

# MERINGA STATION FOREST

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Owned by  
Landcorp Farming Ltd

Forest Management Plan

For the period 2016 / 2021



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## 1. INTRODUCTION

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### Principles and Criteria

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

Landcorp Farming Ltd is committed to the PF Olsen FSC Group Scheme that is implemented through the Group Scheme Member Manual and associated documents.

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### About this Plan

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

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

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### Provision of services

Meringa Station Forest can provide environmental benefits, including:

- Enhanced water quality;
  - Soil, stabilisation and conservation;
  - Providing a buffer against flooding during storms;
  - Shading waterways for aquatic life;
  - Enhance wildlife and plant habitat leading to increased biodiversity;
  - A reduction in greenhouse gases;
  - Stock shelter; and
  - Providing economic and social benefits to the community and Landcorp Farming Ltd.
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### Forest management goals

The forest is managed to:

- Grow trees and produce logs for the manufacturing of different wood products in New Zealand and overseas with a focus on high quality pruned and structural logs depending on the growth capability and environmental factors of the site.
- Provide quality pruned or structural shelterbelts for the primary purpose of stock welfare, but managed to maximise forestry return.
- Protect significant areas of soil conservation concern.
- Ensure that the productivity of the land does not decline.
- Ensure that environmental values are identified and maintained.
- Harvest the trees as close to their economic optimum age.
- Replant following harvesting.
- Help to offset the Landcorp Farming Ltd carbon liability under the New Zealand ETS.

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

All activities within Meringa forest are subject to management within a framework set by PF Olsen's environmental policies and Environmental Management System (EMS).

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**Environmental policy**

**PF Olsen Limited Environmental Policy:**

*PF Olsen Ltd is committed to:*

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

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

**EMS framework**

The EMS is a core document defining the policies, processes and procedures that govern the physical implementation of forest management activities. The EMS applies a systematic approach certified to ISO 14001 standards to ensure that prevention of adverse and harmful impacts is effective.

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

## OPERATING ENVIRONMENT

### 3. Forest Landscape Description

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#### 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

Meringa Station is located off Meringa Road, which in turn is located off the Taumarunui-Ngapuke Road in the Manawatu-Wanganui District.

Internal farm roads and tracks provide access to the forest which is situated 8.4 km to the rear of the property. Access by 4x4 motorbike is required.

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

**Table 1:** Distances from Forest to Log Markets

Potential Market or Export Port	Distance from Forest (km)	Log Market
New Plymouth		
Taumarunui		
Tangiwai		
Te Kuiti		
Kaiori		

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#### Topography

Meringa Station is rolling to steep hill country of a generally southerly aspect. Altitude of the forested area ranges from 525m to 675m.

A combination of ground based and hauler log extraction methods will be utilised at harvesting.

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**Soils**

The soils at Meringa station are as follows:

Pumice flats – Manunui sandy silt loams derived from Taupo ash of medium to low fertility.

Undulating contour – Taumarunui sandy silt loams derived from ash on argillaceous sand stone of medium fertility.

Easy hills – Pakarae sandy loam derived from Taupo ash on mudstone and sandstone of medium fertility.

Steeper hills – Mahoenui silt loams derived from banded mudstone and sandstone of high to medium fertility.

Of these soils, the pumice terraces are prone to wash under excessive cultivation while the steeper mudstones are subject to slumping in storm events when under pasture.

Meringa Station is subject to a Whole Farm Plan under Horizons Regional Council with recommended retirement and regeneration works to mitigate soil slumping issues.

**Climate**

Rainfall: The average rainfall at nearby Taumarunui 1,449.6 mm per year and is relatively evenly distributed during the year, with the driest months being February to April.

Temperature: The mean annual temperature is around 13.0 degrees Celsius.

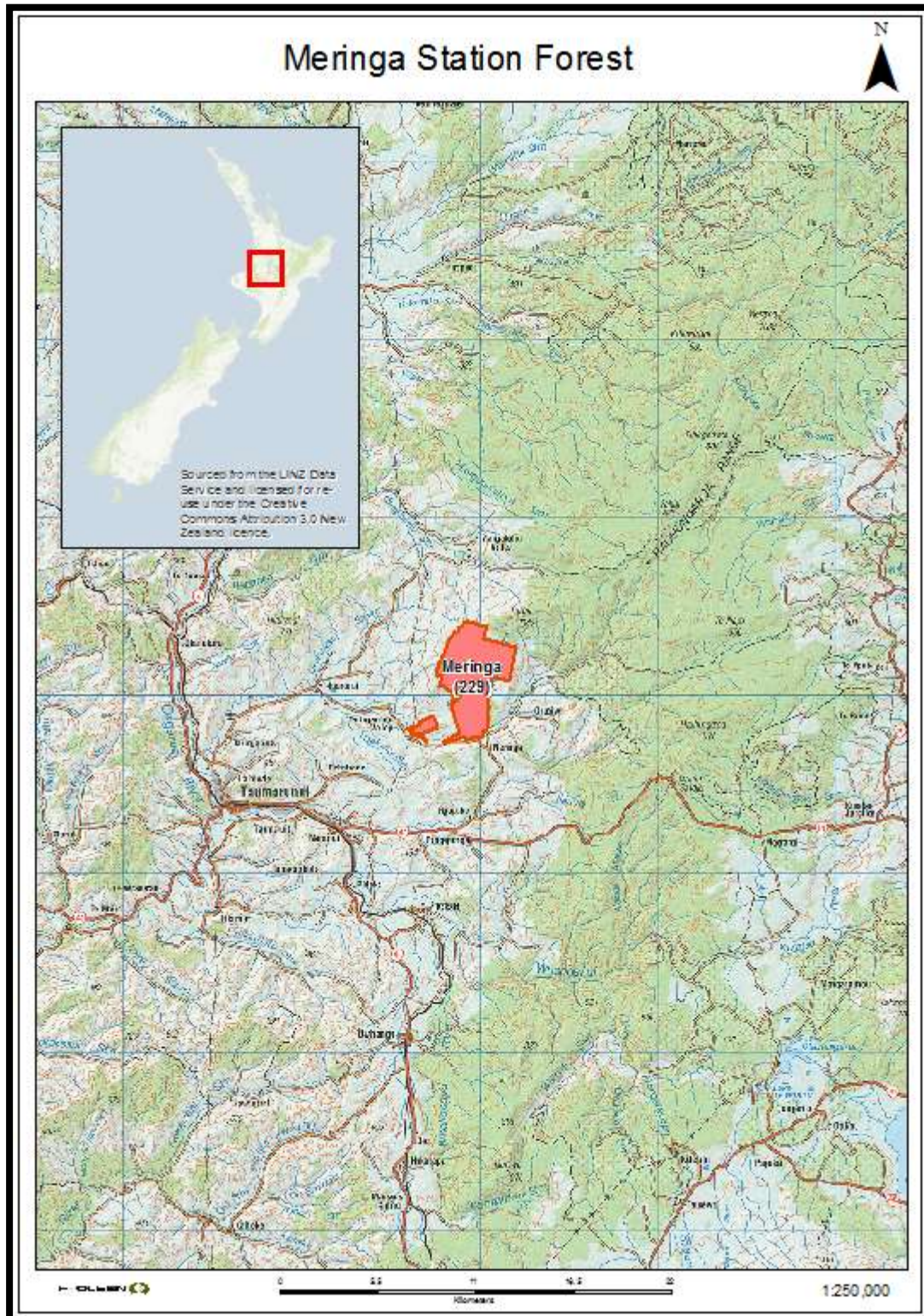
**Legal ownership**

Meringa Station consists of both freehold and leasehold tenure. There are no forests or reserves within the leasehold title. Table 2 lists the legal descriptions and tenure of Meringa Station.

**Table 2:** Land Tenure of Meringa Station

CT	Legal Description	Tenure	Owner
2007/39	Rangitoto Tuhua 67B4C1C2 Block	Freehold	Landcorp Farming Ltd
1498/61	Rangitoto Tuhua 67B4C1A Block	Freehold	Landcorp Farming Ltd
27A/950	Rangitoto Tuhua 67B3 Block	Freehold	Landcorp Farming Ltd
32D/455	Lot 4 Deposited Plan S 35496	Freehold	Landcorp Farming Ltd
32D/455	Rangitoto Tuhua 67B1 Block	Freehold	Landcorp Farming Ltd
32D/457	Part Rangitoto Tuhua 67B2 Block	Freehold	Landcorp Farming Ltd
32D/457	Lot 6 Deposited Plan S 35497	Freehold	Landcorp Farming Ltd
19B/209	Lot 1 Deposited Plan S 18439	Freehold	Landcorp Farming Ltd
32D/457	Lot 7 Deposited Plan S 35497	Freehold	Landcorp Farming Ltd
437871	Rangitoto Tuhua 67B4C2 Block	Leasehold	The Maori Trustee
415302	Rangitoto Tuhua 67B4A Block	Leasehold	Multiple owners

Map 1: Meringa Station Forest Location Map





## 4. The Ecological Landscape

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### The ecological landscape

Meringa Station is located entirely within the Taumarunui Ecological District (ED) in the King Country Ecological Region. The ED is extensive hill country within the upper catchment of the Wanganui River. It is generally steep, mostly over 300m a.s.l. and frequently above 600m a.s.l. The wide valleys are floored with pumiceous alluvium; elsewhere Miocene to Oligocene mudstone, sandstone, limestone and tuff.

The area was originally entirely podocarp-hardwood forest with podocarp dominance on the valley floors. Only scattered forest remnants remain, with a larger but well-logged tract on a rise up to the Hauhungaroa Range (up the Taringamotu and Pungapunga headwaters).

Today the ED is largely semi intensive sheep and cattle farmland, with small (but increasing) areas of exotic forest.

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### Protective status

The following table shows broad vegetation types as required by the Draft National Standard for Plantation Forest Management in New Zealand. Table 3 provides a breakdown of the indigenous vegetation areas on Meringa Station as characterised by their representation within the ecological district. Within the ecological district the total area of indigenous forest is 27 % and of this only 13 % is formally protected.

**Table 3:** Protective Status of the Ecological Landscape

Ecological District or LENZ type	Taumarunui ED
Original (pre-Māori) percentage of ecosystem type in Ecological District within land title	240,847 ha
Natural ecosystem area remaining	64,734 ha 27.0 %
Proportion of remaining natural ecosystem under protection	8,804 ha 13.60 %
Protection by PF Olsen as a % of ED	98.5 ha 0.15 %
Protected areas as a % of individual forest estate	98.5 ha 66.7 %

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### Threatened environments classification

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

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

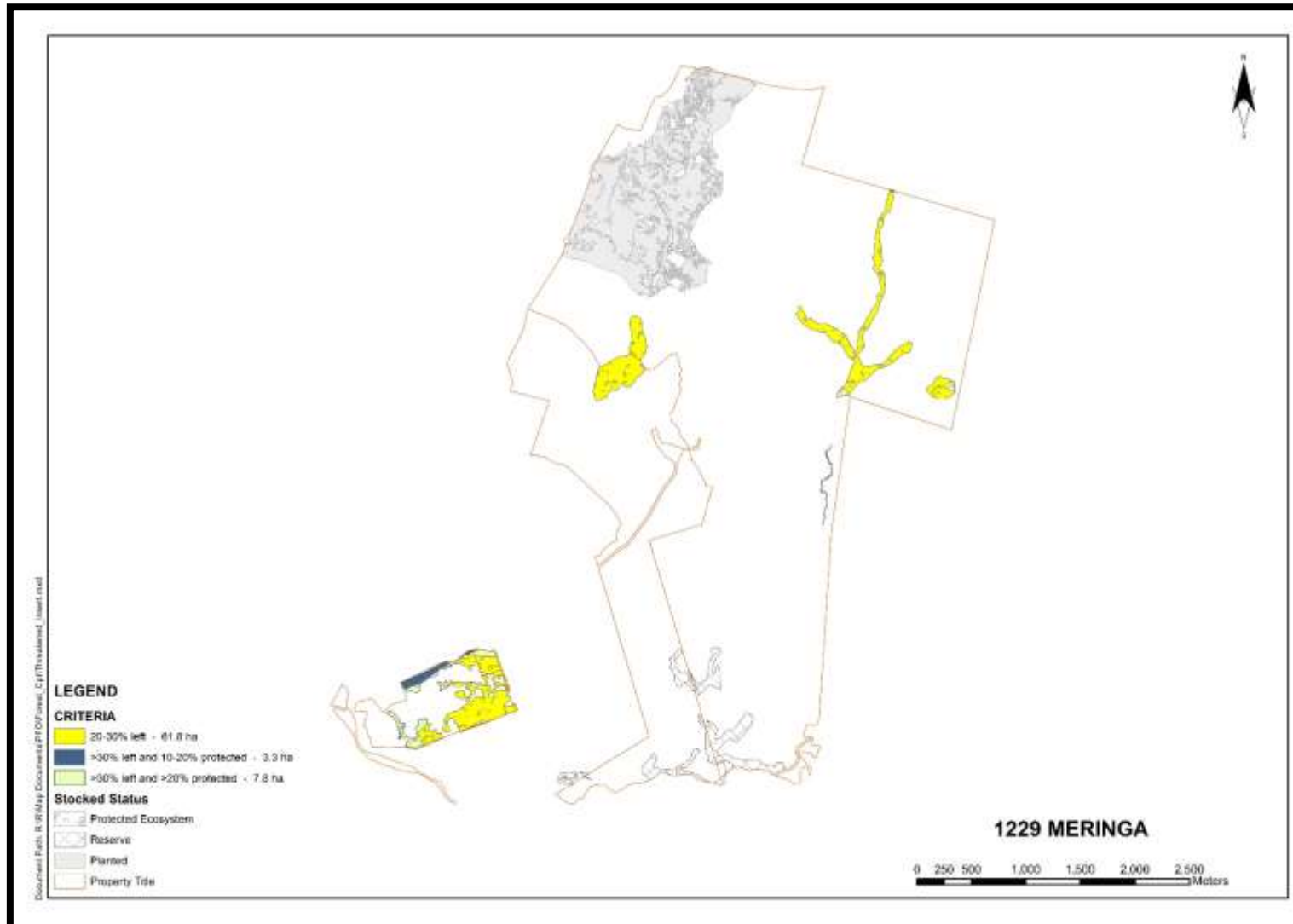
The TEC uses indigenous vegetation cover as a surrogate for indigenous biodiversity, which includes indigenous ecosystems, habitats, and communities; the indigenous species, subspecies and varieties that are supported by indigenous vegetation; and their genetic diversity. It uses legal protection as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

The following map (Map 2) and Table 4 illustrate that most of the protected ecosystems in the Meringa forests occur within environments for which between 20 and 30% of the original vegetation cover types still remain. Some further small riparian reserve areas also are in environments where greater than 30% of the original vegetation cover types remain and greater than 20% is formally protected.

**Table 4:** Reserve areas by Threatened Environments Classification

Threat Classification	Area (ha and %)
<10% indigenous cover left	
10-20% indigenous cover left	
20-30% indigenous cover left	61.8 ha 84.8%
>30% left and <10% protected	
>30% left and 10-20% protected	3.3 ha 4.5%
>30% left and >20% protected	7.8 ha 10.7%
<b>TOTAL</b>	<b>72.9 ha 100%</b>

Map 2: Forest by Threatened Environments Classification



## 5. Socio-economic Profile and Adjacent Land

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### Forest history

Meringa Station is a sheep and beef pastoral farming operation with primary focus on lamb finishing complimented by beef breeding and finishing and a ewe flock.

Forestry was established on the station by the previous owner primarily for the purpose of soil conservation. An additional benefit of the forest stands is as shelter for stock and pastoral growth is also improved through shelter from the wind.

The area established in forest was predominantly a low productivity site in agricultural terms due to the instability of the slopes and potential for slips and erosion.

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### Current social profile

Meringa Station forest is a small, currently passive, incremental contributor to the social profile of the area. The land and forests are privately owned. Contribution to the local economy by way of added incremental employment and infrastructure is small.

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### Tenure & resource rights

There are no forests or reserves that are subject to iwi tenure or resource rights.

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### Associations with Tangata Whenua

In the 11/16 management plan, Horizons Regional Council identified three iwi organisations that may have an interest in Meringa Station:

- Hinengakau Development Trust (Whanganui iwi)
- Ngāti Tuwharetoa Māori Trust Board
- Tuhua-Hikurangi RMC (Ngāti Maniapoto).

Each group has been written to and has been included in our stakeholder register. When this plan was prepared, only the Tuhua-Hikurangi RMC (Ngāti Maniapoto) could be found in Te Kahui Mangai<sup>1</sup>, the Directory of Iwi and Māori Organisations.

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<sup>1</sup> <http://www.tkm.govt.nz/>

## Neighbours

Neighbours to the forest estate boundaries have a special relationship interest in the management of the forest(s). Activities within the forest may positively or negatively impact upon their quality of life or businesses in a number of ways, while inappropriately managed operations could create risks of adverse health, safety and environmental hazards. Neighbours may use the forests for recreational purposes or place reliance on the forests for provision of water quality or quantity services. Boundary issues such as weed and pest control, access and boundary alignment issues may also involve neighbours.

Table 5 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 map of neighbour locations can be found in Appendix 1.

**Table 5:** Meringa Station Neighbours

Name	Address	Activities
Jefferis Ngapuke Ltd	Michelle and Neil Jefferis Ngakonui-Ongarue Road RD 4 Taumarunui 3994	Pastoral Farming
Simon Virtue	Mangakahu Valley Road RD 4 Taumarunui 3994	
VJ and LM Cuttance	Waituhi Road RD 4 Taumarunui 3994	
BP and MC Leslie	31b Waituhi Road RD 4 Taumarunui 3994	
M Hayes	Waituhi Road RD 4 Taumarunui 3994	
MK Smith	1862a Taumarunui-Ngapuke Rd RD 4 Taumarunui 3994	
Manunui Station (Puketapu 3A)	Managers Residence Taumarunui-Ngapuke Rd RD 4 Taumarunui 3994	Pastoral Farming
NJ and A Kelland	Taumarunui-Ngapuke Rd RD 4 Taumarunui 3994	
R Richards	Taumarunui- Ngapuke Road RD 4 Taumarunui 3994	
Waituhi Holdings Ltd	C/- C Walker 1440 Taumarunui- Ngapuke Rd RD 4 Taumarunui 3994	Pastoral Farming
Motunau Farms Ltd	Waitangi Station Taumarunui- Ngapuke Rd RD 4 Taumarunui 3994	Pastoral Farming

## 6. The Regulatory Environment

### Regulatory considerations

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

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

### Resource Management Act

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

Under the RMA, Meringa Station Forest falls under the Ruapehu District Council for land management issues and the Horizons (Manawatu-Wanganui) Regional Council for soil conservation and water quality issues.

### District Plan

Meringa Station falls under the jurisdiction of the Ruapehu District Council. The current plan was notified on 24<sup>th</sup> December 2014.

Under the plan this block is zoned rural and forestry is a permitted activity. The District Plan rules specific to forested areas of Meringa Station are detailed in Table 6 below.

**Table 6:** District Plan Rules That Affect Forestry

Ruapehu District Council - District Plan (October 2013)			
Section	Rule Ref	Activity	Requirement
Rural Zone	RU 3.3.6 (a)	Noise	Harvesting may exceed the noise control rule during the hours of 7am-10pm.
	RU 3.3.10 (d)	Future Urban Area	No forestry activities shall be undertaken in the Future Urban Area.
	RU 3.4.1 (a)-(d)	Forestry Activities	No planting within 75m of residential zone, 45m of urban settlement zone, 25m of the northern boundary of three type of properties, 10m of all other boundaries, or where shading of carriageway or buildings occurs.
	RU 3.4.5 (g)	Fire	Firefighting equipment readily available.
	RU 3.4.5 (j)	Earthworks	Not within 20m of banks of a waterway.

**Regional Plan**

The forest comes under the jurisdiction of Horizons (Manawatu- Wanganui) as the Regional Council. The latest Horizons Proposed One Plan became operative on 19 December 2015<sup>2</sup>.

The Horizons One Plan rules as they currently affect Meringa Station forest are detailed in Table 7 below. The rules affecting forestry are largely permitted “subject to conditions”. These conditions must be carefully read and understood to ensure full compliance. Where they cannot be met a Resource Consent will be needed.

**Table 7:** - Horizons Regional Plan Rules That Affect Forestry  
- One Plan, Operative Version, December 2015.

Rule Reference	Activity	Classification	One Plan Reference
13-1 Small-scale land disturbance	Except as regulated by Rules 13-6, 13-8 and 13-9, any land disturbance pursuant to s9(2) RMA of a total area up to 2500 m <sup>2</sup> per property per 12-month period and any ancillary: <ul style="list-style-type: none"> <li>a) diversion of water pursuant to s14(2) RMA on the land where the land disturbance is undertaken, or</li> <li>b) discharge of sediment into water pursuant to s15(1) RMA resulting from the land disturbance.</li> </ul>	Permitted	Chapter 13, page13-6
13-2 Large-scale land disturbance, including earthworks	Except as regulated by Rules 13-6, 13-8 and 13-9, any land disturbance pursuant to s9(2) RMA of a total area greater than 2500 m <sup>2</sup> per property per 12-month period and any ancillary: <ul style="list-style-type: none"> <li>a) diversion of water pursuant to s14(2) RMA on the land where the land disturbance is undertaken, or</li> <li>b) discharge of sediment into water pursuant to s15(1) RMA resulting from the land disturbance.</li> </ul>	Controlled	Chapter 13, page 13-7

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<sup>2</sup> <http://www.horizons.govt.nz/about-us/one-plan/one-plan-operative-version/>

...continued

13-3 Forestry	<p>Except as regulated by Rule 13-8 and 13-9, any forestry pursuant to s9(2) RMA, and any ancillary:</p> <ul style="list-style-type: none"> <li>a) disturbance of the bed of a river or lake pursuant to s13(1) RMA by forestry, or</li> <li>b) diversion of water pursuant to s14(2) RMA on the land (but not within a river) where the forestry is undertaken, or</li> </ul> <p>discharge of sediment or slash into water or onto or into land that may enter water pursuant to s15(1) or 15(2A) RMA resulting from the forestry.</p>	Permitted	Chapter 13, page 13-8
13-5 Vegetation Clearance	<p>Except as regulated by Rules 13-6, 13-8 and 13-9, any vegetation clearance pursuant to s9(2) RMA and any ancillary:</p> <ul style="list-style-type: none"> <li>a) diversion of water pursuant to s14(2) RMA on the land where the vegetation clearance is undertaken,</li> <li>b) discharge of sediment into water pursuant to s15(1) RMA resulting from the vegetation clearance.</li> </ul>	Permitted	Chapter 13, page 13-11
14-18 Discharges of stormwater to surface water and land	<p>The discharge of stormwater into surface water pursuant to s15(1) RMA or onto or into land pursuant to ss15(1) or 15(2A) RMA, and any ancillary takes or diversions of stormwater pursuant to s14(2) RMA forming part of the stormwater system.</p>	Permitted	Chapter 14, page 14-31
15-1 Small-scale application of agrichemicals	<p>The discharge of agrichemicals into air or onto land from the use of a hand-held appliance pursuant to ss15(1) or 15 (2A) RMA.</p>	Permitted	Chapter 15, page 15-5
15-2 Widespread application of agrichemicals	<p>The discharge of agrichemicals into air, onto land, or into water pursuant to ss15(1) or 15 (2A) RMA, except as permitted under Rule 15-1.</p>	Permitted	Chapter 15, page 15-5
15-3 Small-scale and widespread application of vertebrate pest control products	<p>The discharge of vertebrate pest control products into air or onto land from the use of a hand-held appliance or by way of hand dispersal and the discharge of vertebrate pest control products into air or onto land by all other means pursuant to s15(2) RMA.</p>	Permitted	Chapter 15-7



**Proposed National Environmental Standard for Plantation Forestry**

Likely to come into effect during the period which this plan covers is the Proposed National Environmental Standard for Plantation Forestry (NES-PF). If implemented, the NES-PF would replace councils' existing district and regional plan rules for managing plantation forestry. The benefit of this national standard is that it would provide a consistent approach across the country that is responsive to local environments. This should result in improved environmental outcomes and more efficient forest management.

**Cultural, historic and archaeological sites**

Under the *Heritage New Zealand Pouhere Taonga Act* 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. Where such circumstances exist, an "Authority to Modify or Destroy" will be sought from Heritage New Zealand Pouhere Taonga (HNZ). Such authorities are similar in function to a resource consent and if granted, normally come with conditions that must be met. The process to apply for authorities is documented in PF Olsen's EMS. Note also that Consents to modify an archaeological site may sometimes be required from the local District Council.

Records of archaeological and historical places are maintained in the NZ Archaeological Association Site Recording Scheme run by HNZ. These sites are often included in schedules of places and sites of significance in District plans along with sites of cultural significance.

If a site is found or suspected on any block, the protocols specified in PF Olsen's EMS, and any others specifically developed in conjunction with HNZ and Iwi or other stakeholders must be observed.

There are no recorded sites present within or immediately adjacent to the boundaries of this property.

**Consents & authorities held**

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

At the time of harvest planning any required consents will be obtained. There is no harvesting planned for the period of this management plan.

**The Emissions Trading Scheme**

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

Meringa Station forest contains no area of forest that was existing as at 31<sup>st</sup> December 1989, therefore no areas that are liable for a deforestation tax.

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The entire area of forest was planted on “Kyoto compliant” land that was vacant as at 31<sup>st</sup> December 1989. These forest areas have been registered to participate in the NZ Emissions Trading Scheme and are subject to the accrual of emissions credits and liabilities under that scheme.

**The ETS is currently under review and the impact of this review is unknown.**

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**Environmental Code of Practice**

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

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**Forest Road Engineering Manual**

Roading and engineering techniques employed within the forest should conform to the industry best practice as outlined in the New Zealand Forest Owners Association publication, “NZ Forest Road Engineering Manual”, published 2012.

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**Other relevant legislation**

Other relevant legislation in relation to the growing and harvesting of the tree crop are:

- Accident Compensation Act 2001 #49
- Animal Welfare Act 1999
- Biosecurity Act 1993
- Climate Change Response Act 2002
- Commercially relevant statutes
- Conservation Act 1997
- Crown Forest Assets Act 1989
- Fencing Act 1978
- Forests Act 1949
- Forests Amendment Act 1993 (Forests Act 1949)
- Forest and Rural Fires Act 1989
- Forestry Rights Registrations Act 1983
- Freshwater Fisheries Regulations 1983
- Hazardous Substances and New Organisms Act 1996
- Health and Safety at Work Act 2015
- Heritage New Zealand Pouhere Taonga Act 2014

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- Injury Prevention, Rehabilitation and Compensation Act 2001
- New Zealand Coastal Policy Statement.
- New Zealand Forest Accord
- Noxious Plants Act 1978
- Pesticides Act 1979
- Protected Objects Act 1975
- Reserves Act 1977
- Resource Management Act 1991
- Soil Conservation and River Control Act 1971
- The Treaty of Waitangi Act 1975
- Trespass Act 1980
- Wildlife Act 1953

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

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## FOREST MANAGEMENT

### 7. Forest Estate Description

**Forest area** The net stocked areas have been measured from a map produced by PF Olsen (Section 9 - Forest Stands Map). The estimated net stocked areas of each stand are set out in Table 8.

**Table 8:** Area Statement

Gross area	Net Stocked Area (ha)	Area awaiting restocking	Reserves (ha)	Protected Ecosystems (ha)
246.0	147.5	Nil	25.6	72.9

**Current species** The species grown at Meringa Station Forest is *Pinus radiata* (radiata pine).

Re-establishment will aim to use high quality tree stocks suitable for the site and market. These will be investigated at establishment. There is no establishment planned during the period of this management plan.

**Productivity indices**

Site index and 300 index are measures of productivity of a site in terms of height growth and timber stock on unit area of radiata pine. The parameter used for site index 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) of 300 stems per hectare.

Site index for this stand is 34.68 m on average, and ranges between 29.57 m and 40.38 m. 300 index is 30.14 m<sup>3</sup>/ha/year on average, and it ranges between 26.31 and 33.45 m<sup>3</sup>/ha/year.

The Meringa Station's productivity is among the medium to high end of the general locality.

**Current crop status**

Inventory of stand 3-01 was recorded in May 2014 but measurement data of stand 4-01 was not updated since last inventory in April 2006. This is summarised in Table 9.

**Table 9:** Current Crop Status

Stand	Year Planted	Total Stocking (sph)	BA (m <sup>2</sup> /ha)	MTH (m)	Mean DBH (cm)	Pruned Stocking (sph)	Pruned Height (m)
3-01	1993	264					
4-01	1993	277					

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A sampling programme nearer to harvest time is recommended to determine actual pruned log quality, as pruning was not controlled by PF Olsen and there are no records of DOS (diameter over stubs).

In October 2014, 1.9 ha of Manuka was planted in reserved area and a survival assessment was followed up at March 2015. Results of this assessment are in Table 10.

**Table 10:** Manuka Survival Assessment

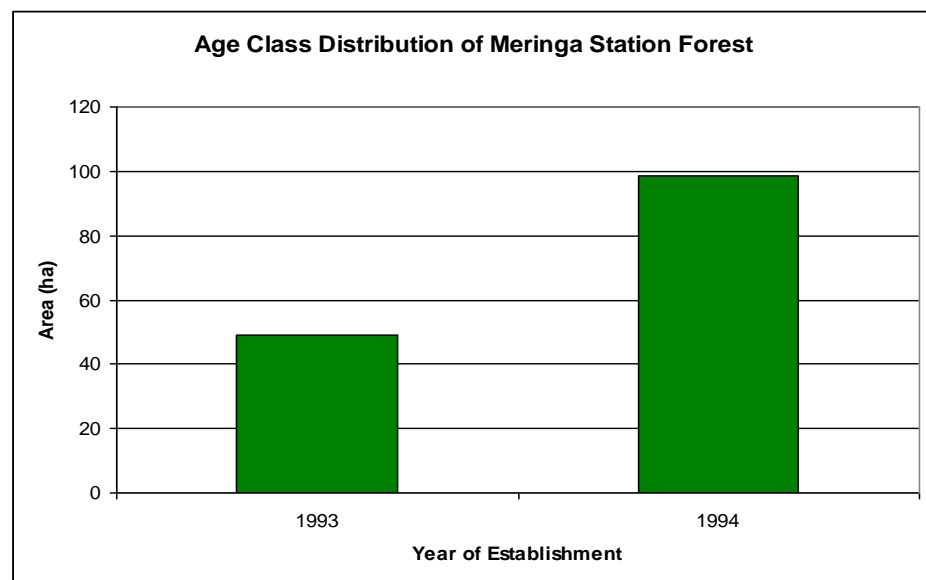
Establish year	Species	Area (ha)	Survival rate %	Mortality rate %	Missing rate %	Weed competing %
2014	Manuka	1.5	84	10	6	0
2014	Manuka	0.4	70	24	6	0

When management by PF Olsen commenced in 2006, a large amount of historical goat damage was noted in both stands of Meringa Station forest. In 2014 when PF Olsen commenced inventory for stand 3-01, some windthrow was found in that stand.

**Age class distribution**

The current age class distribution of Meringa Station forest is illustrated in the figure below.

**Figure 1:** Age Class Distribution of Meringa Station forest



## 8. Reserve areas and significant species

### Introduction

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

### Reserve areas

Meringa Station forest contains 28.4ha of remnant podocarp- hardwood forest. The predominant species are *Podocarpus totara* with incidence of *Dacrycarpus dacrydioides*, *Dacrydium cupressinum*, *Beilschmiedia tawa*, *Knightia excelsa*, *Cordyline australis*, *Sophora tetraptera* and *Pseudopanax crassifolius*. The understorey has been degraded due to past grazing by stock.

Meringa Station also contains 44.5ha of regenerating *Leptospermum* scrubland on steep faces. While unfenced, stock is naturally excluded due to topography though there are plans to fence parts of one of the larger area.

There is also 23.7ha of riparian reserve zones that have been planted in exotic species (willow and poplar) for stream bank soil conservation purposes. There are large native trees and scattered regeneration amongst some of these exotic plantings, and in the long term the removal of exotic species can be considered, provided soil stabilisation objectives are met by native ground cover. In October 2014, another 1.9 ha of Manuka was planted and total reserve zone area increased to 25.6 ha.

The protected ecosystems area are shown on the Forest Stands Map in Section 9 and in Table 11 below.

**Table 11:** Protected Ecosystems of Meringa Station Forest

GeoUnit	Area	Protective Status	Protective Function	Forest Type	LENZ Remaining %	LENZ Protected %	Ranking	Protection category
MERI-SECF-03	3.8	NZ Forest Accord	Terrestrial Ecosystem	Warm lowland softwoods	60.0	58.2	256	Passive
MERI-SECF-04	4.5	NZ Forest Accord	Terrestrial Ecosystem	Warm lowland softwoods	60.0	58.2	256	Passive

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GeoUnit	Area	Protective Status	Protective Function	Forest Type	LENZ Remaining %	LENZ Protected %	Ranking	Protection category
MERI-SECF-05	20.1	NZ Forest Accord	Riparian Ecosystem	Warm lowland softwoods	60.0	58.2	4096	Full
MERI-SCRB-01	11.5	Passive	Terrestrial Ecosystem	Manuka/Kanuka/broadleaf	33.8	55.6	32	Passive
MERI-SERB-02	33.0	Passive	Terrestrial Ecosystem	Manuka/Kanuka/broadleaf	33.8	55.6	32	Passive
MERI-0901-RS01	17.1	Other	Erosion Control					
MERI-0902-RS02	3.9							
MERI-0903-RS03	2.7							

As the individual indigenous vegetation remnants in the estate are relatively small, fragmented and heavily modified from past farming, they are of relatively lower ecological significance and represent ecological environments that are still relatively well represented. However, the one stand containing warm lowland podocarp sequences, the species of which are relatively sparse in the general locality is ranked higher for that reason. Overall, all these areas do cumulatively add to a not insignificant area and are associated with steep riparian catchment areas. As such they have value and most importantly, with fencing will regenerate naturally overtime to mature, good quality, high forest representative of lowland podocarp hardwood forest that used to predominate in the area prior to agricultural development.

### **Riparian reserves**

A standardised GIS-based stream classification system has been developed specifically for PF Olsen, based on NIWA’s River Environment Classification (REC) and Freshwater Environments of New Zealand (FWENZ) models. Categorisation of each stream reach is done by the physical characteristics of the particular reach, e.g. underlying geology, streambed slope, climate, and reach order. Each stream category corresponds with a set of rules in the EMS that apply to operations occurring near the riparian reserve.

The stream categories within the Meringa Station forest are summarised in Table 12 below.

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**Table 12:** Riparian Reserve Categories

Category code	Category name	Total length (km)
LLWH	Large low wet hard	4.39
LLWS	Large low wet soft	3.58
LMWS	Large mod wet soft	0.14
MLWH	Med low wet hard	13.24
MLWS	Med low wet soft	1.14
MMWH	Med mod wet hard	1.24
SLWH	Small low wet soft	4.02
SLWS	Small low wet soft	3.67
SMWH	Small mod wet hard	0.04
VLWH	Very Small low wet hard	0.03
VLWS	Very Small low wet soft	0.28
<b>Total riparian length (km)</b>		<b>31.76</b>

**Rare and threatened species**

Due to the current degraded state of reserve areas, to date there have been no sightings of rare and threatened species.

Fencing and retirement activities will have the effect of increasing the connectivity of the Meringa Station reserves. Over time this may result in the re-introduction of rare species that are present elsewhere in the Taumarunui ecological district, and generally provide for better habitat conditions for native species such as Kereru and the New Zealand Falcon.

Any future sightings of species will be recorded and maintained in the FIPS rare species database and in the database of rare species sightings is maintained for the NPI forest estate and will contribute to the national plantation database being implemented by the plantation forest industry. <http://naturewatch.org.nz/projects/biodiversity-in-plantations>.

**CITES species**

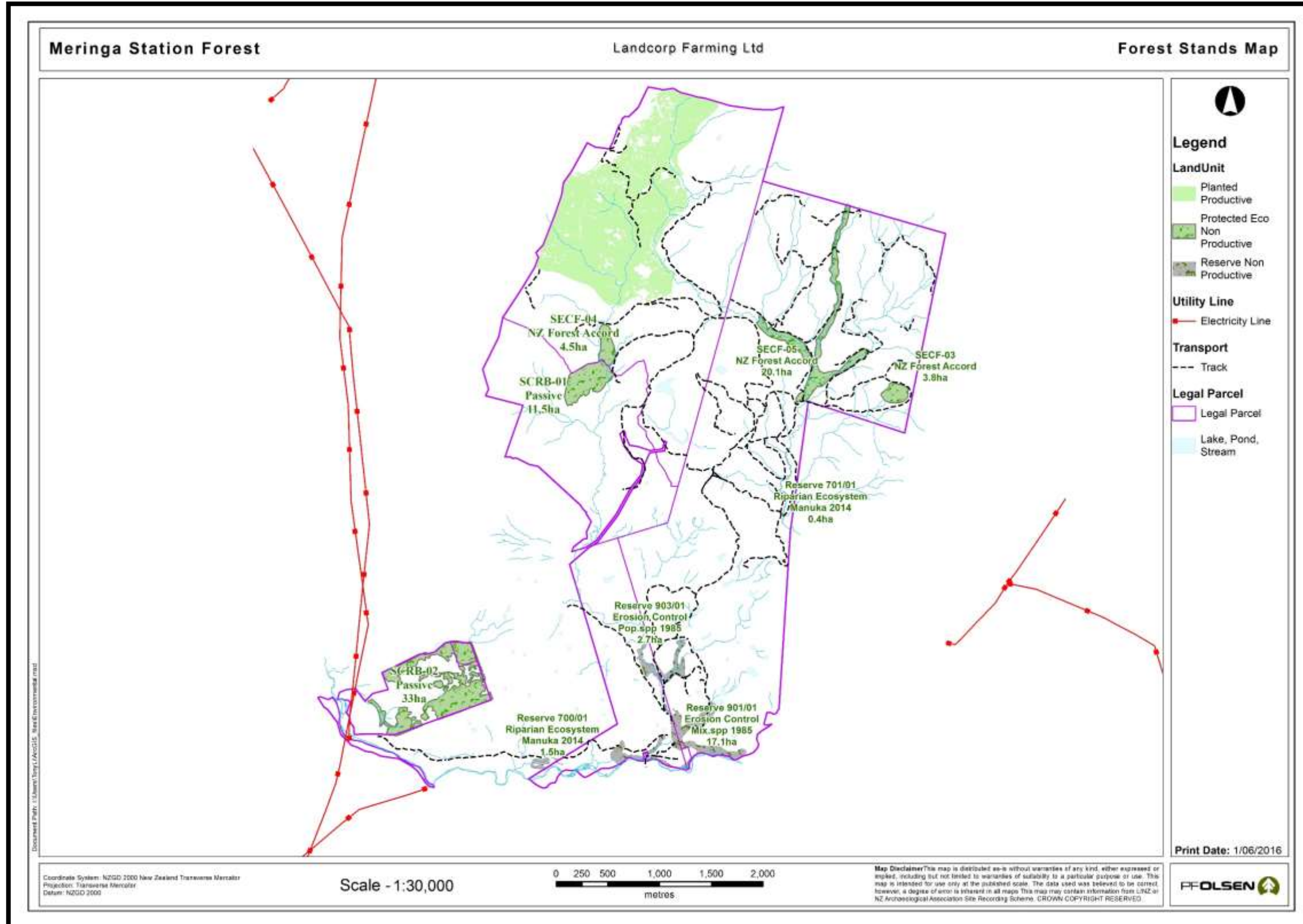
CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international agreement between governments.

Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten the survival of the species in the wild, and it accords varying degrees of protection to more than 34,000 species of animals and plants.

The full list of New Zealand CITES listed species are available in the EMS, or online at <http://www.doc.govt.nz/about-doc/role/international/endangered-species/cites-species/nz-cites-listed-species/>.



Map 3 - Forest stands map



## 9. Non-Timber Forest Products and Other Special Values

### Introduction

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

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

### Environmental and social cost-benefit analysis

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

The table below rates the relative positivity and negativity of the more common social and environmental products produced by Meringa Station forest relative to the most likely alternative primary production system, pastoral dry stock farming.

**Table 13:** Environmental and Social Cost-benefit Analysis

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

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

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**Non-timber forest products**

There are currently no non-timber products being produced or developed in Meringa Station Forest.

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**Other special values**

No other special values have been identified in Meringa Station Forest.

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**Recreational usage**

Recreational usage of Meringa Station Forest is generally reserved for farm staff and neighbours due to security and health and safety concerns. The forest is used for recreational horse and motorbike rides, or to recreationally shoot goat and deer.

The forest does receive some recreational demand from the wider public. Occasionally horse trekkers will pass through the forest and farm as part of a larger trek through the region.

The forest will continue to be open for legitimate use subject to entry by permit. For the last management plan period between 1<sup>st</sup> January 2011 and 31<sup>st</sup> December 2015 no forest access or hunting permits were issued.

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## 10. Environmental Risk Management

### Assessment of environmental risks

Several areas of typical forest management have been identified as posing a possible environmental risk within the NPI forests. The Environmental Assessment Matrix (Table 14) below summarises the identified risks for the NPI forests. The level of risk has been evaluated in the matrix as high ‘H’, medium ‘M’, low ‘L’, or not applicable ‘NA’.

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

**Table 14:** Environmental Risk Assessment Form

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

**Hazardous substances management**

Hazardous substances are any substances, which may cause adverse environmental impacts and/or injury or health problems if incorrectly handled or used.

The hazardous materials which may be used on Meringa Station Forest are:

- Pesticides
- Fuels
- Oil
- Fire retardants
- Surfactants

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

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

**FSC highly hazardous chemicals**

There are five agrichemicals that have been classified ‘highly hazardous (HH)’ by FSC that are used in forestry and conservation operations within PF Olsen certified forests. All these five have only recently been added to FSC’s HH list. Special derogations to continue usage of these chemicals, subject to conditions, are being applied for by PF Olsen in conjunction with the wider NZ certified industry. These chemical pesticides are listed in Table 15 below.

The ‘derogation’ process is run according to specific policies put in place by FSC, including extensive canvassing of stakeholder views. This part of the process has been completed as at September 2015 and formal derogation applications will be lodged with certifying bodies by December 2015.

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Two other highly hazardous vertebrate pesticides, sodium cyanide and 1080 are occasionally used in parts of the FSC Group estate. Such use is undertaken under the statutory controls exercised by the Animal Health Board who apply directly to FSC for temporary derogations if and when needed. Historically these have not been used at Meringa.

At the same time as the five new chemicals were added to the HH list two commonly used forest establishment herbicides, terbuthylazine and hexazinone were removed from the list. Derogations are no longer required for them.

**Table 15:** Highly Hazardous Chemicals used by PF Olsen

Active ingredient	Purpose	Common usage
Copper based products	Fungicide	Needle cast control
Picloram	Herbicide	Establishment weed control
Carbaryl	Insecticide	Localised wasp control
Colecalciferol	Vertebrate pesticide	Localised possum control
Pindone	Vertebrate pesticide	Rabbit and Hare control
Use subject to AHB emergency provisions only		
Sodium cyanide	Vertebrate pesticide	Animal Health Board only, ground based possum control
Sodium Monofluoroacetate (1080)	Vertebrate pesticide	Animal Health Board only, extensive aerial possum control

All chemical use is tracked in PF Olsen’s FIP’s chemical active ingredient tracking system.

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## **11. Commercial Crop Establishment and Silvicultural Operations**

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### **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.

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### **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 of finger jointing. The small logs and those with defects and excessive knots can be used for pulp and paper, MDF and other reconstituted wood products such as tri-board and particle board.

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

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

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### **Other species**

Alternative species including Manuka may be considered at the time of re-establishment especially for small areas where erosion control is the prime goal.

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### **Establishment**

There is no new establishment planned at Meringa Station forest during the period of this management plan.

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**Pre-establishment forest flora and fauna**

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

Adjustments in planting may be required to accommodate improved environmental outcomes in the subsequent rotation, including the extension of an existing wildlife corridor or riparian area by increasing setbacks at the time of crop replanting.

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

**Tending**

The tending regime executed at Meringa Station Forest is a clearwood regime. Tending is complete and there are no further silvicultural operations required.

**Tree nutrition**

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

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

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



## **12. Forest Inventory, Mapping and Forest Records**

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### **Inventory**

Forest growth and development is monitored through regular forest inventory. Forest inventories providing stand information are required at different times and for different reasons throughout the life of the rotation. PF Olsen have developed procedures for each of the following four types of inventory to be applied on Meringa Station Forest:

- Pre-assessment: for silvicultural 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; and
  - Pre-harvest: to obtain estimates of recovery by log grade.
- 

### **Mapping**

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

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

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

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### **Forest records**

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

Meringa forest estate records are currently maintained on PF Olsen’s own stand record system. These record systems allow for retrieval of information, production of reports and statistics and provide a comprehensive audit trail.

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## 13. Harvesting Strategy and Operations

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### **Harvesting strategy**

The harvesting strategy for radiata pine employed at Meringa Station forest is to harvest the tended forest stands as close as possible to their optimum economic age as practical. This is the age at which the growth in volume and improvement in quality is offset by the cost to maintain the forest for another year. The optimum rotation length for radiata pine is expected to be within 25 to 30 years. Stands where minimal tending has been completed may be harvested earlier, particularly when relevant markets are favourable.

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

It is anticipated that harvesting for the total Meringa forest estate will be, if not actually undertaken, operationally planned over the course of this plan.

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### **Getting harvest ready**

Forward planning is essential when considering harvesting activities. Harvest planning should ideally commence 2 years before harvesting to enable roading infrastructure to be developed and any resource consents, archaeological surveys, etc. to be undertaken. This reduces the chance of hold-ups to the commencement of harvesting, which can be costly when log prices are fluctuating.

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

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

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## 14. Property Management and Protection

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**Plant pest statutory obligations**

Plant pest management within Meringa Station forest is subject to statutory obligations under the Horizons Regional Council Combined Regional Pest Management Plan and Strategy 2015 – 2035<sup>3</sup> (under review, August 2015) administered by the Horizons (Manawatu-Wanganui) Regional Council.

The strategy applies to pest plants and categorises them in terms of management objectives. The categories are summarised in Table 16. A complete list of pest plant species under the Combined Regional Pest Management Plan and Strategy 2015 – 2035 is contained in Appendix 2.

**Table 16:** Plant Pest Categories and Objectives

Pest Category	Objectives
<b>Exclusion</b>	Where the outcome for the programme is to prevent the establishment of the subject that is present but not yet established in New Zealand or the region.
<b>Eradication</b>	Means those pests that are to be managed under an eradication programme.  Eradication pest plants are of limited distribution or density in the region or part of the region, for which the eventual goal is eradication at known sites in the region.
<b>Progressive Containment</b>	Where the outcome for the programme is to contain and reduce the geographic distribution of the subject to an area over time.
<b>Sustained Control</b>	Where the outcome for the programme is to provide for the sustained control of the subject in an area to a level where externality impacts are manageable.

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<sup>3</sup> <http://www.horizons.govt.nz/assets/managing-our-environment/publications-plans-and-strategies/HRC-Combined-Regional-Pest-Management-Plan-Strategy-2015-25-final.pdf>

**Animal pest control**

Animal pest management within Meringa Station forest is also subject to statutory obligations under the Combined Regional Pest Management Plan and Strategy 2015 – 2035 administered by the Horizons (Manawatu-Wanganui) Regional Council.

A full list of the pest animal species under the Combined Regional Pest Management Plan and Strategy 2015 – 2035 is contained in Appendix 3.

The main animal pests in Meringa Station Forest are the introduced possum and goats.

Possum attack the growing tips of both plantation and native trees, causing stem malformation and die back. Possums are also a threat to neighbouring property owners who are farmers as they can carry and spread tuberculosis to domestic stock. The Horizons management objective for possums is suppression aiming to reduce possums to numbers that do not affect regional values. There has been no pest control completed at Meringa Station by the Regional Council for Tb vector control for a number of years.

Goats will also chew the growing tips of young trees and strip bark of trees until the bark hardens. The Horizons management objective for goats is site-lead where a regional value is threatened. There is a high density of goats at Meringa Station forest which have caused damage to the existing tree crop. The trees have grown beyond susceptibility to damage, but intensive pest control will need to be considered for any new establishment.

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

Pest control has been undertaken in the protected ecosystems over the period of the last plan and this is anticipated to continue as required.

**Disease control**

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

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

**Protected ecosystems, reserves and species**

Over the term of the previous plan, the primary management objective that had also been included into the Horizons Whole Farm Plan for Meringa Station was a planned fencing programme for these forest remnants. This was to be undertaken in conjunction with QEII Trust to exclude stock and retire the land. The fencing would allow regeneration of the understorey and increase connectivity and ecological value of the remnants.

This work has been almost completed and the intervention will have the long term effect of encouraging the re-establishment of some declining flora and fauna into Meringa Station. The new fence lines data has been mapped.

Over the period of this plan the key management proposed will be:

- a continuation of ground based pest control as required
- the installation of some periodic photopoints to monitor the recovery of the reserves and especially Secf-05.

**Ecological equivalence**

The area of reserves is 72.9.6 ha and total productive area is 147.5 ha. As such the reserve set-aside threshold for FSC conformance of >10% reserves on an Ecological District basis has been easily met.

**Fire prevention and control**

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

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

**Forest management requirements**

The following forest management practices may be employed to assist fire prevention measures:

1. Develop suitable internal access systems, predominantly tracking, but road construction at a later stage.
2. Maintain existing firebreaks and develop others as the need arises.
3. Time silvicultural operations to minimise the potential of fuel build-up and for better control of work activity.
4. Have forest areas grazed where fuel build-up can be reduced.
5. Endeavour to control access, and limit only to legitimate land users. Promote public awareness through appropriate signage.
6. Develop a “fire plan” that encompasses prevention, detection and control procedures.

**Fire authority responsibilities**

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

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

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

**Fire insurance**

If a fire originates within the forest, the owners will ultimately be liable for suppression costs. A major fire may cost many thousands of dollars to extinguish, with the main costs being the use of heavy machinery, helicopters, and manpower.

**Public liability  
insurance**

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

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## 15. Monitoring

### Introduction

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

### Values monitored

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

Environmental Process Monitoring Framework					
Monitored Element	Include √	Components	Data Source	Data medium	Reporting / Website frequency
Chemical usage	√	A.I usage/ Area overuse	operations supervisors	FIPS Form	On demand / annual
Consultation Activity	√	Complaints.	operations supervisors & planners	Form	Annual / annual
Environmental Incidents	√	Incident number / categories	operations supervisors	FIPS Form	On demand / annual
Flora & Fauna	√	Species & Status frequencies/ new finds.	operations supervisors, public, crews	FIPS Form	Annual / annual
Forest estate Structure	√	Area (plantation & Protected ecosystem)/ age-class/ species/forest type/protection status.	management plans/stand records	FIPS stand records	On demand / annual
Forest growth	√	PSP protocols / periodic inventory. ISO9001	contractors	To be established	Periodic-annual – not on web

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Forest Health	√	Disease & health	National Forest surveillance program <sup>4</sup>	document	Periodic-annual – not on web
FSC Membership	√	Block/ location/name	FIPS register	FIPS client database	On demand / annual
Health and safety statistics	√	LTI / accidents & incidents.	operations supervisors	FIPS	Monthly/ annual
Internal Audit CAR activity	√	Frequency * category	Auditor/s	FIPS Form	Annual / annual
Log Production	On harvest	Total logs/ FSC markets	log dockets	Woodtrack	On demand / annual
Operational monitoring	√	Audit trends/cause analysis	operations supervisors	FIPS Form	Monthly / annual
Pests	X	RTC / kill returns or other	supervisors /contractors	From farm manager	Annual where relevant
Protected Ecosystem Condition	√	Condition trends	supervisors /contractors	Photopoint	Tri-annual if restoration initiated through fencing
High Conservation Value forests	NA	Condition trends/photopoint monitoring	Contractors/ supervisors	NA	
Recreational & non-timber	√	Permits issued	Farm manager	FIPS Form	Annual / annual
Resource consents	NA	Number/compliance	operations planners	FIPS	6 monthly / annual
Stream Monitoring	NA	Clarity +/- other specific	supervisors /contractors	Spreadsheet	Monthly / annual where relevant
Environmental Training	√	Courses, numbers, names	Staff	FIPS Form	Annual/as relevant
Client satisfaction	√	Post-operation client survey	clients	Survey form	Post-operational /annual
Social survey	√	Demographics, values, work conditions	contractors	Survey form	3 yearly/

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### Financial

Budget versus expenditure is monitored through the PF Olsen FIPS system and presented to Landcorp Farming Ltd in the annual report and workplan. This information is not made public.

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<sup>4</sup> Forest health inspections are undertaken annually, by either Vigil or Forest Dynamics, through the NZ Forest Owners Association forest health scheme.

**Social**

Consultation with stakeholders has been undertaken and feedback from these stakeholders (and others as they become apparent) is monitored and would include actions undertaken to resolve disputes and issues should they arise.

In addition there is a full social survey of the contractor work force every three years.

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## **16. Future Planning**

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### **Introduction**

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

The next review date for this plan is: January 2021.

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

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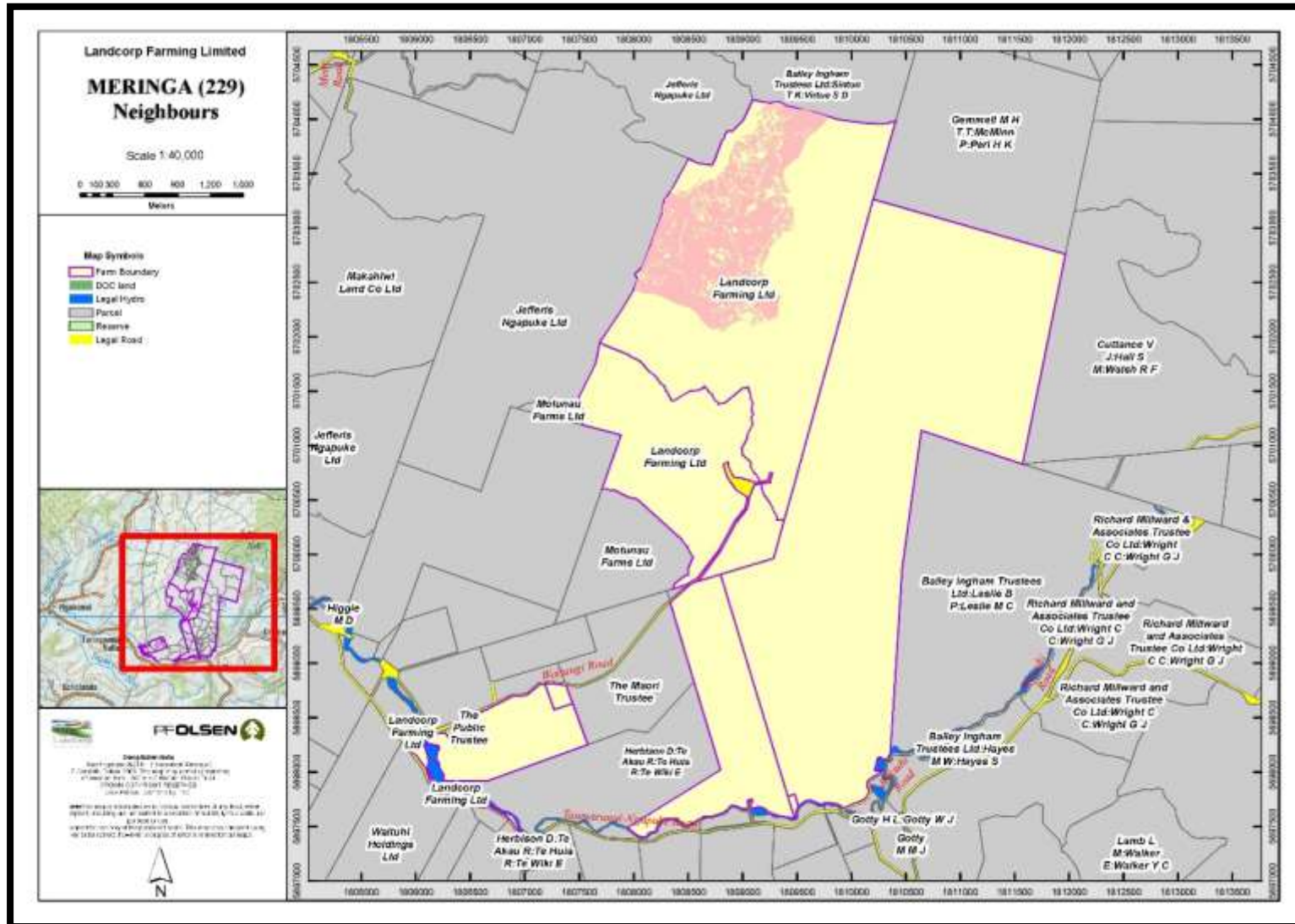
### **Operation plans**

For the short term we use Operation plans. These plans are prepared annually in accordance with this Management Plan. This operation plan and associated budget are subject to approval by Landcorp Farming Ltd at the beginning of each financial year.

Landcorp Farming Ltd financial year is 1<sup>st</sup> July – 30<sup>th</sup> June.

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**Appendix 1: Neighbours Location Map**



## Appendix 2: Horizons Plant Pests

Plant organisms classified as pests, their control programmes under the Horizons RPMP, and the agency responsible for management. The plants are listed alphabetically by common name. The page numbers quoted refer to the page in the Horizons RPMP on which the description of the species can be found.

Species	Exclusion	Eradication	Progressive Containment	Sustained Control
<b>African feather grass</b> (pg. 37) <i>Cenchrus macrourus</i>		✓ Horizons		
<b>Alligator weed</b> (pg. 37) <i>Alternanthera philoxeroides</i>		✓ Horizons		
<b>Arrowhead</b> (pg. 37) <i>Sagittaria montevidensis</i>		✓ Horizons		
<b>Australian sedge</b> (pg. 43) <i>Carex longebrachiata</i>			✓ Occupier	
<b>Banana passionfruit</b> (pg. 43) <i>Passiflora species</i>			✓ Horizons	
<b>Blackberry</b> (pg. 43) <i>Rubus fruticosus agg.</i>			✓ Occupier	
<b>Blue passion flower</b> (pg. 37) <i>Passiflora caerulea</i>		✓ Horizons		
<b>Bladderwort</b> (pg. 35) <i>Utricularia gibba</i>	✓ Horizons			
<b>Boneseed</b> (pg. 43) <i>Chrysanthemoides monilifera</i>			✓ Horizons	
<b>Broom species (exotic)</b> (pg. 43) <i>Cytisus scoparius, Calicotome spinosa Genista monspessulana, Spartium junceum</i>			✓ Occupier	
<b>Californian bullrush</b> (pg. 35 ) <i>Shoenoplectus californicus</i>	✓ Horizons			
<b>Cathedral bells</b> (pg. 37) <i>Cobaea scandens</i>		✓ Horizons		
<b>Chilean needle grass</b> (pg. 35) <i>Nassella neesiana</i>	✓ Horizons			
<b>Chilean rhubarb</b> (pg. 37) <i>Gunnera tinctoria, G. manicata and all varieties and hybrids of these species</i>		✓ Horizons		
<b>Chinese pennisetum</b> (pg. 38) <i>Cenchrus purpurascens</i>		✓ Occupier / Horizons		
<b>Climbing alstromeria</b> (pg. 38) <i>Bomarea caldasii</i>		✓ Horizons		
<b>Climbing spindleberry</b> (pg. 38) <i>Celastrus orbiculatus</i>		✓ Horizons		
<b>Contorta pine</b> (pg. 44) <i>Pinus contorta</i>			✓ Horizons	
<b>Darwin's barberry</b> (pg. 44) <i>Berberis darwinii</i>			✓ Horizons	
<b>Eelgrass</b> (pg. 44) <i>Vallisneria species</i>			✓ Horizons	
<b>Egeria</b> (pg. 44) <i>Egeria densa</i>			✓ Horizons	
<b>Evergreen buckthorn</b> (pg. 44 ) <i>Rhamnus alaternus</i>			✓ Horizons	

<b>Field horsetail</b> (pg. 45) <i>Equisetum arvense</i>			✓ Occupier	
<b>Gorse</b> (pg. 45) <i>Ulex europaeus</i>			✓ Occupier	
<b>Grey willow</b> (pg. 45) <i>Salix cinerea</i>			✓ Horizons	
<b>Heath rush</b> (pg. 35) <i>Juncus squarrosus</i>	✓ Horizons			
<b>Himalayan balsam</b> (pg. 38) <i>Impatiens glandulifera</i>		✓ Horizons		
<b>Hornwort</b> (pg. 45) <i>Ceratophyllum demersum</i>			✓ Horizons	
<b>Knotweed (Asiatic and giant)</b> (pg. 38) <i>Reynoutria japonica</i> and <i>R. sachalinensis</i>		✓ Horizons		
<b>Lagarosiphon</b> (pg. 45) <i>Lagarosiphon major</i>			✓ Horizons	
<b>Manchurian wild rice</b> (pg. 35) <i>Zizania latifolia</i>	✓ Horizons			
<b>Moth plant</b> (pg. 46) <i>Araujia sericifera</i>			✓ Horizons	
<b>Nodding thistle</b> (pg. 46) <i>Carduus nutans</i>			✓ Occupier	
<b>Nassella tussock and Mexican feather grass</b> (pg. 38) <i>Nassella trichotoma</i> and <i>N. tenuissima</i>		✓ Horizons		
<b>Noogoora bur</b> (pg. 35) <i>Xanthium strumarium</i>	✓ Horizons			
<b>Old man's beard</b> (pg. 46) <i>Clematis vitalba</i>			✓ Horizons	
<b>Phragmites</b> (pg. 35) <i>Phragmites australis</i>	✓ Horizons			
<b>Purple loosestrife</b> (pg. 38) <i>Lythrum salicaria</i>		✓ Horizons		
<b>Queensland poplar</b> (pg. 38) <i>Homalanthus populifolius</i>		✓ Horizons		
<b>Reed sweetgrass</b> (pg. 46) <i>Glyceria maxima</i>			✓ Horizons	
<b>Rum cherry</b> (pg. 39) <i>Prunus serotina</i>		✓ Horizons		
<b>Saffron thistle</b> (pg. 35) <i>Carthamus lanatus</i>	✓ Horizons			
<b>Sagittaria</b> (pg. 35) <i>Sagittaria platyphylla</i>	✓ Horizons			
<b>Senegal tea</b> (pg. 39) <i>Gymnocoronis spilanthoides</i>		✓ Horizons		
<b>Spartina</b> (pg. 39) <i>Spartina species</i>		✓ Horizons		
<b>Sweet pittosporum</b> (pg. 36) <i>Pittosporum undulatum</i>	✓ Horizons			
<b>Tussock hawkweed</b> (pg. 36) <i>Hieracium lepidulum</i>	✓ Horizons			
<b>Tutsan</b> (pg. 47) <i>Hypericum androsaemum</i>			✓ Occupier	
<b>Variegated thistle</b> (pg. 46) <i>Silybum marianum</i>			✓ Occupier	
<b>Wilding conifers</b> (pg. 64) <i>(various species)</i>				✓ Occupier / Horizons
<b>Woolly nightshade</b> (pg. 39) <i>Solanum mauritianum</i>		✓ Occupier / Horizons		

<b>Yellow bristle grass</b> (pg. 47) <i>Setaria pumila</i>			✓ Occupier	
<b>Yellow ragwort</b> (pg. 47) <i>Jacobaea vulgaris</i>			✓ Occupier	

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### Appendix 3: Horizons Animal Pests

Animal organisms classified as pests, their control programmes under the Horizons RPMP, and the agency responsible for management. The animals are listed alphabetically by common name. The page numbers quoted refer to the page on which the description of the species can be found.

Species	Exclusion	Eradication	Progressive Containment	Sustained Control
<b>Possum</b> (pg. 64) <i>Trichosurus vulpecula</i>	✓ Horizons / MPI			
<b>Rabbit (feral)</b> (pg. 64) <i>Oryctolagus cuniculus</i>				✓ Horizons
<b>Rook</b> (pg. 37) <i>Corvus frugilegus</i>				✓ Occupier
<b>Wallaby species</b> (pg. 36) <i>Macropus species</i>		✓ Horizons		

*Note: All of the site-led pest animal species listed in the previous Pest Animal Strategy have been removed and will appear in the new Regional BSP. The reason for this is that Horizons no longer believes it requires rules banning those pests from sale and distribution to effectively manage those pests under site-led programmes. The pests include feral mustelids, feral cats, and koi carp.*