

# Forest Estate Valuation

## Blocks 1 & 2 Mangatu Forest

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**As at 31 December 2017**



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# FOREST VALUATION SUMMARY

## MANGATU FOREST BLOCKS 1 & 2

Forme Consulting Group Limited was engaged by Kensington Swan as Counsel for Te Whānau a Kai Trust, to undertake a valuation of forests contained as part of the forest known as Mangatu Forest on the East Coast. Te Whānau a Kai Trust is a Maori claimant group based near Gisborne and require a forest value estimate as the basis for calculation of compensation under Waitangi Tribunal proceedings.

The level of compensation payable is determined according to Schedule 1 of the Crown Forest Assets Act, specifically Section 3 of Schedule 1. This report deals with and reports value associated with:

1. The market value of the trees (section 3(a)) of Schedule 1 and;
2. Market stumpage of wood harvested (section 3 (b) of Schedule 1.

Forme staff visited the forest in late March 2018 to assess the general status of the forest and gain some understanding of management practices and harvesting status of the forest by the existing licensee. Forests can be prone to storm damage, fire and disease and a key objective was to visually observe whether the forest has been subjected to any of these risk factors over recent years. Mangatu Forest is also highly susceptible to erosion and potential fertility issues stemming from this and other risk factors sometimes affecting tree form and other characteristics, therefore requiring assurance that these do not materially adversely affect forest value.

Mangatu Forest is in the eastern foothills of the Raukumara Range, approximately 75kms from Gisborne. The main access is off State Highway 2 via Whatatutu Road, just west of the Te Karaka township and Mangatu Road, also being the route taken for transport of logs to the Port of Gisborne.

Establishment of Mangatu Forest in plantation radiata first commenced in the early 1960's when the NZ Forest Service was tasked with stabilising the erosion prone hillsides, notably the Tarndale and Mangatu Slips and their downstream catchments. Older parts of the forest are now in transition from second to third rotation forest, under management as a Crown Forest Licence to Ernslaw One Limited.

Other than these high level introductory comments it is not intended to prepare this report as a full disclosure forest valuation, rather a step through of the process used to calculate value and stumpage as required under section 3. Several sources of data and information have been used and these are defined in the report.

The forest value is based on potential future earnings. Future revenue is based on the estimated recoverable yields by log grade, log prices and forestry and harvesting costs

calculated based on experience or as provided by the existing licensee. All costs and revenues calculated within this valuation are exclusive of GST and other taxation.

For the calculation of compensation under Section 3 (a) the forest value (tree crop only) of Block 1, Mangatu Forest as at December 2017 is calculated at a pre-tax discount rate of 8.0% to be **\$27,756,466**.

For the calculation of compensation under Section 3 (b) the forest value (tree crop only) of Block 2, Mangatu Forest as at December 2017 is calculated at a pre-tax discount rate of 8.0% to be **\$29,402,452**.

For the calculation of indicative compensation under Section 3 (b) the total forest stumpage of Block 1, Mangatu Forest as at December 2017 is calculated to be **\$57,619,697**.

For the calculation of indicative compensation under Section 3 (b) the forest stumpage of Block 2, Mangatu Forest as at December 2017 is calculated to be **\$69,088,506**.

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## 1. INTRODUCTION

### 1.1 Client and Purpose

Forme Consulting Group Limited (Forme) was engaged by Counsel for Te Whānau a Kai Trust, to undertake a valuation of forests contained as part of the forest known as Mangatu Forest on the East Coast. Te Whānau a Kai Trust is a Maori claimant group based near Gisborne and require a forest value estimate as the basis for calculation of compensation under Waitangi Tribunal proceedings.

The level of compensation payable is determined according to Schedule 1 of the Crown Forest Assets Act, specifically Section 3 of Schedule 1. This report deals with and reports value associated with:

- 1 The market value of the trees (section 3(a)) of Schedule 1 and;
- 2 Market stumping of wood harvested (section 3 (b) of Schedule 1.

### Appendix 1 – Crown Forest Assets Act 1989 – Schedule 1, Cl 3

### 1.2 Terms of Reference

Required as per letter of engagement dated 4 December 2017

**Milestone Report Number 1**

**Report Due:** 30 Apr 2018

**Milestone Report Title** - Te Whanau a Kai Compensation Report

**Activities for Milestone 1**

1. Complete a review and analysis of the Crown Forestry Rental Trust commissioned valuation report of the Mangatū forest (Mangatū CFLL) and any other relevant information. The report will include the value of compensation under clause 3(b) and (c) of Schedule 1 of the Crown Forest Assets Act 1989.

2. Prepare a Compensation Report on behalf of Te Whanau a Kai, specifically in relation to the resumptive land within the Mangatū Remedies Inquiry.

3. The Contractor will be required to visit Mangatū CFLL to verify forestry matters.

4. The Contractor will provide forestry expertise to Te Whanau a Kai as it relates to the forest area within the Mangatū Remedies Inquiry.

This report relates to items 2 and 3.

In completing this report, a number of references have been made available and these are listed:

- 1 *Market Valuation Licensor's Interest, Mangatu Crown Forestry Licence Claimant Area, prepared by Morice for Crown Forestry Rental Trust & Their Approved Clients dated February 2018*
- 2 *Estimates of Maximum 3(c) Compensation Under CFAA First Schedule – Mahaki, Te Whanau a Kai, and Ngariki Kaiputahi, Richard Meade, Cognitus Advisory Services dated 28 November 2017*
- 3 *Brief of Evidence of Richard Brent Meade draft 4 October 2017 related to compensation available under Clause 3*
- 4 *Brief of Evidence of Donn Armstrong dated 25 May 2012 related to valuation of Mangatu CFL land*
- 5 *Brief of Evidence of Michael Dennis Marren dated 25 May 2012 related to area information and compensation available under First Schedule of Crown Forests Asset Act 1989*
- 6 *Numerous spreadsheets and maps supplied by the current Mangatu CFL licensee, Ernslaw One Limited related to forest areas, crops, harvesting intentions, and historical stumpages*
- 7 *Supplementary information clarifying data provided in the spreadsheets (6) by Ernslaw One Limited staff on an as required basis.*

For disclosure, items 1, 5, 6 and 7 have been relied on for calculation of tree values and stumpages (sections 3 (a) and (b)). *Items 2, 3, 4 have been used as background information and are not material to value calculations.*

### **1.3 Forest Visit**

Forme visited the forest during late March 2018 to assess previous forest management including completed silviculture, tree stocking and quality, forest health and growth rates and any evidence of forest damage from storm or erosion events that may impact materially on forest value. Sites were visited that provided assurances on establishment, silviculture and harvesting practices as well as general access through the forest.

Aside from the erosion susceptibility of Mangatu Forest in general there are no significant issues detrimental to forest health and expected returns (yields and stumpages) that were identified during the visit that are not captured in forest data provided by the licensee i.e. crop types adequately describe the range of productivity expectations of the forest.

### **1.4 What is Valued**

The calculated valuation is an estimate of the current value of the tree crop. It does not include the value of land or improvements nor any value of carbon that may have been generated through being a participant in the Emissions Trading Scheme (ETS). Where crops are of an age where final crop status has been reached i.e. post final thinning, the value is discounted stumpage less discounted holding costs (overheads). Where silviculture treatments are on-going or yet to commence these costs are incorporated as future

discounted costs to be subtracted from that crops discounted stumpage. This is necessary as a function of management to maintain and/or enhance crop value. Land that is fallow, has no crop and is therefore valued as zero but is subsequently gathered up the following year as an age 1 crop.

## **1.5 Valuation Date**

The market value of the tree crop is assessed at 31 December 2017. Data provided by the licensee is at 2 August 2017. Harvest in progress has been prorated e.g. 1 July – 30 June year harvest programme was 6/12 completed at valuation date. 2017 planting has been captured and areas harvested during the calendar year (January – December) are assumed fallow i.e. have no crop value.

## **2. VALUATION METHODOLOGY**

### **2.1 Valuation Methods**

There are various methods for valuing forest assets depending on forest size, age and current market information that may be available. The three main forest valuation methods are;

#### **2.1.1 *The Crop Expectation Value (CEV).***

Under an expectation approach to valuing forests, future wood volumes are forecast based on some underlying harvesting and management strategy. Log volumes are multiplied by log price to give forecast revenue. Costs are subtracted from these revenues to give future net cashflows. These are discounted to give forest value.

The CEV approach to valuing forests is the accepted methodology advocated by the New Zealand Institute of Forestry (NZIF) Valuation Standards for forests and woodlots that may not have reached full maturity and if mixed aged stands are involved.

#### **2.1.2 *The Immediate Liquidation approach (IL)W***

Where forest value is calculated by determining the stumpage value of standing merchantable volume with the assumption that the forest can be liquidated immediately and sold at current stumpage prices.

#### **2.1.3 *The Current Replacement Cost (CRC) approach***

Where forest value is based on the present-day cost of efficient re-establishment and tending. This approach is preferred when the forests being valued are relatively young, between 1-10yrs of age, and future management regime is uncertain.



## 2.2 Valuation Approach

The valuation approach adopted for Blocks 1 & 2, Mangatu Forest, is the Estate Based Crop Expectation Value. This approach values the forest as a single entity. The net cashflows of the total estate are forecast and discounted to give forest value.

These cashflows are associated with an underlying management and harvesting strategy which applies to the whole estate.

Information provided does not lend itself to a fully detailed estate valuation approach. This involves detailed knowledge of the crop, harvesting and management strategies and cost and revenue projections. Adoption of an estate modelling approach requires more technical work and often incorporates further field data collection and verification. Accordingly, additional information that may become available could materially affect this valuation calculation. If this occurs the right to undertake re-assessment of the adopted approach is reserved.

A stand based modelling approach has been taken that involves valuing each crop type as a separate entity with its associated crop profile and revenue and cost input components. This required adoption of several assumptions that were applied at a high level. These include the following:

1. harvest all *Pinus radiata* stands at age 28
2. assume all *Pinus radiata* stands currently over the age of 28 to be un-harvestable
3. acceptance of yield tables supplied with adjustment factor
4. acceptance of supplied and recent cost and revenue components with adjustment to trend for log prices
5. replant 12+ months following harvest.

These assumptions are explained in greater detail later.

## 2.3 Valuation Reporting

The standard adopted for the valuation of forest crops in New Zealand is the NZ Institute of Forestry standard<sup>1</sup>. This valuation follows the intent but not the letter of this standard.

The major point of difference is disclosure of all relevant facts required in a full forest valuation report, as many of these are fully disclosed in the “Morice”<sup>2</sup> report and no purpose is served by repeating these here.

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<sup>1</sup> NZ Institute of Forestry “Forest Valuation Standards” Copyright 1999 NZ Institute of Forestry Inc.

<sup>2</sup> Market Valuation Licensor’s Interest, Mangatu Crown Forestry Licence Claimant Area, prepared by Morice for Crown Forestry Rental Trust & Their Approved Clients dated February 2018

Where information provided in the Morice report is relied upon this is noted in the report.

## 2.4 Discount Rate and Taxation

A real discount rate of 8.0% on pre-tax cash flow has been used. This rate is based on the opportunity cost of capital - that is the return that could be earned on a similar investment. Currently within New Zealand pre-tax real discount rates used in forest valuations range between 7% to 11% (average 8.3% pre-tax)<sup>3</sup>.

The same survey also records an IDR (discount rate implicit) in the transaction price of recent (mid-2013 to 2015) forest sales in New Zealand. *“A feature of the 2015 survey is the lower average IDR for medium/large forests compared to small forests – 7.8% vs 9.1% for pre-tax cashflows and 6.4% vs 7.1% for post-tax cashflows<sup>2</sup>”*.

All cost and revenues are in current dollars, no allowance is made for inflation. Taxation benefits from future forestry expenditure or tax on harvest revenues are not included.

The Morice report provides a full analysis of forestry discount, inflation and taxation rate selection processes and it is noted that a post-tax rate of 6.5% is used in the forest land valuation.

To understand the impact of varying discount rates on forest crop value, sensitivity analyses have been undertaken as part of this valuation.

## 3. FOREST DESCRIPTION

### 3.1 Land and location

Full description of the land and key characteristics that impact on forest value are included in the Morice report.

Mangatu Forest is identified in 3 blocks, all of which are managed under a single forest management plan by the current licensee. Te Whānau a Kai Trust claimants interest is only in one, possible two blocks contained within Mangatu and described as follows:

Mangatu Block 1 – that land underlying the forest in the Mangatu No 1 Block defined as a continuation of the near north south straight-line boundary on the north-western side of the forest to the southern boundary;

Mangatu Block 2 – land east of Mangatu 1 with and eastern boundary of the Waipoua and Waimatau rivers;

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<sup>3</sup> Manley, B. August 2016: Discount rates used for forest valuation – Results of 2015 survey. New Zealand Journal of Forestry 61 (2): 28 - 34

Mangatu Block 3 – East block being land to the east of Mangatu 2 for which Te Whānau a Kai Trust has no interest is not included in this valuation.

Forest information provided was for the entire forest as line by line stand data and required filtering to separate the three entities.

### 3.2 Forest Area

The forest is predominantly established with *P.radiata* and is now in transition from 2<sup>nd</sup> to 3<sup>rd</sup> rotation. Stands of minor species and some *Douglas fir* are also present but these do not feature as long term economic crops in the forest. Some *Douglas fir* is used at higher altitudes within the forest but does not contribute materially to forest value at this time.

Remnant stands or pockets of over mature radiata in particular remain in some parts of the forest. These have not been harvested due mainly to difficulty of access and highly erodible damaged country where trees have been left untouched. These stands are not likely to contribute value to the forest in the future as they tend to be continually deteriorating. At the very least, recovery of parts of these stands is assumed at break-even.

As noted earlier forest stand line by line data supplied is for the entire Mangatu Forest however each stand's data has been provided with an additional attribute that has enabled separation into one of the 3 blocks. Several stands that sit on the boundaries between blocks have been further apportioned to one block or another through further interrogation of GIS data.

A summary of forest areas by block and species is detailed in the table below. Areas presented are estimated net stocked areas.

Table 1: N.S.A. by block and species

Species	Block 1 Stocked Area (ha)	Block 2 Stocked Area (ha)
P radiata	2159	2868
P radiata > 30 (incl. above)	5	82
D. fir	26	24
P nigra	130	
Other minor	14	29
<b>Total</b>	<b>2329</b>	<b>3003</b>

**Note:** These areas differ from other data sources including the Morice report where PPA (potential productive area) is used and area summaries provided by the licensee. This is due to several factors including rounding and adjustments to estimate and area position at 31 December 2017.

### 3.3 Site Quality

Site quality, a measure of the forests ability to grow trees, is estimated from tree measurement events throughout the life of the forest. These are traditionally undertaken during forest silviculture such as pruning and thinning through years 5-10 and later by mid-rotation inventory around 15-20 years, and prior to forest harvest by pre-harvest inventory.

The earlier measurement events concentrate on parameters such as tree diameter, tree height and number of trees per hectare. Later measurement includes these parameters but also becomes more specific to the types of logs that the trees are likely to produce based on prevailing marketing options at harvest age. These forest yields are expressed as expected volumes per hectare of the mix of log grades to which values are attributed at harvest and therefore key requirements for estimating forest revenues.

As more is learnt about the forest over successive rotations and mapping, stand measurement and analysis techniques become more advanced, information held in databases about the crop becomes more accurate.

For this exercise we have taken the data supplied as accurate and have not adjusted any detail without supporting information to verify such adjustments.

As noted earlier information has been supplied as stand line by line information with a series of attributes allocated to each stand. Stands have been aggregated by the licensee into like with like crops. This is known as crop typing and key decision criteria are site productivity and silviculture treatment that has been received or is planned. Site productivity is generally determined by altitude (trees at higher altitude perform worse than those at more favourable altitude) and in some forests soils and aspect.

Crop types advised for Mangatu are as follows:

- RH300HP** – radiata high productivity site, 300spha, high pruned
- RH450UP** – radiata high productivity site, 450spha, unpruned
- RL450UP** – radiata low productivity site, 450spha, unpruned
- RM350HP**- radiata medium productivity site, 350spha, high pruned
- RL850UP** – radiata low productivity site, 850spha, unpruned
- RM450UP** – radiata medium productivity site, 450spha, unpruned.
- D fir** – Douglas fir
- Other** - other species

Valuations were undertaken for each crop type and assumptions applied when setting up models were:

1. All radiata stands to be clearfelled at age 28;
2. All existing radiata stands currently older than age 28 (predominantly remnant stands) to be rated at 0 (zero) value;
3. Douglas fir clearfell at age 40 to be replaced with radiata;
4. Minor species (P. nigra) to be clearfelled and replaced by radiata;
5. All other minor species stands to be rated at 0 (zero) value.

### 3.4 Yields

Yield is the common terminology for log volume that is recovered from the forest at harvest time. Yield tables are built from forest measurement events and previous harvest outcomes from similar crop types. They are estimates of volume recovered for each log type that is identified for the markets particular to the forest. For Mangatu, tables have been supplied for the crop types as outlined in 3.3 above and are represented as generic grades that describe product out-turn at a high level. While these change frequently as market mix changes i.e. there may be a multitude of extra log grades sold, they generally fit within the log specs defined for the generic grades. An example is the domestic log grade S30, defined as a generic grade in the supplied yield tables, fits comfortably within the spec of an A grade export log.

When relating the generic grades supplied in the yield tables with the 1 July 2016 – 30 June 2017 stumpage data we have made assumptions to enable the allocation of relevant log price data to the generic grades of the yield tables. These assumptions are as follows:

*Table II: Log grade assumptions*

Generic yield table grades	Market grades
P40	P40
PS	PS
S30	A
CA	K
CM	K
KI	KI
Pulp	Pulp

#### 3.4.1 Yield Adjustments

As noted in 3.4, yield tables are estimates of volume recovery that over time are refined to incorporate results from actual recovery data. This is generally referred to as harvest reconciliation where volume and product out-turn is compared with predictions of the yield tables.

The licensee has provided the following commentary regarding use of yield tables:

*Yield tables are produced from inventory data collected as stands reach maturity. Full inventory data is available for approximately 75% of the Gisborne estate that are older than 23 years. Smaller stands (<10 Ha) and stands that are younger than 23 years are assigned generic yields based on factors such as site productivity and regime.*

*Yield adjustment factors are applied to yield TRV across all grades where for various reasons actual production is reduced. Adjustment factors have improved overtime particularly with the move away from a North Island Generic cutting strategy to a more export specific cutting strategy that is in line with Gisborne log movements. Historical adjustment factors for the Gisborne forests reduced TRV by 20% recent data analysis calculated through annual yield reconciliations (comparing actual volume following harvest with yield predictions pre- harvest) is nearer 15%*

Accordingly, we have reduced all volume estimates predicted in the yield tables by 15%. Reduction has been applied to each log type however in reality this will not occur in practice but vary considerably between log types. Note that yield tables are presented for harvest ages 26 – 30. Harvest age selection for this valuation is age 28.

## Appendix 2 – Yield Tables

### 4. FOREST COSTS/REVENUES ASSUMPTIONS

#### 4.1 Land Value & Land Ownership Costs

This is the subject of the Morice report that has been separately provided. For crop valuation it is normal to include cost of land or land rental costs as a component. The quantum adopted for this report is the current CFL \$/ha rental rate used by Morice. This is currently \$66.01 with an anticipated hike to \$70.76 at the next license fee review date that happens to be a general review effective in May 2019.

We have used a rounded figure of \$70/ha.

#### 4.2 Allocation of Forest Establishment, Tending, and Management Costs

Operational costs associated with owning and managing the land, establishment and tending of the forest and ancillary functions such as forest protection, regulatory and other forest management activities need to be factored in. For Mangatu the following costs are appropriate for Mangatu Forest as a whole and to ensure they are just as relevant for the individual Blocks 1 and 2 they are applied on a per/hectare basis.

Establishment	<b>\$1070.00</b>
1st prune	<b>\$0.00</b>
2nd prune	<b>\$0.00</b>
3rd prune	<b>\$0.00</b>
Thin to waste	<b>\$905.00</b>

Overheads	<b>\$60.00</b>
Land rental	<b>\$70.00</b>

**Notes:**

1. Establishment costs include minimal slash clearance/raking, pre-plant dessication, cost of delivered seedlings/cuttings, planting and tree releasing costs.
2. Pruning is not currently practiced at Mangatu so no costs allocated.
3. Thinning to waste is a mix of thinning in stands with problem wilding regeneration – approximately 10% of stands at \$1100/ha and remaining stands at \$750/ha.
4. Overheads include administration, mapping, insurance, rates and other associated costs.
5. Land rental as estimated by Morice rounded.
6. Forestry services costs i.e. establishment/silviculture etc contain an element of supervision and management estimated as 15% of direct costs.
7. Operational costs verified with licensee, overheads estimated.

**4.3 Harvesting and Costs**

The direct costs of harvesting include logging, road and landing construction, road maintenance, log transport, log sales and marketing, and logging management.

Logging costs are determined by the system used, haul distances, and piece size. Logging of Mangatu Forest will be mostly with a yarder and cable logging systems, though about 25% of the forest will be suitable for logging with ground - based systems (ie. tractors and skidders).

Apportionment of cable yarder and ground based systems is assessed in the Morice report as just under 24% ground based and the remainder to be completed using yarder systems. For convenience this has been rounded to 25%:75% for the calculation of value. Further detailed information to consider the need for adjustment to this ratio for Blocks 1 and 2 individually is not available.

Roads and landings throughout the forest have been established for harvest of previous rotation forest and the need for additional and expensive construction is generally not required for successive rotations. The highly erodible nature of the forest however means that roading costs associated with harvesting are still relatively high compared to other parts of the country and are applied to recovering the old road surface where able and enhancing this with more metal. River beds are also used as logging truck routes and frequent flooding of these means re-establishment of running surfaces following those events. We note also that engineering costs, as well as harvesting costs are typically higher on the East Coast than similar operations in New Zealand, mainly due to a shortage of skilled labour and remoteness for equipment servicing and maintenance.

We have undertaken an independent calculation of harvesting rates using in-house costing and production data to verify actual costs supplied by the licensee and those adopted appear to be robust.

This valuation assumes that all log products will be trucked to the Port of Gisborne as export grade logs. The domestic market in the Gisborne area does not offer opportunities for high volume and consistent supply however we do note a customer base as far away as Kawerau.

Costs per m<sup>3</sup> of recoverable wood volume are tabled below: and are as supplied by the licensee for harvesting and cartage. We have done some rounding and minor adjustment to reflect relevant location of Blocks 1 and 2 in relation to average data supplied for the wider forest.

Roads	<b>\$7.50</b>
Harvesting	<b>\$40.00</b>
Cartage	<b>\$20.25</b>
Log mgmt	<b>\$4.50</b>
Conting./RMA	<b>\$1.50</b>

**Notes:**

1. Roading cost supplied by licensee as forest wide estimate.
2. Harvesting and cartage costs supplied as actual costs from stumpage data for period 1 July 2016 – 30 June 2017 by licensee. These have been adjusted slightly to reflect 2017 – 2018 cost increases.
3. Logging management and contingency/RMA estimated based on industry norms.

#### 4.4 Log prices and markets

For forest valuation, trend log prices for radiata pine (at wharf or mill gate) are generally based on quarterly survey of the major log purchasers and exporters carried out by numerous parties and presented in industry literature. Forme Consulting Group undertakes a quarterly survey of generic log grades and maintains this information in its database.

For this valuation we have adopted our 12Q trend prices (middle column below) but for comparative purposes have noted the log prices supplied as part of stumpage data by the licensee. This information is presented in the following table:

##### 4.4.1 P.rad Trend Log Prices

*Table III: Log price summary*

Log Grade	Q2 2017 Spot \$/m <sup>3</sup>	Q4 2017 12Q trend log prices \$/m <sup>3</sup>	Licensee data Q2 2017 \$/m <sup>3</sup>
P40	\$ 175 - 183	\$168	\$179
PS	\$ 171 - 176	\$165	\$177
A (export)	\$125 - 135	\$115	\$134
K (export)	\$ 118 - 122	\$104	\$120



KI (export)	\$95 - 115	\$95	\$118
KIS (export)	\$83 - 119	\$91	\$107

**Notes:**

1. Licensee data represents log prices received for the 12 months to June 2017. Data is therefore average for the 4 quarters ending June 2017
2. Q2 2017 spot prices represent prices at June 2017 but are average for the previous 3 months. A range is provided as data is national data and there are variances throughout the regions.
3. Q4 2017 trend is 12 Q trend to 31 December 2017, the effective date of this valuation and represents a longer view log price outlook.
4. Export log prices have reached historically high levels in recent years on the back of very strong demand for logs from China. These are represented graphically in the Appendix 3 Chart.
5. Historical data cannot be used confidently to represent future predictions of log price.

**Appendix 3 – Pinus Radiata Historic Price Trend****5. TREE CROP VALUATION (Section 3 (a))**

The values of Blocks 1 and 2, Mangatu Forest were calculated for individual stands based on a harvest age of 28 years. Harvesting at earlier or later ages will mean either reduced yields and therefore reduced stumpage (earlier) or allow additional tree growth (later) and therefore increased yields. Impact of reduced or increased yields however will tend to be balanced by the additional time value of money through the discounting process.

For the calculation of compensation under Section 3 (a) the forest value (tree crop only) of Block 1, Mangatu Forest as at December 2017 is calculated at a pre-tax discount rate of 8.0% to be **\$27,756,466**.

For the calculation of compensation under Section 3 (b) the forest value (tree crop only) of Block 2, Mangatu Forest as at December 2017 is calculated at a pre-tax discount rate of 8.0% to be **\$29,402,452**.

An example of a stand based valuation worksheet is attached.

**Appendix 4 – Sample Stand Based Valuation Worksheet****6. SENSITIVITY TO MAJOR ASSUMPTIONS**

A sensitivity analysis was carried out to assess the effect of changes to the major assumptions. The key assumptions being log prices and the discount rate. The table below presents the range of calculated forest values resulting from this analysis:

Table V: Sensitivity analysis Block 1

Scenario	Log Price	Pre-tax Discount Rate				
		7.00%	7.5%	8.00%	8.50%	9.00%
+10%	12Q Trend	38.130	36.866	35.669	34.536	33.471
	Licensee	53.722	51.896	50.168	48.531	46.979
Base	12Q Trend	29.591	28.640	27.756	26.932	26.159
	Licensee	43.765	42.298	40.909	39.594	38.346
-10%	12Q Trend	21.161	20.554	19.976	19.425	18.9
	Licensee	33.808	32.700	31.651	30.669	29.753

Table V: Sensitivity analysis Block 2

Scenario	Log Price	Pre-tax Discount Rate				
		7.00%	7.5%	8.00%	8.50%	9.00%
+10%	12Q Trend	42.021	40.190	38.465	36.836	35.298
	Licensee	59.600	56.939	54.434	52.074	49.868
Base	12Q Trend	32.110	30.716	29.402	29.163	26.993
	Licensee	48.014	45.872	43.874	42.004	40.238
-10%	12Q Trend	22.201	21.267	20.411	19.619	18.871
	Licensee	36.463	34.868	33.365	31.947	30.608

## 7. STUMPAGE RECEIVED BY LICENSEE (Section 3 (b))

Section 3 (b) of Schedule 1 requires a calculation of indicative stumpage received by the licensee as trees are harvested. Stumpage received calculations are part of the valuation undertaken for Section 3 (a) calculations i.e. all the assumptions and inputs are identical.

Stumpage is defined in the NZIF Valuation Standard as

*“the value of the standing tree. Usually expressed as the value per cubic metre (or tonne) of logs by quality in the tree. Generally derived from the sale value of logs at a sale point (e.g. “at mill”, “at wharf gate” or “on skid”) by deduction of all costs incurred in getting the tree off the stump to that point of sale”.*

Costs incorporated in the stumpage calculation are noted previously in the report under Section 4.3 “Harvesting and Costs” and relate directly to the harvesting component of a forestry operation.

For this report it is assumed that stumpage is received in the financial year ending 30 June based on the assumption of clearfell of P radiata at age 28 and clearfell of other species in the current year i.e. now.

For the calculation of indicative compensation under Section 3 (b) the total forest stumpage of Block 1, Mangatu Forest as at December 2017 is calculated to be **\$57,619,697**.

For the calculation of indicative compensation under Section 3 (b) the forest stumpage of Block 2, Mangatu Forest as at December 2017 is calculated to be **\$69,088,506**.

A schedule of indicative compensation by year and by block is presented in Appendix 5

## **Appendix 5 – Indicative Annual Stumpage Schedule**

Note that for this report the term “indicative compensation” is used as stumpage is by nature paid on an on-going basis, usually quarterly, and very dependent on licensee decisions regarding timing of harvesting which in turn is directly related to prevailing market conditions and other management and operational decisions.

## **8. FOREST OWNERSHIP RISKS**

It is prudent with any forest valuation to identify the potential risks of forest ownership. The risks associated with owning Mangatu Forest are as follows:

- Fire: - The risk of fire increases over the dry summer period. It is unlikely that a fire would start by natural causes. The forest is a contiguous forest block and is therefore more prone than multiple block forests to unsuccessful containment of any fire. Forest insurance to cover loss due to fire is available.
- Heartwood invasion into pruned wood: - as radiata pine grows and matures the heartwood expands. Indications are that heartwood expands more rapidly from age 30. Delayed harvesting beyond age 30 could see a reduction in pruned log quality and value due to heartwood expansion and invasion into the pruned wood.

- Area loss: - Many parts of the forest are located on moving soils, hence it is likely that more land slippage will occur in the future further reducing net stocked area.
- Gisborne Port: - port log storage operates near capacity and off-site storage is being used to cater for overflow, thus increased double handling costs. Plans for further port upgrade including a second log ship berth are a work-on.
- Wind: - Damage to the tree crop because of wind is an ongoing risk. The forest is in the region where Cyclone Bola caused considerable damage to plantation forest and continues to suffer such periodic events. Forest insurance to cover loss due to wind is available.
- Disease: - The risk of a foreign disease infecting any forest increases the closer a forest is to a major port. The increase in freedom of trade between countries has coincided with new and unwanted pests and disease in some countries.
- Market collapse: - radiata pine logs are a commodity product and the price paid to growers is largely dictated by Asian and particularly Chinese demand for logs. Shortages from traditional suppliers (Russia, SE Asia) are predicted to increase leaving a substitution opportunity for NZ logs.
- Failure of East Coast roading infrastructure: - East Coast roads are affected by weather events and frequently are closed or traffic diverted. Cost of log transport could increase if road failure occurred during harvesting.
- Harvesting: - Poor logging and logging management performance could affect the actual yield by log grade if appropriate controls are not put in place.

## 9. DISCLAIMER

This forest valuation has been prepared at the request of Kensington Swan, Counsel for Te Whānau a Kai Trust. Forme Consulting Group Limited understands that the purpose of the valuation is to provide an independent assessment of the current value of the tree crop and indicative stumpage returns as a basis for calculation of compensation under Waitangi Tribunal proceedings.

Forme Consulting Group Limited has not conducted a recent search of the legal title(s) to the forest land and therefore cannot warrant the claimed ownership of the forest. Forme Consulting Group Limited has not conducted on-ground surveys to confirm that the boundaries of the stocked areas do indeed lie within the legal boundaries. Forme Consulting Group Limited does not state any opinion with respect to the value of the underlying land and the other non-forestry improvements to the property.

The valuation is based on information from several data sources including agencies and approved parties as well as high level data related to the forest from the current licensee. This information is believed to be adequate for this valuation. Estimated net stocked area, projected forest yields and cash flow calculated within this valuation are based on accepted forest valuation methodology. This valuation follows the intent but not the letter of the NZ Institute of Forestry standard.

The calculation of stumpages is not a guarantee or promise by Forme Consulting Group Limited of actual returns that may be greater or less than the calculated returns due to future events beyond our control – for example:

- Licensee management decision making
- Lower (or higher) log prices than our current market trend log prices
- Poor harvest management and quality control procedures
- Poor optimisation of potential log grades by the logging crew(s)
- Detrimental events effecting forest health and/or projected tree growth

This valuation provides a theoretical forest value only - it is not a market value. Market value can only be set by negotiation between a willing buyer and willing seller operating in a free market place.

The valuation should be adjusted for unique or special fiscal considerations, particularly taxation. It does not allow for taxation benefits associated with past or present costs or taxation liability on revenues at harvest time. All costs, revenues and the forest valuation itself are exclusive of Goods and Services Taxation (GST).

This valuation opinion has been prepared at the request of Kensington Swan for Te Whānau a Kai Trust and accordingly, neither Forme Consulting Group Limited nor any of its employees shall have any liability to any other person or organisation in respect of this valuation. Nothing in this valuation is or should be relied upon as a promise, representation, opinion or forecast of the future.

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