ESTATE MANAGEMENT PLAN – PUBLIC SUMMARY

LAKE TAUPO & ROTOAIRA FORESTS
Including CROWN ENCLAVES, TE RANGIITA, MANGAKOURA, WAIOTAKA & TE WHENUA 1 FORESTS

TAUPO ESTATE & KAIMANAWA FOREST

OPEPE FOREST, TREGOWETH FOREST, HINGARAE FOREST, HAUHUNGAROA 1C, WAIRAKEI FOREST

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INTRODUCTION

This document is a public summary of the management plans for:

- Lake Taupo Forest
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- Mangakoura Forest
- Taupo Estate
- Kaimanawa Forest
- Opepe Forest
- Tregoweth Forest
- Hingarae Forest
- Hauhungaroa 1C Forest
- Wairakei Forest

All of these forests are certified by the Forest Stewardship Council® (FSC®)(FSC-C007793).

This summary has been prepared to comply with the Forestry Stewardship Council® (FSC®) Principle 7 which requires that…… *'A management plan – consistent with its policies and objectives and proportionate to scale, intensity, and risks of the management activities. The Management Plan shall be implemented and kept up to date based on monitoring and information in order to promote Adaptive management.'*

FOREST OWNERSHIP & MANAGEMENT

The above forests[1] are managed by NZ Forest Mangers on behalf of Lake Taupo Forest Trust (LTFT), Rotoaira Forest Trust (RFT), the Ministry for Primary Industry's Crown Forestry Group (Crown Forestry), Lake Taupo Forest Management (LTFM), New Forests Limited, the Rohatyn Group and the Waihi Pukawa Trust.

NZ Forest Managers (NZFM) is a privately owned forest management company which undertakes contract management of forests. NZFM is committed to conducting its business operations in a legal, ethical, and responsible manner. NZFM's commitment to preventing bribery and corruption within the organisation and in all interactions with clients, contractors, subcontractors, and other stakeholders is outlined in the 'NZFM Anti-Bribery & Corruption Policy, which is available on request.

Two of the major forest estates that NZFM manage are Lake Taupo Forest and Rotoaira Forest. Other forests managed by NZFM within the scope of the FSC certification process that form part of the wider Lake Taupo and Rotoaira Forest area include the Lake Taupo and Rotoaira Crown Enclaves, Te Rangiita, Te Whenua 1, Waiotaka and Mangakoura. The NZFM FSC certificate also includes Taupo Estate,

[1] See map on page 11

Kaimanwa Forest, Opepe Forest, Hingarae Forest, Tregoweth Forest, Hauhungaroa 1C Forest and Wairakei Forest.

Lake Taupo and Rotoaira Forests

Lake Taupo and Rotoaira forests were established following the signing of lease agreements between Maori owners of the land and the Crown in 1969 (Lake Taupo) and 1973 (Rotoaira). These lease agreements contain detailed lessor and lessee rights and obligations. They provide the right for the Crown to establish and manage forests on the land in return for payment of a share of stumpage returns to the owners. Maori land owners of the Lake Taupo Forest are represented by the Lake Taupo Forest Trust (LTFT), and owners of the Rotoaira Forest Land are represented by the Rotoaira Forest Trust (RFT).

As a result of negotiations in 2000, the Lake Taupo lease has been varied so that the forest area (along with previously established second-rotation stands) is now being handed back to the lessors as it is harvested.

The Crown Enclaves are relatively small areas of forest established on Crown owned land that adjoin these forests (7 within Lake Taupo and one within Rotoaira) and are logically managed in conjunction with these estates.

Te Rangiita and Te Whenua 1 are forests on Maori land that are owned by the Lake Taupo Forest Trust. Similarly, Mangakoura and Waiotaka are small forest areas owned by Lake Taupo Forest Management Ltd, an entity of the Lake Taupo Forest Trust.

NZFM is contracted by Crown Forestry for the management of the forest on areas of Lake Taupo and Rotoaira Forests that are currently leased by the Crown and the Crown enclaves. NZFM is also contracted by the Lake Taupo Forest Trust for the management of the areas of Lake Taupo surrendered from the lease and handed back by the Crown into full Trust ownership; as well as for the management of Te Rangiita and Te Whenua 1 Forests; and by the Lake Rotoaira Forest Trust for the areas of Rotoaira Forest surrendered from that lease.

Co-ordination of common management activities across the mosaic of Crown/Lake Taupo Forest Trust and Rotoaira Forest Trust forest ownership is undertaken by FORMAC (Forest Management Advisory Committee) which includes representatives from Crown Forestry, the Trust & NZFM. This Committee deals with joint management issues.

Taupo Estate and Kaimanawa Forests

In 2015 a company comprising a group of Tuwharetoa Trusts and Incorporations, plus the Tuwharetoa Settlement Trust, formed a company called Hautu Rangipo Whenua Ltd (HRWL) to purchase the Corrections Department lands and Mangamawhitiwhiti Farm near Turangi. The Lake Taupo and Lake Rotoaira Forest Trusts took a majority share of this investment.

The land included an approximately 4,000 ha plantation forest. This was on-sold to Australian based fund manager ‘New Forests’, who entered into a 1-rotation Forestry Right with HRWL. New Forests call this forest ‘Taupo Estates’.

Lake Taupo Forest Management Ltd (LTFM) – a subsidiary of LTFT and LRFT, entered into a 2-rotation Forestry Right with HRWL to plant around 1,400 ha of pasture land over 4 years, and to replant the 4,000 ha Taupo Estates Forest over approx. 30 years. This is Kaimanawa Forest.

Opepe Forest

In 2011 Opepe Farm Trust Ltd (OFTL) approached LTFT and LRFT to see if they were interested in leasing some of the land for 1 rotation of forestry. OFTL wanted to afforest some of its land in order to free up nitrogen and thus intensify the farming on their remaining farm areas. Lake Taupo Forest Management Ltd (LTFM) – a subsidiary of LTFT and LRFT, entered into a 1-rotation Forestry Right with OFTL in 2012. NZFM manages the forest on behalf of LTFM.

Tregoweth Forest

Consent was been granted by Land Information New Zealand (LINZ) giving effect to a transaction which resulted in an overseas investment in sensitive land being freehold acquisition of Tregowth Forest by QIC Strategy Timber No.1 Limited. In December 2019 QIC Strategy Timber No.1 Limited sold their freehold interest to Zentral Estate Limited.

Hingarae Forest

In December 2009 the Lake Taupo Protection Trust purchased four farms on the Western Bays of Lake Taupo as part of the strategy to reduce nitrogen leaching into Lake Taupo. The four farms were purchased independently by the Lake Taupo Protection Trust. However all four farms were adjoining and able to form a contiguous area of approximately 1,149 hectares. The farms were offered for sale by tender in July 2010 with a nitrogen discharge allowance that essentially restricted the properties to a forestry land use. GMO Renewable Resources were successful with their tender and the sale was completed in April 2011.

The landowners established a commercial but multiple use forest on the land and the forest was established on the property from 2011 to 2013.

Hauhungaroa 1C Forest

Following a series of meetings through the early 1990's, the owners of Hauhungaroa 1C Incorporation agreed to a joint venture afforestation proposal from Tasman Forestry Limited. This resulted in the signing of a Forestry Right with Tasman Forestry Limited in early 1995. There were several changes to the ownership of the Forestry Right from 1995 to 2003, when it was assigned to the Ontario Teachers' Pension Plan (OTPP). In December 2005, the Waihi Pukawa Trust purchased the interest of OTPP in Hauhungaroa 1C Forest and accordingly the Forestry Right was assigned to the Waihi Pukawa Trust.

Wairakei Forest

In April 2020 Wairakei Pastoral Ltd on-sold most of their existing forest (approximately 4,000 ha) and rights to establish a further approximately 3,000 hectares of further forest to New Forests Asset Management Ltd who trade as Zentral Estate Limited (ZEL). The forest is governed by a Forestry Right Agreement in favour of ZEL which took effect from April 2020 and terminates 30 years from the date of establishment for Radiata pine and 45 years for Douglas fir stands.

This management plan relates to the existing forest and any future plantings that will be established by ZEL.

RESOURCE DESCRIPTION

Summary

The resources managed by NZFM that are within the scope of this certification are as follows:

Forest	Ownership	Net Stocked Area (ha)	Unplanted - reserves, utilities etc (ha)	Total Area (ha)
Lake Taupo	LTFT/Crown	22,986.9	7,815.2	30,802.1
Lake Taupo Crown Enclave	Crown	535.1	202.6	737.7
Rotoaira	RFT/Crown	9,770.1	5,526.3	15,296.4
Rotoaira Crown Enclave	Crown	53.4	3.6	57.0
Te Rangiita	LTFT	679.6	163.07	842.7
Te Whenua 1	LTFT	93.9	0.4	94.3
Te Whakao	LTFT	683.6	163.6	847.2
Mangakoura	LTFT	243.1	0	243.1
Waiotaka	LTFT	126.2	10.1	136.3
Opepe	LTFM	1,450.2	0	1,450.2
Taupo Estate/Kaimanawa Forest	NF/LTFM	6,825.0	0	6,825.0
Tregoweth	NF	242.9	105.2	348.2
Hingarae	The Rohatyn Group	965.7	94.1	1,059.8
Hauhungaroa 1C	WP Trust	488.6	0	488.6
Wairakei	NF	6,407	0	6,407
Total		**51,506.6**	**14,084.17**	**65,590.75**

**Table correct at Dec 2022*

LTFT = Lake Taupo Forest Trust
RFT= Rotoaira Forest Trust
Crown= Crown Forestry, MPI
LTFM = Lake Taupo Forest Management
NF = New Forests

The planted forest areas are dominated by Radiata pine. 96% of Lake Taupo Forest and 92% of Rotoaira Forest are planted in Radiata pine. The other species present include Douglas fir, Larch and Eucalyptus species.

Lake Taupo Forest

Lake Taupo Forest is established on the eastern shores of Lake Taupo and borders the western boundary of Kaimanawa Forest Park. During the 1960's meetings were held by the Maori owners of the various blocks of land in this area, and it was agreed in principle that afforestation should be undertaken to provide a productive use of the land and provide protection of lake values. In 1969 the land owners agreed to lease the land to the Crown for afforestation. This lease had a 70 year term and involved the Crown undertaking forest establishment and management on the land, with the major return to Maori owners being a share of the final stumpage. This agreement included a process for review of the stumpage share.

The objectives of the original lease are:

- Preventing soil erosion, reducing pollution of the waters of Lake Taupo and of the streams and rivers flowing into and out of the said Lake and minimising adverse changes in river and lake waters.
- Conserving and protecting fish and wild life habitat and other natural resources of the area.
- Preserving and safeguarding the graves of the Maori people and all historic and sacred places in and around the said land and the areas of natural beauty and scenery and of unique vegetation.
- Consistent with the above purposes establishing managing and protecting a forest or forests thereon and appraising selling realising removing and utilising the produce thereof in a manner consistent with good forestry practices so as to achieve the maximum practicable financial yield to the Minister as forest owner and the Trustees as Lessors.

Establishment of the forest took place between 1969 and 1986, working from south to north. Most areas of the forest have been intensively tended to produce pruned butt logs.

In April 2000 a variation of the lease was agreed which allowed:

- The LTFT to resume ownership (from 1 April 2001) of the then second rotation stands
- The LTFT progressively (as first rotation stands are harvested) resumed ownership of the cleared land (which the Trust then re-stocks).
- A fixed stumpage share formula applied to for the balance of the lease – which terminated in June 2021.

The terrain in Lake Taupo Forest is generally gently rolling hill country, with some steeper country toward the Kaimanawa Forest Park Boundary and around river gorges. Soils are volcanic, derived from the Taupo volcanic centre. These soils vary depending on the exact nature of the volcanic parent material.

The annual harvest levels from Lake Taupo Forest are approximately 480,000m^3 which is close to the long term sustainable harvest level.

Rotoaira Forest

Rotoaira Forest is established on the lower slopes of Mounts Pihanga, Tongariro, Kakaramea and Kuharua. It is established on the shores of lakes Rotoaira and Otamangakau.

The forest was established following the signing of a lease between RFT and the Crown in 1973. This was superseded by a permanent lease in 1974 which was in turn replaced by a new lease agreement in 1980.

The objectives of the lease are:

- Preventing soil erosion, reducing pollution of the waters of Lake Taupo, Rotoaira, Otamangakau and Te Whaiau and of the streams, rivers and canals flowing into and out of the said lakes and minimising adverse changes in river and lake waters.
- Conserving and protecting fish and wild life habitat and other natural resources

of the area.
- Preserving and safeguarding the graves of the Maori people and all historic and sacred places in and around the said land and the areas of natural beauty and scenery and of unique vegetation.
- Consistent with the above purposes establishing managing and protecting a forest or forests thereon and appraising selling realising removing and utilising the produce thereof in a manner consistent with good forestry practices so as to achieve the maximum practicable financial yield to the Minister as forest owner and the Trustees as Lessors.

The forest was established between 1973 and 1989. Most areas of the forest have been intensively tended to produce pruned butt logs.

In March 2002 a variation of the lease was agreed which allows:
- The RFT to progressively (as first rotation stands are harvested) resume ownership of the cleared land (which the Trust then re-stocks.
- A fixed stumpage share formula to apply to for the balance of the lease – which is now set to terminate on 30 June 2026.

Soils are volcanic, with parent material formed from the Tongariro, Ngauruhoe, Kakaramea, Pihanga, and Taupo volcanic sources.

Planted forest is established between 580m and 850m in altitude. The majority of the area is flat to undulating. The current annual harvest level is 180,000m^3. This level of harvest is effectively sustainable in the long term, although the long-term harvest strategy is continually being revised to accommodate new inventory and harvest reconciliation data and in reaction to market indicators.

Lake Taupo & Rotoaira Crown Enclaves
These are areas of forest on Crown-owned land that were established in conjunction with the establishment of the lease forests. Seven blocks are within or adjoining Lake Taupo Forest and one block is located within Rotoaira Forest. All 8 blocks are managed by NZFM in conjunction with the Lake Taupo and Rotoaira lease forests.

Te Rangiita & Te Whenua 1 Forests
Te Rangiita Forest has been established on Maori land which has come under the administration of the Lake Taupo Forest Trust, whilst Te Whenua Forest is on freehold land owned by the Lake Taupo Forest Trust.

Mangakoura and Waiotaka Forests
In 2012 the Trust purchased 185 ha of freehold farmland in the Waiotaka Valley, on its southern boundary. It subsequently sold some of the land to the local hapu. The same year the Trust bought in 23 ha of Maori-owned land in the Waiotaka Valley, adjacent to the free-hold land. Together these lands are called the Waiotaka blocks, and they have a planted area of 134 ha.

In 2013 the Trust brought into its lands approximately 250 ha of Maori-owned land being the Mangakoura Farm Trust lands. These lands were planted in that and the following years.

Adjacent Lands to Lake Taupo and Rotoaira Forests

Lake Taupo Forest is bounded by Lake Taupo to the northwest and by Department of Conservation lands (Kaimanawa Forest Park) to the southeast. Most of the northeastern boundary adjoins Timberlands Limited's Waimahia Block and the southwestern boundary adjoins land (forest and farm) administered by the Hautu Rangipo Whenua Limited, including Taupo Estate and Kaimanawa Forest.

Public access to Kaimanawa Forest Park is provided by Kiko Road.

Within Lake Taupo Forest is land owned by Manawa Energy Ltd who own and operate 3 hydro-electric schemes (dams) developed between 1952 and 1981on the Hinemaiaia River. Access to the sites is by way of an access licence over the lease.

There are four land blocks located between the Lake Taupo Forest and Kaimanawa Forest Park:

- Pahikohuru No 1 Block – Maori land leased to Fletcher Challenge Forests ("Tiraki Lease")
- Hautu 1B1B2B5B4 Block – Maori land, currently unoccupied.
- Hautu 1B1B2B5B3 Block – Maori land, currently unoccupied.
- Hautu 1B1B2B5B2B Block – Maori land, currently unoccupied.

Rotoaira Forest consists of 5 blocks with a number of adjacent landowners. Significant adjacent landholders are:

- Department of Conservation (including Tongariro National Park)
- Department of Corrections
- Lake Rotoaira Trust
- Genesis Power Ltd
- Waihi-Pukawa Station
- Oraukura Station
- Moerangi Station

Taupo Estate/Kaimanwa Forest

Taupo Estate is located to the east of the Turangi Township with the northernmost point being 2 kilometres north of Turangi and the southernmost point being 15 kilometres south of Turangi. It is also located to the east of State Highway 1 on both sides of the Tongariro River, and west of State Highway 1 near Rangipo.

Kaimanawa Forest is located south-east of Lake Taupo, and also comprises areas of land east of State Highway 1 on both sides of the Tongariro River, and west of State Highway 1 near Rangipo. Taupo Estate and Kaimanawa Forest sit adjacent to each other as ex-Department of Corrections administered land.

Opepe Forest

Opepe Forest is located just North of Lake Taupo, and comprises a contiguous area of land along and south of State Highway 5.

Tregoweth Forest

Tregoweth Forest is located at Waimiha Road, Mangapehi. Waimihia Road joins State Highway 30 not far from the forest boundary.

Hauhungaroa 1C Forest

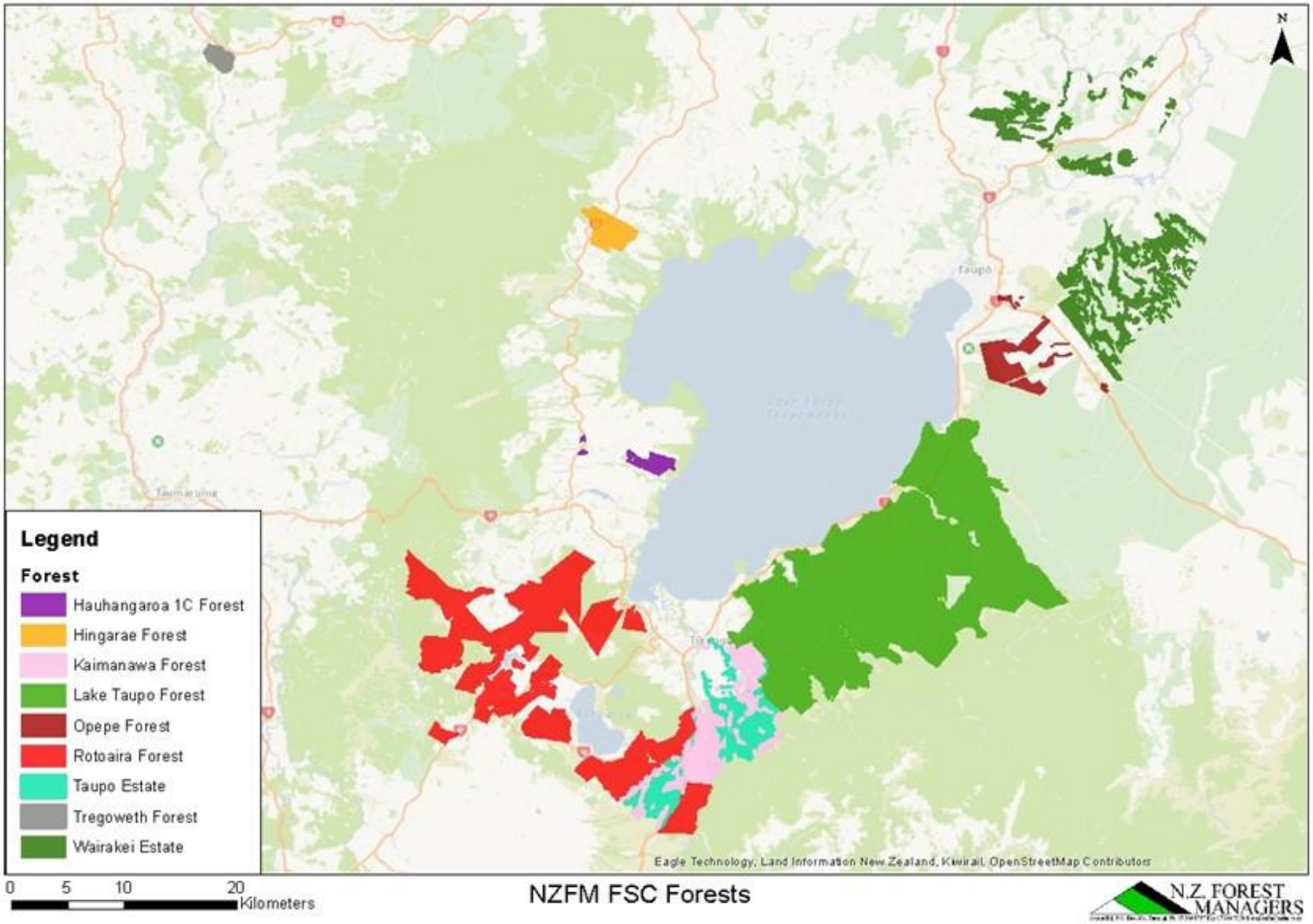
Hauhungaroa 1C is located on Rangiatea Station, approximately 30 kilometres to the northwest of Turangi. It is located along State Highway 32, 7kms north of the intersection with State Highway 41.

Wairakei Forest
The land is located between Taupo and Rotorua off Broadlands Road and State Highway 5. For a large part the land are remnants of the former Tahorakuri and Tauhara Forests. The forests are located and scattered within the Wairakei Pastoral Estate and are largely bordered by farmland.

Local Government
Lake Taupo Forest, the Crown Enclaves, Te Rangiita, Te Whenua 1, Waiotaka, Mangakoura, Opepe, Taupo Estate/Kaimanawa Forests, Hauhungaroa 1C Forest, Wairakei Forest and part of Rotoaira Forest all fall within the Taupo District and the Waikato Region. Part of Rotoaira Forest (a little over 5,000 hectares), falls within Ruapehu District and the Manawatu-anganui Region (Horizons.MW).

LOCATION/AREA

The map overleaf shows the location of the various forests described in this plan and delineates between planted forest area and unplanted areas which have been retained in natural vegetation.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Lake Taupo Forest
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Wairakei Estate
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N.Z. FOREST MANAGERS

MANAGEMENT OBJECTIVES

The objectives of management for the forests covered by this plan are:

Lake Taupo & Rotoaira Forests (incl enclaves, Te Rangiita, Te Whenua 1, Te Whakao, Mangakoura & Waiotaka)

- For Lake Taupo and Rotoaira Forests; to meet the legal commitments embodied in the respective leases and subsequent variations (as detailed in the previous section).
- To manage the forests in accordance with FSC Principles & Criteria.
- The two Forest Trusts' management objectives for their second rotation forests are to maximise financial return while meeting all the necessary tikanga obligations with regard to the land, forest and wildlife and to the landowners.

Taupo Estate/Kaimanwa Forest

Taupo Estate Forest will be managed in accordance with the Forestry Right Agreement. Key objectives are:

- Compliance with all Laws and Legislative Requirements and any other requirements of Government Agencies, including Codes of Practice;
- The forest will be managed by exercising professional skill, diligence and care and utilising such methods and techniques expected of a reasonable, professional and competent manager and in accordance with sound silvicultural and environmental practices adopted within the forestry industry;
- The forest will be managed in accordance with any social and environmental policy provided by Taupo Estate Ltd;
- The forest will be managed in accordance with the social and environmental management system (SEMS) provided by Taupo Estate.

LTFM's objectives for Kaimanawa Forest are:

- To strive for optimal and sustainable asset growth and financial returns through development of LTFM's assets to assist the long-term social, cultural and economic development of the beneficial owners of LTFM's parent Trusts.
- To apply the principles of professionalism, honesty and due diligence in attending to Trust business.

Opepe Forest

- LTFM will strive for optimal and sustainable asset growth and financial returns through development of LTFM's assets to assist the long-term social, cultural and economic development of the beneficial owners of LTFM's parent Trusts.
- To apply the principles of professionalism, honesty and due diligence in attending to Trust business.

Tregoweth Forest

The primary purpose of forest management in Tregoweth Forest is to manage the forest so that it is capable of producing high value wood products at the time of harvest.

The management policies can be broadly summarised as follows:

- Completion of the tending of the forest crop so as to produce and market the highest available yields and value of forest produce.

- Protecting the forest from fire, pest and disease.
- Researching the performance of forestry on the lands and applying available and applicable technological improvements to ensure that the growing forest is achieving the management objectives efficiently.
- Ensuring that environmental and amenity values are identified, maintained and/or protected.
- Ensuring that historic sites are identified and protected.

Hingarae Forest

Forest management will focus on optimising the return on investment while minimising the risks to the investment. Consequently the primary purpose of forest management is to manage the forest so that it is capable of producing both wood products and high carbon sequestration rates while over the longer term providing an attractive property with multiple use benefits.

Management policies are summarised as:

- Tending the forest crop to produce and market the highest available yields and value of forest produce while maximising carbon sequestration.
- Protecting the forest from fire, pest and disease.
- Researching the performance of forestry on the lands and applying available and applicable technological improvements to ensure that the growing forest is achieving the management objectives efficiently.
- Ensuring that environmental and amenity values are identified, maintained and/or protected.
- Ensuring that any historic sites are identified and protected.

Hauhungaroa 1C Forest

The forest will be managed with the objective of producing a crop of forest produce, but is subject always to the covenants, conditions, agreements, restrictions and rights contained in the Forestry Right and its Schedules.

Management policies are summarised as generally to carry out forest management activities for planting, managing, protecting and harvesting the forest crop and to utilise all trees, timber and logs growing or to be grown on the woodlot.

Wairakei Forest

The Wairakei Pastoral Forest will be managed in accordance with the Forestry Right Agreement.

Key objectives of management are:

- The forest will be managed in accordance with the ZEL Strategic Plan.
- The forest will be managed in accordance with any social and environmental policy provided by ZEL.
- The forest will be managed in accordance with the social and environmental management system (SEMS) provided by ZEL.
- The forest will be managed by exercising professional skill, diligence and care and utilising such methods and techniques expected of a reasonable, professional and competent manager and in accordance with sound silvicultural and environmental practices adopted within the forestry industry.
- Compliance with all Laws and Legislative Requirements and any other requirements of Government Agencies, including Codes of Practice.

FOREST MANAGEMENT PRACTICES

Day to day operational management of the forest estate is under the control of NZ Forest Managers Ltd (NZFM). NZFM is a private forest management company based in Turangi and is contracted by both the Crown and the respective Forest Trusts to manage forestry operations over the entire estate. The company employs some 25 staff. Approximately 300 people are employed in contract harvesting, forest establishment and tending, engineering and transportation operations across all forest that NZFM manages.

Detailed and separate management plans which underpin this summary plan exist for:

- Lake Taupo Crown Lease Forest (Crown portion)
- Lake Taupo Forest (Trust portion incl Te Rangiita, Te Whenua 1, Te Whakao, Mangakoura and Waiotaka)
- Rotoaira Crown Lease Forest
- Rotoaira Forset (Trust portion)
- Taupo Estate
- Kaimanawa Forest
- Tregoweth Forest
- Opepe Forest
- Hingarae Forest
- Hauhungaroa 1C
- Wairakkei Forest

Establishment Policy & Practices

Policies

Conversion of Unplanted Areas

No unplanted areas of ecological, cultural or environmental significance shall be converted to production forest.

Re-establishment Timing

Re-establishment shall take place as soon as practicable following harvesting except where time is required to allow weed re-growth to be effectively and efficiently controlled in line with an integrated pest management strategy.

Species Choice

Species choice will be based on the obligation in both lease agreements to achieve the maximum practicable financial yield to the Minister as forest owner and the Trustees as Lessors in a manner consistent with good forestry practices.

Land Preparation Methods

Land preparation shall be carried out in a manner which recognises the objectives of minimising site disturbance and nutrient loss consistent with the need to successfully and quickly establish a replacement crop. Burning of slash shall not be carried out as a routine method of land preparation.

Practices

- Mechanical land preparation methods (roller crushing, heaping of slash, V-blading and spot cultivation) are carried out when this is required to facilitate planting operations.
- Sites are assessed on an individual basis - in line with an integrated pest management strategy – for the need to carry out pre-plant weed control operations.
- Planting is carried out by hand using (in the case of radiata pine) high GF planting materials and clonal stock at a stocking (in the case of radiata pine) of between 800 and 1,000 stems/ha, depending on site fertility.
- Sites are assessed on an individual basis - in line with an integrated pest management strategy – for the need to carry out post-planting weed control operations (releasing).

Silvicultural Tending Policy & Practices

Policies

Choice of Regime (Tending Schedule)

The choice of tending regime will be based on formal evaluations of costs, benefits and risks. Key factors in the evaluation shall include:

- Growth and yield differentiation between different sites
- Maintaining tree and stand health
- Expected wood properties of the eventual harvest
- Minimising windthrow
- Maintaining a spread of product types (log grades)

Practices

P.radiata - :

Operation	**Stems/ha Treated**	**age (years)**
prune 0-2.5m	330 - 400	4-5
prune 2.5-4.5m	330 - 400	6-7
Prune 4.5 – 6.5m	330 - 400	8 - 9
waste thin	800/600 –320 /400	9 - 10

The pruning heights are indicative only, as 'variable height' pruning is practiced, where each tree is pruned to the maximum of half height. In some cases four pruning lifts will be required to achieve the target pruned height whilst maintaining a target maximum diameter over stubs (DOS) of 17.0cm.

Production thinning, undertaken widely during the first rotation, is not planned for the second rotation.

The owners are considering growing stands on the lowest fertility sites on a non-pruning ('framing') regime.

Douglas Fir and Larch:

Operation	**Predominant Mean Ht (m)**	**stems/ha Treated**
waste thin	8-10	to 600
production thin	30	600 - 300

Eucalyptus:

Operation	**Predominant Mean Ht (m)**	**stems/ha Treated**
waste thin	10	to 500

production thin	20	500 – 200

Protection Policies & Practices

Policies

Forest Fire Protection

The Crown, the Trusts and NZFM shall actively participate in fires control in conjunction with Fire and Emergency NZ (FENZ). The Crown and the Trusts shall maintain an agreement with the NZ Defence Force for fire control assistance.

Animal and Plant Pest Control

Animal and Plant Pests shall be controlled in accordance with the requirements of the respective Pest Management Strategies of Regional Councils and additional operations shall be carried out as necessary to protect planted stands, unplanted areas and forest infrastructure (e.g. roads).

Forest Health

The health of the forests shall be regularly surveyed under the NZ Forest Owners Forest Health Surveillance Scheme and action taken as necessary. The forests shall be annually surveyed for the presence and level of infection of *Dothistroma pinii* and stands above the threshold infection level treated.

Forest Security & Recreation

Access to the forests shall be controlled by the Trusts (who control beneficial owner access) and NZFM (who control worker access). Other requests for access to Trust land shall be considered by the respective Trusts and in the case of access to the Crown Enclaves, shall be considered by Crown Forestry.

Practices

Forest Fire Protection

Crown Forestry (through NZ Forest Managers Ltd) is responsible for maintaining fire prevention infrastructure within the forest.
Fire equipment, including fire appliances are housed at Turangi.
An Agreement with the NZ Defence Force for assistance with fire suppression (in return for access for training purposes) is in place.

Animal and Plant Pest Control

Regular inspections are made to assess the need for animal control and to identify effective means of control. The assessment of the need for pest control is not only to ensure protection of the plantations, but also the health of the native forests and birdlife. Possums are a significant pest impacting on native and plantation forests, while mustelids and rats also impact on native birdlife. Trapping in most instances has not proved to be effective in controlling these pests and 1080 poisoning is presently the favoured control method. In recent years the Animal Health Board, with the approval of the Trusts, has undertaken intermittent aerial 1080 operations over most of both forests, as part of their Bovine Tb eradication programme. This has largely avoided the need for the forest owners to undertake pest control. Neighbouring landowners are also consulted over pest control

operations as necessary. Other wild animals - pigs, deer, goats, hares and rabbits – are confined to localised areas and seldom require control.

Forest Health

Annual inspections of the forests by Forest Health Officers are undertaken. Each year between June and August, the forest is surveyed to assess pine needle blight (*Dothistroma pinii*) level of infection. Stands with significant levels of infection are sprayed with copper oxychloride in November and December annually. Armillaria root rot has a concentrated occurrence in areas formerly under podocarp/broadleaf forest but is not a major problem as retaining a slightly higher final crop stocking in affected areas ensures a satisfactory final crop. Upper mid-crown yellowing (UMCY) is common in the forest. The precise causes of this disease which does impact on tree growth is thought to be related to magnesium levels. Crown Forestry is a member of the UMCY Research group which is quantifying the effect of the disease and researching treatments.

The forest also has areas that are slightly to moderately deficient in some nutrients including boron, magnesium, nitrogen and phosphorus. Crown Forestry is a member of the Site Management Research Co-operative which provides research and information on the best methods to address the deficiencies.

Each year between June and August, the forests are surveyed to assess pine needle blight (*Dothistroma*) level of infection. *Dothistroma pini* is a needle cast fungus resulting in red needles and cast. It is particularly associated with wet warm conditions. Stands with significant levels of infection are sprayed with cuprous oxide in November and December.

Security & Recreation

The lessors are permitted access at all reasonable times to hunt, fish and tend graves of ancestors. The Tongariro, Waitahanui, Hinemaiaia, Tauranga-Taupo, Waimarino and Waiotaka Rivers and the Poutu Stream are important angling rivers. A fishing access agreement between the local iwi (Tuwharetoa) and the Crown is set down in legislation. Fishing access is by way of a 20 metre (1 chain) wide access strip up the rivers to defined limits for licensed fisherman on foot. The Trusts have access into the Crown lease forests for the purposes of salvaging dead and windthrown indigenous forest material for firewood and cultural purposes. Dedicated security control is maintained to exclude trespassers, protect assets and to control illegal activity.

Harvesting Planning Methodology

NZFM uses Tigermoth software for Estate Modelling. The following data is collated to derive an estate model for each NZFM managed forest.

- Croptyping Strategy – Developed to allow for a greater level of detail within the forest estate model, based on Harvest Units.
- Yield Estimations – Derived using:
    - Pre-harvest Inventory – Stands are inventoried 2-3 year prior to clearfelling.
    - Mid-Rotation Inventory – Stands aged 18 to 20 years
    - YTGen – tool used to derive yield estimate by log grade for harvest unit croptypes
    - Adjustment factors – Derived from YTGen to reflect actual total and log grade recovery
- Costs – Log and Load: to reflect the harvest unit extraction system and piece size/age gradients
- Forest Area – Accurate areas recorded on GIS and stand record system

Tigermoth software provides users with a standardised forest estate description and optimisation framework for understanding and valuing forest assets. The solution of the optimisation model is used to determine future wood flows including allowable cut and cash flows, and understand key metrics of the forest estate such as the net present value (NPV) of individual forest assets.

Forest Estate Models have historically focused on long-term strategic and tactical planning, however updates in recent years have facilitated more detailed information as there has been an increasing use of FEM's for short-term planning.

Waahi Tapu & Historic Sites Policies & Practices

Policies NZFM, as the forest manager, shall recognise the role, rights and responsibilities of the respective forest Trusts and/or landowners as kaitiaki of the waahi tapu and historic sites on their lands.

Practices All known graves, historic and sacred places have been recorded and classified using the NZ Archeological Association site recording system and a register of all known sites is maintained in the forest office with a copy provided to the respective forest Trusts/landowners. The sites are also recorded within a GIS database so that they can be identified and protected during any operations. As any new sites are located, they are recorded within the GIS database. In all matters concerning burial sites, historic and sacred places, the respective forest trusts have active involvement.

Harvesting & Marketing Policies & Practices

Policies

<u>Harvesting & Marketing Strategy</u>

A harvest strategy for those forests that have harvest operations underway shall be produced annually. This strategy shall be based on a comprehensive forest description with the twin objectives of:

- Maximising the net present value of the estate
- Maintaining a regular supply of high quality forest produce.

<u>Sales</u>

Stumpage return (gross sales revenue less production costs) from the sale of forest produce shall be optimised by building a reputation as a

"preferred supplier" - on the basis of quality - with a wide customer base.

Practices

The current marketing strategy for the forest estate involves supplying logs to a range of domestic customers (30 at present) located from Taihape to Katikati and a smaller number of export customers (principally Japanese, Chinese, Korean and Indian). The present harvest from the forest estate is 750,000m^3 per annum which is close to the long-term sustainable harvest level.

At present, between 8-10 contract harvest crews operate within the forests managed by NZFM. All crews source the majority of their labour from the Taupo and Turangi areas and around 40% of the personnel are either beneficial owners or are of Tuwharetoa descent.

ENVIRONMENTAL MANAGEMENT

The Environmental Management System (EMS) that applies within the forest estate is underpinned by the NZ Forest Managers' Policy. The Policy states that the estate will be managed in such a way that:

- Recognises the environmental requirements of:
  - the contracts between the forest manager and the forest owner
  – the resource consents applying to the forest estate
  – the *Principles for Commercial Plantation Forest Management in New Zealand*
  - the *New Zealand Environmental Code of Practice for Plantation Forestry*

- Ensures that environmental management and performance is consistent with the Principles and Criteria of the Forest Stewardship Council.

- Ensures contractors and employees are committed to the Environmental Policy.

- Continually reviews opportunities for further environmental improvements.

- Works in partnership with other business organisations, the Government and interest groups where opportunities exist to benefit all parties and the environment.

- Ensures this sustainable forest management commitment is integrated with other key business objectives of financial performance, operating efficiency, customer satisfaction, health and safety and good corporate citizenship.

CONSERVATION OF RARE & ENDANGERED SPECIES

A number of rare, threatened and endangered species have been identified within the estate and all forest operations adhere to guidelines and procedures outlined in the Environmental Management System (EMS) developed by NZ Forest Managers. These guidelines protect populations from the direct and indirect impact of forestry operations.

Monitoring and managing the health and condition of specific populations of rare, threatened and endangered species and representative forest types is on-going along with broader environmental and social monitoring as reported in the next section.

ASSESSMENT AND MONITORING PROGRAMMES

NZFM currently has a number of environmental assessment and monitoring programmes underway within the estate. These are detailed below:

Water Quality Monitoring

The main objective of the programme is to assess the effect of forest harvesting on water quality in the Waimarino River and the Mangakowhitiwhiti Stream. The potential impacts of harvesting are determined by measuring suspended sediment, nitrogen and phosphorus concentrations and water clarity. Water quality assessments are undertaken at 3 sites along each watercourse. The location of these sites were carefully chosen in each catchment to ensure that water quality

measurements were taken from upstream, within and downstream of the plantation forest boundary. Latest monitoring results are available on the NZFM website www.nzfm.co.nz.

Rotoaira Forest Wetlands
An Ecological Management Plan is in place to manage the Rotoaira Forest Wetlands. The plan provides for the protection and enhancement of the forest estate's environmental values through the control, containment and eradication (where practicable) of noxious pests and pest plants within the wetlands of Rotoaira Forest.

Social Impact - Workforce Survey
NZFM annually completes a survey of the entire workforce. The company is proud of the level of local employment provided for within the forests and look forward to continuing this trend. Most recent results are summarised on the NZFM website www.nzfm.co.nz.

Social Impact - Logging Trucks
NZFM has a number of forestry roads that enter the State Highway roading network alongside lakeshore communities. In order to plan operations to minimise the overall effect on properties within these communities, NZFM collate the projected annual truck movements using these roads and update this data when planning for operations adjacent to these areas.

Health and Safety
Health and safety statistics are analysed regularly and reported on at least quarterly.

Rare and Endangered Indigenous Fauna
NZFM has carried out a number of flora and fauna surveys to identify the indigenous species present within the certified forests. Key species identified are:

Kiwi: The survey indicated that kiwi may be present within the vicinity of sites surveyed in Rotoaira Forest. Kiwi were not conclusively recorded in plantation forest, but may use part of the planation forest at times in at some locations. Note that a survey of Lake Taupo Forest failed to find evidence of kiwi in that forest.

NZ Falcon: NZFM contributed to the NZ Falcon study undertaken by PhD research student Richard Seaton. Falcons are regularly identified in forests manged by NZFM, particularly around recently harvested areas.

Reptiles: After six months of site monitoring no lizards were found to occupy the dens located within Lake Taupo and Rotoaira Forests. However, it is highly likely that several species of gecko and skink are present within the Forests, particularly because Lake Taupo and Rotoaira Forests are within the correct altitudinal and geographical range for many species, as well as having suitable habitat type. The most likely habitat occurs in reserve areas of indigenous forest or riparian stream margins, which are protected from harvest disturbance.

Blue Duck: The Whio Protection Project has been established on the Waimarino River. This project was originally supported by the CNI Blue Duck Charitable

Trust, the Waikato Catchment Ecological Enhancement Fund, and Waikato Regional Council's Environmental Initiative Fund. It is now funded by the forest owner. The project involves intensive predator control along the banks of the river during the breeding and nesting season for whio (September – February) and an annual population survey. In total, 16 km of the river bank is controlled using trap lines.

Bats: ABM's (Automatic Bat Monitors) have been used to survey for the presence of native bats within Lake Taupo and Rotoaira Forests. Within both Lake Taupo and Rotoaira Forests both Long-tailed and Short-tailed bats have been detected. The surveys have been carried out at 5-year intervals and NZFM will continue with this work to ensure it is aware of the presence and use of the forests by both indigenous bat species.

High Conservation Value Forests

There are four High Conservation Value (HCV) forest areas identified within the NZFM FSC certified forest area. HCV forest areas are clearly defined by the Forest Stewardship Council and the four areas identified as meeting one or more of these criteria are outlined below.

1. *Pittosporum turnerii, Rotoaira Forest:* A population of the rare native plant *Pittosporum turnerii* is present within Rotoaira Forest. In conjunction with the Tongariro / Taupo Conservancy of the Department of Conservation (DOC), NZFM has prepared a management plan for the *Pittosporum turnerii*. The plan includes a ten year management time-line outlining tasks including possum browse monitoring and control where required with the aim of allowing *Pittosporum turnerii* to remain healthy and continue to flower and produce seed.

2. *Dactylanthus taylorii, Rotoaira Forest*: A population of Dactylanthus taylorii exists in Rotoaira Forest. NZFM are managing the population in an attempt to conserve the population. Within the forest, a large number of individual plants are caged to protect the plants from predators and with the help of funding from the Biodiversity Condition Fund, NZFM erected a predator exclusion fence around a population of *D.taylorii* with young host tree species. The aim of the fence is to eliminate predators from the area to allow the population to grow.

3. *Lake Taupo Forest Flat Areas:* There are extensive areas in the northern end of Lake Taupo Forest that have been identified as having high conservation value. The biggest threat to the health and vitality of these areas is the presence of plant threat. A management plan outlining the priority areas for plant pest control has been developed and these control measures will take place in conjunction with NZFM's wider plant pest control programme in Lake Taupo Forest.

4. *Hipaua Geothermal Area, Rotoaira Forest:* The Hipaua Geothermal Area is part of the larger Tokaanu-Waihi-Hipaua geothermal system, which occurs beneaath the eastern slopes of the inactive Kakaramea-Tihia volcano. The Hipaua geothermal area lies across the boundary of Rotoaira Forest and

adjacent land, with only part of the area under the management of NZFM as Rotoaira Forest.

Indigenous Forest Condition Monitoring

In 2003 NZFM began a monitoring program to assess the health and vitality of important indigenous vegetation types and tree species within Lake Taupo and Rotoaira Forests. Monitoring will also identify any significant threats to the integrity of these indigenous forest remnants so that management action can be considered. The forests are assessed every two years, with the forests alternating each year.