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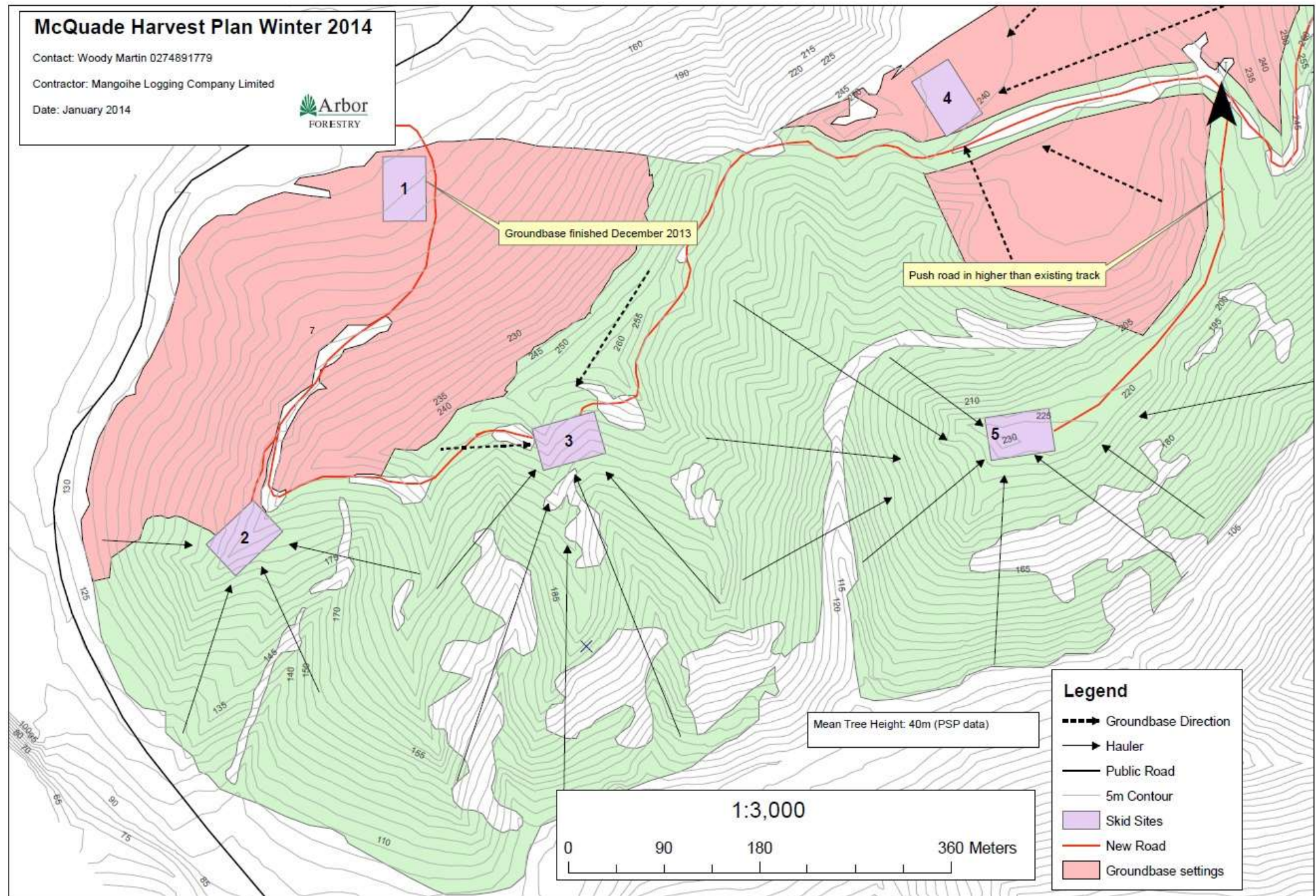
Roadline Harvesting at
McQuade Forest
(October – February 2013/2014)

McQuade Harvest Plan Winter 2014

Contact: Woody Martin 0274891779

Contractor: Mangoihe Logging Company Limited

Date: January 2014





**First load out of McQuade
(Skid 1)**

A large pile of pruned logs is shown in a forest setting. The logs are stacked horizontally, with some showing the cross-section of the wood. The bark is light brown and peeling in places, revealing the underlying wood. The logs are of varying lengths and diameters, with some having blue markings on their ends. The background is a dense forest with tall trees and green foliage.

Pruned logs up to 900mm in diameter



A gravel road winds through a forested area. On the right side of the road, there is a steep, eroded bank of light-colored soil or sand, showing some root exposure. The background is filled with a dense forest of tall, thin evergreen trees. In the distance, a mountain peak is visible under a clear sky. The overall scene suggests a remote, possibly logging-related, location.

**Finished road McQuade Forest-
Looking down to Skid 1**

Roadline Harvesting Greenoch Forest (January 2014 – present)

Setting No.	Area (ha)
1	4.5
2	16.4
3	9.9
4	13.6
5	10.2
6	17.2
7	4.1
8	13.6
Roadline	8.5
Total	98

Road Section	Length (m)
1	828
2	398
3	1003
4	456
5	714
6	96
7	1091
Total	4586



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FORESTRY

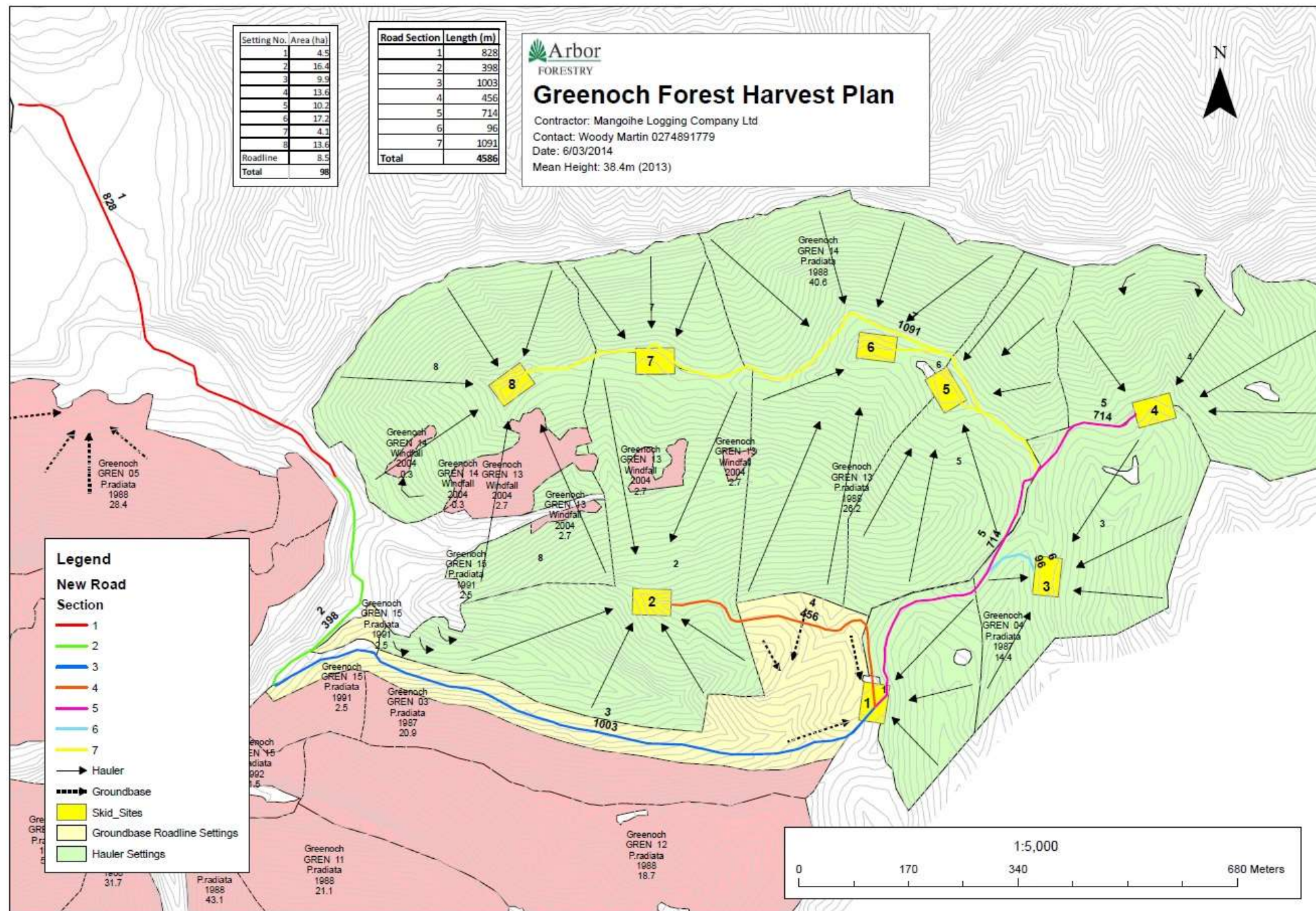
Greenoch Forest Harvest Plan

Contractor: Mangoihe Logging Company Ltd

Contact: Woody Martin 0274891779

Date: 6/03/2014

Mean Height: 38.4m (2013)



Roadline crew working on Skid 1, Greenoch Forest



Digger forming road down to Skid 2



A photograph of a temporary haul track in a forest. The track is a wide, cleared path of brown earth and pine needles, leading up a gentle slope. It is flanked by tall, thin pine trees. The ground is uneven with some logs and debris. A person in a bright green vest is visible in the distance on the right side of the track. The sky is bright and visible through the trees at the top of the frame.

Temporary haul track up to Skid 1

Timberjack 460D

Value:\$400,000

Cost/day: \$1200

Weight: 27 Tonne

- Pulls up to 10 tonne on flat land
- Can travel around 30km/h while loaded
- Equipped with winch as well as grapple
- Cleats on front tyres improve traction






View from new roadline skid



**View from Roadline skid towards Skid 1.
Minimal widening completed, road needs
to be shaped and metal spread and compacted.
Logging truck access achievable in dry weather
before metal is down**

A photograph of a dirt road winding through a forest. The road is light-colored and appears to be a skid trail. On the left side of the road, there is a steep, eroded bank of soil and some sparse vegetation. On the right side, there is a dense forest of tall, thin trees. The road curves to the right in the distance. A semi-transparent text box is overlaid on the left side of the image.

**View down the hill from Skid 1 towards highway.
Light spread of metal only required for roadline activity.
Note tree removal on uphill side of road more than
downhill side of road due to prevent damage to road
later on during harvest.**

Health and Safety

Health and Safety Audits

From The Approved Code of Practice for Forest Operations

2.4.1 The principal shall verify that the employer has in place a documented safety management system before commencing operations and shall periodically audit the effectiveness of this system.

The principal is the forest owner. The forest owner engages Arbor to act on its behalf when carrying out operations.

Arbor carries out a monthly health and safety audit on all logging contractors it manages to ensure they are using their health and safety system correctly.

Other Health and Safety Procedures

- WorkSafe is notified of operation, its duration and location by both the contractor and principal.
- Site specific hazard ID is carried out before the work commences.
- Contractor has weekly health and safety meetings to discuss new hazards
- A visitor register is kept onsite.
- Contractor has daily breaking out sheet to fill out, which details the plan for the day.
- Breaking out plan is done monthly with the principal

Steep Country Harvesting-
Same harvesting crew moving
into McQuade Forest, June 2014

Hauler crew moving into McQuade consists of:

- 1 Swing yarder
- 1 loader
- 1 processor
- 10 men

With the possibility of a groundbased crew being integrated to do roadlining throughout winter consisting of:

- 1 bulldozer/skidder
 - 1 loader
 - 4 men
-
- Cost approximately \$8000 per day to run without groundbased crew.
 - Will pull between 180- 240 tonnes per day depending on conditions
 - Logging rate between \$35-\$40 per tonne



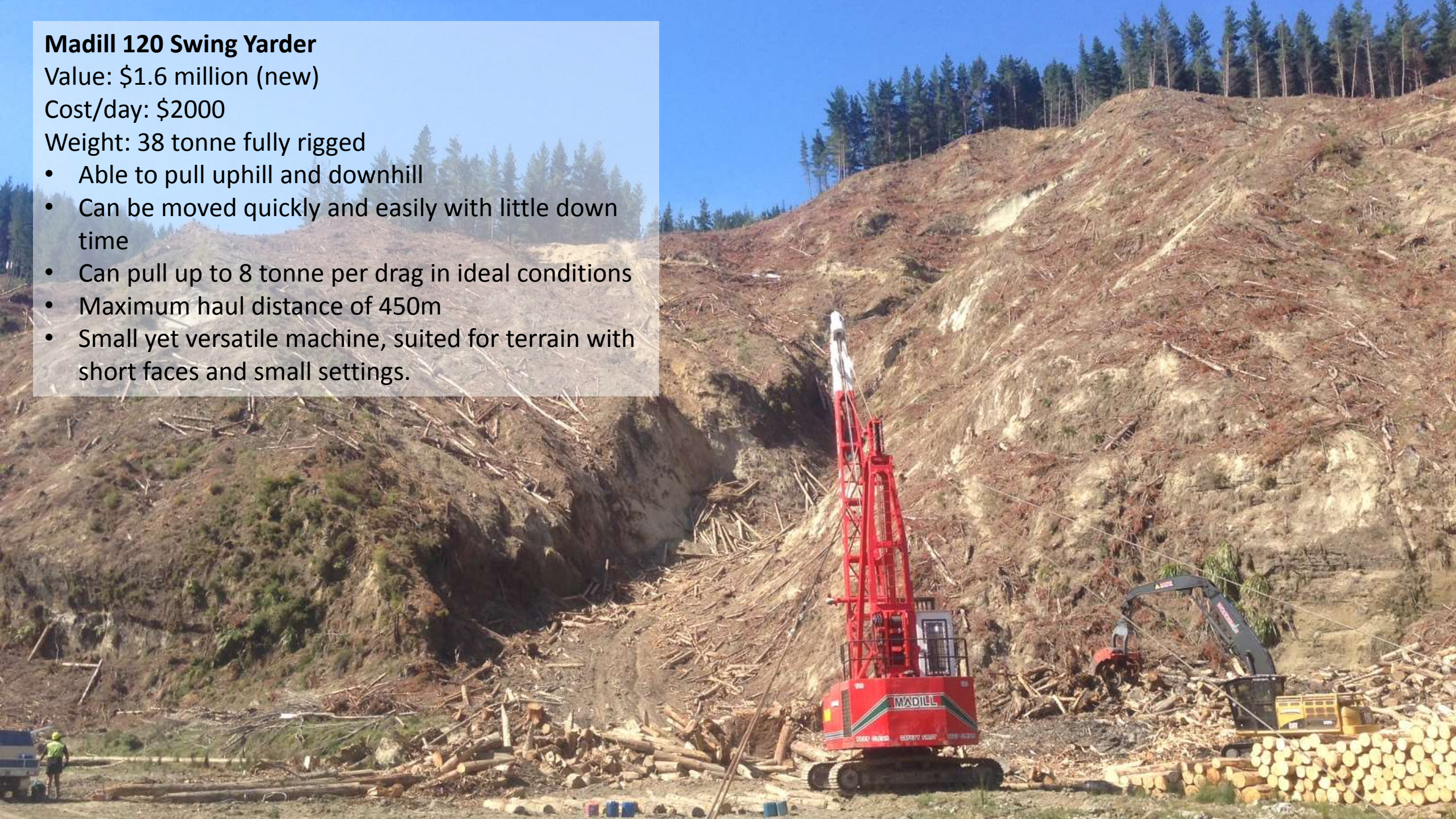
Madill 120 Swing Yarder

Value: \$1.6 million (new)

Cost/day: \$2000

Weight: 38 tonne fully rigged

- Able to pull uphill and downhill
- Can be moved quickly and easily with little down time
- Can pull up to 8 tonne per drag in ideal conditions
- Maximum haul distance of 450m
- Small yet versatile machine, suited for terrain with short faces and small settings.







CAT 336D fitted with Woodsman 800 processing head

Weight: 43 tonnes

Value: \$950,000

Cost per day: \$1800

- Delimbs logs
- Measures length, diameter and sweep
- Cuts into specified log grades
- Eliminates men with chainsaws on the skid
- Capable of felling trees on flat to rolling terrain



CAT 324D Log Loader

Value: \$450,000

Cost/day:\$1200

Weight: 30 Tonne

- Fleets logs into piles
- Loads trucks
- Shovels stems on flat ground



Note quality control deck
All wood from processor is QC'd
to ensure it meets the log
specifications



Processor

Loader

Hauler



Kenworth 4 axle Logging Truck with 4 axle trailer

Value: \$500,000

Carry approximately 29 tonne of logs

Operate 7 days a week (drivers, 4 days on, 4 off)

Cart logs from McQuade/Greenoch to Karioi Pulp Mill (82km), Palmerston North Railyard (106km) and Waverley Sawmills (86km)

Actual Harvest Figures- McQuade Forest

Volume Table - Mcquade

Figures shown in m³

	October	November	December	January	February	Total
Pruned	1682.49	836.49	186.54	25.75	596.86	3328.13
S Grade	549.89	315.39	70.82	45.01		981.11
Export A/K	1405.93	1165.08	323.37	211.21	858.53	3964.12
Export KI/KIS	195.63	144.74	97.66	67.04	461.68	966.75
KW	510.34	384.46	30.36			925.16
Pulp	226.46	207.86	28.6	54.86	139.56	657.34
Total	4570.74	3054.02	737.35	403.87	2056.63	10822.61

McQuade

Log Grade	Volume (m ³)	Percentage Output
A	3129.3	29%
K	834.82	8%
KI	623.57	6%
KIS	343.18	3%
Pruned	3328.13	31%
S Grade	981.11	9%
KW	925.16	9%
Pulp	657.34	6%
Total	10822.61	

Stumpage - McQuade 2013/2014

	October	November	December	January	February	Total
Gross Return	\$ 516,695.33	\$ 341,386.25	\$ 86,559.56	\$ 37,377.57	\$ 247,916.72	\$ 1,229,935.43
Logging	\$ 130,252.05	\$ 79,784.04	\$ 13,092.57	\$ 12,344.82	\$ 53,197.59	\$ 288,671.07
Freight	\$ 132,692.38	\$ 90,187.75	\$ 16,959.23	\$ 18,710.41	\$ 70,280.20	\$ 328,829.97
Other	\$ 4,658.90	\$ 2,443.50	\$ 807.70	\$ 271.59	\$ 867.00	\$ 9,048.69
Management	\$ 25,881.06	\$ 17,337.30	\$ 4,335.06	\$ 2,855.39	\$ 12,395.83	\$ 62,804.64
Net (No Roding)	\$ 223,210.94	\$ 151,633.66	\$ 51,365.00	\$ 3,195.36	\$ 111,176.10	\$ 540,581.06

Total Per Tonne	
Gross Return	\$ 113.64
Logging	\$ 26.67
Freight	\$ 30.38
Other	\$ 0.84
Management	\$ 5.80
Net (No Roding)	\$ 49.95

Actual Harvest Figures- Greenoch Forest

Volume Table - Greenoch

Figures shown in m³

	January	February	Total
Pruned	453.86	169.73	623.59
S Grade	199.9		199.9
Export A/K	287.78	205.63	493.41
Export KI/KIS	85.5	110.22	195.72
Pulp	55.78	27.08	82.86
Total	1082.82	512.66	1595.48

Greenoch

Log Grade	Volume (m ³)	Percentage Output
A	408.65	26%
K	84.76	5%
KI	155.86	10%
KIS	39.86	2%
Pruned	623.59	39%
S Grade	226.98	14%
Pulp	55.78	3%
Total	1595.48	

Stumpage - Greenoch 2013/2014

	January	February	Total
Gross Return	\$ 126,072.01	\$ 62,854.14	\$ 188,926.14
Logging	\$ 29,236.14	\$ 13,841.82	\$ 43,077.96
Freight	\$ 35,898.30	\$ 15,343.99	\$ 51,242.29
Other	\$ 286.17	\$ 454.91	\$ 741.08
Management	\$ 6,313.59	\$ 3,127.55	\$ 9,441.14
Net (No Roding)	\$ 54,337.81	\$ 30,085.87	\$ 84,423.67

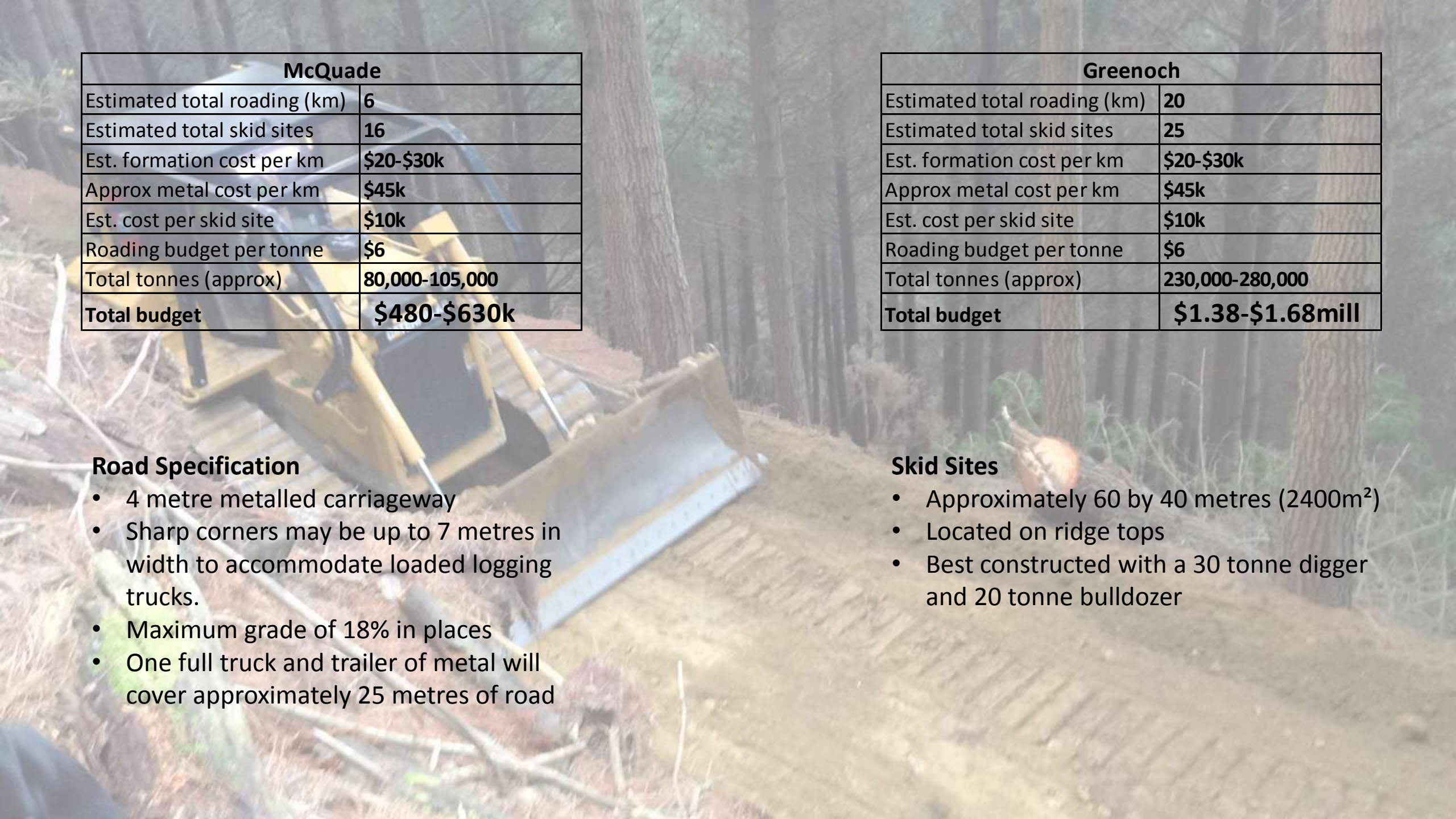
Total Per Tonne	
Gross Return	\$ 118.41
Logging	\$ 27.00
Freight	\$ 32.12
Other	\$ 0.46
Management	\$ 5.92
Net (No Roding)	\$ 52.91

Roading

McQuade Forest

Roading cost to date: \$245,000

- This consist of approximately 1.7km of main arterial road to be used by the rest of the forest.
- Spur roads and skid sites to accommodate approximately 36,000 tonne of wood, to be harvested starting June 2014.



McQuade	
Estimated total roading (km)	6
Estimated total skid sites	16
Est. formation cost per km	\$20-\$30k
Approx metal cost per km	\$45k
Est. cost per skid site	\$10k
Roading budget per tonne	\$6
Total tonnes (approx)	80,000-105,000
Total budget	\$480-\$630k

Greenoch	
Estimated total roading (km)	20
Estimated total skid sites	25
Est. formation cost per km	\$20-\$30k
Approx metal cost per km	\$45k
Est. cost per skid site	\$10k
Roading budget per tonne	\$6
Total tonnes (approx)	230,000-280,000
Total budget	\$1.38-\$1.68mill

Road Specification

- 4 metre metallised carriageway
- Sharp corners may be up to 7 metres in width to accommodate loaded logging trucks.
- Maximum grade of 18% in places
- One full truck and trailer of metal will cover approximately 25 metres of road

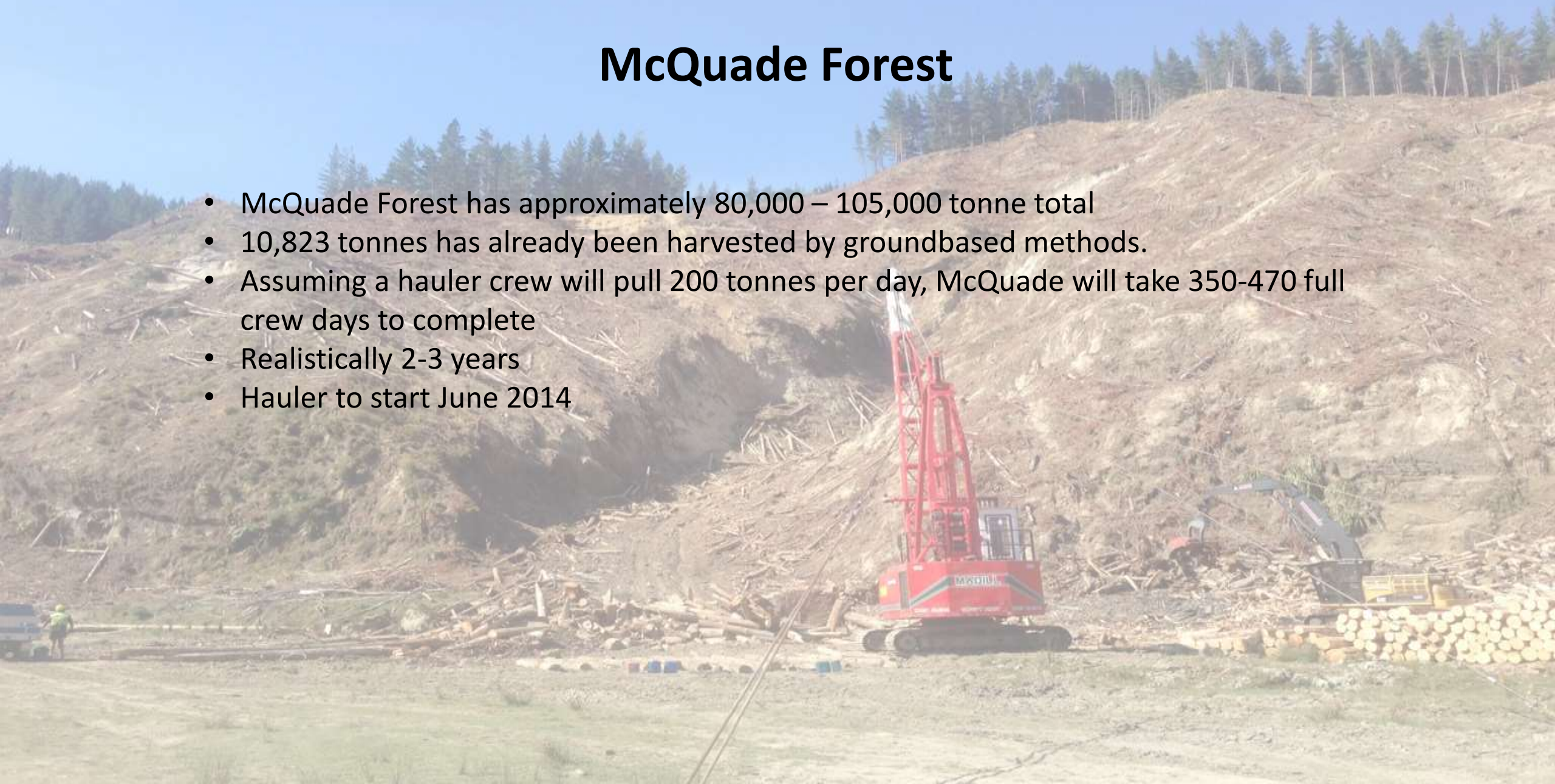
Skid Sites

- Approximately 60 by 40 metres (2400m²)
- Located on ridge tops
- Best constructed with a 30 tonne digger and 20 tonne bulldozer

Outlook

McQuade Forest

- McQuade Forest has approximately 80,000 – 105,000 tonne total
- 10,823 tonnes has already been harvested by groundbased methods.
- Assuming a hauler crew will pull 200 tonnes per day, McQuade will take 350-470 full crew days to complete
- Realistically 2-3 years
- Hauler to start June 2014



Greenoch Forest

- Greenoch Forest has approximately 230,000 – 280,000 tonne total
- 1,595 tonnes has already been harvested by groundbased methods.
- Assuming a hauler crew will pull 200 tonnes per day, McQuade will take 1,150-1,400 full crew days to complete
- Realistically 6-7 years
- However after 3 years 2 haulers will be available so this time could be decreased
- Hauler to start August 2015



Hauler to be used in Greenoch - August 2015

TMY 70

Operated by Mangoihe Logging

- “Pole” hauler
- Suited to larger settings due to its set up time.
- More power so increased pay loads
- Can haul long distances (beyond 1000m)
- Similar setup to swing yarder i.e. 10 men, 1 processor, 1 loader