

GARLAND FOREST

Owned by
W & S GARLAND AND TINTAGEL TRUST

Forest Management Plan

For the period 2019 / 2023



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1. Introduction

Principles and Criteria

W & S Garland and Tintagel Trust 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.

W & S Garland and Tintagel Trust 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 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.
-

Legal ownership

The forest is legally described on certificate of title numbers 211853 as follows:

Lot 1	DPS 59103	53.6560 hectares	Maungatautari SD
Lot 2	DPS 59103	62.4710 hectares	Maungatautari SD

The tenure is freehold.

Location and access

Garland Forest is located approximately 20 km south of Cambridge at the end of Rahiri Road. At the end of Rahiri Road there is a private metalled road owned by W & S Garland which provides access for forestry and farming operations.

The location of the forest in relation to potential markets is listed in the Table 1 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 Type
Tauranga	105	Export
Putaruru	57	Domestic
Kinleith	83	Pulp

Topography

The topography of the forestland is rolling to steep. The forest is planted in three separate compartments in close proximity.

The blocks are mainly planted on steeper sidlings falling into a gully. Compartment 3 has a QEII covenanted native reserve (GARL SECF 01) located through the centre of the block.

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A combination of cable logging and ground based hauler systems are likely to be used in Garland forest.

Altitude ranges from 200 metres above sea level at the end of Rahiri road to the north of the block, to 390 metres above sea level where the native stand meets the private road. The general aspect is north and west facing.

Soils

The soils are yellow brown loams of the Pukerata silt loam and clay loam hill soil family. They are formed from ash deposits, from pre-Taupo eruptions, and Greywacke. Erosion hazard potential is rated as negligible to slight soil slip. Production forestry is a suitable land use on these soils (Source NZ Land Resource Inventory Sheet N66 and N75 and the Waikato Legend).

Climate

Rainfall: The average rainfall at nearby Cambridge is about 1181mm per year and ranges from approx. 79mm in summer to 153mm in winter.

Temperature: The mean annual temperature is around 13.4 degrees Celsius. Ground frosts are common with an average of 50.7 ground frost days per year.

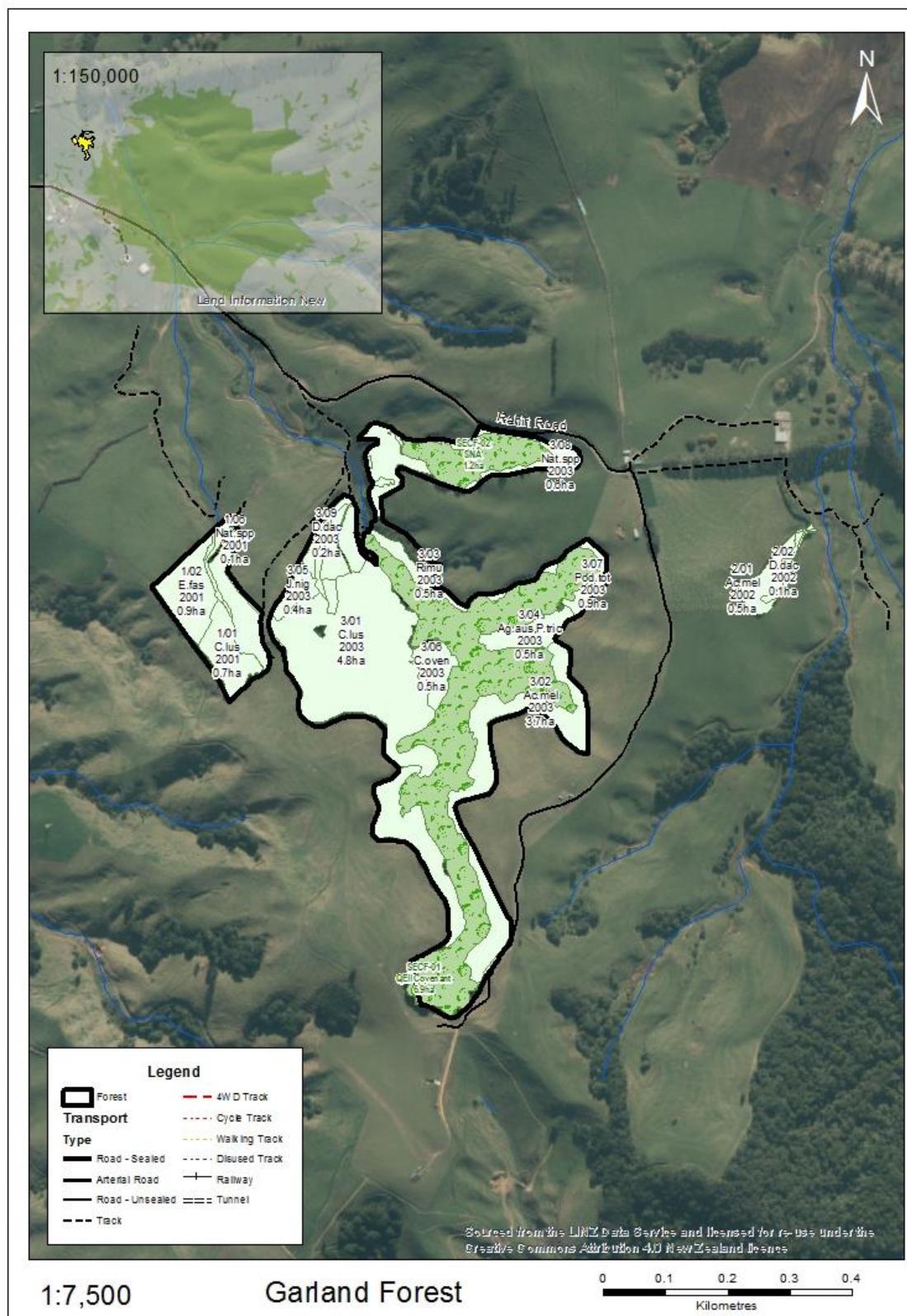
Wind: Gale force wind events are recorded as occurring on an average of 3.4 days per year (Source: NZ Meteorological Service, Summaries of Climatological Observations to 1980). This wind has proved a challenge to trees established at Garland forest with some minor windthrow events occurring over the past few years.

Ownership of Trees The forest is planted in a two separate compartments in close proximity. Both compartment 1 and 3 are part of a joint venture between W & S Garland and Tintagel Trust; Compartment 2 is owned by W & S Garland only, and therefore does not form part of Garland Forest and is not part of the Group Scheme. Ownership of the tree crop is summarised in Table 2.

Table 2: Ownership of Tree Crop of Garland Forest

Compartment	Ownership	Year Established	Area (ha)
1	W & S Garland and Tintagel Trust	2001	2.8
2	W & S Garland	2002	0.6
3	W & S Garland and Tintagel Trust	2003	12.6

Map 1 – Forest Location Map



3. The Broader Landscape

Ecological landscape

The Garland forests lie within the Maungatautari Ecological District (Figure 1), described as “Low sedimentary ranges, mostly below 300m a.s.l.; several andesite cones, peripheral downlands, some lahar deposits in S; mild, humid; complex pattern of soils mainly silty loams; forests on Maungatautari (796m) and upper slopes of other cones, floristically poor submontane forest on Maungatautari summit; lower parts farmed,...”¹

The native forest associations present within the farm block are now considered to be regionally significant, both because of the restoration and protection activities carried out by the Garlands which have enhanced the areas, but also because they represent an extension of the forests of Maungatautari Mountain into an intensively productive agricultural landscape in which forest cover has been almost entirely removed as have large areas of natural wetlands; drained and converted into exotic grassland ecosystems. As such, almost any native forest vegetation remnants in this region are valuable and require protection from further area loss and damage.

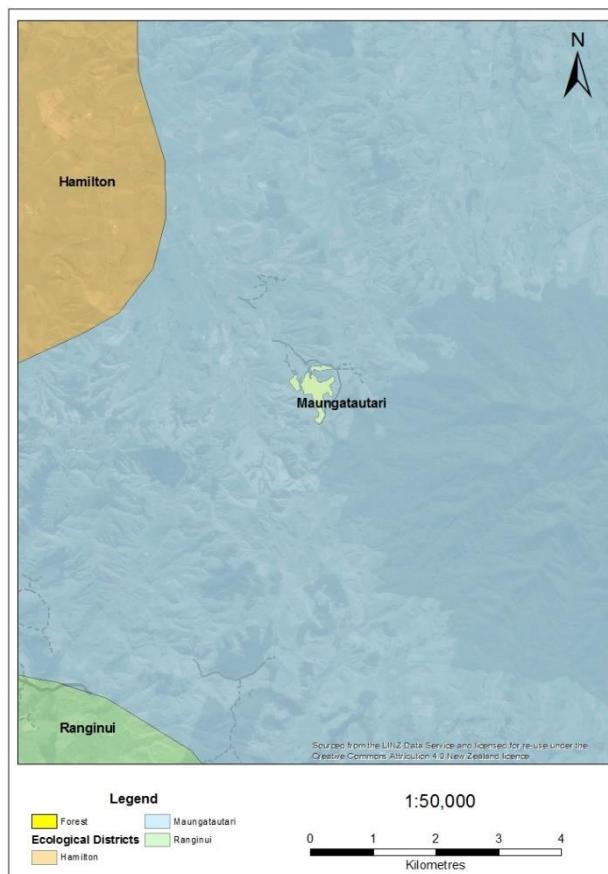


Figure 1: Garland Forest Ecological District

¹ <http://www.doc.govt.nz/upload/documents/science-and-technical/Ecoregions2.pdf>

Protective Status Table 3 shows vegetation types as required by the National Standard for Plantation Forest Management in New Zealand revised in 2013.

Table 3: Protective status of the ecological landscape

LENZ type	LENZ 2.3	LENZ F6.1
Original (pre-Maori) percentage of ecosystem type in Ecological District within land title	198,979ha a 100%	777,878ha 100%
Natural ecosystem area remaining	78,995ha 39.7%	201,705ha 25.9%
Proportion of remaining natural ecosystem under protection	36,495ha 46.2%	109,256ha 54.3%
Protection by certificate holder	8.1ha 0.01%	1.2ha 0.0006%
Protected areas as a % of management estate	8.1ha 34.9%	
Protected areas as a % of the aggregated Group Scheme management estate by Ecological District	12.4ha 18.0%	

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 Conservation² 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.

The site recording scheme has revealed no known sites within Garland 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.

² Arnold, G.; Newsome, P.; Heke, H. 2004: Predicting archaeological sites in New Zealand. *DOC Science Internal Series 180*. Department of Conservation, Wellington. 24 p.

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.

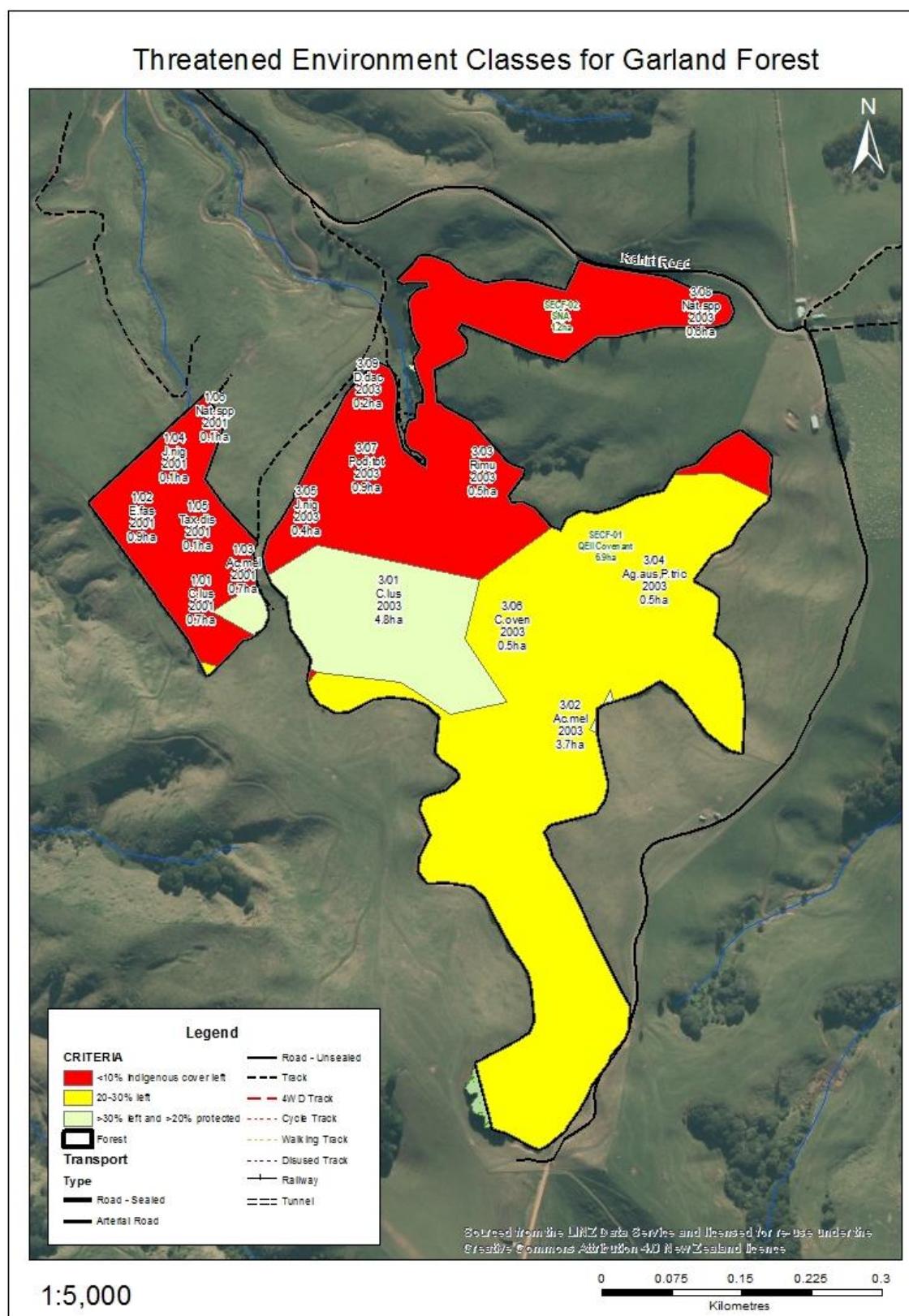
Table 4 shows the threatened environments classifications as they pertain to Garland forest estate (Map 2). The rarest threatened environments (< 10% indigenous cover left) make up 9.02 ha of Garland Forest, while the remaining area is split between less threatened land.

Table 4: Reserve areas by Threatened Environments Classification

Category	Area (ha)	Area (%)
< 10% indigenous cover left	9.02	38.3
10 - 20% left		
20 - 30% left	11.63	49.3
> 30% left and < 10% protected		
> 30% left and 10 - 20% protected		
> 30% left and > 20% protected	2.92	12.4
Total	23.57 ha	100.0%

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.

Map 2 – Threatened Environment Classifications



4. Socio-economic profile and adjacent land

Forest history Prior to being established in trees, the property was used for pastoral grazing. The steeper ridges now established with trees were overrun with gorse. Gorse was slashed and burned to clear the land for forest establishment.

Current social profile Garland forest contributes positively to the social profile of the area. The land is adjacent to the Maungatautari scenic reserve which is protected by a pest proof fence. Access to this reserve and fence is permitted across the Garland land. The Garlands have contributed time and financial resources to this project.

The range of species selected by W & S Garland and Tintagel Trust will assist in supporting specialty timber processors in the area, in a landscape dominated by Radiata pine.

The forest is regularly used by public groups and the Garlands are active members of the New Zealand Farm Forestry Association with local and national field days held on the property.

The Waikato region, in which Garland Forest falls, is one of the most populated in New Zealand (Table 5).

Table 5. Key statistics as summarised from 2013 Census³ data

Census Category	Waikato	New Zealand
Ethnicity: European	77.4%	74.0%
Ethnicity: Māori	21.9%	14.9%
Formal qualifications	75.3%	79.1%
Unemployment	7.5%	7.1%
Dominant occupation	Managers	Professionals
Median income	\$27,900	\$28,500
Family with children	39.3%	42.1%
Internet access	72.5%	76.8%
Home ownership	62.7%	64.8%

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³ http://archive.stats.govt.nz/Census/2013-census/profile-and-summary-reports/quickstats-about-a-place.aspx?request_value=13631&tabname=

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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 Garland Forest is located appears to be one of the most wealthy and least deprived areas in the region. Age and family statistics for the Waikato region are very similar to the national averages.

Associations with Tangata Whenua The land of Garland Forest is freehold, however the iwi associated with the southern slopes of Maungatautari is currently Ngāti Koroki.

A full and comprehensive history of the Maungatautari mountain can be found at http://www.maungatrust.org/About_Us.cfm#history

Tenure & resource rights The land tenure is freehold. A search of the Maori Land Online website (<http://www.maorilandonline.govt.nz/gis/map/search.htm>) 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.

Table 6 lists the forest neighbours and their primary activities ([Appendix 1](#)). Some or all of these parties should be consulted when operations are proposed in forest areas adjacent to their boundaries.

Table 6: Forest neighbours

Owner/Occupier	Location	Activities
Burgenridge Ltd (Angela McGee & Jonny Oien)	Rahiri road	Sheep farming
Maungatautari Ecological Island Trust	Maungatautari mountain	Conservation – Community Project
Susan Lord & John Malone	Rahiri road	Pig farming
Waipa District Council	Rahiri road	Scenic Reserve

REGULATORY ENVIRONMENT AND RISK MANAGEMENT

5. The Regulatory Environment

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 Garland 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. Table 7 lists the organisations relevant to Garland Forest.

Table 7: Regional and District Councils under Garland Forest

Regional Councils ⁴	District Councils ⁵
Waikato Regional Council	Waipa 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. The contact details for the relevant councils can be seen in [Appendix 2](#).

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).

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 Garland Forest, Table 8 below indicates the proportion of the forest by the respective ESC classes.

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⁴ Regional Councils responsible for soil conservation and water and air quality issues

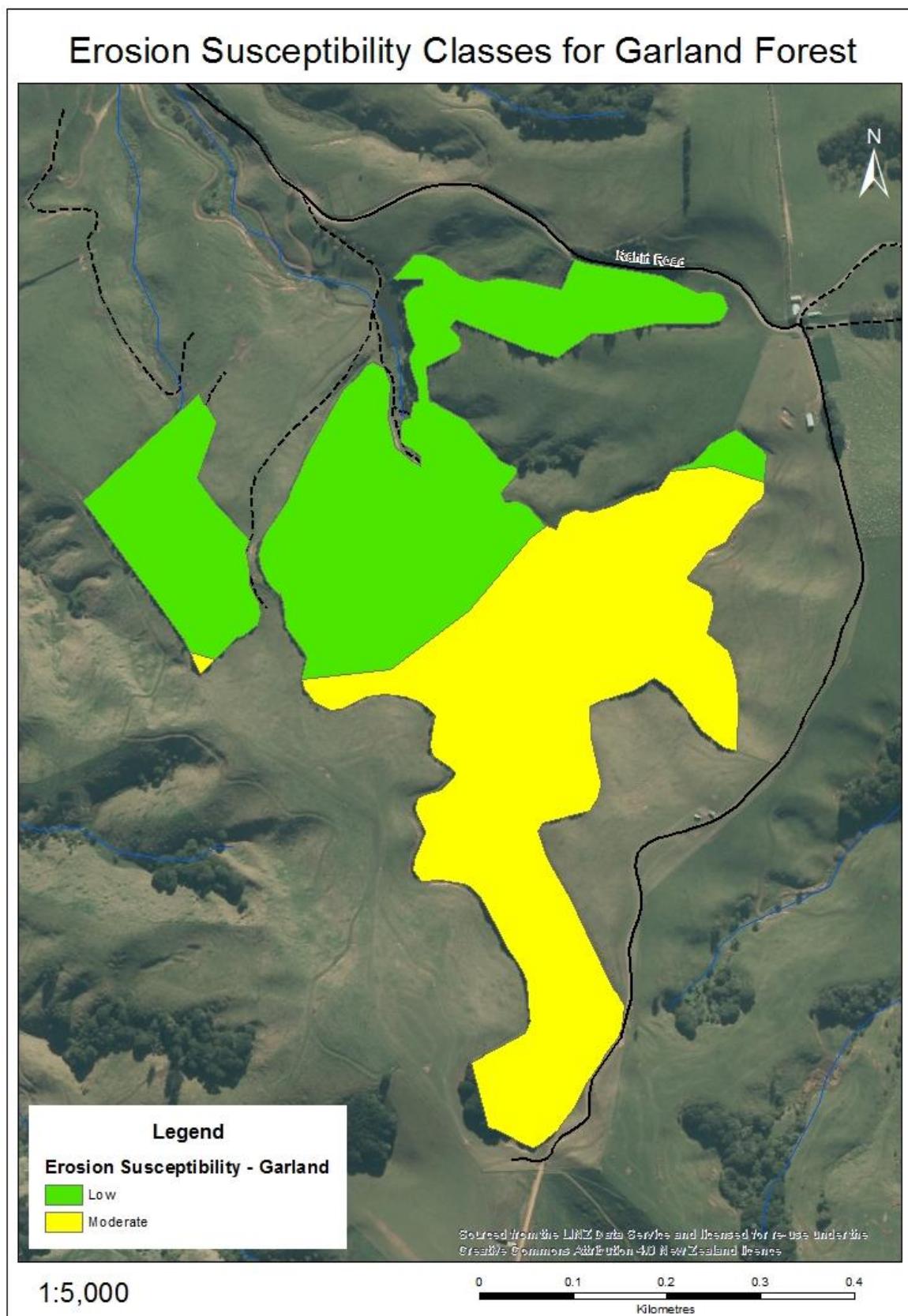
⁵ District Councils responsible for land use and biodiversity issues

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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 8: ESC Classes (Erosion Risk) for Garland Forest

	Low	Moderate	High	Very High	Very High (8e)	Undefined
Area (ha)	11.34	12.24				
Area (%)	48.1%	51.9%				

Map 3 – National Environmental Standard Erosion Susceptibility Classes in Garland 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 New Zealand (HNZ), archaeologists and Iwi or other stakeholders, will be observed and the necessary Archaeological Authorities obtained with HNZ, 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

A land use consent for forestry planting from the Waipa District Council is held for the planting and harvesting of vegetation within the Special Landscape Character Area. Consent conditions include: stock proof fencing, earthworks disturbance re-grassed within twelve months and a harvest plan must be submitted to Waipa District Council 12 months before harvesting commences. The resource consent does not supersede any legislation requirements prior to any harvesting.

A full copy of the consent and conditions is held by PF Olsen.

There are no HNZ authorities that apply to Garland Forest.

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.

Garland Forest was planted on 'Kyoto compliant' land that was vacant as at 31st December 1989. The forest has 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 legalisation

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 3](#).

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 W & S Garland and Tintagel Trust retains credible access to its markets.

W & S Garland and Tintagel Trust 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

Garland Forest currently does not have any non-public tracks through the forest. If any infrastructure is installed at a future date, then the risks will be 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 14](#)).

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 W & S Garland and Tintagel Trust's 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**; and 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.

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.

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Earthworks, planting and harvesting have the potential to destroy or damage any historic places that may be present. Native vegetation has the potential to be killed by harvesting into the reserve or spraying of the reserve. Water quality can be negatively affected by sediment runoff because of harvesting, stream crossing and earthwork operations. In addition, the entry of oil and fuel and fertilisers will reduce the quality of water.

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 9).

Table 9: 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 Garland 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).
- 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.

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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. 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. These chemical pesticides are listed in Table 10.

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.

Table 10: FSC Highly Hazardous chemicals used or potentially used in Garland 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 Garland 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 (Table 11, Figure 2).

Table 11: Garland Forest Area (ha)

Gross area	Net Stocked Area	Reserves
22.8	14.7	8.1

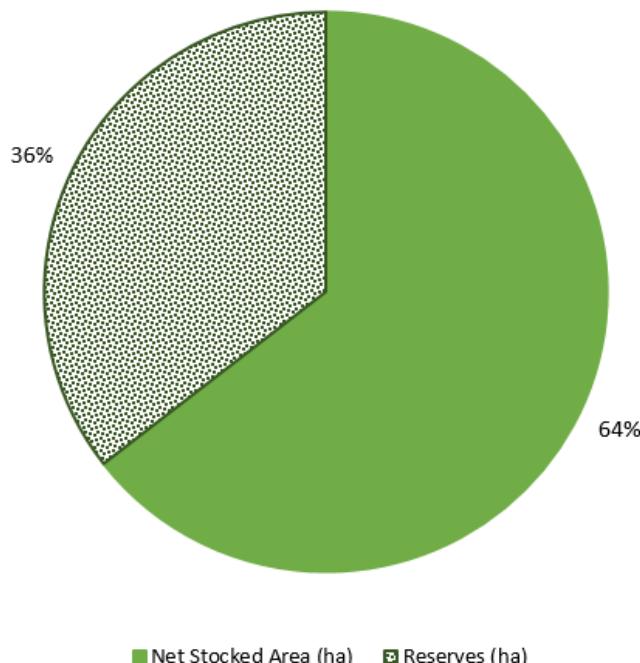


Figure 1: Garland Forest Area (ha)

Current species There are a range of species grown in Garland Forest (Table 12). These species have been chosen to best meet the management objectives set out above, given the characteristics of the forest land.

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

Table 12: Species

Stand	Species	Planted Year	Net Stocked Area (ha)
GARL-001-01	<i>Cupressus lusitanica</i>	2001	0.7
GARL-001-02	<i>Eucalyptus fastigata</i>	2001	0.9
GARL-001-03	<i>Acacia melanoxylon</i>	2001	0.7
GARL-001-04	<i>Juglans nigra</i> (Eastern Black Walnut)	2001	0.1
GARL-001-05	<i>Taxodium distichum</i> (Swamp cypress)	2001	0.1
GARL-001-06	Mixed natives	2001	0.1
GARL-003-01	<i>Cupressus lusitanica</i>	2003	4.8
GARL-003-02	<i>Acacia melanoxylon</i>	2003	3.7
GARL-003-03	<i>Dacrydium cupressum</i> (Rimu)	2003	0.5
GARL-003-04	<i>Agathis australis</i> (Kauri)	2003	0.5
GARL-003-05	<i>Juglans nigra</i> (Eastern Black Walnut)	2003	0.4
GARL-003-06	<i>Cupressocyparis ovensii</i> (Ovens Cypress)	2003	0.4
GARL-003-07	<i>Podocarpus totara</i> (Totara)	2003	1.0
GARL-003-08	Mixed natives	2003	0.6
GARL-003-09	<i>Dacrycarpus dacrydoides</i> (Kahikatea)	2003	0.2
GARL-SECF-01	Reserve	-	6.9
GARL-SECF-02	Reserve	-	1.2
Net Stocked Area (ha)			14.7
Area Awaiting Restocking (ha)			0.0
Reserve Area (ha)			8.1
Gross area (ha)			22.8

Species mix

The species mix of Garland Forest is Figure 3 below.

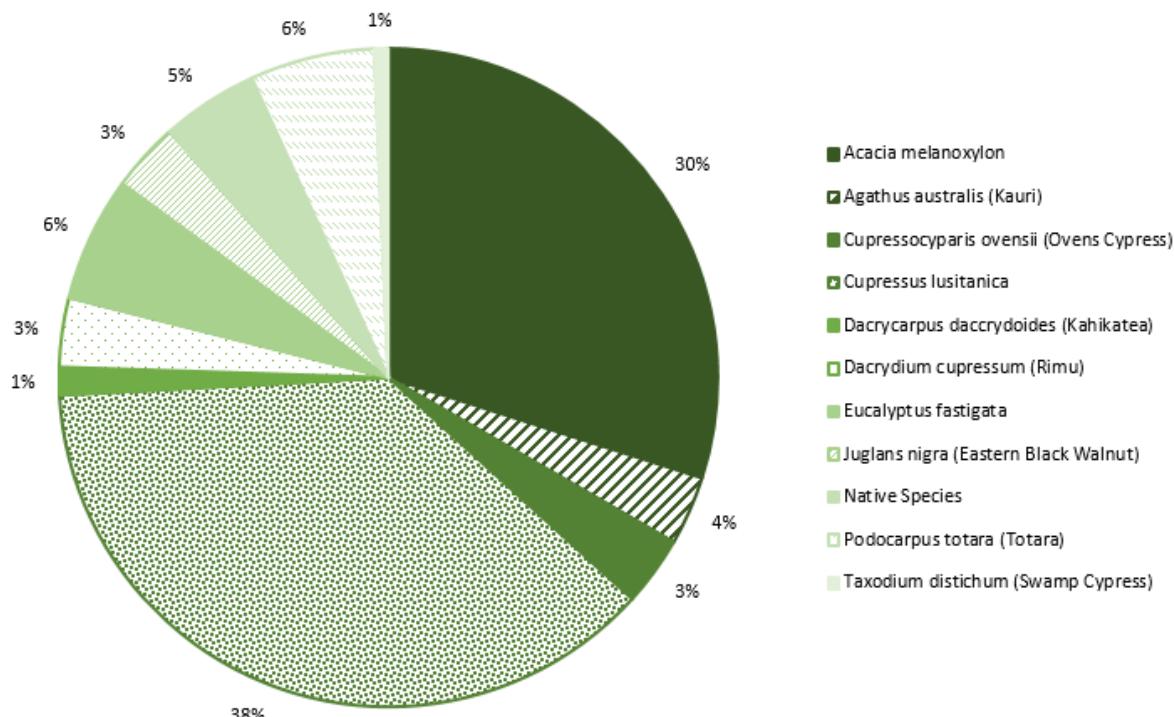


Figure 3: Species composition by area for Garland Forest

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 Garland Forest is between 35 – 38 m, while the 300 index is 28 – 34 m³ / ha / year.

For *E. fastigata* the measure of mean annual increment under a sawlog regime is between 15 and 20m³/ha/yr.

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

Current crop status Measurement data from the most recent inventories is summarised to give the current status of the crop (Table 13).

Table 13: Current crop status

Stand	Year Planted	NSA (ha)	Tot. Stocking (sph)	MTH (m)	Mean DBH (cm)
GARL-01-01	2001	0.6	417	15.0	27.4
GARL-01-02	2001	0.9	308	12.0	16.0
GARL-01-03	2001	0.7	383	15.1	20.8
GARL-03-01	2003	4.8	778	15.1	20.9
GARL-03-02	2003	3.7	589	14.3	19.9
GARL-03-06	2003	0.4	817	15.7	23.6
GARL-03-07	2003	1.0	1,000	5.6	12.2

9. Commercial Crop Establishment and Silvicultural Operations

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 W & S Garland and Tintagel Trust's. 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

Garland Forest's 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' ([Appendix 4](#)).

Crop species

Garland Forest consists of two main crop species; *A. melanoxylon* (total of 4.4 ha) and *C. lusitanica* (total of 5.5ha).

A. melanoxylon when intensively managed will produce high value, quality pruned butt logs. These logs have a number of end uses, but are most likely to be used as decorative veneer or as the basis of high quality, high value furniture or knot free decorative timber.

C. lusitanica and *C. ovensii* when intensively managed produce a number of different log types suitable for various processing options. High value pruned butt logs will be used for knot free decorative timber. Unpruned logs can be used for structural timber. *C. lusitanica* has the added advantage that it can be used in ground contact situations without needing to be treated.

J. nigra is one of the world's premier wood species. It has high value end use applications for appearance grade timber, rifle stocks, furniture and turnery.

A. australis and *D. cupressinum* are iconic native timbers that have high value end use applications for appearance grade timber, furniture and turning.

The other alternative species at Garland forest will have the likely end use as a high value decorative timber for veneer, furniture, or flooring.

These species were chosen because they were the most suitable for achieving W & S Garland and Tintagel Trust's objectives.

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**

It is possible that some harvesting will take place during the period of this management plan. If so, then establishment of native species at Garland Forest will take place following harvesting.

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

Tending

The tending regime executed at Garland Forest is an intensive pruned regime, consisting of frequent short lifts to ensure a small diameter over stubs is achieved, and therefore a small defect core.

A. melanoxylon stands require regular form pruning of branches greater than 30mm to ensure a single dominant leader. *C. lusitanica* stands have received sail pruning to minimise windthrow risk in these stands.

There are several further tending operations required for most stands-further pruning and thinning to waste when pruning has been completed. Table 14 presents target pruned heights and stocking for each of the main species grown at Garland forest. The regimes may be updated as new knowledge and research becomes available.

Table 14: Species silviculture

Species	Target Pruned Height (m)	Target Final Crop Stocking (sph)
<i>A. melanoxylon</i>	4.5	200-300
<i>C. lusitanica</i>	5.5	350-450
<i>E. fastigata</i>	6.5	250-300
<i>C. ovensii</i>	5.5	350-450

Native stands will be tended. Both thinning and pruning operations will take place during the period of this management plan.

Tree nutrition

The soils in Garland 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:

- **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.

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 As a plantation with a non-normalised age-class structure, the harvesting strategy employed at Garland 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.

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.

Table 15 indicates approximate optimum harvest ages for the species of Garland Forest. There is no harvesting planned for the period of this management plan.

Table 15: Approximate harvesting ages.

Species	Clearfell Age (yrs)
<i>A. melanoxylon</i>	35-40
<i>C. lusitanica</i>	30-35
<i>E. fastigata</i>	30-40
<i>C. ovensis</i>	30-35
<i>J. nigra</i>	50-60
Kauri, Totara	80-120
Rimu, Kahikatea	120+

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.

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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. Design specifications for these are outlined in the 'PF Olsen Standard Specifications for Road and Landing Construction'.

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

Land hand back

The process for land handback is unique to each individual forest agreement. They can involve quite a few steps and vary from block to block.

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 NorthTec, 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.

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All harvesting, engineering and silviculture contractors are subject to quarterly contractor 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 Garland 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.

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

Garland Forest contains 8.1 ha of remnant native forest reserves (Table 16). The largest of 6.9 ha (SECF-01) is protected by a QEII covenant and the smaller area of 1.2 ha is protected under the NZ Forest Accord. Both areas are also identified as Significant Natural Areas (SNA's) by the Waipa District Council (SNA 866).

While the forest types are in a national sense neither rare nor threatened, they do represent a local presence beyond a nationally important reserve of tall forest cover that has been almost totally removed from the local landscape.

To this end the stands provide a locally important habitat extension and are being protected accordingly with additional buffering from planted indigenous and exotic stands.

SECF-01 also provides riparian protection to a local headwaters stream – something of a rarity in the region.

The protected ecosystems are shown on the [Forest Stands Map](#).

Table 16: Protected ecosystems and reserve areas

Stand	Area (ha)	Reserve Type	Protective Status	Protective Function	Forest Type Description	LENZ Remaining (%)	LENZ Protected (%)	Protection Category
GARL-SECF-01	6.9	Secondary Forest	QE II Covenant	Terrestrial Ecosystem	Tawa / Podocarp / Hardwood	39.7	46.4	Limited
GARL-SECF-02	1.2		SNA			25.9	59.3	Passive

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All 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.

Actions are prioritised according to the 'Protection Category' status allocated to the areas from the assessments and classifications undertaken (Table 17). 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.

Table 17: Protected Ecosystems Management Categories

Protection Category	Primary Management Objective	Activity Level	Monitoring
Passive	<ul style="list-style-type: none"> • Minimise non-essential damage • maintain area 	<ul style="list-style-type: none"> • Fire protection 	<ul style="list-style-type: none"> • Area- with adjacent stand assessments
	<ul style="list-style-type: none"> • Observe RPMS obligations 	<ul style="list-style-type: none"> • 3rd party arrangements re: pests • Apply RPMS 	<ul style="list-style-type: none"> • Pests- to meet RPMS • General forest health survey
Limited	<ul style="list-style-type: none"> • Protect from non-essential damage • Maintain area • Maintain function (where practical) 	<ul style="list-style-type: none"> • Fire protection 	<ul style="list-style-type: none"> • Sample forest condition monitoring
	<ul style="list-style-type: none"> • Observe RPMS obligations 	<ul style="list-style-type: none"> • 3rd party arrangements re: pests, • Apply RPMS • Associated maintenance pest control 	<ul style="list-style-type: none"> • Low level pest monitoring where relevant • Sample related fauna if relevant
Full	<ul style="list-style-type: none"> • Protect from all controllable damage • Maintain area and function 	<ul style="list-style-type: none"> • Fire protection 	<ul style="list-style-type: none"> • Area monitoring
	<ul style="list-style-type: none"> • Improve quality 	<ul style="list-style-type: none"> • Specific management 	<ul style="list-style-type: none"> • Forest condition monitoring
	<ul style="list-style-type: none"> • Observe RPMS obligations 	<ul style="list-style-type: none"> • Targeted pest control • 3rd party arrangements re: pests. 	<ul style="list-style-type: none"> • Pest monitoring where relevant • Related fauna monitoring if relevant
Special	<ul style="list-style-type: none"> • Restoration if practical 	As above, plus: <ul style="list-style-type: none"> • Fencing • Covenants • Co-management agreements • Funding where practical 	As above, plus <ul style="list-style-type: none"> • As defined in any restoration agreement

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Table 18 details the areas in each protection category within Garland Forest, categorised by protective function.

Table 8: Protected ecosystems management categories by function and area

Protective Function	Protective Category	
	Passive	Limited
Erosion Control		
Landscape / Amenity		
Non-specific		
Rare Species		
Riparian Ecosystem		
Terrestrial Ecosystem	6.9	1.2
Wetland Ecosystem		
Total Area (ha)	6.9	1.2

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.

The stream categories within the Garland Forest are summarised in Table 19. The total length of waterways within the forest is 0.78 kilometres.

Table 19: Length of stream by REC class

REC Class	Length (m)	Length (km)
Very small, low, wet, soft	779.4	0.78

Rare and threatened species

The proximity of the protected Garland Forest stands to the nationally important Maungatautari Ecological Island reserve means that it appears to be providing transitory habitat services to important fauna such as kereru and long tailed bat that reside there. In addition, the exclusion of stock encourages king fern development. Kereru, tui, fantail, bellbirds, tomtits, karearea, long-tailed bats, giant kokapu, eels, koura, glow worms, and Swamp Maire have been sighted in Garland Forest.

Records of sightings and locations were originally collected and reported in FIPS, but an app call iNaturalist is now used. Over time these databases have enabled the build-up of a spatial distribution picture of species within different geographical locations. Recorded sightings within the plantations and indigenous reserves are summarised in Table 20. These records are made available to conservation authorities.

A listing of key species of interest is held by all contractors and staff, along with the login details for [iNaturalist](#).

Table 20: Rare and threatened species reported in Garland Forest

NZ Threat Classification System Category	Species	No Sightings
Nationally Critical	Swamp Maire	1
Nationally Vulnerable	King Fern	2
Recovering	Karearea / NZ Falcon	1
Not Threatened	Kereru / NZ Wood Pigeon	1
	Piwakawaka / Fantail	1
	Tomtit	1
	Tui	2
Total		9

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 iNaturalist – Biodiversity in Plantations Project⁶,
- 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.

⁶ <https://www.inaturalist.org/projects/biodiversity-in-plantations>

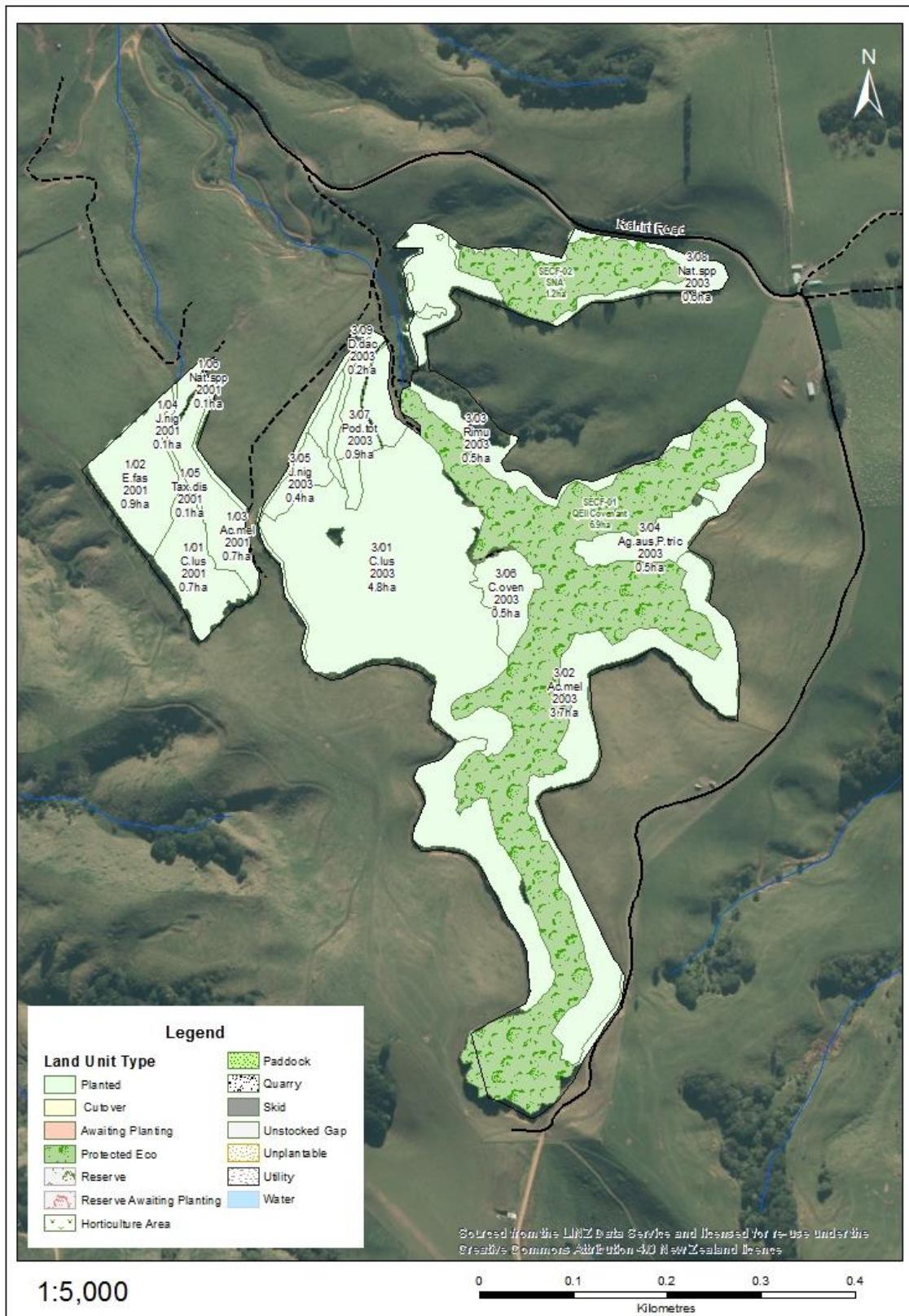
CITES species

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 on the [Department of Conservation's website](#).

Map 4 - Forest Stands Map



13. Property Management and Protection

Statutory pest obligations Pest management within Garland 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, objectives and land owner obligations are summarised the Regional Pest Management Plan. 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 Garland Forest.

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

Pest control The main animal pest with potential to cause problems in Garland 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.

Pest control in the past has been completed annually on behalf of the Animal Health Board as the area was a vector risk area for tuberculosis. Until recently, the property has also benefited from possum control being carried out by the Waikato Regional Council, due to its proximity to Maungatautari Ecological Island.

Currently, the Garlands carry out possum and rat control personally, using a network of baits stations. The Garlands intend to control wild cats themselves. They also intend to engage a contractor themselves to control rats during the bird nesting season.

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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 through silviculture by timely thinning and pruning operations, which increases air movement and lowers humidity levels.

As there is no radiata pine in Garland Forest, there is no *Dothistroma* control required.

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 Garland Forest the Rural Fire Authority (RFA) is Waipa 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.

Public liability insurance

It is recommended that W & S Garland and Tintagel Trust 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 Garland Forest onto adjoining land, W & S Garland and Tintagel Trust would be liable for the firefighting costs and any damage to property.

There is no public liability insurance currently held by W & S Garland and Tintagel Trust for Garland Forest.

Fire insurance

Garland Forest is small and its location removed from uncontrolled public access and risky boundaries. As such the fire risk is considered relatively low. However, 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 Garland Forest is not held by W & S Garland and Tintagel Trust.

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

Garland Forest receives some recreational demand from the wider public. In the past horse trekking, hunting, possum trapping and infrastructure access were all activities authorised and recorded. The majority of usage was accounted for by possum trapping and trekking.

The forest will continue to be open for legitimate use subject to permission from the Garlands. Usage is notified to PF Olsen once a year.

Non-timber forest products

There are no non-timber products for certified, commercial production currently being produced or developed in Garland Forest.

Other special values

The following special values have also been identified in Garland Forest:

- Research - AgResearch have an ongoing research project based at Garland Forest relating to water quality.
 - Aesthetic value - The fence lines of the forest have been specially contoured so the forest blends in with the special landscape character of the region, as required by the district plan.
-

Public access roads

There are no public tracks and trials near or within the forest as the forest is located on privately owned farm land. 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.

Continued on next page...

...continued

These public road locations are publicly viewable in the Walking Access Commission website⁷. Any users are expected to abide by the Outdoor access code⁸ published by the Walking Access Commission.

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 W & S Garland and Tintagel 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. Table 21 details the full monitoring framework that is implemented and applicable to Garland Forest.

Table 21: 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

⁷ https://www.wams.org.nz/wams_desktop/index.html

⁸ <http://www.walkingaccess.govt.nz/walkways-and-access/outdoor-access-code>

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 ⁹	- 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 - Form	- Monthly - Annual
Pests	- RTC / RTI - Kill Returns - Other	- Contractors - Supervisors - Permittees	- 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.

⁹ 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 W & S Garland and Tintagel Trust 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.

16. Future Planning

Introduction This plan pertains to the management of Garland 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 June 2024.

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 W & S Garland and Tintagel Trust at the beginning of each financial year.

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.

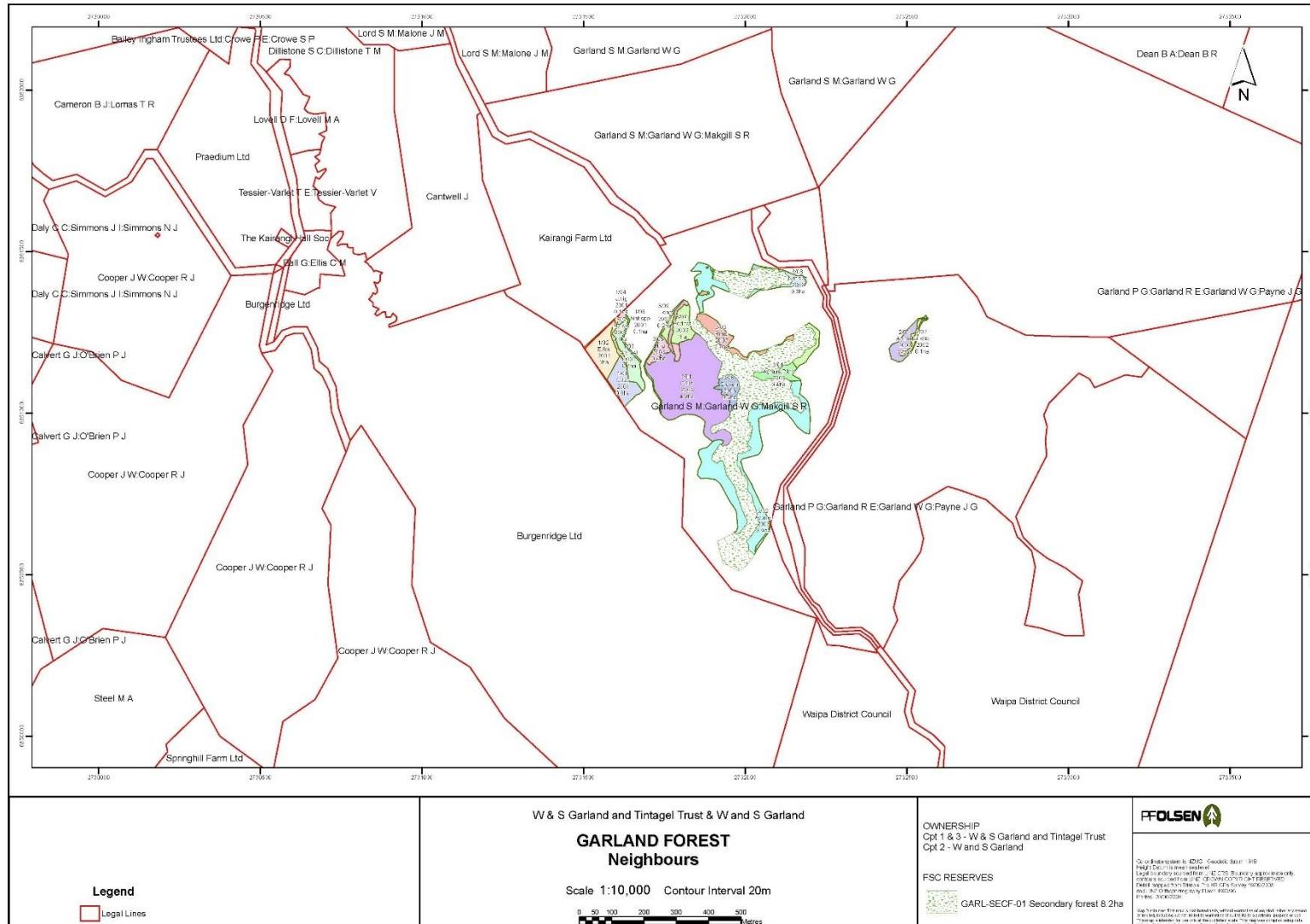
17. Register of Plan Change and Review

Introduction

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

Date	Section / Page	Change

Appendix 1 – Neighbour Location Map



Appendix 2 – Contact details for Regional and District Councils with jurisdiction over Garland Forest

Entity	Phone	Email	Website
Waikato Regional Council	0800 800 401	Web Form	https://www.waikatoregion.govt.nz/
Waipa District Council	0800 924 723	info@waipadc.govt.nz	https://www.waipadc.govt.nz/
Waikato-Tainui	0800 824 684	reception@tainui.co.nz	https://www.waikatotainui.com/

Appendix 3 - Other Relevant Legislation

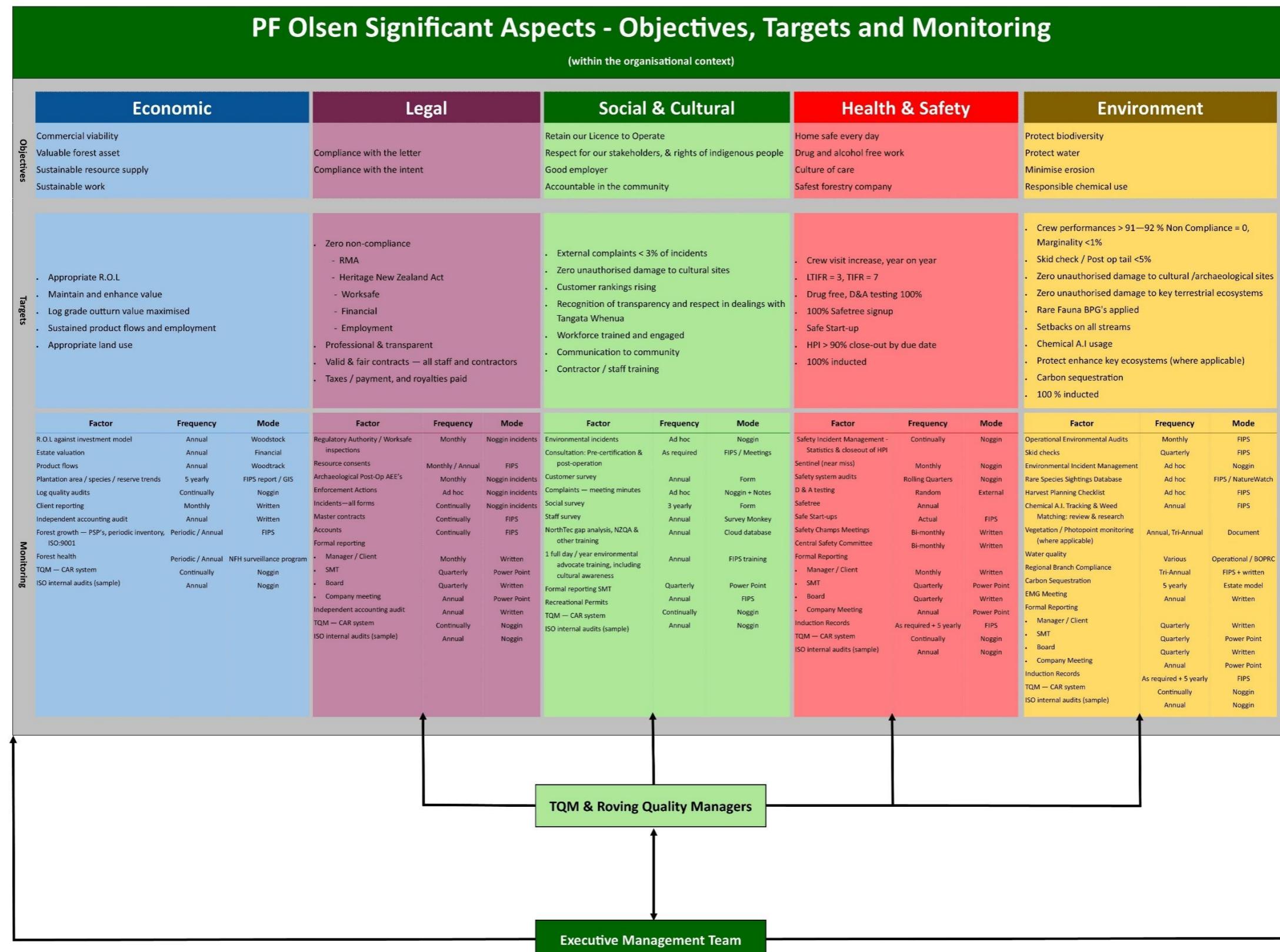
Commercially Relevant Statutes & Regulations

- 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
- 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:

- 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
- Forest Practice Guides

Appendix 4 – PF Olsen Significant Aspects: Objectives, Targets and Monitoring



Appendix 5 – Waikato Regional Pest Management

Plant species to be managed under the Waikato Regional Pest Management Plan

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
Kudza 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
Sengeal 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

Pest Plant	Production Threat	Environmental Threat	Public Threat	Reference in the Plan
Climbing spindleberry	✓	✓		5.17
Contorta pine	✓	✓		5.18
Darwin's barberry	✓	✓		5.19
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: Gray and Crack		✓		5.67

Animal species to be managed under the Waikato Regional Pest Management 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.