aim being to achieve pruned heights of 2.5 to 3.0+ metres (2.7 m average)

Second prune:

When the diameter over pruned stubs (DOS) will be similar to that achieved in the first lift prune 350 to 380 s/ha to leave 3.5 m of green crown.

The aim being to achieve pruned heights of 4.2 to 4.8 metres.

Third prune & thin:

When the DOS will be similar to or smaller than that achieved in the earlier lifts, prune 350 s/ha to 6.5 metres.

Followed by a thin to waste to allow the pruned crop trees to grow. An even DOS size and a pruned height of 6.5m should be achieved in three lifts.

A sampling programme nearer to harvest time is recommended to determine actual pruned log quality.

**Alternative 2-lift
tending regime**

Alternatively a two lift pruning regime to around 5.8 metres average pruned height could be carried out. Our cost benefit analysis for pruning operations show that a two lift regime to variable final pruned height is best for sites such as your for the following reasons:

- The most common pruned log lengths sold are 4.1m, 5.2m, and 5.5m other lengths are usually difficult to sell, so pruning to 6.5m is not necessary.
- An acceptable DOS and pruned height can be achieved in 2 lifts.

Two-lift pruning is generally cheaper than three lifts.

The disadvantage of a two-lift regime is that a slightly larger DOS is achieved. Past analysis shows that an average DOS of 19 to 20cm would be achieved compared to around 18 to 19 cm for a three-lift prune of this stand.

The two lift regime we recommend for this forest is as follows:

First prune:

Prune 350 to 380 s/ha to around 3.2m.

Second prune:

When the DOS will be similar to that achieved in the first lift prune 350 s/ha to leave 4.0m of crown.

A sampling programme nearer to harvest time is recommended to determine actual pruned log quality.

Tree nutrition

The soils in Tutukau Road 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:

- **Nitrogen** – Generally west coast sands in the North Island and the Canterbury Plains, West Coast and Nelson regions in the South Island.
- **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 crown 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.

13. 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. PF Olsen have procedures for each of the following four types of inventory to be applied on Tutukau Road Forest:

- 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: to obtain estimates of recovery by log grade.
-

Mapping

Digital mapping of Tutukau Road Forest currently exists, but will require updating from time to time as the forest changes.

The digital data is retained, processed and managed on PF Olsen’s GIS (Geographic Information System) to an accuracy fit for purpose.

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

Forest records

Forest records are essential in monitoring the forest operations by providing a historic perspective to the physical condition of each stand.

Tutukau Road Forest records are maintained on PF Olsen’s FIPS system (Forest Information and Planning System). These record systems allow for fast retrieval of information, production of reports and statistics and provide a comprehensive audit trail.

Forest records are essential to understand the status and condition of forest stands, reserves, and important fauna species as well as the retention of inventory data and operation monitoring data.

14. Harvesting Strategy and Operations

Harvesting strategy As a plantation with a non-normalised age-class structure, the harvesting strategy employed at Tutukau Road Forest is to harvest the forest or constituent stands as close as possible to the 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 (this may be less for framing or unpruned stands).

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 and 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.

Getting harvest ready Forward planning is essential when considering harvesting activities. Harvest planning should ideally commence 2 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.

Preparation for harvest is expected to commence within the term of this plan. Harvesting operations, when ultimately undertaken, will be by contractor supervised by the forest manager.

15. Property Management and Protection

Statutory pest obligations

Pest management within Tutukau Road Forest is subject to statutory obligations under the Regional Pest Management Strategy 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 and landowner obligations are summarised in the table below.

Table 15: Statutory pest regulations

<i>Plant and Animal Pest Categories- Waikato Regional Pest Management Strategy</i>		
Pest Category	Pest objectives	Forest Landowner Obligations
Eradication Pest	Pests of limited distribution where reduction of pests to zero density is possible.	Landowner must not knowingly spread pest or hinder control. WRC will fund and implement appropriate control programmes for these pests
Containment Pest	Pests which are abundant in suitable habitats in the region. Goal may be to contain density of pest to within its range or prevent spread to neighbours and other parts of region.	WRC will develop and enforce rules requiring land occupiers to control the pests in a variety of circumstances. WRC may also undertake service delivery of some containment pests in specific areas.
Potential Pest	Pests which have a high potential threat to the region where there is no strategy rule requiring the land occupier to control the pest.	WRC will undertake surveys. Control may be warranted at an early stage and would be undertaken by WRC, not the land occupier.
<p>Plant pests- Full details of classifications and obligations of plant pests are listed in Chapter 5 of the Pest Management Strategy. Animal pests- Full details of classifications and obligations of plant pests are listed in Chapter 6 of the Pest Management Strategy.</p> <p><i>The full list of plant and animal pest species covered by the Waikato Regional Pest Management Strategy are contained in Appendix 1.</i></p>		

Pest control

The PF Olsen Integrated Pest Management provides guidance on application and execution of the PF Olsen Ltd Environmental Management System (EMS) for pest control and chemical use.

The main animal pest in Tutukau Road Forest is the introduced possum. Possums 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.

Other pests include rabbits and hares at the time of establishment and wild goats during the first half of the crop rotation when bark is soft and palatable.

Animal pests in Tutukau Road 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.

There is no pest control currently being undertaken at Tutukau Road Forest.

Disease control

Diseases, which can affect the forest trees and adjacent native vegetation, are monitored throughout the year by the forest manager, and once a year by a professional independent forest health assessor. 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 though silviculture by timely thinning and pruning operations, which increases air movement and lowers humidity levels.

There no *Dothistroma* control carried out at present in Tutukau Road Forest.

Protected ecosystems, reserves and species

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.

No specific management is proposed for the very small low quality patches within this forest. At the time of harvesting care should be taken to avoid these areas if possible however due to their size and location this is unlikely to be fully achievable. Avoidance of roading or tracking through the areas, and protecting from fire and pests should be achieved. After harvesting options for the future maintenance and management can be better reviewed.

Ecological equivalence

Tutukau Road Forest is a small (SLIMF) forest as defined under the FSC NZ Standard. By these definitions the forest avoids the requirement to have 5% of its area under protection but the FSC estates within the Group Scheme must in aggregate achieve a level of 10% of the certified estate within each Ecological District also under protection. Where such thresholds cannot be met, there are other mechanisms generally termed ‘ecological equivalence actions’ that can be undertaken to meet the standard.

Where such thresholds cannot be met, there are other mechanisms generally termed ‘ecological equivalence actions’ that can be undertaken to meet the standard.

The table below illustrates how the requirements are met.

	>1000 ha (L)	<1000 ha (SLIMF)
Forest Size		√
Meets 5% internal threshold		NA
10% Ecological District Requirement		
- Met within forest		N
- Met within eco district		Y
- Met by eco district adjacency eco equivalence effort.		n
- Met by eco region adjacency eco equivalence effort.		-

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Tutukau Road Forest has only 3.6% of its total managed area as reserves. The forest falls into the Atiamuri Ecological District which has which has an aggregated total reserved area across the Group Scheme forests in the ED of 8.9%(22.4 hectare shortfall).

Under the FSC NZ Standard shortfalls in reserve area can be made up by an ‘ecological equivalence’ investment into other protected ecosystems within the estate, or in other parts of the estate in other Ecological Districts or in other party’s lands within the Ecological District. The “ecological equivalence’ value has been benchmarked and calculated against the average annual spend of the Department of Conservations 2013 Annual report and would amount to just under \$ /annum.

This amount is already being substantially exceeded by the combined inputs to a wetland restoration project in an adjacent forest (), in the same ED.

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 prevails, access to adequate water sources, constructing and maintaining firebreaks, and selective forest grazing to reduce fuel within stands;
3. Effective detection systems which includes 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, and
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 Tutukau Road Forest the Rural Fire Authority (RFA) is the Taupo 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 fire fighting 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.

Fire insurance

With regard to 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.

Insurance for Tutukau Road Forest is held by Tutukau Land Company Ltd. The current extent of cover is:

- Fire fighting cover (the costs of fire suppression) of \$.
- Cover for the crop value and re-establishment costs are retained based on a recognised crop valuation, but reviewed on an annual basis.

Tutukau Land Company Ltd should liaise closely with the forest manager at the time of fire insurance renewals and if necessary instruct the forest manager to keep premiums paid up.

Public liability insurance

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

There insurance currently held by Tutukau Land Company Ltd for Tutukau Road Forest.

16. 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 Tutukau Land Company Ltd as and when required and are also, where appropriate, made publicly available through the PF Olsen webpage.

Values monitored

Management inspections are completed regularly during operations and periodically between times to monitor all aspects of the forest growth, health and conditions. The findings of the inspections are detailed and, where appropriate, summarised on the PF Olsen FSC website. The full monitoring framework implemented and applicable to Tutukau Road Forest is tabulated below.

Environmental Process Monitoring Framework					
Monitored Element	Include √	Components	Data Source	Data medium	Reporting / Website frequency
Chemical usage	√	A.I usage/ Area overuse	operations supervisors	FIPS Form	On demand / annual
Consultation activity	√	Complaints	operations supervisors & planners	Form	Annual / annual
Environmental incidents	√	Incident number / categories	operations supervisors	FIPS Form	On demand / annual
Flora & fauna	√	Species & Status frequencies/ new finds	operations supervisors, public, crews	FIPS Form	Annual / 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
Forest growth	√	PSP protocols / periodic inventory. ISO 9001	contractors	To be established	Periodic-annual – not on web
Forest health	√	Disease & health	National Forest surveillance program ²	document	Periodic-annual – not on web

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² Forest health inspections are undertaken annually, by an independent specialist forest health assessor, through the NZ Forest Owners Association forest health scheme.

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FSC membership	√	Block/ location/name	FIPS register	FIPS client database	On demand / annual
Health and safety statistics	√	LTI / accidents & incidents.	operations supervisors	FIPS	Monthly/ annual
Internal Audit CAR activity	√	Frequency * category	Auditors/ees	FIPS Form	Annual / annual
Log production	On harvest	Total logs/ FSC markets	log docket	Woodtrack	On demand / annual
Operational monitoring	√	Audit trends/cause analysis	operations supervisors	FIPS Form	Monthly / annual
Pests	√	RTC / kill returns or other	supervisors /contractors	To be established	Annual where relevant
Protected ecosystem condition	NA	Condition trends/photopoint monitoring	Contractors/ supervisors	To be established	Bi-annual if restoration initiated
High Conservation Value forests	NA	Condition trends/photopoint monitoring	Contractors/ supervisors	To be established	Bi-annual if restoration initiated
Recreational & non-timber	√	Permits issued	branch offices / forest security	FIPS Form	Annual / annual
Resource consents	NA	Number/compliance	operations planners	FIPS	6 monthly / annual
Stream monitoring	NA	Clarity +/- other specific	supervisors /contractors	Spreadsheet	Monthly / annual where relevant
Environmental training	√	Courses, numbers, names	Staff	FIPS Form	Annual/as relevant
Client satisfaction	√	Post-operation client survey	clients	Survey form	Post-operational /annual
Social survey	√	Demographics, values, work conditions	contractors	Survey form	5 yearly/annual

Financial

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

Social

Consultation with stakeholders has been undertaken and constant feedback from these stakeholders (and others as they become apparent) is monitored. This includes actions undertaken to resolve disputes and issues.

17. Future Planning

Introduction

This plan pertains to the management of Tutukau Road 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 require a full review of this plan.

The next review date for this plan is June 2019.

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

Operation plans

For the short term we use operation plans. These plans are prepared annually in accordance with this management plan. This operation plan and associated budget are subject to approval by Tutukau Land Company Ltd at the beginning of each financial year.

Appendix 1 – Waikato Regional Pest Management Plan

Plant pest management

The RPMS identifies management programmes for 59 plant pests in three pest categories that warrant some level of regional intervention:

Eradication plant pests

Waikato Regional Council will directly manage and control these 15 plants or classes of plants⁴. The Council will also undertake monitoring of these pests and provide information to the community on identification of the pests and progress of control.

- African feather grass (*Pennisetum macrourum*)
- Alligator weed (*Alternanthera philoxeroides*)
- Cathedral bells (*Cobaea scandens*)
- Climbing spindleberry (*Celastrus orbiculatus*)
- Evergreen buckthorn (*Rhamnus alaternus*)
- Japanese knotweed and giant knotweed (*Fallopia japonica* and *Fallopia sachalinensis*)
- Manchurian wild rice (*Zizania latifolia*)
- Mile-a-minute (*Dipogon lignosus*)
- Nassella tussock and fine stemmed needle grass ('Mexican feather grass') (*Nassella trichotoma* and *N. tenuissima*)
- Noogoora bur (*Xanthium strumarium*)
- Old man's beard (*Clematis vitalba*)
- Senegal tea (*Gymnocoronis spilanthoides*)
- Spartina¹ (*Spartina* species and hybrids)
- Variegated thistle (*Silybum marianum*)
- White bryony (*Bryonia cretica*)

⁴ DOC is the lead agency for spartina control.

Containment plant pests

The table below summarises 23 plants or classes of pests which land occupiers are responsible for controlling under Strategy rules. The Council monitors all these pests and will provide information and advice when required.

Containment pest plants	Strategy rules		Other council assistance	
	Total control	Boundary control	Biological control	Direct control (discretionary)
Australian sedge (<i>Carex longebrachiata</i>)		√ (20 metres)		√
Banana passionfruit (<i>Passiflora tripartita</i> and <i>P. mixta</i>)	√			√
Boneseed (<i>Chrysanthemoides monilifera</i> ssp. <i>monilifera</i>)	√		√	√
Broom (<i>Cytisus scoparius</i>)		√ (20 metres)	√	√
Climbing asparagus (<i>Asparagus scandens</i>)	√			√
Darwin's barberry (<i>Berberis darwinii</i>)	√			√
Gorse (<i>Ulex europaeus</i>)		√ (20 metres)	√	
Mexican devil (<i>Ageratina adenophora</i>)	√ ⁵			√
Mignonette vine (<i>Anredera cordifolia</i>)	√			√
Mistflower (<i>Ageratina riparia</i>)	√ ⁶		√	
Moth plant (<i>Araujia sericifera</i>)	√			√
Nodding and plumeless thistle (<i>Carduus nutans</i> and <i>C. acanthoides</i>)	√ ⁷	√ (50 metres)	√	
Pampas (<i>Cortaderia jubata</i> , <i>C. selloana</i> and cultivars)	√ ⁸			√
Pinus contorta (<i>Pinus contorta</i>)	√		√	√
Privet (Chinese and tree privet) (<i>Ligustrum</i> species)	√ ⁹			√

⁵ Excluding Thames Coromandel area.

⁶ Excluding Thames Coromandel area.

⁷ Total control in intensively farmed areas, boundary control in less intensive areas. See RPMS for maps of areas.

⁸ Total control in parts of region only (Taupo, Rotorua, South Waikato, Matamata Piako, Waipa and parts of Otorohanga, Waitomo and Hauraki districts). See RPMS for map of total control area.

⁹ Total control where the Council receives a valid health related complaint from occupier living or working within 50 metres of the privet. Total control on roadsides and rail corridors.

Containment pest plants	Strategy rules		Other council assistance	
	Total control	Boundary control	Biological control	Direct control (discretionary)
Purple nutsedge (<i>Cyperus rotundus</i>)	√			
Ragwort (<i>Senecio jacobaea</i> and <i>Jacobaea vulgaris</i>)	√ ¹⁰		√	
Taiwan cherry and rum cherry (<i>Prunus campanulata</i> and <i>P. serotina</i>)	√ ¹¹			√
Tutsan (<i>Hypericum androsaemum</i>)		√ (20 metres)		√
Wild ginger (kahili and yellow) (<i>Hedychium gardnerianum</i> and <i>H. flavescens</i>)	√			√
Willow (grey and crack) (<i>Salix cinerea</i> and <i>S. fragilis</i>)				√
Woolly nightshade (<i>Solanum mauritianum</i>)	√		√	√
Yellow flag iris (<i>Iris pseudacorus</i>)	√			√

Potential plant pests

A number of plant pests could potentially become invasive weeds in the Waikato Region. Some of the plants are not yet known in the region, while others have limited distributions. More information is required to make informed decisions about their effects on the environment.

- Bushy asparagus (*Asparagus aethiopicus* excluding 'Foxtail' cultivar)
- Californian bulrush (*Schoenoplectus californicus*)
- Chilean flame creeper (*Tropaeolum speciosum*)
- Chilean rhubarb (*Gunnera tinctoria* and *G. manicata*)
- Chocolate vine (*Akebia quinata*)
- Freshwater eel grass (*Vallisneria gigantea*, *V. spiralis*)
- Fringed water lily (*Nymphoides peltata*)
- Hawkweed (*Hieracium pilosella*)
- Horse nettle (*Solanum carolinense*)
- Horsetail (*Equisetum* species)

¹⁰ Total control in intensively farmed areas, boundary control in less intensive areas. See RPMS for maps of areas.

¹¹ Total control where plants are likely to be acting as a seed source for wild seedlings.

- Hydrilla (*Hydrilla verticillata*)
- Kudzu vine (*Pueraria montana*)
- Marshwort (*Nymphoides geminata*)
- Mexican water lily (*Nymphaea mexicana*)
- Monkey apple tree (*Syzygium smithii* also known as *Acmena smithii*)
- Mouse-eared hawkweed (*Hieracium pilosella* and *Pilosella officinarum*)
- Purple loosestrife (*Lythrum salicaria*)
- Reed sweetgrass (*Glyceria maxima*)
- Saltwater paspalum (*Paspalum vaginatum*)
- Rhododendron ponticum (*Rhododendron ponticum*)
- Sagittaria (all Sagittaria species – except *S. subulata* in Lake Waahi only)
- Water poppy (*Hydrocleys nymphoides*)

Animal pest management

Eradication and containment animal pests

The table below summarises 22 animals, or classes of animal pests, which the Council and land occupiers are responsible for controlling under the production threat, public threat (affecting human health) and environmental threat pest groups.

Animal pests	Means of achievement			
	Strategy rules	Production threat	Environmental threat	Public threat
Dama wallaby (<i>Macropus eugenii</i>)	y	√	√	
Feral cat (<i>Felis catus</i>)	y		√	√
Wild deer (<i>Cervus and Dama species</i>)	n	√	√	
Feral goat (<i>Capra hircus</i>)	y	√	√	
Feral pig (<i>Sus scrofa</i>)	n	√	√	
Hedgehog (European) (<i>Erinaceus europaeus</i>)	y		√	
Mustelids – ferret, stoat, weasel (<i>Mustela furo</i>), (<i>Mustela erminea</i>) and (<i>Mustela nivalis vulgaris</i>)	y	√	√	
Possum (<i>Trichosurus vulpecula</i>)	y	√	√	
Rabbit (<i>Oryctolagus cuniculus</i>)	y	√	√	
Rat Ship rat (<i>Rattus rattus</i>), Norway rat (<i>Rattus norvegicus</i>)	y	√	√	√
Magpie (<i>Gymnorhina tibicen</i>)	y		√	√
Rainbow lorikeet (<i>T. haematodus</i>)	y		√	
Rook (<i>Corvus frugilegis</i>)	y	√		
Brown bullhead catfish (<i>A. nebulosus</i>)	y		√	
Koi carp (<i>cyprinus carpio</i>)	y		√	
Gambusia (<i>Gambusia affinis</i>)	y		√	
Wild goldfish (<i>Carassius auratus</i>)	y		√	
Perch (<i>Perca fluviatilis</i>)	y		√	

Animal pests	Means of achievement			
	Strategy rules	Production threat	Environmental threat	Public threat
Tench (<i>Tinca tinca</i>)	y		√	
Rudd (<i>Scardinius erythrophthalmus</i>)	y		√	
Asian paper wasp (<i>Polistes chinensis</i>)	y	√	√	√
Australian paper wasp (<i>Polistes humilis</i>)	y	√	√	√
Common wasp (<i>Vespula vulgaris</i>)	y	√	√	√
German wasp (<i>Vespula germanica</i>)	y	√	√	√
*Lesser banded hornet (<i>Vespa affinis</i>)	n	√	√	
*Median wasp (<i>Dolichovespula media</i>)	n		√	√
*Yellow flower wasp (<i>Radumeris tasmaniensis</i>)	n		√	√
Argentine ant (<i>Linepithema humile</i>)	n		√	√
*Darwin's ant ¹² (<i>Doleromyrma darwiniana</i>)	n		√	√
*Little fire ant (<i>W. auropunctata</i>)	n	√	√	√
*Red imported fire ant (<i>S. invicta</i>)	n	√	√	√
*Tropical fire ant (<i>S.geminata</i>)	n	√	√	√
*Yellow crazy ant (<i>A. gracilipes</i>)	n	√		

* 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.

¹² The first population recorded in Auckland in 1959 was eradicated, but the species is now established in Christchurch and additional populations are known from the northern and eastern North Island and the northern South Island.