

SCOTT FOREST

Owned by
Scott Afforestation Ltd

Forest Management Plan



For the period 2021 / 2026



Prepared by Sally Moore
PO Box 1127 | Rotorua 3040 | New Zealand
P: 64 7 921 1010 | F: 64 7 921 1020
E: info@pfolsen.com | www.pfolsen.com

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1. Introduction

Foundation Principle

Scott Afforestation Ltd is committed to adopt the Forest Stewardship Council (FSC) Principles and to meet their Criteria pertaining to forest management.

Scott Afforestation Ltd seeks FSC certification to obtain the best access opportunities to the local processing market which is capable of and seeking to source all its input requirements as FSC certified feedstock.

The FSC Principles and Criteria describe the essential elements or rules of environmentally appropriate, socially beneficial, and economically viable forest management.

Scott Afforestation Ltd is committed to the PF Olsen FSC Group Scheme that is implemented through the Group Scheme Member processes and associated documents, as this provides the most efficient mechanism to obtain certification.

About this Plan

This Management Plan provides a summary of Scott forest and the intended management and will be current for the next 5 years. The next major review date for this plan is **April 2026**. Minor annual revisions made to this plan in the interim are recorded in Section 18: [Register of Plan Change and Review](#). This plan contains:

- A description of the land and its landscape context.
 - A description of the external operating environment.
 - Management objectives.
 - A description of the commercial plantation estate and its non-commercial elements and obligations.
 - Forest management, harvesting, protection and land management intentions.
 - Provisions for monitoring and protection and public usage.
 - Maps showing plantation area, legal boundaries and protected areas.
-

2. The Forest Land

Overview

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

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

Location and access

Scott forest is located off Cockburn Road, which in turn is located approximately 5km off State Highway 1 between Milton and Balclutha. From Cockburn Road, a public road, access is then via a private road owned by City Forests Ltd.

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
Milburn	17	Domestic
Port Chalmers	80	Export

Topography

The topography of the forestland is rolling to moderate. Harvesting is likely to be ground based, or a mix of hauler/ground based as slope allows for either.

Altitude is 200 metres above sea-level.

Soils

Soils are predominantly typic argillic pallic soils, originating from colluvium on highly weathered rock. These soils are typically dry in summer and wet in winter, moderately well drained, silty and stoneless. The soil structure is vulnerable to compaction under wet conditions.

Climate

The Otago region experiences a continental type climate, but proximity of the forest to the coast tempers the seasonal variation in temperature and rainfall somewhat. The forest area has warm summers and cool winters. The average rainfall is about 700mm and the mean annual daytime temperature is around 12 degrees Celsius.

Legal ownership

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

Lots 1 - 5 DP 23310, Otago Survey Land District. CT 15d/1028

The forest tenure is via a forestry right agreement with the underlying landowners. The agreement lapses in July 2029 and contains no conditions that preclude FSC certification.

Historic and archaeological sites

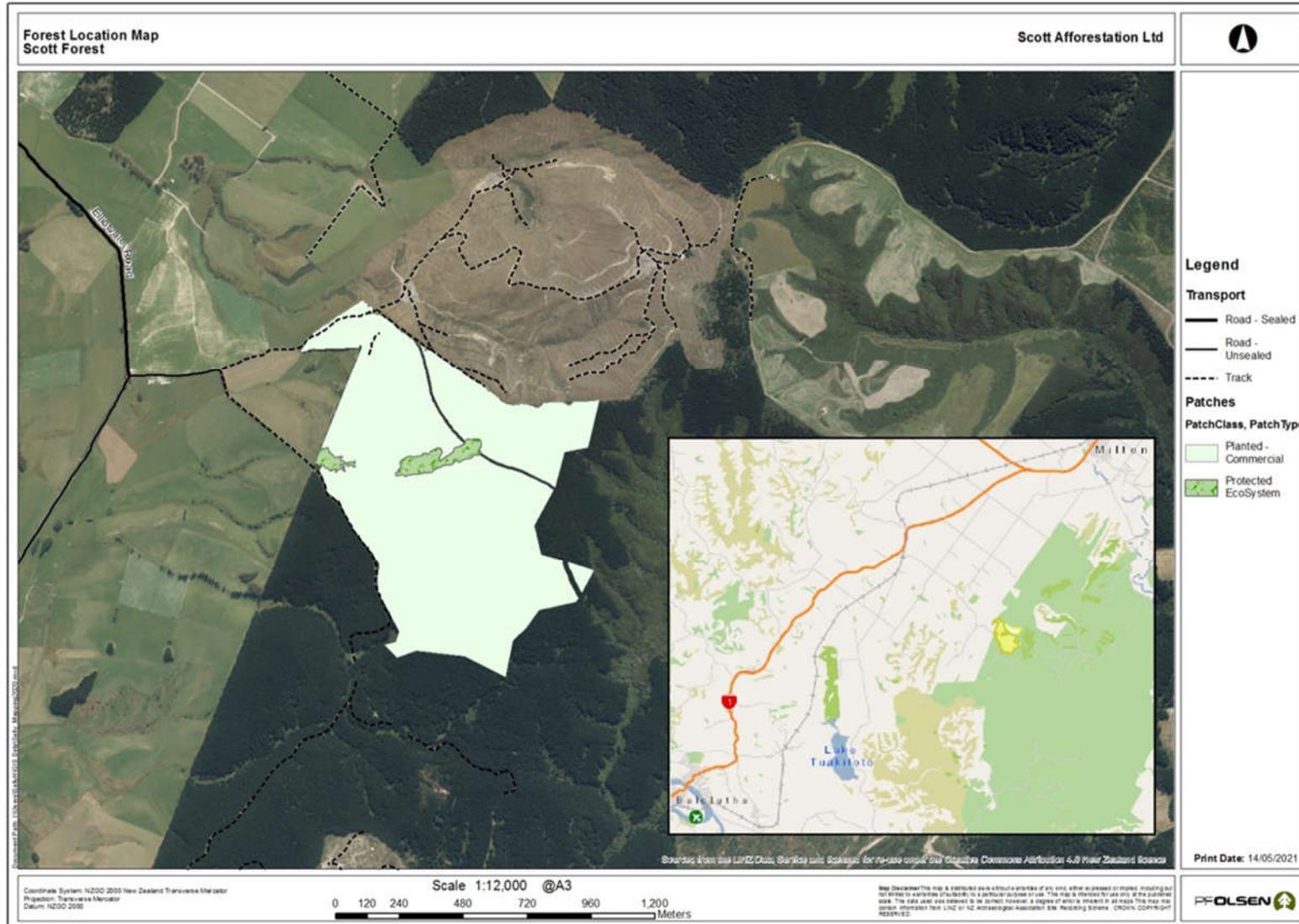
Records of known archaeological and historical places are maintained in the New Zealand Archaeological Association (NZAA) Site Recording Scheme published in the 'Archsite' database¹. PF Olsen retains a license to this dataset and all recorded site information is reproduced in mapping for forestry operations. 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.

Records from the 'Archsite' web resource has revealed there are no known historic sites in Scott forest, or within 1km of the forest boundary.

¹ <https://archsite.eaglegis.co.nz/NZAAPublic>

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.

3. Map 1 – Scott Forest Location Map



4. The Broader Landscape

Ecological Landscape

Scott forest is located within the Tokomairiro Ecological District (ED), in the Otago Coast Ecological Region. The District has a diverse topography, with alluvial plains, wetlands and low coastal hills rising to higher elevation mountains in the west. Much of the district is farmed, with dairy, stud farms and cropping on the plains, and cattle and plantation forestry extensive on the coastal hills.

Indigenous forest remnants of podocarp/hardwood forests, silver beech, kanuka stands are present around the coastal and lower altitude areas. Highly modified swamps on the plains. Flax-crack willow swamps around Lake Waipori and Waihola are critical habitat for a range of birds, including spotless crane, banded rail and fernbird. Remnant snow tussock, low alpine cushion bog and scrub in the western high country, and mostly induced silver tussock remnants are present in the lower hills.

Ecological District

Under the FSC National Standard for Plantation Forest Management in New Zealand revised in 2013, an area of reserves equivalent to 10% of the productive area should be reserved within each ED, inclusive of reservation of 5% of the productive area within large forests (> 1,000 ha).

Table 2 illustrates the percentage of area protected within Scott forest, compared to the total forest area. As the area is less than 10% within the Tokomairiro ED as there are currently no other forests within the PF Olsen Group Scheme in this ED, there is a 5.7 hectare reserve shortfall. This will be addressed by making an annual donation to Te Nohoaka o Tukiauau/Sinclair Wetlands Trust³, coordinating the restoration of an expansive wetland between Lakes Waihola and Waipori, also within the Tokomairiro ED.

Table 2: Reserve areas in Scott forest by Ecological District

Ecological District	Total Forest Area (ha)	Reserve Area (ha)	Reserve %	Meets FSC?	Reserve Shortfall (ha)
Tokomairiro	82.0	2.5	3%	NO	5.7

³ <https://www.tenohoaka.org.nz/>

**Threatened
Environments
Classification**

The Landcare ‘Threatened Environments Classification’ (TEC) is a spatial tool providing information on the quantity and status of current indigenous vegetation cover relative to its pre-human extent. It is illustrative of the remaining extent, its legal protection status, and spatial distribution in New Zealand’s landscape. The TEC is a combination of three national databases:

1. Land Environments New Zealand (LENZ)
2. Landcover Database
3. 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 small reserve areas in Scott forest fall in the 10 – 20% indigenous cover left category.

Table 3: Protective status of the ecological landscape

Threatened Environment Classification	Area (ha)
<10% remaining	
10 – 20% remaining	2.5
20 – 30% remaining	
>30% remaining & <10% protected	
>30% remaining & 10 – 20% protected	
>30% remaining & >20% protected	
Total Area (ha)	2.5

5. Socio-economic profile and adjacent land

Current social profile

The area surrounding Scott forest is a mix of pastoral farming and plantation forestry, with small rural towns servicing the predominantly rural communities. Scott forest is a small, incremental contributor to the social profile of the area. The forest is privately owned; contribution to the local economy by way of added incremental employment and infrastructure is negligible.

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 region. The Clutha district, where Scott forest is located, appears to be one of the lesser deprived areas in the region. A snapshot of the Otago region’s population using data from the 2018 census⁴ is shown below:

Table 4: Census data for the Otago region, 2018

Population	225,186 people	
	Otago region	NZ total
Maori	8.7%	16.5%
Fulltime employment	49.2%	50.0%
Unemployment	3.2%	4.0%
Median income	\$30k	\$51k
Home ownership	52.2%	51.3%

Associations with Tangata Whenua

Ngāi Tahu exercises kaitiakitanga across much of Te Waipounamu (the South Island) for the purposes of the Resource Management Act 1991. There are 18 regional Papatipu Rūnanga that each have a representative on Te Rūnanga o Ngāi Tahu governing council, which oversees the tribe’s activities. The nearest Papatipu Rūnanga to Scott forest is Te Rūnanga o Ōtākou, based in Dunedin.

Tenure & resource rights

There are no known Iwi interests in Scott forest and, being a small forest, none anticipated.

⁴ <https://www.stats.govt.nz/tools/2018-census-place-summaries/otago-region>

Neighbours

Neighbours to the forest estate boundaries may 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 and biosecurity hazards. As such, neighbours are considered stakeholders with a potential interest in the management of the forests.

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. A location map is included in Appendix 1.

Table 5: Forest neighbours

Owner/Occupier	Contact #	Location (See Location Map)	Activities	Other Notes
[REDACTED]	[REDACTED]	[REDACTED]	Plantation forestry	Also FSC certified
[REDACTED]	[REDACTED]	[REDACTED]	Dairy farm	
[REDACTED]	[REDACTED]	[REDACTED]	Sheep & beef farm	

6. The Regulatory Environment & Risk

Regulatory considerations

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

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

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
 - 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 1991

Within the framework of the RMA, there are several functional instruments that are designed to manage the effects of all undertakings in or on land and water to ensure sustainable outcomes. Some of these are briefly described over the next page.

**National
Environmental
Standard for
Plantation
Forestry (NES-PF)**

Coming into force in 1st May 2018, the NES-PF⁵ is a suite of regulations designed specifically to manage most activities related to commercial plantation forestry. The regulations establish a nationally uniform rules hierarchy intended to cover operational phases from afforestation and new planting through to harvesting and road construction. The hierarchy takes a risk-based approach to define situations in which activities may be undertaken as ‘permitted activities’ and those where Resource Consents will be required. The NES-PF gives direction to Councils and forest operators⁶ and is intended to encourage a uniform and standardised approach to a series of activities that are conducted in similar fashion throughout the country.

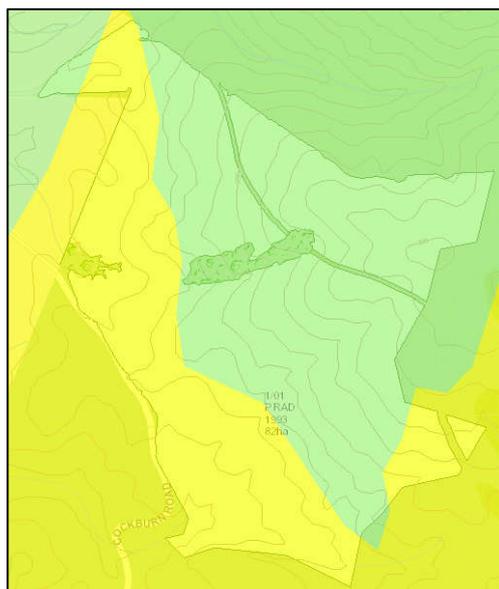
The underpinning the structure of the NES-PF is a rule hierarchy linked to the erosion susceptibility of the lands upon which forestry operations are to be conducted. The stringency of the rules hierarchy, i.e. whether consents are needed and the degree to which Councils can apply discretion to the conditions 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 broad terms, harvesting, roading (earthworks) and new afforestation operations will need consents in the red zones (very high) while consents will also be needed for earthworks in orange (high) zones. In the green and yellow zones most operations will be permitted subject to conditions.

Scott forest falls within the low and moderate ESC categories, as shown below.

Table 6: Productive plantation area (ha) within each ESC Classes (Erosion Risk)

Forest	Low	Moderate
Scott	48.2	33.8



⁵ <https://www.mpi.govt.nz/growing-and-harvesting/forestry/national-environmental-standards-for-plantation-forestry/>
⁶ <https://docs.nzfoa.org.nz/forest-practice-guides/amalgamated-guides/>

**Council RMA
Plans**

Implicit in the framework of the RMA is the role of Council’s District and Regional Plans which apply to landuse, water management, biodiversity and air quality, either as separate planning documents or as integrated plans.

As they relate to forestry, local planning rules must align and or give effect to National Environmental Standards such as the NES-PF. Under the NES-PF, local Councils can exercise greater stringency than the NES-PF through their plans to give effect to an NPS, or in situations related to outstanding natural landscapes and other specific situations. The local planning rules must be followed in these situations.

Scott forest falls under the jurisdiction of the Clutha District Council, and the Otago Regional Council. Under the Clutha District Plan, Scott forest falls within the Rural zone, and the Lake Tuakitoto Catchment. The Lake Tuakitoto catchment is subject to a Local Water Conservation Notice and the Lake Tuakitoto Management Strategy, which have specific rules about water takes in the catchment.

Otago Regional Council have identified more stringent rules in their Water Plan in relation to discharges of sediment and bed disturbance, to protect threatened indigenous fish, many of which are found only in Otago. Appendix 2 clarifies where stricter rules in the Otago Regional Water Plan prevail over rules in the NES-PF.

**National Policy
Statement and
NES - Freshwater**

A National Policy Statement on Freshwater and an associated National Environmental Standard- Freshwater (NES-FW) have been issued by the Ministry for the Environment, upgrading an existing NPS.

In respect of the requirements for forestry activities covered under the NES-PF, the regulations in that instrument take precedence over the NES-FW. That means that for such matters as setbacks, discharges and Council discretionary considerations under the NES-PF, the NES-PF will prevail.

However, for activities outside those covered by the NES-PF, the NES-FW will prevail. Also, specific stringency can be applied to give effect to targets under an NPS if greater stringency than that already being applied is required.

**National Policy
Statement -
Biodiversity**

At this time of writing, this proposed legislation is about to enter a phase of public consultation. The final form and impact upon forestry operations is unknown.

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.

If a site is found or suspected on any block, the protocols specified in PF Olsen’s Environmental Management Processes (EMP), and any others specifically developed in conjunction with Heritage New Zealand (HNZ) and Iwi or other stakeholders, must be observed. Where circumstances require, an ‘Authority to Modify or Destroy’ will be sought from HNZ with the assistance of an archaeologist. Such Authorities are similar in function to a resource consent and, if granted, come with conditions that must be met. The process to apply for Authorities is documented in PF Olsen’s EMPs. Consents from the District Council may also be required under the heritage rules of the District Plan.

Management responses to the potential presence of archaeological and cultural evidence may include, but are not limited to:

- Map and ground surveys to identify, mark and protect known heritage sites.
- Iwi consultation and surveys for unknown sites.
- Archaeological Authorities to modify sites if required.
- Accidental Discovery Protocols to stop work and engage experts if sites are discovered during operations.

Consents & authorities held

There are no resource consents or Archaeological Authorities relevant to Scott forest.

Emissions Trading Scheme

Forests in New Zealand are governed by legislation, the Climate Change Response Act 2002 and the associated Emission Trading Scheme (ETS), which is related to New Zealand’s Kyoto commitments to reduce the nation’s carbon emissions and contribution to associated climate change.

Scott forest is post 1989 land, so the landowners would have to meet a carbon liability if there was a change in landuse from forestry.

Other relevant legislation

There are numerous other statutes and regulations that impact on forest operations. Forest owners can be held liable for breaches of these Acts and may be held responsible for damage to third party property. Management processes seek to manage and minimise these risks. Other relevant legislation is listed in Appendix 3.

7. Commercial Risk Management

Market access Scott Afforestation Ltd is seeking to achieve and maintain Forest Stewardship Council (FSC) certification for Scott forest to allow access to local domestic markets that either require, or award a premium for, FSC certified wood. 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 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 There are no known infrastructure risks associated with Scott forest.

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 12).

Fire Fire is always a risk to forests. As the region can be prone to drought periods over the summer the risk can become elevated, and an increased frequency of these events is a possibility under climate change scenarios.

Fire risk is managed through:

- Protocols to restrict work hours or to stop work in periods of extreme fire risk.
 - Annual auditing and regular monitoring of contractors' fire prevention and first response equipment prior to fire season each year.
 - Maintenance of trained personnel and fire suppression equipment.
 - Protocols for pooling of resources as a first response to fires under the leadership of the relevant Fire and Emergency New Zealand organisation.
 - Management of public and recreational use when risks become high based on advice received from Fire and Emergency NZ (FENZ).
-

8. 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 forest owner, through PF Olsen's own environmental policies, thence through defined and documented processes constituting an Environmental Management Process (EMP's), supported by monitoring and reporting. PF Olsen's policies and Scott Afforestation Ltd's business objectives are considered to be well in alignment.

Environmental policy

PF Olsen Limited and Scott Afforestation Ltd as an FSC Group Member are 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 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 **New Zealand Forest Accord** the **Principles for Commercial Plantation Forest Management in New Zealand**, and other relevant agreements, conventions and accords.
 - Promotion of the prevention of **waste** and **pollution** / efficient use of **energy**.
 - Due regard for the well-being of the **community**.
-

Objectives, targets and monitoring

In managing a forest estate on behalf of its owner, PF Olsen’s sets objectives, targets and monitoring categorised across five key aspects of the business:

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

A systematic management approach ensures these objectives and targets remain the cornerstone of PF Olsen’s business, backstopped by monitoring processes that form a regular review of practices. These are summarised in Appendices 5 and 6.

EMP framework

The Environmental Management Process (EMP) is an integrated set of cloud based, defined and documented policies, processes and activities that govern the physical implementation of forest management activities. The EMP’s apply a systematic approach certified to ISO:14001 standards to ensure effective mechanisms to manage potential adverse or harmful impacts from operations.

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 New Zealand Forest Owners Association ‘New Zealand Environmental Code of Practice for Plantation Forestry’⁷. This publicly available document sets out guidelines that underpin the requirements for sound and practical environmental management.

Operations will also be following the Forest Practice Guides⁸ published in support of the NES-PF.

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, ‘New Zealand Forest Road Engineering Manual’, published 2020⁹.

⁷ <https://www.nzfoa.org.nz/resources/file-libraries-resources/codes-of-practice/44-environmental-code-of-practice/file>

⁸ <https://docs.nzfoa.org.nz/forest-practice-guides/>

⁹ https://www.nzfoa.org.nz/images/NZ_Road_Engineering_Manual_Web_Feb_2020_compressed.pdf

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

At a high level, ‘risks’ are presented as consuming services summarised for a typical plantation life cycle in Appendix 6. As a broad assessment over Scott forest, the **potential** for adverse impacts across the range of operations and forest sites is indicated in the Environmental Assessment matrix below, which summarises the identified risks across ‘key management aspects’. The level of potential risk has been evaluated in the matrix as high ‘H’, medium ‘M’ or low ‘L’, or not applicable ‘NA’ and is thus indicative of the level of care that might need to be applied to ensure the potential for adverse effects is minimised.

Table 7: 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	M	H		M	H	L	M	M	M	M	M	M
Earthworks	H	H	H		M	M	L	H	L	L	L	L	L-M
Slash Management	H*	H*	H		H	L	L		L	L	H	L	L
Stream Crossings	M	M	M		L		L						M
Mechanical Land Preparation	NA	M	L	NA	L	L	L	H	L	NA	NA	NA	M
Burning	L	M	L	H	L	H	L		H	H	L	H	M
Planting	L	L	L	L	L	L	L	L	L	L	L	L	L
Tending										L	L		L
Fertiliser Application		H		L	H					L	L	L	L
Agrichemical Use	L	H	L	L	H	M	M		L	H	H	H	L-H
Oil & Fuel Management		H	L		H		L			L	L		L
Waste Management		L			L				L	L			L
Forest Protection		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 permitted hazardous materials are:

- Pesticides
 - Herbicides : for commercial and ecological weeds
 - Fungicides : for forest fungal disease control
 - Vertebrate or invertebrate toxins: used for control of pest mammals, e.g. possums, 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.

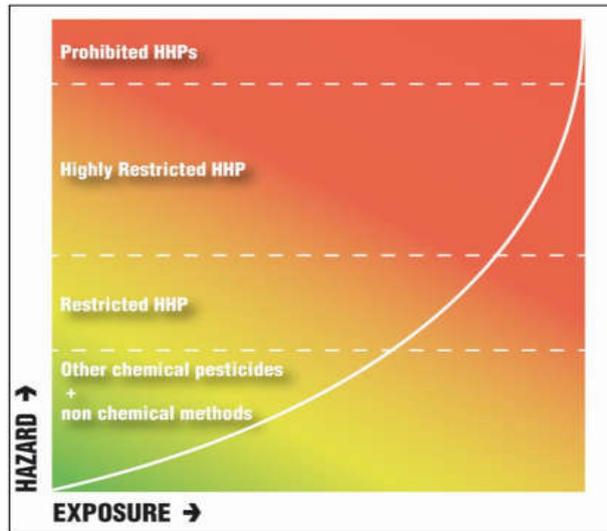
Risk management includes active involvement in and review of technologies and research into alternative methods for the control of weeds, pests and diseases where these are effective and efficient.

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.

**Hazardous
Chemicals**

FSC applies a risk-based approach to rules around the use of chemical pesticides. The framework defining this approach is documented in new policies released by FSC in 2019¹⁰. Chemicals are classified according to an FSC Hazard rating. The rating then requires differing levels of actions by managers to enable their use under regionally prescribed situations.

Figure 1: FSC Hazardous Risk Management approach



Of the chemical pesticides used or potentially used in Scott forest, none fall into the Prohibited or Highly restricted categories. Those that fall into the Restricted category are listed in Table 8 below.

Most of the ‘restricted’ pesticides are vertebrate poisons and insecticides that if used, would be targeted at specific pest problems, such as wasps or pest predators or high possum numbers. In the latter case, such use is only likely in conjunction with a wider coordinated application aimed at achieving positive biodiversity outcomes across much larger areas than the areas within the boundaries of this certified area.

Within the herbicides and fungicides, usage is expected at between 1-2 and 2-4 times per radiata rotation respectively.

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

Continued on next page...

¹⁰ FSC Pesticides Policy FSC-POL-30-001 V3-0 <https://www.fsc.org/en/document-centre/documents/resource/208>

...continued

Table 8: FSC Highly hazardous chemicals used or potentially used within Scott forest

Active ingredient	Purpose	FSC Hazard	Common usage
Boric Acid	Fertilizer	Restricted	Component of micro-nutrient fertilization
Copper based products	Fungicide	Restricted	Needle cast control
Glyphosate	Herbicide	Restricted	Establishment weed control/pest weed control
Haloxypop-methyl	Herbicide	Restricted	Establishment weed control/pest weed control
Picloram	Herbicide	Restricted	Establishment weed control/pest weed control
Animal and insect pest control			
Brodifacoum	Vertebrate pesticide	Restricted	Ground-based vertebrate pest control
Carbaryl	Insecticide (wasps)	Restricted	Localised wasp control
Cholecalciferol	Vertebrate pesticide	Restricted	Ground-based / Vertebrate pest control
Fipronil	Insecticide (wasps)	Restricted	Localised wasp control
Pindone	Vertebrate pesticide	Restricted	Rabbit and hare control
Sodium Monofluoroacetate (1080)	Vertebrate pesticide	Restricted	Vertebrate pest control / extensive aerial possum control
Sodium cyanide	Vertebrate pesticide	Restricted	Vertebrate pest control, ground-based possum control

9. Commercial Plantation Estate

Productive capacity strategy

Forest management is carried out to ensure the productive capacity of Scott 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. The estimated net stocked areas of each stand are set out below.

Table 9: Scott forest commercial forest area (ha)

Forest	Gross Forest Area (ha)	Net-stocked area (ha)	Cutover (ha)	Awt Planting (ha)	Reserves (ha)
Scott	84.5	82.0	0	0	2.5

Current crop

Scott forests is currently wholly radiata pine, planted in 1993 and 1994. Radiata pine has been selected as it is the most commercially viable species. The majority of the crop [REDACTED]. This inventory information was provided by a previous forest manager.

Productivity indices

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

For radiata pine, Site index is a measure of productivity of a site in terms of height growth. 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 a measure of productivity of a site based on stem volume growth (mean annual increment MAI) of 300 stems per hectare.

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Based on the productivity surfaces produced by Future Forests Research the estimated productivity indices for Scott forest are illustrated in Table 10 below. Both these figures are a mid-range value for NZ grown radiata pine.

Table 10: Productivity indices for Scott forest

Forest	Site Index (m)	300 Index (m³)
Scott	25 - 30	25 - 30

10. Commercial Crop Establishment and Silviculture

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.

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

Forest management goals

The forest owners are committed to ensure that Scott 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, including the protection of the water supply catchments.
- 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.
- Act as a good corporate citizen and neighbour; and
- Ensure all forest management practices are consistent with the principles of the Forest Stewardship Council and NZS AS 4708:2014

These goals are further detailed in 'PF Olsen Key Aspects - Objectives, Targets and Monitoring' in Appendix 5.

Crop species

Radiata pine, when intensively managed, will produce a range of different log types suitable for various processing options. The pruned butt log can be used to make knot-free veneer or decorative timber. The unpruned logs can be used for structural timber, for veneer or for feedstock for finger jointing. 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.

Wilding spread

As part of the requirement of the NES-PF, any change in species must be evaluated using the 'wilding spread calculator'¹¹ to ensure that the threshold for spread will not be exceeded. It is unlikely that wilding spread from Scott forest is a great risk, owing to the wider area being either intensively grazed, or existing pine forest.

Establishment methods

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

The typical re-establishment regime will take place after harvest and involves some combination of:

- Crushing or line raking felling debris/waste (where necessary) to enable planting access.
- Spot mounding in frost prone sites.
- Line ripping of compacted skid sites.
- Aerial desiccation spraying of weeds (including naturally regenerated pines) and/or,
- Spot spraying of limited sensitive areas where aerial spraying may not be appropriate.

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¹¹ <https://www.mpi.govt.nz/growing-and-harvesting/forestry/national-environmental-standards-for-plantation-forestry/wilding-tree-risk-calculator/>

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- Planting with genetically improved radiata seedlings at 800-1000 stems per hectare.
- Fertilising those sites where required at planting by individual tablets placed in a slit with each tree.
- Spot releasing or aerial releasing where necessary to eliminate competition from weeds.
- Replanting, which is important for maintaining soil stabilisation functions of the forests, will follow harvesting as it occurs with only minor deviation for seasonal or operational logistics reasons and boundary rationalisation.

Pre-establishment considerations

Prior to re-establishment of the tree crop, a review will be conducted to identify and incorporate any boundary changes or other considerations in relation to riparian or reserve protection which would assist better outcomes for both the commercial management of the crop and the environmental outcomes within the forest.

Tending

The tending regime executed to date in Scott forest has been 3 different treatments:

1. a [REDACTED]
2. a [REDACTED]
3. a [REDACTED]

The future tending regime to be a clearwood one, with two pruning lifts and two thinning to waste operations.

Tree nutrition

The soils in Scott forest are not generally seen to be deficient in nutrients for healthy tree growth. Foliar samples are 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 or where economic analysis demonstrates a benefit.

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.

11. Harvesting Strategy and Operations

Harvesting strategy

The harvesting strategy employed at Scott forest is to harvest the forest 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 accumulated interest costs 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 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.

Forward planning is essential when considering harvesting activities. Planning should 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 and disruptive in relation to market supply chains and contractors.

The harvest planning process is comprehensively outlined in the PF Olsen EMP's and I.T supported through a harvest planning system that requires an array of 120+ planning issues to be addressed, assists in the development of an 'Assessment of Environmental Effects' and the resulting operational prescriptions that address those effects.

Scott forest is scheduled for harvesting to commence within the next 4 to 18 months, and will take around 7 months to complete.

Infrastructure

Forest infrastructure includes roads, tracks, landings, bridges and culverts. Design specifications are aligned with those of the industry Road Engineering design manual¹² and associated forest guidelines for support of the NES-PF.

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.

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¹² New Zealand Forest Road Engineering Manual 2020

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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.

Access is currently gained off Cockburn Road, then via a private road owned by City Forests Ltd. Infrastructure work will include maintenance of the private road, plus the construction of approximately two skid sites. There are no significant road construction or upgrade operations planned.

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. 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.

All new contractor crews undergo a comprehensive safety and environmental inductions. Crew members are contractually required to hold relevant skills qualifications under the NZQA suites related to forestry or to be ‘under formal training’ for those qualifications. The formal NZQA qualifications are supplemented periodically by internally run training courses including those on environmental matters. At least 1 full day of environmental advocate training is held each year for staff and contractors.

All harvesting, engineering and silviculture contractors are subject to 6 monthly contractor monitoring audits and regular 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.

12. 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.

Pre-assessment

Pre-assessment is the collection of stand parameters prior to a tending operation. It allows for:

- The calculation of contract rate for tending.
- A final check on the validity of the regime and timing of commencement of operations i.e., DOS targets can be achieved, or crop height is sufficient for pruning lift scheduled.

Sampling intensity is low but pre-assessment does provide good quality information on the work content involved in each tending operation and sets a base price for negotiation.

Quality control

Quality control is carried out during and after a tending operation. The aims of the quality control system PF Olsen have established are to:

- Collect sufficient data to monitor a contractor's performance and correct this if necessary, with minimum delay.
- Collect sufficient quantitative data to provide reliable estimates of the crop state.
- Provide data as input for growth modelling; and
- Provide data for estimating timing of the next tending operation.

PF Olsen’s ‘Tending Manual’ details the procedures to follow for pre-assessment and quality control plotting.

Mid-crop inventory The principal aim for the mid-crop inventory is to collect stand data for inputs for growth modelling. Under current tending regimes mid-crop inventory is scheduled for between 11 and 15 years of age.

Sampling intensity is targeted to achieve 10% confidence limits on basal area on a stand-by-stand basis. Smaller stands may be aggregated into crop types to achieve this.

Pre-harvest inventory The principal aim for the pre-harvest inventory is to obtain estimates of recoverable volume by log grade. This information can then be used to develop marketing and harvesting strategies. Pre-harvest inventories will be undertaken when stands reach five years or less from harvesting.

Sampling intensity is targeted to achieve 10% confidence limits on basal area on a stand-by-stand basis. Smaller stands may be aggregated into crop types to achieve this as in mid-crop inventory. Use of LiDAR is increasingly able to replace plot-based inventory systems.

Mapping and stand records All mapping of Scott forest is in digital format and is constantly updated in a Geographic Information System (GIS). The GIS and forest information system spatially records a large array of forest data, from stand and legal boundaries, to reserves, rivers, roads, infrastructure, topography, soils, environmental constraints, stand operational and cost histories and productivity and post-harvest yield information.

Accurate mapping assists operational budgeting and planning, silvicultural payments, calculation of future revenue/tree crop value, protected ecosystems management, infrastructure location, and harvest planning. They also provide a means of measuring the performance of a Forest Manager. In a management audit, forest records can be verified against the status of the tree crop and unit costs derived for each operation.

13. Protected Forests, Habitats, Ecosystems and Species

Introduction

Consideration of indigenous biodiversity 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 and in specific cases restoration, where they are able.

Exotic forests can and do provide a level of biodiversity, which is often enhanced by natural forest ecosystem remnants embedded within the plantation matrix. In combination these can be an 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.

Protection categories

PF Olsen’s EMP’s provide broad guidance and specification on the application and execution of ecological management targets and actions.

The first steps are to accurately map the indigenous vegetation present within the plantation area. The protected ecosystems are recorded and ranked based on basic ecological criteria reflecting the stands representativeness, rarity of species, size and connectivity, function and landscape values.

Table 11: Protected Ecosystems Protection Categories

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

Protected ecosystems

Within Scott forest, there are 2 small reserve areas, totalling 2.5 ha, that were reserved during conversion from farm to forest when the current crop was established. RIPR_02 is a patch of small regenerating shrub hardwoods, providing riparian protection to the upper reaches of the gully that drains into WETL_01. This site is an artificially created pond with a margin of manuka, reeds and grey willow. Both reserve areas fall within the ‘limited’ protection category.

Stream protection and riparian setbacks

A standardised GIS-based stream classification system based on NIWA’s River Environment Classification (REC¹³) has been used to develop a rationale for defining riparian management with a set of rules in the EMP’s 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.

The guidance also includes minimum setbacks upon establishment or re-establishment of forest after harvest where riparian setbacks had not existed before, which are aligned with the NES-PF.

In Scott forest, there are only two small unnamed tributaries of Frasers stream. These may require wider riparians provided for after harvesting- at time of replant, they will be assessed, and planting boundaries adjusted accordingly.

The combined length of these within the forest is 1780m. They fall outside the current REC coverage but feed into ‘Small_Low_Dry_Hard’ streams from the forest boundary.

Rare and threatened species

Plantation forests and their intertwined native habitats have proved capable of supporting or contributing to the support of important New Zealand fauna including threatened species.

Records of sightings and locations will be collected using the NatureWatch application ‘Biodiversity in Plantations¹⁴’ project which provides means for recording any sightings of any biodiversity into a spatial dataset from which long-term data can be extracted for rare species reporting. These records can be made available to conservation authorities.

To date, sightings of kārearea (*Falco novaeseelandiae*; NZ falcon) and weka (*Gallirallus australis*) have been recorded in the area in NatureWatch. It is possible that the pond on the forest boundary may be habitat for waterfowl, but likely only intermittently owing to the close proximity of the vast Lake Tuakitoto wetlands area.

¹³ REC V2 specifically modified by NIWA to include widths (V.small 0-0.75m, small 0.75-1.5m, medium 1.5-3.0m, large >3.0m).

¹⁴ <https://inaturalist.nz/projects/biodiversity-in-plantations>

Fish

The NIWA Freshwater fisheries database and Freshwater Environments of New Zealand (FWENZ) models have been used to inform the potential for threatened fish species to be present in streams affected by operations and if necessary, any response to such a presence.

Streams within the productive forest area are very small and fish information is sparse as a result. Species likely present in streams just below the forest boundary are shown in the table below.

Table 12: Fish species likely in the small tributaries of Scott forest

Y: present (NZFFDB or FWENZ high probability)

Brown trout	Y
Longfin eel	Y
Shortfin eel	-
Koaro	-
Koura	-
Redfin Bully	-
Upland Bully	-
Common Bully	-
Torrent fish	-

Primary actions – rare species

Primary management actions in relation to rare species are:

- Adherence to industry protocols developed for management of New Zealand falcon if required¹⁵.
- A listing of key species of interest is held by all contractors and staff and a request to report such information using the application is part of their training.
- Inclusion of threatened species sightings into the PF Olsen sightings database, and subsequently into the New Zealand Forest Owners NatureWatch – Biodiversity in Plantations Project.
- Minimising damage to natural forest areas and the pond area during harvest and reforestation.
- Sound design and construction of any new stream crossings.

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¹⁵ Falcon: <https://go.promapp.com/pfolsen/Documents/Minimode/Permalink?crypto=GpQQzJNsfpld30mDb64yR>

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- Promotion of the development of improved riparian corridors after harvest.
 - Utilisation of the Fish Spawning Indicator as a management tool¹⁶ to avoid operations involving works over or in the beds of streams during spawning periods and at all times maintain good sediment controls around earthworks.
 - Identification of, and avoidance and/or buffering of waterbodies during aerial spraying for replanting and *Dothistroma* control or aerial fertilisation if ever required.
-

CITES species

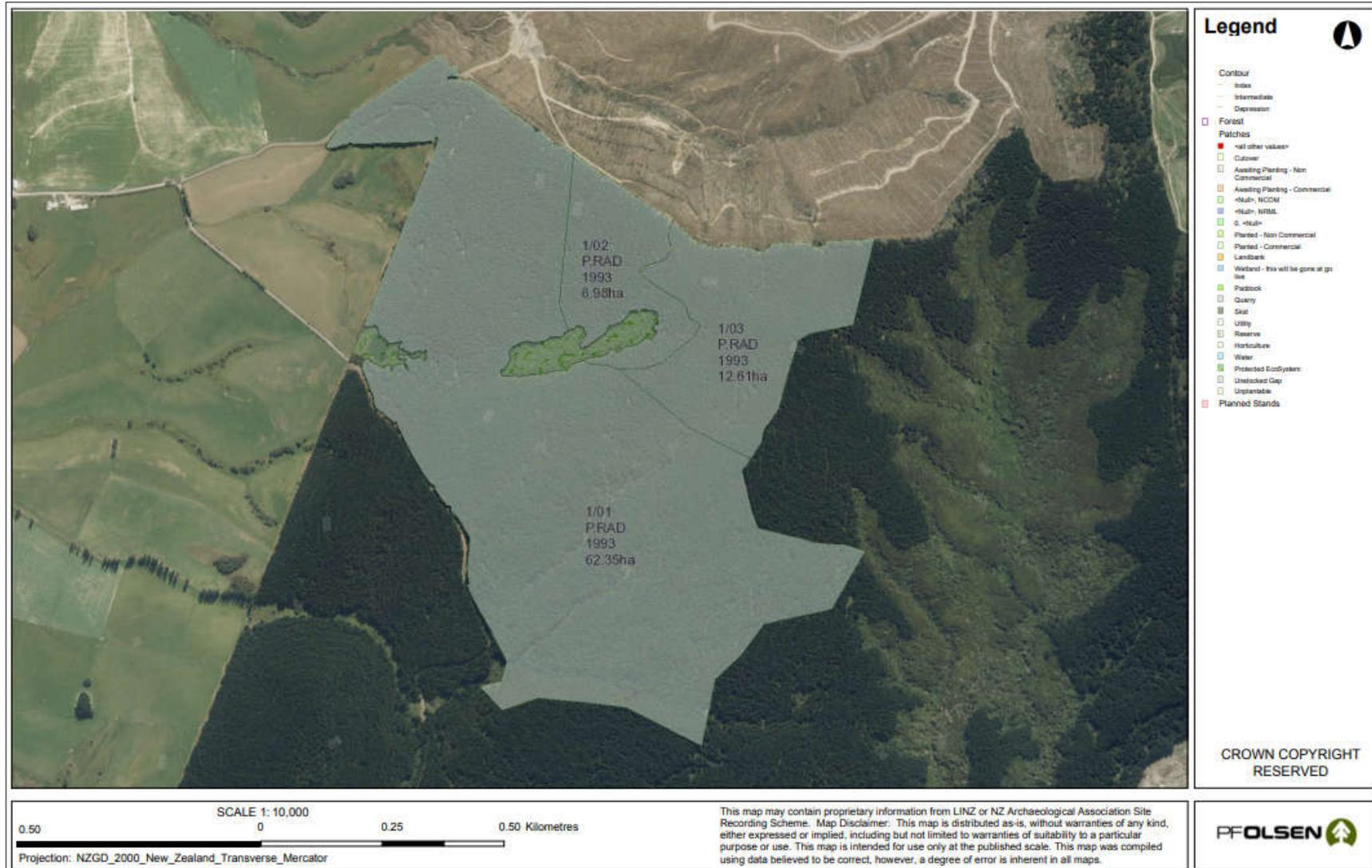
CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international agreement between governments.

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 EMP's, or online at <http://www.doc.govt.nz/about-doc/role/international/endangered-species/cites-species/nz-cites-listed-species/>.

¹⁶ Published by NIWA to support the regulations of the NES-PF

14. Map 2- Scott Forest Stand Map



15. Property Management and Protection

Statutory pest obligations

Scott forest is subject to statutory obligations under the Otago Regional Pest Management Plan 2019 (ORPMP) administered by Otago Regional Council.

The strategy applies to both pest plants and animals and categorises them, in terms of management objectives. The categories, objectives and landowner obligations are summarised in the ORPMP¹⁷ in Appendix 3.

Plant pests

The management of pests within the forest will be targeted to manage commercial pests specific to plantation health and direct obligations under the RPMS. Chemical herbicides are the usual tool whether for dealing with establishment weeds or ecological pest plants.

All chemicals used are subject to Environmental Protection Agency (EPA) approval and will also meet the FSC Hazardous chemicals policy and are applied in keeping with all legislative and safety requirements and with industry best practice.

Herbicides are used to desiccate most harvested areas prior to re-establishment, usually by aerial spraying, but occasionally by spot spraying in sensitive areas and where grasses are the main problem rather than woody weeds. Re-established trees are also released with another chemical application where necessary, during the first one to two years after establishment.

Pest weed control, where required can include aerial applications through to ground-based manual cut and swab or similar techniques dependent upon the site and weed species.

Animal pests

The main animal pest in Scott forest is the introduced possum, which can attack the growing tips of both plantation and native trees, causing stem malformation and die back. Possums are also a nationally significant ecological pests, preying on native birds and their eggs.

Deer, goats and pig are present and while less commercially significant are again problematic for natural ecosystems. Stoats, weasels, rats and mice have no commercial impact but are a massive ecological threat to all natural ecosystems. Rabbits and hares can be a problem at the time of plantation establishment.

Control of commercially impacting animal pests in Scott forest, if required, will likely involve ground-based methods, to prevent impacts on planted species.

¹⁷ https://www.orc.govt.nz/media/8029/orc-pest-management-plan-2019_final_digital.pdf

Insects and fungal disorders

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 an aerially applied copper-based fungicide spray, usually required between 1 to 4 times only, during the first third of a radiata rotation and only when the infection reaches a critical level.

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

Fire prevention and control

With the weather patterns normally experienced in the Otago region during summer, fire can be a potential threat to the commercial and native forests.

Though the risk level will fluctuate season to season, there may be a trend for a rise in hazard levels due to climate change, and is indicative of the need for awareness, readiness, and the avoidance of complacency.

Scott forest's location also warrants extra caution, being sandwiched between a large plantation forest estate, and farmland.

Fire risk can be minimised by:

1. Having an effective fire plan and rural fire control organisation.
2. Maintaining a close link with the relevant fire authorities, and an understanding of equipment and trained manpower requirements.
3. Effective fire reporting communications systems, mapping, and fire plan alert procedures.
4. Active prevention measures which include restrictions on allowable access, fire prevention signage, publicity when fire danger prevails, access to adequate water sources, and if required in the limited situations where they could be applied, constructing and maintaining firebreaks or other limited site-specific adjustments to silvicultural practice or timing of operations.

Fire authority responsibilities

The legal responsibility for fighting forest fires lies with Fire and Emergency New Zealand (FENZ). In the event of a fire that starts within the forest, FENZ is responsible for attending and providing the resources to extinguish the fire. Costs are borne through a general insurance levy that supports a rural firefighting fund.

If a fire starts outside the forested area and moves into the forest, those costs remain covered under the fund, however in both cases loss of crop value due to fire will be a matter for the forest owners crop insurance if any.

If in the event a fire, either internally or external to the forest boundaries was caused by negligence or identifiable criminal acts, the cost recovery might be attempted by FENZ.

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

Crop insurance

Scott Afforestation Ltd maintain crop insurance cover for fire and wind under a PF Olsen managed crop insurance scheme. This is reviewed regularly.

Public liability insurance

Scott Afforestation Ltd and PF Olsen Ltd maintain full public and statutory liability insurance as do contractors employed on forestry operations. This would include cover in the case of fire spreading from the forest onto adjoining land, where Scott Afforestation Ltd could be liable for costs of any damage to the adjoining property.

16. Recreation, Forest Products and Other Special Values

Environmental and social cost-benefit analysis Forests can deliver numerous social and environmental products and services, 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 relative to the most likely alternative primary production system, pastoral dry stock farming. A high-level generalised analysis of provisioning and consuming services related to forest management is shown in Appendix 6.

Table 13: Environmental and social cost-benefit analysis of key non-timber products & services

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

NOTE: 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.

Recreational usage

Being a small forest, there is little demand of it for recreational opportunities. There has historically been some walking access permitted through Scott forest. During operations, if the forest owners wish to continue to allow occasional access, such will be managed through a permit system for safety and security reasons. Signage at the boundary will inform the required contacts.

Public access roads

Scott forest contains some unformed public access roads. These routes remain open to public, subject to any temporary closures as required for safety such as during times of high fire risk or forestry operations. these public road locations are publicly viewable in the Walking Access Commission website¹⁸. Any users are expected to abide by the intent of the Outdoor Access Code¹⁹ published by the Walking Access Commission, or signage or barriers places at track or public access points.

During harvesting and roading operations in particular, a temporary road closure will be sought in liaison with the District Council and notices placed at the boundary informing the reason, duration and contact details for PF Olsen.

Non-timber forest products

There are no FSC certified non-timber forest products²⁰ arising from Scott forest.

¹⁸ <https://maps.walkingaccess.govt.nz/Viewer/?map=b1d1e76a6c754d11b3f3fd9dfce1eb12>

¹⁹ <https://www.walkingaccess.govt.nz/assets/Publication/Files/Outdoor-Access-Code/0fcf4d2e5b/Outdoor-Access-Code.pdf>

²⁰ In FSC standards, the reference to non-timber forest products is a reference to such products that are able to carry the FSC label. It is not a reference to the presence of absence of other co-products from the forest areas that do not seek to carry the FSC label.

17. 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 as and when required and are also, where appropriate, made publicly available through the PF Olsen webpage.

Values monitored

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

Table 14: Environmental process monitoring framework

Monitored Element	Components	Data Source	Data medium	Reporting / Website Frequency
Chemical Usage	- A.I Usage - Area Overuse	- Operational Supervisors	- FIPS - Form	- On Demand - Annual
Client Satisfaction	- Post-operation client survey	- Clients	- Survey Form	- Post-operational - Annual
Consultation Activity	- Complaints - Other Interactions	- Operational Supervisors - Planners	- Form - Meeting minutes	- Annual - Annual
Environmental Incidents	- Incident Number - Categories	- Operational Supervisors	- Assura	- 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 - Eco Surveys	- FIPS - Naturewatch-Biodiversity in plantations	- On Demand - Annual
Forest Estate Structure	- Area: Plantation & Protected Ecosystem - Age-class - Species - Forest Type - Protection Status	- Management Plans - Stand Records	- Geomaster Stand Records	- On Demand - Annual
Forest Growth	- PSP Protocols - Periodic Inventory	- Contractors	- Volume Reconciliations - Estate model	- Periodic-annual - Not on web
Forest Health	- Disease & health	- NFH Surveillance Program ²¹	- Document	- Periodic-Annual - Not on web

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²¹ 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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Monitored Element	Components	Data Source	Data medium	Reporting / Website Frequency
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	- Drone, photos, - Spreadsheet	- Annual
Internal Audit CAR Activity	- Frequency * - Category	- Auditors(ees) - Operational Supervisors	- Assura	- Annual
Log Production	- Total Logs - FSC Certification	- Log docket at harvest	- Woodtrack	- On Demand - Annual
Operational Monitoring	- Audit Trends - Cause Analysis	- Operational Supervisors	- Assura	- Monthly - Annual
Pests	- RTC / RTI - Kill Returns - Other	- Contractors - Supervisors - Permittees	- TrapNZ - 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 - MCI - RAPID	- Supervisors - Contractors	- Various	- Operational - Annual

Other monitoring 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 estate. 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.

18. Industry Participation and Research

NZFOA and FGLT Scott Afforestation Ltd’s primary means of participating as part of the forest owner community, and to gain industry intelligence and access to research findings is via:

- Membership of New Zealand Forest Owners’ Association Inc. (NZFOA) <http://www.nzfoa.org.nz/> and representation through its Property Manager PF Olsen on the Executive Board and working committees of NZFOA.
 - Payment of a commodity levy (currently 27 cents/tonne or JAS) to the Forest Growers’ Levy Trust (FGLT). <http://fglt.org.nz/>. The FGLT uses these funds to finance pan-industry good programmes and contracts NZFOA to carry out this work.
-

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

Application of the research is via knowledge gained in workshops and uptake by contractors, commercial providers, PF Olsen staff and through the deployment of better genetics. PF Olsen’s direct involvement with other research bodies across all the estates it manages contributes to and benefits Scott Afforestation Ltd through early application of good ideas and research findings.

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

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

**Additional
representation**

Other bodies that the Property Manager are active in, that bring benefit to Scott Afforestation Ltd include:

- Wood Council of New Zealand (Woodco)
- Business Leaders' Health and Safety Forum
- New Zealand Forest Nursery Growers' Association
- Forest Health and Biosecurity Committee
- Forest Owners Association – Transport, Environment and Safety committees.
- Log Transport Safety Council
- New Zealand Institute of Forestry Inc.
- New Zealand International Business Forum
- New Zealand China Council
- Various organisations dealing with freshwater quality regulations
- Te Uru Rakau and MPI review of the National Environmental Standard for Plantation Forestry.
- MFE Freshwater and biodiversity legislation

19. Future Planning

Introduction

This plan will provide guidance on the management of Scott forest for the next 5 years. Minor revisions may be made on an annual cycle. Any material changes made will be documented in the following section. The next major review date for this plan is April 2026.

Deviations from this plan will only 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.

Such operational plans and associated budgets are subject to approval by the forest owners 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.

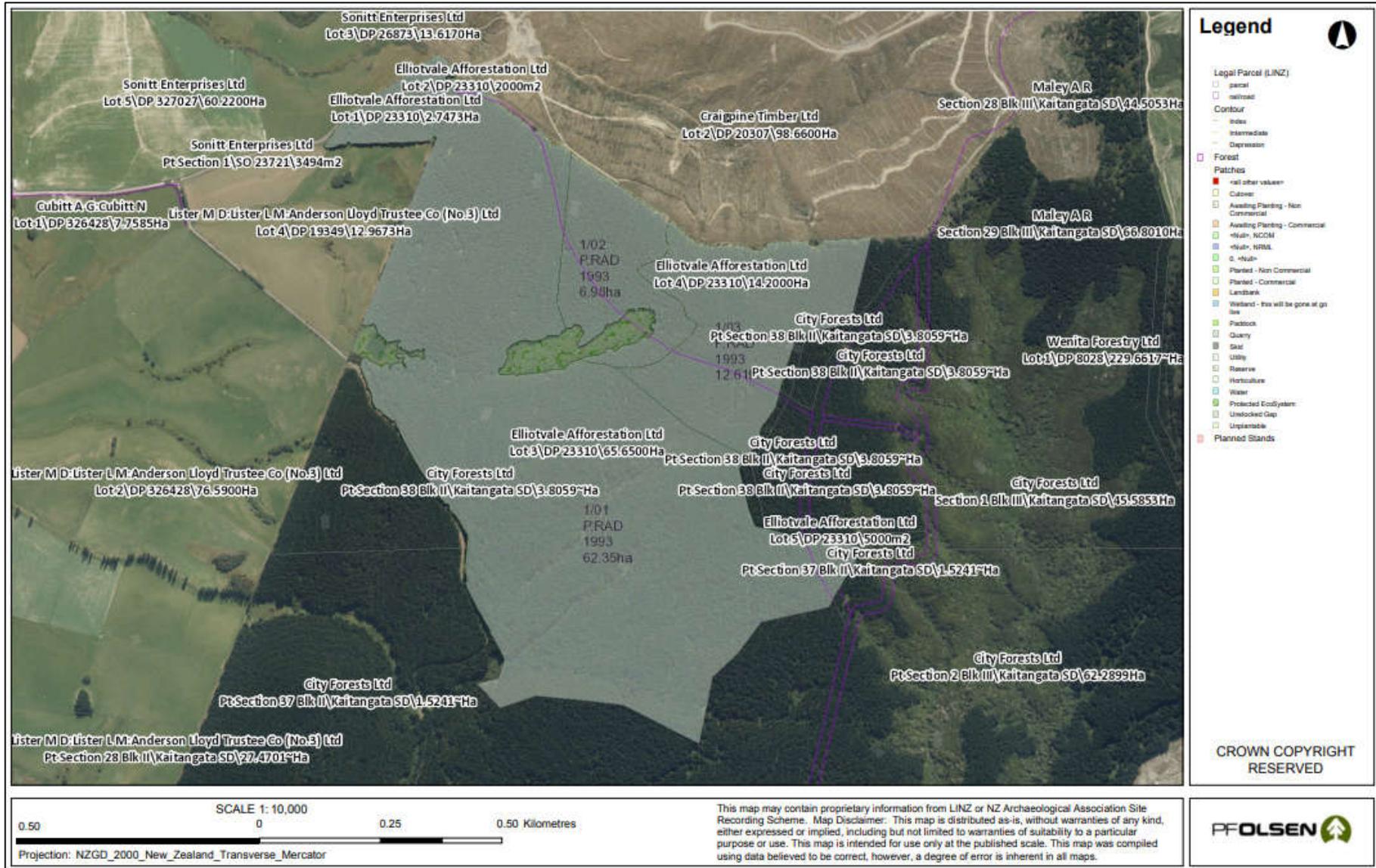
20. Register of Plan Change and Review

Introduction

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

Change	Date	Section/Page

Appendix 1: Scott Forest Neighbours Map



Appendix 2: Otago Regional Plan Rules vs NES-PF

National Environmental Standards for Plantation Forestry (Part 2)	Regional Plan: Water for Otago
Subpart 1 – Afforestation All regulations apply	
Subpart 8 – Replanting All regulations apply	Not applicable.
Subpart 2 – Pruning and thinning to waste All regulations apply	
Subpart 3 – Earthworks All regulations apply, except 26 replaced (see opposite and 13.5 rules below in relation to ephemeral rivers)	Chapter 12: Rules Water Take, Use & Management 12.C Other discharges 12.C.1 Permitted activities: No resource consent required
Subpart 5 – Forest quarrying All regulations apply, except 56 (1) replaced (see opposite)	12.C.1.1 (d) (e) (f), excluding (iii) 12.C.2 Restricted discretionary activities: Resource consent required
Subpart 6 – Harvesting All regulations apply, except 65 replaced (see opposite).	12.C.2.1 12.C.2.2 12.C.2.4
Subpart 7 – Mechanical land preparation All regulations apply, except 74 (6) replaced (see opposite)	12.C.3 Discretionary activities: Resource consent required
Subpart 9 – Ancillary activities All regulations apply, except 90 replaced (see opposite)	12.C.3.2

National Environmental Standards for Plantation Forestry (Part 2)	Regional Plan: Water for Otago
Subpart 3 – Earthworks All regulations apply (except 26 replaced, see above). In addition to 28(2), 13.5.3.1 rule opposite also applies for ephemeral flow paths	
Subpart 4 – River Crossings All regulations apply. In addition to 44, 13.5.1.1(g) rule opposite applies, if this rule cannot be met then 13.5.3.1 applies.	Chapter 13: Rules: Land Use on Lake or River Beds or Regionally Significant Wetlands
Subpart 6 – Harvesting All regulations apply. In addition to 68(3), rule 13.5.3.1 opposite applies if logs are to be dragged through streams less than 3 metres wide.	13.5 Alteration of the bed of a lake or river, or of a Regionally Significant Wetland 13.5.1 Permitted activities: No resource consent required.
Subpart 9 – Ancillary activities All regulations apply. In addition to 89, 13.5.1.1(g) rule opposite applies, if this rule cannot be met then 13.5.3.1 applies.	13.5.1.1 (g) 13.5.3 Discretionary activities: Resource consent required
Subpart 10 – General provisions All regulations apply. In addition to 97, rule 13.5.3.1 opposite also applies to any bed disturbance outside fish spawning seasons as defined by the Fish Spawning Indicator.	13.5.3.1

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
 Fencing Act 1978
 Fire and Emergency New Zealand Act 2017
 Forestry Rights Registrations Act 1983
 Forests Act 1949
 Freshwater Fisheries Regulations 1983
 Freshwater NPS & Freshwater NES
 Hazardous Substances and New Organisms Act 1996
 Health and Safety at Work Act 2015
 Heritage New Zealand Pouhere Taonga Act 2014
 Protected Objects Act 1975
 Reserves Act 1977
 Resource Management Act 1991 regulations
 Soil Conservation and Rivers Control Act 1941
 The Treaty of Waitangi Act 1975
 Trespass Act 1980
 Wildlife Act 1953

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

Industry Accords & Codes

New Zealand Forest Accord
 Principles of Commercial Plantation Forest Management
 New Zealand Environmental Forestry Code of Practice
 New Zealand Code of Practice for the Management of Agrichemicals.
 Climate Change Accord
 NEW ZEALAND 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

Appendix 4: Otago Regional Pest Management Plan Pests

Common name	Scientific name	Primary programme	Good neighbour rule
Plants			
African feather grass*	<i>Cenchrus macrourus</i>	Exclusion	
African love grass*	<i>Eragrostis curvula</i>	Progressive containment	
Banana passionfruit	<i>Passiflora tripartita</i> var <i>mollissima</i> <i>P. tripartita</i> var <i>azuayansis</i> <i>P. tarminiana</i> * <i>P. pinnatistipula</i> <i>Passiflora x rosea</i> <i>P. caerulea</i>	Site-led	
Bomarea*	<i>Bomarea caldasii</i> B. <i>multiflora</i>	Progressive containment	
Boneseed*	<i>Chrysanthemoides monilifera</i>	Progressive containment	
Broom (common and montpellier)	<i>Cytisus scoparius</i> <i>Teline monspessulana</i>	Sustained control	Yes
Bur daisy	<i>Calotis lappulacea</i>	Progressive containment	
Cape ivy	<i>Senecio angulatus</i>	Progressive containment	
Chilean flame creeper	<i>Tropaeolum speciosum</i>	Site-led	
Chilean needle grass*	<i>Nassella neesiana</i>	Exclusion	
Contorta (lodgepole) pine*	<i>Pinus contorta</i>	Progressive containment	Yes
Corsican pine ⁵	<i>Pinus nigra</i>	Progressive containment	Yes

Darwin's barberry*	<i>Berberis darwinii</i>	Site-led	
Egeria	<i>Egeria densa</i>	Exclusion	
False tamarisk	<i>Myricaria germanica</i>	Exclusion	
Gorse	<i>Ulex europeaus</i>	Sustained control	Yes
Gunnera	<i>Gunnera tinctoria</i>	Site-led	
Hornwort	<i>Ceratophyllum demersum</i>	Exclusion	
Lagarosiphon*	<i>Lagarosiphon major</i>	Site-led	
Larch (excl. sterile hybrids) ⁵	<i>Larix decidua</i>	Progressive containment	Yes
Moth plant*	<i>Araujia hortorum</i>	Exclusion	
Mountain pine and dwarf mountain pine ⁵	<i>Pinus uncinata</i> <i>Pinus mugo</i>	Progressive containment	Yes
Nassella tussock*	<i>Nassella trichotoma</i>	Progressive containment	
Nodding thistle	<i>Carduus nutans</i>	Sustained control	Yes
Old man's beard*	<i>Clematis vitalba</i>	Progressive containment	Yes
Perennial nettle	<i>Urtica dioica</i>	Progressive containment	
Ragwort	<i>Senecio jacobaea</i>	Sustained control	Yes
Scots pine ⁵	<i>Pinus sylvestris</i>	Progressive containment	Yes
Spartina	<i>Spartina spp</i>	Progressive containment	
Spiny broom	<i>Calicotome spinosa</i>	Eradication	
Sycamore	<i>Acer pseudoplatanus</i>	Site-led	
Tradescantia*	<i>Tradescantia fluminensis</i>	Site-led	
White-edged nightshade*	<i>Solanum marginatum</i>	Progressive containment	
Wilding conifers ³	See Table 3	Progressive containment	Yes
Wild Russell lupin ⁴	<i>Lupinus polyphyllus</i>	Sustained control	Yes
Animals			
Bennett's wallaby ^{1, 2}	<i>Macropus rufogriseus rufogriseus</i>	Eradication	

Feral cat	<i>Felis catus</i>	Site-led	
Feral deer	<i>Cervus elaphus</i> , <i>C. nippon</i> , <i>C. dama</i>	Site-led	
Feral goat	<i>Capra aegagrus hircus</i>	Site-led	
Feral pig	<i>Sus scrofa</i>	Site-led	
Feral rabbit	<i>Oryctolagus cuniculus</i>	Sustained control	Yes
Hedgehog	<i>Erinaceous europaeus</i>	Site-led	
Mustelids (ferret, stoat, weasel)	<i>Mustelo furo</i> , <i>M. ermine</i> , <i>M. nivalis</i>	Site-led	
Possum	<i>Trichosurus vulpecula</i>	Site-led	
Rat (Norway, ship and Kiore)	<i>Rattus norvegicus</i> , <i>R. rattus</i> , <i>R. exulans</i>	Site-led	
Rook*	<i>Corvus frugilegus</i>	Eradication	

* Classified as Unwanted Organisms

- 1 Also included in site-led programmes.
- 2 Unwanted Organism status expires 20/09/2021.
- 3 Wilding conifers are any introduced conifer tree, including (but not limited to) any of the species listed in Table 3, established by natural means unless it is located within a forest plantation, and does not create any greater risk of wilding conifer spread to adjacent or nearby land than the forest plantation that it is a part of. For the purposes of this definition, a forest plantation is an area of 1ha or more of predominantly planted trees. This also excludes planted conifers of less than 1ha, such as windbreaks and shelterbelts existing before March 2019.
- 4 Wild Russell lupin are Russell lupins that are established by natural means.
- 5 Does not include specimens used or intended to be used for plantation forestry purposes in a plantation forest.

Appendix 5: PF Olsen Significant Aspects - Objectives, targets and monitoring

PF Olsen Significant Aspects - Objectives, Targets and Monitoring																	
(within the organisational context)																	
Economic			Legal			Social & Cultural			Health & Safety			Environment					
Objectives			Commercial viability Valuable forest asset Sustainable resource supply Sustainable work			Compliance with the letter Compliance with the intent			Retain our Licence to Operate Respect for our stakeholders, & rights of indigenous people Good employer Accountable in the community			Home safe every day Drug and alcohol free work Culture of care Safest forestry company			Protect biodiversity Protect water Minimise erosion Responsible chemical use		
Targets			<ul style="list-style-type: none"> Appropriate R.O.L Maintain and enhance value Log grade outturn value maximised Sustained product flows and employment Appropriate land use 			<ul style="list-style-type: none"> Zero non-compliance <ul style="list-style-type: none"> RMA Heritage New Zealand Act Worksafe Financial Employment Professional & transparent Valid & fair contracts — all staff and contractors Taxes / payment, and royalties paid 			<ul style="list-style-type: none"> External complaints < 3% of incidents Zero unauthorised damage to cultural sites Customer rankings rising Recognition of transparency and respect in dealings with Tangata Whenua Workforce trained and engaged Communication to community Contractor / staff training 			<ul style="list-style-type: none"> Crew visit increase, year on year TIFR = 3, TIFR = 7 Drug free, D&A testing 100% 100% Safetree signup Safe Start-up HPI > 90% close-out by due date 100% inducted 			<ul style="list-style-type: none"> Crew performances > 91—92 % Non Compliance = 0, Marginality <1% Skid check / Post op tail <5% Zero unauthorised damage to cultural /archaeological sites Zero unauthorised damage to key terrestrial ecosystems Rare Fauna BPG's applied Setbacks on all streams & zero unauthorised discharges. Chemical A.I. usage Protect enhance key ecosystems (where applicable) Carbon sequestration 100% inducted 		
Monitoring			Monitoring			Monitoring			Monitoring			Monitoring					
Factor	Frequency	Mode	Factor	Frequency	Mode	Factor	Frequency	Mode	Factor	Frequency	Mode	Factor	Frequency	Mode			
R.O.L against investment model	Annual	Woodstock	Regulatory Authority / Worksafe inspectors	Monthly	Noggin incidents	Environmental incidents	Ad hoc	Noggin	Safety Incident Management	Continually	Noggin	Operational Environmental Audits	Monthly	FIPS			
Estate valuation	Annual	Financial	Resource consents	Monthly / Annual	FIPS	Consultation: Pre-certification & post-operation	As required	FIPS / Meetings	Statistics & closeout of HPI	Monthly	Noggin	Skid checks	Quarterly	FIPS			
Product flows	Annual	Woodtrack	Archaeological Post-Op AEE's	Monthly	Noggin incidents	Customer survey	Annual	Form	Sentinel (near miss)	Rolling Quarters	Noggin	Environmental Incident Management	Ad hoc	Noggin			
Plantation area / species / reserve trends	5 yearly	FIPS report / GIS	Enforcement Actions	Ad hoc	Noggin incidents	Complaints — meeting minutes	Annual	Form	Safety system audits	Random	External	Rare Species Sightings Database	Ad hoc	FIPS / NatureWatch			
Log quality audits	Continually	Noggin	Incidents—all forms	Continually	Noggin incidents	Social survey	3 yearly	Form	D & A testing	Annual	FIPS	Harvest Planning Checklist	Annual	FIPS			
Client reporting	Monthly	Written	Master contracts	Continually	Noggin incidents	Staff survey	Annual	Sunday Monday	Safetree	Bi-monthly	Written	Chemical A.I. Tracking & Weed Matching: review & research	Annual, Tri-Annual	Document			
Independent accounting audit	Annual	Written	Accounts	Continually	Noggin incidents	NorthTec gap analysis, NZQA & other training	Annual	Cloud database	Safe Start-ups	Bi-monthly	Written	Vegetation / Photopoint monitoring (where applicable)	Various	Operational / BOPRC			
Forest growth — PSP's, periodic inventory, ISO:9001	Periodic / Annual	FIPS	Formal reporting	Monthly	FIPS	1 full day / year environmental advocate training, including cultural awareness	Annual	FIPS training	Safety Champs Meetings	Monthly	Written	Water quality	Tri-Annual	FIPS + written			
Forest health	Periodic / Annual	NH surveillance program	Manager / Client	Quarterly	FIPS	Formal reporting SMT	Quarterly	Power Point	Central Safety Committee	Quarterly	Power Point	Regional Branch Compliance	5 yearly	Estate model			
TQM — CAR system	Continually	Noggin	SMT	Quarterly	FIPS	Recreational Permits	Annual	FIPS	Formal Reporting	Annual	Power Point	Carbon Sequestration	Annual	Written			
ISO internal audits (sample)	Annual	Noggin	Company meeting	Annual	Power Point	TQM — CAR system	Continually	Noggin	Company Meeting	As required + 5 yearly	FIPS	EMG Meeting	Quarterly	Written			
			Independent accounting audit	Annual	Written	ISO internal audits (sample)	Annual	Noggin	Induction Records	Continually	Noggin	Formal Reporting	Quarterly	Written			
			TQM — CAR system	Annual	Power Point				TQM — CAR system	Annual	Noggin	Manager / Client	Quarterly	Power Point			
			ISO internal audits (sample)	Annual	Written				ISO internal audits (sample)	Annual	Noggin	SMT	Quarterly	Written			
												Board	Annual	Power Point			
												Company Meeting	As required + 5 yearly	FIPS			
												Induction Records	Yearly	Noggin			
												TQM — CAR system	Continually	Noggin			
												ISO internal audits (sample)	Continually	Noggin			

TQM & Roving Quality Managers

Executive Management Team

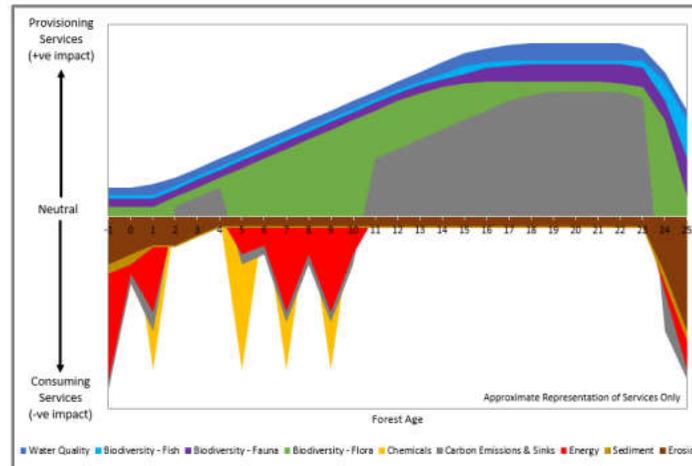
Appendix 6: Significant Aspects of a Plantation Forest Life Cycle

SIGNIFICANT ASPECTS OF A PLANTATION FOREST LIFE CYCLE

Provisioning and Consuming Services

Provisioning Services (+ves)

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

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

Consuming Services (-ves)

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

