

**NORTHLAND REGIONAL COUNCIL**

**FOREST MANAGEMENT PLAN**

**2015 - 2019**

**draft**

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draft

# 1 INTRODUCTION

## 1.1 BACKGROUND

This management plan has been prepared by Chandler Fraser Keating Limited (CFK) for Northland Regional Council (NRC). It is a reference document that provides essential guidelines for the future management of the NRC Mount Tiger forest.

This is the third management plan prepared by CFK and it updates and replaces the 2010-2014 Management Plan. The previous management plans provide a detailed description of the forest, past history and background information (in the form of a single reference document) and this information is not wholly repeated in this plan. This new plan outlines the management objectives for NRC's Mount Tiger forest, and provides the basic details and essential guidelines for its future management.

Whilst it is anticipated that this plan will remain in place for the next five years, each year a new annual work programme and budget will be prepared, as well as an update of the 5 year rolling draft work schedules and budgets and the 10 year cash flow projection.

## 1.2 DEFINITION OF ROLES

NRC historically managed its forest in-house with technical support from forestry consultants and specialists as required. With the passing of NRC's staff forestry manager (the late Mr Neville King) in 2003, NRC moved to further use of the assistance of a forestry consultant and a contract forest manager (both on an as required basis) to manage the forest. Owing to reducing harvest levels and small forestry development programmes pending, this approach seems to be working well and is proposed to continue in the medium term.

Under this structure there are four main parties involved in the management of the Mount Tiger forest. It is important that their respective roles are defined and understood.

### Northland Regional Council

NRC constituents are the owners of the forest. As their elected representatives and servants, NRC has the ultimate responsibility for the management of the forest. Its role is to:

- provide the strategic direction and make the final decision on management issues;



- periodically review the objectives of the forest and ensure that the management of the forest is in line with these objectives and NRC overall objectives, eg LTP, etc ;
- ensure the creation and regular review of a management plan that reflects the objectives of the forest and provides directives and guidelines for day-to-day management;
- determine the appropriate time for harvesting, initiate and approve forest produce sales;
- prior to harvest, make a decision on the future land use and whether replanting with a commercial forest crop should be undertaken; and
- appoint the forest consultant and forest manager/s who are responsible for forest planning, forest harvesting and day to day forest operational management respectively.

### Forest Consultant

In the absence of in-house specialised staff and expertise, NRC obtains “as required” professional help from an independent forestry consultant. The consultant’s role includes:

- provision of strategic advice on such matters as management requirements to meet the stated objectives and the consequences of management decisions or policy changes, forest development regimes, forest produce sales, etc;
- preparation of management plans and subsequent reviews;
- preparation of annual work programme and budgets;
- preparation of a rolling five year indicative work schedule and budget and a 10 year cash flow projection;
- organising, managing and supervising the agreed harvest programme and maintenance and protection functions (eg. Fire control), etc;
- overseeing the implementation of the annual work programme by the forest manager for specific operations as required;
- monitoring and reporting on performance against plan and budget; and
- provision of other services such as forest valuations, technical advice as required and co-ordinating specialist input where required with respect to Mt Tiger forest and NRC other forestry matters as required.

Chandler Fraser Keating Limited (Ian Jenkins) is the current forest consultant, and has been since 1995.



## Forest Manager

NRC no longer has the in-house staff or expertise to manage the forest on a day to day basis. Consequently this work is now co-ordinated by the forest consultant using a professional forest manager (under contract to NRC) to manage and supervise the forest development programme. The forest manager is thus responsible, on an “operation by operation, as required” basis, for activities relating to re-establishment and silviculture in accordance with the management plan. The manager is responsible for ensuring that they are carried out in the most efficient and cost effective manner in line with normal industry practice.

In September 2013, NRC contracted Northland Forest Managers (1995) Limited (NFML) via a Silvicultural Management Agreement to undertake the forest manager role. This contract expires 30 June 2016, and can be extended at annual intervals thereafter.

In addition to the forest manager, NRC also contracts other specialists as required, e.g. forest fire protection, forest health surveys, harvest planning, etc.

## Harvesting and Marketing Agent

Historically, NRC used to sell all forest produce from Mount Tiger as standing blocks under a competitive stumpage sale process. This work was co-ordinated by the Forest Consultant including the stumpage sale contract administration.

However in 2007 when the 1977 stand came due for harvest, NRC made a decision to move to a fully managed log sale as compared to a stumpage sale for this area. This was because as result of poor market returns in preceding years, the competitive stumpage market in Northland had all but evaporated with most players exiting the market.

As a result, the harvesting and marketing of forest produce (fully managed log sales) became a new management function. Consequently this work is now undertaken by a professional, experienced and suitably qualified harvesting and marketing agent under contract to NRC. This agent is also engaged on an “operation by operation, as required” basis to allow future flexibility.

In September 2013, NRC also contracted NFML via an Agreement to Provide Harvesting and Marketing Services to undertake this role. This contract expires 30 June 2016, or until the harvest of the 1985 area is complete, whichever is the earlier.



## 2 OBJECTIVES AND TERM

The Council's Treasury Risk Management Policy - states that the objective of its forestry investment is "the development, maintenance and protection of the Council's timber plantations in order to maximise the long term revenue whilst meeting the Council's environmental responsibilities". In line with all NRC commercial investments the goal is to "manage and maximise the return on commercial property with consideration to the requirements of the Council and the public". *The performance measures for commercial investments (page 109 LTCCP vo.I 1) state "maintain the forestry holding to ensure maximum net forestry returns on a sustainable basis".*

In order to meet the above, this forest management plan is designed to meet the following objectives.

- Provide all parties with the essential information, directives and guidelines pertinent to the future management of the NRC Mount Tiger forest.
- Create, manage and harvest the forest so as to maximise the financial return on investment to NRC.
- Provide for the review of each area prior to harvest and update future management guidelines if replanting in commercial forestry is deemed appropriate.
- Management of the forest in a sustainable and environmentally sound manner, to protect the forest against injurious agents, to maintain the soil and water resources on the land occupied by the forest and to protect historic places and artifacts.
- Efficient completion of all forest operations, meeting prescribed standards and undertaken in accordance with the relevant legislation, and in particular HSE requirements.
- Ensuring that appropriate forest growing and financial records are kept and that management performance is properly documented.
- To protect the commercial forest investment and mitigate risks from fire and health and safety issues and then allow public access and recreational use of Mount Tiger forest only if these are compatible.

The NRC 2015 - 2019 Forest Management Plan will take effect from 1 July 2015.

It will be updated within the next five years.

However, the annual work programmes, budget and the five yearly rolling budget will be updated each year as part of NRC's annual budget preparation.





## 3 DESCRIPTION OF FOREST AND LAND

### 3.1 FOREST

NRC's Mount Tiger forest has a total area of some 523 ha, with around 320 ha planted in radiata pine. Approximately 160 ha of mature native bush has been retained in its natural state and the remaining area comprises unproductive area and native scrub.

It is located on the south west face of Mount Tiger, overlooking Onerahi and Whangarei City. It is adjacent to Liangren Li's Waikaraka forest (to the east) and Whangarei District Council's (WDC) Waikaraka Block (located to the north east). The forest is well located with respect to both domestic sawmills and the export port at Marsden Point. Refer Appendix 1 - Map 1.

### 3.2 LAND AND TENURE

NRC report that it has ownership of all land on which the trees are growing. There are a few small areas of trees outside the legal boundaries but these are mostly on paper roads within the forest areas.

The total legal area is 523.1753 ha. The legal description of Mount Tiger forest is as follows:

LOTS 1-4 DP24339, LOT 4 DP26589, LOT 4 DP36368,  
ALLOTS 6, 10, 11, N15, S15, NE16, SW16, 17, 18, and PARTS ALLOTS 4, 5, 7,  
9, 12, 13, 14, N8, S8, NE23, WARIARA PSH  
ALLOTS S14, N15, PT 116 PARAHAKI PSH, BLKS IX & X WHANGAREI SD

The legal area is shown in Appendix 1 - Map 2.

### 3.3 ACCESS

There are 4 main access points to Mount Tiger forest. These are:

- Wrack Road (off Mount Tiger road ) for the northern part of the forest. [Gate 1];
- a short harvest road - to stand 1991 (off Mount Tiger road) for the north eastern part of the forest. [Gate 2];
- Awaroa River road for the southern part of the forest. [Gate 3]; and
- a temporary harvest road from Mount Tiger road over a ROW and WDC land to stand 2005/B [Gate 4].



All access points have lockable gates and have a common key series effective (and distributed) December 2002. The forest consultant holds the keys and monitors key distribution.

Current vehicle access within the forest is generally good as a result of first rotation harvesting and is adequate for ongoing silviculture of the second rotation. There is no current permanent vehicle access within the forest linking the northern side with the southern.

### 3.4 PHYSICAL ATTRIBUTES

#### Topography and Hydrology

Mount Tiger forest comprises the headwaters of 3 separate watersheds, each of between 100 -150 ha in area. Two of these watersheds, comprising some 50% of the forest, are the eastern tributaries (about 30% of the overall catchment area) of Awaroa Creek. The forest area is approximately 1.5 km upstream from where the Awaroa Creek enters Whangarei Harbour opposite the old Whangarei port. The remaining 50% of the forest (to the east) forms the headwaters of the Waimahanga Stream, approximately 1 km upstream from where it enters the harbour. The lower reaches of both these watercourses traverse private farmland.

Much of the forest terrain is bisected by steep sided creek systems, which have slopes of 20 - 30 degrees and are of short length, 50 - 150 m. Previous slips on upper slopes and slumps below have had a "scooped" effect resulting in areas of near vertical upper gully heads with wet areas below. The steep gully heads have the greatest potential for sheet and soil erosion.

The general steepness of the area limits ground based logging to relatively few areas (approximately 10-20%) for safety and soil disturbance reasons.

Whilst most of the watercourses are perennial, during the summer months flows are severely reduced and some of the upper reaches of the watercourses dry up.

Many of the gully systems are partially protected by native vegetation. This is sometimes as riparian vegetation and/or as larger areas of native reserves in the head waters.

Creek beds typically comprise a substrata of clay and greywacke. There will likely be reactivation of some of the old earth flows in the creeks as a consequence of harvesting.

#### Geology and Soils

The New Zealand Land Resource Inventory (NZLRI) describes the bulk of the area as having a parent material of interbedded sandstone and mudstone (greywacke and argillite). Toward the north of the forest carbonaceous mudstones and sandstones become more common.



The predominant soils are Marua clay loams in the southern part of the forest, Te Ranga steepland clay loams and sandy clay loams in the middle, and Waitotira clay loams in the north toward Wrack Road.

Although the NZLRI describes these soils as being of moderate to high suitability for exotic forestry they are frequently marginal in their phosphate availability for tree growth and corrective fertiliser application is often required.

## Land Use Capability

The NZLRI Land Use Capability Classifications for the forest are:

- Vle7 for approximately 10 % of the area, i.e. the area adjacent to and west of Wrack Road; and
- Vle17 for the remainder and most of the forest area.

The forest is described as having a slight (1-10%) potential for sheet, soil slip and earth flow erosion.

Building roads and harvesting on this type of land requires careful siting, design and construction. In addition, earthworks must be carried out in dry conditions and if involving extensive new formation, preferably left at least 12 months to consolidate before use.

Under the NRC Regional Water and Soil Plan [RWSP] - Operative 28<sup>th</sup> August 2004, (including subsequent updates for Plan Changes), the Mount Tiger forest area is on non-erosion prone land as defined in the RWSP.

## Climate

Northland's climate is characterised by warm, humid summers and relatively mild winters. Rainfall is adequate for tree growth. Annual rainfall at Mount Tiger can usually be expected to be in the range of 1500-2000 mm per year. Approximately two thirds of the rain falls over the winter months providing good conditions for planting and seedling survival but causes some access problems and difficult conditions for logging.

Cyclonic storms can occur occasionally with short duration violent winds and localised heavy rainfall. Toppling of young stands can occur, as happened to the 2000 plantings in July 2002, requiring corrective management. Also cyclonic storms (eg July 2007, Cyclone Wilma in January 2011, July 2014) can cause slipping and damage to roads.



## Native Bush

The forest contains significant areas, approximately 160 ha, of native vegetation as shown in [Appendix 1 - Map 3](#). These areas were identified in the early 1970's and were removed from the commercial forest establishment programme. They have been retained as reserves to protect significant native bush, significant archaeological/cultural sites and for water and soil protection.

There are no plans to increase the forest area by removing native vegetation. However, there will be some minor impacts upon some areas of native vegetation and scrub as a consequence of future logging.

The Mount Tiger native bush areas contain some impressive areas of regenerating Kauri. Kauri dieback is the deadly kauri disease caused by *Phytophthora taxon Agathis* (or PTA). Following DNA studies, this fungus-like disease was formally identified in 2008 as a distinct and previously undescribed species of *Phytophthora*. Kauri dieback is specific to New Zealand kauri and can kill trees of all ages. At this point in time it has not been found in Mount Tiger. Public awareness through signage and the limitation of recreational access are currently being implemented in response.

## 3.5 HISTORY

### Land History

The more recent ownership history of Mount Tiger forest can be summarised as follows.

Half of the land was bought in 1839 by Peter Greenhill from its maori owners. He sold it to Mr Dent who sold to Mr Gorrie, by 1845. When surveyed, the block, from Awaroa Creek to Mount Tiger road, was found to be 1,000 acres.

The adjoining block to the southeast was Tamaterau and this was sold to the Government in 1857 by its maori owners Wiremu Pohe, Tipene Hari, Whare Te Puia, Manihoro Te Horo and others.

The land owned by Gorrie and the Tamaterau block were subdivided and sold to private owners in 1857. The area was then in private ownership and farmed from about the 1850's to 1960's. The native timber on the area, including kauri, was felled and extracted, probably around the early 1900's.

Ferrar mapped the geology of the area in 1934 and his map showed only 1 house on Wrack road and an old timber driving dam in one of the streams. Aerial photos from 1942 show most of the area in grass with pockets of bush and some manuka.

The land was purchased in 1970 by the then Northland Harbour Board. Two small additional areas were purchased in the mid 1980's. The objective of the Harbour Board purchase was to control the land as on-going farming operation were seen as a source of sedimentation and potential problem for Port Whangarei. A further 20



ha property was purchased in December 1994, primarily to provide an alternative route for transporting logs out of the forest (to the south).

The total area of 523 ha was predominantly farm land with some secondary scrub and native bush.

## First Rotation

The 1<sup>st</sup> rotation planting commenced in 1971 under a Government Forest Encouragement Loan, and continued through 1972-74 and 1977 with Encouragement Grants. Further 1<sup>st</sup> rotation plantings were undertaken in 1985, 1991 and 1995 without loan assistance. The loans were fully repaid in March 2001.

In line with industry practice at the time, the 1<sup>st</sup> rotation forest was managed to produce large pruned sawlogs, which entailed pruning around 300 sph to 6 m in 3 lifts and thinning to a final crop stocking of 250-300 sph. Actual silvicultural results were variable.

Harvesting of the 1<sup>st</sup> rotation commenced in 1999. At this time a harvest strategy for the 1971-1977 areas of the forest was prepared. The initial harvest strategy proposed a harvesting sequence over a period of up to eight years with an annual harvest level of between 15,000 m<sup>3</sup> and 25,000 m<sup>3</sup>. The strategy allowed the flexibility to modify annual harvest programmes to respond to market conditions or changes in NRC's objectives. Over the past 15 years NRC has been implementing the harvest strategy with delays mainly due to the deferral of harvesting in times of poor market conditions.

In 2005, NRC was 85% through the initial harvest programme, with only the 1977 area remaining. This was due in 2007/08 but was postponed due to poor market conditions until October 2009 - when the decision was made to proceed with harvesting over the 2009/10 summer. This harvest was completed in June 2010 and the area replanted August 2010. This was the last area harvested, with the next area for harvest being the 1985 stand due around 2015/16.

With the exception of some stand boundary adjustments, all 1<sup>st</sup> rotation areas have been replanted following harvest. Mount Tiger forest currently has about only 13% of its area remaining in 1<sup>st</sup> rotation.

## Past Management Structure

Initial forest management of the first rotation was under the control of M Sexton, forestry consultant. From 1988 the forest was managed in-house by NRC, (Neville King) with assistance from CFK.

In 1996 CFK became more involved and prepared a harvest strategy, undertook pre-harvest planning, obtained resource consents, assisted with sale method options and sales programmes.



Since 2002 CFK has taken on an extended role involving forest planning, stumpage sales and supervision, and co-ordinating forest management activities via contract forest managers.

### 3.6 CURRENT TREE CROP

The current commercial tree crop at Mount Tiger comprises solely radiata pine.

The forest area was first remapped in 2005 when it was put on to a GIS mapping system. This mapping was from aerial photography undertaken in 2003. At this time, the areas for stands planted in 2000 and later were planting estimates as the tree crop was not definable on the photography.

These areas were to be updated when the trees were 4-5 years old (pre-silviculture) and able to be better seen by aerial photography. This was done on a temporary stand-by-stand basis until December 2014, with mapping estimates prepared to underpin the required silvicultural contracts undertaken.

In January 2015, a full remap of the Mount Tiger forest was undertaken by a forest mapping specialist (ForestryMaps). This was based upon 2011 aerial photography and mapping all stands based upon their actual areas with the exception of the 2010 stand which (owing to its young age at the time of the photography) remains based upon planting boundary estimates.

Table 3.1 shows the current area statement and as compared to that in the previous management plan.

Table 3.1 AREA AGE CLASS DISTRIBUTION - 30 JUNE 2015

Planting year	Previous area	2015 remapped area (ha)
1985	15.3	16.2
1991	22.9	23.4
1995	3.0	3.9
1999	15.6	17.9
2000	40.9	45.2
2001	6.1	6.0
2002	37.4	37.7
2003	81.9	79.3
2004	45.3	42.6
2005	22.9	21.4
2010	27.0	25.8
<b>Total</b>	<b>318.4</b>	<b>319.4</b>

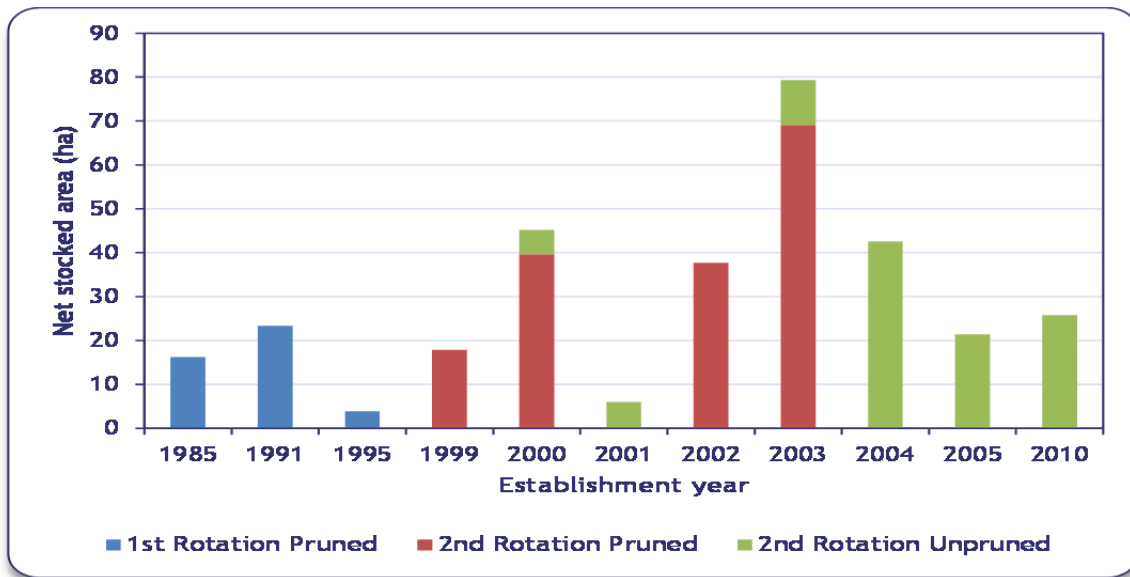
Appendix 1 - Map 3 shows the current forest area map.

The distribution of area by year of establishment in Mount Tiger is shown in Figure 3.1.





Figure 3.1 MOUNT TIGER AREA AGE CLASS DISTRIBUTION - 30 JUNE 2015



As depicted in Figure 3.1, the commercial tree crop is spread across a relatively narrow band of age classes. The first rotation forest comprises the 1985-1995 age classes and the areas planted 1999 and after are second rotation.

The next harvest is now not due until 2015 (1985 age class) and then 2021 (1991 age class) and after this then should recommence around 2029 on a more substantial basis with second rotation harvesting.

The first rotation tree crop was managed under a clearwood regime (pruned and thinned). Similar tending commenced on the second rotation crop in 2004/05 in line with the forest management plan guidelines, but has now moved to an unpruned regime- refer section 4.

Mount Tiger forest is generally in good condition with regard to stand health.

Appendix 2 contains the most up to date (January 2015) stand records outlining the available silvicultural history and planned future operations for each stand in the forest, consistent with the annual work programmes, budget and the five yearly rolling budget.

## 4 FOREST MANAGEMENT

### 4.1 FOREST MANAGEMENT OBJECTIVE

The objective of forest management is to manage Mt Tiger forest so as to maximise the financial return on investment to NRC on a sustainable basis.

This will be achieved as follows:

Re-establishment Strategy:

Forest establishment will be confined to replanting of harvested areas.

Silvicultural Strategy:

Undertake silvicultural regimes that maximise the return on investment whilst taking cognisance of future market options. Subject to economic analysis, the current strategy is to implement an unpruned structural regime to produce 400-450 stems per hectare (sph) final crop. However, consideration will be given to implementing a clearwood regime designed to produce 300 - 350 good quality final sph with the majority pruned to at least 5.5 metres (m) if areas are suitable and a higher rate of return on investment shown.

Other:

The forest will require on-going management intervention in order to maintain site productivity (tree crop nutrition), general forest maintenance (roads, firebreaks, water points and weed control) and to protect the forest against injurious agencies (fire, pests and diseases).

The following sections outline how the forest management objective will be achieved and strategies implemented.

### 4.2 PRODUCTIVE AREA

No expansion of the NRC forest estate or new planting is currently planned and forest establishment will be confined to the replanting of harvested areas where deemed appropriate. However, the Council's Treasury Risk Management Policy does allow for its Audit and Finance Committee to recommend to Council any further purchase or disposition of forestry investments as part of its property management responsibilities.





Prior to the harvest of each area at Mt Tiger forest, the future management options will be considered and a decision made whether to continue with commercial forestry and replant or otherwise retire all or some parts of the area for environmental reasons.

### 4.3 MANAGEMENT OF FOREST DEVELOPMENT PROGRAMME

Under the present management structure and that proposed in this management plan, the forest consultant is responsible for preparing annual work programmes and budgets which are consistent with the forest management objectives above. A professional forest manager will then be contracted, on an operation by operation basis, to undertake the activities relating to re-establishment and silviculture in accordance with this work programme.

A suitable prescription will be prepared for each operation by the consultant in conjunction with the forest manager to clearly define the work requirements. It will then be the responsibility of the forest manager to manage and supervise the work, reporting back to the forest consultant, who in turn reports to NRC.

All operations require a written contract and detailed work prescription signed by the forest manager and the contractor. The prescription will specify the standards to be met and allowable tolerances.

Other work such as inventory, foliage analysis, forest health surveys, fire protection, maintenance, harvest planning, etc will undertaken on contract - co-ordinated and overseen by the Consultant, subject to NRC prior approval.

### 4.4 ESTABLISHMENT

The following sections provide basic prescription guidelines for re-establishment activities where replanting is undertaken at Mt Tiger forest.

#### Site Preparation

Actual areas and boundaries to be replanted should be determined by the forest consultant in conjunction with NRC.

In general, all of the harvested area will be replanted. However, there may be cause to set aside some areas for regeneration to native vegetation (e.g. environmentally sensitive areas, difficult topography such as very steep gullies, etc).

Subsequent to harvesting, land preparation will involve the following.

- Felling or crushing any remaining scrub on harvested areas and ensuring log slash is distributed in a condition suitable for planting.



- In some areas mechanical ground preparation techniques such as ripping or spot mounding may be required to mitigate the effects of soil compaction and improve drainage.
- If possible, allowing the site at least one full autumn season for the germination of weed species (especially gorse and pampas). However, whilst current harvesting levels are such that summer-only logging predominates, planting will generally be undertaken in the winter immediately following in order to regain site occupancy as soon as possible.
- Spraying weed species with herbicides designed to target the particular weed species present.
- Over-sowing with grass and legumes to help control the regrowth of weeds may be considered as an option, depending on site conditions.

Windrowing of harvesting slash to provide access over the site may be required (if possible) in some areas where it is otherwise physically impractical to access the site by foot owing to debris accumulation. If machinery is used to clear logging slash it must be used in such ways as to minimise disturbance and removal of topsoil.

Burning of harvesting debris accumulated around landings may be required.

## Planting

As a minimum, tree seedlings of GF rating 19 will be planted at 1000 sph. However the forestry consultant will, prior to each planting year, consider the benefits of planting higher GF rated seedlings (e.g. GF plus) or cuttings on sites where the advantages of such tree stock outweigh the additional costs.

Planting using bare-rooted cuttings (GF25) at a minimum 850 sph was undertaken from 2003-2005. This was adopted as a result of the fertile site promoting rapid initial crown growth with comparatively lesser root development, predisposing young trees to toppling risk. The severe toppling of seedlings (planted in 2000) in July 2002 acted as the catalyst for this change to cuttings which are less prone to toppling.

However, poor survival and initial growth rates in in the 2004 and 2005 plantings resulted in a change for the 2010 planting (the 1977 area replant) to using GF19+ containerised seedlings at 1000 sph.

Tree stock and planting rates type shall be revisited prior to the replanting of the 1985 area based upon performance of these plantings (around 2016).

Containerised tree stocks should meet the following basic specifications.

- Minimum root collar diameter of 4 mm.



- Stem length, measured from the root collar to tip, between 22 cm and 32 cm. The ratio of stem length to root collar diameter should be a maximum of 50.
- All tree stocks to have a well developed tertiary root structure and mycorrhizal rootlets in at least 4 quadrants.
- Only single leader tree stocks are acceptable.
- Tree stocks must be disease free and of acceptable foliar nutrient levels.
- Trees to be packaged in dip waxed cardboard boxes, plastic lined, and delivered to site promptly. On site, trees to be stored on site in crates or in deep shade.
- Trees stock quality shall be monitored by NRC (or agent) as required to ensure specifications are met.

Planting shall be as follows.

- The objective is to plant tree stock within 48 hours of uplift from the nursery.
- Plant direct from transport boxes.
- A multiple cut planting method shall be used with cultivation extending at least 5 cm below lowest root and 15 cm on either side of tree.
- Plant with a third of the green needles below soil surface and ensure that the root system is properly placed and not distorted.
- Trees to be well-firmed with the sole of the foot.

Given the above general requirements, the actual planting rate will be at the consultant's discretion but the required outcome is that by age four years there will be at least 500 good quality sph from which to select for first pruning.

### Hand Fertilising

Currently soil fertility has been adequate and hand fertilising after planting has not been required.

If the preceding tree crop has experienced soil fertility issues and future deficiencies are expected, hand fertilising with a nitrogen-phosphate fertiliser will be considered by the forest consultant. Diammonium phosphate (DAP) at 75 - 85 gm/tree or similar is recommended.



## Releasing

The objective of releasing is to:

- maintain a 2 m<sup>2</sup> (1.6 m diameter) weed free spot around each tree during the first growing season; and
- prevent over-topping of trees by weeds thereafter.

The requirement for releasing will be assessed by the forest consultant in conjunction with the forest manager. It will be determined by visual observation at the start of spring following planting and also during the year following planting.

A number of methods, chemicals and application rates exist. The consultant will select the most cost effective releasing option, taking account of the growth rate of the seedlings, the type of weeds emerging and any environmental requirements. An operational prescription will be prepared in conjunction with the forest manager to define the work requirements.

In some areas, particularly those which are steep and with limited access, aerial release spraying (as compared to spot-spraying) may be the more cost effective and reliable option to release trees from vigorous weed growth.

It is likely that one release will be required in the first spring and perhaps supplemented by hand releasing later on in the season in selected areas.

## Stability Pruning

Parts of Mount Tiger forest are exposed to strong winds and when a strong wind event is combined with wet soil conditions, toppling can occur. Trees can be vulnerable to toppling at around ages 2 - 4 when the crown development (yet to be pruned) is often disproportionate to the root development. A common management practice to reduce the potential risk of toppling is to undertake "sail" pruning - whereby the tree crowns are lightened by removing branches in the upper crown. The operation is solely to reduce the crown area and is not the same as pruning for clearwood (section 4.5).

Toppling occurred in July 2002 on the 45 ha of 2000 plantings adjacent to Wrack road. Toppling correction and "sail" pruning was implemented and was successful. As explained above, this prompted the decision to move to planting cuttings, rather than seedlings, to try to mitigate the future toppling risk at Mount Tiger.

However, there may be some localised areas where stability pruning should also be considered. The forest consultant will consider implementing stability pruning on sites that are identified as being at high risk of toppling. Since 2002, none has been required and minimal toppling has occurred.



## 4.5 SILVICULTURE

The objective of silvicultural operations is to maximise the financial return from the forest. Tending (pruning and thinning) determines the number and quality of trees in the final crop. Mount Tiger forest has some variations in site and growth potential but generally the forest is capable of growing either a good pruned tree crop or able to produce a good unpruned structural grade crop.

Silvicultural regimes should be regularly reviewed from an economic perspective to ensure they are meeting the forest management objectives.

The 1<sup>st</sup> rotation tree crop was managed to produce large pruned sawlogs, which entailed pruning around 300 sph to 6 m in 3 lifts and thinning to a final crop stocking of 250-300 sph.

Over the past 10 years pruned log prices showed a steady decline from around \$150/m<sup>3</sup> to around \$120/m<sup>3</sup>. However, over 2014-15 export pruned prices have improved to currently being at levels back around \$150/m<sup>3</sup>. Whilst large unpruned sawlog prices have varied (domestic more stable than export) they have not declined, on average, to the same extent. Consequently over the past 10 years the margin between pruned and unpruned large sawlogs has reduced, resulting in a greater reduction in the profitability of pruned regimes as compared to unpruned structural regimes.

At the present point in time (January 2015) the estimated rates of return from the two regimes at Mt Tiger are similar at around 6.2% for the pruned regime and 6.7% for the unpruned regime. As a consequence, NRC has looked more closely at regime choice over the past few years and now plans to only implement a pruned regime on the better areas of the forest, thereby optimising the pruned investment while maintaining some market flexibility. This approach is consistent with most of the larger forest owners.

To date, the initial 2<sup>nd</sup> rotation stands (1999, 2000, 2002 and 2003A and 2003B) are being managed under a pruned regime. The 2001, 2004 and 2005 areas, due to poorer initial survival, slow growth and/or heavy gorse undergrowth (higher pruning costs) have been relegated to an unpruned regime. The 2010 plantings are expected to also be managed under an unpruned regime. This will result in about 65% of the second rotation being managed under a pruned regime.

It will be the responsibility of the forest consultant, with approval from NRC, to determine the appropriate final silvicultural strategy for each stand based upon its growth potential, specific attributes, economic analysis and other relevant factors. This will be done at the time of pre-assessment.



## Pruned Regime

The question of the final pruned height is complex and depends upon expected markets. Historically final pruned heights of 6 - 6.5 m were targeted. However, current favoured domestic market pruned log lengths (cutting clearwood for the US market) are around 5 m, equating to a required pruned height of around 5.5 m (allowing for stump height, cutting waste). Thus the pruning costs above 5.5 m were often not realised by growers selling to the domestic market. Export pruned logs are commonly 3.9 m or 5.9 m in length (China market), again with the potential to not realise the full pruning costs.

The suggested approach is to now target a minimum pruned height on all final crop stems of 6.0 m and a maximum of 6.5 m.

The tending schedule will be designed to maintain tree vigour whilst achieving the target pruned prescriptions. The key requirements of pruning are:

- an average maximum DOS not exceeding 19 cm at each lift;
- retention of at least 4.0m of green crown (measured from the lowest remaining whorl to the highest whorl of branches) on individual trees after each lift;
- a final crop stocking of 300-330 sph;
- at least 90% of final crop stems pruned to the target minimum pruned height of 6.0 m; and
- thinning to promote maximum growth on the pruned crop element whilst exercising some level of branch control;

Pruning will be undertaken using the variable lift method, where individual stems are pruned to a height commensurate with their size. The objective is to remain below the maximum DOS but to maintain tree vigor by retaining adequate crown.

In most cases (at least from 1999) this was and should continue to be achievable with a 2 prune, single thin regime.

## Unpruned Structural Regime

On lower fertility sites, sites with heavy understorey, etc, no pruning will be undertaken. The regime on these sites will be to undertake a single thin to 400-450 sph at a mean top height of 12-14 m (age 9-10 years depending upon growth rates).

The key requirements of thinning are to:

- achieve some degree of branch control prior to final thinning;





- avoid increasing the windthrow risk from delaying thinning too long;
- avoid significant loss of dominance on final crop stems;
- avoid damage to the crop stems during thinning; and
- be achieved as economically as possible.

As with pruning, a degree of compromise between competing objectives is required, and the timing will be determined by subjective considerations as well as the usual objective measures. Pine trees grow best in a forest situation where trees provide mutual shelter. However, if the trees are too close, the competition between the trees for light, water, and nutrients can severely restrict growth. It is also desirable to achieve some measure of branch control through the timing of the thinning.

### Silvicultural Prescriptions

Table 4.1 presents standard schedules to guide the manager's regime selection.

Table 4.1 STANDARD SILVICULTURAL SCHEDULES

Approx. Age	Mean Crop Height	Pruning height	Maximum DOS Average	Target Pruned stems	Thin to stocking
(yrs)	(m)	(m)	(cm)	(sph)	(sph)
Main regime and Lower Fertility Sites, etc (Unpruned regime)					
9 - 10	12 - 14				400 - 450
High Fertility Sites (Pruned Regime)					
5 - 6	8 - 9	0 - 3.5 (VLP)	19	approx. 350	If required
7 - 8	10 - 12	3.5 - 6.5 (VLP)	19	300 - 330	300 - 330

The figures in Table 4.1 are indicative and should generally be based upon pre-assessment data which will aid stand scheduling.

### Scheduling of Tending Operations

Commercially available stand growth modelling software (e.g. the Radiata Pine Calculator) can be used to assist stand scheduling for tending and the parameters (DOS, tree height, etc) that will result from the operation. These work using data obtained from stand measurements taken prior to the first pruning lift. Following



pruning, measurements taken for quality control on the pruning operation can be used to predict the timing and intensity of the subsequent pruning lifts.

Initially, the process will commence with a visit to the stand 3 - 6 months before the first pruning operation at about age 5 years. A suitable systematic pre-assessment survey will be undertaken and data recorded. The measurements taken will be stocking, mean tree height and diameter at breast height (dbh) for both crop trees and followers. This data will be processed through the Radiata Pine Calculator to schedule the first pruning lift (unless the measurements and/or a regime analysis indicate that an unpruned regime should be adopted).

### Crop Tree Selection

Choosing the best trees to be pruned or to remain following thinning is vital in order to ensure a good final crop.

The forest manager will issue all tending crews with clear written prescriptions for silvicultural operations. They will generally specify crop trees as follows.

- Dominant or co-dominant.
- Well formed (straight, erect, no abnormal branching).
- Healthy and vigorous.

The following basic pruning quality standards shall be applied.

- On trees less than 6 m height, at least 50% of the green crown shall be left but any large branches on the first remaining whorl should be removed.
- On trees greater than 6 m height, prune to no more than half height and leave at least 4.0 m of green crown.
- Branches shall be cut flush. With no tearing of bark (undercut where necessary) and with branch collars undamaged.
- Scarring to the bark of the tree stem is unacceptable.
- All green and dead epicormic growth, green stem needles and stem cones shall be removed from the pruned stem within the pruned zone.
- Form prune on the lowest remaining whorl where necessary.
- At least 90% of final crop pruned greater than 6.0 m.





## Thinning

It is expected that in most cases the pruned regime (if adopted) will be able to be undertaken with a single thinning to waste operation after the second and final pruning. This will be verified prior to the first pruning and subject to total stand stocking, growth and the level of competition between trees.

If two thinnings are required, then a first thinning should be undertaken after the first pruning operation. The retention of unpruned followers during the first thinning operation is designed to restrict branch development in the final crop stems. Followers shall be selected to minimise the risk of a shift in dominance from pruned to unpruned stems.

The final thin (whether a first or second thin) for the pruned regime should be timed to ensure that branch control on the first log above the pruning is achieved, whilst not unduly compromising the growth of the crop trees. This may be as long as two to three years after the final pruning lift. To minimise the risk of windthrow, thinning should be undertaken no later than stand height 15 - 16 m.

The unpruned regime has a single thinning to waste to final crop stocking.

Unless significant benefits of production thinning can be demonstrated and these clearly outweigh the risk of damage to the valuable pruned butt logs, production thinning operations, and managing the tree crop for this option, are not proposed for the Mount Tiger forest in the future. In any event there are few areas where the topography is suitable.

## 4.6 NUTRITION

As discussed in Section 3.4, Mt Tiger forest contains several soil types of varying natural fertility. Trees growing in the poorer soils are expected to develop nutrient deficiencies.

Corrective action should be considered at establishment if the preceding tree crop has shown problems - refer to section 4.4 above. Otherwise the following guidelines are relevant.

### Foliar Sampling

A formal foliage sampling programme will be co-ordinated and overseen by the forest consultant. Sampling will follow final thinning or earlier if regular health inspections reveal symptoms of possible deficiencies.

Foliage sampling will be carried out between February and March. Foliage sampling shall be carried out by reliable and experienced personnel and strictly to the specifications laid down by Scion (ex Forest Research (FR)).



The objective is to obtain samples that represent “management units”, that is, distinct areas that can be treated independently. Sample point selection should be systematic (e.g. grid used), at an intensity of at least 5 samples (each of 5 trees) per stand, and sample points pre-located on maps in the office. The samples (25) should be amalgamated for each sampling unit and sent to Scion for analysis.

## Interpretation of Results

Analysis of samples shall be carried out by Scion. Frequency of analysis after the initial test shall be based on advice from Scion or the forest consultant.

In general, fertilising should be considered if foliage analysis results fall below the following levels.

Phosphorus	-	0.11% oven dry weight
Nitrogen	-	1.30% "
Potassium	-	0.40% "
Magnesium	-	0.07% "
Boron	-	8 ppm
Copper	-	2 ppm
Zinc	-	10 ppm
Manganese	-	10 ppm.

However, in addition to the above trigger levels, cognisance should also be made of:

- the stand’s visual appearance;
- previous analysis results where available;
- previous fertilising history;
- physical conditions of the soil (such as poor drainage) which may inhibit nutrient uptake;
- weather conditions leading up to and at the time of foliage collection; and
- the interactions between silvicultural operations, tree canopy recovery and anticipated nutrient release from decomposing slash.

## Fertiliser Application

When deficiencies are detected, the forest consultant shall propose a fertiliser programme for the following spring. This will be submitted for approval as part of the annual work programme and budget process. The following points shall be considered when developing the fertiliser programme.

- Aerial fertilising operations must be undertaken using standard industry practice. Aircraft must be calibrated and equipped with navigational



guidance aids (which have the ability to produce hard copy maps of flight paths).

- Urea fertiliser must not be applied during periods of hot, dry weather nor if heavy rain is imminent, as significant loss of nitrogen can occur. In some cases this may mean delaying operations until the following spring or autumn.

#### 4.7 FOREST MAINTENANCE

The forest consultant will co-ordinate and oversee a forest maintenance programme and contract the necessary works as required and agreed by NRC.

##### Roads

Roads and tracks within the forests are of varying quality. Current condition is generally good as a result of the first rotation harvest access. After harvesting, the quality of roading needs to be sufficient only to allow access for four-wheel drive vehicles for silvicultural operations and fire suppression. Regular maintenance should include vegetation control and, when necessary, road shaping, clearing of water tables and maintenance of flumes to prevent batter slope erosion.

Wherever possible, planning and construction of logging roads and skids should be completed at least 12 months prior to harvesting operations to allow sufficient time for the earthworks to consolidate prior to use.

##### Firebreaks

Firebreaks will be formed and maintained only where there is an identified risk of fire on neighbouring land (e.g. neighbouring vegetation is combustible or where the area fronts a public road) and where they will be effective.

They shall be kept clear of combustible vegetation to a minimum width of 5 - 10 m, depending upon practicability. Any firebreaks will be inspected and cleared in advance of the fire season.

##### Water Points

Water points and the access to them will be maintained and they should be signposted prior to the start of the fire season (1 October) each year.

There is currently only one water point in the forest, at the pond on Drews Main road. In most cases water will be more reliably and best sought from outside the forest, eg helicopter monsoon bucket filling from Whangarei harbour, etc.



## Weed Control

Mount Tiger forest contains most of the weeds and pest plants common in Northland forests, including some of the more difficult weeds such as gorse, blackberry and pampas.

Weed control rather than eradication is the objective. Eradication will be possible only where a weed is present in small, localised areas.

Being an NRC owned forest, weed control will be undertaken in accordance with the requirements of the Northland Regional Pest Management Strategy and the *NRC Pest and Weed Control Management Plan for the Northland Regional Council Mt Tiger Forest - 2007* or subsequent updates.

## 4.8 FOREST PROTECTION

The forest consultant will oversee and implement procedures to ensure the protection of the forest against injurious agents and advise NRC of situations which might put the health of the forest at risk.

### Fire

The major fire related risks within Mount Tiger forest are associated with operational activity within the forest, public roads, recreational areas and illegal entry.

WDC is the controlling fire authority and Mount Tiger forest is afforded some protection under the Whangarei District Fire Plan prepared annually by WDC. The WDC fire plan contains surveillance, reporting and control procedures. Because Mount Tiger forest is adjacent to significant other forest holdings, it is most likely the WDC Principal Rural Fire Officer (PRFO) would be involved in any fire within, or which threatens, Mount Tiger forest.

NRC no longer has in-house fire prevention and response capability. At present the most efficient and cost effective approach is to contract a specialist organisation to undertake this role. The forest consultant, in consultation with NRC, shall be responsible for setting up and implementing a suitable management structure for this role.

At present this is achieved via an annual rolling contract with Fire Protection Services Limited (FPS). The contract defines the requirements which include the following.

- Provide Duty Fire Officer to respond/deal with fire reports in NRC forests.
- Prepare and submit for NRC approval, a current Fire Plan for Mount Tiger forest which will meet any statutory and Council requirements.



- Develop co-operative agreements and understandings with other fire authorities and forest owners to share firefighting resources.
- Undertake review of, and ensure that, any fire protective structures in the forest are maintained.
- Review, document and advise on maintenance requirements for NRC fire equipment (stored by FPS).
- Fire training and advice.

It is worth noting that FPS are also the current service provider contracted by WDC to undertake the PRFO role under the WDC District Fire Plan.

The forest consultant will ensure that protective procedures are implemented, including the following.

- Ensuring all contract crews carry a minimum of \$1.0 million public liability insurance and a minimum fire fighting extension of \$500,000.
- Enforcing strict smoking restrictions.
- Ensuring all contract crews carry the minimum amount of fire equipment specified in the Fire Plan.
- Cessation of thinning to waste when fire danger is “high” or above.
- Adopting precautions in harvesting operations when fire danger is “high” or above.

### Pests and Diseases

The pests and diseases that currently exist in Mount Tiger Forest are largely controllable through normal forest management practices.

Mount Tiger forest used to receive annual forest health inspections under the National Forest Health Surveillance Programme (NFHSP) co-ordinated by the NZ Forest Owners Association (NZFOA) but these were postponed between 2000 - 2012 as the forest was largely mature and being harvested.

Formal forest health inspections, in addition to the general overall monitoring inspections, were restarted in 2013 and should be continued annually going forward. Whilst the NRC continues to be a member of the NZFOA, this can be undertaken under their NFHSP and their specialist forest health contractors. All reports prepared under the NFHSP and recommendations therein must be followed up and acted upon as appropriate.



The 2014 forest health inspection found:

- No new pests or diseases during the inspections.
- No significant pathogen problems were detected.
- Limited signs of several other agents, including several needle cast disorders.
- No significant insect problems were detected.
- Some small areas showing nutrient deficiency.
- Some areas showing light possum damage.

However, in all cases these were not considered significant and no management intervention above what is outlined in this management plan were recommended. A Forest Health Certificate dated 10<sup>th</sup> May 2014 was issued.

*Dothistroma pini* is a needle blight fungus common throughout most of the North Island. It does not normally cause mortality and can be controlled adequately by a combination of thinning, pruning and aerial spraying with low doses of copper oxychloride. Where this disease becomes evident and infection levels are over 25% of the crown as assessed in July/August, spraying will be carried out. Remedial spraying operations are generally co-ordinated on a national basis by the Dothistroma Action Committee.

*Cyclaneusma* is another needle blight which can affect older trees, mainly after 7-9 years of age. There is presently no economic control, so selection against this disease at the time of second thinning is the best means of reducing its impact.

Needle cast diseases are becoming more prevalent in New Zealand exotic forests in recent years. This includes *Dothistroma* and *Cyclaneusma* as well as Physiological Needle Blight (PNB) and Red Needle Cast (RNC). The forest industry is undertaking research to better understand these diseases as they can exist in the same forest, same stand and same tree are often mixed up in their identification. However, very little recent needle cast of any sort was observed in the estate during the 2014 survey.

*Armillaria* is an indigenous fungus that spreads from the roots of native trees. It will remain present throughout the life of the crop and low level mortality can be expected from the infection centres. It also has the potential to affect the second rotation.

## Wild Animals

Overall the current damage from noxious animals is generally minimal in Mount Tiger forest. However in past years damage from goats has occasionally been





significant, particularly with respect the 2004 and 2005 plantings which adjoined neighbouring land and control was thus difficult.

It is likely that possums, goats and other wild animals will require control from time to time. In particular goat control will be required on a regular basis while the second rotation tree crop is young due to persistent encroachment from neighbouring farm land. Since the forest was first planted NRC has been undertaking an ongoing animal control programme at Mt Tiger and this programme was revamped in 2007.

As the regulatory authority, NRC has overall responsibility for wild animal control in Northland. The forest consultant shall liaise with NRC with regard to the effective control of wild animals in the forest and with respect to the Regional Pest Management Strategy and the *NRC Pest and Weed Control Management Plan for the Northland Regional Council Mt Tiger Forest - 2007* or subsequent updates.

Domestic stock from time to time enter the forest and require removal so as not to cause damage to the tree crop, roads and tracks.

### Monitoring

The forest consultant shall undertake regular inspections of the forest (at least monthly) to monitor maintenance and protection issues and ensure appropriate works are undertaken as required.

Inspections of the forest should also be made after major storm events to ensure no significant damage to the tree crop and the infrastructure (particularly roads and tracks) has occurred. Immediate remedial work shall be undertaken as required, any tree crop damage recorded and salvage operations initiated where necessary.

## 4.9 GRAZING

Grazing within forest stands can provide the following benefits to the forest.

- Weed control, particularly pampas.
- Improved access for silvicultural operations.
- Reduced fire hazard.
- Improved tree growth from accelerated nutrient recycling.
- Additional revenue.

However, grazing, if not well supervised, can cause irreparable damage to the tree crop.



No grazing is currently being undertaken in the forest and there is no current infrastructure (water and fencing) for such.

The forest consultant will consider the introduction of grazing where it is practical to do so and where the advantages clearly outweigh the risks to the tree crop.

Any grazing will be formally managed under a grazing licence with the grazier wholly responsible for fencing and water reticulation. In drawing up these licences the consultant will ensure NRC has the right to require stock to be immediately withdrawn from the forest if damage to the tree crop is occurring or likely to occur.

In addition, the following shall prevail.

- No grazing of sheep in any stand prior to age three years.
- No grazing of cattle in any stand prior to age six years.

In general, it is not anticipated that extensive grazing will be undertaken within the forest.

#### 4.10 INDICATIVE WORK SCHEDULES

The forest consultant is responsible for preparing the annual work programme and budget and also preparing and updating a rolling five year work schedule and budgets for NRC approval.

Appendix 3 contains the 2015-16 annual work programme and budget.





Appendix 4 contains the indicative work schedules and budgets for the following 4 years in detail and a summary of the 10 year cash flow projection.

The indicative future tending schedule for each stand is also contained in the stand records in Appendix 2.

These will updated and prepared at a timing defined by NRC and its budgeting requirements.

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## 5 SALES OF FOREST PRODUCE

### 5.1 OBJECTIVE

The objective of forest produce sales is to maximise the net return to NRC. This will be achieved by implementing the most appropriate sales method, ensuring suitable contracts are negotiated, signed and adhered to, and that forest produce sales and all harvesting operations are well planned, managed and supervised.

All harvesting operations must be undertaken in an environmentally responsible manner so that long-term site sustainability is maintained and downstream values maintained.

### 5.2 SITUATION

Harvesting of the 1<sup>st</sup> rotation tree crop at Mount Tiger commenced in 1999. At this time a harvest strategy for the 1971-1977 areas of the forest was prepared. The initial harvest strategy proposed a harvesting sequence over a period of up to eight years with an annual harvest level of between 15,000 m<sup>3</sup> and 25,000 m<sup>3</sup>. The strategy allowed the flexibility to modify annual harvest programmes to respond to market conditions or changes in NRC's objectives. Over the past 15 years NRC has been implementing the harvest strategy with delays mainly due to the deferral of harvesting in times of poor market conditions.

In 2005, NRC was 85% through the initial harvest programme, with only the 1977 area remaining. A summary of previous sales is contained in [Appendix 5](#).

From 1999 to 2005 NRC's harvest was undertaken via stumpage sales - which during that time, was the preferred option of NRC. The purchaser bought the standing trees and was responsible for the harvest and marketing of the tree crop. Stumpage areas were generally sold with access only to the block boundary. Sales were on a "pay as cut" basis and forest produce was paid for on the basis of a composite or average price for all material extracted from the site. These 1999-2005 stumpage sales were managed by CFK and were on an open tender basis.

In 2007, NRC made the decision to defer the harvest of the 1977 stand at Mount Tiger (approximately 26 ha - programmed for harvest at 30 years of age - in 2007/08) owing to poor market returns. The harvest was again deferred in 2008.

At that time it was also decided that owing to a lack of stumpage purchasers still operating in the Northland market and uncertain market conditions, the NRC would adopt a managed sale method for the harvest of the 1977 area.



In late 2008, NRC signed an “Agreement to provide Harvesting and Marketing Services” with NFML for the 1977 area. This meant that once NRC agreed to the harvest timing, NFML would be responsible for organising the harvest, extracting the logs, cartage, and marketing of forest produce on NRC’s behalf.

In October 2009, based upon market conditions and prospects at that time, NRC made a decision to proceed with the harvest of the 1977 area over the 2009/10 summer and NFML were instructed to proceed accordingly. The harvest was successfully undertaken between February 2010 and May 2010.

The next area due for harvest is the 1985 stand of approximately 16 ha - due provisionally in 2015/16. The pre-harvest planning work is now largely complete. The harvest timing is yet to be decided and ideally should be market driven, as well as taking account of logistics (eg, equipment/crew availability and working in with other local small blocks to minimise establishment and set-up costs). The forest consultant shall again consider, advise and recommend the appropriate harvest timing for NRC consideration and final decision to proceed.

As noted earlier, in September 2013, NRC contracted NFML via an Agreement to provide Harvesting and Marketing Services to undertake the 1985 stand harvest. This contract expires 30 June 2016, or until the harvest of the 1985 area is complete, whichever is the earlier.

### 5.3 SALES PROCEDURES

Apart from the 1985 area, no other harvesting is planned within the term of this management plan. However, if this changes and harvesting of the 1991 area is bought forward (scheduled for 2021/22), then general procedures for the sales of forest produce will be as for the 1985 area and are as follows.

The forest consultant will be responsible for pre-harvest planning in consultation with NRC. It will be undertaken at least 12 months prior to planned harvest timing, in order to provide adequate time for obtaining the necessary regulatory approvals, iwi consultation and to allow some flexibility in the timing of harvest with respect to markets. Pre-harvest activities include the following.

- A pre-harvest inventory (eg MARVL or PLOTSAFE inventory methodology), carried out by an experienced field technician as described in section 7.2.
- Preparation of a logging plan.
- Archeological surveys where necessary.
- Iwi consultation in line with resource consent requirements and in line with the Memorandum of Understanding (MoU) between NRC and Ngati kahu O Torongare/Te Parawhau Hapu Trust, refer [section 9.4](#).



- Submission and approval of any resource consent requirements from the relevant territorial authorities - ie Northland Regional Council and Whangarei District Council, refer section 9.2.
- Obtaining any authorities required from Historic Places Trust.

NRC will determine, in conjunction with the forest consultant, the appropriate timing for harvesting - and the method of sale. The forest consultant will advise NRC on the different methods of sale available (e.g. lump sum stumpage sale, stumpage sale by log grade, on-truck log sale, fully managed log sale, etc) and recommend the most appropriate method of sale for NRC's consideration. Currently, and in place for the 1985 harvest, NRC has a preference for fully managed log sales.

Depending upon the decision made, the forest consultant will be responsible for overall co-ordination of the forest produce sales process, either:

For managed log sales (current preference):

- Preparation of suitable documentation for a managed log sale including:
  - a Harvesting and Marketing Services Agreement (updated as appropriate);
  - a brief resume of forest information ;
  - inventory data; and
  - various correspondence explaining NRC's requirements.
- Calling for requests for proposals from suitable qualified and experienced service providers.
- Receive responses, dispatch relevant information/documentation, briefing, discussions and site inspections with prospective providers.
- Receive proposals for the harvesting and marketing services.
- Prepare a formal written report to NRC on the outcome, evaluating proposals and making recommendations.
- Upon NRC decision, formalise a suitable contractual agreement.
- Oversee and manage the Harvesting and Marketing Services Agreement and harvest on NRC's behalf.

For stumpage sales:

- Preparation of suitable documentation for a stumpage sale including:
  - a draft Stumpage Sale and Purchase Agreement (updated as appropriate);
  - a brief resume of forest information ;
  - inventory data; and



- various correspondence explaining the sale process and NRC requirements.
- Advertising of the sale:
  - via newspaper “tenders” advertisements; and
  - by direct approach (letter) to known potential purchasers.
- Receive responses, dispatch relevant information/documentation, briefing, discussions and site inspections with prospective tenderers.
- Receive tenders.
- Prepare a formal written report to NRC on the sale outcome, determining a reserve price, evaluating tenders and making recommendations.
- Upon NRC decision, formalise a suitable contractual agreement, eg . Agreement for Purchase of Forest Produce.
- Oversee and manage the Stumpage Sale and Purchase Agreement and harvest on NRC’s behalf.

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## 6 OPERATIONAL QUALITY CONTROL

### 6.1 OBJECTIVE

The objective of operational quality control is to ensure that forest operations meet prescribed standards. Quality control is used to monitor each operation as it progresses. Information from quality control is an important input to permanent stand records.

### 6.2 QUALITY CONTROL PROCEDURES

The forest manager will be responsible for quality control assessments (QA) of all operations under its control. The manager will provide and keep written plot data and other records for all QA operations. The contractors should be required to adequately supervise their own work quality.

QA field checks should be implemented within two days of a new operation commencing and thereafter at a frequency determined by how well the job is being done and the rate of progress. In general the frequency should not fall below one check per week.

Allowable tolerances for acceptable stocking will generally be  $\pm 10\%$  on an individual plots basis. If QA checks show actual acceptable stocking below these tolerances, the area must be reworked. At acceptable stocking levels above these tolerances, the contractor should not be paid for work above the tolerance level.

QA plots must not be measured by the contractor who carried out the operation, or by anyone associated with him. However, the contractor is encouraged to accompany the forest manager during quality control plotting.

### 6.3 ESTABLISHMENT QUALITY CONTROL

The forest manager shall implement a suitable, formal quality control system to ensure that tree stock standards and the prescriptions outlined in section 4 are met. This will include monitoring at the nursery, observation of the lifting and packing process, and a sampling and measurement audit at the time of tree stock delivery.

The forest manager shall carry out a formal planting QA programme. This will be designed to check planted stocking and planting quality.

A 2% sample by area will be assessed for stocking with at least four seedlings per plot excavated to ensure proper root placement.



## 6.4 TENDING QUALITY CONTROL

QA of tending operations is essential to ensure that operational prescriptions and targets (section 4) are met and to provide the necessary data for contractor payment.

### Tending Quality Control Inventory

Pruning and thinning QA inventory will begin soon after the commencement of the operation so that the work quality can be assessed and corrected if necessary before work progresses too far. General procedures are outlined in [Appendix 6](#).

QA shall also be carried out in accordance with the guidelines in FR Bulletin No 186 "*Field Guide for sample plots in New Zealand forests*" or in line with standard NZ forest industry tending quality control assessment practice.

All tending quality control data shall be averaged and entered into the stand record system at the completion of the operation.

### Pruning Auditing

NRC previously had each pruning operation audited by a qualified "pruned stand auditor" so that all pruned stands received full certification under the FR Pruned Stand Certification Scheme. Provided a professional, reliable forest manager undertakes pruning quality control in line with the above guidelines this should achieve the same result and be adequate for verifying pruning quality when undertaking future forest produce sales.

## 6.5 PRODUCTION THINNING QUALITY CONTROL

No production thinning operations are anticipated under this management plan. However, as stated in Section 4.5, this may be reassessed if the benefits can be clearly demonstrated to outweigh the risks. If production thinning is agreed to by NRC, then the forest consultant and forest manager will agree upon suitable quality control procedures.

## 6.6 FERTILISER APPLICATION QUALITY CONTROL

Fertiliser applications involve the expenditure of large amounts of money in a very short time. If the contractor fails to perform, the operation can be complete before the forest manager is aware of such failure. Therefore on-site supervision and monitoring of fertiliser applications is critical.





The forest manager must ensure a suitably qualified person is present on-site throughout fertilising operations to ensure:

- the aircraft is correctly calibrated and that the calibration is consistent throughout the operation;
- the physical monitoring of the application process and that fertiliser is well distributed over the target area;
- the rate of application is monitored against the area covered as the operation progresses; and
- that if unforeseen events force a change of plan, the forest manager is present to make the best decision.

The forest manager shall provide and keep records of all documentation pertaining to the operation, including hard copy maps of the flight paths. These maps will be kept with individual stand records.

## 6.7 SALES OF FOREST PRODUCE QUALITY CONTROL

The management and supervision of forest produce sales contracts (either Stumpage Sale and Purchase Agreements or Harvesting and Marketing Services Agreements) is the responsibility of the forest consultant.

In both cases, the quality control of harvesting operations will generally comprise the implementation of the respective Agreements, ensuring contractual requirements and the terms and conditions therein are fully met. In general, this will include, but is not limited to:

- adhering to the respective Agreements;
- following the agreed logging plan;
- at least complying with normal industry standards and those outlined in the “New Zealand Environmental Code of Practice for Plantation Forestry” (and Best Environmental practices (BEP’s) therein) and subsequent publications or industry best practice, including the Forestry Earthworks & Harvesting Guidelines for Northland;
- meeting all relevant legislative and regulatory requirements, including but not confined to the Health and Safety in Employment Act and Regulations, relevant District plans, Resource Consents issued, Historic Places Act and other environmental standards;
- extracting all merchantable material (the “Wagner” or other industry suitable waste assessment should be used to quantify merchantable waste where visual checks indicate a problem);





- properly accounting for all forest produce leaving the site (including keeping a copy of all bush and weight docket) and making the appropriate payments on time; and
- leaving the site in a condition suitable for replanting and with suitable environmental and management structures and safeguards in place.

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## 7 FOREST INVENTORY

### 7.1 OBJECTIVE

Forest inventory involves the measurement of the trees and stands in a forest. It is used for operational planning (e.g. harvesting) and control (e.g. quality control of tending operations).

The objective of forest inventory information is to establish and maintain an accurate record of the forest's basic stand parameters. It forms an important part of permanent stand records and is an essential input in yield projections and forest valuations.

### 7.2 FOREST INVENTORY PROCEDURES

Forest inventory should be undertaken at four stages in a stand's life:

#### Pre-Assessment

Undertaken during the early years to determine the timing of silvicultural operations (Section 4.5).

#### Tending Quality Control

Undertaken during the early years when tending is being carried out (Section 4.5, 6.4 and Appendix 6).

#### Mid-rotation inventory (MRI)

Undertaken at around age 15-16 years, after the stand has stabilised following the final thinning. The following guidelines should be used by the forest consultant when organising MRI.

- The inventory will be designed to try to achieve a Probable Limit of Error (PLE) of 10% on basal area for individual stands. The forest consultant shall strike the appropriate balance between increased expenditure on inventory and improved reliability.
- Suitably qualified and experienced inventory contractors will be used and work under an inventory plan and technical specification prepared by the forest consultant.
- As a minimum, all field work will be carried out according to the guidelines in FR Bulletin 186 - "*Field Guide for Sample Plots in New Zealand Forests*" or in line with standard NZ forest industry mid-rotation inventory practice.



## Pre-harvest Inventory

Undertaken 1-2 years prior to harvesting.

The forest consultant shall organise a full pre-harvest inventory prior to harvesting, refer section 5.3 above. This will form an integral part of the pre harvest planning process whatever sales process is ultimately chosen. The following guidelines should be used when conducting a pre-harvest inventory.

- The pre-harvest MARVL (or equivalent, eg PLOTSAFE) inventory will be carried out by an experienced field contractor. Any previous inventory will be utilised as appropriate to indicate the required sampling intensity.
- The sampling intensity will be set to achieve a PLE of  $\pm 10\%$  on total volume per hectare.
- An inventory plan and technical specification will be prepared by the forest consultant for each pre-harvest inventory.
- Sufficient tree quality data will be collected to enable analysis of various marketing options. In general this will entail tree coding to cover 4, 7, and 10 cm branch classifications and at least D/4 and D/8 sweep classifications.
- As a minimum, all field work will be carried out according to the guidelines in FR Bulletin 186 - "*Field Guide for Sample Plots in New Zealand Forests*" or in line with standard NZ forest industry pre-harvest inventory practice.



## 8 RECREATION

### 8.1 OBJECTIVE

To protect the commercial forest investment and mitigate risks from fire and health and safety issues and then allow public access and recreational use of Mount Tiger forest only if these are compatible.

At present and for the term of this management plan, NRC will not be providing any formalised public access to Mount Tiger forest.

### 8.2 SITUATION

The primary purpose of Mount Tiger forest is a productive commercial investment for NRC. However, because of its close proximity to Whangarei city, access to the forest is regularly sought by the public for various recreational uses.

#### Historical Usage

Historically the forest had open access with respect to walking and other passive usage, except during harvesting when, for safety reasons, access was restricted. This passive recreational use was encouraged by NRC as part of a multiple land use approach. Forest tracks were marked for ease of access.

Entry for more formal forms of recreational activity was by formal permit only, and a forestry plan showing access points, track location and current contract harvesting operations was supplied with all permits. The Parahaki Mountain Bike Club had such a permit, and established a number of mountain bike trails in the forest. However, this permit has not been renewed since 2008, although their use continued on a casual basis.

A New Zealand Walkway Track (the Waikaraka Walkway) used to run along the eastern boundary of the forest. This track used to be managed by Department of Conservation (DoC) but in late 2007 when DoC found the absence of a Walkways Act easement meant they did not have a legitimate right to manage the walkway, DoC removed signs and withdrew from the Walkway management. DoC tried to pass the issue to WDC but little has been done since. The track is currently not marked, nor being maintained, but still receives usage from time to time from legitimate walkers. It also acts as an entry point for illegal motorbike trespass into Mount Tiger forest and this usage is obviously not compatible with other track users.

Previously potential recreational conflicts were recognised, and where possible, areas of the forest were allocated for different uses, eg hunters, trampers, motor bikers/mountain bikers, joggers, walkers, orienteering, horse-riders etc.



No dogs were permitted in the forest because of NRC's Kiwi Protection Policy. The New Zealand Police has also used Mount Tiger forest in the past for Armed Offender Squad training.

### Current Usage

In recent years, the recreational access and use of the forest has been restricted owing to the harvesting operations.

Illegal entry by motorbikes has been an ongoing management challenge as the motorbikes present a fire danger risk (particularly in summer) and also damage roads and tracks.

Harvesting stopped in mid-2010 and the restricted access has remained in place and is planned to continue to at least 2015/16 when the next harvest is planned.

There is the potential to resume more recreational use of the forest after the 2015/16 harvest. However, it is noted that the forest is small and it is not possible to allow for all recreational activities without resulting in conflict between users. The issue then becomes one around which recreational use/s should be allowed, and which are not.

In addition, there are the issues of protection of NRC's commercial asset and risk mitigation, including from fire, damage and also important now days is NRC's responsibilities as a landowner with respect to Health and Safety legislation and any forest users.

## 8.3 PROCEDURES

### Future Usage

Mount Tiger forest is potentially a valuable recreational resource for Whangarei. However, it is small and there are a number of potentially competing recreational users whose activities are often not compatible with each other. Providing controlled and safe recreational opportunities within the forest environ is therefore challenging.

There is a need to protect NRC's commercial investment in the first instance and secondly not unduly expose NRC to other risks by providing public and multiuse access, particularly risks associated with fire and health and safety. The location and nature of Mount Tiger forest is such that controlling access is difficult and it is not possible to fully eradicate illegal entry (eg motorbikes) and hence risk for any users.

The forest consultant will work closely with NRC in developing and managing appropriate recreational use of Mount Tiger forest if and when permitted.



NRC's current policy is that owing to the need to protect its commercial investment and mitigate risks around fire and health and safety, NRC will not be providing any formalised public access to the forest. All future access will remain at NRC discretion.

Where practicable, NRC will work towards limiting illegal access (from motorbikes in particular) especially during periods of heightened fire risk by periodic forest inspections, trying to identify culprits, issuing "Warning to Stay of Place" notices where illegal users are identified, and pursuing trespass actions when appropriate.

draft



## 9 LEGISLATION AND ENVIRONMENTAL COMPLIANCE

### 9.1 OBJECTIVE

To manage the forest in a sustainable manner that meets all legislative and environmental requirements.

To ensure that the long term site productivity of Mount Tiger forest and downstream values are maintained by careful planning, implementation and control of all forest operations.

To reduce the likelihood of breaches of any legislation and possible litigation, the forest consultant and forest manager must remain conversant with current legislation relating to afforestation activities. A brief description of the major issues follows.

Notwithstanding any restrictions that might be imposed on forest operations by the Regional or District Council, all such forest operations shall undertaken generally in accordance with the "New Zealand Environmental Code of Practice for Plantation Forestry" (and Best Environmental practices (BEP's) therein) and subsequent publications or industry best practice.

### 9.2 RESOURCE MANAGEMENT ACT (RMA)

The RMA is the definitive legislation covering activities that impact on soil, water, vegetative cover and other environmental aspects. Such activities include land clearing, land preparation, roading and harvesting. Resource consents may be required before such activities take place.

The NRC is the regulatory authority that administers the RMA in Northland. The forest consultant, forest manager and harvesting and marketing agent must be familiar with the RMA and with local regulations such as:

- The "Regional Soil and Water Plan for Northland"(RWSP) - operative 28<sup>th</sup> August 2004 - under which NRC regulates local activities;
- Updates for Plan Change 1 - these became operative 30<sup>th</sup> August 2007;
- Plan Change 2 - operative 18<sup>th</sup> October 2010
- Transitional Policies (20<sup>th</sup> September 2011) and National Policy Statement for Freshwater Management - 1<sup>st</sup> August 2014
- Forestry Earthworks & Harvesting Guidelines for Northland; and





- Subsequent RMA and RWSP changes and updates.

Currently consents are required for certain activities, set out in Table 9.1 as they pertain to the Land Use Classifications (LUCs) within Mount Tiger forest. Relevant rules are contained primarily in section 32, 33 and 34 of the Regional Water and Soil Plan.

Table 9.1 CURRENT NRC RESOURCE CONSENT REQUIREMENTS

	NON-EROSION PRONE AREAS All LUCs not stated as Erosion Prone Areas (Section 33)	EROSION PRONE AREAS V11e l - 10 V111 e l - 3 V111 s (Section 33)	RIPARIAN MANAGEMENT ZONE (Section 34)
Approx. % of forest	90%		10 % Numerous - alongside streams
Vegetation clearance	Permitted <sup>(1)</sup>	Permitted <sup>(1)</sup> Where NRC notified > 15 days Site revegetated within 2 years No groundbased work 1 May - 30 Sep. Minor impact only.	Permitted <sup>(1)</sup> Where plantation forest planted prior to Aug 2004. If plantation forest planted after Aug 2004 then only permitted > 5m from waterbody.
Earthworks	Permitted <sup>(1)</sup> Where volume < 5000 m <sup>3</sup> in 1 year. Minor impact only.  Controlled <sup>(1)</sup> Where volume >5000 m <sup>3</sup> in 1 year. Minor impact beyond property.	Otherwise Discretionary.  Permitted <sup>(1)</sup> Where volume < 1000 m <sup>3</sup> in 1 year and <1000 m <sup>2</sup> . Minor impact only.  Controlled <sup>(1)</sup> Where associated with plantation forest harvest < 26 deg slope and volume < 1000 m <sup>3</sup> in 1 year and <1000 m <sup>2</sup> . Minor impact beyond property	Otherwise Discretionary  Permitted <sup>(1)</sup> Maintenance of roads and tracks, or exposed soil < 200m <sup>2</sup> and <50m <sup>3</sup> . No adverse effects on other property  Otherwise Discretionary
Land Preparation	Permitted <sup>(1)</sup> Minor impact only.  Otherwise Discretionary	Otherwise Discretionary.  Discretionary	Land preparation and harvesting is Permitted <sup>(1)</sup> where- Setback from waterbody of 5m and <15 degrees slope.  Otherwise Discretionary

Note: (1) Subject the Environmental Standards (Section 32) of the Plan being met.

The first area of harvest, stand 2A comprising 18 ha of 1971 *Pinus radiata* on easy terrain west of Wrack road, was undertaken under a resource consent applied for as part of the stumpage sale to Rayonier NZ Limited in early 1998.



Resource consent was applied for in late 1998 for the harvest of the remainder of the 1971-1977 age classes comprising 268 ha. A 10 year consent was applied for and the application was prepared by CFK. Because NRC was both the applicant and the regulatory authority, an independent planning consultant, (M2 Planning) was appointed to consider the application. Resource consent No 98 - 8585 was subsequently obtained - dated 29<sup>th</sup> March 1999 for a 10 year term. It was subject to annual harvest plans being prepared and presented to NRC's Monitoring Manager.

From 1999 to 2009 this consent was actioned. NRC, via the forest consultant, was treated the same as any other resource consent holder. No problems were encountered and overall compliance was been good. Annual plans were approved as required and signed off by NRC's Monitoring Manager after completion. The annual plan for the harvest of the 1977 area was approved by NRC 's Monitoring Manager in November 2007, but harvest was delayed until 2010.

Resource consent 98-8585 expired on 30 June 2009. It was not renewed for the harvesting of the 1977 area because the works to be undertaken fell inside the permitted activities within the RWSP and consent was not required, although the activities had to comply with for RWSP Section 32 - Environmental Standards. A summary of the activities and processes undertaken under resource consent 98 8585 is contained in [Appendix 7](#).

In future, the forest consultant will be responsible for obtaining all appropriate resource consents for forest operations and ensuring the adherence to all conditions therein. This includes undertaking adequate consultation with affected parties, in particular the relevant iwi to ensure the protection of sites of cultural or spiritual significance.

Resource consent applications should be made at least 12 months prior to planned harvest. They should be generally sought on a "forest level" basis whereby they cover all harvest operations and the harvest period of the forest involved. Harvest of the 1985 area will be possible within the permitted activity rules of the RWSP. It will be undertaken in line with the Forestry Earthworks & Harvesting Guidelines for Northland.

### 9.3 TERRITORIAL AUTHORITY

Mount Tiger forest is in the Whangarei District Council (WDC) territorial authority area.

Under WDC's current District Plan (Operative on 3 May 2007) the forest area is on land zoned "Countryside", on which "forestry" is a permitted activity. No specific consents to harvest appear to be required from WDC. Also noted points of relevance for permitted activities on "Countryside" zone are:

- Traffic- (permitted if less than 30 traffic movements per day)
- Signs - (permitted if for HSE requirements)



- Noise - (permitted if for limited duration for events such as that associated with forestry activities)
- Indigenous vegetation clearance and indigenous wetland disturbance - (permitted if under specified amounts).

The forest consultant, forest manager and harvesting and marketing agent should all be familiar with this Plan and its provisions (and any new District Plans , updates or amendments) with respect to plantation forestry and the necessary procedures and consent requirements. The forest consultant will be responsible for ensuring all relevant consents and approvals are obtained and any additional requirements of WDC (as the territorial authority) with respect to forestry activities are complied with.

The harvest therefore at Mount Tiger forest should fall into the permitted criteria and it is anticipated that no resource consent or specific approvals will be required from WDC for harvest.

However it may be prudent to advise WDC of the harvesting intentions as soon as possible and prior to harvest with regular 6 monthly updates as they evolve with respect to road usage, etc.

#### 9.4 HERITAGE NZ ACT 2014

##### Heritage New Zealand Pouhere Taonga Act 2014

The Heritage New Zealand Pouhere Taonga Act 2014 replaced the Historic Places Act (HPT) 1993 on 20 May 2014. Under this Act it is unlawful to disturb or modify any known archaeological site. Adherence to this Act is also required by the resource consent requirements and both require ongoing consultation with iwi.

##### Archaeological/Historic/Cultural/Significant Sites

NRC commissioned an archaeological survey of Mount Tiger forest in 1998 (as part of the information prepared for the initial resource consent application) and 26 new sites were identified in addition to the 6 sites previously recorded in an archaeological survey carried out in 1983 or prior. The sites are mostly kumara storage pits in association with terraces or midden and hence are relatively common to the area. There are no major pa sites in the forest harvest areas. There are at least 10 recorded on the steep ridges among the gentler land closer to the harbour.

The sites in the forest were summarised in the 1998 report as follows.

- Nine sites are in native bush, already preserved and not affected by forest activities.
- Fourteen sites are in the pines and with careful logging they should be able to be largely preserved, even though more than half of these have been already modified or damaged by earlier land clearing and farming activities.



- Nine sites were identified as being likely to be affected in some way by the logging and discussion was planned with relevant iwi/persons/authorities to establish the appropriate management of these sites.

A bibliography of the archaeological work undertaken and reports prepared is contained in **Appendix 8**.

The overall management objective is to preserve sites where ever possible, particularly sites that are intact, significant, easily preserved and can form a manageable precinct. The specific issues will be addressed on an annual basis as part of the annual harvest plan.

### Current Status

At the completion of harvesting in 2010, areas containing 32 sites in total had been harvested. A total of 4 sites had been destroyed. These were small midden, and pits and terraces. This work was all done under HPT Authorities (4 separate authorities).

The 1977 harvest area involved the modification of only one site - the removal of the pine trees off it, whilst preserving the site. An application to HPT for Section 11 and 12 was made and approved in August 2007 (HPT Authority 2008/09). A final report on the site and overall harvest of the 1977 area with respect to archaeological sites was prepared and submitted to HPT at harvest completion and concluded this authority.

The 1985 harvest area contains several archaeological sites. As part of pre-harvesting planning activities, an archaeological assessment of the proposed harvest area was undertaken in April 2014. The only known site to be potentially affected by the 1985 harvest is site Q07/1075. However, it will be possible to remove the trees from this site and leave it intact. As a result, an archaeological authority (2015-045) was applied for and granted. It allows for the felling of the trees as per the harvesting plan developed and under the overview of an archaeologist. A final report on the site and overall 1985 area post-harvest is required within 6 months of harvest completion.

### Iwi Consultation

As part of the initial resource consent application in 1998, iwi consultation was required. A total of nine iwi groups that may have had an interest in the Mount Tiger area were identified by the NRC iwi liaison officer. These were all contacted. There were no responses from six groups. The Pakikaikutu Trust asked for more information and did not indicate any major problems nor respond further. Ngatiwai Trust Board were consulted and had input into the original consent process. Ngatikahu O Torongare/Te Parawhau Hapu Trust also expressed an interest but further meaningful dialogue was not achieved at this time by CFK nor by M2 Planning when considering the initial consent application. The consent conditions required ongoing consultation with iwi throughout the consent term.



NRC continued dialogue with Ngatiwai throughout 1999. However there was ongoing disagreement between Ngatiwai and Ngatikahu as to who had manawhenua over the area pertaining to Mount Tiger forest. Despite numerous attempts to obtain input from Ngatikahu over this time no meaningful dialogue was achieved. As a result of a dispute over the management of archaeological sites on a new road into the south of the forest, a hui was held in December 1999. At this hui, Ngatiwai acknowledged that Ngatikahu have manawhenua over the area and passed the iwi consultation over to them. Since that time consultation has only been undertaken with Ngatikahu.

In order to formalise the relationship over consultation NRC and Ngatikahu O Torongare/Te Parawhau Hapu Trust signed a Memorandum of Understanding in October 2000. This laid the foundation for ongoing consultation between the parties with respect to the resource consent requirements and consultation required under the then Historic Places Act. It outlined the process for consultation and agreed operational procedures to follow if unknown sites are discovered during the harvest operation.

Consultation for previous harvesting operations was undertaken with NKTP (Waimarie Bruce) and a good working relationship was developed over the initial years. However, this group were (as advised by NRC's iwi liaison officer) liquidated in 2006 and any matters pertaining to this group are now being handled by Ngararatunua Marae Trust.

This new group (Mr Dick Shepherd) was consulted with respect to the 1977 harvest area and most recently with the 1985 harvest area and the current Heritage New Zealand Authority 2015/045.

### Management Process

The forest consultant is responsible for managing the process involved in harvesting on or around archaeological sites in the forest. A brief summary of the management process for handling sites follows. It is further detailed in the MoU between Ngati Kahu and NRC.

- Annual (or other) harvest area identified.
- If registered sites (midden, pits, possible house platforms) are present and/or it is possible other sites could exist within the harvest area, then previous archaeological records are reviewed and information passed on to harvest planner. NRC has the 1998 original survey.
- A draft harvest plan is prepared (determines sites to be retained/modified/destroyed).
- If required, an archaeologist is commissioned to inspect the area on the basis of the draft harvest plan (ie focus on roads, landings and major haul ways, and treatment of sites - is targeted and reasonably quick).
- Iwi consultation undertaken, but again targeted on the draft harvest plan details.
- Archaeologist report (if required) and iwi consultation used to support a Heritage New Zealand Authority application to modify/destroy sites if required.





- If required, any necessary authorities or approvals from Heritage New Zealand are applied for (i.e. General Authority pursuant to Section 48);
- Heritage New Zealand approvals obtained.
- If possible, all archaeological work is done prior to harvest (eg investigations) in accordance with Heritage New Zealand approval conditions.
- Contractor and workers briefing undertaken at harvest start up.
- Procedures in place for management of any new sites if detected.
- Other sites have trees removed as appropriate (iwi/archaeologist present on site if practicable).
- Harvest completed.
- Reports on site modification/destruction and final reports at harvest completion are sent to and signed off by Heritage New Zealand.
- Sites not replanted, buffer zone (but objective is to still maintain canopy closure in final tree crop) left, sites marked and then periodic returns made to remove any regenerating pine.

## 9.5 OTHER RELEVANT LEGISLATION

Health and Safety in Employment Act (1992), Health and Safety in Employment Regulations (1995) and Approved Codes of Practice for Safety and Health in Forest Operations (the ACOP's).

This Act has in recent years become increasingly important and has implications for all forest operations and users of the forest. Under this legislation and the ACOP the landowner is ultimately responsible for accidents on his property and must take adequate steps (and be able to prove this was done) to avoid accidents happening. Certain types of forestry work are notifiable under Regulations 2 and 26 of the Health and Safety in Employment Regulations 1995.

Under the Act, Regulations and ACOP (2012), NRC is ultimately the "principal" - the person who or that engages any person (otherwise than as an employee) to do any work for reward or gain. The principal engaging a contractor to work has the responsibility to take all practicable steps to ensure no one is harmed while undertaking any work on their behalf.

The forest consultant, forest manager and harvesting and marketing manager will ensure that all operations undertaken in Mount Tiger Forest take due account of the requirements of the Act, Regulations and ACOP's. Of recent relevance is the "*ACOP - November 2014 - Safety and Health in Forest Operations: Roles and responsibilities of principals and contractors*".  
<http://www.business.govt.nz/worksafe/information-guidance/all-guidance-items/forest-operations-roles-and-responsibilities>

Every contractor working in the forest must have a written Health and Safety Plan and be actively implementing it. This includes a specific emergency plan and hazard identification for each operation.



Regular detailed contractor safety audits shall be undertaken (or done by a third party) to ensure the requirements of the Act, Regulations and ACOP's are being met.

#### Other

The forest consultant, forest manager and harvesting and marketing manager will ensure they are familiar with, and that all forest operations and management are undertaken in accordance with, all other relevant legislation.

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## 10 ADMINISTRATION

### 10.1 OBJECTIVE

To ensure full and accurate records are kept of all forest operations, including operational and financial records.

To report to NRC as required on physical and financial performance as compared to plan and budget.

### 10.2 STAND RECORDS

Records of the history of operations on each stand will be kept by the forest consultant in accordance with standard industry practice. A computer-based system is to be maintained with adequate electronic and hard copy backups. The stand record system should be kept up to date.

Stand records are the single most important set of information kept for a forest. In order to protect against their loss or destruction, a duplicate set should be kept off-site from the forest manager's office.

Mount Tiger forest was first remapped onto GIS based maps in 2005. Forest map and individual stand maps (to a scale of 1:10,000) were produced from this mapping information.

In January 2015, a full remap of the Mount Tiger forest was undertaken by a forest mapping specialist (ForestryMaps). This was based upon 2011 aerial photography and mapping all stands based upon their actual areas with the exception of the 2010 stand which (owing to its young age at the time of the photography) remains based upon planting boundary estimates.

Forest maps should be updated from time to time as a result of tree ageing, more recent photography being available and changes to stand areas due to management or other impacts (eg wind or storm damage). In most cases stands should be at least remapped prior to silviculture.

### 10.3 FINANCIAL RECORDS

NRC shall be responsible, with assistance from the forest consultant, for keeping records of all expenditure and revenue pertaining to the forest.

All log sales should be tendered and generally silvicultural contracts should also be tendered (or at least benchmarked if a preferred supplier is used for small contracts). Records shall be kept of pricing, tender and budgeting information. This will establish a history of contract rates and information for auditing.



## 10.4 ANNUAL WORK PLANS AND BUDGETS

The forest consultant will prepare detailed annual work plans and budgets for the current year. These will detail the work to be done and costs to be incurred by any sub-contractors. These plans shall be provided to the relevant NRC staff no later than November (*so that budgets can be presented to Council in December, final changes made in the January Council meeting and Annual Plans adopted for consultation for the March Council meetings.*) each year for the forthcoming year commencing July 1.

In addition, as outlined in Section 4.10, the forest consultant shall prepare indicative work schedules and budgets for the following 4 years in detail and a summary of the 10 year cash flow projection for presentation to NRC each year with the annual work plan and budget.

## 10.5 REPORTS

The forest consultant shall report briefly to NRC in writing each month and a full year report shall be prepared for the 12 months ending each June. The reports will cover:

- operations undertaken;
- a comparison of actual expenditure against budget;
- next month's (year for the annual report) work programme and budget; and
- any other information of relevance to the management of the forests.

The forest consultant shall also prepare a report summarising each year's harvest activities including a comparison of actual outcomes versus plan.

## 10.6 GENERAL RECORDS

NRC, with assistance from the forest consultant, will record and keep on file all management decisions, reasons for departures from the management plan, and correspondence with other parties such as the forest consultant, the forest manager, contractors, purchasers of forest produce, regulatory authorities, etc.

This information will be for the purpose of ensuring (and documenting) that NRC has agreed to all major decisions regarding the management of its forests.



## 10.7 INSURANCE

NRC currently insures Mount Tiger forest for loss against fire. NRC shall be responsible, with assistance from the forest consultant, for maintaining up to date cover. This includes updating the insurance schedules as stands are harvested and replanted.

In conjunction with the forest consultant, NRC shall ensure that the various insurance options are investigated, eg first loss cover as compared to full insurance cover for every stand.

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## APPENDICES

- 1 MAPS.
- 2 STAND RECORDS.
- 3 2015/16 ANNUAL WORK PROGRAMME AND BUDGET.
- 4 5 YEAR INDICATIVE WORK SCHEDULES AND BUDGETS AND 10 YEAR CASH FLOW PROJECTION.
- 5 FOREST PRODUCE SALES SUMMARY
- 6 TENDING QUALITY CONTROL.
- 7 SUMMARY OF RESOURCE CONSENT # 98 8585
- 8 SUMMARY OF ARCHAEOLOGICAL REPORTS, WORKS AND SITES BY HARVEST AREA.



## APPENDIX 1

### MAPS

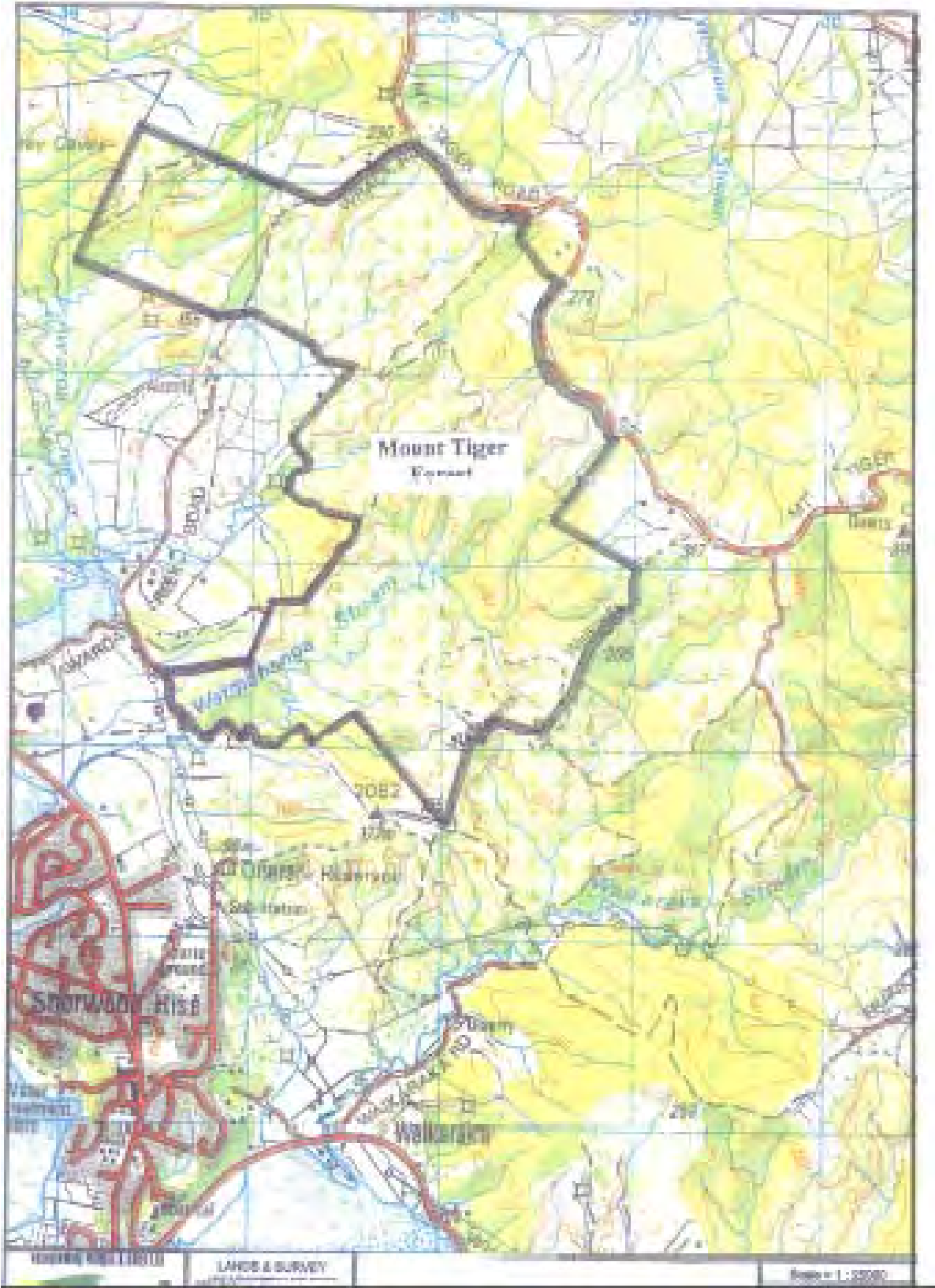
Map 1 - Location Map

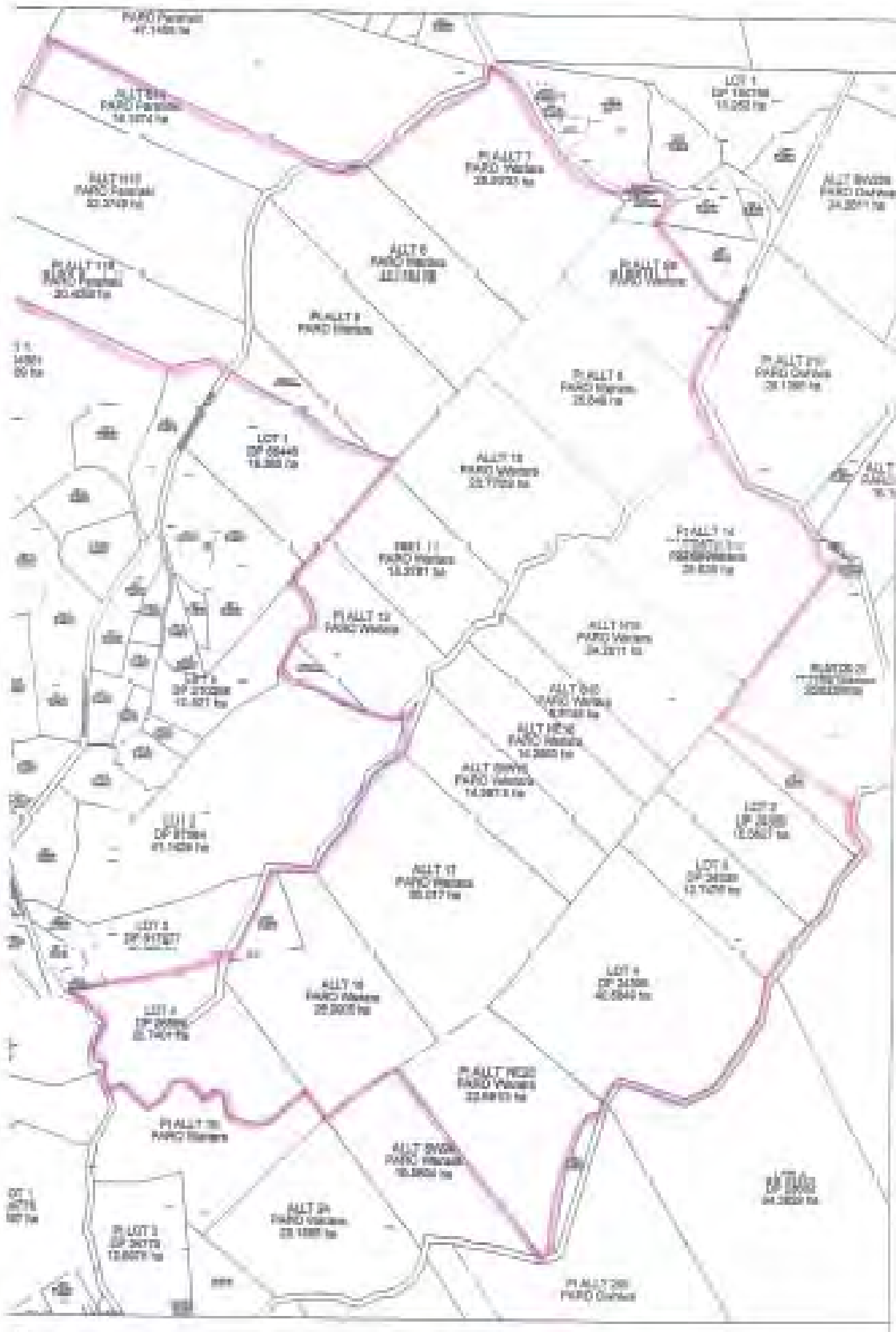
Map 2 - Legal area

Map 3 - Forest Map

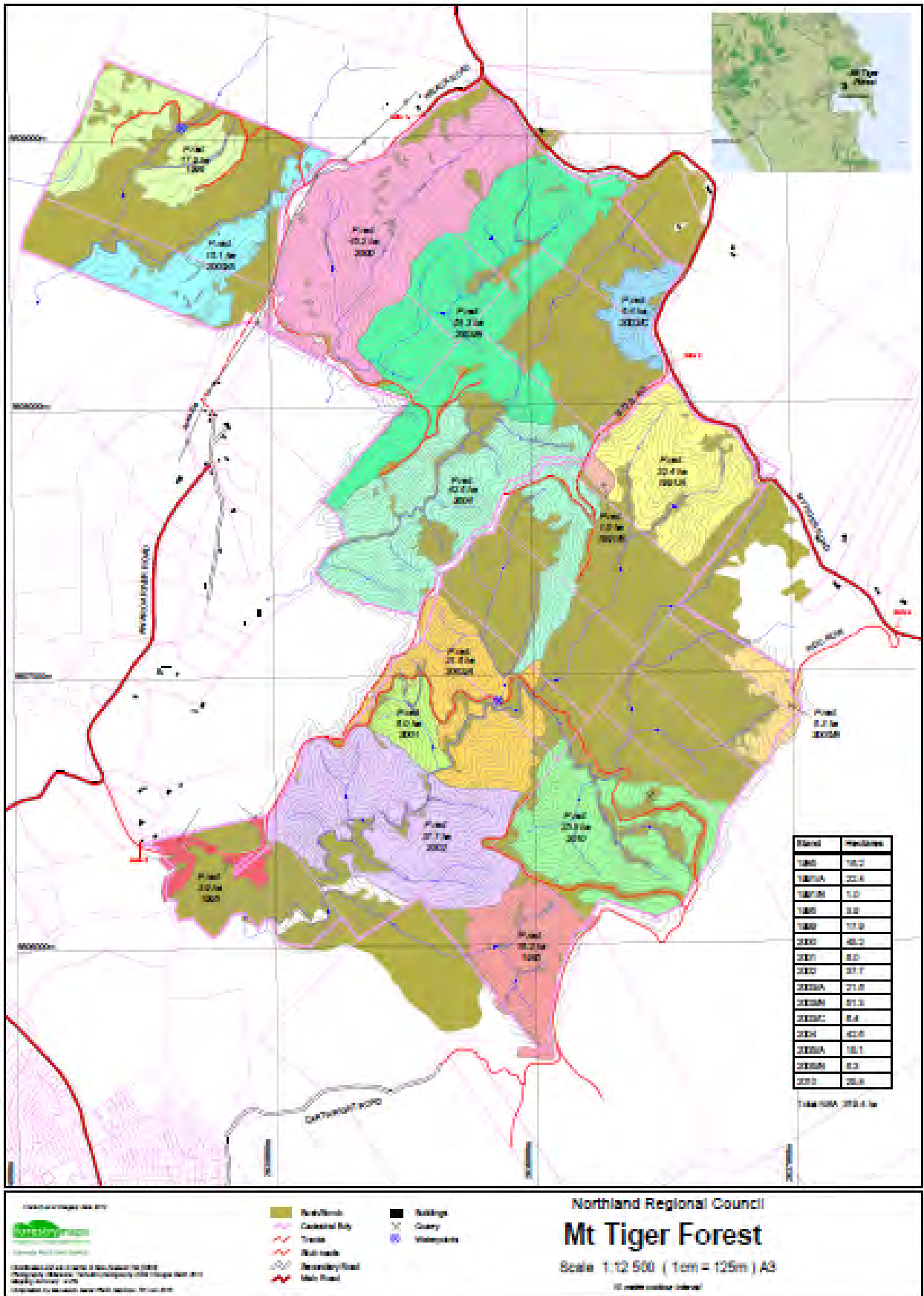
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APPENDIX 2

STAND RECORDS

draft



**NORTHLAND REGIONAL COUNCIL**  
**Mount Tiger Forest**

**Stand 1985**  
**Y.E. 1985**  
 Revised date **9-Mar-15**

Total Area (ha)	16.2	Topography/Logging	90% Hauler
Net stocked area (ha)	16.2	Soil type	Marua
Species	P.radiata	Site Index (radiata)	27 (estimate)
Rotation	1 st	Aspect	SW catchment, SW facing slopes
		Comments	

**ESTABLISHMENT RECORD**

Date	Operation	Planting (sph)	Tree stock	Comments
1985	Planting	1000	GF 17 seedlings	prescription information ex NK records

**PRUNING RECORD**

Date	Lift	Area treated (ha)	Total sph (sph)	Pruned sph (sph)	Av. Pr. Ht. (m)	Max.DOS (cm)	Residual sph (sph)	Comments
age 5	1st	17.0	740	400	2.4			prescription information ex NK records
age 7	2nd	17.0	400	375	4.2			prescription information ex NK records
Mar-94	3rd	17.0	370	300	6.0			NK report info

**THINNING RECORD**

Date	Type	Area treated (ha)	Stocking (sph)		Volume (m <sup>3</sup> /ha)	Comments
			Initial	Residual		
1990	waste	17.0	1000	400		prescription information ex NK records
1996	waste	17.0	400	300		NK report info

**TREE NUTRITION RECORD**

Date	Operation	Area treated (ha)	Foliage analysis result/application details				Comments
			N	P	K	Other	
1994	Foliar	17.0	low				NK report info
Nov-94	Fertiliser	17.0					450 kg/ha Urea applied
Apr-99	Foliar	17.0	low	low			NK report info
Jun-00	Fertiliser	17.0					450 kg/ha Urea and 390 kg/ha triple-super applied

**MEASUREMENT RECORD**

Date	Event	Percent sample	Number of plots	Stocking (sph)	B.A. (m <sup>2</sup> /ha)	MCH (m)	MTH (m)	DBH (cm)	Pr. Stock (sph)	Av.Pr.ht (m)	TSV (m <sup>3</sup> /ha)
2014/15 p	MARVL	2% min									
<b>Latest</b>	<b>0</b>	<b>0.00%</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

**NOTES**

Date	Remarks
Jun-05	Remapping onto GIS - 2003 photography - FPS - area change from 17 ha to now 15.29 ha
Jan-15	Remapping, ex ForestryMaps (old area 15.3 ha now updated)
2014/15 p	MARVL and Pre-harvest planning 12 months earlier - at age 29
2015/16 p	Provisionally planned for harvest at 30 years - Summer 2015/16 (2015 budget)



**NORTHLAND REGIONAL COUNCIL**  
**Mount Tiger Forest**

Stand 1991  
 Y.E. 1991

Revised date 9-Mar-15

Total Area (ha)	23.4	Topography/Logging	90 % Hauler
Net stocked area (ha)	23.4	Soil type	Waiohira
Species	P. radiata	Site Index (radiata)	28 (pr meas)
Rotation	1 st	Aspect	S catchment, SE/SW facing slopes
		Comments	

**ESTABLISHMENT RECORD**

Date	Operation	Planting (sph)	Tree stock	Comments
1991	Planting	1000	GF 17 seedlings	prescription information ex NK records
1991	Hand fertilise			NK records
Nov-91	Release			Spot spray Velpar - NK records
				Some follow up slasher releasing

**PRUNING RECORD**

Date	Lift	Area treated (ha)	Total sph (sph)	Pruned sph (sph)	Av. Pr. Ht. (m)	Max.DOS (cm)	Residual sph (sph)	Comments
mid 1996	1 st	24.9	400					NK report info - Stand cert 2181
Oct-98	2 nd	24.0	400					NK report info - Stand cert 2901
Oct-02	3rd	24.0	471	367	6.3	26.5	104	Late - NK <> PFO timing

**THINNING RECORD**

Date	Type	Area treated (ha)	Stocking (sph)		Volume (m <sup>3</sup> /ha)	Comments
			Initial	Residual		
Oct-98	Waste	24.9	1000	400		NK report info - prescription
Dec-03	Waste	24.9	471	327		PFO operation

**TREE NUTRITION RECORD**

Date	Operation	Area treated (ha)	Foliage analysis result/application details				Comments
			N	P	K	Other	
Apr-99	Foliar sample	23.4		low			NK report info
Jun-00	Fertiliser	24.9					390 kg/ha Triple-super applied
Mar-04	Foliar sample	24.9	1.9	0.206	1.055	Copper 3.8 ppm (marg)	All other nutrients are > satisfactory
Mar-07	Foliar sample	22.9	1.54	0.142	0.823	Copper 3.8 ppm (marg)	All other nutrients are > satisfactory

**MEASUREMENT RECORD**

Date	Event	Percent sample	Number of plots	Stocking (sph)	B.A. (m <sup>2</sup> /ha)	MCH (m)	MTH (m)	DBH (cm)	Pr. Stock (sph)	Av.Pr.ht (m)	TSV (m <sup>3</sup> /ha)
Oct-02	Final Prune	2.8%	11 @ 0.06	471	crop 24.9	15.5		crop 29.4	367	6.3	
Dec-03	Waste thin	2.6%	10 @ 0.06	327	26 gm est		17.1 gm est	31.8 gm est			
Mar-08	MRI	2.40%	12 @ 0.05	269	36.0		28.6	41.3	238	6.1	346
2018/19 p	MARVL	2% min									
Latest	MRI	2.4%	12 @ 0.05	269	36.0	0	28.6	41.3	238	6.1	346

**NOTES**

Date	Remarks
Oct-02	Pruning operation - managed by PFO (Kawakawa) - used NIFI at \$573/ha - supervn/mgmt \$86/ha
Dec-03	Thinning operation - managed by PFO (Kawakawa) - used NIFI at \$288/ha (inclusive of supervn/mgmt)
Dec-03	Area of 0.9 ha southern corner not Med pruned in Oct 98, not High pruned in Oct 02 and now thinned to 450 sph as structural area - called stand B
Mar-04	Foliar sampling PFO - all ok, some minor Copper others NPK are all good - \$450 collection & \$80 analysis
Jun-05	Remapping onto GIS - 2003 photography - FPS - area change from 24.9 ha to now 22.03 ha for A and 0.91 ha for B
Mar-08	MRI 1991 - 22.0 ha, 11 plots @ 0.05 ha, PLE 17.8%, Pruned sph 238 @ 6.1m, Total sph 269, TRV 297 (windthrow and stand gaps)
Mar-08	MRI 1991 - 0.9 ha, 1 plot @ 0.05 ha, PLE n/a, Not high Pruned area, sph 400 @ 4.2m, Total sph 540, TRV 470
Jan-15	Remapping, ex ForestryMaps (old area 22.9 ha now updated)
2018/19 p	MARVL and Pre-harvest planning 12 months earlier - at age 27
2018/19 p	Pre-harvest planning ?? at age 27



**NORTHLAND REGIONAL COUNCIL**  
**Mount Tiger Forest**

**Stand 1995**  
**Y.E. 1995**

Revised date **9-Mar-15**

Total Area (ha)		3.9	Topography/Logging	100 % ground based
Net stocked area (ha)		3.9	Soil type	Marua
Species		P.radiata	Site Index (radiata)	32 (pr meas)
Rotation		1 st	Aspect	S catchment, SE/SW facing slopes
			Comments	

**ESTABLISHMENT RECORD**

Date	Operation	Planting (sph)	Tree stock	Comments
1995	Planting	1000	GF 17 seedlings	prescription information ex NK records (6 ha planted ??, harvest road acces thru block99/00)
1995	Hand fertilise			NK records
Nov-95	Release			Spot spray Velpar - NK records
				Some follow up slasher releasing

**PRUNING RECORD**

Date	Lift	Area treated (ha)	Total sph (sph)	Pruned sph (sph)	Av. Pr. Ht. (m)	Max.DOS (cm)	Residual sph (sph)	Comments
Feb-01	1 st	3.5	700	700				NK report info
Mar-03	Final	3.3	717	333	6.8	21.6	384	PFO Operation

**THINNING RECORD**

Date	Type	Area treated (ha)	Stocking (sph)		Volume (m <sup>3</sup> /ha)	Comments
			Initial	Residual		
Dec-03	Final waste	3.5	717	342		PFO Operation

**TREE NUTRITION RECORD**

Date	Operation	Area treated (ha)	Foliage analysis result/application details				Comments
			N	P	K	Other	
Mar-07	Foliar sample	3	1.64	0.13	0.593	Copper 3.9 ppm	All other nutrients are > satisfactory

**MEASUREMENT RECORD**

Date	Event	Percent sample	Number of plots	Stocking (sph)	B.A. (m <sup>2</sup> /ha)	MCH (m)	MTH (m)	DBH (cm)	Pr. Stock (sph)	Av.Pr.ht (m)	TSV (m <sup>3</sup> /ha)
Mar-03	Final prune	3.6%	2 @ 0.06	717	crop 12.1	13.1		crop 21.5	333	6.8	
Dec-03	Waste thin	3.1%	2 @ 0.06	342	13.8 gm est		14.0 gm est	22.9 gm est			
2011/12 p	MRI	2.00%	3								
Latest	Waste thin	3.08%	2 @ 0.06	342	13.8 gm est	0	14.0 gm est	22.9 gm est	0	0	0

**NOTES**

Date	Remarks
Mar-03	Pruning operation - managed by PFO (Kawakawa) - used NIFI at \$532/ha (1.60/tree) , supervn/mgmt \$164/ha
Dec-03	Thinning operation - managed by PFO (Kawakawa) - used NIFI at \$300/ha (inclusive of supervn/mgmt)
Jun-05	Remapping onto GIS - 2003 photography - FPS - area change from 3.5 ha to now 3.02 ha
Jan-15	Remapping, ex ForestryMaps (old area 3.9 ha now updated)
2011/12 p	MRI



**NORTHLAND REGIONAL COUNCIL**  
**Mount Tiger Forest**

**Stand 1999**  
**Y.E. 1999**  
 Revised date **9-Mar-15**

Total Area (ha)	17.9	Topography/Logging	60% ground, 30 % Hauler
Net stocked area (ha)	17.9	Soil type	Waiohira
Species	P. radiata	Site Index (radiata)	28 (first rotation)
Rotation	2nd	Aspect	E faces and top flats
		Comments	

**ESTABLISHMENT RECORD**

Date	Operation	Planting (sph)	Tree stock	Comments
Jun-99	Pre-plant	n/a	n/a	don't know NK job
	Dessicant			
Jul-99	Planting	1000 target	GF19 Seedlings	Seedlot ?? ex Northland Forest Nursery Kerikeri (Strawbridge), NK order Total planting was ????. acceptable planting NK was ???sph (??%)
Jul-99	Hand Fertilise			NK report info - applied to selected areas
Dec-99	Release			NK job

**PRUNING RECORD**

Date	Lift	Area treated (ha)	Total sph (sph)	Pruned sph (sph)	Av. Pr. Ht. (m)	Max.DOS (cm)	Residual sph (sph)	Comments
Dec-04	0 - 3.6m	17.2 all	779	446	3.6	18.6	333	Overprune sph, but only paid 376 sph
Apr-07	3.6 - 6.0m	15.63 all	916	358	6	18.9	558	Overprune sph, but only paid 320 as a set fixed rate

**THINNING RECORD**

Date	Type	Area treated (ha)	Stocking (sph)		Volume (m³/ha)	Comments
			Initial	Residual		
Oct-07	waste	17.9	850	340		no basal area data collected

**TREE NUTRITION RECORD**

Date	Operation	Area treated (ha)	Foliage analysis result/application details				Comments
			N	P	K	Other	
Mar-09	Foliar	all	1.23%	0.164%	0.946%		All other nutrients are > satisfactory
Mar-12	Foliar resample	all	1.44%	0.156%	0.903%		All other nutrients are > satisfactory

**MEASUREMENT RECORD**

Date	Event	Percent sample	Number of plots	Stocking (sph)	B.A. (m²/ha)	MCH (m)	MTH (m)	DBH (cm)	Pr. Stock (sph)	Av.Pr.ht (m)	TSV (m³/ha)
Mar-00	Survival			(NK ?)							
Dec-04	Prune 1	2.70%	8	779	7.28	8.5		14.6	446	3.6	
Apr-07	Prune 2	3.07%	8 @ 0.06ha	917	10.54	11.9		19.6	358	6	
Oct-07	Thin	1.68%	5 @ 0.06 ha	340							
2015/16 p	MRI p	2.00%	9-10 plots								
Latest	Thin	2%	5 @ 0.06 ha	340							

**NOTES**

Date	Remarks
Jun-99	area is ex Rayonier contract planted in 1999
	MARVL at age 28grow had: 17.8 ha, 301 sph, 49.7 cm dbh, 37.6 mth, 58.4 ba, 612 m3/ha TRV , 23.8 % PLE (7 plots) Rayonier stumpage sale - Nov 1998
Jun-99	Preplant dessicant managed by NK
Jul-99	Planting managed by NK - tree stocks supply only @ \$???/1000 ex Strawbridge
Aug-99	Planting managed by NK used ??? (rate \$???/ha included plant, transport),
Nov-99	Spot chemical release - managed by NK used ??? (rate \$???/ha included application, chemical) ,
Mar-00	Survival assessment - NK was ???% survival (?? plots)
Dec-04	Pruning - NIFI , managed by PFO (Kawakawa) overprune sph 446 pruned but only 376 paid, 0.75c//metre inclusive of supervision
Jun-05	Remapping onto GIS - 2003 photography - FPS - area change from 17.8 ha to now 15.63 ha (central low sph area removed)
Apr-07	Pruning - NIFI , managed by PFO (Kawakawa) overprune sph 358 pruned but only eq 325 paid, \$770/ha fixed rate inclusive of supervision
Oct-07	Thinning - NIFI , managed by PFO (Kawakawa) , paid \$443/ha inclusive of supervision
Mar-09	Foliar sampling - NFM , standard sample - \$296 sample plus \$80 scion analysis
Mar-12	Foliar sampling - NFM , standard sample - \$176 sample plus \$80 scion analysis
Jan-15	Remapping, ex ForestryMaps (old area 15.6 ha now updated)
2015/16 p	MRI p



**NORTHLAND REGIONAL COUNCIL**  
**Mount Tiger Forest**

**Stand**                    **2000**  
**Y.E.**                        **2000**

Revised date **9-Mar-15**

Total Area (ha)	45.2
Net stocked area (ha)	45.2
Species	P. radiata
Rotation	2nd

Topography/Logging	90% Hauler
Soil type	Waiotira
Site Index (radiata)	27 (first rotation)
Aspect	S catchment, SE / NW faces
Comments	

**ESTABLISHMENT RECORD**

Date	Operation	Planting (sph)	Tree stock	Comments
Jun-00	Pre-plant	n/a	n/a	don't know NK job
Jul-00	Dessicant			
Jul-00	Planting	1000 target	GF19 Seedlings	Seedlot ?? ex Northland Forest Nursery Kerikeri (Strawbridge), NK order
Jul-00	Hand Fertilise			Total planting was ?????, acceptable planting NK was ???sph (??%)
Nov-00	Release			NK report info - applied to selected areas
Aug-02	Toppling			NK job
Nov-02	Release			Toppling correction and sail prune (NIFI) - 525 sph achieved sail prune
				Aerial release 5 ha gulleys - Skyworks (5kg velpar/ha in 150 l/ha water)

**PRUNING RECORD**

Date	Lift	Area treated (ha)	Total sph (sph)	Pruned sph (sph)	Av. Pr. Ht. (m)	Max. DOS (cm)	Residual sph (sph)	Comments
Dec05-Jan06	3.6	35.4	884	404	3.6	16.0	480	Overprune sph, but only paid 371 sph, regen in places
July-Oct 2008	6.1	35.4	670	367	6.1	18.3	303	Overprune sph, only paid 330 sph

**THINNING RECORD**

Date	Type	Area treated (ha)	Stocking (sph)		Volume (m <sup>3</sup> /ha)	Comments
			Initial	Residual		
Jul06-Aug06	Waste	35.4	884-1000	696		Light thin to remove regen and prevent overtopping of pruned stems
Apr-May 2009	Waste	35.4	670	345		Thin to waste - prescribed 350 max sph (320 + 10%)
Apr-May 2009	Waste	5.5	750	406		Thin to waste - prescribed 450 max. sph (400 + 10%) no basal area data collected

**TREE NUTRITION RECORD**

Date	Operation	Area treated (ha)	Foliage analysis result/application details				Comments
			N	P	K	Other	
Mar-11	Foliar	all	1.53%	0.149%	0.902%		All other nutrients are > satisfactory
Mar-13	Foliar resample	all	1.41%	0.123%	0.840%		All other nutrients are > satisfactory, CU 3.2 marginal

**MEASUREMENT RECORD**

Date	Event	Percent sample	Number of plots	Stocking (sph) (NK ?)	B. A. (m <sup>2</sup> /ha)	MCH (m)	MTH (m)	DBH (cm)	Pr. Stock (sph)	Av.Pr.ht (m)	TSV (m <sup>3</sup> /ha)
Mar-01	Survival										
Dec05-Jan06	Prune	2.70%	16	884	5.8 crop	8.8		13.7 crop	404	3.6	
Jul06-Aug06	Waste thin	2.50%	15	696							
July-Oct 2008	Prune	2.70%	16	670	11.0 crop	13.2		19.6 crop	367	6.1	
Apr-May 2009	Waste thin 35.4	1.90%	11	345							
Apr-May 2009	Waste thin 5.5	3.30%	3	406							
2016/17 p	MRI p	2.00%	15-18 plots								
Latest	Waste thin 35.4	1.90%	11	345							
Latest	Waste thin 5.5	3.30%	3	406							

**NOTES**

Date	Remarks
Jun-00	area is ex SNL AND FCF contracts planted in 2000
	North 1971/A MARVL at age 28 grow had: 31.0 ha, 258 sph, 48.6 cm dbh, 34.5 mth, 47.8 ba, 497 m <sup>3</sup> /ha TRV, 14.6% PLE (15 plots) SNL stumpage sale - May 1999
	South 1971/B MARVL at age 28 had: 16.9 ha, 285 sph, 50.2 cm dbh, 37.6 mth, 56.4 ba, 613 m <sup>3</sup> /ha TRV, 17.3% PLE (11 plots) FCF stumpage sale - Oct 1999
Jun-00	Preplant dessicant managed by NK
Jul-00	Planting managed by NK - tree stocks supply only @ \$???/1000 ex Strawbridge
Aug-00	Planting managed by NK used ??? (rate \$???/ha included plant, transport),
Nov-00	Spot chemical release - managed by NK used ??? (rate \$???/ha included application, chemical)
Mar-01	Survival assessment - NK was ??? survival (?? plots)
Aug-02	Toppling correction - managed by PFO (Kawakawa) - used NIFI \$21.5/hr and rate \$0.22/tree = \$292/ha op (PFO 10@ 0.04 ha plots) \$44/ha
Nov-02	Aerial release (gulleys) - managed by PFO (Kawakawa) 5 ha at \$571/ha(chemical & application), supervn/mgmt \$42/ha
Jun-05	Remapping onto GIS - 2003 photography - FPS - area change from 45 ha to now 45.21 ha (but still planting estimate)
Oct-05	Remapped - flown by Tower (\$400 incl 1999 area, interpret IJ, GIS update Gover @ FPS - area change from 45.21 now 40.897 plus 4.559 failed areas
Dec05-Jan06	Pruning - NIFI, managed by PFO (Kawakawa) overprune sph 404 pruned but only 371 paid, 0.75c/l/metre inclusive of supervision.
Feb-06	Top of stand (Wrack end @ 5.5 ha, line from gate 1 to NE bush) is now relegated to framing regime
Jul06-Aug06	Waste thin - NIFI, managed by PFO (Kawakawa) 1st thin (regen reduction) 880 to 696, \$293/ha contract, \$44/ha sup.
July-Oct 2008	Pruning - SILVICULTURAL CONTRACTORS, managed by PFO (Kawakawa) overprune sph 367 pruned but only 330 paid, 2.48/tree inclusive of supervision.
Apr -May 2009	Thinning - SILVICULTURAL CONTRACTORS, managed by PFO (Kawakawa) thin \$383/ha (35.4) and \$500/ha (5.5) plus 17.5% supervision.
Mar-11	Foliar sampling - NFM - field collections costs (with thin) sample plus \$80 Scion analysis
Mar-13	Foliar sampling - NFM - standard sample - \$609 (2000/01/02, 6.87/ha) sample plus \$80 scion analysis
Jan-15	Remapping, ex ForestryMaps (old area 40.9 ha now updated)
2016/17 p	MRI p





**NORTHLAND REGIONAL COUNCIL**  
**Mount Tiger Forest**

**Stand 2001**  
**Y.E. 2001**  
Revised date **9-Mar-15**

Total Area (ha)	6.0
Net stocked area (ha)	6.0
Species	P. radiata
Rotation	2nd

Topography/Logging	100% Hauler
Soil type	Te Ranga / Waitotira
Site Index (radiata)	27 (first rotation)
Aspect	SE catchment
Comments	

**ESTABLISHMENT RECORD**

Date	Operation	Planting (sph)	Tree stock	Comments
Jun-01	Pre-plant	n/a	n/a	don't know NK job
	Dessicant			
Jul-01	Planting	1000 target	GF19 Seedlings	Seedlot ?? ex Northland Forest Nursery Kerikeri (Strawbridge), NK order Total planting was ????, acceptable planting NK was ???sph (??%)
Nov-01	Release			NK job
Nov-02	Release			Aerial release - Skyworks (5kg velpar/ha in 150 l/ha water)

**PRUNING RECORD**

Date	Lift	Area treated (ha)	Total sph (sph)	Pruned sph (sph)	Av. Pr. Ht. (m)	Max.DOS (cm)	Residual sph (sph)	Comments
<i>relegate to framing regime - heavy gorse, gappy and small area</i>								

**THINNING RECORD**

Date	Type	Area treated (ha)	Stocking (sph) Initial	Stocking (sph) Residual	Volume (m <sup>3</sup> /ha)	Comments
May-11	waste	all	850	380		Deferred in 2008/09 to do with 2002 area Thin to waste - prescribed 400 max sph (400 + 10%)

**TREE NUTRITION RECORD**

Date	Operation	Area treated (ha)	Foliage analysis result/application details				Comments
			N	P	K	Other	
Mar-13	Foliar sample	all	1.51%	0.113%	1.092%		All other nutrients are > satisfactory
2014/15p	Foliar resample						
2014/15p	Fert	all ??	y	y			contingency - subject to foliar

**MEASUREMENT RECORD**

Date	Event	Percent sample	Number of plots	Stocking (sph) (NK ?)	B.A. (m <sup>2</sup> /ha)	MCH (m)	MTH (m)	DBH (cm)	Pr. Stock (sph)	Av.Pr.ht (m)	TSV (m <sup>3</sup> /ha)
Mar-02	Survival			(NK ?)							
May-11	Thin	2.45%	3	380	15.52 crop	15.1 crop		22.4 crop	nil	nil	
2018/19 p	MRI p	2.00%	3 - 4 plots								
Latest	Thin	2.45%	3	380	15.52 crop	15.1 crop	0	22.4 crop	nil	nil	0

**NOTES**

Date	Remarks
Jun-01	area is ex CHHFS contract 1972/A&B planted in 2001
	west 1972/A MARVL at age 28 had: 28.4 ha, 411 sph, 42.4 cm dbh, 34.7 mth, 58.0 ba, 579 m3/ha TRV , 10.4% PLE (24 plots)
Jun-01	Preplant dessicant managed by NK
Jul-01	Planting managed by NK - tree stocks supply only @ \$???/1000 ex Strawbridge
Aug-01	Planting managed by NK used ??? (rate \$???/ha included plant, transport),
Nov-01	Spot chemical release - managed by NK used ??? (rate \$??/ha included application, chemical) ,
Mar-02	Survival assessment - NK was ??? survival (?? plots)
Nov-02	Aerial release (gorse) - managed by PFO (Kawakawa) 9 ha at \$571/ha(chemical & application) , supervn/mgmt \$42/ha
Jun-05	Remapping onto GIS - 2003 photography - FPS - area change from 9 ha to now 6.13 ha (but still planting estimate)
May-11	Waste thin - SILVICULTURAL CONTRACTORS , managed by NFM (Kerikeri) thin @ \$500/ha , supervision \$35/ha
Mar-13	Foliar sampling - NFM , standard sample - \$609 (2000/01/02 , 6.87/ha) sample plus \$80 scion analysis
Jan-15	Remapping, ex ForestryMaps (old area 6.1 ha now updated)
2014/15p	Foliar resample Mar 15
2018/19 p	MRI p



**NORTHLAND REGIONAL COUNCIL**  
**Mount Tiger Forest**

**Stand**                    **2002**  
**Y.E.**                        **2002**

Revised date                    9-Mar-15

Total Area (ha)	37.7
Net stocked area (ha)	37.7
Species	P.radiata
Rotation	2nd

Topography/Logging	90% Hauler
Soil type	Te Ranga / Waioira / Marua
Site Index (radiata)	27 (first rotation)
Aspect	NW / SE steep faces
Comments	

**ESTABLISHMENT RECORD**

Date	Operation	Planting (sph)	Tree stock	Comments
Jul-02	Pre-plant	n/a	n/a	Skywork Helicopters ( 8 l Glyphosphate450 and 500 mls organosilicone) on 10 ha south
	Dessicant			
Aug-02	Planting	1080	GF19 Seedlings	Seedlot ?? ex Northland Forest Nursery Kerikeri (Strawbridge), NK order
				Total planting was 1080 ,acceptable planting PFO was 1043 sph (96%)
Nov-02	Release			Spot release with Vaizine 500 (20 l/ha, 2.4l Val in 20l & dye, 25mls on 1.54 spot)
Nov-03	Release			Slasher release approx 6-8 ha

**PRUNING RECORD**

Date	Lift	Area treated (ha)	Total sph (sph)	Pruned sph (sph)	Av. Pr. Ht. (m)	Max.DOS (cm)	Residual sph (sph)	Comments
Mar 08 - May 08	4	all	776	388	4.0	18.4	389	Overprune sph, but only paid 363 sph, regen in places
Apr 10 - Sept 2010	4-6 m	all plus 1 ha	854	349	6.1	17.5	505	Overprune sph, but only paid 330 sph, regen in places the 2003/A area (1 ha) in 2002 is being treated with 2002

**THINNING RECORD**

Date	Type	Area treated (ha)	Stocking (sph)	Volume (m <sup>3</sup> /ha)	Comments
			Initial	Residual	
May-11	waste	all	850	339	Thin to waste - prescribed 300 max sph (300 + 10%) the 2003/A area (1 ha) in 2002 is being treated with 2002

**TREE NUTRITION RECORD**

Date	Operation	Area treated (ha)	Foliage analysis result/application details				Comments
			N	P	K	Other	
Mar-13	Foliar sample	all	1.32%	0.121%	0.773%		All other nutrients are > satisfactory
2014/15p	Fert	all ??	y	y			contingency - subject to foliar

**MEASUREMENT RECORD**

Date	Event	Percent sample	Number of plots	Stocking (sph)	B.A. (m <sup>2</sup> /ha)	MCH (m)	MTH (m)	DBH (cm)	Pr. Stock (sph)	Av.Pr.ht (m)	TSV (m <sup>3</sup> /ha)
Mar-03	Survival			1024							
Mar 08 - May 08	Prune	3%	19	776	6.9 crop	8.7		15	388	4.0	
Apr 10 - Sept 2010	Prune	2.8	18	854	9.85 crop	12.7		19.1 crop	349	6.1	
May-11	Thin	2.10%	16	339	10.26 crop	14.0 crop		19.4 crop	335		
2018/19 p	MRI p	2.00%	15 - 18 plots								
Latest	Thin	2.10%	16	339	10.26 crop	14.0 crop	0	19.4 crop	335	6.1	

**NOTES**

Date	Remarks
Jun-02	area is ex CHIFS contract 1972/A&B planted in 2002
	west 1972/A MARVL at age 28 had: 28.4 ha, 411 sph, 42.4 cm dbh, 34.7 mth, 58.0 ba, 579 m <sup>3</sup> /ha TRV , 10.4% PLE (24 plots)
	east 1972/B MARVL at age 28 had: 37.6 ha, 383 sph, 45.0 cm dbh, 33.6 mth, 60.9 ba, 612 m <sup>3</sup> /ha TRV , 8.4% PLE (24 plots)
Jul-02	Preplant dessicant managed by PFO - 10 ha (south side) @ \$200/ha (included application, chemical, supervision) , mgmt \$15/ha
Aug-02	Planting managed by PFO (Kawakawa) tree stocks supply only @ \$198/1000 ex Strawbridge Kerikeri, original NK order
Aug-02	Planting managed by PFO (Kawakawa) used NIFI (rate \$280/ha included plant, transport), Supervn/mgmt \$44/ha
Nov-02	Spot chemical release - managed by PFO (Kawakawa) used NIFI (rate \$159/ha included application, chemical) , Supervn/mgmt \$21/ha
Mar-03	Survival assessment - PFO was 94.8 % survival (42 plots)
Nov-03	Slasher release part \$1680, approx 8 ha - managed by PFO (Kawakawa)
Jun-05	Remapping onto GIS - 2003 photography - FPS - area change from 37.5 ha to now 37.37 ha (but still planting estimate)
Mar 08 - May 08	Pruning - NIFI, managed by PFO (Kawakawa) overprune sph 388 pruned but only 363 paid, 0.86c/l/metre inclusive of supervision.
Apr 10 - Sept 2010	Pruning - SILVICULTURAL CONTRACTORS , managed by PFO (Kawakawa) overprune sph 349 pruned but only 330 paid, 1.70/tree (+20% supervision).
May-11	Waste thin - SILVICULTURAL CONTRACTORS , managed by NFM (Kerikeri) thin @ \$500/ha , supervision \$35/ha
	Note - the 1 ha of 2003 within the 2002 stand was treated also.
Mar-13	Foliar sampling - NFM , standard sample - \$609 (2000/01/02, 6.87/ha) sample plus \$80 scion analysis
Jan-15	Remapping, ex ForestryMaps (old area 37.4 ha now updated)
2014/15p	Fert
2018/19 p	MRI p



**NORTHLAND REGIONAL COUNCIL**  
**Mount Tiger Forest**

**Stand 2003A**  
**Y.E. 2003**

Revised date **9-Mar-15**

Total Area (ha)	21.6
Net stocked area (ha)	21.6
Species	P. radiata
Rotation	2nd

Topography/Logging	100% Hauler
Soil type	Te Ranga / Manua
Site Index (radiata)	26 (first rotation)
Aspect	NW/SE steep faces
Comments	

**ESTABLISHMENT RECORD**

Date	Operation	Planting (sph)	Tree stock	Comments
Jun-03	Pre-plant	n/a	n/a	Skywork Helicopters ( 9 l Glyphosphate450 and 500 mls organosilicone) 68 ha total
	Dessicant			
Aug-03	Planting	890	GF25 cuttings	Seedlot 00/954 ex CHHFS Kaikohe (Horizon) Acceptable planting PFO was 836 sph (94%)
Nov-03	Release			Spot release with Valzine extra (20 l/ha, 2.5l Val in 20l & 300 mls dye, 25mls on 1.54 spot) <b>NOTE- this area and 2003B were established under 1 contract</b>

**PRUNING RECORD**

Date	Lift	Area treated (ha)	Total sph (sph)	Pruned sph (sph)	Av. Pr. Ht. (m)	Max.DOS (cm)	Residual sph (sph)	Comments
Feb-Apr 09	0-3.5 prune	19	972	377	3.8	18.8	595	Overprune sph, but only paid 351 sph, regen in places, gaps (2.9 ha)not pruned
Feb- Mar 11	3.7-6.0m prune	17.6 all	1058	294	6.2	19	737	Pruned 321, some over, but 294 paid only the 2003 area (1 ha) in 2002 is being treated with 2002

**THINNING RECORD**

Date	Type	Area treated (ha)	Stocking (sph) Initial	Stocking (sph) Residual	Volume (m³/ha)	Comments
Nov 11 - Feb 12	waste 17.6CW	17.6	850	333		Thin to waste - prescribed 300 max sph (300 + 10%) 2003A and B treated together
Nov 11 - Feb 12	waste 3.4FR	3.4	850	380		Thin to waste as a framing regime - prescribed 400 sph (400-450) - 2003A and B treated together the 2003 area (1 ha) in 2002 is being treated with 2002

**TREE NUTRITION RECORD**

Date	Operation	Area treated (ha)	Foliage analysis result/application details				Comments
			N	P	K	Other	
Mar-14	Foliar sample	all	1.43%	0.108%	0.634%		All other nutrients are >= satisfactory (Cu, B & Mg marg.)
2015/16p	Foliar resample						
2015/16p	Fert	all ??	y	y			contingency - subject to foliar

**MEASUREMENT RECORD**

Date	Event	Percent sample	Number of plots	Stocking (sph)	B.A. (m²/ha)	MCH (m)	MTH (m)	DBH (cm)	Pr. Stock (sph)	Av.Pr.ht (m)	TSV (m³/ha)
Mar-04	Survival			805							
Feb-Apr 09	0-3.5 prune	3.15%	10	972	4.6 crop	9.6		15.9 crop	377	3.8	
Feb- Mar 11	Prune	1.90%	26	1058	8.07 crop	12.8		17.7 crop	321	6.2	
Nov 11 - Feb 12	waste 17.6CW	1.60%	22	333	10.32	14.5		19.4	300		2003A and B treated together
Nov 11 - Feb 12	waste 3.4FR	3.50%	3	380	13.75	13.2		20.6	0		2003A and B treated together
2019/20 p	MRI p	2.00%	8-10 plots								
Latest	Prune	1.9%	26	1058	8.07 crop	12.8		17.7 crop	321	6.2	

**NOTES**

Date	Remarks
Jun-03	area is ex CHHFS contract 1972/A&B planted in 2003 (in combination/same contract as 2003B) 1972/B MARVL at age 28 had: 37.6 ha, 383 sph, 45.0 cm dbh, 33.6 mth, 60.9 ba, 612 m³/ha TRV , 8.4% PLE (24 plots)
Jul-03	Preplant dessicant managed by PFO - \$174/ha (included application, chemical, supervision) , mgmt \$10/ha
Aug-03	Planting managed by PFO (Kawakawa) tree stocks supply only @ \$395/1000 ex Horizon Kaikohe
Aug-03	Planting managed by PFO (Kawakawa) used NIFI (rate \$288/ha included plant, transport & supervision), mgmt \$15/ha
Nov-03	Spot chemical release - managed by PFO (Kawakawa) used NIFI (rate \$220/ha included application, chemical, supervision) , mgmt \$7/ha
Mar-04	Survival assessment - PFO and CFK - (138 plots) was 90.6 % survival (drought - dry Jan-Mar )
Jun-05	Remapping onto GIS - 2003 photography - FPS - area change from 19.9 ha to now 22.93 ha (but still planting estimate)
Feb-Apr 09	Pruning - SILVICULTURAL CONTRACTORS , managed by PFO (Kawakawa) overprune sph 377 pruned but only 351 paid, 2.58/tree + 17.5% supervision.
Feb - Mar 11	Pruning - SILVICULTURAL CONTRACTORS , managed by NFM (Kerikeri) overprune sph 321 pruned but only 294 paid, 2.10/tree + 73.50/ha supervision.
Nov 11 - Feb 12	Waste thin - FPS CONTRACTORS , managed by NFM (Kerikeri) thin @ \$340/ha CW and \$320ha FR (v good rate) , supervision \$35/ha
Mar-14	Foliar sampling - NFM , standard sample - \$631.51 (2003 A, B C , 7.72/ha) sample plus \$240 scion analysis (\$80/sample)
Jan-15	Remapping, ex ForestryMaps (old area 22.9 ha now updated)
2015/16p	Foliar resample
2019/20 p	MRI p



**NORTHLAND REGIONAL COUNCIL**  
**Mount Tiger Forest**

**Stand** 2003B  
**Y.E.** 2003

Revised date 9-Mar-15

Total Area (ha)		51.3	Topography/Logging	85% Hauler
Net stocked area (ha)		51.3	Soil type	predom Waitotira
Species		P. radiata	Site Index (radiata)	27 (first rotation)
Rotation		2nd	Aspect	NW/SE steep faces, flat on Mt Tiger
			Comments	

**ESTABLISHMENT RECORD**

Date	Operation	Planting (sph)	Tree stock	Comments
Jun-03	Pre-plant	n/a	n/a	Skywork Helicopters ( 9 l Glyphosphate450 and 500 mls organosilicone) - 68 ha total
	Desiccant			
Aug-03	Planting	890	GF25 cuttings	Seedlot 00/954 ex CHHFS Kaikohe (Horizon)
				Acceptable planting PFO was 836 sph (94%)
Nov-03	Release			Spot release with Valzane extra (20 l/ha, 2.5l Val in 20l & 300 mls dye, 25mls on 1.54 spot)
				NOTE- this area and 2003A were established under 1 contract

**PRUNING RECORD**

Date	Lift	Area treated (ha)	Total sph (sph)	Pruned sph (sph)	Av. Pr. Ht. (m)	Max.DOS (cm)	Residual sph (sph)	Comments
Feb-Apr 09	0-3.5 prune	51.1	646	371	3.7	18.5	275	Overprune sph, but only paid 351 sph, regen in places, gaps (1.8 ha) not pruned
Feb- Mar 11	3.7-6.0m prune	51.1	1058	321	6.2	19	737	Pruned 321, some over, but 294 paid only

**THINNING RECORD**

Date	Type	Area treated (ha)	Stocking (sph)		Volume (m <sup>3</sup> /ha)	Comments
			Initial	Residual		
Nov 11 - Feb 12	waste 51.1 CW	51.1	850	333		Thin to waste - prescribed 300 max sph (300 + 10%) 2003A and B treated together
Nov 11 - Feb 12	waste 0.8 FR	0.8	850	380		Thin to waste as a framing regime - prescribed 400 sph (400-450) - 2003A and B treated together

**TREE NUTRITION RECORD**

Date	Operation	Area treated (ha)	Foliage analysis result/application details				Comments
			N	P	K	Other	
Mar-14	Foliar sample	all	1.42%	0.122%	0.784%		All other nutrients are >= satisfactory (Cu, marg.)
2015/16p	Foliar resample						
2015/16p	Fert	all ??	y	y			contingency - subject to foliar

**MEASUREMENT RECORD**

Date	Event	Percent sample	Number of plots	Stocking (sph)	B.A. (m <sup>2</sup> /ha)	MCH (m)	MTH (m)	DBH (cm)	Pr. Stock (sph)	Av.Pr.ht (m)	TSV (m <sup>3</sup> /ha)
Mar-04	Survival			805							
Feb-Apr 09	0-3.5 prune	2.00%	17	646	6.8 crop	9.1		15.3 crop	371	3.7	
Feb- Mar 11	Prune	1.90%	26	1058	8.07 crop	12.8		17.7 crop	321	6.2	
Nov 11 - Feb 12	waste 51.1CW	1.60%	22	333	10.32	14.5		19.4	300		2003A and B treated together
Nov 11 - Feb 12	waste 0.8FR	3.50%	3	380	13.75	13.2		20.6	0		2003A and B treated together
2019/20 p	MRI p	2.00%	18-20 plots								
Latest	Prune	0.019	26	1058	8.07 crop	12.8	0	17.7 crop	321	6.2	

**NOTES**

Date	Remarks
Jun-03	area is ex SNL contract 1973/A planted in 2003 (in combination/same contract as 2003A)
Jul-03	1973/A MARVL at age 28 had: 44.7 ha, 347 sph, 45.2 cm dbh, 35.1 mib, 55.8 ba, 534 m <sup>3</sup> /ha TRV 9.3% PLE (24 plots)
Aug-03	Preplant desiccant managed by PFO - \$174/ha (included application, chemical, supervision) , mgmt \$10/ha
Aug-03	Planting managed by PFO (Kawakawa) tree stocks supply only @ \$395/1000 ex Horizon Kaikohe
Nov-03	Planting managed by PFO (Kawakawa) used NIFI (rate \$288/ha included plant, transport & supervision), mgmt \$15/ha
Nov-03	Spot chemical release - managed by PFO (Kawakawa) used NIFI (rate \$220/ha included application, chemical, supervision) , mgmt \$7/ha
Mar-04	Survival assessment - PFO and CFK - (138 plots) was 90.6 % survival (drought - dry Jan-Mar)
Jun-05	Remapping onto GIS - 2003 photography - FPS - area change from 53.8 ha to now 58.93 ha (but still planting estimate)
Feb-Apr 09	Pruning - SILVICULTURAL CONTRACTORS - managed by PFO (Kawakawa) overprune sph 371 pruned but only 351 paid, 2.58/tree +17.5% supervision.
Feb - Mar 11	Pruning - SILVICULTURAL CONTRACTORS - managed by NFM (Kerikeri) overprune sph 321 pruned but only 294 paid, 2.10/tree + 73.50/ha supervision.
Nov 11 - Feb 12	Waste thin - FPS CONTRACTORS - managed by NFM (Kerikeri) thin @ \$340/ha CW and \$320/ha FR (v good rate) - supervision \$35/ha
Mar-14	Foliar sampling - NFM - standard sample - \$631.51 (2003 A, B C , 7.72/ha) sample plus \$240 scion analysis (\$80/sample)
Jan-15	Remapping, ex ForestryMaps (old area 52.9 ha now updated)
2015/16p	Foliar sample Mar-16
2019/20 p	MRI p



**NORTHLAND REGIONAL COUNCIL**  
**Mount Tiger Forest**

**Stand 2003C**  
**Y.E. 2003**

Revised date **9-Mar-15**

Total Area (ha)	6.4
Net stocked area (ha)	6.4
Species	P. radiata
Rotation	2nd

Topography/Logging	85% Hauler
Soil type	predom Waiotira
Site Index (radiata)	27 (first rotation)
Aspect	NW/SE steep faces, flat on Mt Tiger
Comments	

**ESTABLISHMENT RECORD**

Date	Operation	Planting (sph)	Tree stock	Comments
Jun-03	Pre-plant	n/a	n/a	Skywork Helicopters ( 9 l Glyphosphate450 and 500 mls organosilicone) - 68 ha total
	Dessicant			
Aug-03	Planting	890	GF25 cuttings	Seedlot 00/954 ex CHHFS Kaikohe (Horizon) Acceptable planting PFO was 836 sph (94%)
Nov-03	Release			Spot release with Valzine extra (20 l/ha, 2.5l Val in 20l & 300 mls dye, 25mls on 1.54 spot) NOTE- this area and 2003A were established under 1 contract

**PRUNING RECORD**

Date	Lift	Area treated (ha)	Total sph (sph)	Pruned sph (sph)	Av. Pr. Ht. (m)	Max.DOS (cm)	Residual sph (sph)	Comments
								Decided Feb 2009 to relegate to FRAME regime

**THINNING RECORD**

Date	Type	Area treated (ha)	Stocking (sph)	Volume (m³/ha)	Comments
			Initial	Residual	
Nov 11 - Feb 12	waste	all	850	390	Thin to waste as a framing regime - prescribed 400 sph (400-450)

**TREE NUTRITION RECORD**

Date	Operation	Area treated (ha)	Foliage analysis result/application details				Comments
			N	P	K	Other	
Mar-14	Foliar sample	all	1.39%	0.117%	0.877%		All other nutrients are >= satisfactory (Mg & Cu marg.)
2015/16p	Foliar resample						
2015/16p	Fert	all ??	y	y			contingency- subject to foliar

**MEASUREMENT RECORD**

Date	Event	Percent sample	Number of plots	Stocking (sph)	B.A. (m²/ha)	MCH (m)	MTH (m)	DBH (cm)	Pr. Stock (sph)	Av.Pr.ht (m)	TSV (m³/ha)
Mar-04	Survival			805							
Nov 11 - Feb 12	Thin	3.30%	4	390	13.05	11.3		20.0			
2019/20 p	MRI p	2.00%	3 plots								
Latest			4	805	0	0	0	0	0	0	0

**NOTES**

Date	Remarks
Jun-03	area is ex SNL contract 1973/A planted in 2003 (in combination/same contract as 2003A)
	1973/A MARVL at age 28 had: 44.7 ha, 347 sph, 45.2 cm dbh, 35.1 mth, 55.8 ba, 534 m³/ha TRV 9.3% PLE (24 plots)
Jul-03	Preplant dessicant managed by PFO - \$174/ha (included application, chemical, supervision) , mgmt \$10/ha
Aug-03	Planting managed by PFO (Kawakawa) tree stocks supply only @ \$395/1000 ex Horizon Kaikohe
Aug-03	Planting managed by PFO (Kawakawa) used NIFI (rate \$288/ha included plant, transport & supervision), mgmt \$15/ha
Nov-03	Spot chemical release - managed by PFO (Kawakawa) used NIFI (rate \$220/ha included application, chemical, supervision) , mgmt \$7/ha
Mar-04	Survival assessment - PFO and CFK - (138 plots) was 90.5 % survival (drought - dry Jan-Mar)
Jun-05	Remapping onto GIS - 2003 photography - FPS - area change from 53.8 ha to now 58.93 ha (but still planting estimate)
Nov 11 - Feb 12	Waste thin - FPS CONTRACTORS , managed by NFM (Kenkeri) thin @ \$340/ha (v good rate) , supervision \$35/ha
Mar-14	Foliar sampling - NFM , standard sample - \$631.51 (2003 A, B C , 7.72/ha) sample plus \$240 scion analysis (\$80/sample)
Jan-15	Remapping, ex ForestryMaps (old area 6.0 ha now updated)
2015/16p	Foliar resample
2019/20 p	MRI p



**NORTHLAND REGIONAL COUNCIL**  
**Mount Tiger Forest**

**Stand** 2004  
**Y.E.** 2004

Revised date 9-Mar-15

Total Area (ha)	42.6
Net stocked area (ha)	42.6
Species	P. radiata
Rotation	2nd

Topography/Logging	90% Hauler
Soil type	Te Ranga / Waiotira / Marua
Site Index (radiata)	27 (first rotation)
Aspect	NW /SE steep faces
Comments	

**ESTABLISHMENT RECORD**

Date	Operation	Planting (sph)	Tree stock	Comments
Jun-04	Pre-plant	n/a	n/a	Northland Helicopters ( 6 l Glyphosphate 510 & 100 gms meturon, 500 mls organo)
Jul-04	Dessicant Planting	881	GF25 cuttings	Seedlot 00/954 ex CHHFS Kaikohe (Horizon) Acceptable planting PFO was 848 sph (96%)
Dec-04	Release	12 ha only	western side - via Wrack	Spot release with Valzine 500 (15/ha, 1.9 l Val in 17.75l 350 mls dye, on 1.54 spot) & Liberate
Jan-05	Release	31.3 residual	rest of area	Spot release remainder (as above - Liberate 20/ha, 2.4l Lib in 17.75l 350dye, on 1.54 spot)

**PRUNING RECORD**

Date	Lift	Area treated (ha)	Total sph (sph)	Pruned sph (sph)	Av. Pr. Ht. (m)	Max.DOS (cm)	Residual sph (sph)	Comments
								Decided Feb 2009 to relegate to FRAME regime

**THINNING RECORD**

Date	Type	Area treated (ha)	Stocking (sph)		Volume (m <sup>3</sup> /ha)	Comments
			Initial	Residual		
Feb 13- Mar 13	Waste 45.3 ha	45.3	a. 850	419		Thin to waste as a framing regime - prescribed 400 sph (400-450) - all as one

**TREE NUTRITION RECORD**

Date	Operation	Area treated (ha)	Foliage analysis result/application details				Comments
			N	P	K	Other	
2014/15 p	Foliar sample	all					see standard sample contingency - subject to issue
2014/15 p	Post	all FR					
2016/17 p	Foliar resample	all					

**MEASUREMENT RECORD**

Date	Event	Percent sample	Number of plots	Stocking (sph)	B. A. (m <sup>2</sup> /ha)	MCH (m)	MTH (m)	DBH (cm)	Pr. Stock (sph)	Av.Pr.ht (m)	TSV (m <sup>3</sup> /ha)
Apr-05	Survival		76	747							
Feb 13- Mar 13	waste 45.3FR	1.99%	18	419	12.99	13.7		19.4	0	0	all as one
2020/21 p	MRI p	2.00%	18-20 plots								
Latest	waste 45.3FR		18	419	12.99	13.7	0	19.4	0	0	all as one

**NOTES**

Date	Remarks
Jun-04	area is ex SNL contract 1973/B planted in 2004
	1973/B MARVL at age 29 had: 57.5 ha, 332 sph, 46.5 cm dbh, 32.2 mth, 56.4 ba, 489 m <sup>3</sup> /ha TRV 10.1% PLE (26 plots)
Jun-04	Preplant dessicant managed by PFO - \$175/ha (included application, chemical, supervision) , mgmt \$15/ha
Jul-04	Planting managed by PFO (Kawakawa) tree stocks supply only @ \$400/1000 ex Horizon Kaikohe
Jul-04	Planting managed by PFO (Kawakawa) used NIFI (rate \$308/ha included plant, transport & supervision), mgmt \$13/ha
Dec-Jan 04	Spot chemical release - managed by PFO (Kawakawa) used NIFI (rate \$197/ha included application, chemical, supervision) , mgmt \$5/ha
Jun-05	Remapping onto GIS - 2003 photography - FPS - area change from 43.3 ha to now 46.13 ha (but still planting estimate)
Apr-05	Survival assessment - PFO and CFK - (76 plots) was 84.7 % survival (will have enough crop but disappointing result, slash/goats/releasing causal)
Nov-12	Mapping update with NRC GIS people, based upon latest photography (was 46.13 now to 45.3 ha)
Feb 13- Mar 13	Waste thin - FPS CONTRACTORS , managed by NFM (Kerikeri) thin @ \$575/ha FR (less than\$595) , supervision \$35/ha
Jan-15	Remapping, ex ForestryMaps (old area 45.3 ha now updated)
2014/15 p	Foliar sample
2016/17 p	Foliar resample
2020/21 pp	MRI p



**NORTHLAND REGIONAL COUNCIL**  
**Mount Tiger Forest**

**Stand 2005A**  
**Y.E. 2005**

Revised date **9-Mar-15**

Total Area (ha)	15.1	Topography/Logging	100 % Groundbased
Net stocked area (ha)	15.1	Soil type	Waiotira
Species	P.radiata	Site Index (radiata)	27 (first rotation)
Rotation	2 nd	Aspect	NE facing slope and terrace
		Comments	

**ESTABLISHMENT RECORD**

Date	Operation	Planting (sph)	Tree stock	Comments
Jun-05	Slash raking	n/a	n/a	Ripped area and managed slash - main landing 2005A \$1000 total
Jul-04	Pre-plant	n/a	n/a	Northland Helicopters ( 6 l Glyphosphate 510 & 100 gms meturon, 500 mls organo)
	Dessicant			
Aug-05	Planting	943	GF25 cuttings	Seedlot 00/954 ex CHHFS Kaikohe (Horizon)
				Acceptable planting PFO was 907 sph (96%), too many and PFO told. small area reasons
Nov/Dec 05	Release	15.1	n/a	Spot release with Valzine 500 (15l/ha, 1.9 l Val in 17.75l 350 mls dye, on 1.54 spot)
Jan-07	Release	4 ha & 5 ha		Aerial release with Gallant and TBK

**PRUNING RECORD**

Date	Lift	Area treated (ha)	Total sph (sph)	Pruned sph (sph)	Av. Pr. Ht. (m)	Max.DOS (cm)	Residual sph (sph)	Comments
								Decided May 2011 to relegate to FRAME regime 2013/14 delayed thinning

**THINNING RECORD**

Date	Type	Area treated (ha)	Stocking (sph)		Volume (m <sup>3</sup> /ha)	Comments
			Initial	Residual		
2014/15p	waste thin	all	850	410-450p		

**TREE NUTRITION RECORD**

Date	Operation	Area treated (ha)	Foliage analysis result/application details				Comments
			N	P	K	Other	
2016/17p	Foliar samole	all					yes - standard sample
2016/17p	Fert	all ??	y	y			contingency - subject to foliar
2018/19 p	Foliar resample	all					

**MEASUREMENT RECORD**

Date	Event	Percent sample	Number of plots	Stocking (sph)	B.A. (m <sup>2</sup> /ha)	MCH (m)	MTH (m)	DBH (cm)	Pr. Stock (sph)	Av.Pr.ht (m)	TSV (m <sup>3</sup> /ha)
Feb-06	Survival		52	843							
2014/15p	waste thin										
2021/22 p	MRI p	2.00%	8-10 plots								
Latest	Survival		52	843	0	0	0	0	0	0	0

**NOTES**

Date	Remarks
Jun-05	Area is ex TDC 1974/A contract area = harvest completed April 2005.
Aug-04	MARVL - Colin Smith (2 strata, 12 plots, (\$80/plot), POPULATION - 241 sph, 52.3 ba, 52.6 dbh, 36.8 mth, 180 pr @ 5.18, TSV635, TRV 547 (13.4 % ple) Grade mix - Pruned 25%, S1S2 15%, A large branch 18%, K large branch 17%, KI 8%, Pulp 17%
Jun-05	Remapping onto GIS - 2003 photography - FPS - area change from 18.2 ha to now 16.58 ha (but still planting estimate), areas retired
Jun-05	Preplant dessicant managed by PFO - \$175/ha (included application, chemical, supervision) , mgmt \$23/ha - incl planting
Aug-05	Planting managed by PFO (Kawakawa) tree stocks supply only @ \$421/1000 ex Horizon Kaikohe
Aug-05	Planting managed by PFO (Kawakawa) used NIFI (rate \$308/ha included plant, transport & supervision), mgmt incl in \$23 above
Nov/Dec 05	Spot chemical release - managed by PFO (Kawakawa) used NIFI (rate \$207/ha included application, chemical, supervision) , mgmt \$9/ha
Feb-06	Survival assessment - CFK - (52 plots) was 89.4 % survival (will have enough crop slash/drought causal )
Jan-07	Aerial release for Tobacco weed and pampas - managed by PFO ( 5 ha Tordon Brush Killer and 4ha Gallant 565/ha all incl)
Jan-15	Remapping, ex ForestryMaps (old area 16.6 ha now updated)
2014/15p	waste thin
2016/17p	Foliar samole Mar-17
2018/19 p	Foliar resample
2021/22 pp	MRI p





**NORTHLAND REGIONAL COUNCIL**  
**Mount Tiger Forest**

**Stand 2005B**  
**Y.E. 2005**  
 Revised date **9-Mar-15**

Total Area (ha)	6.3	Topography/Logging	60% ground based, 40 % Hauler
Net stocked area (ha)	6.3	Soil type	Waioitira / Marua
Species	P.radiata	Site Index (radiata)	28 (first rotation)
Rotation	2 nd	Aspect	S facing slope and W terrace
		Comments	

**ESTABLISHMENT RECORD**

Date	Operation	Planting (sph)	Tree stock	Comments
Jul-04	Pre-plant	n/a	n/a	Northland Helicopters ( 6 l Glyphosphate 510 & 100 gms meturon, 500 mls organo)
	Dessicant			
Aug-05	Planting	963	GF25 cuttings	Seedlot 00/954 ex CHHS Kaikohe (Horizon)
				Acceptable planting PFO was 944 sph (98%), too many and PFO told, small area reasons
Nov/Dec 05	Release	6.3	n/a	Spot release with Valzine 500 (15l/ha, 1.9 l Val in 17.75l 350 mls dye, on 1.54 spot)

**PRUNING RECORD**

Date	Lift	Area treated (ha)	Total sph (sph)	Pruned sph (sph)	Av. Pr. Ht. (m)	Max.DOS (cm)	Residual sph (sph)	Comments
								Decided May 2011 to relegate to FRAME regime 2013/14 delayed thinning

**THINNING RECORD**

Date	Type	Area treated (ha)	Stocking (sph)		Volume (m <sup>3</sup> /ha)	Comments
			Initial	Residual		
2014/15 p	waste thin	all	853	<10-15%		

**TREE NUTRITION RECORD**

Date	Operation	Area treated (ha)	Foliage analysis result/application details				Comments
			N	P	K	Other	
2016/17p	Foliar samole	all					yes - standard sample
2016/17p	Fert	all ??	y	y			contingency - subject to foliar
2018/19 p	Foliar resample	all					

**MEASUREMENT RECORD**

Date	Event	Percent sample	Number of plots	Stocking (sph)	B.A. (m <sup>2</sup> /ha)	MCH (m)	MTH (m)	DBH (cm)	Pr. Stock (sph)	Av.Pr.ht (m)	TSV (m <sup>3</sup> /ha)
Feb-06	Survival		33	846							
2014/15 p	waste thin										
2021/22 p	MRI p	2.00%	3-4 plots								
Latest	Survival		33	846	0	0	0	0	0	0	0

**NOTES**

Date	Remarks
Jun-05	Area is ex TDC 1974/B contract area = harvest completed April 2005.
Aug-04	MARVL - Colin Smith (1 strata, 6 plots, (\$80/plot), POPULATION - 254 sph, 63.9 ba, 56.6 dbh, 37.6 mth, 252 pr @ 5.47, TSV 778, TRV 672 (9.5 % ple) Grade mix - Pruned 31%, S1S2 16%, A large branch 13%, K large branch 12%, KI 15%, Pulp 13%
Jun-05	Remapping onto GIS - 2003 photography - FPS - area change from 7.9a to now 6.32 ha (but still planting estimate), areas retired
Jun-05	Preplant dessicant managed by PFO - \$175/ha (included application, chemical, supervision) , mgmt \$23/ha - incl planting
Aug-05	Planting managed by PFO (Kawakawa) tree stocks supply only @ \$421/1000 ex Horizon Kaikohe
Aug-05	Planting managed by PFO (Kawakawa) used NIFI (rate \$308/ha included plant, transport & supervision), mgmt incl in \$23 above
Nov/Dec 05	Spot chemical release - managed by PFO (Kawakawa) used NIFI (rate \$207/ha included application, chemical, supervision) , mgmt \$9/ha
Feb-06	Survival assessment - CFK - (33 plots) was 87.9 % survival (will have enough crop slash/goats/drought causal )
Jan-15	Remapping, ex ForestryMaps (old area 6.3 ha now updated)
2014/15 p	waste thin
2016/17p	Foliar samole
2018/19 p	Foliar resample
2021/22 p	MRI p



**NORTHLAND REGIONAL COUNCIL**  
**Mount Tiger Forest**

**Stand** 2010  
**Y.E.** 2010

Revised date 9-Mar-15

Total Area (ha)	25.8
Net stocked area (ha)	25.8
Species	P.radiata
Rotation	2 nd

Topography/Logging	80% ground based, 20 % Hauler
Soil type	Waiotira / Marua
Site Index (radiata)	28 (first rotation)
Aspect	S facing slope and W terrace
Comments	

**ESTABLISHMENT RECORD**

Date	Operation	Planting (sph)	Tree stock	Comments
Jul-10	Pre-plant	n/a	n/a	Northland Helicopters ( 6 l Glyphosphate 510 & 30 l Terbutylazine, 500 mls organo; 150l water)
	Dessicant			
Aug-10	Planting	989	GF 19 select (22-25 eq)	Seedlot 09/2114SSOP ex PFO Waiuku containerised
Mar-11	Release	25.8	n/a	Acceptable planting PFO was 989 sph (1006 total) 98%, OK Aerial release with Chloram and Organosilicone

**PRUNING RECORD**

Date	Lift	Area treated (ha)	Total sph (sph)	Pruned sph (sph)	Av. Pr. Ht. (m)	Max.DOS (cm)	Residual sph (sph)	Comments
								Decided Nov 2014 to relegate to FRAME regime

**THINNING RECORD**

Date	Type	Area treated (ha)	Stocking (sph)	Volume (m³/ha)	Comments
			Initial	Residual	
2019/20 p	waste thin	all	850	400-450p	

**TREE NUTRITION RECORD**

Date	Operation	Area treated (ha)	Foliage analysis result/application details				Comments
			N	P	K	Other	
2021/22 p	Foliar sample	all					yes - standard sample
2021/22 p	Fert	all ??	y	y			contingency - subject to foliar
2023/24 p	Foliar resample	all					

**MEASUREMENT RECORD**

Date	Event	Percent sample	Number of plots	Stocking (sph)	B.A. (m²/ha)	MCH (m)	MTH (m)	DBH (cm)	Pr. Stock (sph)	Av.Pr.ht (m)	TSV (m³/ha)
May-11	Survival										
2019/20 p	waste thin										
2026/27 p	MRI p	2.00%	10-12 plots								
Latest	Survival		0	0	0	0	0	0	0	0	0

**NOTES**

Date	Remarks
2010	Area is ex 1977 contract area = harvest completed June 2010 ex NFM H&M agent sale
Jul-10	Preplant dessicant managed by PFO - \$323/ha (included application, chemical, ) , mgmt \$57/ha
Aug-10	Planting managed by PFO (Kawakawa) tree stocks supply only @ \$300+17.5 package + 3.75 royalty /1000 ex Olsen's Waiuku containerised
Aug-10	Planting managed by PFO (Kawakawa) used SILVICULTURAL CONTRACTORS (rate \$420/ha included plant, transport , mgmt \$84/ha exp!!)
Mar-11	Aerial release required - managed NFM (Kerikeri) NORTHLAND HELICOPTERS - 150l/ha - Fly \$93/ha, Chemical \$137.75 /ha, supr \$25/ha
Aug-11	Jenks wlk thru, sph and survival generally ok, few pockets struggling but should develop ok.
Jan-15	Remapping, ex ForestryMaps (old area 27.0 ha now updated)
2019/20 p	waste thin
2021/22 p	Foliar sample
2023/24 p	Foliar resample
2026/27 p	MRI p



## APPENDIX 3

### 2015/16 ANNUAL WORK PROGRAMME AND BUDGET

draft



NORTHLAND REGIONAL COUNCIL 2015-2016 Budget		Year 1 of the 2015/16 Five Year Plan				Start 1 July 2015 - end 30 June 2016	
<b>EXPENDITURE</b>							
<b>General Operations</b>							
<b>Forest Fire Unit</b>							
Pump Maintenance/Training				(NRC fire gear now stored maintained by FPS)		\$	-
						\$	-
<b>Forest Harvest Planning</b>							
Sale of Forest Produce 1985 area						\$	5,000
General planning and monitoring markets						\$	
Inventory PHI and MRI 1985 and 1999						\$	3,023
						\$	8,023
<b>Forest Re-establishment</b>							
No replanting in 2014-15 year	approx	0	ha				
Tree stock deposit	1985 area 15.3 ha @ say \$150			check nursery stocks		\$	2,295
						\$	574
						\$	2,869
<b>Forest Operations</b>							
2010 stand	approx	27.0	ha				
First prune (09/14, now move to structural [no prune] regime [now 2020])	2010	350	sph to 3.5-4.0 m	0.85 per ha	\$1,041.25	0.0	\$ -
Supervision					\$82.00	0.0	\$ -
2005 stands	approx	22.0	ha				
Foliar sample and Fertiliser	2005	(Subject to foliar sampling)		\$450 @80s per ha	\$500.00	0.0	\$ -
					\$31.25	0.0	\$ -
2003 stands	approx	80.86	ha				
Foliar 2nd sample and fertiliser (contingency)	2003	(Subject to foliar sampling)		\$450 @80s per ha	\$500.00	80.9	\$ 40,430
					\$31.25	80.9	\$ 2,527
Forest Management Operational set up				8 hrs	\$ 70.00		\$ 560
							\$ 43,517
<b>Forest Maintenance</b>							
Harvest road maintenance and monitoring				2 excavator/truck days plus 5000		\$	8,840
Fencing, spraying, health, quarry, culverts, firebreaks, permits, etc						\$	3,000
Contingency						\$	5,000
						\$	16,840
<b>Subscriptions, etc</b>							
				NZFOA LEVY etc (NZFOA +200)		\$	1,000
						\$	1,000
<b>Fire Prevention and Control</b>							
Update fire plan	(FPS contract)				est	\$	500
Standby, etc						\$	3,400
						\$	3,900
<b>Insurance</b>							
				Tree Crop and general		est	\$ 6,000
						\$	6,000
<b>Rates</b>							
				general		est	\$ 2,100
						\$	2,100
							\$ 84,248
<b>New Fencing</b>							
				NK \$12/m		\$	12,000
Gates, etc						\$	3,000
						\$	15,000
							\$ 15,000
<b>PLUS</b>							
<b>Jenks costs</b>							
General assistance	12 months @			\$ 1,710		\$	20,520
	(1.5 days per month, plus 2 @ 3.0 hrs field check per month)					\$	10,080
Harvest assistance (harvesting planned in 2015-16 year)	3.0 months @			\$ 3,360		\$	10,080
						\$	1.19
						\$	30,600
							\$ 30,600
<b>INCOME</b>							
<b>HARVEST SCHEDULED FOR 2015-16</b>							
Harvest planned = September 2015 - May 2016	contract	1985	ha	15.29	m3/ha	550	8410
				0		0	8500
				0		0	0
				0		8410	8500
							(note - this includes any deposit)
						42.04	\$ 353,529
						\$0	\$ -
							\$ 353,529
							\$ 353,529
							<b>NET RETURN \$ 223,681</b>



**APPENDIX 4**  
**5 YEAR INDICATIVE WORK SCHEDULES AND BUDGETS**  
**AND 10 YEAR CASH FLOW PROJECTION**

draft













**NRC FORESTRY - 10 YEAR Broadlevel Budget**

	linked 14/15 budget xls	linked 15/16 budget xls	linked 16/17 budget xls	linked 17/18 budget xls	linked 18/19 budget xls	linked 19/20 budget xls	year 20/21	year 21/22	year 22/23	year 23/24	year 24/25					
YEAR (begin July 1) Budget Year	2014 current	2015 Year 1	2016 Year 2	2017 Year 3	2018 Year 4	2019 Year 5	2020 6	2021 7	2022 8	2023 9	2024 10					
HARVEST AREA (ha)		15.29						22.94								
FALLOW AREA (Ha)		8500 tonnes						11,470 tonnes								
REPLANT AREA (ha)			15.3						22.8							
<b>FOREST FIRE UNIT</b>	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -					
<b>FOREST HARVEST PLANNING</b>	\$ 10,000	\$ 8,023	\$ 3,886	\$ 1,000	\$ 6,175	\$ 4,774	\$ 3,845	\$ 11,832	\$ 2,000	\$ 2,000	\$ 2,000					
<b>FOREST DEVELOPMENT</b>							Area	\$ Total	Area	\$ Total	Area	\$ Total	Area	\$ Total	Area	\$ Total
<b>Forest Re-establishment (Directs)</b>																
Access/Tracking																
Site preparation																
Planting		deposit	2,295	15.3	3,394											
Releasing 1				15.3	9,410											
Hand Fertilising				15.3	4,923											
Blanking						5.0	1,810									
Releasing 2						5.0	4,000									
<b>Total Establishment</b>	0.0 \$ -	0.0 \$ 2,295	45.9 \$ 17,727	10.0 \$ 5,810	0.0	0.0	0.0	0.0	0.0 \$ -	0.0 \$ 3,441	68.8 \$ 30,969	0.0 \$ -	0.0 \$ -	0.0 \$ -	0.0 \$ -	
<b>Forest Operations/Tending (Direct costs)</b>																
Stability prune																
VLP (1) to approx 2.5																
Thin to waste 1																
VLP (1) to approx 3.5																
VLP (2) to approx 4.5																
VLP (3) to approx 6.5																
VLP (2) to approx 6.5																
Single final thin to waste																
Final thin to waste	22.9	13,740														
Aerial fertiliser	46.1	21,289														
<b>Total Tending</b>	69.0	35,029	80.9	40,430	69.0	35,575	0.0	0.0	22.9	11,980	27.0	18,900	27.0	14,000	0.0	0.0
<b>Total Development Expenditure (Direct)</b>	\$ 35,029	\$ 42,725	\$ 53,302	\$ 5,810	\$ 11,980	\$ 18,900	\$ -	\$ 17,441	\$ 30,969	\$ -	\$ -					
<b>Management of Development Programme (of all forest development)</b>	\$ 3,376	\$ 3,661	\$ 5,561	\$ 500	\$ 716	\$ 1,620	\$ -	\$ 2,616	\$ 4,645	\$ -	\$ -					
<b>FOREST MAINTENANCE</b>	\$ 11,840	\$ 16,840	\$ 11,840	\$ 16,840	\$ 11,840	\$ 16,840	\$ 10,000	\$ 10,000	\$ 7,000	\$ 5,000	\$ 5,000					
<b>SUBSCRIPTIONS, etc</b>	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,500	\$ 1,500	\$ 1,500	\$ 1,500	\$ 1,500					
<b>FIRE PREVENTION AND CONTROL</b>	\$ 3,900	\$ 3,900	\$ 4,400	\$ 3,900	\$ 3,900	\$ 3,900	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000					
<b>INSURANCE</b>	\$ 7,000	\$ 6,000	\$ 6,000	\$ 6,000	\$ 6,000	\$ 6,000	\$ 6,000	\$ 6,000	\$ 6,000	\$ 6,000	\$ 6,000					
<b>RATES</b>	\$ 2,000	\$ 2,100	\$ 2,100	\$ 2,100	\$ 2,100	\$ 2,100	\$ 2,100	\$ 2,100	\$ 2,100	\$ 2,100	\$ 2,100					
<b>NEW FENCING, gates etc</b>	\$ 5,000	\$ 15,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 12,000	\$ 3,000	\$ 3,000	\$ 3,000					
<b>CONSULTANTS, etc</b>	\$ 15,000	\$ 30,600	\$ 20,520	\$ 20,520	\$ 20,520	\$ 14,760	\$ 15,000	\$ 20,000	\$ 15,000	\$ 15,000	\$ 15,000					
<b>TOTAL EXPENDITURE</b>	\$ 94,144	\$ 129,848	\$ 111,609	\$ 60,670	\$ 67,231	\$ 72,894	\$ 46,445	\$ 88,489	\$ 77,214	\$ 39,600	\$ 39,600					
<b>INCOME from TIMBER SALES</b>	\$ -	\$ 353,529	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 516,150	\$ -	\$ -	\$ -					
	-\$ 94,144	\$ 223,681	-\$ 111,609	-\$ 60,670	-\$ 67,231	-\$ 72,894	-\$ 46,445	\$ 427,661	-\$ 77,214	-\$ 39,600	-\$ 39,600					



APPENDIX 5  
FOREST PRODUCE SALES SUMMARY

draft



## Significant Forest Produce Sales Contracts

September 1997	Agreement for Purchase of Forest Produce Stand 2A - 1971 Planting.
May 1999	Agreement for Purchase of Forest Produce Stand 1971/A.
October 1999	Agreement for Purchase of Forest Produce Stand 1971/B.
December 2000	Agreement for Purchase of Forest Produce Stand 72/A and B (Two year agreement).
September 2002	Agreement for Purchase of Forest Produce Stand 1973/A&B.
September 2004	Agreement for Purchase of Forest Produce Stand 1974/A&B.
December 2008	Agreement to provide Harvesting and Marketing Services 1977 area.
September 2013	Agreement to provide Harvesting and Marketing Services 1985 area.

Stand	Date of Sale	Area (ha)	Volume (m <sup>3</sup> )	Purchaser	Price	Status
Stand 2A	November 1997	18	12500	Rayonier NZ Ltd	\$61.00/tonne \$2.00 binwood	Completed in May 1999 Replanted July 1999
Stand 1971/A	May 1999	31	15,000	Suttons Logging Ltd	\$44.10/tonne \$3.00 binwood	Completed in April 2000 Replanted June 2000
Stand 1971/B	October 1999	17	10,000	Fletcher Forests Ltd	\$46.80/tonne \$3.00 binwood	Completed in June 2000 Replanted July 2000
Stand 1972/A&B	December 2000	66	39,000	Carter Holt Harvey Ltd	\$53.51/tonne \$2.50 binwood	Completed April 2003 Replanted 9ha 2001, 38 ha 2002, 19 ha 2003.
Stand 1973/A&B	September 2002	102	53,000	Suttons Northland Limited	\$40.25/tonne \$2.50 binwood	Completed April 2004 Replanted 54 ha in 2003, 43 ha 2004, 5 ha retired
Stand 1974/A&B	September 2004	26	15,000	TDC Sawmills Limited	\$37.11/tonne \$1.00 binwood	Completed 30 <sup>th</sup> April 2005 Replanted 16.6 ha and 6.3 ha August 2005

Note: Stand 2A was a separate block of easy terrain, located on the western side of the forest. Most other stands are on steep terrain posing difficulties in access and operations.

### 2009/10

Fully managed log sale for 1977 harvest area.

26.2 ha - achieved 12,100 tonnes (92%).

Net stumpage \$42.68/t (\$517,000 net return to NRC)

Managed by Northland Forest Managers (1995) Limited.

### 2015/16

Fully managed log sale for 1985 harvest area.

16.2 ha - approximately 8,500 tonnes.

Being managed by Northland Forest Managers (1995) Limited.



## APPENDIX 6

### TENDING QUALITY CONTROL

draft



## TENDING QUALITY CONTROL

### General

Tending (pruning and thinning) quality control (QC) is undertaken to:

- ensure operational standards are met;
- determine payments for the operation;
- provide information for the stand records; and
- provide information to plan the next tending operation.

Silvicultural contracts shall be drafted such that work is to be performed to a standard quantifiable by means of post-operational measurement plots.

Payment for silvicultural work shall be subject to the results of quality assessment plots established in completed work areas as soon as practicable behind the work face.

Unsatisfactory work shall be replotted before payment and as if the initial plots had not been established.

### Timing

Plots are established behind the tending crew as they progress through the stand. They should be "right up behind" the crew, particularly in the early part of the operation or when operational quality is not meeting the standards, to ensure that any deficiencies are picked up early.

### Method

Plots are established at an intensity of, typically, 2% - 4 % of stand area. In smaller stands, the higher intensity - 4% or higher - will be adopted in order to provide a reasonable total number of plots - at least three plots per stand.

Plots will be circular in shape to minimise the scope for error at the perimeter. Plot size shall be such that they include a minimum of 15 crop trees and a maximum of 25 crop trees, generally 0.05 ha in area.

The location of plots will be pre-determined on a map in the office using a grid overlay and choosing sufficient intersections to give the required number of plots.

Plots shall be marked in the field in such a way that their measurement can be audited within a reasonable period of time after establishment.

### Plot Establishment

Plot centre is typically located using compass and hip chain working off a 1:10,000 scale stand map.

It is essential that the plots adequately cover the mapped stocked area of the stand without bias. If a plot falls in an area with no trees, it is established there and "no trees" is recorded. Alternatively, the unstocked area is delineated on the stand map, the stand area is later re-calculated, and the plot is cancelled (or moved into a stocked part of the stand using a rule - e.g. move it 100 m to the north - if it is required).





## Appendix 6 cont.

### Plot Measurements - Pruning

The following parameters will be measured and recorded:

- Stocking (crop trees and unpruned followers)
- Diameter at breast height (all trees)
- Maximum diameter over stubs [DOS] (every 4th tree)
- Height of maximum DOS (every 4th tree)
- Maximum branch on DOS whorl (every 4th tree)
- Pruned height (all crop trees)
- Tree Height (every 4th tree)
- Tree classification:
  - Trees are judged to be "pruned acceptable" on the following criteria:
    - well formed, dominant or co-dominant;
    - health;
    - no pruning defects such as "coat hangers" or bark scars;
    - a "gap filler" if no other good trees are in the immediate vicinity.
  - If "pruned unacceptable" trees exist, are there other unpruned trees that should have been pruned instead.

A summary should be prepared for each operation showing the plot summaries and calculation of the stand averages for the above parameters. Basal area must also be calculated and entered into the stand record system.

### Plot Measurements - Thinning

Formal QC plots will be established after thinning to waste to ensure the prescribed stocking levels are met.

The following parameters are usually measured and recorded:

- Stocking (crop trees and unpruned followers)
- Diameter at breast height (all trees)
- Pruned height (all crop trees)
- Tree Height (every 4th tree)

In the case of final thinning, if significant followers are left then it is important that all trees are measured (particularly pruned heights) as the data collected forms the basis for future growth projections until MRI is undertaken.

A summary should be prepared for each operation showing the plot summaries and calculation of the stand averages for the above parameters. Basal area must also be calculated and entered into the stand record system.



## APPENDIX 7

### SUMMARY OF RESOURCE CONSENTS

draft



draft



**SUMMARY OF NORTHLAND REGIONAL COUNCIL HARVESTING AT MOUNT TIGER FOREST**

**Table 1.**

**RESOURCE CONSENTS APPLIED FOR AND CURRENT STATUS**

DATE	APPLICATION	RESPONSE	OUTCOME
Late 1998	<b>Initial consent application</b> 10 year harvest programme <b>1998/99 Annual Plan (the first year's plan)</b> this included harvest of stand 1971/A , the extension of Wrack road to 1971/B and these landings and the initial road development of Awaroa and Drews Main and these landings	<b>Resource Consent # 98 8585 obtained dated 29th March 1999.</b>	<b>10 year plan on-going</b>  The 1998/99 clearfell area (Stand 1971/A) proposed in the original consent did not sell, thus no work in 1971/A nor the rest
May 1999	Area named Stand 1971/A was sold to SLC CFK sought variation for SLC winter logging	Approved by NRC on 25th May 1999	1971/A area then harvested, completed April 2000 All consent conditions met and signed off Area replanted July 2000 the rest of the 1998/99 plan had not been started at this time
August 1999	<b>The 1999/00 Annual Plan submitted 26th August 1999</b> included 1998/99 not done, plus harvest of stand 1971/B, the new (delayed and now more details) of Awaroa Access road and Drews Main and harvest 1972/A (22 ha at that stage)	Approved by NRC on 8th September 1999, excluding the southern part ( Stand 1972/A) - more details required for this part.	
October 1999	Area named Stand 1971/B was sold to FCF		This area was harvested and completed June 2000 Area replanted July 2000 Awaroa Access Road was held up - iwi issues and all of 1972/A works held up also
September 2000	<b>The 2000/01 Annual Plan was submitted</b> Completion of Awaroa road. Included harvest of Stands 1972/A&B (increased area from 1999 plan to around 66 ha - HPNZ plan) And perhaps the Wrack road extension beyond 1971/B but will be advised later.	Approved by NRC on 4th October 2000	Awaroa Road access was completed December 2000 All consent conditions met and signed off
December 2000	Stand 1972/A&B sold to CHHFS (approximately 66 ha)		
February 2001	<b>Approval sought for variation for Stand 1972/A&amp;B</b> for winter vegetation removal for CHHFS	NRC approval gained 27th March 2001.	This sale was due for completion 31st March 2002 ended up stopping over Winter 2001 NRC inspection August 2001 - all conditions met NRC was notified when operation re-started in October 2001
March 2001	<b>The 2000/01 Supplementary Plan was lodged</b> This was for Wrack Road extension to Landing 5 (ie proposed at bottom as per Asset) ie crossing the main gully	NRC approval gained 15th March 2001 subject to suitable weather conditions	Construction commenced, but stopped due to weather Stopped over Winter 2001, NRC inspection August 2001 - all conditions met NRC was notified when operation re-started in Spring 2001 This was completed NK summer 01/02 and signed off , see 31 Jan 2002 JJ letter
August 2001	<b>The 2001/02 Annual Plan was submitted</b> noted that 1972/A&B still to be completed noted that the 2000/01 Supplementary Plan (Wrack ext) still to complete the new Plan submitted was therefore for: The harvest of Stand 1973/A (approx 41 ha at this point) the roadline and build into Stand 1973/B off Mt Tiger over saddle	NRC approval gained 20 September 2001	Stand 1973/A put up for sale = WAS NOT CONSUMATED
31 January 2002	<b>Letter to NRC re update of current state of play</b> That 2000/01 plan is ongoing CHH still logging That the 2000/01 Supplementary plan (Wrack ext) is now complete) That the harvest of 1973/A is on hold due to non-sale  The roadline and build into Stand 1973/B is ongoing	no response required	This sale is ongoing. (extended to September 2002 plus) This was completed summer 01/02. See above - NK work but upgrade req'd NRC told they would be notified when new Sale done and this clearfell of 1973/A starts as already approved.  NRC was notified when operation started in early 2002 This (first stage ?) was completed April 2002 , subject to some final maintenance, etc



DATE	APPLICATION	RESPONSE	OUTCOME
23 April 2002	<b>Approval sought for variation for Stand 1972/A&amp;B</b> Placed with NRC Monitoring Manager as per email to NK 23/4/02 CHH asked for 4 weeks more earthworks, then winter variation for harvest only.	NRC approval obtained 23/04/02 extension, fortnightly agreed Winter variation agreed	This sale is ongoing. (extended to September 2002 plus)  All earthworks extensions were withdrawn by NRC @ 16th June 2002 Harvesting stopped June 2002 , restarted in Oct/Nov 2002
3 July 2002	<b>The 2002/03 Annual Plan was submitted</b> this was for 1973/B (a further 58 ha of harvest) and noted that  The 2000/01 plan part = CHHFS 1972/A & B still not complete  The 2001/02 Plan , 1973/B road (stage 1 ?) is complete (see above)  The 2001/02 Plan , 1973/A harvest is not started but approval is in place	1973/B approved 22 August 2002 subject to repair of 1973/B saddle and Mtce No winter harvest approval was given at this sate	CHH still to complete (start after Oct 02) new end date is 31 st Mar 2003 and the NRC would be notified when restarts NRC were notified, work complete, harvest 30 April 2003 Clean up, end of May 2003. NOW COMPLETE area replanted 2001 (9ha) , 2002 (37.5) and 2003 (19.9) No specific FINAL signoff obtained from NRC HP visit 18/08/04 no issues, email re NRC report 31/08/04 - ALL OK  and the NRC would be notified when restarts (see below)
September 2002	Stand 1973/A&B sold to SUTTONS (approximately 102.2 ha)		contract is to March 31, 2004 SNL started in October 2002
3 October, 2002	<b>Variation to 2002/03 plan to accomodate final logging plan</b> changes by SNL (culvert, saddle, roads, etc)	Approved 4th October 2002 by NRC	Actioned , include Wrack culvert upgrade (00/01 supp) and saddle upgrade (01/02) subsequent site visits November 2002 re these works
16 April 2003	<b>CFK , SNL, NRC field trip for Winter Variation approvals for 1973/A&amp;B</b>	Approved 17/04/03 by NRC	OK now for winter harvest in 1973/A&B , SNL Notified Ongoing = harvest due for completion March 31, 2004 subsequent site visits during 2003 and February 2004
10 February 2004	<b>Email correspondence re variation to SNL 1973/B area at L 11 &amp; pond</b>	Approved 27 February 2004, NRC	Actioned, and harvest completed April 2004 Clean up, end of May 2004. NOW COMPLETE area replanted 2003 (53.8ha) , 2004 (43.3) and some retired also No specific FINAL signoff obtained from NRC HP visit 18/08/04 no issues, email re NRC report 31/08/04 - ALL OK
3rd August 2004	<b>The 2004/05 Annual Plan was submitted</b> This was for infrastructure and harvest of 1974/A & B.	Approved NRC email 9th August 2004	
September 2004	Stand 1974/A&B sold to TDC SAWMILLS (approximately 26 ha) Variation to 2004/05 Plan to accommodate final TDC logging plan	Approved NRC email 22nd September 2004	contract is to April 30 , 2005 TDC started road in October 2004, full scale harvest commenced January 2005. Harvest completed April 2005 HP visit 15/04/05 - no issues, emails 18/05/04 & 02/05/05 - final sign off OK Area replanted Aug 2005 - both A (16.6ha) & B (6.3ha), some retired areas designated
16th August 2007	<b>The 2007/08 Annual Plan was submitted</b> This was for infrastructure and harvest of 1977 stand (26.2 ha)	Approved NRC letter 6 November 2007	Stand 1977 was deferred from sale in Oct 2007 and Oct 2008 and early 2009
30th June 2009	RC 98-8585 expired , despite 1977 area not yet harvested NRC decided no need to renew consent for the completion of the 1977 area as planned works fall within the levels for permitted activities under the current RWSP.		
13 October 2009	NRC agreed to proceed with harvest of 1977 area over 2009/10 summer - managed log sale Harvesting & Marketing Agent - Northland Forest Managers (1995) Ltd This work was undertaken without a resource consent as it was a permitted activity		Harvesting started 25th January 2010 (WW Logging contractor) Harvest completed May 2010 NRC cosensts monitoring officer inspected and signed off site. Replanting of area undertaken August 2010
March 2015	Awaiting final pre-harvest planning for 1985 area, and NRC decision to proceed with managed sale for the 2015-16 summer period. Harvesting & Marketing Agent - Northland Forest Managers (1995) Ltd This work will be able to be undertaken without a resource consent as it will fall under permitted activity levels		



**APPENDIX 8**  
**SUMMARY OF ARCHAEOLOGICAL REPORTS,**  
**WORKS AND SITES BY HARVEST AREA**

draft



## Archaeological Surveys and Reports

The following surveys and reports have been provided by the archaeological consultant Mr David Nevin.

July 1998	Archaeological Survey - Total Mount Tiger - Whole Forest Estate.
January 2000	Archaeological Report on sites Q07/717 and Q07/1106 - Mt Tiger Forest - Awaroa Access Road Proposal.
August 2000	Mt Tiger Forest - Archaeological Sites - 1999/2000 Logging - Contracts 1971/A&B - Harvesting Completion.
September 2000	Mt Tiger Forest - Archaeological Sites - 2000/2001 - Contracts 1972/A&B - pre-harvest survey.
November 2000	Archaeological Investigation Part Q07/717 - Mt Tiger forest - Awaroa Access Road Completion
July 2001	Mt Tiger Forest - Archaeological Sites - 2001/2002 - Contracts 1973/A&B - 2002/04 pre-harvest survey.
December 2002	Mt Tiger Forest - Archaeological sites - 2002/2003 - Contract 1973/A&B - Q07/1070 site excavation.
December 2002	Mt Tiger Forest - Archaeological sites - 2002/2003 - Contract 1973/A&B - Q07/1070 site excavation. Photos for Report.

In 2003 David Nevin left New Zealand for China and was replaced by Northern Archaeological Research NAR (Leigh Johnson & Ivan Bruce) on contract to NRC to assist with Mount Tiger Forest archaeological matters. The following surveys and reports have been provided by NAR.

November 2003	Archaeological Monitoring Report - Stand 1972/A Mt Tiger/Awaroa Forest Whangarei - Contracts 1972/A&B - 2002/2004 Harvesting Completion.
April 2004	Archaeological Survey and Assessment of 1974/A and 1974/B, Mt Tiger/Awaroa forest, Whangarei - Contract 1974/A&B - 2004/05 pre-harvest survey.
October 2004	Archaeological Assessment of Completed Logging 1973/A and B, Mt Tiger/Awaroa forest, Whangarei - Contracts 1973/A&B - 2002/2004 Harvesting Completion.
October 2004	Archaeological Investigation, Site Q07/1072 Stand 1974/B, Mt Tiger/Awaroa forest, Whangarei - Contract 1974/A&B - site excavation.
April 2005	Archaeological Site Monitoring Report - Stand 1974/A, Mt Tiger/Awaroa forest, Whangarei - Contract 1974/A&B.
September 2007	Archaeological Report - Stand 1977, Mt Tiger/Awaroa forest, Whangarei - Site Q07/1073, including Archaeological Site Management Plan & logging of site Q07/1073.
June 2010	Archaeological report - Archaeological Monitoring of the Logging of Archaeological Site Q07/1073, Mt Tiger/Awaroa Forest as per NZHPT Authority 2008/09".

This completed all archaeological requirements up to the completion of harvesting for the 1977 area in June 2010.

In 2014 as part of the pre-harvest planning for the 1985 area, NRC commissioned a further report to underpin the archaeological requirements for the 1985 harvest area. This report was undertaken by Jonathan Carpenter, Geometria Limited

April 2014	Archaeological Assessment of the Proposed Timber Harvest on Compartment 1985, Mt Tiger Forest, Whangarei.
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This report underpinned the Heritage New Zealand application and granting of current Authority 2015/045. A final post-harvest report will be required.





ARCHAEOLOGICAL SITES IN 1971/A and 1971/B CLEARFELL AREAS (Annual Plans 98/99 and 99/00)								
Site ID	Description	Current Status	Recommendation	Action	Stand	Annual Plan	Contract	Outcome
Q07/1064	Midden/platform 6*3m	reasonable	Careful logging Leave unplanted	as per recommendation	1971/A		SLC	preserved complete
Q07/1058	Described as 2 pits , filled 1*1*0.15	Modified already, adjacent to tracks. Partly filled or shallow.	Careful logging Leave unplanted	as per recommendation	1971/A		SLC	preserved complete
Q07/1059 photo	Described as a single pit , open, damaged 4*2*0.8	Modified already, adjacent to track, Pine has uprooted and modified part of pit.	Careful logging Leave unplanted	as per recommendation	1971/A		SLC	preserved complete
Q07/1061	Described as 2 pits , shallow. 3*2*0.2 and 5*2*0.2	Modified already, partly filled or shallow.	Careful logging Leave unplanted	as per recommendation	1971/A		SLC	preserved complete
Q07/1062 photo	Pit/terrace 3*1	modified already by tracks	Careful logging Leave unplanted	as per recommendation	1971/A 1971/B	99/00	SLC FCF	preserved complete
Q07/1063 photo	Sheep dips/dams, farming remnants	mostly covered by totara	Careful logging Leave unplanted	as per recommendation	1971/A		SLC	preserved complete
Q07/1065	Described as a pit , shallow, 4*2*0.3m	Modified and one end under boundary fence location is actually further west (140m)	Careful logging Leave unplanted.	As per recommendation.	1971/B	99/00	FCF	preserved complete

**NOTES:**

These areas were part of the consultation undertaken for the original resource consent application in lodged in late 1998.

This was subsequently approved in 1999 (Resource Consent # 98 8585 - dated 29th March 1999).

The areas were listed as being part of the 1998/99 programme at that point in time.

The original application also included the Awaroa Road extension and the infrastructure for Wrack south and 1972A & B.

Consultation was undertaken (HP of Ngati wai only on-site at that point). All OK.

No specific application to HPT to modify, but did end up with final report upon completion = see Nevin Report - Aug 2000

Area were logged as two contracts 1971/A = SLC and 1972/B = FCF

Harvest completed in April 2000 and June 2000 respectively and replanted in June/July 2000

**COMPLETE**



**ARCHAEOLOGICAL SITES AWAROA ROAD ACCESS AND IN STAND "1972 A and B" (Annual Plans 98/99, 99/00(hold) and 00/01)**

Site ID	Description	Current Status	Recommendation	Action	Stand	Annual Plan	Contract	Outcome
Q07/717 photo	Living area, undefended settlement Pit/terrace/Platform/midden	In young pines, Excellent condition	Remove trees Leave unplanted.	Was in the roadline formation Roadline relocated but additional sites were uncovered HPT approval obtained Q07/717 (22/05/00) to modify /destroy	Awaroa Road	99/00		slight modification DN reports done Jan 00 complete
Q07/1077	An isolated terrace related to Q07/717 7*4*0.6m	average, in young pines	Remove trees Leave unplanted.	Roadline relocated	Awaroa Road	99/00		preserved complete
Q07/1078	3 terrace and 1 midden related to Q07/717	In young pines, Good condition	Remove trees Leave unplanted.	Roadline relocated	Awaroa Road	99/00		preserved complete
Q07/718 photo	4 Terraces, 1 pit	In pasture Excellent condition		Not affected by roadline, do not plant	Awaroa Road	99/00		preserved complete
Q07/721	6 Terraces, 13 middens	In bush		Not affected by roadline, do not plant	Awaroa Road	99/00		preserved complete
Q07/1079	Midden, 2m long	Already modified by fence line	Remove trees Leave unplanted.	as per recommendation HPT approval 20/12/00	1972/A&B	99/00 00/01	CHHFS	preserve complete
Q07/1106	2 small midden, 50 cm and 30 cm	Uncovered during roadline excavation	Unavoidable to destroy	Was in the roadline formation Moved with Ngati kahu input HPT approval obtained 20/12/00 to modify/destroy this new site	Road	00/01	CHHFS	destroyed DN reports done Jan 00 complete
Q07/716	9 pits, good, compact group on a spur.	Good condition In mature pines	Remove trees Leave unplanted.	as per recommendation Agreed with Ngati kahu on site HPT approval 20/12/00	1972/A&B	99/00 00/01	CHHFS	preserve complete
Q07/1075	6 pits and a terrace on 128.2 m ridge	Already modified, remains are excellent	Remove trees Leave unplanted.	as per recommendation Agreed with Ngati kahu on site HPT approval 20/12/00	1972/A&B	00/01	CHHFS	preserve complete
Q07/1074 photo	5 Pits/ 3 terraces/platform, small settlement on on 162.4 m ridge	Already modified,	Remove trees Leave unplanted.	as per recommendation Agreed with Ngati kahu on site HPT approval 20/12/00	1972/A&B	00/01	CHHFS	preserve complete
Q07/1073 photo	Midden above 3 terraces	Already modified,	Remove trees Leave unplanted.	as per recommendation Agreed with Ngati kahu on site not lodged with HPT	1972/A&B	00/01	CHHFS	preserve complete

**NOTES:**

Part was first submitted as part of initial 98/99 resource consent application then not undertaken  
Awaroa main access route then put in 99/00 plan and started, but hit (part site Q07/717) site and held up  
HPT approval to modify/destroy site Q07/717 applied for 15th February 2000, approved HPT 22 May 2000 HPT # 9990/42  
Report on Q07/717 and Q07/1106 prepared for HPT - Nevin Jan 00  
These sites were part of the resubmitted 2000/01 Annual plan  
Consultation undertaken with Ngati kahu as per MoJ.  
Annual plan approved NRC 4th October 2000  
Pre-harvest archaeological Report prepared - Nevin report Sept 2000.  
Sites were (Q07/716, Q07/1075, Q07/1074, Q07/1073, Q07/1106, Q07/1079)  
HPT application on 2nd November 2000, approved HPT on 20 December 2000 (to destroy Q07/1106) and modify rest HPT # 2001/55  
1972/A&B sold to CHHFS on 7th December 2000  
NRC approval gained 27th March 2001 for Winter harvest (variation)  
Contract extension to 30 September 2002  
NRC approval gained 23rd April 2002 Winter harvest (variation) and 4 week earthwork extension  
This extension revoked 16 June 2002  
Contract extension to March 31, 2003  
Harvest restarted October 2002  
Harvest finally complete April 2003, and clean up May 2003  
Area replanted over 3 seasons, approx 9ha 2001, 37.5ha 2002 and 19.9 ha 2003  
Archaeological survey and report prepared on completion - see NAR Nov 2003.  
Report submitted to HPT 8th December 2003 for completion #2001/55  
HPT confirmation all conditions met - 24th December 2003  
**COMPLETE and HPT AUTHORITY # 2001/55 CONCLUDED**



**ARCHAEOLOGICAL SITES IN STAND "1973/A & B" (01/02 plan = 1973/A and 02/03 plan = 1973/B)**

Site ID	Description	Current Status	Recommendation	Action	Stand	Annual Plan	Contract	Outcome
Q07/1071	Possible timber driving dam ? In the stream, in native area	No trace	OK, non harvest area	n / a	1973/A&B	01/02 02/03	SNL 2003/04	preserved complete
Q07/522	Pa site	More information from Neville required ?.	out of area		1973/A	01/02		
Q07/1065	Described as a pit , shallow, 4*2*0.3m	Modified and one end under boundary fence location is actually further west	Careful logging Leave unplanted.	Previously part of stand 1971 B logging As per recommendation. Not an issue for this harvest area. HPT approval 11/09/01 to modify (remove trees)	1973/A	01/02		preserved complete
Q07/1061	Described as 2 pits , shallow. 3*2*0.2 and 5*2*0.2	Modified already, partly filled or shallow.	Careful logging Leave unplanted.	Previously on edge of stand 1971 A logging As per recommendation. Is only a backline/anchor point/issue now Can be worked around OK not lodged with HPT	1973/A	01/02	SNL 2003/04	preserved complete
Q07/1059 photo	Described as a single pit , open, damaged 4*2*0.8	Modified already, adjacent to track, Pine has uprooted and modified part of pit.	Careful logging Leave unplanted.	Previously on edge of stand 1971 A logging As per recommendation. Is only a backline/anchor point/issue now Can be worked around OK HPT approval 11/09/01 to modify( remove trees)	1973/A	01/02	SNL 2003/04	preserved complete
Q07/1058	Described as 2 pits , filled 1*1*0.15	Modified already, adjacent to tracks. Partly filled or shallow.	Careful logging Leave unplanted.	Previously on edge of stand 1971 A logging As per recommendation. Not an issue for this harvest area. Can be worked around OK HPT approval 11/09/01 to modify (remove trees)	1973/A	01/02	SNL 2003/04	preserved complete
Q07/1060 photo	Described as a midden and 2 scarps.	Modified by bulldozer track, before current harvest	Careful logging Leave unplanted.	Within harvest area As per recommendation. Need to get a machine down to log carefully It is possible to work around and preserve this site. HPT approval 11/09/01 to modify (remove trees)	1973/A	01/02	SNL 2003/04	preserved complete
Q07/1069 photo	Described as terraces 7*4 and 9*5	Good condition	Careful logging Leave unplanted.	On edge of proposed landing area As per recommendation. It is possible to work around and preserve this site. HPT approval 11/09/01 to modify (remove trees)	1973/B	01/02 02/03	SNL 2003/04	preserved complete
Q07/1070	Described as 2 terraces and 3 pits Terraces are 5*4m, Pits are 5*2*0.2, 3*2*0.25, 5*2*0.3	Broad ridge top, poorly defined site	Careful logging Leave unplanted.	On edge of proposed landing and processing area Destruction is unfortunately unavoidable Measures agreed with iwi. HPT application to destroy obtained 11/09/01	1973/B	01/02 02/03	SNL 2003/04	destroyed 17/10/02 DN reports done Dec 02 Complete
Q07/1068 photo	Described as 2 shallow pits, 3.5*3.5*0.25, 3*1*0.15	Partly filled or shallow.	Careful logging Leave unplanted.	As per Q07/1069 it is on the edge of proposed landing area Destruction is unfortunately unavoidable Measures agreed with iwi. HPT application to destroy obtained 11/09/01	1973/B	01/02 02/03	SNL 2003/04	preserved complete
Q07/1067	Pit in good condition, 4*1.5*0.7	already preserved - in unplanted area	OK, outside this area	n / a	n/a	n/a	SNL 2003/04	preserved complete
Q07/1066	Midden under rock overhang	already preserved - in unplanted area	OK, outside this area	n / a	n/a	n/a		
Q07/989	Mound, in watercourse	within 1991 planting, already preserved	OK, outside this area	n / a	n/a	n/a		

**NOTES:**

Areas first submitted as part of 2001/02 plan for 1973/A  
Possible sites in 01/02 Annual Plan re 1973/A were (Q07/1071, Q07/522, Q07/1065, Q07/1061, Q07/1059, Q07/1058, Q07/1060, (adjacent 1067,1066)  
Pre- harvest archaeological Report prepared - David Nevin - July 2001  
All OK, application to HPT 17 July 2001, for Q07/1058, 1059, 1060, 1065 (not 1061 edge) and not (adjacent 522, 1071, 1067,1066) APPROVED 11/09/02 (Sec's 11 and12, modify)  
This application to HPT also included Q07/1069 (modify) and Q07/1068 and Q07/1070 which were to be destroyed APPROVED 11/09/02 (Sec's 11 and 12)  
Possible sites in 02/03 plan re 1973/B were Q07/1069, Q07/1070, Q07/1068 (adjacent 1067, 1066, 1071, 989)  
Approvals from HPT already obtained. HPT 2002/15 the renewed to 2004/40  
Stand 1973/A&B sold to SUTTONS (approximately 102.2 ha)  
Site Q07/1070 destroyed 17/10/02 but Q07/1068 was preserved - despite HPT approval to destroy  
Report on Q07/1070 prepared for HPT - reports by D Nevin Dec 2002  
Actioned, and harvest completed April 2004  
Clean up, end of May 2004.  
Area was replanted 2003 (53.8ha) , 2004 (43.3) and some retired also  
Archaeological survey and report prepared on completion - see Report NAR Oct 2004  
Report submitted to HPT 3rd November 2004 for completion #2002/15 then 2004/40  
HPT confirmation all conditions met - 29th Nov 2004  
**COMPLETE and HPT AUTHORITY # 2002/15 or 2004/40 CONCLUDED**



**ARCHAEOLOGICAL SITES IN STAND "1974/A & B" (04/05 Annual Plan)**

Site ID	Description	Current Status	Recommendation	Action	Stand	Annual Plan	Contract	Outcome
Q07/1054	Described as a pit , shallow, 2*1*0.7m north is another pit 1.5*0.7*.4m also terrace 3*2 and faint scarp	Good, in native pole stand hard to find	OK, non harvest area	n / a	1974/A	04/05	TDC 04/05	preserved complete
Q07/1055 photos	Described as 6 pits ,	Excellent condition easy to find	Careful logging Leave unplanted.	As per recommendation. Can be worked around OK HPT approval 2004/251 to modify( remove trees)	1974/A	04/05	TDC 04/05	removed trees with NAR/WB preserved = Ref Rep 12
Q07/1056 photos	Described as 2 pits , 4*2*1.2m and 5*2*1.2m	Good condition easy t find	Careful logging Leave unplanted.	As per recommendation. Can be worked around OK HPT approval 2004/251 to modify( remove trees)	1974/A	04/05	TDC 04/05	removed trees with NAR/WB preserved = Ref Rep 12
Q07/1057 photos	Described as pits and terrace. 5*2*0.4, 2*2*0.2m and 2.5*2.5*.6m 20 m gap to a terrace and small midden	Average difficult to locate all features	Careful logging Leave unplanted.	As per recommendation. Can be worked around OK HPT approval 2004/251 to modify( remove trees)	1974/A	04/05	TDC 04/05	removed trees with NAR/WB preserved = Ref Rep 12
Q07/1072	Described as a single pit , open, 2*1*0.8m perhaps fall area 4*4 at 8m metres along ridge 10m NW is a tree throw hole,	Average easy to find	Will be destroyed Follow HPT requirements	As per recommendation. It will be destroyed due to landing being formed here Agreed with iwi 21/06/04, HPT application to destroy obtained 2004/251	1974/B	04/05	TDC 04/05	destroyed Sept 04 NAR report Oct 2004 COMPLETE

**NOTES:**

Areas submitted as part of 2004/05 plan for 1974/A & B  
Possible sites in 04/05 Annual Plan re 1974/A & B were (Q07/1054, Q07/1055, Q07/1056, Q07/1057, Q07/1072)  
Pre-harvest archaeological Report prepared - report NAR April 2004  
All OK, application to HPT 30th April 2004 for Q07/1055, 1056, 1057 and to destroy Q07/1072  
Approvals from HPT obtained 15th July 2004, HPT Authority 2004/251

Stand 1974/A&B sold to TDC SAWMILLS (approximately 26 ha)  
Site Q07/1072 destroyed 23/09/04  
Report on Q07/1072 prepared for HPT - report NAR - Oct 2004  
Report submitted to HPT 4th November 2004 for site Q07/1072 and sign off for this site re Authority # 2004/251  
HPT confirmation conditions met for Q07/1072 - 27th Nov 2004  
29th March 2005 - Removed trees from q07/1055, 1056 and 1057 with Ivan and WB  
Report on 1974/A prepared for HPT - report NAR - APRIL 2005 Ref 12  
Report submitted to HPT 15th May for sites Q07/1055, 1056 and 1057 and sign off for this site re Authority # 2004/251  
HPT confirmation all conditions met - 30th May 2005  
**COMPLETE and HPT AUTHORITY # 2004/251 CONCLUDED**



ARCHAEOLOGICAL SITES IN OR NEAR STAND 1977 (Annual Plan 2007/08)									
Site ID	Description	Current Status	Recommendation	Action	Stand	Annual Plan	Contract	Outcome	
Q07/1075	6 pits and a terrace on 128.2 m ridge	Already modified, remains are excellent	Was in 1972A&B area outside this harvest area	Previously treated as per recommendation Agreed with Ngati kahu on site HPT approval 20/12/00	1972/A&B	00/01	CHHFS	preserve complete	
Q07/1074 photo	5 Pits/ 3 terraces/platform, small settlement on 162.4 m ridge	Already modified,	Was in 1972A&B area outside this harvest area	Previously treated as per recommendation Agreed with Ngati kahu on site HPT approval 20/12/00	1972/A&B	00/01	CHHFS	preserve complete	
Q07/1073 photo	Midden above 3 terraces	Already modified,	Remove trees Leave unplanted.	as per recommendation Agreed with Ngati kahu on site not lodged with HPT		1977 07/08	NFM managed sale 2010	will be preserved	

**NOTES:**

Areas submitted as part of 2007/08 plan for 1977 stand  
 These sites were previously involved in the 1972/A&B harvest area  
 No pre-harvest archaeological report prepared - as only Q07/1073 likely involved  
 All OK, application to HPT 30th June 2007 for modify (remove trees) Q07/1073 and section 12 (general)  
**Approvals from HPT obtained 14th August 2007 - HPT Authority 2008/09**  
 NAR inspected forest and works 03/09/2007 & Report on site Q07/1073 & site plan  
 Stand 1977 was deferred from sale in Oct 2007 and Oct 2008 and early 2009  
 NRC agreed to proceed with harvest of 1977 area over 2009/10 summer - managed log sale  
 IJ to HPT, intention to start, NAR sec 17 archaeologist, site mgmt plan included 19th October 2009  
 Harvesting & Marketing Agent - Northland Forest Managers (1995) Ltd  
 Harvesting commenced Jan 2010  
 NAR informed & on stand by & when required fro site Q07/1073 works - 19th October 2009  
 Iwi informed - by NFM 28th october 2009  
 25th January 2010 - On site startup and iwi blessing  
 2 May - Removed trees from Q07/1073, no iwi, NFM checked & ok to go, NAR looked at after also.  
 3 June 2010 = Report on Q07/1073 & final 1977 prepared for HPT - report NAR - #14  
 13 June 2010 = Report submitted to HPT for Q07/1073, final and sign off for this site re Authority # 2008/09  
 HPT confirmation all conditions met  
 COMPLETE and HPT AUTHORITY # 2008/09 CONCLUDED

