

Roger Dickie NZ Ltd

Waikare Forest Second Rotation Feasibility

September 2017



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30 September 2017

Summary

The strategy for developing and managing a second rotation of radiata forestry at Waikare is presented along with associated costs and returns in present NZ dollar values.

An estimated 445.0 hectares of land at Waikare Forest is expected to be planted with radiata pine at a stocking of 1,000 trees per hectare before the project starts in 2019.

Returns are calculated under the assumption that the forest is managed on an unpruned and thinned tending regime. A single waste thinning to a final crop stocking of 600 stems per hectare is proposed. Forecast yields are based on the performance of the current crop being harvested on the property. The prices of logs are based on recent historic prices up to September 2017. The forest is to be replanted after the crop is harvested and the property is assumed to be sold in year 2045.

Rogers comment:

The \$3.99 million is the total cost of land, trees and forest tending for the next rotation.

Investors would only be leaving in \$1,050,000 or \$2,450 per hectare to fully fund the next rotation.

The total development cost, including purchase of land and trees, maintenance, tending and management, is estimated in current money terms at \$3.99 million. Inflation is expected to increase these costs. Expenditure is concentrated in the first four years with the maximum demand being \$1.77 million in 2019 for purchase of land, trees and other management costs.

Revenue from hive rental, harvesting, and the sale of land and trees at the end of the project is forecast in current money terms at \$12.01 million. Harvest is scheduled when the tree crops reach age 26. Log prices used in the projection of revenues assume no real increase over time. Forecast forest costs are based on current industry standards.

The internal rate of return of the project, as described in this report, is:

- 6.55% pre-tax, real
 - 5.52% post-tax, real
-

1. Introduction

Terms of reference

At the request of Roger Dickie N.Z. Limited (RDNZ), PF Olsen Limited has prepared this report on the development and management of a forest crop on Waikare forest. The purpose is to assess the economic returns from a second rotation of forestry on the property.

Scope

This report details the development programme, operations, costs and financial returns from the management of this property assuming current best forestry practice. Actual management undertaken by the designated forest manager under the ultimate control of the forest owner may differ from the programme set out in this report. The assembled cashflow and IRR calculation does not purport to be a budget. Actual costs may vary and are expected to increase with inflation.

Waikare forest is currently being harvested and replanted. The project described in this report is assumed to commence in 2019 with the newly-planted tree crop, and finish in 2045 after this crop is harvested and a new crop replanted.

Methodology

Following a site inspection, an afforestation development programme has been developed, setting out the operations and costs needed to manage a radiata pine forest on the property. Future yields at clearfell have been estimated using appropriate growth models, and future harvest revenues are estimated based on current projected log prices.

Data sources

We have relied on a map of the potentially productive area at Waikare produced by Forest Management NZ Ltd (FMNZ), the current forest managers of Waikare. This map was checked in the field by PF Olsen Ltd (PF Olsen).

In addition, FMNZ has provided data on the actual harvest yield by log grade from recent harvesting on the property, and the costs to re-establish the new crop.

All other costs and prices have been assessed by PF Olsen Ltd (PF Olsen) and are based on current best industry practices. All costs and prices exclude GST and are expressed in current NZ dollar terms, unless noted otherwise.

A PF Olsen staff member inspected the property on 15 September 2017.

2. Physical Description

Location and access

The Waikare property is located approximately 20 kms north of Waitotara (on SH 3), via Mangawhio and Ngutuwhera Roads. Access is gained off Waikare Road.

The log export facility at New Plymouth is 140 kms away. The forest is 22 kms from Waverley and 55 kms from the railhead at Wanganui.

Internal access is afforded by a network of harvest roads. These have been recently installed to allow for harvesting of the current crop.

Legal description

Waikare forest is on land with the following legal description.

Table 1: Legal description

Title reference	Description	Legal area (hectares)
105/209	Sec 27 Blk XIII Moumuhaki SD	593.3703
22B/24	Pt Sec 28 Blk XIII Moumuhaki SD	217.7749
33A/957	Sec 25 Blk V Omahine SD	169.1586
21A/756	Sec 20 Blk V Omahine SD	2.0359
155/107	Lot 1/A 2153	11.0858
	Total legal area	993.4255

The property lies within the South Taranaki District. The tenure is freehold.

We have not inspected the titles for encumbrances which may constrain a forestry land use. Given the current forestry land use of the property, we have assumed that there will be no encumbrances constraining a second rotation.

Planted area

According to a map produced in September 2017 by FMNZ (Map appended), the total potentially productive area is anticipated to be 459.7 hectares when the project starts in March 2019.

A check of this map during the field inspection showed it to be reasonably accurate with good positional accuracy for roads and skid locations. It was noted that, as of the date of the inspection, approximately 75 hectares of the older crop remained to be harvested. This harvesting is expected to be completed, and the area replanted, by 2019.

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The inspection also noted the presence of some unmapped gaps in the planted area of the young crops. These were most likely the result of mid-slope erosion.

Young crops are typically mapped using ground survey after planting. They are then remapped at around age 3 or 4, once the trees become visible on aerial imagery. This remapping usually results in a decrease of the stocked area estimate due to factors such as small areas of crop failure and inaccuracies in the original mapping.

In this case, we have assumed that the planted area at Waikare in 2019 will be reduced by 3.2% from the current estimate of potentially productive area. This allows for the small gaps already apparent, and for future area loss between now and 2020 when the forest is remapped.

Table 2: Planned productive area at start of project in 2019

Plant year	Mapped area (hectares)	Current status	Projected area (hectares)
2013	7.6	Established	7.4
2016	110.7	Established	107.1
2017	150.0	Established	145.2
2018	191.4	To be planted	185.3
Total	459.7		445.0

This report assumes that 445.0 hectares will be established when the project starts in March 2019.

Topography and soils

Approximately three quarters of the property is on medium to steep hill country, with the balance on easy to medium hill country. Altitude ranges from 50m to 350m above sea level.

We have assumed that 70% of the area will require harvesting using cable hauler logging systems. The balance can be logged using ground-based systems. These estimates have been made using topographic maps, supplemented by observations during the field inspections.

The soils are comprised predominantly Brown Orthic and Brown Allophanic soil groups¹. These are relatively stable soils with good drainage and deep rooting depths. The potential for erosion is slight to moderate.

¹ New Zealand Fundamental Soil Layer – NZ Revised Soil Classification

Growth potential The growth potential of a forestry site is indicated by two measures: site index and 300 index.

Site index is a measure of the height growth potential of a site. For radiata pine the parameter used is the mean height in metres of the 100 largest trees per hectare by diameter at age 20.

The 300 index is a measure of the volume growth potential of a site. It is the estimated mean annual increment for a specific management regime, and expressed in m³ per hectare per year.

The Radiata Pine Productivity Surface is a map-based predictor of radiata pine growth.² It derives estimates of site index and 300 index from soil and climate variables. It gives a general indication of site productivity. The Waikare site produces estimates of 31.8 and 33.6 for site index and 300 index respectively, when using this tool.

Productivity measures can also be estimated from inventory data collected on the tree crop. Using measurement data collected during the tending operations on the first tree crop at Waikare, a site index of 31.5 and a 300 index of 30.5 were projected. These latter measures are considered more accurate, having been projected from actual measurements rather than regional averages.

² Palmer, D.J., Watt, M.S., Kimberley, M.O., Hock, B.K., Payn, T.W., and Lowe, D.J. 2010. Mapping and explaining the productivity of *Pinus radiata* in New Zealand. N.Z. J. Forestry, 55 (1) 15-19.

3. Legislation

Introduction

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

The following legislation and agreements currently apply to the proposed afforestation and forest operations at Mangawehi.

Emissions Trading Scheme (ETS)

The NZ Emissions Trading Scheme (ETS) has been created by an amendment to the Climate Change Response Act 2002.

The ETS allows for a price to be set on emissions of greenhouse gases, providing appropriate incentives for sectors to reduce their net emissions.

Waikare received a one off allocation of 16,671 NZUs with no liability.

These are being sold down and will contribute approximately \$280,000 to the required \$1,080,000 retained earnings for the next rotation.

ETS treats forest land in two distinct ways, depending on its status on 31 December 1989.

Pre-1990 forest land – land that was established in exotic or indigenous forest species on or before 31 December 1989, and that remained in exotic species on 31 December 2007.

Post-1989 forest land – land established with exotic or indigenous forest species after 31 December 1989, on land that was not forest land on 31 December 1989.

The productive area at Waikare is classed as Pre-1990 forest land. If the land is converted to another land use, the landowner would be liable for deforestation penalties. Replanting is therefore assumed following harvest. As Pre-1990 classified land, there are no carbon revenue opportunities at Waikare from the ETS.

New Zealand Forestry Accord

The New Zealand Forestry Accord is an agreement between members of forest industry organisations and conservation groups. This accord recognises that plantation forestry is essential for the conservation of natural forests and that forestry development on private land will exclude areas of natural forest within the property boundaries. The proposed development at Waikare excludes the development of such areas. The Waikare forest owner may become a member of the New Zealand Forest Owners' Association, which is a signatory to this accord and the Principles that follow.

**Principles for
Commercial
Plantation
Management in
New Zealand**

These Principles have also been agreed between members of the NZ forest industry and conservation groups. Parties to this agreement undertake to apply sound ecological, social and economic principles to forest management operations. Management practices must meet all statutory requirements and accepted best practices.

**New Zealand
Forest Code of
Practice**

All operations carried out on the property should be undertaken to the standards specified in the New Zealand Forest Code of Practice. This document sets out guidelines which are aimed to ensure safe and efficient forest operations that meet the requirements of sound and practical environmental management, to maintain environmental values, forest health and site productivity and provide a safe working environment.

**Resource
Management Act**

Waikare Forest is subject to the provisions of the Resource Management Act (RMA) 1991. The RMA integrates existing laws and sets up a resource management system that promotes sustainable management of natural and physical resources. It is the principal statute for the management of land, water and soil and associated resource values.

Under the RMA, the Waikare block falls under the authority of the South Taranaki District Council for land management issues, and Taranaki Regional Council for soil conservation and water quality.

In general, all harvesting operations including forestry roading and vegetation clearance are restricted discretionary activities and will require resource consents. Applications must be lodged with the Taranaki Regional Council and will thus be subject to any conditions that they may impose pursuant to the regional plan.

**National
Environmental
Standards for
Plantation
Forestry**

National Environmental Standards (NES) are regulations made under the Resource Management Act 1991 (RMA) and:

- set out technical standards, methods or requirements relating to matters under the RMA
- provide consistent rules across the country by setting planning requirements for certain specified activities.

The NES prevails over district or regional plan rules except where the National Environmental Standards for Plantation Forestry (NES-PF) specifically allows more stringent plan rules. The NES-PF were published on 3 August 2017 and will commence on 1 May 2018.

Heritage New Zealand Pouhere Taonga Act

Under the Heritage New Zealand Pouhere Taonga Act 2014 it is an offense to destroy, damage, or modify any archaeological site unless successful application is made to Heritage New Zealand.

Health and Safety in Employment

The Health and Safety at Work Act 2015 has a main objective to prevent harm to employees while at work. It is the responsibility of the forest owner, the manager and any contractors to ensure that all workers on the forest are suitably trained for the job they are carrying out, that adequate safety equipment has been provided and that safety procedures are adhered to.

Other relevant legislation

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

- Fire and Emergency New Zealand Act 2017
 - Biosecurity Act 1993
 - Pesticides Act 1979
 - Hazardous Substance and New Organism Act 1996
 - Climate Change Response Act 2002
-

4. Forest Development Plan and Costs

Introduction

A development programme is proposed and outlined below which sets out the operations considered necessary to manage the property assuming current best forestry practice. The management objective is to maximise returns from the sale of logs within a framework of managed risk, and subject to legal and physical constraints. Actual management, carried out by the designated forest manager under the direction of the forest owner, may differ from that presented here.

All costs are presented in 2017 NZ\$ terms and represent current industry efficient costs. Inflation can be expected to impact on future costs and revenues. Details of operations and costs are contained in Appendix 2.

The project is scheduled to begin in March 2019. It is assumed that a tree crop will have been successfully established by that time. Establishment up to September 2017 has been successful, as evidenced by the field inspection. Establishment to date has been at the rate of 1,000 stems per hectare of GF19s tree stocks, and we have assumed this will continue.

Land preparation and infrastructure installation (roads, fences etc.) are also assumed to be completed prior to the project starting. The field inspection in September has confirmed this.

Tending

Both a pruned and unpruned regime are tested in this feasibility. The tending operations and costs are shown below for each regime.

Rogers comment:

At this stage we are not anticipating pruning the forest, however there is a cash buffer in the projected retained earnings, and this decision does not need to be made until the tree crop is age 5.

If the decision was made to prune, it is likely that only the best areas of forest would be pruned. i.e. none of the steep hard faces would be economic to prune.

Table 3: Tending operations – pruned regime

Tree age	Operation	Cost (\$/ha)
5.0	Prune 375 s/ha to 3.0m	1,307
6.5	Prune 360 s/ha to 5.0m	862
7.5	Prune 350 s/ha to 6.2m	532
8.0	Waste thin to 350 s/ha	770

Table 4: Tending operations – unpruned regime

Tree age	Operation	Cost (\$/ha)
8.0	Waste thin to 600 s/ha	600

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Recent research conducted by Scion indicate that thinning to a final crop stocking of 600 stems per hectare maximises value at maturity.³

Provision has been made for mapping prior to the first silvicultural operation (pruning or thinning), once trees are visible in aerial photography. A cost of \$12 per hectare for mapping has been included in the cashflow.

Close supervision of silvicultural operations is essential. The tending costs shown above include a component to cover field supervision. Provisions have been made in the forest management costs for stand assessment inventories to be carried out in conjunction with the tending operations.

Inventory

A pre-harvest inventory is scheduled two years prior to the onset of clearfelling operations. The objective of this inventory is to provide data on the quantity and quality of log products expected from this forest. This data is used for harvest planning and will assist in developing a marketing plan for the logs. This inventory is expected to cost around \$90 per stocked hectare. This includes an allowance for updating the mapping of the forest.

Re-establishment

We have assumed that the entire planted area will be replanted after harvest.

An aerial desiccation spray will be carried out to suppress weed growth, and planting will be carried out in the year following harvest. A cost of \$300 per hectare for application, chemical and supervision is included in the cashflow.

It is proposed that this crop is managed in the same way, with planting of radiata pine seedlings at a rate of 1,000 stems per hectare and managed under the same regime as the prior rotation.

Rogers comment:
Because the forest is pre 1990 it is a requirement to be replanted following harvest. This is being carried out each winter and funded from harvest receipts.

Table 5: Re-establishment costs

Operation	Cost (\$/ha)
Aerial desiccation spray	300
Plant 1000 s/ha GF19s	1,030
Releasing	288

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³ Moore, J. R., Dash, J. P., Lee, J. R., McKinley, R. B., & Dungey, H. S. (2017). Quantifying the influence of seedlot and stand density on growth, wood properties and the economics of growing radiata pine. *Forestry: An International Journal of Forest Research*, 1-14

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These costs include a contingency of 3% to allow for uncertainty in the areas to be treated. Mapping of cutover following harvest will determine actual areas to be re-established.

These costs compare well with actual costs of the recent re-establishment at Waikare, which have been reported at around \$1,445 per hectare in total for aerial desiccation, planting and releasing.⁴

⁴ Forest Management NZ Ltd

5. Protection

Fire

Losses of forest to fire have been relatively low in New Zealand. Losses continue to diminish with:

- Better detection, reporting (cell phones) and early suppression techniques,
- Better public education,
- Conversion of former areas of unmanaged scrub near to forests to productive use.

To reduce the fire risk, public access should be restricted by locked gates. The forest manager should ensure that trained personnel are available on standby during periods of high fire risk.

The risk of loss can be minimised through good work practices, ensuring contractors are equipped to put out small accidental fires and by making arrangements for the rapid deployment of men, helicopters and equipment in the event of a fire being detected.

Fire is an insurable risk. We recommend that both fire and public liability insurance be taken out for the full value of the forest over the entire rotation. This cost has been included in the cashflow.

Wind

Wind damage can be classified as:

- Malformation, meaning deformed stems or tops blown out,
- Attritional, meaning the loss of individual stems or small groups over the life of the forest,
- Catastrophic, meaning substantial areas of forest are blown down in single storm events.

Historically, wind has caused far more damage to forest plantation in New Zealand than fire. Catastrophic losses have averaged 0.21% of the stocked area per annum, but regional differences are significant⁵. Canterbury Plains and the South Island West Coast regions have been the worst affected.

The risk of losses due to wind can be reduced through correct establishment techniques. Also, insurance against windthrow loss is available, and provision for this cost has been made in the feasibility cashflow.

⁵ Moore, J., Manley, B. and Park, D. (2011) Quantification and management of the risk of wind damage to New Zealand's planted forests. MAF Technical Paper No: 2011/41.

Disease

Established pathogens affecting radiata pine have a relatively minor impact on forest growth with good management practices. However, despite being an island nation with high standards of border control, new introductions of forest insects and fungi do, and will continue to occur. Forest health monitoring programmes can assist in controlling this risk.

Existing forest plantations in the area surrounding Waikare are generally in a good state of health. The common needle cast fungus *Dothistroma pini* is present in the region. If infection does occur, control is cheap and easily implemented by aerial spraying with copper fungicides. An allowance has been made in the property maintenance and protection cost for this.

A number of other forest pathogens common to New Zealand occur in the region but, to date, have not posed a serious health threat.

There is always the possibility of a serious disease or insect pest becoming established in the country and affecting tree growth. This is one of the risks of any forestry investment. The Ministry for Primary Industries have responsibility for port surveillance and organise annual checks on forest health subject to payment of an annual levy. We have incorporated this into the feasibility cashflow forecast.

Other pests

Possums damage the stem leaders and their numbers should be controlled. Hares and goats can also cause significant damage to newly planted trees. Costs for animal control are included in the cashflow.

Security

Security gates and locks can be installed to prevent unlawful trespass and control the risk of fire during dry periods. An allowance has been made in the forest management component of the cashflow for maintaining these security measures.

Attrition loss

It is prudent to allow for some loss in productive area over the course of the rotation, over and above those losses covered by insurance. We have assumed that Waikare forest will lose 5% of the area over the full 26-year rotation in addition to those possible losses from wind and fire that are expected to be covered by insurance. We have applied this attrition loss to the projected stumpage revenue estimate.

6. Management

Mapping

Prior to silviculture operations, the block should be photographed from the air to accurately complete stand maps and define net stocked area boundaries. Silviculture contractors are commonly paid on an area basis. Accurate mapping prevents overpayments and avoids disputes regarding area actually completed. Costs for this have been included in the cashflow.

Mapping should also be updated prior to logging to assist with harvest planning. The future revenue and value of the tree crop is directly proportional to the area actually stocked. Having accurate maps of the forest is necessary for planning and monitoring forest operations and allows the forest owners to have confidence in the costs and revenues projected. Costs for this have been included in the cashflow.

Waikare forest mapping is currently carried out to a high standard by the current manager, and we assume that this will continue.

Forest management

Forest management includes the following:

- Planning forest operations.
- Obtaining resource consents.
- Organise contractors and supplies.
- Ensure compliance with rules and regulations.
- Preparation of annual budgets.
- Monitoring, recording and reporting of physical and financial performance.
- Maintenance of stand records and maps.
- Collection of inventory data, including permanent sample plot (PSP) data.
- Risk management.

We have assumed a cost of \$15 per hectare plus 5% of operation costs per year to cover these items.

Property maintenance

The current harvest roading network will need to be maintained throughout the rotation to an adequate standard to allow for access by fire crews and for tending and management operations. This also ensures that the costs to upgrade these roads at harvest time will be manageable.

We have assumed a cost of \$20 per hectare per year to cover protection and maintenance costs at Waikare.

Administration

Forest owner administration includes:

- Communication with the forest manager.
- Preparation of annual tax returns.
- Audit and valuation.

A cost of \$20 per hectare per year has been assumed to cover this, and assumes a similar partnership ownership structure to that currently existing.

Annual property rates are assumed at \$6 per hectare per year. This is based on the current rates levied by the District and Regional Councils, and excludes GST.

Annual costs

A summary of the forest protection, forest management and administration costs included in the cashflow is presented below.

Table 6: Annual costs

Item	Cost \$/ha/yr
Property Maintenance & Protection	20.00
Fire, wind & Public Liability Insurance ⁶	36.00
Forest & Operations Management ⁷	20.00
Administration	20.00
Rates	6.00
TOTAL	102.00

⁶ The cost shown is an average over the full rotation. Costs will vary with crop value over time.

⁷ Costs will vary with activity levels on the forest.

7. Yields

Models

The Forecaster modelling system (version 2.2.0) has been used to estimate log yields for Waikare. Model settings are shown below.

Table 7: Model settings

Parameter	Setting
Growth model	300 Index
GM mortality additive adjustment	0.10
GM mortality multiply adjustment	0
Regional drift	-0.05
Sweep model	Generic
Forking model	Generic
Branch model	Blossim
Volume & Taper model	460
Breakage model	1
Stump height	0.3m

These settings are appropriate for estimating future radiata log yields at Waikare, in our view. No formal validation of any of these settings has been carried out specific to Waikare forest.

Log grade specifications

Total estimated yield has been further refined to predict log grade outturn in the following log grades.

Table 8: Log grade specifications

Log grade	Min SED (cm)	Max knot (cm)	Lengths (m)
Pruned	40	None	4.0, 5.2
A export	30	12	4.0, 6.0
K export	20	12	4.0, 6.0
KI export	26	25	4.0, 6.0
KIS export	14	N/A	4.0

Benchmarking

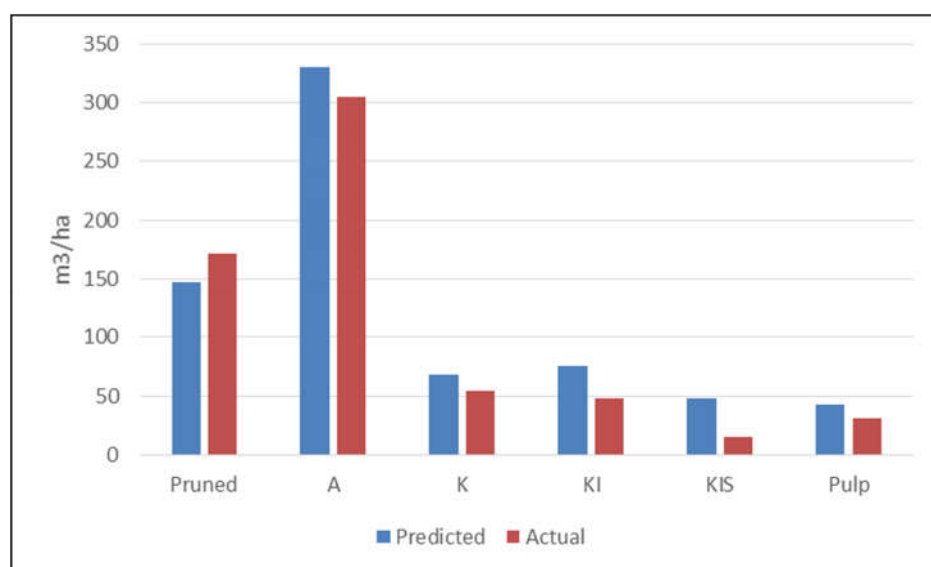
The current crop at Waikare is being harvested presently. The actual yields achieved in this harvesting provide a useful benchmark for the predicted yields of the next rotation. Harvest data has been provided by FMNZ and is used for this comparison.

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The bulk of the crop has been harvested at age 27. Actual yields by log grade are compared with predicted yields at this age. The predictions were made with model settings similar to those assumed in this report, and projected from actual measurements recorded during the tending operations. The results of the comparison are shown below.

Figure 1: Waikare 1989 crop yield – predicted vs. actual



Overall, predicted recoverable volume is 14% higher than the actual recovered volume.

The results show reasonably good alignment in yields by log grade. Collectively, the Pruned and A grade components are virtually identical. The differences are assumed to be due to misalignment of log specifications.

The lower value grades (K, KI, KIS and Pulp) are being over-predicted by varying amounts. The following adjustments are required to align the predictions.

Table 9: Log grade adjustments

Log Grade	Adjustment
Pruned	0%
A	0%
K	-20%
KI	-35%
KIS	-70%
Pulp	-25%

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Given the relatively low proportion of volume in the lower value grades, the application of these adjustments lowers the total predicted recoverable volume by around 14%, bringing it into alignment with the actual outturn for the 1989 pruned regime crop.

The adjustments above have been applied to the predicted yields for the second rotation at Waikare. The adjustment applied to the unpruned regime results in a 17% reduction in TRV as a higher proportion of the volume resides in the lower value grades compared to the pruned regime.

Log yield

Harvest of most of the tree crop is assumed at age 26⁸. At that point the stand is projected to have the following characteristics.

Table 10: Average stand variables at age 26

Variable	Pruned regime	Unpruned regime
Stocking (s/ha)	328	519
Mean Height (m)	36.7	36.6
Basal Area (m ² /ha)	63.1	78.3
Standing Volume (m ³ /ha)	820	984

Yield by log grade is shown below.

Table 11: Predicted Yield by log grade at age 26 (m³/ha)

Log grade	Pruned regime	Unpruned regime
Pruned	145	0
A export	303	406
K export	76	184
KI export	45	24
KIS export	15	31
Total recoverable	584	645

There is only an opportunistic market for domestic pulp in the region. Therefore, we have assumed that this material will be left behind on the forest.

⁸ The small area of 2013 plantings is assumed to be harvested at age 29.

8. Forecast Log Prices

Log prices

The prices used in this report are what we consider to be long term predictions. Prices are based on those achieved in the Southern North Island (SNI) by PF Olsen. They represent the average of the past three years to September 2017.

Table 12: Log Prices (\$/m³)

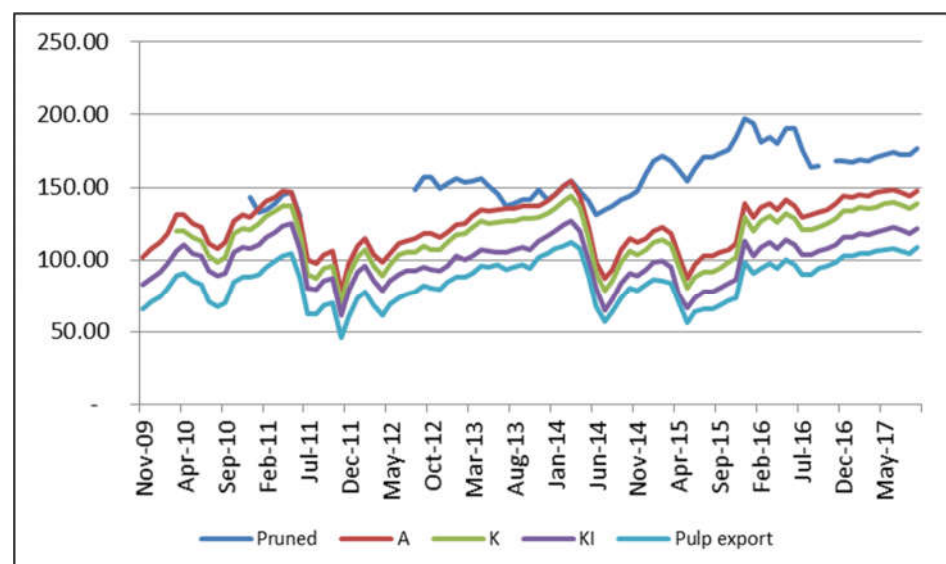
Log grade	Log price (\$/m ³)
Pruned	172
A export	123
K export	112
KI export	100
KIS export	88

Log prices are specified in 2017 NZ dollar terms, delivered to wharf or mill gate. We have assumed that all log prices remain constant in real terms through time.

Pricing perspective

The graph below shows the trend in prices at Napier Port over the past 8 years, up to September 2017. Napier was used because it has a more complete and available price history than New Plymouth. New Plymouth export price trends are similar.

Figure 2: Quarterly log prices – CPI adjusted (\$/m³)



9. Forecast Revenue

Log production costs

To derive the net value per cubic metre, the costs of cartage, roading, logging, loading and harvest management are deducted from wharf gate prices.

Log production costs for the second rotation at Waikare are estimated as follows.

Table 13: Log production costs (\$/m³)

Item	Cost \$/m ³
Logging	39.00
Harvest management	5.00
Road upgrade and maintenance	4.60
Post-harvest costs	1.50
Cartage – New Plymouth	31.10
Total Log Production Costs	81.20

These costs assume harvesting at age 26 and are estimated, on average, over the whole block.

Logging costs assume that 70% of the block will require cable hauler logging at \$42/m³, and 30% able to be logged with ground-based logging systems at \$32/m³. These costs are based on current rates prevalent in the SNI region, and supported by observations during the field inspection.

Harvest management costs include all costs associated with managing and monitoring the harvest operations. The forest owner's commodity levy is included here.

The road upgrade and maintenance cost takes account of the current harvest roading network, and assumes that this network will be maintained at a reasonable standard throughout the rotation. There are expected to be costs associated with upgrading these roads prior to the start of harvest operations. These costs are expected to cover items like installing new skids, upgrading drainage and surface metal. Total upgrade costs are expected to be around \$40,000 per km of road.

FMNZ estimate the complete harvest roading network at 18.8 kms. This implies a total upgrade cost at harvest of \$752,000 or \$1,690 per hectare. Apportioning this cost by recoverable volume gives an expected upgrade cost of \$2.60 per cubic metre.

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An additional cost of \$2.00 per cubic metre is assumed to cover maintenance of the roads during the harvest operations. Post-harvest costs of \$1.50 per cubic metre are assumed to cover the clean-up of the site after logging. This includes a small component to cover contingency costs.

Cartage costs assume that all recoverable volume will be sent by truck to the port at New Plymouth with an estimated cartage distance of 140km. Cartage costs at Waikare are expected to cost \$31.10 per cubic metre. This is in line with current rates prevalent in the SNI.

Net stumpage

Subtracting log production costs from the gross revenue realised at the price point gives net stumpage revenue estimates as follows.

Table 14: Net Stumpage estimates (\$ per hectare)

Item	2016-2018 plantings Age 26	2013 plantings Age 29
Unpruned option	\$22,117	\$26,093
Pruned option	\$27,526	

The 2013 plantings are shown separately because this small area (7.4 hectares) will be harvested at age 29 together with the 2016 plantings when they are harvested at age 26.

No pruned option is modelled for the small 2013 area, as this area will be too old for pruning when the project starts in 2019. Therefore, this area has only the unpruned option available.

These stumpage figures include an allowance for attrition losses at 5%.

Calculations are shown in Appendix 2.

Other revenue

We are advised by RDNZ that Waikare currently receives annual hive rental from apiarists of approximately \$12,000 per year.

For this project, we have assumed a hive rental income of \$15,000 per year. This is based on advice from RDNZ indicating an annual rental of \$50 per hive for 300 hives. We believe this is reasonable.

Sale of land and trees

We have assumed that at the end of the project the harvested area will be replanted and managed in a similar fashion as the first crop of new plantings. Replanting is projected to occur in the year following harvest. At the end of the simulation period, in year 2045, the replanted tree crop will be aged 1-3.

It is proposed that the land and the existing tree crop is sold at that time, through either a market sale or credited to the next rotation. The sale value is estimated as the sum of pre-tax expenditure from replanting and releasing up to that point. This estimate is considered fair and reasonable from a vendor and purchaser perspective in the current market for the sale and purchase of forests. Any reasonable variation around these assumptions about this future value estimate does not materially affect the projected financial return on investment.

The land is assumed sold at the current (2017) government valuation.

10. Financial Return

Internal rate of return

The costs and revenues associated with the project have been assembled into a cashflow, and internal rates of return calculated.

The cashflow starts in 2019 with the purchase of the land and tree crop, and finishes in year 2045 with the sale of the newly replanted tree crop and the land.

The purchase and sale of the trees and land are notional sales, and allow for the calculation of an internal rate of return (IRR).

Both the pruned and unpruned regimes have been tested. The IRRs (real, pre-tax) are reported below.

Table 15: Pre-tax, real IRRs by tending regime

Regime	Total Cost (\$ million)	Total Income (\$ million)	IRR (%)
Pruned	5.31	14.38	5.8
Unpruned	3.99	12.01	6.5

The unpruned regime returns the highest IRR, under the cost and price assumptions used here. The pruned regime may become more profitable in the future, with increased pruned log prices and under different cost assumptions. The decision on tending regime can be deferred until around 2021 when the first pruning operations need to be carried out.

We have assumed that an unpruned regime will be followed, and further analysis will be restricted to this option.

Sensitivity analysis

The rates of return calculated here are sensitive to assumptions made as to areas, yields, costs and, most importantly, log prices. The following table shows the impact on the IRR from using various pricing scenarios. The unpruned regime is assumed.

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Table 16: Sensitivity of IRR to log price assumptions

Log prices	IRR (pre-tax, real)
-10%	4.8%
-5%	5.8%
0	6.5%
5%	7.2%
10%	7.8%

The IRR is moderately sensitive to changes in log price assumptions. For example, assuming a set of log prices 5% higher than that assumed in this report increases the IRR from 6.5% to 7.2%.

The rate of return will also be sensitive to the level of other revenue achieved through the hive rental. This is tested below.

Table 17: Sensitivity of IRR to other revenue assumptions

Annual hive rental (\$/annum)	IRR (pre-tax, real)
\$0	6.1%
\$10,000	6.4%
\$15,000	6.5%
\$20,000	6.7%

Impact of inflation

All costs and revenues in this project are assumed to be in 2017 NZ\$ terms. Inflation can be expected to impact both costs and revenues. To test the impact of inflation, both costs and revenues have been inflated at a range of inflation rates. The resulting nominal cashflows produce the following IRRs.

Table 18: Impact of inflation

Inflation (% per annum)	Total Cost (\$ million)	Total Income (\$ million)	IRR (pre-tax, nominal)
0%	3.99	12.01	6.5%
1.5%	4.78	17.72	8.1%
2.0%	5.11	20.15	8.7%
2.5%	5.47	22.90	9.2%

Funding option

A funding option has been proposed by RDNZ whereby earnings from the current crop are retained to fund the establishment and management of the second rotation. This is augmented by income from the sale of pre-1990 carbon credits currently held by the present owners of the forest.

Funds are retained in an interest earning bank account, and used to fund the establishment and management of the second rotation.

Assuming a carbon credit sale of \$280,000 and a bank interest rate of 3.35% per annum (both sourced from RDNZ), then retained earnings from the current rotation need to be at least \$660,000 to cover all forest expenditure up to the point of harvest. This calculation assumes inflation at 2.0% per annum.

The full cashflow is shown in Appendix 3.

Appendix 1: Forest costs

Pruning (Pruned option only)	\$/ha
Prune 375 s/ha to 3.0m at age 5	1,307.50
Prune 360 s/ha to 5.0m at age 7	862.00
Prune 350 s/ha to 6.2m at age 8 (including supervision)	532.00

Waste Thin	\$/ha
Waste thin- pruned regime	770.00
Waste thin- unpruned regime (including supervision)	600.00

Aerial desiccation of cutover	\$/ha
Chemical	115.00
Application	125.00
Supervision	50.00
Contingency 3%	10.00
Total desiccation	\$300.00

Planting	1000 s/ha	\$/ha
Treestocks: GF19s	\$350.00 per 1,000	\$350.00
Packaging and freight	\$50.00 per 1,000	\$50.00
Labour	\$500.00 per 1,000	\$500.00
Supervision		\$100.00
Contingency 3%		\$30.00
Planting costs		\$1,030.00

Releasing	\$/ha
Chemical - Valzine 500, 15L/ha	145.00
Application	75.00
Supervision	60.00
Contingency 3%	8.00
Total releasing	\$288.00

Appendix 2: Stumpage calculations

Waikare second rotation			Unpruned One Waste Thin
Clearfell Age	26		
Stocking at Clearfell	519	trees/ha	
Total Recoverable Volume at Clearfell	644	m3/ha	

GROSS REVENUE

Log Grade	Min SED (cm)	Product Mix (%)	Volume (m3/ha)	Price at mill/wharf (\$/m3)	Gross Revenue (\$/ha)
Pruned	35	0%	0	172.00	0
Export A	30	63%	406	123.00	49,933
Export K	20	28%	184	112.00	20,555
Export KI	26	4%	24	100.00	2,379
Export KIS	14	5%	31	88.00	2,740
Total		100%	644		75,608

LESS HARVEST COSTS (\$/m3)

	\$/m3
Logging/loading	39.00
Management	5.00
Roading and skid formation	4.60
Post harvest costs	1.50
Total	50.10

LESS CARTAGE COSTS (\$/m3)

Destination	Dist (kms)	\$/m3
All logs export	New Plymouth	140
		31.10

STUMPAGE

	\$/m3	m3/ha	\$/ha
Pruned	90.80	0	0
Export A	41.80	406	16,969
Export K	30.80	184	5,653
Export KI	18.80	24	447
Export KIS	6.80	31	212
TOTAL RECOVERABLE VOLUME		644	
NET LOG REVENUE after attrition at		5%	\$22,117

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Waikare second rotation

Pruned, thinned

Clearfell Age	26	
Stocking at Clearfell	328	trees/ha
Total Recoverable Volume at Clearfell	584	m3/ha

GROSS REVENUE

Log Grade	Min SED (cm)	Product Mix (%)	Volume (m3/ha)	Price at mill/wharf (\$/m3)	Gross Revenue (\$/ha)
Pruned	35	25%	145	172.00	25,021
Export A	30	52%	303	123.00	37,290
Export K	20	13%	76	112.00	8,469
Export KI	20	8%	45	100.00	4,451
Export KIS	26	3%	15	88.00	1,332
Total		100%	584		76,563

LESS HARVEST COSTS (\$/m3)

	\$/m3
Logging/loading	39.00
Management	5.00
Roading and skid formation	4.90
Post harvest costs & contingencies	1.50
Total	50.40

LESS CARTAGE COSTS (\$/m3)

Destination	Dist (kms)	\$/m3
All logs export	New Plymouth	140
		31.10

STUMPAGE

	\$/m3	m3/ha	\$/ha
Pruned	90.50	145	13,165
Export A	41.50	303	12,582
Export K	30.50	76	2,306
Export KI	18.50	45	823
Export KIS	6.50	15	98
TOTAL RECOVERABLE VOLUME		584	
NET LOG REVENUE after attrition at		5%	\$27,526

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2013 crop

Clearfell Age	29	
Stocking at Clearfell	500	trees/ha
Total Recoverable Volume at Clearfell	743	m3/ha

GROSS REVENUE

Log Grade	Min SED (cm)	Product Mix (%)	Volume (m3/ha)	Price at mill/wharf (\$/m3)	Gross Revenue (\$/ha)
Pruned	35	0%	0	172.00	0
Export A	30	77%	496	123.00	61,014
Export K	20	29%	187	112.00	20,913
Export KI	20	5%	29	100.00	2,929
Export KIS	26	5%	30	88.00	2,681
Total		115%	743		87,538

LESS HARVEST COSTS (\$/m3)

	\$/m3
Logging/loading	39.00
Management	5.00
Roading and skid formation	4.30
Post harvest costs & contingencies	1.50
Total	49.80

LESS CARTAGE COSTS (\$/m3)

Destination	Dist (kms)	\$/m3
All logs export	New Plymouth	140
		31.10

STUMPAGE

	\$/m3	m3/ha	\$/ha
Pruned	91.10	0	0
Export A	42.10	496	20,884
Export K	31.10	187	5,807
Export KI	19.10	29	560
Export KIS	7.10	30	216
TOTAL RECOVERABLE VOLUME		743	
NET LOG REVENUE after attrition at		5%	\$26,093

Appendix 3: Cashflow

CASHFLOW			Key assumptions				
	Real	Nominal			Silvicultural regime:	Unpruned	
PRE-TAX IRR:	6.55%	8.68%			Target CF age:	26	
POST-TAX IRR:	5.52%	7.63%					
TOTAL INVESTOR COST, PRE-TAX:	\$ 3,994,087	\$ 5,108,977					
TOTAL INVESTOR REVENUE, PRE-TAX:	\$ 12,012,997	\$ 20,147,119					
	Year:	1	2	3	4	5	6
Year commencing 1 March		2019	2020	2021	2022	2023	2024
Area							
Stocked area (ha)		445.0	445.0	445.0	445.0	445.0	445.0
Awaiting restocking (cutover)							
Clearfell area (ha)							
Planted area (ha)							
Capital Costs							
Land Purchase	1,150,000	1,150,000					
Tree Crop Purchase	586,510	586,510					
Forestry Costs							
Planting	458,350						
Release	128,160						
Animal Control	38,270	2,670	2,670	2,670	2,670	445	445
Pruning							
Waste thin	267,000			4,440			64,260
Inventory, Mapping	45,390		5,340				
Aerial spray cutover	133,500						
Annual Costs							
Property Maintenance & Protection	231,400	8,900	8,900	8,900	8,900	8,900	8,900
Fire, Wind & Public Liability Insurance	412,809	10,680	11,125	11,570	12,015	12,460	12,905
Forest & Operations Management	233,759	6,809	7,076	7,031	6,809	6,697	9,910
Administration/Acting/Audit	240,300	8,900	8,900	8,900	8,900	8,900	8,900
Rates	68,640	2,640	2,640	2,640	2,640	2,640	2,640
Total Expenditures	3,994,087	1,777,109	46,651	46,151	41,934	40,042	107,960
Revenue							
Log Revenue	9,871,487						
Hive rental	405,000	15,000	15,000	15,000	15,000	15,000	15,000
Tree crop sale	586,510						
Land sale	1,150,000						
Total Revenue	12,012,997	15,000	15,000	15,000	15,000	15,000	15,000
NET PRE-TAX CASHFLOW, Real	8,018,910	-1,762,109	-31,651	-31,151	-26,934	-25,042	-92,960
Taxation analysis							
Tax credits on forestry/annual costs	632,122	11,368	13,062	12,922	11,741	11,212	30,229
Tax liabilities	3,041,639	4,200	4,200	4,200	4,200	4,200	4,200
Total tax credit/liability	-2,409,518	7,168	8,862	8,722	7,541	7,012	26,029
NET POST-TAX CASHFLOW, NZ\$ Real	5,609,393	-1,754,941	-22,788	-22,428	-19,392	-18,030	-66,931
Inflation adjustment							
Assumed inflation rate per annum	2.00%						
Total Expenditures (with inflation)	5,108,977	1,848,904	49,506	49,955	46,298	45,094	124,012
Total Revenue (with inflation)	20,147,119	15,606	15,918	16,236	16,561	16,892	17,230
NET PRE-TAX CASHFLOW, NZ\$ Nominal	15,038,142	-1,833,298	-33,588	-33,718	-29,737	-28,202	-106,782
Inflation adjustment, post-tax							
Tax credits (with inflation)	924,647	11,827	13,862	13,987	12,963	12,626	34,723
Tax liabilities (with inflation)	5,080,584	4,370	4,457	4,546	4,637	4,730	4,824
Total tax credit/liability	-4,155,936	7,457	9,405	9,441	8,326	7,896	29,899
NET POST-TAX CASHFLOW, NZ\$ Nominal	10,882,206	-1,825,841	-24,183	-24,277	-21,410	-20,305	-76,883
Funding Calculation							
Bank Term Deposit Rate	3.35%						
Carbon Income	280,000						
Cash Retained from Harvest Receipts	800,000						
Opening Bank Balance (earnings retained)		1,080,000	1,019,392	1,019,954	1,020,404	1,024,851	1,030,982
Interest Earned		36,180	34,150	34,168	34,184	34,333	34,538
Total Expenditures (with inflation)		112,394	49,506	49,955	46,298	45,094	124,012
Total Revenue (with inflation)		15,606	15,918	16,236	16,561	16,892	17,230
Closing Bank Balance, nominal		1,019,392	1,019,954	1,020,404	1,024,851	1,030,982	958,738

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	Year:	7	8	9	10	11	12
Year commencing 1 March		2025	2026	2027	2028	2029	2030
Area							
Stocked area (ha)		445.0	445.0	445.0	445.0	445.0	445.0
Awaiting restocking (cutover)							
Clearfell area (ha)							
Planted area (ha)							
Capital Costs							
Land Purchase	1,150,000						
Tree Crop Purchase	586,510						
Forestry Costs							
Planting	458,350						
Release	128,160						
Animal Control	38,270	445	445	445	445	445	445
Pruning							
Waste thin	267,000	87,120	111,180				
Inventory, Mapping	45,390						
Aerial spray cutover	133,500						
Annual Costs							
Property Maintenance & Protection	231,400	8,900	8,900	8,900	8,900	8,900	8,900
Fire, Wind & Public Liability Insurance	412,809	13,350	13,795	14,240	14,685	15,130	15,575
Forest & Operations Management	233,759	11,053	12,256	6,697	6,697	6,697	6,697
Administration/Acctng/Audit	240,300	8,900	8,900	8,900	8,900	8,900	8,900
Rates	68,640	2,640	2,640	2,640	2,640	2,640	2,640
Total Expenditures	3,994,087	132,408	158,116	41,822	42,267	42,712	43,157
Revenue							
Log Revenue	9,871,487						
Hive rental	405,000	15,000	15,000	15,000	15,000	15,000	15,000
Tree crop sale	586,510						
Land sale	1,150,000						
Total Revenue	12,012,997	15,000	15,000	15,000	15,000	15,000	15,000
NET PRE-TAX CASHFLOW, Real	8,018,910	-117,408	-143,116	-26,822	-27,267	-27,712	-28,157
Taxation analysis							
Tax credits on forestry/annual costs	632,122	37,074	44,273	11,710	11,835	11,959	12,084
Tax liabilities	3,041,639	4,200	4,200	4,200	4,200	4,200	4,200
Total tax credit/liability	-2,409,518	32,874	40,073	7,510	7,635	7,759	7,884
NET POST-TAX CASHFLOW, NZ\$ Real	5,609,393	-84,534	-103,044	-19,312	-19,632	-19,953	-20,273
Inflation adjustment							
Assumed inflation rate per annum	2.00%						
Total Expenditures (with inflation)	5,108,977	155,137	188,964	50,981	52,554	54,169	55,829
Total Revenue (with inflation)	20,147,119	17,575	17,926	18,285	18,651	19,024	19,404
NET PRE-TAX CASHFLOW, NZ\$ Nominal	15,038,142	-137,562	-171,037	-32,696	-33,903	-35,146	-36,424
Inflation adjustment, post-tax							
Tax credits (with inflation)	924,647	43,438	52,910	14,275	14,715	15,167	15,632
Tax liabilities (with inflation)	5,080,584	4,921	5,019	5,120	5,222	5,327	5,433
Total tax credit/liability	-4,155,936	38,517	47,890	9,155	9,493	9,841	10,199
NET POST-TAX CASHFLOW, NZ\$ Nominal	10,882,206	-99,045	-123,147	-23,541	-24,410	-25,305	-26,226
Funding Calculation							
Bank Term Deposit Rate	3.35%						
Carbon Income	280,000						
Cash Retained from Harvest Receipts	800,000						
Opening Bank Balance (earnings retained)		958,738	853,293	710,841	701,958	691,570	679,592
Interest Earned		32,118	28,585	23,813	23,516	23,168	22,766
Total Expenditures (with inflation)		155,137	188,964	50,981	52,554	54,169	55,829
Total Revenue (with inflation)		17,575	17,926	18,285	18,651	19,024	19,404
Closing Bank Balance, nominal		853,293	710,841	701,958	691,570	679,592	665,934

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	Year:	13	14	15	16	17	18
Year commencing 1 March		2031	2032	2033	2034	2035	2036
Area							
Stocked area (ha)		445.0	445.0	445.0	445.0	445.0	445.0
Awaiting restocking (cutover)							
Clearfell area (ha)							
Planted area (ha)							
Capital Costs							
Land Purchase	1,150,000						
Tree Crop Purchase	586,510						
Forestry Costs							
Planting	458,350						
Release	128,160						
Animal Control	38,270	445	445	445	445	445	445
Pruning							
Waste thin	267,000						
Inventory, Mapping	45,390						
Aerial spray cutover	133,500						
Annual Costs							
Property Maintenance & Protection	231,400	8,900	8,900	8,900	8,900	8,900	8,900
Fire, Wind & Public Liability Insurance	412,809	16,020	16,465	16,910	17,355	17,800	18,245
Forest & Operations Management	233,759	6,697	6,697	6,697	6,697	6,697	6,697
Administration/Acctng/Audit	240,300	8,900	8,900	8,900	8,900	8,900	8,900
Rates	68,640	2,640	2,640	2,640	2,640	2,640	2,640
Total Expenditures	3,994,087	43,602	44,047	44,492	44,937	45,382	45,827
Revenue							
Log Revenue	9,871,487						
Hive rental	405,000	15,000	15,000	15,000	15,000	15,000	15,000
Tree crop sale	586,510						
Land sale	1,150,000						
Total Revenue	12,012,997	15,000	15,000	15,000	15,000	15,000	15,000
NET PRE-TAX CASHFLOW, Real	8,018,910	-28,602	-29,047	-29,492	-29,937	-30,382	-30,827
Taxation analysis							
Tax credits on forestry/annual costs	632,122	12,209	12,333	12,458	12,582	12,707	12,832
Tax liabilities	3,041,639	4,200	4,200	4,200	4,200	4,200	4,200
Total tax credit/liability	-2,409,518	8,009	8,133	8,258	8,382	8,507	8,632
NET POST-TAX CASHFLOW, NZ\$ Real	5,609,393	-20,594	-20,914	-21,234	-21,555	-21,875	-22,196
Inflation adjustment							
Assumed inflation rate per annum	2.00%						
Total Expenditures (with inflation)	5,108,977	57,532	59,282	61,078	62,923	64,817	66,762
Total Revenue (with inflation)	20,147,119	19,792	20,188	20,592	21,004	21,424	21,852
NET PRE-TAX CASHFLOW, NZ\$ Nominal	15,038,142	-37,740	-39,094	-40,487	-41,919	-43,393	-44,909
Inflation adjustment, post-tax							
Tax credits (with inflation)	924,647	16,109	16,599	17,102	17,618	18,149	18,693
Tax liabilities (with inflation)	5,080,584	5,542	5,653	5,766	5,881	5,999	6,119
Total tax credit/liability	-4,155,936	10,567	10,946	11,336	11,737	12,150	12,575
NET POST-TAX CASHFLOW, NZ\$ Nominal	10,882,206	-27,173	-28,148	-29,150	-30,182	-31,243	-32,335
Funding Calculation							
Bank Term Deposit Rate	3.35%						
Carbon Income	280,000						
Cash Retained from Harvest Receipts	800,000						
Opening Bank Balance (earnings retained)		665,934	650,503	633,201	613,927	592,574	569,032
Interest Earned		22,309	21,792	21,212	20,567	19,851	19,063
Total Expenditures (with inflation)		57,532	59,282	61,078	62,923	64,817	66,762
Total Revenue (with inflation)		19,792	20,188	20,592	21,004	21,424	21,852
Closing Bank Balance, nominal		650,503	633,201	613,927	592,574	569,032	543,185

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	Year:	19	20	21	22	23	24
Year commencing 1 March		2037	2038	2039	2040	2041	2042
Area							
Stocked area (ha)		445.0	445.0	445.0	445.0	445.0	445.0
Awaiting restocking (cutover)							
Clearfell area (ha)							114.5
Planted area (ha)							
Capital Costs							
Land Purchase	1,150,000						
Tree Crop Purchase	586,510						
Forestry Costs							
Planting	458,350						
Release	128,160						
Animal Control	38,270	445	445	445	445	445	445
Pruning							
Waste thin	267,000						
Inventory, Mapping	45,390				40,050		
Aerial spray cutover	133,500						
Annual Costs							
Property Maintenance & Protection	231,400	8,900	8,900	8,900	8,900	8,900	8,900
Fire, Wind & Public Liability Insurance	412,809	18,690	19,135	19,580	20,025	20,470	20,915
Forest & Operations Management	233,759	6,697	6,697	6,697	8,700	6,697	6,697
Administration/Acctng/Audit	240,300	8,900	8,900	8,900	8,900	8,900	8,900
Rates	68,640	2,640	2,640	2,640	2,640	2,640	2,640
Total Expenditures	3,994,087	46,272	46,717	47,162	89,660	48,052	48,497
Revenue							
Log Revenue	9,871,487						2,561,819
Hive rental	405,000	15,000	15,000	15,000	15,000	15,000	15,000
Tree crop sale	586,510						
Land sale	1,150,000						
Total Revenue	12,012,997	15,000	15,000	15,000	15,000	15,000	2,576,819
NET PRE-TAX CASHFLOW, Real	8,018,910	-31,272	-31,717	-32,162	-74,660	-33,052	2,528,322
Taxation analysis							
Tax credits on forestry/annual costs	632,122	12,956	13,081	13,205	25,105	13,455	13,579
Tax liabilities	3,041,639	4,200	4,200	4,200	4,200	4,200	721,509
Total tax credit/liability	-2,409,518	8,756	8,881	9,005	20,905	9,255	-707,930
NET POST-TAX CASHFLOW, NZ\$ Real	5,609,393	-22,516	-22,836	-23,157	-53,755	-23,798	1,820,392
Inflation adjustment							
Assumed inflation rate per annum	2.00%						
Total Expenditures (with inflation)	5,108,977	68,758	70,808	72,912	141,384	77,289	79,565
Total Revenue (with inflation)	20,147,119	22,289	22,735	23,190	23,653	24,127	4,227,545
NET PRE-TAX CASHFLOW, NZ\$ Nominal	15,038,142	-46,469	-48,073	-49,722	-117,731	-53,162	4,147,980
Inflation adjustment, post-tax							
Tax credits (with inflation)	924,647	19,252	19,826	20,415	39,588	21,641	22,278
Tax liabilities (with inflation)	5,080,584	6,241	6,366	6,493	6,623	6,755	1,183,712
Total tax credit/liability	-4,155,936	13,011	13,460	13,922	32,965	14,885	-1,161,434
NET POST-TAX CASHFLOW, NZ\$ Nominal	10,882,206	-33,458	-34,612	-35,800	-84,766	-38,277	2,986,545
Funding Calculation							
Bank Term Deposit Rate	3.35%						
Carbon Income	280,000						
Cash Retained from Harvest Receipts	800,000						
Opening Bank Balance (earnings retained)		543,185	514,913	484,089	450,584	347,948	306,442
Interest Earned		18,197	17,250	16,217	15,095	11,656	10,266
Total Expenditures (with inflation)		68,758	70,808	72,912	141,384	77,289	79,565
Total Revenue (with inflation)		22,289	22,735	23,190	23,653	24,127	4,227,545
Closing Bank Balance, nominal		514,913	484,089	450,584	347,948	306,442	4,464,687

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	Year:	25	26	27
Year commencing 1 March		2043	2044	2045
Area				
Stocked area (ha)		330.5	299.8	259.7
Awaiting restocking (cutover)		114.5	145.2	185.3
Clearfell area (ha)		145.2	185.3	
Planted area (ha)		114.5	145.2	185.3
Capital Costs				
Land Purchase	1,150,000			
Tree Crop Purchase	586,510			
Forestry Costs				
Planting	458,350	117,935	149,556	190,859
Release	128,160	32,976	41,818	53,366
Animal Control	38,270	4,911	6,108	7,672
Pruning				
Waste thin	267,000			
Inventory, Mapping	45,390			
Aerial spray cutover	133,500	34,350	43,560	55,590
Annual Costs				
Property Maintenance & Protection	231,400	6,610	5,996	5,194
Fire, Wind & Public Liability Insurance	412,809	15,864	10,793	7,012
Forest & Operations Management	233,759	16,184	18,727	22,049
Administration/Acctng/Audit	240,300	8,900	8,900	8,900
Rates	68,640	2,640	2,640	
Total Expenditures	3,994,087	240,369	288,097	350,642
Revenue				
Log Revenue	9,871,487	3,211,388	4,098,280	
Hive rental	405,000	15,000	15,000	15,000
Tree crop sale	586,510			586,510
Land sale	1,150,000			1,150,000
Total Revenue	12,012,997	3,226,388	4,113,280	1,751,510
NET PRE-TAX CASHFLOW, Real	8,018,910	2,986,019	3,825,183	1,400,868
Taxation analysis				
Tax credits on forestry/annual costs	632,122	67,303	80,667	98,180
Tax liabilities	3,041,639	903,389	1,151,718	168,423
Total tax credit/liability	-2,409,518	-836,085	-1,071,051	-70,243
NET POST-TAX CASHFLOW, NZ\$ Real	5,609,393	2,149,934	2,754,132	1,330,625
Inflation adjustment				
Assumed inflation rate per annum	2.00%			
Total Expenditures (with inflation)	5,108,977	402,238	491,749	610,477
Total Revenue (with inflation)	20,147,119	5,399,097	7,020,902	3,049,421
NET PRE-TAX CASHFLOW, NZ\$ Nominal	15,038,142	4,996,859	6,529,153	2,438,944
Inflation adjustment, post-tax				
Tax credits (with inflation)	924,647	112,627	137,690	170,934
Tax liabilities (with inflation)	5,080,584	1,511,747	1,965,853	293,228
Total tax credit/liability	-4,155,936	-1,399,120	-1,828,163	-122,295
NET POST-TAX CASHFLOW, NZ\$ Nominal	10,882,206	3,597,738	4,700,990	2,316,650
Funding Calculation				
Bank Term Deposit Rate	3.35%			
Carbon Income	280,000			
Cash Retained from Harvest Receipts	800,000			
Opening Bank Balance (earnings retained)		4,464,687	9,611,113	16,462,238
Interest Earned		149,567	321,972	551,485
Total Expenditures (with inflation)		402,238	491,749	610,477
Total Revenue (with inflation)		5,399,097	7,020,902	3,049,421
Closing Bank Balance, nominal		9,611,113	16,462,238	19,452,667

Forest Map

