

NORTH ISLAND MANAGEMENT PLAN SUMMARY

2019/2020

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1 INTRODUCTION

This document is a summary of the Ernslaw One Limited (Ernslaw) Management Plan for the North Island estate which is certified by the Forest Stewardship Council® (FSC®) (FSC®C010424). FSC® certification is an internationally recognised standard that demonstrates how a company's forests are managed in an environmentally sound, socially beneficial, and economically viable manner. Ernslaw certification was granted through measurement of its operations and practices against the principles and criteria developed by FSC® which define well managed forests.

Principle 7 requires Ernslaw to develop a management plan.

Principle 10 requires Ernslaw to explicitly state in the management plan the management objectives of the plantation, including natural forest conservation and restoration objectives, which are clearly demonstrated in the implementation of the plan.

The Principles state:

Principle 7: Management Plan - A management plan, appropriate to the scale and intensity of operations-shall be written, implemented, and kept up to date. The long-term objectives of the management, and the means of achieving them, shall be clearly stated"

Principle 10.1.1: Objectives of tree planting shall be explicit in the management plan, with clear statements regarding the relationship between tree planting and the silviculture, socioeconomic and environmental (i.e. forest conservation and restoration) realities in the region.

Principle 10.1.2: Management objectives for conservation of natural forest and restoration shall be described in the management plan.

Principle 10.1.5: Plantation management objectives, including explicit measures under Criteria 6.2, 6.3, 6.4, 6.9, 6.10, 10.2 and 10.5 intended to maintain and retain indigenous biodiversity, are identified in the management plan and implemented in a timely manner.

Principle 10.1.6: The management plan shall identify the boundaries of the area encompassed by the certificate, which includes the plantation forest plus any designated reserve areas.

This document is in fulfilment of Principle 7 and the relevant criteria of Principle 10. The first part of this document describes the higher-level policies for the North Island estate. The second part details the management plan of each forest under the Ernslaw Certificate SGS-FM/COC-000905.

2 COMPANY PROFILE

Ernslaw is a private company, registered in New Zealand, with its owners based in Malaysia. The company was established in 1990 when it purchased several Crown Forestry Licences (CFL) of state forests from the government, as well as a sawmill. The company has since bought more forests and more land which has been converted to forestry. In 2011 a private company Timbergow Ltd (TGL) acquired forest estate in the North Island. Ernslaw entered into an agreement to manage this estate for TGL. These forests are referred to as the Tolaga

Forests. In 2017 a private company, Forestland Investments Ltd (FIL) acquired forest land in the Gisborne district - this is managed by Ernslaw on behalf of the owners.

Contacts for key offices are below:

Head Office	North Island and Gisborne Regional Office
Private Bag 92826 Penrose Auckland Ph:(09) 622 2080 Fax:(09) 622 2191	PO Box 2042 Gisborne Ph:(06) 867 9179 Fax:(06) 863 1011

3 MANAGEMENT OBJECTIVES

Ernslaw is committed to creating sustainable softwood forests and delivering premium quality appearance grade wood and panel board products for export and domestic customers.

Ernslaw has demonstrated its commitment to forestry in New Zealand by reinvesting company earnings back into the New Zealand operation, as well as investing further capital. This commitment has seen the New Zealand forest area to increase from the 23,987 hectares purchased in 1990 to an area of 96,229 stocked hectares as at 30 June 2019 (including both North Island and South Island). In addition to this is the 14,570 hectare forest estate managed on behalf of TGL, and the land holding of FIL.

4 FOREST RESOURCE

The North Island forest estate under certificate SGS-FM/COC-000905 is spread throughout the North Island. The North Island is split into two regions of management; Gisborne (based out of the North Island regional office in Gisborne, Regional Manager Iain McInnes), and Southern North Island (based out of Bulls, Regional Manager Steve Couper). The two regions report to the Chief Executive Officer, Paul Nicholls based in Auckland.

Forest blocks more distant from the regional offices have an office from which forestry and harvesting operations are managed; this includes the Karioi office and Whangapoua office. The North Island estate comprises the three following forest regions:

Coromandel	Gisborne	Southern North Island
<ul style="list-style-type: none"> Whangapoua forest 	<ul style="list-style-type: none"> Ruatoria forest Tokomaru forest Mata forest Mangatu forest Timbergrow forests Forestland forests 	<ul style="list-style-type: none"> Karioi forest Waimarino forest Te Namu forest Titoki forest Kumeroa forest Rangitikei Sands Rangitikei Hills

Ernslaw has entered into management agreements with two forest companies, namely Timbergrow Ltd and Forestland Investments Ltd. The resource of both these companies form part of the forest management unit making up the certification area for Ernslaw. The tree crop currently on the land owned by Forestland Investments Ltd is currently being harvested through PF Olsen Ltd and managed under a forestry right. Once harvested, direct management of the land is taken over by Ernslaw.

The table over page gives a summary of the areas managed by Ernslaw and the tenure status of each forest (North Island estate). (Note; the total productive area detailed in this document includes the current stocked area, plus areas awaiting restocking.)

Table 1: North Island estate area summary as at 30th June 2019

Forest Region	Forest	Tenure	Total Area (ha)	Total Productive Area (ha)
Coromandel	Whangapoua	CFL	10,582	7,493
Gisborne	Ruatoria	CFL	11,867	8,136
	Tokomaru	CFL	7,644	5,073
	Mata	Freehold	7,973	5,873
	Mangatu	CFL	12,535	9,007
		Leasehold	3,519	1,997
Southern North Island	Karioi	CFL	11,068	8,936
	Waimarino	Freehold	3,918	2,349
		Leasehold	10,203	4,696
	Te Namu	Freehold	3,772	2,906
	Titoki	Freehold	8,396	6,942
	Kumeroa	Freehold	1,079	944
	Rangitikei Sands	CFL	1,859	1,528
		Leasehold	3,661	2,865
		Freehold	370	338
	Tree Farm	Freehold	461	418
	Rangitikei Hills	Freehold	1,324	760
<i>Total Ernslaw North Island</i>			<i>100,232</i>	<i>71,343</i>
<i>Total Ernslaw South Island</i>			<i>30,899</i>	<i>24,885</i>
<i>Total Ernslaw New Zealand</i>			<i>131,131</i>	<i>96,229</i>
<i>TGL North Island</i>			<i>13,119</i>	<i>9,051</i>
<i>TGL South Island</i>			<i>6,164</i>	<i>4,791</i>
<i>Total TGL New Zealand</i>			<i>19,283</i>	<i>13,842</i>
<i>Forestland Investment</i>			<i>894</i>	<i>310*</i>

*area replanted and currently under Ernslaw One Ltd management

Crown Forestry Licences (CFL's) are agreements in which the Crown and forest companies enter into purchase of cutting rights for a defined area. The company has the right to harvest the trees at maturity and then replant the land subject to the conditions within the licence agreement and Regional Council resource consents. The Crown continues to own the land and is paid an annual rental.

Much of the CFL land under Ernslaw management is subject to Treaty of Waitangi claim and may be returned to Maori land owners as part of any settlement agreement. The Ruatoria and Tokomaru forest land has been returned to Maori ownership under the Ngati Porou Claims

Settlement Act 2012. Ngati Porou intend to increase their interest in forestry, and as such will obtain cleared land as Ernslaw concludes harvest operations and re-establish the land themselves. This means the Ruatoria and Tokomaru forest areas under Ernslaw management are diminishing each year as a result of this process.

Parts of Santoft and Lismore Sands (Harakeke Forest) have been returned to Ngati Apa with the signing of the Ngati Apa Claims Settlement Act 2010. While a couple of areas are earmarked for conversion to pastoral land uses Ngati Apa are yet to fully determine what involvement, if any, they are likely to have in forestry.

With the passing of the Ngati Tuwharetoa Settlement Act 2018, an area of 952 hectares within Karioi Forest was transferred from the Crown to Ngati Tuwharetoa. It wasn't until nearly a year later with the passing of the Ngati Rangi Claims Settlement Act in August of 2019, that the remaining land area of Karioi Forest was transferred from the Crown to Ngati Rangi ownership.

5 SPECIES AND SILVICULTURE

5.1 POLICY

The North Island estate focuses on growing radiata pine.

5.2 METHODS OF IMPLEMENTATION

Approximately 90% of the certified productive area is stocked with radiata pine. This species has been proven to grow successfully in New Zealand and performs extremely well compared to other species. It can be grown on a wide range of sites, has minimal associated pests and diseases, and when purchasing land, the company has selected areas that are suitable for radiata pine.

Ernslaw mostly establishes improved controlled pollinated (CP) radiata pine tree stock and occasionally will establish small areas using lower quality open pollinated tree stock. CP stock results in faster growth, increased volume and enhanced wood properties at harvest time. The target stocking for planting is 1000 stems/hectare across all sites. The processes, regimes and other operational guidelines are detailed in the Ernslaw Establishment and Silviculture Manual. The manual has been reviewed and an updated version made available in February 2018. This manual is a 'dynamic' document, which is subject to periodic updates as required. The most recent was including guidance on the topic of the National Environmental Standard for Plantation Forestry (NES-PF)

6 HARVESTING

6.1 POLICY

Production forest harvesting is undertaken in an economically, environmentally and socially sustainable basis with safety as a primary focus.

6.2 METHOD OF IMPLEMENTATION

Harvesting includes both production thinning (carried out in the Rangitikei Sands forests and Karioi forest) and clearfell harvest of mature stands. Harvesting is carried out by contractors using a mixture of ground based and hauler techniques, depending on the terrain.

The detailed process of harvest planning is described in the Ernslaw Harvesting Manual. A harvest plan is written which describes the method by which timber will be safely harvested and transported from a forest area with minimal environmental impact. Topography, landing requirements, design, location, and spacing of roads and landings, environmental constraints, statutory and voluntary compliance requirements must be analysed, balanced and considered in order for harvesting operations to occur with maximum efficiency and minimal disturbance. Forest management software tools are used to analyse various scenarios in order to select the optimal harvesting layout for any given cut plan area.

7 WOODFLOW

7.1 POLICY

The company has two general regimes for growing radiata pine; clearwood and panel-board. In addition to this is a small amount of pulp taken from production thinning's and clearfell.

1. The clearwood regime focuses on producing pruned clearwood for appearance end uses. Pruning is done in 2-3 lifts and aims to produce a pruned butt log of at least 5.2 m with sawlogs above that.
2. The panel board regime aims to produce a structural grade log with small branching that could be used in the production of plywood and other panel board products.

These regimes vary slightly between forests, as they have been customised for the local site conditions.

7.2 METHODS OF IMPLEMENTATION

Ernslaw's current sustainable harvest levels will vary among forests over time due to differing age classes. The annually produced Estate Plan will define these levels. The Estate Plan and harvest volume is determined using Remsoft Spatial Planning System (Woodstock), a spatial linear programming tool.

Harvest volumes will increase around the year 2025 when new forests established in the Southern North Island and Gisborne reach maturity and harvesting commences.

Currently around 30% of the Ernslaw North Island volume is sold domestically, with Ernslaw supplying logs to up to ten domestic sawmills and three pulp and paper mills in the North Island. The remaining 70% is exported in log form. The primary export destination is China.

100% of the TGL harvested volume is exported.

8 MAINTENANCE AND PROTECTION

8.1 POLICY

1. To actively participate in rural fire committees.
2. To control pest animals and pest plants in accordance with the Integrated Pest Management Strategy, District Council Regional Pest Management Strategy and Animal Health Board requirements.

8.2 METHODS OF IMPLEMENTATION

Ernslaw maintains its own fire-fighting equipment (including fire engines) and has its own fire stores. Ernslaw staff are trained in a variety of fire related roles including operations, planning and logistics to combat forest fires.

Up to the 30th June 2017 Ernslaw had been aligned with Rural Fire Authorities of which (by district) were coordinated by the National Rural Fire Authority. Following a 2012 and 2015 review of fire services in New Zealand the Fire and Emergency New Zealand Act 2017 was instated and Fire and Emergency New Zealand (FENZ) was established in July 1 2017. All North Island forests now come under the FENZ Authority with reported forest fires being directed through the National 111 emergency system of which is then coordinated by the appropriate District Principle Rural Fire Officer (DPRFO).

During 2018 the Forest Health Surveillance (FHS) system was replaced by the Forest Biosecurity System (FBS). This system takes the focus of assessment to those areas identified as high risk, i.e airports, shipping ports, industrial facilities etc. It is in the environs surrounding these locations that plantation species are assessed for pest and disease. A component of the budget for this system is available for non-model allocation sites, and as such some forests may be subject to a field visit.

Foliage samples are taken from a section of stands on an annual basis to determine nutrient status, as per foliar sampling policies by region. Stands found to be deficient will then be fertilised if deemed necessary. Common nutrient deficiencies include phosphorous (P) and nitrogen (N) at Whangapoua, nitrogen and boron (B) at Rangitikei forests and Titoki forest.

9 FOREST GROWTH AND DYNAMICS

9.1 POLICY

1. To adopt a variety of techniques to monitor forest growth and dynamics.
2. All stands and forest operations are recorded on a computerised stand record system.

9.2 METHODS OF IMPLEMENTATION

Ernslaw uses a number of software tools to manage the tree crop and assist with growth and volume predictions. These include YTGen (yield table generator) and Atlas Forecaster. These tools are used to model development of a forest and to assist with timing of pruning and thinning operations, compare and develop regimes, and predict log grade and harvest yield at harvest time.

Quality control is carried out after each tending operation. This provides information on the number of trees per hectare, their size, and how well the tending was carried out. Permanent sample plots (PSP's) are installed in a selection of forests and stands throughout the North Island estate following tending and obtain regular measurement for the life of each stand.

Atlas GeoMaster is a stand record repository system. GeoMaster has an interface that allows information to be linked to the mapping software (Arc GIS) enabling forest, compartment and stand areas to be spatially displayed. This capability assists forest managers with planning and managing the forest estate.

Forest inventory data is collected at age 23 years using the PLOTSAFE field data collection software. Inventory information is processed using YTGen to predict log grade yields at harvest age.

10 ENVIRONMENTAL PERFORMANCE

10.1 POLICY

- To set high standards for all operations, especially harvesting, to minimise the effect on the environment.
- To monitor streams to confirm that forestry and harvesting operations have not impacted upon riparian function.
- To confirm that Ernslaw and its contractors meet the legal requirements and standards outlined in the Environmental Management System (EMS) through audits and identifying means for continuous improvement.

10.2 MANAGEMENT OBJECTIVES

The management objectives under our EMS are:

- To meet both voluntary and statutory requirements
- To improve our environmental performance
- Benefit from a strong environmental reputation

10.3 METHODS OF IMPLEMENTATION

Ernslaw has had an EMS in place since 1998. The EMS identifies our processes and procedures, who is responsible for these and our Best Management Practices. It incorporates an Environmental Incident Procedure, Heritage Site Management, and a Riparian Management and Monitoring Strategy. The EMS covers Consents and Permits, both internal and external communication and incorporates an audit and review process. The audit process measures how Ernslaw operations meet the voluntary and statutory environmental requirements and identifies opportunities for further improvement. The EMS is a comprehensive document that allows us to meet a high standard of environmental performance.

In May 2018 the National Environmental Standard for Plantation Forestry (NES-PF) came into force. These regulations are made under the Resource Management Act 1991 (RMA) and significantly changed how plantation forestry is regulated within New Zealand. The regulations set out technical standards, methods or requirements relating to matters under the RMA and provide consistent rules across the country. The NES-PF prevails over district or regional rules except where the NES-PF allows more stringent plan rules. The EMS is currently in the process of being updated to reflect the NES-PF.

Ernslaw has, along with most New Zealand Forest Owners, ratified the New Zealand Forest Owners Association Environmental Code of Practice and uses this document alongside the EMS. In 2018, the Forest Practice Guides were released by NZFOA and are accepted industry guides for a range of forestry activities. EOL has adopted these guides for relevant the forestry activities.

Ernslaw has over 400 archaeological sites within its estate, primarily Maori sites such as midden, kumara pits, or terraces. The majority of these are at Whangapoua forest. These are marked on maps where locations are known, and staff and contractors are trained to identify them if they find new sites.

Known sites are not planted, and if trees are to be harvested from a site, this is done in consultation with Tangata Whenua, archaeologists and Heritage New Zealand to minimise disturbance.

The EMS contains a section entitled “*Vista Management for Outstanding Landscapes*” to summarise the known outstanding landscapes, how we can influence them and how we should manage activities around them. We have reviewed the Integrated Pest Management Strategy to convert two regional strategies into a national strategy for the company. This process has included a review of chemical use procedures and development of a national chemical use policy. This is now contained in the Establishment and Silviculture Manual so staff can access the information they require when planning weed or pest control operations.

In November 2007 the Forest Owners Association released the New Zealand Environmental Code of Practice for Plantation Forestry. These best practice guidelines have been adopted by Ernslaw. In 2018 the Forest Practice Guides were released by NZFOA and are accepted industry guides for a range of forestry activities. EOL has adopted these guides for relevant the forestry activities.

As part of a continual process to reduce the use of agrichemicals Ernslaw has introduced a weed assessment protocol to be employed post-harvest and in the two years following re-planting. The intention is that only stands requiring treatment will have residual herbicide applied. Others will receive an alternative treatment if required. In its first year of application this policy has resulted in a 22% reduction in the use of tree release herbicide. Chemical use is reported annually as part of the FSC audit process.

EOL undertakes a biannual water monitoring programme using the Stream Health Monitoring Assessment Kit (SHMAK) to assess water quality trends over time and measure the effects of our activities on freshwater values.

Ongoing evaluations of indigenous vegetation within the estate are undertaken to identify and assess ecosystem values. Management priorities are then planned according to the associated value. Assessments are progressed both at a coarse and fine level in order to identify vegetation types, distribution of rare, threatened and endangered species, threats to the ecosystem and to develop management requirements.

Additionally, the estate has been assessed for areas that are of High Conservation Value (HCV). Ernslaw has undertaken an extensive analysis and consultation process to identify and assess potential HCV areas. Currently 1099 hectares have been classified as having HCV and a management plan has been developed for each area which includes an annual monitoring programme. Ernslaw will continue to re-assess and consult with local experts on areas that have potential HCV and make management plan amendments where necessary. An additional HCV area was included in 2019 (Waingaro wetland) in Whangapoua forest.

11 CARBON FORESTRY

With the passing of the Climate Change Response Act 2002, the scene was set for development of initiatives to assist with addressing climate change. The creation of the Emissions Trading Scheme (ETS) has provided Ernslaw with an opportunity to derive additional value from the forest resource, through the sale of carbon credits.

Throughout the 1990's Ernslaw developed new radiata pine forests on company owned freehold land which had not previously been under forest cover. As these are forests established after 1990 i.e. Post-1989 forests, they are eligible for entry into the ETS. Since 1st September 2011 forest companies were able to install sample plots in their own post-1989 forest land. With information collected from these plots, Te Uru Rākau (formerly MPI) provided a specific carbon lookup table to be used for calculating carbon stocks instead of using regional lookup tables.

The North Island has three forest groups entered into the ETS:

- Mata Forest (Gisborne)
- Titoki and Kumeroa Forests (SNI)
- Te Namu Forest (SNI)

The South Island also has forest areas registered in the ETS, being Waihopai Downs, Wether Hill and Sweetstream Forests.

Since TGL has acquired forest estate in New Zealand, they have entered all their eligible North and South Island estate into the ETS.

These forest groups are:

- Tolaga Forests (Waiau, Moonlight, Uawa and West Ho)
- Merriwa Forest (Hawkes Bay)
- Marlborough Forest (Renwick, Tordarroch and Netherwood)

12 INDIGENOUS FLORA AND FAUNA

12.1 POLICY

1. Forest operations are carried out so that threatened species and their habitats are not disturbed.
2. Effects of forestry operations on indigenous vegetation distributed throughout Ernslaw's estate, designated as Significant Natural Areas (SNA's) are avoided, remedied or mitigated.

12.2 METHODS OF IMPLEMENTATION

Ernslaw is a member of the New Zealand Forest Owners Association and is a signatory to the Forest Accord. The Accord does not allow conversion of areas of tall indigenous vegetation greater than five hectares to plantation forestry. It has always been the policy of the company to adhere to the Forest Accord and to protect areas of indigenous vegetation.

Ernslaw has developed an estate map to show areas of indigenous flora and fauna. An array of management options exists to mitigate adverse effects on indigenous species within the North Island estate. Management strategies have been established for brown mudfish (*Neochanna apoda*), falcon (*Falco novaeseelandiae*), powelliphanta snails (*Powelliphanta traversi tararuaensis*) at Santoft and Shannon Forests.

An agreement between Ernslaw and the Department of Conservation (DOC) ensures the protection of Archey's (*Leiopelma archeyi*) and Hochstetter frogs (*Leiopelma hochstetteri*), long-tailed bats (*Chalinolobus tuberculatus*) North Island brown kiwi (*Apteryx australis*), threatened lizards and their habitats from forestry and harvesting operations at Whangapoua forest. Ernslaw are actively involved in kiwi habitat protection in Waimarino forest with local Iwi and other parties.

Any indigenous species found within the estate have been recorded in the Ernslaw Arc GIS. This work is an important part of the identification and protection of rare, threatened and endangered species and their habitats. The Rare and Threatened Species Plans Identification and Management Summary are an additional tool for contractors and staff.

In situations where forest operations could potentially have an adverse effect on SNA's, and/or the habitats of threatened indigenous species, relevant stakeholders will be consulted prior to works commencing.

Additionally, Ernslaw uses the **i-Naturalist** platform to record sightings of native species within the forest estate.

13 EMPLOYMENT SUMMARY

Ernslaw employs 40 salaried staff in the North Island. All other work is carried out by a contract work force comprising harvesting, harvest roading and forest silviculture, logging transport is also contracted, this means there can be between 150 and 300 people working within Ernslaw forests at any time. Most of these people live locally to the forests. The number of staff and crews is summarised in the following table.

Table 2: Staff and contract crews employed by Ernslaw and TGL

Office	Staff	Harvesting	Roading	Silviculture
Whangapoua	2	2	2	1
Rangitikei Bulls	6	1	2	2
Ruapehu	4	5	1	2
Titoki	1	3	2	1
Gisborne	29	11	5	2

14 OTHER FOREST USES

The forests also provide a number of other uses. These comprise commercial uses such as grazing, sites for beehives, Horopito leaf gathering, possum trapping for fur, and recreational

uses such as hunting of pigs and deer, mountain biking, adventure races, orienteering and others.

15 COMMUNITY INVOLVEMENT

Ernslaw has a close involvement with the local communities around its forests. As mentioned, much of the labour force comes from those communities. Ernslaw supports some of these communities by way of scholarships and sponsorships. School groups will also visit forests for an educational experience. Forests are used by local hunters, and also a number of sporting organisations, e.g. mountain bike clubs, rally's, orienteering and others.

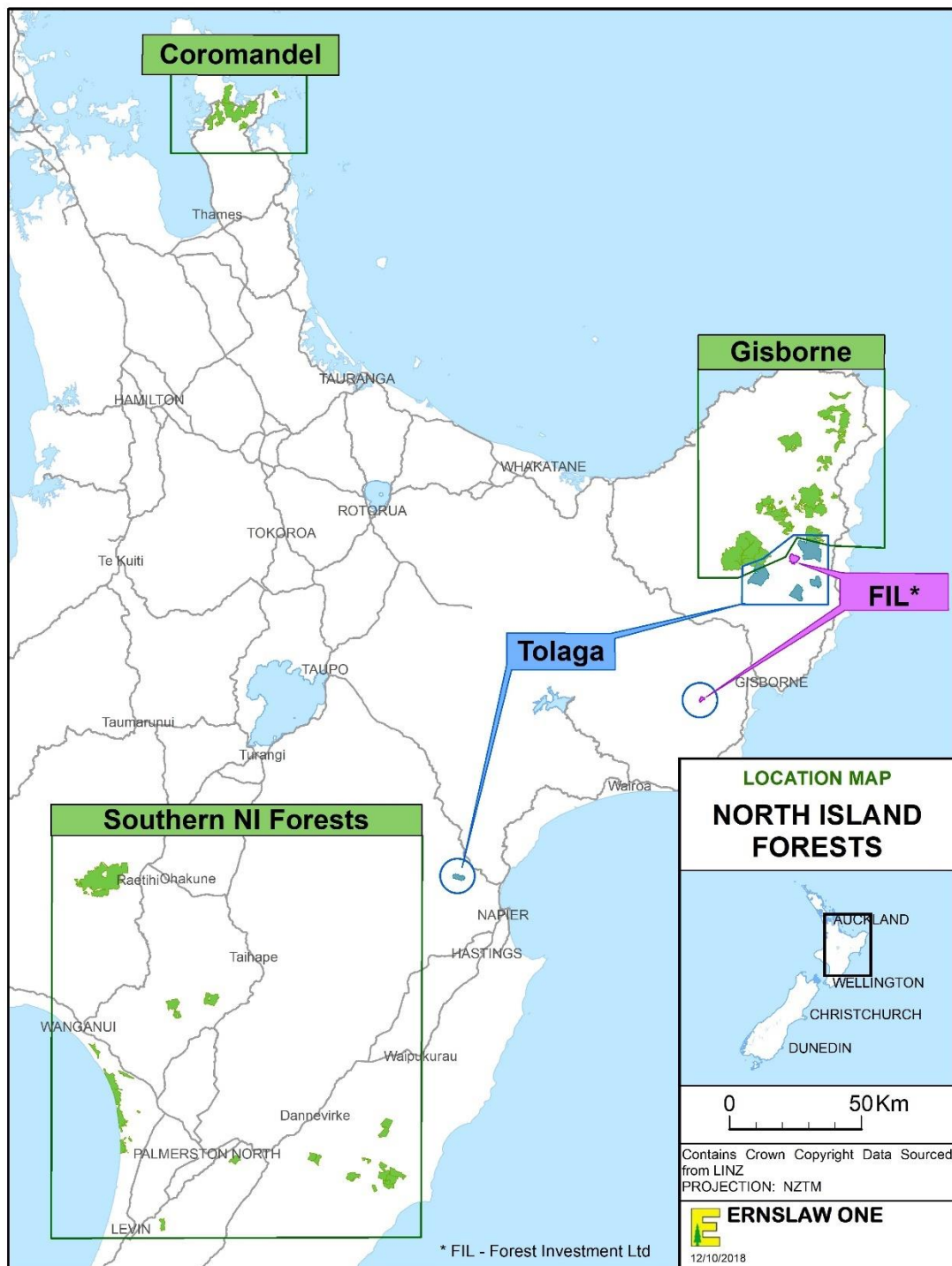


Figure 1: Location map of the Ernslaw North Island managed estate.

16 GISBORNE FORESTS

The Gisborne forests are divided into three groups Mangatu/Waipaoa, Tokomaru/Mata and Ruatoria. All forests (with the exception of Waipaoa and Mata) are under CFL's, much of the CFL land under Ernslaw management is under Treaty of Waitangi claim and may be returned to Maori land owners as part of any settlement agreement. Waipaoa is leasehold and Mata forest is freehold.

Table 3: Gisborne forests area summary as at 30th June 2019

Forest group	Total area (ha)	Productive area (ha)
Mangatu/Waipaoa	16,054	11,003
Tokomaru/Mata	15,617	10,959
Ruatoria	11,867	8,136
Total Area	43,538	30,098

16.1 BACKGROUND

The Ruatoria forests are located in the Gisborne region, approximately between 85 and 110 km north-northeast of Gisborne and between 10 and 40 km inland from the coast (in straight-line distances). The forests have a total area of 11,867 hectares, of which 8,136 hectares is stocked.

There are twelve forest blocks, comprising Mullanys, Manu, Littleworths, Whakaangiangi, Mackeys, Mangaoporo, Rauponga, Hills, Rip, Stevensons, Matahiia and Taitai. The majority of the land was first planted in the 1970s and 1980s by the New Zealand Forest Service. Previous tenure was under CFL with the lands now going back to Ngati Porou Iwi through the Treaty of Waitangi settlement Ngati Porou are now the land owner.

16.2 HARVESTING

Harvesting has started in Taitai forest (1st rotation) at the end of 2017 and has also recommenced in the Rip forest (1st rotation), two ground-based crews are being used.

16.3 SILVICULTURE

These forests are mostly radiata pine. A variety of silvicultural approaches in the past has given a wide range of treatments and stockings. Prior to post-Treaty return of land to Ngati Porou, stands planted by Ernslaw have been stocked with radiata pine applying either a clearwood regime or (the now favoured) panelboard (or structural regime), depending on site productivity, access, and land stability. The company contracts three full time silviculture crews who work throughout the Gisborne forest estate.

16.4 ENVIRONMENTAL

Ecological surveys have revealed the presence of Hochstetter's frogs at Littleworths Forest, falcon at Mullanys, Rip and Mackeys, Blue duck in the Rip and North Island brown kiwi at Whakaangi.

Forestry operations likely to impact on these species and their habitats are planned and managed under the species management plan and where required in consultation with the DOC and other stakeholders.

There are several known archaeological sites in the Ruatoria Forests. These were recorded up to thirty years ago and some have been relocated. New sites are found as planning progresses through areas.

16.5 OTHER

Much of the Ruatoria forests consist of steep, unstable terrain and are prone to occasional high-intensity storm events which can cause severe damage. Harvesting and earthworks are carried out with a great deal of care to avoid any detrimental effects. The majority of these forests were established to protect the environment from the effects of land clearance.

17 TOKOMARU AND MATA FORESTS

17.1 BACKGROUND

Tokomaru and Mata forests are located in the Gisborne region, approximately between 60 and 75 km north of Gisborne and between 10 and 40 km inland from the coast (in straight-line distances). The forests have a total area of 15,617 hectares, of which 10,959 hectares is stocked.

There are thirteen forest blocks, comprising Carters, Ihungia, Te Pora, Ruangarehu, Puketoro, Pouturu, Owhena, Mangawhero, Hauturu, Huiarua, Matanui and Makomako. Ihungia, Te Pora and Ruangarehu blocks (which make up Mata Forest) were former sheep and cattle stations that were purchased by Ernslaw in the mid 1990's. There were some existing woodlots but the majority of land was planted in radiata pine from 1997-2000. The remaining blocks were CFL forests, planted in the late 1970s, 1980s, and early 1990s by the New Zealand Forest Service. Like the Ruatoria forests, these blocks have now been returned to Ngati Porou Iwi under the Treaty of Waitangi settlement. A high percentage of the land is unstable and was eroding rapidly as farmland.

17.2 HARVESTING

Harvesting is carried out by four full time hauler crews and one full-time ground based roadlining crew. Mata roadlining will commence in 2020.

17.3 SILVICULTURE

This forest is largely radiata pine. Trees were planted at stockings ranging from 850-1500 stems/hectare, with the higher stockings generally on the less stable sites. Of the mid 1990s plantings, better sites were pruned to a minimum height of 5.5 m, and then thinned to a final stocking of 333 stems/hectare. The remainder of this area was thinned to a final crop stocking of 500 stems/hectare. Of the older blocks, a variety of silvicultural approaches in the past has given a wide range of treatments and stockings. Current intentions for the Mata forests are to

replant into either a clearwood or panelboard radiata pine regime, depending on site productivity. Area within the Tokomaru forests which had been harvested prior to the Ngati Porou Treaty of Waitangi settlement have been re-established with radiata pine for panelboard (or structural) regime. Subsequent harvested area is handed back to Ngati Porou for re-establishment. The company contracts one full time silviculture crew between the Tokomaru and Ruatoria forests, balancing the workforce across the other Gisborne forests. Thinning has now commenced in the 2nd rotation tree crop.

17.4 ENVIRONMENTAL

These forests are on steep terrain and unstable land so slips and slumps are common. Earthworks are carried out with a great deal of care to avoid any detrimental effects.

Ecological surveys have revealed the presence of North Island brown kiwi in Te Pora, long-tailed bats at Ihungia, and Puketoro, and blue duck (whio) at Owheana and Mangawhero. Falcon has also been identified in Owheana. Forestry operations likely to impact on these species and their habitats are planned and managed under the species management plan and where required in consultation with the DOC and other stakeholders.

Within Mata forest, 252 hectares have been classified as HCV-3 in order to maintain high value primary podocarp forest along the Mata River. This area is some of the most significant surviving lowland forest remnants in the entire Ecological District. Additionally, biennial stream monitoring has been undertaken within Mata forest since 2016 to build an understanding of stream health prior to harvest activity begin. Stream monitoring will continue during harvesting and beyond to measure stream recovery.

There are a several Maori archaeological sites such as pits and terraces within the Tokomaru and Mata forests. These have not been planted and will be preserved as they are.

17.5 OTHER

Approximately half of the area was planted under the East Coast Forest Project, in which the Government through the MAF (now MPI) subsidised planting on the poorer, less stable sites which were unattractive for forestry, and unsuitable for any other land use. Protective covenants are tied to the land for areas and prescribe management requirements.

18 MANGATU AND WAIPAEOA FORESTS

18.1 BACKGROUND

Mangatu forest is located in the Gisborne region, approximately between 40 and 55 km north-northwest of Gisborne and approximately between 30 and 45 km inland from the coast (in straight-line distances). The forest has a total area of 16,054 hectares, of which 11,003 hectares is stocked.

There are two forest blocks, Mangatu and Waipaoa. The Mangatu block was planted in the 1960s, the Waipaoa block in the 1980s and 1990s. The Mangatu block is a CFL, and the Waipaoa block is private leasehold. A high percentage of the land is unstable and was eroding rapidly as farmland.

The majority of the first rotation stands in the Mangatu block have been clearfelled and replanted.

18.2 HARVESTING

Harvesting is carried out by two hauler crews in both 1st and 2nd rotation blocks.

18.3 SILVICULTURE

These forests are mostly radiata pine, although there are large areas of minor species, such as Douglas-fir and Corsican pine. A variety of silvicultural approaches in the past has given a wide range of treatments and stockings. Currently the forest are being re-established with radiata pine for panelboard regimes. Thinning in the 2nd rotation tree crop is well underway.

The company contracts one full time silviculture crew in Mangatu Forest. In 2018, a small pruning regime programme began within Waipaoa forest.

18.4 ENVIRONMENTAL

This forest is on moderate steep terrain and unstable land so slips and slumps are common. Earthworks are carried out with a great deal of care to avoid any detrimental effects. Historically, this forest was established to protect the environment from the effects of land clearance for farming on unsuitable land.

Ecological surveys have revealed the presence of long-tailed bats, and falcon. Forestry operations likely to impact on these species and their habitats are planned and managed under the species management plan and where required in consultation with other stakeholders. In 2018 a bat survey was undertaken within Mangatu forest. Automatic bat monitors were deployed throughout the forest assist with quantifying the make-up of any bat population within the forest area. The outcome of the survey suggests Mangatu forest has a good population of Long-tailed bats. No Short-tailed bats were detected. In 2019, a freshwater survey was undertaken to determine what freshwater fish species were present in the Waipaoa river to support resource consent applications for river crossings. The survey found both long-fin eel and torrent fish present.

Within Waipaoa forest, 770 hectares have been classified as HCV-3 in order to maintain a large area of significant secondary vegetation which is classed as usual in the context of the Ecological District. Contained within the Areoma reserve is the Otuhawaiki pa site which has been classified as HCV-6.

18.5 OTHER

The Mangatu block was planted in the 1960s to provide erosion control in the headwaters of the Waipaoa River, which flows through the Poverty Bay flats of which are crucial to the Gisborne economy. Ernslaw recognises the need to maintain this catchment control function.

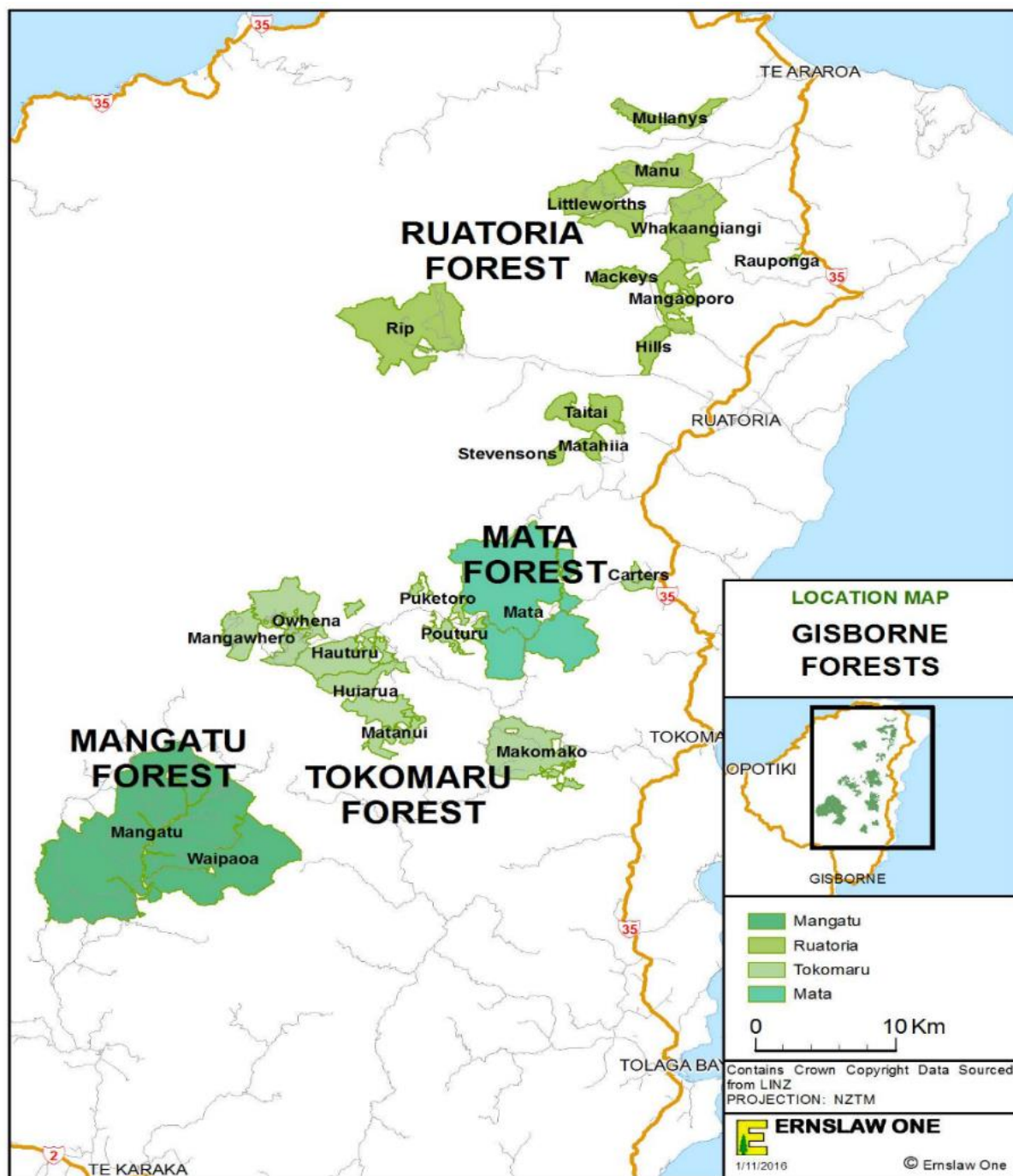


Figure 2: Ernslaw One Ltd. Gisborne forest location map

19 OPERATIONS (GISBORNE)

Table 4: Gisborne forests summary of operations as at 30th June 2019

Operation	Quantity
Harvesting (m ³)	400,000
Pre-plant Aerial Spraying (ha)	312
Restocking/planting (ha)	425
Thinning (ha)	696

20 TGL NORTH ISLAND FORESTS (TOLAGA FORESTS)

20.1 BACKGROUND

This forest estate was purchased in 2011 by TGL Ltd. The majority of the North Island forest estate is located on the East Coast (8,340 total area hectares in the Tolaga/Tokomaru Bay area and 4,055 total area hectares adjacent to Mangatu), with one forest inland from Napier (724 total area hectares) making a total of 13,119 total area hectares in the North Island. The TGL New Zealand estate comprises 19,281 total area hectares. Ernslaw has been contracted to manage these forests on behalf of the forest owner.

In late 2017 Forestland Investment Ltd (FIL) purchased 1,100 hectares of forested land in the Gisborne region. The owners of the existing tree-crop have entered a forestry right with FIL. As land is harvested FIL will restock the cutover the following winter. This process will be managed by Ernslaw. The location of the FIL estate is shown in Figure 1.

Table 5: Forest area summary of TGL and FIL as at 30th June 2019

Forest block	Region	Total area (ha)	Productive area (ha)
Timbergrow			
Waiau	Gisborne	5,326	2,793
Uawa	Gisborne	1,176	858
West Ho	Gisborne	1,838	1,379
Moonlight	Gisborne	4,055	3,506
Merriwa	Hawkes Bay	724	517
Total Area		13,119	9,053
Forestland Investments			
Waiteata	Gisborne	894	728 (310*)
Parikanapa	Gisborne	215	187
		1,109	915

*area replanted and currently under Ernslaw One Ltd management

20.2 HARVESTING

Harvesting is currently underway in West Ho and Moonlight forests. The harvesting in West Ho forest is being carried out by one three full time hauler crews. Moonlight has one road line.

20.3 SILVICULTURE

These forests are predominantly planted in radiata pine, with less than 1% planted in alternative species. A variety of silvicultural regimes, including pruned and unpruned regimes, have been

used in the past. As a result of the age class distribution, there is little silviculture happening in these forests at present however some thinning has begun in the 2nd rotation in West Ho. With harvesting well underway re-establishment is started in Waiau, West Ho, Uawa and Moonlight. Current intentions are to replant harvested areas with radiata pine applying either a clearwood or panelboard regime, depending on site productivity, access, and stability. Labour is generally sourced from the silviculture crews working in the Mangatu, Tokomaru and Ruatoria Forests.

20.4 ENVIRONMENTAL

There are several known archaeological sites in Uawa and Waiau Forests, with more sites often found during operational processes. These sites have been mapped and assessed and are taken into consideration during planning for subsequent forest operations.

NZ falcon are identified as present in all Tolaga forests and are managed under species management plans.

Within Waiau forest, 34 hectares have been classified as HCV-3 in order to protect and maintain the most valuable primary remnants on the gentle plateau country known as Jacob's Bush.

Several freshwater fish surveys were conducted within West Ho forest as part of Council consenting processes. The outcome of these identified the presence of Long-finned eels. No other fish species were identified.

Waiteata forest contains an area of significant indigenous vegetation. This 13-hectare area of indigenous vegetation is now under Ernslaw One Ltd management and therefore has been assessed and confirmed as a protected reserve. Predominate species include tawa, pukatea, rimu and rewarewa.

20.5 OTHER

Much of the TGL forests consist of steep, unstable terrain and are prone to occasional high-intensity storm events which can cause severe damage. Harvesting and earthworks are carried out with a great deal of care to avoid any detrimental effects. Historically, many of these forests were established to protect the environment from the effects of land clearance for farming on unsuitable land.

20.6 OPERATIONS (TGL)

Table 6: TGL forests summary of operations as at 30th June 2019

Operation	Quantity
Harvesting (m ³)	154,225
Pre-plant Aerial Spraying (ha)	370
Restocking/planting (ha)	450
Thinning (ha)	226

21 CONTACT DETAILS (GISBORNE AND TGL FORESTS)

Gisborne Regional Office:
 PO Box 2042
 Gisborne
 Ph: (06) 867 9179
 Fax: (06) 863 1011

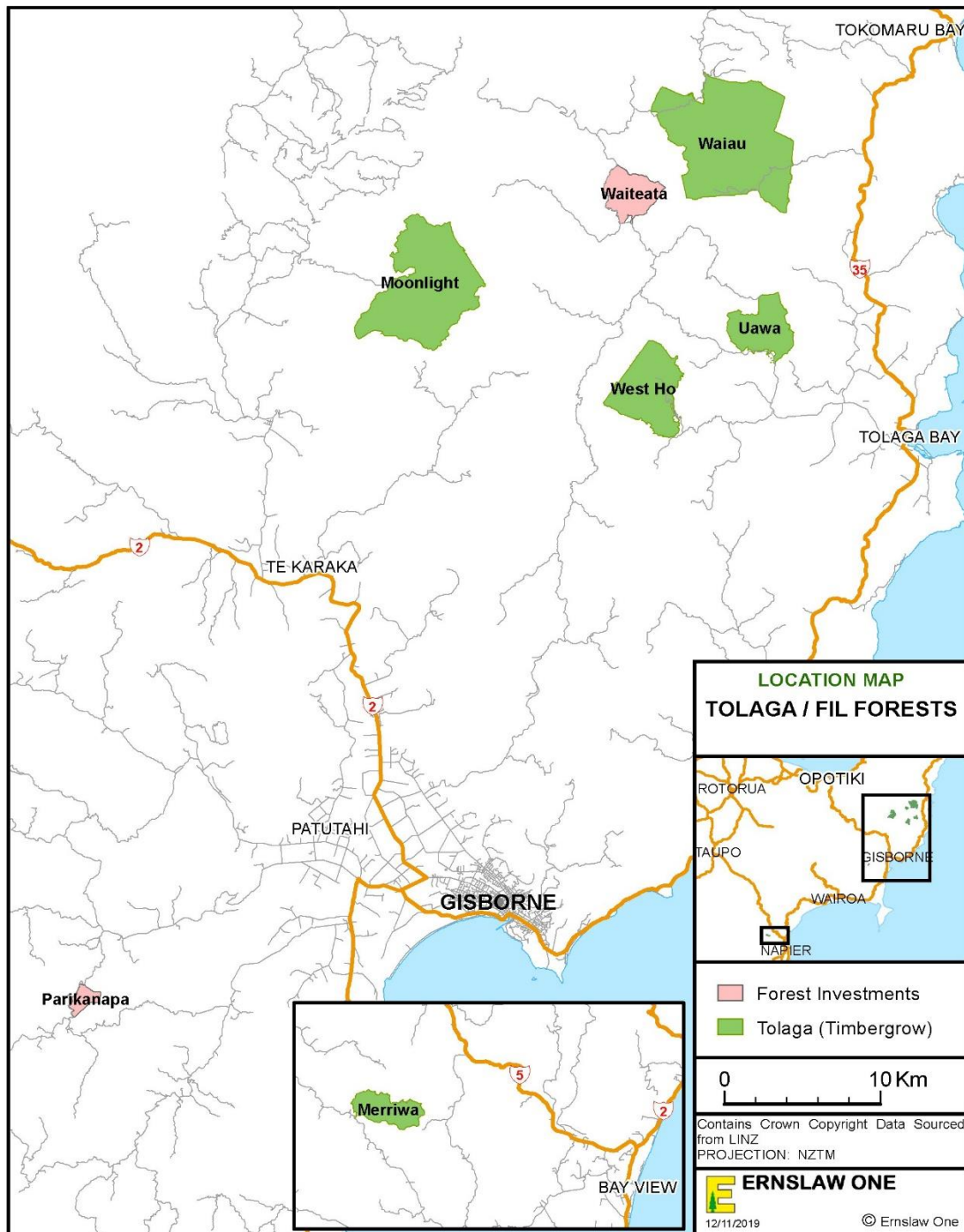


Figure 3: TGL Tolaga forests location map

22 RANGITIKEI SANDS FORESTS

22.1 BACKGROUND

The Rangitikei Sands forests lie within 10 kilometres of the Rangitikei coastline, and are situated between Wanganui and Himatangi. The forests have a total area of 6,612 hectares, of which 5,176 hectares are productive. They comprise several blocks, as listed below. Some blocks are CFL or leasehold, while the remainder are freehold (Ernslaw owned).

22.2 AREA SUMMARY

Table 7: Rangitikei Sands forests area summary as at 30th June 2019

Tenure	Forest block	Total area (ha)	Net stocked area (ha)
CFL or other lease	Harakeke	546	488
	Santoft	4,138	3,292
	Tangimoana	836	604
Freehold	Himatangi	105	94
	Parewanui	195	178
	Pukehou	70	65
	Tree Farm	461	418
Total		6,351	5,139

The forests are planted on converted sand dunes or developed sand country. The terrain is flat to rolling.

The CFL forests run along the coast and were established by the New Zealand Forest Service, with the first plantings beginning in the late 1950's, following a sand stabilisation project. The project involved dune shaping, followed by marram planting and lupin over sowing to increase nitrogen levels. The company maintains a coastal protection strip of some 500 hectares that acts as a buffer between the commercial forest and the dunes.

The Tree Farm block was purchased by Ernslaw in 1994. This forest is currently in its third rotation.

Himatangi, Parewanui and Pukehou are part of the Manuka Holdings block, and are further inland. These forests lie on more developed/fertile sand country and are relatively more productive.

22.3 HARVESTING

Harvest operations are currently underway in Harakeke, Parewanui, Santoft and Tree Farm forest consisting of both clearfell and production thinning.

22.4 ESTABLISHMENT / SILVICULTURE

All harvested areas are replanted in the winter following harvest with radiata pine. Trees are planted at 1000 stems/hectare. Better sites are pruned to a minimum height of 5.5 m, and then thinned (waste or production) to a final stocking of 267 stems/hectare. The remainder of the forest will be thinned to a final crop stocking of 333 stems/hectare under a structural regime. The company contracts one fulltime silviculture crew. Some areas are fertilised with Ulexite to lift boron levels which can be low on sand soils. Both pruning (limited) and thinning programmes have commenced in the 2nd rotation.

22.5 ENVIRONMENTAL

This forest is situated on flat sandy terrain. The main threat is from the westerly wind. The company maintains the fore dune, with a programme of re-shaping dune blow-outs and replanting in Marram grass when required. It is also experimenting with Spinifex inter-plantings.

Ecological surveys have revealed the presence of brown mudfish at Santoft. Forestry operations likely to impact on this species and its habitats are planned in consultation with DOC and other stakeholders. Tangimoana has recently been identified as habitat for falcon and is therefore managed under the species management plan.

There are several midden sites within the forests. Some of these are found in the coastal protection zone and will remain undisturbed. Trees planted over old sites will be logged in a sensitive manner and the site assessed for preservation in consultation with the appropriate iwi and Heritage New Zealand.

22.6 OTHER

These forests are quite close to urban centres, i.e. Wanganui and Palmerston North, which means that the forests have high recreational use. These include hunters, motor sports, game bird shooters, firewood collectors, trampers, whitebaiters, dog-sledders, researchers, and orienteers. Some areas are grazed, and the NZ Army frequently carry out field exercises in the forest.

These forests are often subjected to hot dry summers and when these occur the fire risk becomes extreme. In this situation, access may be restricted to the public, and even forest operations may be curtailed.

22.7 OPERATIONS

Table 8: Rangitikei Sands forests summary of operations as at 30th June 2019

Operation	Quantity
Harvesting (m ³)	116,776
Production thin (m ³)	21,600
Pre-plant Aerial Spraying (ha)	225
Restocking /planting (ha)	285
Spot releasing (ha)	245
Thinning (ha)	494

23 RANGITIKEI HILLS FORESTS

23.1 BACKGROUND

The Rangitikei Hills forests consist of Shannon forest which lies 5 km south-east of Shannon, and Aokautere forest, which is 15 km east of Palmerston North.

These forests have a total area of 1,328 hectares of which 763 hectares are stocked. Some areas had a forestry right which is now finished. Ernslaw have replanted all harvested areas in radiata pine.

The forests are planted on moderate to steep ex-pasture or reverting farmland. The majority of the forests were established by Carter Holt Harvey, between 1974 and 1981.

Road-lining operations commenced in Shannon forest in the summer of 2003/2004, and harvesting began in 2004 and finished in 2007. Harvesting in Aokautere forest began in 2007 and finished in 2012.

23.2 ENVIRONMENTAL

This forest is on moderate to steep terrain. The land is generally stable. Operations will be carried out with a great deal of care to avoid any detrimental effects. This will be monitored by the Regional Council.

23.3 HARVESTING

Harvesting in these areas is completed until the new crop matures.

23.4 ESTABLISHMENT / SILVICULTURE

All harvested were replanted in the winter following harvest with radiata pine. Trees are planted at 1000 stems/hectare. The forests will be thinned to a final crop stocking of 500 stems/hectare under a structural regime. Thinning of the 2nd rotation is complete in Shannon and near completion in Aokautere.

23.5 ENVIRONMENTAL

Ecological surveys have revealed the presence of powelliphanta snail and falcon at Shannon. Forestry operations likely to impact on these species and their habitats are planned in consultation with DOC and other stakeholders.

23.6 OTHER

The forests are used by interest groups such as hunters (including possum trappers), mountain bikers, trampers, orienteer's and horse riders. A Memorandum of Agreement is in place with local iwi.

24 TE NAMU FOREST

24.1 BACKGROUND

Te Namu forest is located in the Rangitikei District. It lies 15 km west of Hunterville, and 60 km north of the Southern North Island regional office located in Bulls. Te Namu has a total area of 3,772 hectares, of which 2,904 hectares is stocked. The forest is planted on moderate to steep ex-pasture or reverting farmland. Altitude ranges from 200-650 m above sea level. The forest comprises three blocks - Te Namu, Whareroa and Ngaruru - which were sheep and cattle stations prior to purchase by Ernslaw.

The forest was established by Ernslaw between 1996 and 1999. Due to the young age of the trees, there will not be any harvesting until after 2020. Pruning and thinning operations have all been completed.

24.2 ESTABLISHMENT/SILVICULTURE

The only species planted is radiata pine. Trees were planted at 850-1133 stems/hectare. Better sites are pruned to a minimum height of 5.5 m, and then thinned to a final stocking of 300 stems/hectare. The remainder of the forest was thinned to a final crop stocking of 450 stems/hectare under a structural regime. Some areas were fertilised with Ulexite to lift boron levels.

24.3 HARVESTING

Harvest roadlining to commence in 2023.

24.4 ENVIRONMENTAL

Ecological surveys have revealed the presence long-tailed bats at Te Namu, Whareroa and Ngaruru. Forestry operations likely to impact on this species and its habitats are planned in consultation with DOC and other stakeholders. This forest is on moderate to steep terrain. The land is generally stable, so slips and slumps have been confined to some of the steeper papa gully systems. Earthworks are carried out with a great deal of care to avoid any detrimental effects.

In 2019, a biennial SHMAK water monitoring programme was initiated to measure stream health and determine trends over time prior to the harvesting activity which is forecast to begin in coming years.

24.5 OTHER

There are four historic Maori sites on Ngaruru and Whareroa. An archaeological survey revealed that two of the sites are covered in native bush. The remaining two sites have been planted in radiata pine and will be harvested in a sensitive manner. Contractors are versed in heritage site procedure, should they find a possible site. A Memorandum of Agreement is in place with local iwi.

25 TITOKI FOREST

25.1 BACKGROUND

Titoki forest is in the Tararua and Central Hawkes Bay Districts. The forest has a total area of 8,394 hectares, of which approximately 6,921 hectares is currently stocked. The forest was established on moderate to steep pasture country and farmland reverting to scrub. It consists of two main blocks east of Dannevirke. The first is the Te Uri block which is inland from the coastal settlement of Porangahau. The remainder of the forest (the Titoki block) consists of a number of properties between Weber and Wimbledon.

The majority of the forest was established by Ernslaw between 1995 and 2000. Pruning and clearwood thinning operations commenced in 2002 and were completed in 2007. Structural thinning programmes began in 2001. Silviculture has been completed for this rotation.

In 2014/2015 a neighbouring property was purchased by Ernslaw comprising a total area of 315 hectares of which 282 was planted in 2015.

25.2 HARVESTING

Most of the forest is now in its early 20's, however roadline and groundbase harvesting has commenced in some of the highly productive areas. Three harvesting crews alternate between hauler and ground based operations.

25.3 ESTABLISHMENT/SILVICULTURE

The only commercial species planted is radiata pine. Trees were planted at target stocking rates of between 850-1200 stems/hectare. Some sites are pruned to a minimum height of 5.5 m in two or more lifts and are two hit thinned to a final target stocking of 317 stems/hectare. Unpruned stands were thinned to final crop target stockings of 550 stems/hectare under a structural regime. New and re-establishment species will be radiata pine and will follow the same silviculture regime strategy.

25.4 ENVIRONMENTAL

Earthworks are carried out with care to avoid detrimental environmental effects. Adjacent to the Hales block is an ecologically sensitive area of native forest. Ongoing pest control within the plantation forest assists to protect this indigenous forest. Harvest operations will be managed carefully to ensure any potential edge damage is minimised.

Falcon have been observed in the forest and therefore contractors are now required to adhere to the falcon management plan.

In 2019, a biennial SHMAK water monitoring programme was initiated to measure stream health and determine trends over time as the harvesting activity progresses over coming years.

25.5 OTHER

There are few known historic sites within the forest, either Maori or European. Staff and contractors are versed in procedures to be taken if a site is discovered within the forest. A Memorandum of Agreement is in place with local iwi. There is some grazing carried out within the forest.

25.6 TITOKI FOREST OPERATIONS

Table 9: Titoki forests summary of operations as at 30th June 2019

Operation	Quantity
Harvesting (m ³)	114,563
Pre-plant Aerial Spraying (ha)	122
Restocking /planting (ha)	124
Spot releasing (ha)	124
Thinning (ha)	22

26.7 Kumeroa Forest

26.7.1 BACKGROUND

Kumeroa forest is located in the Tararua District and was purchased by Ernslaw One Ltd in 2015. The total area of the forest is mapped at 1,079 hectares of which approximately 944 hectares is (at the end of 2017) stocked. The forest has been established on pasture where the terrain is moderate to steep country.

26.7.2 HARVESTING/EARTHWORKS

Road construction activities were completed across the property to make suitable access for establishment operations.

26.7.3 ESTABLISHMENT/SILVICULTURE

Establishment in commercial species is radiata pine with 447ha planted in 2016, and 497ha established during the winter of 2017. Establishment has been undertaken between 1000 stems/hectare. Potential silviculture operations will be determined in time.

26.7.4 ENVIRONMENTAL

Ernslaw will undertake assessments to determine what native species are present within the forest and develop appropriate management guidelines. Brown trout and NZ falcon have been identified as present within the forest boundary during assessments in 2017. A number of areas have been assessed during afforestation planning as being high risk in terms of future logging operations and have therefore been retired from plantation species. These areas are now classified as reserves and established in tree native species to enhance the reserves value over time.

Specific areas have been excluded from aerial desiccation operations due to the fragile soil structures and the potential for accelerated erosion. These areas have been spot released.

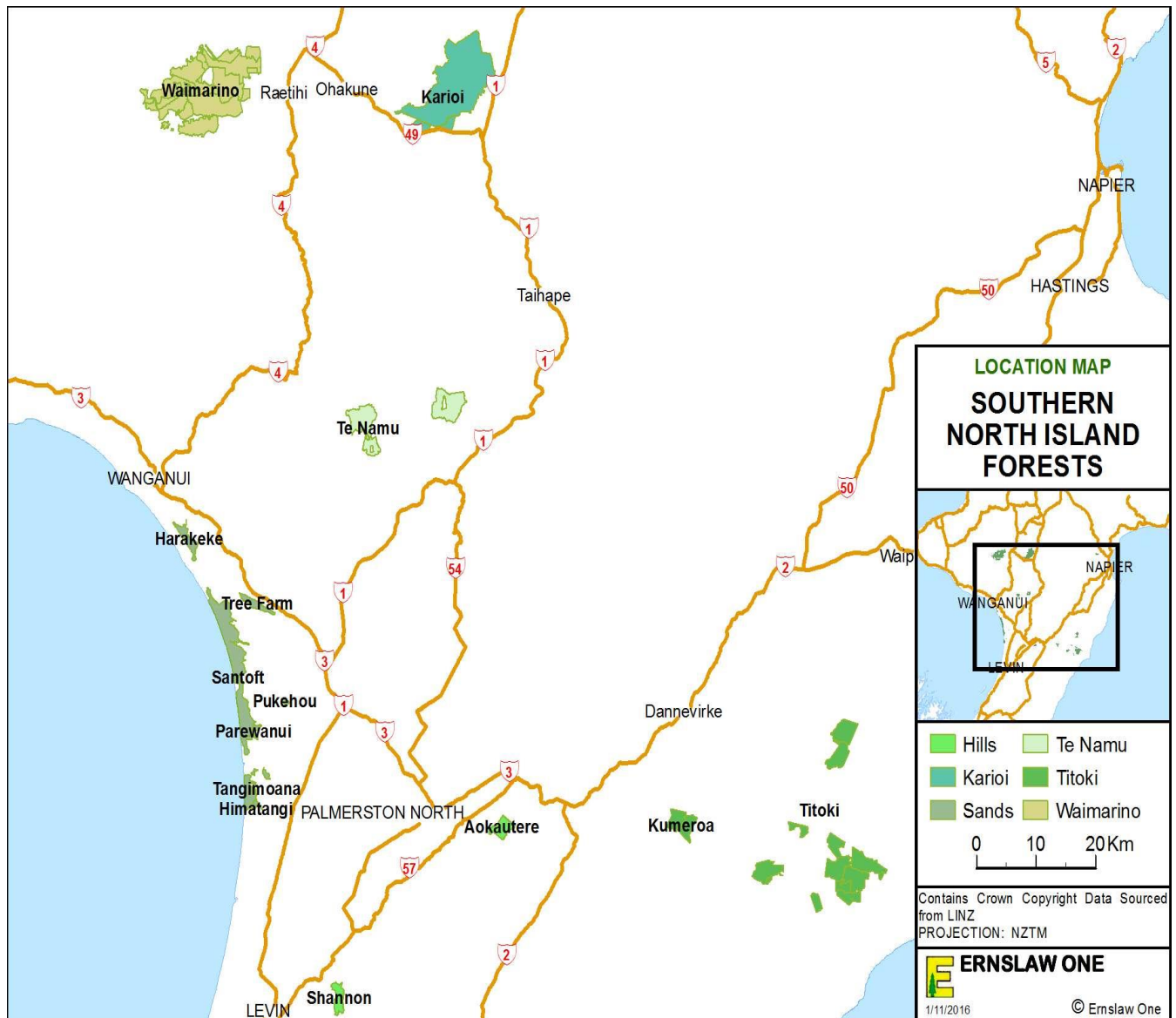


Figure 4: Ernslaw One Ltd. Southern North Island forest location map

CONTACT DETAILS

Titoki/Kumeroa Forests
 31 Bridge St
 PO Box 23
 Bulls
 Ph: (06) 322 1558

27 WHANGAPOUA FOREST

27.1 BACKGROUND

Whangapoua forest is located on the Coromandel Peninsula, and is between Coromandel and Whitianga townships. It has a total area of 10,582 hectares, of which 7,493 hectares is stocked or waiting replanting.

The forest is located on both sides of the Coromandel Ranges and is on the mid-slopes. The forest is on steep erodible country, and its topography is irregular and broken by numerous streams.

The forest was established by the Forest Service between the early 1960's and mid 1980's. Ernslaw bought the CFL in 1990. Harvesting began in 1992, and most of the first rotation crop has been harvested and subsequently re-planted.

Whangapoua forest is managed under the SNI forest region.

27.2 HARVESTING

Harvesting is carried out by two hauler crews. The steepness of the terrain precludes the majority of the forest from ground based logging. Hauler (cable) logging also results in less ground disturbance.

27.3 ESTABLISHMENT / SILVICULTURE

All harvested areas are replanted in the winter following harvest with radiata pine. Trees are planted at 1000 stems/hectare. Trees are unpruned and are thinned to a final crop stocking of 450 stems/hectare under a structural regime. One contract silviculture crew carries out establishment and tending operations. Current thinning operations are in the 2nd rotation.

Whangapoua forest is on a clay soil which is inherently deficient in phosphorous. Stands may receive an application of phosphate fertiliser to overcome this problem which significantly limits growth.

27.4 ENVIRONMENTAL

This forest is on steep terrain and is prone to high-intensity storm events which can cause severe damage. There are also sensitive receiving environments such as the Waingaro wetland and Whangapoua harbour. Harvesting and earthworks are carried out with a great deal of care to avoid any detrimental effects.

National Institute of Water and Atmospheric Research (NIWA) is contracted to monitor the effects of forestry on the local streams and harbour. This includes monitoring water clarity, abundance of algae and invertebrates in streams, sediment particle size and depth. Formal monitoring of the Whangapoua Harbour ended in 2007. EOL has been monitoring water quality trends in Whangapoua for 25 years.

The Coromandel area was heavily settled by Maori and also extensively mined by Europeans and there are over 370 recorded historical sites within Whangapoua. These are marked on forest maps, and staff and contractors complete training sessions when required so they will recognise any other sites. Regular surveys are carried out prior to earthworks and planting by tangata whenua and an archaeologist. Roads and landings are placed so as not to disturb historic sites.

Known sites are not planted, and if trees are to be harvested from a site, this is done in consultation with tangata whenua, archaeologists and the Historic Places Trust, so as to minimise disturbance.

A DOC Agreement ensures the protection of Archey's and Hochstetter frogs, North Island brown kiwi, long-tailed bats, threatened lizards and their habitats. Under this Agreement, twelve riparian corridors have or will be created over time to link the DOC estate on the upper slopes with the Whitianga, Whangapoua, Coromandel and Manaia harbours below.

Furthermore, an Ecological Mitigation Plan has been prepared by Ernslaw in fulfilment of resource consent conditions. The aim of this is to protect indigenous species and their habitats within the Whangapoua estate from the effects of forestry and harvesting operations. There is annual consultation with DOC in regard to this plan.

In 2015, Waikato Regional Council (WRC) introduced the biological control agent (Lace bug) at a number of locations within Whangapoua forest. The trial has been designed to control the plant pest Woolly Nightshade that is a prominent pest species within the forest. WRC are monitoring the release sites and are reporting back to Ernslaw.

In 2018, Ernslaw and WRC have begun collaborating to scope a project for the restoration of the Waingaro wetland. Plant pest control and species and habitat monitoring are the initial focus areas. The project design and set up was completed in 2019 with WRC committing to undertake plant pest control and EOL establishing a predator control trapping network to enhance native bird populations. Additionally, local school students have been invited to collaborate in the project to assist their learning about biodiversity protection and ecological restoration. This wetland has been classified as HCV-3.

27.5 OTHER

Ernslaw is closely involved with the local community who provide much of the work force, and many suppliers of goods and services. Ernslaw actively supports the Kuaotunu Kiwi Recovery programme. This is a sanctuary on the Kuaotunu Peninsula, and part of the forest is included within this area. The forest is used for a range of recreational activities, including pig hunting, horse riding, and adventure sport races. Commercial uses include apiaries for honey, trapping possums for fur, and small areas of grazing.

27.6 OPERATIONS

Table 10: Whangapoua forest summary of operations as at 30th June 2019

Operation	Quantity
Harvesting (m ³)	109,263
Pre-plant Aerial Spraying (ha)	227
Oversowing (ha)	227
Restocking/planting (ha)	227
Spot releasing (ha)	162
Thinning (ha)	295

28 CONTACT DETAILS

Whangapoua Forest	or	Southern North Island Regional Office.
Te Rerenga		31 Bridge St
RD 2		PO Box 23
Coromandel		Bulls
Ph: (07) 866 5710		Ph: (06) 322 1558

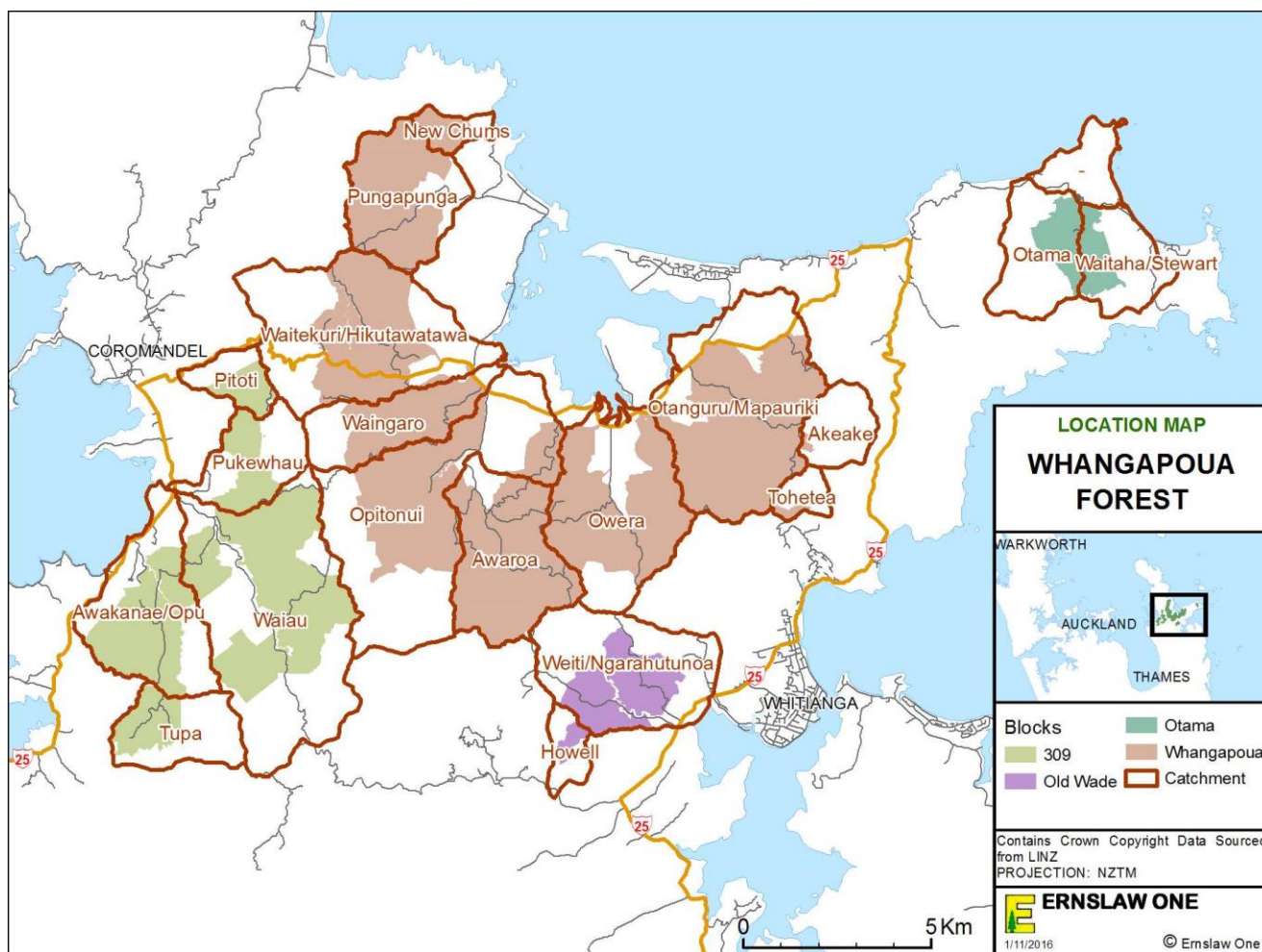


Figure 5: Ernslaw One Ltd Whangapoua forest location map

29 KARIOI FOREST

29.1 BACKGROUND

Karioi forest is located on the lower south eastern slopes of Mount Ruapehu in the Ruapehu District overlooking Waiohuru to the south. It has a total land area of 11,068 hectares, of which 8,936 hectares is stocked. The forest is located on flat to rolling topography made up of a series of montane terraces formed by volcanic ash and lahar activity over many centuries. The soil types are volcanic in origin derived predominantly from Taupo and Ngaruahoe tephra (ash). Parts of the forest are characterised by extensive rock and boulder fields originating from previous glacial activity from Ruapehu. The forest is unique in terms of its high altitude range 670m – 1180 m above sea level, its location at the base of an active volcano.

The forest was established by the NZ Forest Service between the late 1920's and the mid 1930's and much of the forest is either in second or third rotation. Ernslaw bought the CFL from Winstone Pulp International in 2008. The first harvesting in Karioi began in the mid 1950's under the NZ Forest Service and is still (continuing to this day) on a sustainable cut.

29.2 HARVESTING

Harvesting is carried out by two full time ground based clearfell crews, there is also one full time production thinning crew. The topography is relatively flat and suitable for mechanised harvest operations including production thinning.

29.3 ESTABLISHMENT / SILVICULTURE

All harvested areas are replanted in the winter following harvest with radiata pine. Mechanical land preparation is undertaken to help improve tree survival because of the high incidence of heavy frost due to the high altitude climate. Frequent heavy snowfalls during winter also provide additional challenges for operations and tree form and survival.

The forest is divided into 4 production zones (based on altitude) and aligned with potential operational silvicultural regimes and growth rates. In the high and medium productivity zones trees are planted at 1000 stems/hectare, better sites may be pruned to a minimum height of 5.5m and then production thinned to 300 stems/hectare. Unpruned sites are production thinned to 400 stems/hectare under a structural regime. In the low and suppressed production zones trees are planted at 1000 stems/hectare, better sites are thinned to 450sph under a structural regime and the remaining stands are left un-thinned to maximise wood volume for pulp production. The suppressed zone is also used as a buffer zone to stop the spread of wilding *Pinus contorta* on neighbouring DOC and Defence land.

One fulltime contract silviculture crew carry's out all planting and tending.

29.4 ENVIRONMENTAL

Karioi forest has significant areas of natural wetlands, springs, streams and rivers flowing through the forest which are good remnant examples of the wetlands that used to be in the local region. Many of these wetland areas are reserved and are protected from forest operational activity. They are also home for many wetland flora and fauna species including the green hooded orchid. Native wildlife monitoring started in 1997 when 12 wetland swamp areas were assessed to determine their ecological values. Biennial five minute bird counts were first

established in 2001 to determine baseline bird species presence in the forest and continue to be used as an indicator of bird abundance and potential impacts from forestry operations. Kiwi call surveys were also conducted from 2002-2005 but failed to confirm the presence of Kiwi in the forest, however Kiwi are known to inhabit the adjacent Rangataua Conservation Area to the west and the Rangiwaia 4F19 Maori freehold land to the North. Fish and reptile surveys were also conducted but did not identify any endangered or high conservation species that were at risk. Falcon and trout are also present within the forest.

A comprehensive natural area survey was also completed in 2001 to provide a baseline record of flora species present in native remnant areas throughout the forest; these were predominantly wetland areas and a regenerating scrubland area on the western boundary in compartment 20, which was reserved as a result of DOC recommendations to protect the area.

In 2018 a freshwater fish survey will be undertaken to investigate trout populations and potential effects from forestry traffic. The results of the survey will help support decision making for obligations under the NES-PF.

Threatened Plant Species

Karioi forest has several rare or regionally uncommon plant species such as Swamp leek orchid (*Prasophyllum* aff. *patens*), Matagouri or wild Irishman (*Discaria toumatou*), Porcupine Shrub (*Melicytus* aff. *alpina*) and the green hooded orchid (*Pterostylis* spp.). All of these species have been identified and are being protected in conjunction with advice provided by local DOC staff.

Karioi forest has an established noxious weed problem with the wildling spread of *Pinus contorta* var. *latifolia* (commonly called green contorta.). This colonising pine species was planted as a production species in Karioi and quickly became a problematic weed species by the late 1960's. It is a species specifically listed in the local Horizons Regional Council Pest Plant Management Strategy and Ernslaw is committed to meeting the requirements of the regional pest management strategy with regards to contorta control.

29.5 OTHER

Ernslaw is involved with the local community groups and organisations. The forest is used for a range of recreational activities, including deer, pig and small game hunting, horse riding, mountain biking, running, fishing and an annual motorcycle event. Commercial uses include, trapping possums for fur, and approximately one 20 -25% of the area is grazed over winter each year

29.6 OPERATIONS

Table 11: Karioi forest summary of operations as at 30th June 2019

Operation	Quantity
Harvesting (m ³)	160,532
Pre-plant Aerial Spraying (ha)	34
Restocking/planting (ha)	281
Spot releasing (ha)	292
Thinning (ha)	98

30 WAIMARINO FOREST

30.1 BACKGROUND

Waimarino forest is located in the southern Ruapehu District approximately 10 km west of the township of Raetihi with the main access points off the Raetihi – Pipiriki Road. It has a total area of 14,122 hectares, of which 7,045 hectares is stocked. The forest is located north of the Whanganui River and east of the Manganuioteao River and is comprised of both freehold and Maori leasehold land. The forest is on steep erodible papa country, and its topography is irregular and dissected by numerous streams.

The forest was established by Waimarino Afforestation Limited between 1978 and 1990 with some smaller additional area planted up in 1994. Harvesting began in 1996. Ernslaw purchased the forest in 2008. The forest comprises both leasehold land and freehold blocks as represented below:

Table 12: Waimarino forest area by land tenure as at 30th June 2019

Tenure	Owner/ Trustee
Leasehold	Atihau Whanganui Incorporation
Leasehold	Pipiriki Township Incorporation
Leasehold	Ngaporo Waimarino Forest Trust
Freehold	Ernslaw One Limited

30.2 HARVESTING

Harvesting is carried out by three hauler crews and one ground based/road line crew. The steepness of the terrain precludes the majority of the forest from ground based logging. Hauler (cable) logging also results in less ground disturbance.

30.3 ESTABLISHMENT / SILVICULTURE

Most of the earlier planted area in Waimarino forest was managed under a one thin operation to 400sph (unpruned sawlog/ pulp regime) while the areas planted between 1987 – 1989 were pruned to 5.5-6.5m and thinned to final stocking of 350 -400sph. Currently all harvested areas are replanted in the winter following harvest with radiata pine. Trees are planted at 1000 stems/hectare and stands will be thinned to around 450 sph under a structural regime. On the high productivity sites, a clearwood regime may be implemented. One silviculture crew carry's out all planting and tending operations. Thinning operations have commenced in the 2nd rotation.

30.4 ENVIRONMENTAL

This forest is on highly erodible steep terrain and is prone to soil erosion which requires sensitive environmentally sound roading and logging practice.

There is a nationally significant population of North Island Brown Kiwi resident in Waimarino forest. A series of comprehensive Kiwi monitoring and research projects have been ongoing since 1996 to assess the impacts of exotic forest operations on Kiwi populations. An interim

Kiwi Management plan was developed in 2002 and revised in 2009. To date research has proven that forest operations do not have a negative impact on Kiwi and that Kiwi can coexist with plantation forestry in Waimarino.

As of 2017, kiwi recovery is managed within the Aramahoe Ecological Reserve with the aim to grow the kiwi population by 10% every three years. Additional aims include enhancing environmental awareness and providing a learning platform for schools regarding conservation. The key project areas are pest control and monitoring, kiwi recovery, bird population monitoring, promotion and conservation education. During 2018, a forest wide and Aramahoe Ecological reserve kiwi population assessment was undertaken to assess the changes in population dynamics and the effectiveness of the current pest management programme. Results from both surveys were very positive, with forest operations showing no negative effect on the kiwi population over the last 8-10 years. Likewise, the results of the Aramahoe assessment showed there is a healthy and viable population residing in the reserve.

Ecological surveys have also identified a number of threatened species including N.I. falcon (*Falco novaeseelandiae*), kereru (*Hemiphaga novaeseelandiae*), central short-tailed bat (*Mystacina tuberculata rhyacobia*) and the North Island long tailed bat (*Chalinolobus tuberculata*), which are managed under EOL species management plans.

There are a small number of registered Maori archaeological sites in the Manganui o te ao valley and there are a number of other recorded sites within the forest which have been protected in consultation with local tangata whenua. These are marked on forest maps, and recorded in a forest wahi tapu register. Staff and contractors have undergone training, so they will recognise any other sites.

Annual stream monitoring is also undertaken with Waimarino forest to assess water quality trends over time in relation to forestry activities.

30.5 OTHER

Ernslaw One is closely involved with the local community who provide much of work force, and many suppliers of goods and services. Ernslaw contributes to the local school in Raetihi and supports local events

30.6 OPERATIONS

Table 13: Waimarino forest summary of operations as at 30th June 2019

Operation	Quantity
Harvesting (m ³)	176,887
Pre-plant Aerial Spraying (ha)	444
Restocking/planting (ha)	319
Releasing (ha)	319
Thinning (ha)	227

31 CONTACT DETAILS

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Figure 6: Ernslaw One Limited Southern North Island forests, Ruapehu forests

