

Tree farming guidelines

sappi

4th Edition (2022)

Part 5 - Annexures



PART 5 – ANNEXURES

Contents		Page
Annexure 1	Risk assessment	3
Annexure 2	Life-saving rules	8
Annexure 3	“Stop and think before you act”	10
Annexure 4	Health and safety basics	12
Annexure 5	A basic budget	20
Annexure 6	Threatened and protected species on plantations	21
Annexure 7	Weeding by manual hoe	23
Annexure 8	Felling by chainsaw	28
Annexure 9	Debarking by axe	31
Annexure 10	Debranching by chainsaw	38
Annexure 11	Cross cutting by chainsaw	41
Annexure 12	Complete operation by chainsaw	45
Annexure 13	Stacking	52
Annexure 14	Legal register	54



Risk assessment matrix

The objectives of the risk assessment are to minimise work-related injuries, reduce lost time, maintain productivity, and limit litigation. Activities with a high risk rating shall stipulate mitigating factors to reduce the risk.

Process	Activity	Possible hazard	Possible risk				Rating Medium High Low	Mitigating factors
			Safety	Health	Environmental	Quality		
SILVICULTURE	Land preparation	Slope	√		√		L	Burning of slash
		Wetland/riparian damage				√	M	No commercial planting in wetland/riparian zones
		Ground roughness	√		√	√	L	
		Sharp equipment	√			√	L	
		Moving equipment	√				L	
		Ergonomics		√			M	
	Planting	Injury	√				L	
		Slope	√		√		L	Land preparation/mulching
		Ground roughness	√		√		L	
		Sharp equipment	√				L	
		Moving equipment	√				L	
		Ergonomics		√			M	
	Fertilize	Injury	√				L	
		Storage	√		√	√	L	
		Application	√		√	√	L	
		Spillage	√		√		L	
	Maintenance (chemical)	Carrying		√			L	
		Weight		√				
		Chemical	√				M	
	Maintenance (manual)	Spillage	√		√	√	H	Training and bunding
		Application	√	√	√	√	M	Rates - liters/kg per ha
Equipment			√			L		
Fire protection		Hazards	√		√		M	
	Fires	√	√	√		M		
	Slopes	√		√		L		
	Ground roughness	√		√		L		
	Road network	√		√	√	L		
		Fatigue		√		H	Shifts & rotate staff, followed by rest periods	

Risk assessment matrix

	Lookouts	Access to tower	√			√	L		
		Cold/heat		√			L		
		Lightning	√		√		M		
	Prune	Sawdust	√	√			L		
		Ergonomics		√			M		
		Ground roughness	√		√		L		
		Slope	√		√		L		
		Sharp equipment	√			√	L		
	Thinning	Sawdust	√	√			L		
		Ergonomics		√			L		
		Ground roughness	√		√		L		
		Slope	√		√		L		
		Falling trees	√				M		
		Sharp equipment	√				M		
		Moving equipment	√			√	M		
	Fires	Smoke inhalation	√	√	√		H	Training, PPE, first aid available, supervision	
		Heat exposure	√	√			H	"	
		Physical injuries	√	√			H	"	
		Fatigue	√	√			H	Supply water & rations/rotate staff, followed by rest periods	
		Slopes	√		√		L		
		Ground roughness	√		√		L		
			Possible risk					Rating	
Process	Activity	Possible hazard	Safety	Health	Environmental	Quality	Medium High Low	Mitigating factors	
HARVESTING	Felling & debranching	Sawdust	√	√			L		
		Ergonomics		√			M		
		Ground roughness	√		√		L		
		Slope	√		√		L		
		Sharp equipment	√			√	H	Training, PPE, first aid available, supervision	
		Working distance	√			√	H	Teams to be at least two tree lengths apart	
	Debarking	Sawdust	√	√			L		
		Ergonomics		√			H	Training, PPE, supervision, regular rest periods	
		Ground roughness	√		√		L		
		Slope	√		√		L		
		Sharp equipment	√			√	M		
		Working distance	√			√	H	Teams to be at least two tree lengths apart	
	Cross cutting	Sawdust	√	√			L		

Risk assessment matrix

		Ergonomics		√			L		
		Ground roughness	√		√		L		
		Slope	√		√		M		
		Sharp equipment	√			√	H	Training, PPE, first aid available, supervision	
		Working distance	√			√	H	Teams to be at least two tree lengths apart	
	Extraction	Dust	√	√			L		
		Ergonomics		√			L	Drinking water to be available in field	
		Ground roughness	√		√		M		
		Slope	√		√		H	Training & supervision	
		Sharp equipment	√			√	L		
		Working distance	√			√	H	Teams to be at least two tree lengths apart	
		Moving equipment	√				H	Warning signs shall be in place	
	Loading	Moving equipment	√				H	Warning signs shall be in place	
		load capacities	√			√	M		
		Dust	√	√			L		
		Ergonomics		√			L		
			Possible risk				Rating		
Process	Activity	Possible hazard	Safety	Health	Environmental	Quality	Medium High Low	Mitigating factors	
General	Driving/Transport	Fatigue	√	√			H	Supply water & rations/rotate staff, followed by rest periods	
		Road worthy	√				H	All vehicles travelling on public roads have license discs displayed	
		Speed	√				H	Training	
		Hazards	√				H	Training	
		Road conditions	√			√	M		
		Passengers	√	√			H	No overloading permitted	
	Natural	Insects		√	√		L		
		Snakes		√	√		L		
		Hazardous plants		√	√		L		
		Lightning	√	√	√		L		
		Heat	√	√	√		M		
		Cold	√	√	√		M		
		Allergies		√	√		M		
		Threatened & protected (TOPS) species				√	M	TOPS species list available	
		Important conservation areas			√	√	M		

Risk assessment matrix

		Open areas			√	√	M	Open areas have been assessed for conservation value
	Arson	Loss					M	
		Damage			√		H	Regular meetings with community
		Re-work				√	L	
		Injuries	√	√			L	
		Theft			√		M	
	Chemicals	Usage	√	√	√	√	M	Only from the approved list
		Storage	√	√	√		M	
		Theft	√		√		L	
		Handling	√	√	√	√	M	
	Fuels and oils	Usage	√		√		L	
		Storage	√		√		M	
		Theft	√				H	Secure supplies
		Handling	√		√		M	
	Housing & ablutions	Cold/heat		√			H	Refer housing standards
		Dampness/wet		√			H	Refer housing standards
		Hygienic		√			H	Refer housing standards
	Chain of Custody	Mixing of FSC® and non-FSC products/sale of non-FSC as FSC				√	M	Labelling system in use
		Incorrect trademark use				√	M	All FSC trademark use is approved by certification body.
	Visitors	Entry	√				L	
		Collection/delivery	√		√		L	
		Contractual	√				M	
	Infrastructure	Ventilation	√				M	
		Safety	√				L	
		Storage	√				L	
		Stacking	√				M	
		Electricity	√				H	Training & refresher meetings
		Lighting	√				L	
		Fire equipment	√				L	
		Ladders	√				M	
		Compressors	√				L	
		Welding	√				M	
		Small tools	√				L	
	Road maintenance	Sharp equipment	√			√	L	
		Moving equipment	√	√			L	

Risk assessment matrix

		Ergonomics	√	√		√	L	
		Dust	√	√			L	
		Natural areas			√		M	

Sappi Forests 8 Life Saving Rules



Rule 01:

Wear a seatbelt if you are in a moving vehicle.



Rule 02:

Don't talk on a cell phone, unless you use a hands free kit, when you drive. Pull over in a safe place if you need to SMS.



Rule 03:

Don't transport people on the back of an open vehicle.



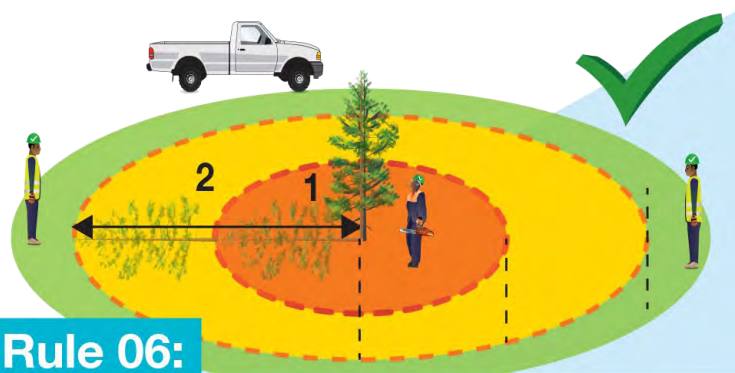
Rule 04:

The workplace is an alcohol and drug free area.



Rule 05:

No domino felling.



Rule 06:

Maintain the two tree length rule for manual felling.



Rule 07:

Only operate or use equipment if you are authorised and trained to do so.



Rule 08:

Always wear the correct PPE for the task as prescribed in the Safe Work Procedure.

My behaviour is my choice.

CHOOSE to be Clever Me

sappi

Imithetho engu-8 Engasindisa Impilo



Umthetho 1:
Bopha ibhanda uma usemotweni ehambayo.



Umthetho 2:
Ungakhulumi kumakhalekhukhwini ngaphandle uma uzosebenzisa umakhalekhukhwini ongadingi ukubanjwa ngezandla ngesikathi ushayela. Ima eceleni endaweni ephaphile uma udinga ukuthumela umqhafazo.



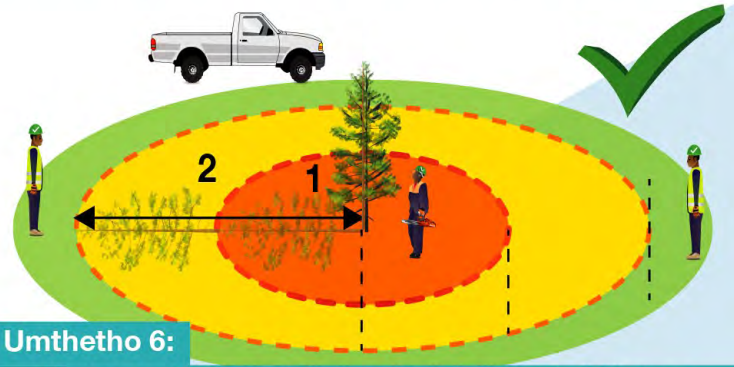
Umthetho 3:
Ungagibezi abantu ngemumva emotweni evulekile.



Umthetho 4:
Indawo yomsebenzi ayihambisani nokusetshenziswa kwezidakamizwa nophuzo oludakayo.



Umthetho 5:
Ungawisi izihlahla eziningi ngesikhathi esisodwa.



Umthetho 6:
Gcina umthetho webanga lezihlahla ezimbili uma uwisa izihlahla ngezandla.



Umthetho 7:
Kufanele usebenzise umshini kuphela uma unikezwe invume futhi uqeqeshelwe ukuwusebenzisa.



Umthetho 8:
Kufanele ugqoke i-PPE ehambisana nomhlahlandlela obekiwe wokwenza umsebenzi.

Indlela engziphata ngayo iyisinqumo sami.

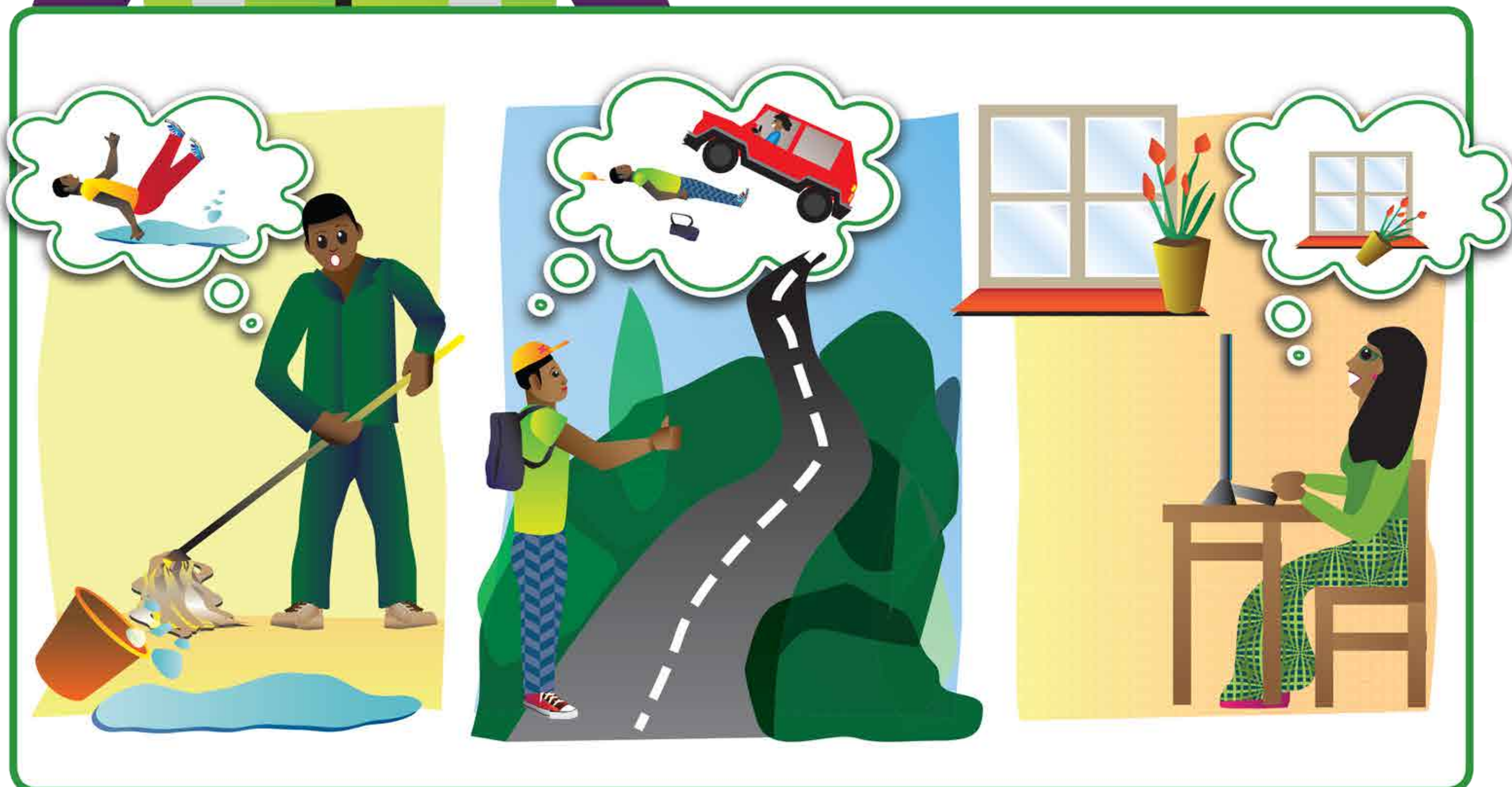


Khetha ukuba ngohlakaniphile.

Stop and Think Before you Act



- What can I do about this?
- What could go wrong?
- How bad can it be?



I do not accept the risk.

sappi

Inspired by life

Cabanga: Ngingenzani ngalokhu?



Kushintsheni?



Ingabe ingqondo
kanye nomzimba
wami kusesimweni esihle
sokwenza umsebenzi?



Ingabe nginawo amathuluzi
okusebenza aphephile?



Ingabe Nginalo
ulwazi olwanele
lwezokuphepha?



Ikuphi okubi
okungenzeka?
Umonakalo ungaba
mkhulu kangakanani?



Health and safety: The basics



sappi | khulisa 

People have a right to a safe and healthy working environment.

BEFORE AND DURING A TASK



What could go wrong?
How bad could it be?
Has anything changed?



Am I okay to do the job?
Do I understand my task?
Do I have the right tools and
equipment?



Make it safe.
Use the right procedure.
Use the right tools
Reduce risks.

STOP IF IT CAN'T BE DONE SAFELY.

Occupational Health and Safety (OHS) Act

The Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) aims to provide for the health and safety of persons at work.



Compensation for Occupational Injuries and Diseases (COID) Act

This Act provides compensation to workers that are injured or killed at work, or become ill from work.



Hazards in the forestry industry

Common hazards



Weather hazards



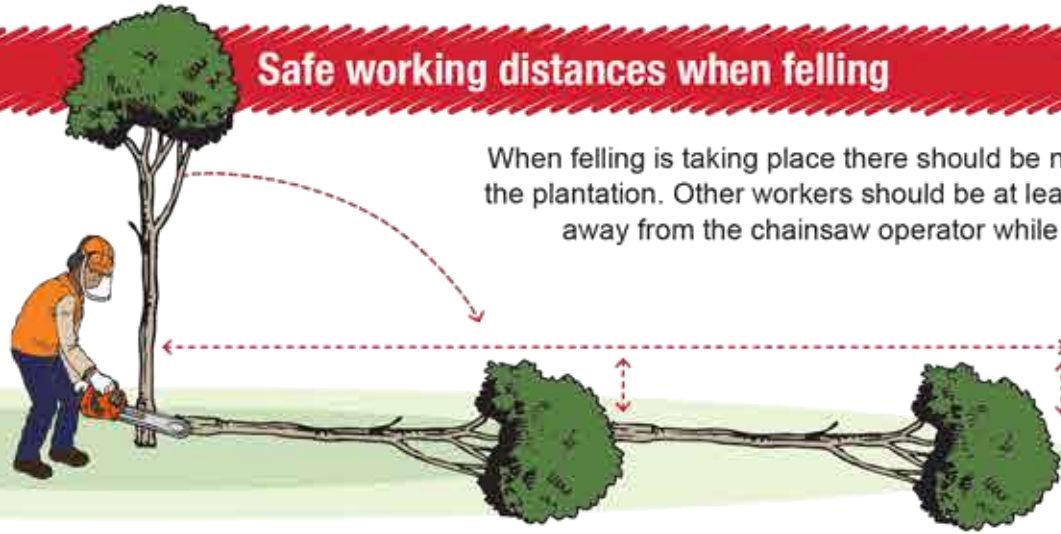
Different types of signage



Basic health and safety tips for contractors and workers




Safe working distances when felling



When felling is taking place there should be no other workers in the plantation. Other workers should be at least two tree lengths away from the chainsaw operator while he is felling.

Sound protection while felling



90+ DB | Chain saw | Bell loader 

75 - 90 DB | Lawn mower | Busy road

45 - 60 DB | Telephone | Power mower | Loud radio

20 - 45 DB | Living room | Library | Quiet office

0 - 20 DB



Safety zones

It is the duty of the safety rep to set up Safety Zones at each work site.



Toolbox talks

Toolbox talks are weekly talks given to workers, that cover safety issues.



Flagging

Flagging is used to control traffic especially when felling or burning next to public roads.



Stop



Slow down



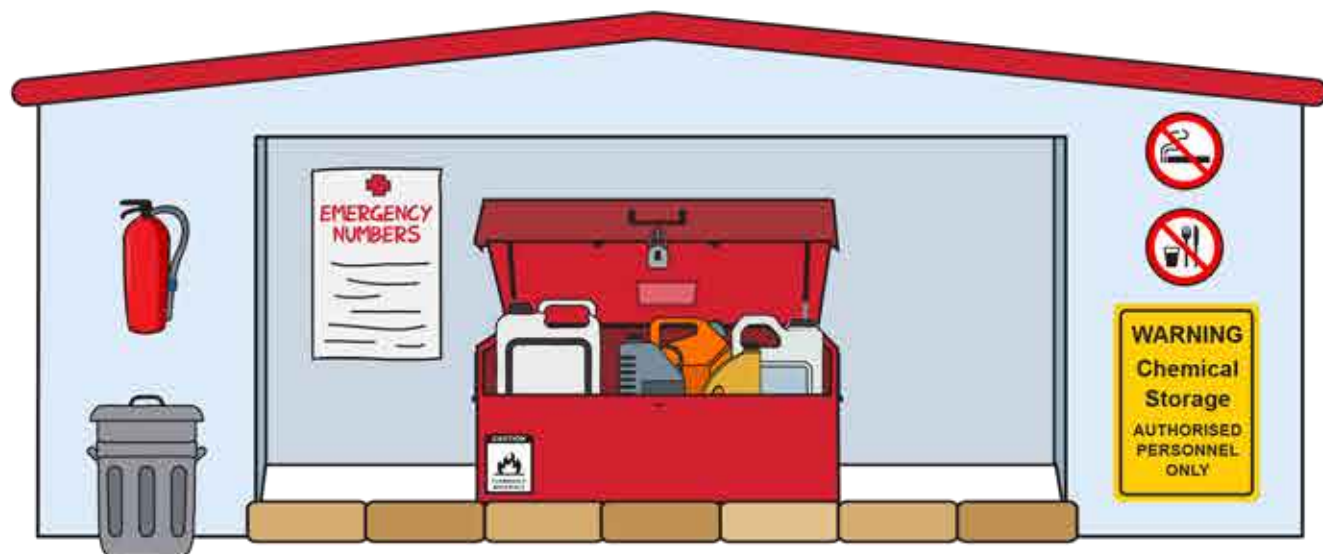
Go

Protective Personal Equipment (PPE)

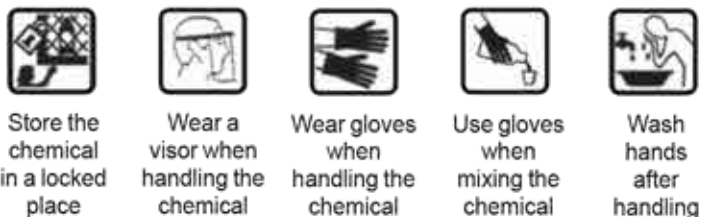
Workers should know and adhere to the PPE requirements for the specific operation and associated risks.



Storage of chemicals, oil and fuel



Information on chemical labels



Store the chemical in a locked place

Wear a visor when handling the chemical

Wear gloves when handling the chemical

Use gloves when mixing the chemical

Wash hands after handling

First aid

First aid is help given to a sick or injured person until full medical treatment is available.



Incident management

It is important to have a record of all incidents as well as 'near misses'.



Impilo nokuphepha emsebenzini



sappi | khulisa

Abantu banelungelo lokuphepha endaweni yokusebenzela.

NGAPHAMBI KOKWENZA, NANGENKATHI WENZA UMSEBENZI.



Ikuphi okungalungile okungenzeka?
Kungaba ubungozi kangakanani?
Ngabe kukhona okuguqukile?



Ngabe ngikulungele ukwenza lomsebenzi?
Ngabe ngiyawuqonda umsebenzi?
Ngabe nginawo amathuluzi afanele?



Yenza kuphephe.
Sebenzisa imigomo efanele.
Sebenzisa amathuluzi afanele.
Yehlisa ubungozi.

YIMA! UNGAKWENZI UMA KUNGEKE KWENZEKE NGENDLELA EPHEPHILE.

I-Occupational Health and Safety (OHS) Act



Inhloso ye-Occupational Health and Safety (OHS) Act, 1993 (Act No. 85 of 1993) ukubeka umthetho obhekelela ukuphepha kwabantu emsebenzini.

I-Compensation for Occupational Injuries and Diseases (COID) Act



Lomthetho ubhekelela ukukhokhelwa kwabasebenzi uma belimala, bekhubazeka noma befa emsebenzini.



Izingozi embonini yezamahlathi

Izingozi ezijwayelekile



Ukuqhuma kukadizili noma kukapethiloli



Ukuchitheka kwa oyela namakhemikali



Imililo



Ukulinyazwa imishini ehambayo



Ukugingqika kukagandaganda



Ukulimala uma kuwiswa izihlahla



Ukulimala uma kuxebulwa



Ukulinyazwa isaha



Ugesi



Ukulunywa izinyosi



Ukulunywa inyoka

Izingozi ezidalwa isimo sezulu



Inkungu



Imibani



Imvula



Ukushisa



Umoya

Izinhlabo zezimpawu ezahlukene



Ulwazi



Isexwayiso



Ulwazi lokulwa nomlilo



Okudingekayo



Okungavumelekile

Izinhlabo zezimpawu ezahlukene

Thutha abasebenzi ngokusebenza



Phatha kahle amathuluzi kanye nemishini yakho

Hlinzeka ngezinsiza kusebenza eziphephile



Imininingwane ngezingu



Yiba nemigomo yokusebenza epephile



Qinisekisa inhlanzeko

Ibanezimpawu ezidingekayo



Beka izimpawu endaweni enobungozi



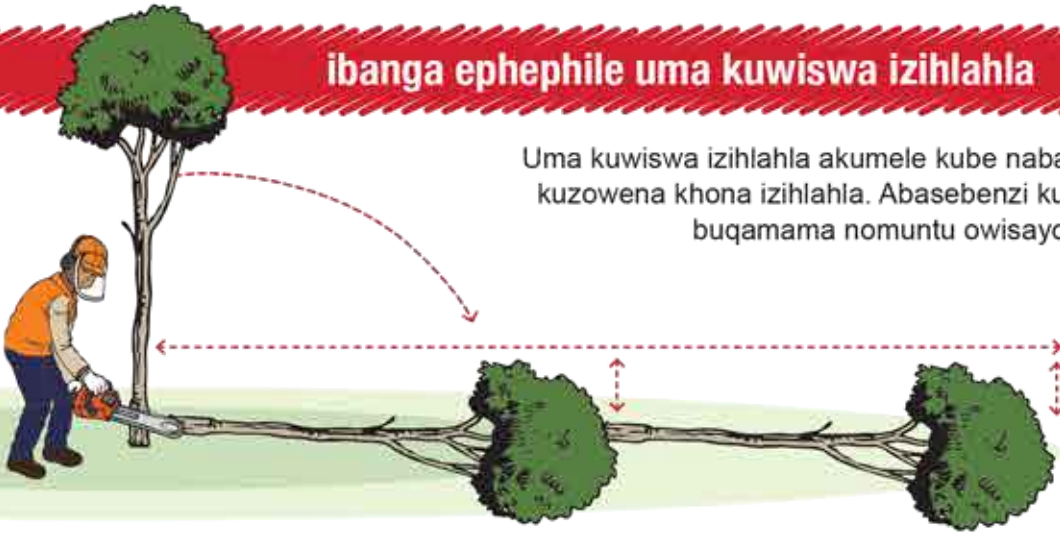
Ibanesikhwama sosizo lokuqala esiphelele



Hlinzeka ngamanzi ahlanzekile okuphuza

ibanga ephephile uma kuwisa izihlahla

Uma kuwisa izihlahla akumele kube nabasebenzi lapho kuzowena khona izihlahla. Abasebenzi kumele bamele buqamama nomuntu owisayo.



Ukuvikela izindlebe uma kuwisa izihlahla



90+ DB | Isaha | Ugandaganda 

75 - 90 DB | Umshini wokusika utshani | Umgwaqo omatasatasa

45 - 60 DB | Ucingo | Umshini wokusika utshani | Umsakazo okhalela phezulu

20 - 45 DB | Igumbi lokuphumula | Umtapo wolwazi | Ihovisi elithule

0 - 20 DB



Izindawo ezivikelekile

Kuwumsebenzi womuntu obhekelele ukuphepha ukuhlonza indawo evikelekile lapho kusetshenzelwa khona.



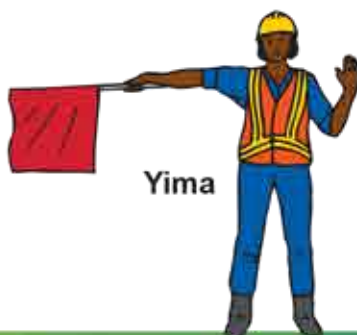
Izinkulumo zokuphepha

Lezi izinkulumo ezenziwa njalo ngesonto. Lapho kukhulunywa khona ngokuphepha emsebenzini.



iFulegi

Ifulegi lisetshenziswa uma kulawulwa izimoto, uma kuwisa noma kushiswa uduze komgwaqo omkhulu.



Yima



Ehlisa ijubebane



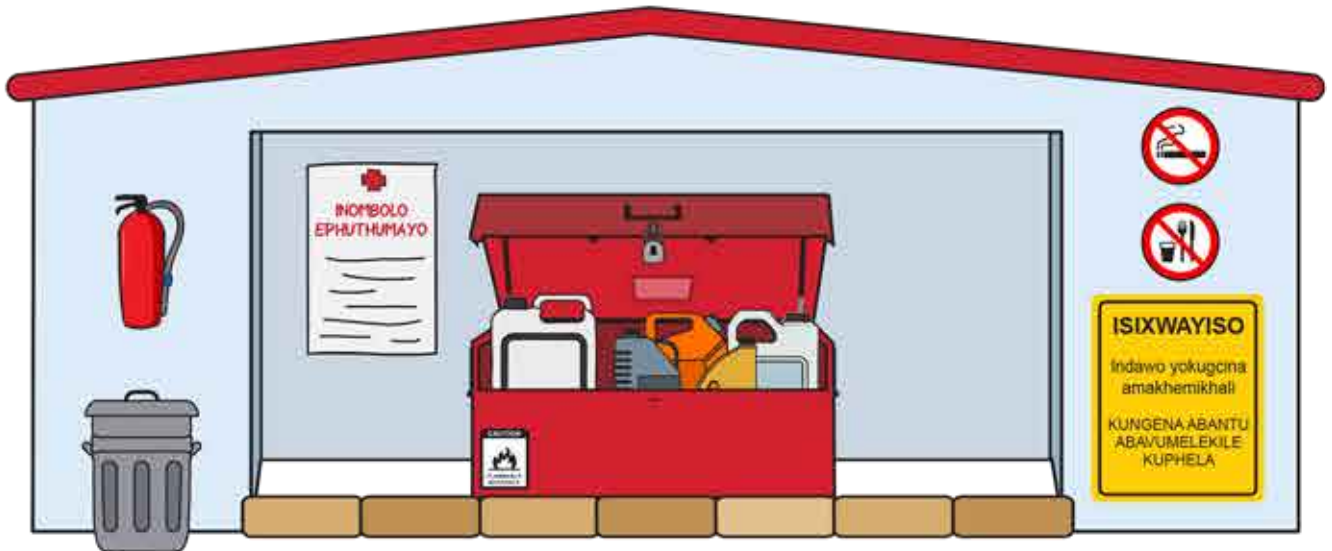
Hamba

Izingubo zokusebenza ezivikelayo

Abasebenzi kumele bazi futhi bazibophezele ekugqokeni izingubo zokusebenza ezivikelayo ebungozini



Ukugcinwa kwamakhemikhali, u-oyela kanye nophethiloli



Iminingwane ebhalwe kumalebula amakhemikhali



Gcina ikhemikhali endaweni ekhiyelwe



Mboza ubuso uma uphethe amakhemikhali



Gqoka amagilavu uma uphethe ikhemikhali



Gqoka amagilavu uma uxuba amakhemikhali



Geza izandla emva kokusebenzisa ikhemikhali

Usizo lokuqala

Usizo lokuqala lunikezwa umuntu ogulayo noma olimele kuze kufike usizo lwezempilo oluphelele.



Ukulawula izigameko

Kubalulekile ukushicilela zonke izigameko ezenzekile nezicishe zenzeka.



ESTIMATED INCOME		Eucalyptus	R/ton Wattle	Pine
	Mill delivered price	<input type="text"/>	<input type="text"/>	<input type="text"/>
LESS	Harvesting costs	<input type="text"/>	<input type="text"/>	<input type="text"/>
LESS	Loading	<input type="text"/>	<input type="text"/>	<input type="text"/>
LESS	Short haul	<input type="text"/>	<input type="text"/>	<input type="text"/>
LESS	Long haul	<input type="text"/>	<input type="text"/>	<input type="text"/>
A	Standing value	<input type="text"/> 0	+ <input type="text"/> 0	+ <input type="text"/> 0
B	Estimated volumes to be harvested (tons)	<input type="text"/>	<input type="text"/>	<input type="text"/>
Gross income (A x B)		<input type="text"/> 0	+ <input type="text"/> 0	+ <input type="text"/> 0 = <input type="text"/> 0
EXPENSES				Total (Rands)
Social expenses				
	Management of special sites			<input type="text"/>
	Improvements to staff accommodation			<input type="text"/>
	Safety training			<input type="text"/>
	Protective clothing			<input type="text"/>
	Support to local community			<input type="text"/>
Total social costs				<input type="text"/> 0
Environmental				
	Control of invasive plants			<input type="text"/>
	Open area management			<input type="text"/>
	Roads maintenance			<input type="text"/>
Total environmental costs				<input type="text"/> 0
Forestry		Hectares	Cost per ha	Total Costs (Rand)
	Establishment	<input type="text"/>	x <input type="text"/>	= <input type="text"/> 0
	Thinnings	<input type="text"/>	x <input type="text"/>	= <input type="text"/> 0
	Pruning	<input type="text"/>	x <input type="text"/>	= <input type="text"/> 0
	Weeding	<input type="text"/>	x <input type="text"/>	= <input type="text"/> 0
Total forestry costs				<input type="text"/> 0
Risk				
	Fire break preparation (total costs)			<input type="text"/>
	Maintenance of firefighting equipment			<input type="text"/>
	Insurance costs (if applicable)			<input type="text"/>
Total risk management costs				<input type="text"/> 0
Overheads (optional)				<input type="text"/>
TOTAL COSTS (Social + Environmental + Forestry + Risk + Overheads)				<input type="text"/> 0
NETT INCOME (Gross income less Total costs)				<input type="text"/> 0

Listed Threatened or Protected Species that may be found in areas where plantation forestry is commonly undertaken in South Africa. (Gov. Gazette No. 30568 of 14 December 2007 - NEMBA Act 10 of 2004)

Species	Category	Distribution	Habitat	Threats	Presence
Wattled Crane	Critically endangered	Escarpment - Mpumalanga, Free State, KZN & E Cape	Wetlands	Loss of habitat (wetland destruction)	
Blue Swallow	CE	Escarpment - Mpumalanga & KZN	High rainfall montane (sour) grassland	Loss of habitat	
Cape Parrot	CE	E Cape, KZN & Limpopo	Afromontane forest	Habitat degradation, trapping & disease	
Cycads (all species)	Various	Widespread	Various	Habitat degradation & collection	
Blue Crane	Endangered	SA & Namibia only	Grassland	Poisoning & habitat degradation	
Grey Crowned Crane	E	Mpumalanga, Free State, KZN & E Cape	Grassland & wetlands	Habitat loss & degradation, poisoning	
Bearded Vulture	E	Free State, KZN, E Cape, Lesotho	Mountains - alpine grasslands, cliffs	Poisoning	
Cape Vulture	E	Widespread	Cliffs - breeding	Poisoning & habitat loss	
Oribi	E	Mpumalanga, Free State, KZN & E Cape	Grassland	Hunting (dogs) & habitat loss	
Wild Ginger	E	Mpumalanga & KZN (may be extinct in KZN)	Forest floor	Collecting (medicinal)	
Pepper-bark Tree	E	Limpopo, Mpumalanga, KZN & E Cape	Woodland and forest edges	Bark collecting (medicinal)	
Southern Bald Ibis	Vulnerable	Endemic SA escarpment - Mpumalanga, KZN, Free State & E Cape	High altitude alpine grassland - cliffs for breeding	Habitat loss & degradation	
African Grass Owl	Vulnerable	Limpopo, Gauteng, Mpumalanga, KZN, E Cape, W Cape	High rainfall tall rank grassland, wetland	Habitat loss	
Samango Monkey	Vulnerable	Limpopo, Mpumalanga, KZN & E Cape	Forest	Habitat degradation	

Tree Hyrax	Vulnerable	E Cape, KZN	Forest	Habitat degradation & loss	
Leopard	Vulnerable	Widespread	Varied	Persecution (hunting & trapping)	
Blue Duiker	Vulnerable	KZN, E Cape, W Cape	Coastal & escarpment forest	Habitat loss, predation, hunting	
Giant Bullfrog	Protected	Mpumalanga, Gauteng, Free State, KZN & E Cape	Seasonal grassy pans & vleis (Highveld)	Habitat loss	
Nile Crocodile	Protected	Limpopo, Mpumalanga, KZN & E Cape	Water bodies	Persecution (hunting & trapping)	
African Rock Python	Protected	Limpopo, Mpumalanga, KZN & E Cape	Varied	Persecution	
Southern Ground Hornbill	Protected	Limpopo, Mpumalanga, KZN & E Cape	Woodland & grassland	Habitat degradation	
African Marsh Harrier	Protected	Limpopo, Gauteng, Mpumalanga, KZN, E Cape, W Cape	Wetlands & adjacent grassland	Wetland loss, fire during breeding season	
Denham's Bustard	Protected	Mpumalanga, KZN, E Cape & W Cape	Grassland & fynbos	Habitat degradation & loss, trapping & poisoning	
Cape Clawless Otter	Protected	Widespread	Water bodies	Persecution	
Brown Hyena	Protected	Widespread	Grassland & woodland	Persecution	
Serval	Protected	Widespread	Grassland, wetlands & woodland	Persecution	
Spotted-necked Otter	Protected	Widespread	Water bodies	Habitat degradation & persecution	
Honey Badger	Protected	Widespread	Varied	Persecution	
Common Reedbuck	Protected	Limpopo, Mpumalanga, KZN & E Cape	Moist grassland, wetland and woodland	Hunting	
Cape Fox	Protected	Widespread	Dry grassland	Trapping	

Weeding by manual hoe

<https://www.forestrysolutions.net>

The tables below detail the production targets for weeding of young trees using manual hoeing. The standards are based on a 9 hour (540min) work shift with 8 hours (480min) being allowed for productive work infield. These include fatigue and operational allowances associated with the activity.

Targets will vary according to the prevailing working conditions, for which points are allocated on the variable conditions table. Prior to determining a task, the points are calculated and taken into consideration.

Condition	Variable	Points
Soil condition	Soft loose, moist, easy hoe penetration (80%)	0
	Firm soil, clay, grit, scattered rock, medium hoe penetration (50%)	2
	Hard ground surface, rock and shale, poor hoe penetration (20%)	4
Slope conditions (%)	0 – 30%	0
	31 – 50%	1
	51 – 70%	3
	70% >	4
Vegetation type	General broadleaf	0
	Wattle/gum regrowth	1
	Annual grasses	3
	Kikuyu	4
Vegetation cover	0 – 40%	0
	41 – 60%	1
	61 – 80%	2
	81 – 100%	4
Height of vegetation: light	Broadleaf up to 500mm	0
	Regrowth up to 750mm	0
	Grasses up to 200mm	0
Height of vegetation: medium	Broadleaf 500 - 1000mm	1
	Regrowth 750 - 1500mm	2
	Grasses 200 - 500mm	2
Height of vegetation: heavy	Broadleaf above 1000mm	3
	Regrowth above 1500mm	4
	Grasses above 500mm	4
Total		

1. Ring hoe – 1.0m diameter (0.5m radius)

Ring hoe – 1.0m (0.5m radius)			Mandays/ha							
Points	Minutes per tree	Task in trees	Stems/ha 816	Stems/ha 1,111	Stems/ha 1,333	Stems/ha 1,666	Stems/ha 1,736	Stems/ha 1,852	Stems/ha 2,222	Stems/ha 2,777
0	0.67	750	1.09	1.48	1.78	2.22	2.31	2.47	2.96	3.70
1	0.74	680	1.20	1.63	1.96	2.45	2.55	2.72	3.27	4.08
2	0.83	600	1.36	1.85	2.22	2.78	2.89	3.09	3.70	4.63
3	0.89	560	1.46	1.98	2.38	2.98	3.10	3.31	3.96	4.96
4	0.96	520	1.57	2.14	2.56	3.20	3.34	3.56	4.27	5.34
5	1.04	480	1.70	2.31	2.78	3.47	3.62	3.86	4.63	5.79
6	1.14	440	1.85	2.53	3.03	3.79	3.95	4.21	5.05	6.31
7	1.25	400	2.04	2.78	3.33	4.17	4.34	4.63	5.56	6.94
8	1.35	370	2.21	3.00	3.60	4.50	4.69	5.01	6.01	7.51
9	1.47	340	2.40	3.27	3.92	4.90	5.11	5.45	6.53	8.17
10	1.56	320	2.55	3.47	4.16	5.21	5.43	5.79	6.94	8.68
11	1.61	310	2.63	3.58	4.30	5.37	5.60	5.97	7.17	8.96
12	1.67	300	2.72	3.70	4.44	5.55	5.79	6.17	7.41	9.26
13	1.78	280	2.91	3.97	4.76	5.95	6.20	6.61	7.94	9.92
14	1.92	260	3.14	4.27	5.12	6.41	6.68	7.12	8.55	10.68
15	2.08	240	3.40	4.63	5.55	6.94	7.23	7.72	9.26	11.57
16	2.27	220	3.71	5.05	6.06	7.57	7.89	8.42	10.01	12.62
17	2.50	200	4.08	5.56	6.67	8.33	8.68	9.26	11.11	13.89
18	2.63	190	4.29	5.85	7.02	8.77	9.14	9.75	11.69	14.62
19	2.78	180	4.53	6.17	7.41	9.26	9.64	10.29	12.34	15.43
20	2.86	170	4.80	6.54	7.84	9.80	10.21	10.89	13.07	16.33

Adjustment for various size ring cleans

Ring clean radius	Task variation
0.35m	+ 40%
0.50m	0%
0.60m	- 30%
0.75m	- 55%

The ring hoe task table is based on a 0.5m radius (1m diameter) ring clean. Should the diameter change, adjust the task according to the above adjustment table.

2. Line hoe – 1.0m width

Line hoe – 1.0m width			Mandays/ha			
Points	Minutes per linear metre	Task in linear metres	Stems/ha 3.5m espacement 2,857 linear m	Stems/ha 3.3m espacement 3,030 linear m	Stems/ha 3.0m espacement 3,333 linear m	Stems/ha 2.7m espacement 3,703 linear m
0	0.56	900	3.17	3.37	3.70	4.14
1	0.60	840	3.40	3.61	3.97	4.41
2	0.64	780	3.66	3.88	4.27	4.75
3	0.68	740	3.86	4.09	4.50	5.00
4	0.71	700	4.08	4.33	4.76	5.29
5	0.76	660	4.33	4.59	5.05	5.61
6	0.81	620	4.61	4.89	5.38	5.97
7	0.86	580	4.93	5.22	5.75	6.38
8	0.93	540	5.29	5.61	6.17	6.86
9	1.00	500	5.71	6.06	6.67	7.41
10	1.09	460	6.21	6.59	7.25	8.05
11	1.19	420	6.80	7.21	7.94	8.82
12	1.28	390	7.32	7.77	8.55	9.49
13	1.39	360	7.94	8.42	9.26	10.29
14	1.52	330	8.66	9.18	10.10	11.22
15	1.67	300	9.52	10.10	11.11	12.34
16	1.79	280	10.2	10.82	11.90	13.23
17	1.92	260	10.99	11.65	12.81	14.24
18	2.08	240	11.90	12.63	13.89	15.43
19	2.27	220	12.99	13.77	15.15	16.83
20	2.50	200	14.29	15.15	16.67	18.52

Adjustment for various size line cleans

Line clean width	Task variation
0.80m	+ 18 %
1.00m	0%
1.20m	- 18 %
1.50m	- 30 %
2.00m	- 47 %

The line hoe task table is based on a 1m wide line clean. Should the line clean diameter change, adjust the task according to the above adjustment table.

Felling by chainsaw

<https://www.forestrysolutions.net>

The tables below detail the production targets per shift for felling by a chainsaw operator. The standards are based on a 9 hour (540min) work shift with 8 hours (480min) being allowed for productive work infield. These include fatigue and operational allowances associated with the activity.

Targets will vary according to the prevailing working conditions, for which points are allocated on the respective variable conditions tables. Prior to determining a task, the points are calculated and taken into consideration.

1. Eucalypt

1.1 Felling sawlog only, without wedges

1.2 Felling sawlog only, with wedges

1.3 Felling pulp only

2. Pine

2.1 Felling without wedges

2.2 Felling with wedges

3. Wattle

3.1 Task adjustment

3.2 Felling pulp, with assistant

1. Eucalypt

Eucalypt		
Condition	Variable	Points
Tree volume	0.60m ³	0
	1.00m ³	1
	1.30m ³	2
	1.60m ³ and higher	3
Tree branching	Heavy branching	2
Slope conditions (%)	0 – 20%	0
	21 – 50%	2
	51 – 70%	4
	+ 70%	6
Ground conditions	Good	0
	Moderate/uneven	1
	Poor/rough	2
Total		

1.1 Felling sawlog only, without wedges

Points	0	1	2	3	4	5	6	7	8	9	10	11	12
Trees/shift	410	370	330	300	280	265	250	235	220	200	180	160	140

1.2 Felling sawlogs only, with wedges

Points	0	1	2	3	4	5	6	7	8	9	10	11	12
Trees/shift	275	250	225	200	180	170	160	150	140	130	120	110	100

1.3 Felling pulp only (average tree volume 0.15m³) Guideline only - small study sample

Points	0	1	2	3	4	5	6	7	8
Trees/shift	1000	960	940	890	860	830	800	775	750

2. Pine

Pine		
Condition	Variable	Points
Tree volume	0.30m ³	0
<i>P. taeda</i> & <i>P. elliotii</i>	0.60m ³	1
	1.00m ³	2
	1.30m ³	3
	1.60m ³ and higher	4
Tree species	<i>P. patula</i> / <i>P. radiata</i>	2
	<i>P. patula</i> heavy branching	4
Slope conditions (%)	0 – 20%	0
	21 – 50%	2
	51 – 70%	4
	+ 70%	6
Ground conditions	Good	0
	Moderate/uneven	1
	Poor/rough	2
Total		

2.1 Felling without wedges

Points	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Trees/shift	450	410	370	330	300	280	265	250	235	220	200	180	160	140

2.2 Felling with wedges

Points	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Trees/shift	300	275	250	225	200	180	170	160	150	140	130	120	110	100

3. Wattle

Wattle		
Condition	Variable	Points
Slope conditions (%)	0 – 20%	0
	21 – 30%	1
	31 – 50%	2
	51 – 70%	4
	+ 70%	6
Vegetation cover	Light to medium	0
	Heavy – thorn, lantana	2
Ground conditions	Good	0
	Moderate/uneven – moderate rock	1
	Poor/rough – heavy rocks	3
Total		

3.1 Task adjustment

Points	0	1	2	3	4	5	6	7	8	9	10	11
% Task adjustment	100	98	95	92	90	88	85	82	80	78	75	72

3.2 Felling pulp, with assistant

	Average tree height							
	12m	14m	16m	18m	20m	22m	24m	26m
DBH	Trees per shift							
10cm	900	800	675					
11cm	820	700	625					
12cm	715	650	575	500	450			
13cm		600	550	475	420	390		
14cm		560	520	455	405	370		
15cm		530	500	440	390	350		
16cm			480	420	383	340	300	
17cm			460	400	365	330	295	
18cm				385	355	320	290	260
19cm				375	340	312	285	252
20cm					325	306	280	245

Debarking by axe

<https://www.forestrysolutions.net>

The tables below detail the production targets for the manual debarking of eucalypts and wattle, prior to extraction to roadside, landing or depot. The standards are based on a 9 hour (540min) work shift with 8 hours (480min) being allowed for productive work infield. These include fatigue and operational allowances associated with the activity.

Targets will vary according to the prevailing working conditions, for which points are allocated on the respective variable conditions tables. Prior to determining a task, the points are calculated and taken into consideration.

This is followed by referring to the adjustment table for the percentage the task must be reduced by. Next, select the appropriated table regarding the stripability factor, and determine the task in trees taking into consideration diameter and height. Finally reduce this task by the adjustment percentage.

Note that a chainsaw operator is usually followed by a team who debark and stack. This can be done by the same workers in the team.

1. Eucalypt
 - 1.1 Eucalypt pulp
 - 1.2 Eucalypt sawlogs
2. Wattle

1. Eucalypt

Eucalypt		
Condition	Variable	Points
Slope conditions (%)	0 – 20%	0
	21% – 25%	1
	26% – 35%	3
	35%+	5
Ground conditions	Light to medium regrowth, no bramble or thorny vegetation.	0
	Heavy regrowth, thorny vegetation. Movement is restricted by 50%.	2
Underfoot conditions	Light – no rock.	0
	Medium – moderate rock. Movement restricted to 70% of normal walking pace.	1
	Heavy – dense rock. Movement restricted to 50% of normal walking pace.	3
Total		

Task adjustment

Points	0	1	2	3	4	5	6	7	8	9	10
% Task adjustment	100	98	95	92	90	88	85	82	80	78	75

The task above reflects debarking of poles only as prescribed in the system 8.

With the chainsaw operator and an assistant felling, debranching and crosscutting, the following additional task reductions are allowed, over and above the variable conditions where debranching and marking are required:

Debranching & marking task adjustment	
Light conditions (clonal species, limited branching in crown)	10%
Medium conditions (<i>E grandis</i> , branching top 1/3 rd of tree)	18%
Heavy conditions (cold tolerant species, branching top ½ of tree)	25%
Marking for crosscutting	12%

1.1 Eucalypt pulp (task in trees)

40% stripability

DBH	Mean tree height					
	15m	17.5m	20m	22.5m	25m	27.5m
14cm	47	41	34	29		
16cm	43	39	34	30	26	
18cm		35	31	28	24	21
20cm			30	27	23	21

50% stripability

DBH	Mean tree height					
	15m	17.5m	20m	22.5m	25m	27.5m
14cm	52	46	38	32		
16cm	47	42	37	32		
18cm		39	35	31	27	
20cm			32	31	26	24

60% stripability

DBH	Mean tree height					
	15m	17.5m	20m	22.5m	25m	27.5m
14cm	55	49	40	34		
16cm	50	46	39	34	31	
18cm		42	37	33	28	
20cm			34	31	28	25

70% stripability

DBH	Mean tree height					
	15m	17.5m	20m	22.5m	25m	27.5m
14cm	60	52	44	37		
16cm	55	50	44	37		
18cm		45	41	36	32	
20cm			38	35	31	28

80% stripability

DBH	Mean tree height					
	15m	17.5m	20m	22.5m	25m	27.5m
14cm	76	67	55	47		
16cm	69	63	54	48		
18cm		58	51	47	40	
20cm			48	44	39	36

90% stripability

DBH	Mean tree height					
	15m	17.5m	20m	22.5m	25m	27.5m
14cm	82	70	60	51		
16cm	75	67	59	51		
18cm		62	56	50	44	
20cm			52	48	43	38

Where the debarkers use the traditional harvesting systems of debranch, mark for crosscut, debark and stacking of poles the following tasks can be applied as a guideline:

Condition	Task in poles
<i>E grandis</i> or clonal species	
Light conditions, 9+ poles/tree, very good stripability	200 poles
Light conditions, 8+ poles/tree, good stripability	180 poles
Normal conditions, 8+ poles/tree, good stripability	160 poles
Limited abnormal conditions, 7+ poles/tree, fair stripability	140 poles
Abnormal conditions, 6+ poles/tree, poor stripability	120 poles
Cold tolerant species	
Normal conditions, 7+ poles/tree, good stripability	130 poles
Limited abnormal conditions, 6+ poles/tree, fair stripability	110 poles
Abnormal conditions, 6+ poles/tree, poor stripability	90 poles

1.2 Eucalypt sawlogs (task in trees)

Stripability	Mean tree DBH								
	25cm	27cm	30cm	32cm	35cm	37cm	40cm	42cm	45cm
50%	32	30	28	26	24	22	20	18	16
70%	38	35	33	31	29	27	24	22	20
90%	50	47	44	41	38	35	32	29	26

Estimated poles (2.4m) per mean tree height

Mean tree height	Estimated poles (2.4m)
15m	5 poles
17.5m	6 poles
20m	7 poles
22.5m	8 poles
25m	9 poles
27.5m	10 poles

2. Wattle pulp

Wattle		
Condition	Variable	Points
Slope conditions (%)	0 – 20%	0
	21% – 25%	1
	26% – 35%	3
	35%+	5
Ground conditions	Light to medium regrowth, no bramble or thorny vegetation.	0
	Heavy regrowth, thorny vegetation. Movement is restricted by 50%.	2
Underfoot conditions	Light – no rock.	0
	Medium – moderate rock. Movement restricted to 70% of normal walking pace.	1
	Heavy – dense rock. Movement restricted to 50% of normal walking pace.	3
Total		

Task adjustment

Points	0	1	2	3	4	5	6	7	8	9	10
% Task adjustment	100	98	95	92	90	88	85	82	80	78	75

The task above reflects debarking of poles only as prescribed in the system 8.

With the chainsaw operator and an assistant felling, debranching and crosscutting, the following additional task reductions are allowed, over and above the variable conditions where debranching and marking are required:

Debranching & marking task adjustment	
Debranching with hatchet	30%
Marking for crosscutting	12%

40% stripability

DBH	Mean tree height					
	15m	17.5m	20m	22.5m	25m	27.5m
12cm	30	25	20			
14cm	26	23	19	17		
16cm	23	21	18	16		
18cm		18	16	15	13	11
20cm			15	14	12	11

50% stripability

DBH	Mean tree height					
	15m	17.5m	20m	22.5m	25m	27.5m
12cm	35	30	22			
14cm	30	27	21	19		
16cm	26	24	20	18		
18cm		21	19	17	15	13
20cm			17	16	14	13

60% stripability

DBH	Mean tree height					
	15m	17.5m	20m	22.5m	25m	27.5m
12cm	37	32	24			
14cm	32	29	23	21		
16cm	29	26	22	20		
18cm		23	20	19	16	15
20cm			19	17	15	14

80% stripability

DBH	Mean tree height					
	15m	17.5m	20m	22.5m	25m	27.5m
12cm	52	44	33			
14cm	45	40	32	28		
16cm	40	37	31	27		
18cm		33	29	26	23	21
20cm			28	25	22	20

90% stripability

DBH	Mean tree height					
	15m	17.5m	20m	22.5m	25m	27.5m
12cm	56	48	38			
14cm	50	44	36	32		
16cm	44	40	34	30		
18cm		36	32	29	25	23
20cm			29	27	24	22

Where the debarkers use the traditional harvesting systems of debranch, mark for crosscut, debark and the bundling of bark, the following tasks can be applied as a guideline:

Condition	Task in poles
Light conditions, 9+ poles/tree, very good stripability, 20 tons/ha yield	550kg
Light conditions, 8+ poles/tree, good stripability, 17 tons/ha yield	500kg
Normal conditions, 8+ poles/tree, good stripability, 15 tons/ha yield	450kg
Limited abnormal conditions, 7+ poles/tree, fair stripability	400kg
Abnormal conditions, 6+ poles/tree, poor stripability	350kg
Abnormal conditions, 6+ poles/tree, very poor stripability	300kg

Debranching by chainsaw

<https://www.forestrysolutions.net>

The tables below detail the production targets per shift for debranching by a chainsaw operator. The standards are based on a 9 hour (540min) work shift with 8 hours (480min) being allowed for productive work infield. These include fatigue and operational allowances associated with the activity.

Targets will vary according to the prevailing working conditions, for which points are allocated on the respective variable conditions tables. Prior to determining a task, the points are calculated and taken into consideration.

1. Eucalypt sawlog
2. Pine
3. Wattle pulp

1. Eucalypt sawlog

Eucalypt sawlog debranch		
Condition	Variable	Points
Tree volume	0.60m ³	0
	1.00m ³	1
	1.30m ³	2
	1.60m ³	3
Tree species	Light branching	0
	Medium branching	2
	Heavy branching	4
Slope conditions (%)	0 – 20%	0
	21 – 50%	1
	51 – 70%	3
	+ 70%	5
Ground condition	Good	0
	Moderate/uneven	1
	Poor/rough	2
Total		

Points	0	1	2	3	4	5	6	7	8	9	10	12	14
Trees/shift	330	300	275	250	230	220	210	200	190	180	170	160	150

2. Pine

Pine debranch		
Condition	Variable	Points
Tree volume	0.20m ³	0
<i>P. taeda</i> & <i>P. elliotii</i>	0.30m ³	1
	0.60m ³	2
	1.00m ³	3
	1.30m ³	4
	1.60m ³	5
Tree species	<i>P.patula/P. radiata</i>	2
	Heavy branching	4
Pruning height	7 metre	0
	5 metre	1
	3 metre	3
Slope conditions (%)	0 – 20%	0
	21 – 50%	1
	51 – 70%	3
	+ 70%	5
Ground condition	Good	0
	Moderate/ uneven	1
	Poor/rough	2
Total		

Points	0	1	2	3	4	5	6
Trees/shift	290	270	250	230	220	210	200

Points	7	8	9	10	12	14	16	18
Trees/shift	190	180	170	160	150	140	120	100

3. Wattle pulp

Wattle pulp debranch		
Condition	Variable	Points
Slope conditions (%)	0 – 20%	0
	21 – 30%	1
	31 – 50%	2
	51 – 70%	4
	+ 70%	6
Vegetation cover	Light to medium	0
	Heavy – thorn, lantana	2
Ground condition	Good	0
	Moderate/uneven – moderate rock	1
	Poor/rough – heavy rocks	3
Total		

Task adjustment

Points	0	1	2	3	4	5	6	7	8	9	10	11
% Task adjustment	100	98	95	92	90	88	85	82	80	78	75	72

	Average tree height							
	12m	14m	16m	18m	20m	22m	24m	26m
DBH	Trees per shift							
10cm	490	430	365					
11cm	440	380	340					
12cm	385	350	310	270	240			
13cm		320	300	260	230	210		
14cm		300	280	250	220	200		
15cm		290	270	240	210	190		
16cm			260	230	203	182	165	
17cm			250	220	196	178	160	
18cm				210	190	172	157	142
19cm				200	182	168	154	136
20cm					175	164	151	132

Cross cutting by chainsaw

<https://www.forestrysolutions.net>

The tables below detail the production targets per shift for cross cutting tree lengths that have been extracted to a landing, by a chainsaw operator. The standards are based on a 9 hour (540min) work shift with 8 hours (480min) being allowed for productive work infield. These include fatigue and operational allowances associated with the activity.

Targets will vary according to the prevailing working conditions, for which points are allocated on the respective variable conditions tables. Prior to determining a task, the points are calculated and taken into consideration.

In the case of sawlogs, the expected number of trees crosscut per hour and shift, for various diameters and number of logs produced from the tree, are provided.

1. Eucalypt pulp

2. Eucalypt & pine sawlog

2.1. Cross cutting only LANDING (after log scaling) Trees/hour

2.2. Cross cutting only LANDING (after log scaling) Trees/shift

2.3. Cross cutting only MERCHANDISING YARD (after log scaling) Trees/hour

2.4. Cross cutting only MERCHANDISING YARD (after log scaling) Trees/shift

3. Wattle

3.1. Task adjustment

3.2. Crosscut with assistant

1. Eucalypt pulp

Eucalypt pulp		
Condition	Variable	Points
Tree height	Pole/tree as per table	0
	1-2 Poles per tree above standard	1
	3+ Poles/tree above standard	2
Tree form	Bend or forked trees mixed	2
Slope conditions (%)	0 – 20%	0
	21 – 30%	1
	31 – 50%	2
Vegetation cover	Light to medium	0
	Heavy – thorn, lantana	2
Tree presentation	Good	0
	Partial tree overlap (restricted access)	2
	Extensive trees stacked & overlap (difficult access)	5
Total		

Crosscut with assistant

Average DBH							
	12cm	14cm	16cm	18cm	20cm	22cm	23cm
Standard poles per tree							
	3.7	5.5	6.7	8.5	9.0	9.5	10
Points	Trees per shift						
0	945	627	507	394	367	342	320
1	908	602	487	378	353	328	307
2	871	577	467	363	338	314	295
3	834	552	447	347	324	301	282
4	797	527	427	332	309	287	269
5	760	502	407	316	295	273	257
6	723	477	387	300	280	259	244
7	686	452	367	284	266	245	231
8	649	427	346	269	251	232	218
9	612	402	326	254	237	218	206
10	575	377	306	238	222	204	193
11	538	352	286	222	208	190	180
12	501	327	266	207	193	176	168
13	464	302	246	191	179	163	155

2. Eucalypt & pine sawlog

2.1 Cross cutting only LANDING (after log scaling) Trees/hour

DBH approx.	Logs/tree							
	2	3	4	5	6	7	8	9
20cm	40	38	36	33	28	26	24	22
25cm	39	37	35	31	27	25	23	21
30cm	38	36	34	30	26	24	21	19
35cm	36	34	33	29	25	22	20	18
40cm	35	33	32	28	24	21	18	17
45cm	35	33	32	28	23	20	17	16

2.2 Cross cutting only LANDING (after log scaling) Trees/shift

DBH approx.	Logs/tree							
	2	3	4	5	6	7	8	9
20cm	300	285	270	248	210	195	180	165
25cm	293	278	263	233	203	188	173	158
30cm	285	270	255	225	195	180	158	143
35cm	270	255	248	218	188	165	150	135
40cm	263	248	240	210	180	158	135	128
45cm	263	248	240	210	173	150	128	120

2.3 Cross cutting only MERCHANDISING YARD (after log scaling) Trees/hour

DBH approx.	Logs/tree							
	2	3	4	5	6	7	8	9
20cm	50	45	40	38	36	33	28	26
25cm	48	44	39	37	35	31	27	25
30cm	46	42	38	36	34	30	26	24
35cm	44	40	36	34	33	29	25	22
40cm	42	39	35	33	32	28	24	21
45cm	40	38	35	33	32	28	23	20

2.4 Cross cutting only MERCHANDISING YARD (after log scaling) Trees/shift

DBH approx.	Logs/tree							
	2	3	4	5	6	7	8	9
20cm	375	340	300	285	270	248	210	195
25cm	360	330	293	278	263	233	203	188
30cm	335	315	285	270	255	225	195	180
35cm	330	300	270	255	248	218	188	165
40cm	315	292	263	248	240	210	180	158
45cm	300	285	263	248	240	210	173	150

3. Wattle

Wattle pulp		
Condition	Variable	Points
Slope conditions (%)	0 – 20%	0
	21 – 30%	1
	31 – 50%	2
	51 – 70%	4
	+ 70%	6
Vegetation cover	Light to medium	0
	Heavy – thorn, lantana	2
Ground condition	Good	0
	Moderate/uneven – moderate rock	1
	Poor/rough – heavy rocks	3
Total		

3.1 Task adjustment

Points	0	1	2	3	4	5	6	7	8	9	10	11
% Task adjustment	100	98	95	92	90	88	85	82	80	78	75	72

3.2 Crosscut with assistant

	Average tree height							
	12m	14m	16m	18m	20m	22m	24m	26m
DBH	Trees per shift							
10cm	700	610	520					
11cm	630	540	480					
12cm	550	500	440	380	340			
13cm		460	420	360	325	300		
14cm		430	400	350	310	280		
15cm		410	380	336	300	270		
16cm			360	324	290	260	235	
17cm			350	310	280	254	228	
18cm				294	270	246	224	205
19cm				288	260	240	220	200
20cm					250	236	216	195

Felling, debranching, and cross cutting by chainsaw (complete operation)

<https://www.forestrysolutions.net>

The tables below detail the production targets per shift for felling, de-branching, and cross cutting by a chainsaw operator. The standards are based on a 9 hour (540min) work shift with 8 hours (480min) being allowed for productive work infield. These include fatigue and operational allowances associated with the activity.

Targets will vary according to the prevailing working conditions, for which points are allocated on the respective variable conditions tables. Prior to determining a task, the points are calculated and taken into consideration.

1. Eucalypts

1.1 Pulp

1.1.1 Felling, debranching, and crosscut with assistant

1.1.2 Felling and crosscut with assistant

1.2 Sawlogs

1.2.1 Felling only, without wedges

1.2.2 Felling only, with wedges

1.2.3 Felling pulp only

1.2.4 Felling and debranching, without wedges

1.2.5 Felling and debranching, with wedges

2. Pine

2.1 Felling only, without wedges

2.2 Felling only, with wedges

2.3 Felling and debranching, without wedges

2.4 Felling and debranching, with wedges

2.5 Cross cutting only LANDING (after log scaling) Trees/hour

2.6 Cross cutting only LANDING (after log scaling) Trees/shift

3. Wattle pulp

3.1 Task adjustment

3.2 Felling pulp, with assistant

3.3 Felling, debranching, and crosscut with assistant

3.4 Felling and debranching with assistant

3.5 Felling and crosscut with assistant

1. Eucalypts
1.1 Pulp

Eucalypt pulp		
Condition	Variable	Points
Tree height	Pole/tree as per table	0
	1-2 poles per tree above standard	1
	3+ poles per tree above standard	2
Tree species	<i>E. grandis</i>	0
	<i>E. dunnii</i>	1
	<i>E. globulus</i>	4
Tree branching	Heavy branching (for species)	2
	Coppice regrowth at tree base	2
Vegetation cover	Light to medium	0
	Heavy – thorn, lantana	2
Ground condition	Good	0
	Moderate/uneven – moderate rock	1
	Poor/rough – heavy rocks	2
Total		

1.1.1 Felling, debranching, and crosscut with assistant

	Average DBH							
	12cm	13cm	14cm	15cm	16cm	17cm	18cm	20cm
	Standard poles per tree (<i>E. grandis</i> & <i>E. dunnii</i>)							
	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5
	Standard poles per tree (<i>E. globulus</i>)							
	2.5	3.0	3.5	4.0	4.5	5.0	6.0	6.5
Points	Trees per shift							
0	532	453	437	378	366	302	250	225
1	505	433	418	362	351	289	239	215
2	486	415	400	348	337	278	228	206
3	466	398	384	334	324	267	219	197
4	447	383	370	322	312	257	210	189
5	430	369	356	311	301	248	202	182
6	414	356	343	300	291	239	195	175
7	399	343	331	290	281	231	188	169
8	385	332	320	280	272	224	181	163
9	373	321	310	272	263	217	175	158
10	361	311	300	263	255	210	169	153
11	349	302	291	254	248	203	164	148
12	339	295	282	246	242	198	159	143
13	330	289	274	239	235	195	155	140

1.1.2 Felling and crosscut with assistant

	Average DBH							
	12cm	13cm	14cm	15cm	16cm	17cm	18cm	20cm
	Standard poles per tree							
	3.7	4.4	5.5	6.2	6.7	7.5	8.5	9.0
Points	Trees per shift							
0	665	566	546	472	458	378	312	281
1	646	550	530	459	445	367	303	273
2	627	534	515	446	432	356	294	265
3	608	518	499	432	419	345	285	257
4	589	502	483	419	406	335	276	249
5	570	486	467	405	393	324	267	241
6	551	470	450	392	380	313	259	233
7	532	453	437	378	366	302	250	225
8	505	433	418	362	351	289	239	215
9	486	415	400	348	337	278	228	206
10	466	398	384	334	324	267	219	197
11	447	383	370	322	312	257	210	189
12	430	369	356	311	301	248	202	182
13	414	356	343	300	291	239	195	175

1.2 Sawlogs

Eucalypt sawlogs		
Condition	Variable	Points
Tree volume	0.60m ³	0
	1.00m ³	1
	1.30m ³	2
	1.60m ³ and higher	3
Tree branching	Heavy branching/ <i>P. radiata</i>	2
Slope conditions (%)	0 – 20%	0
	21 – 50%	2
	51 – 70%	4
	+ 70%	6
Ground condition	Good	0
	Moderate/uneven	1
	Poor/rough	2
Total		

1.2.1 Felling only, without wedges

Points	0	1	2	3	4	5	6	7	8	9	10	11	12
Trees/shift	410	370	330	300	280	265	250	235	220	200	180	160	140

1.2.2 Felling only, with wedges

Points	0	1	2	3	4	5	6	7	8	9	10	11	12
Trees/shift	275	250	225	200	180	170	160	150	140	130	120	110	100

1.2.3 Felling pulp only (average tree volume 0.15m³) Guideline only - small study sample

Points	0	1	2	3	4	5	6	7	8
Trees/shift	1000	960	940	890	860	830	800	775	750

1.2.4 Felling and debranching, without wedges

Points	0	1	2	3	4	5	6	7	8	9	10	12	15
Trees/shift	250	235	220	205	190	180	170	160	150	140	130	120	110

1.2.5 Felling and debranching, with wedges (use with discretion – standards to be verified)

Points	0	1	2	3	4	5	6	7	8	9	10	12	15
Trees/shift	235	220	205	190	180	170	160	150	140	130	120	110	100

2. Pine

Pine		
Condition	Variable	Points
Tree volume	0.30m ³	0
<i>P. taeda</i> & <i>P. elliotii</i>	0.60m ³	1
	1.00m ³	2
	1.30m ³	3
	1.60m ³ and higher	4
	Tree species	<i>P. patula</i> / <i>P. radiata</i>
	<i>P. patula</i> heavy branching	4
Slope conditions (%)	0 – 20%	0
	21 – 50%	2
	51 – 70%	4
	+ 70%	6
Ground condition	Good	0
	Moderate/uneven	1
	Poor/rough	2
Total		

2.1 Felling only, without wedges

Points	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Trees /shift	450	410	370	330	300	280	265	250	235	220	200	180	160	140

2.2 Felling only, with wedges

Points	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Trees /shift	300	275	250	225	200	180	170	160	150	140	130	120	110	100

2.3 Felling and debranching, without wedges

Points	0	1	2	3	4	5	6	7	8	9	10	12	15	16
Trees/shift	150	135	125	115	105	100	95	90	85	80	75	65	55	50

2.4 Felling and debranching, with wedges (use with discretion – standards to be verified)

Points	0	1	2	3	4	5	6	7	8	9	10	12	15	16
Trees/shift	140	125	115	105	95	90	85	80	75	70	65	60	50	45

2.5 Cross cutting only LANDING (after log scaling) Trees/hour

DBH approx.	Logs/tree							
	2	3	4	5	6	7	8	9
20cm	40	38	36	33	28	26	24	22
25cm	39	37	35	31	27	25	23	21
30cm	38	36	34	30	26	24	21	19
35cm	36	34	33	29	25	22	20	18
40cm	35	33	32	28	24	21	18	17
45cm	35	33	32	28	23	20	17	16

2.6 Cross cutting only LANDING (after log scaling) Trees/shift

DBH approx.	Logs/tree							
	2	3	4	5	6	7	8	9
20cm	300	285	270	248	210	195	180	165
25cm	293	278	263	233	203	188	173	158
30cm	285	270	255	225	195	180	158	143
35cm	270	255	248	218	188	165	150	135
40cm	263	248	240	210	180	158	135	128
45cm	263	248	240	210	173	150	128	120

3. Wattle

Wattle		
Condition	Variable	Points
Slope conditions (%)	0 – 20%	0
	21 – 30%	1
	31 – 50%	2
	51 – 70%	4
	+ 70%	6
Vegetation cover	Light to medium	0
	Heavy – thorn, lantana	2
Ground condition	Good	0
	Moderate/uneven – moderate rock	1
	Poor/rough – heavy rocks	3
Total		

3.1 Task adjustment

Points	0	1	2	3	4	5	6	7	8	9	10	11
% Task adjustment	100	98	95	92	90	88	85	82	80	78	75	72

3.2 Felling pulp, with assistant

	Average tree height							
	12m	14m	16m	18m	20m	22m	24m	26m
DBH	Trees per shift							
10cm	900	800	675					
11cm	820	700	625					
12cm	715	650	575	500	450			
13cm		600	550	475	420	390		
14cm		560	520	455	405	370		
15cm		530	500	440	390	350		
16cm			480	420	383	340	300	
17cm			460	400	365	330	295	
18cm				385	355	320	290	260
19cm				375	340	312	285	252
20cm					325	306	280	245

3.3 Felling, debranching, and crosscut with assistant

	Average tree height							
	12m	14m	16m	18m	20m	22m	24m	26m
DBH	Trees per shift							
10cm	350	305	260					
11cm	315	270	240					
12cm	275	250	220	190	170			
13cm		230	210	183	162	150		
14cm		215	200	175	155	140		
15cm		205	190	168	150	135		
16cm			180	162	145	130	116	
17cm			175	155	140	127	114	
18cm				147	135	123	112	101
19cm				144	130	120	110	97
20cm					125	118	108	94

3.4 Felling and debranching with assistant

	Average tree height							
	12m	14m	16m	18m	20m	22m	24m	26m
DBH	Trees per shift							
10cm	440	380	325					
11cm	395	340	300					
12cm	345	315	275	240	215			
13cm		290	262	230	202	188		
14cm		270	250	220	195	175		
15cm		255	240	210	188	169		
16cm			230	202	182	164	145	
17cm			220	195	175	159	143	
18cm				189	168	154	140	126
19cm				184	163	150	138	121
20cm					125	147	135	118

3.5 Felling and crosscut with assistant

	Average tree height							
	12m	14m	16m	18m	20m	22m	24m	26m
DBH	Trees per shift							
10cm	525	458	390					
11cm	475	405	360					
12cm	415	375	330	285	255			
13cm		345	315	275	243	225		
14cm		323	300	263	233	210		
15cm		308	285	252	225	203		
16cm			270	243	218	195	175	
17cm			263	233	210	190	170	
18cm				220	203	185	167	150
19cm				215	195	180	165	146
20cm					188	177	162	142

Stacking

<https://www.forestrysolutions.net>

The tables below detail the production targets for an individual worker stacking poles manually only. The standards are based on a 9 hour (540min) work shift with 8 hours (480min) being allowed for productive work infield. These include fatigue and operational allowances associated with the activity.

Targets will vary according to the prevailing working conditions, for which points are allocated on the respective variable conditions tables. Prior to determining a task, the points are calculated and taken into consideration.

Where the stackers work in a team with the chainsaw operators the task is given as a team task and is based on the production capabilities of the chainsaw operation.

1. Eucalypt & wattle
2. Pine

1. Eucalypt & wattle

Eucalypt & wattle		
Condition	Variable	Points
Log volume	0.010m ³	0
	0.015m ³	1
	0.020m ³	2
	0.025m ³	3
	0.033m ³	4
Time after felling	6 weeks	0
	3 weeks	1
	1 week	3
	<3 days	4
Slope conditions (%)	0 – 25%	0
	25% – 35%	1
	35%+	2
Ground conditions	Good	0
	Poor / rough	1
Total		

0 - 5 metre stacking distance

Points	0	1	2	3	4	5	6	7	8	9
Poles/shift	1000	850	750	680	500	400	300	275	250	225

0 - 10 metre stacking distance

Points	0	1	2	3	4	5	6	7	8	9
Poles/shift	800	700	600	520	430	340	275	250	225	200

0 - 30 metre stacking distance

Points	0	1	2	3	4	5	6	7	8	9
Poles/shift	500	400	330	240	210	180	160	150	140	135

0 - 60 metre stacking distance

Points	0	1	2	3	4	5	6	7	8	9
Poles/shift	300	230	200	150	130	110	100	95	90	85

2. Pine

Pine		
Condition	Variable	Points
Log volume	0.015m ³	0
	0.025m ³	1
	0.030m ³	2
	0.045m ³	3
	0.050m ³	4
	0.060m ³	5
Slope conditions (%)	0 – 25%	0
	25% – 35%	1
	35%+	2
Ground conditions	Good	0
	Poor / rough	1
Total		

0 - 10 metre stacking distance

Points	0	1	2	3	4	5	6	7	8	9
Trees/shift	600	450	340	240	200	175	160	150	140	130
m ³ /shift	9	11.2	10.2	10.8	10	10.5				

0 - 30 metre stacking distance

Points	0	1	2	3	4	5	6	7	8	9
Trees/shift	400	300	250	200	175	150	140	130	125	120
m ³ /shift	6	7.5	7.5	9	8.75	9				

0 - 60 metre stacking distance

Points	0	1	2	3	4	5	6	7	8	9
Trees/shift	250	200	165	120	110	100	90	85	80	75
m ³ /shift	3.75	5	5	5.4	5.5	6				

LEGAL REGISTER

Applicable laws, regulations, nationally ratified international treaties, conventions, and agreements. Visit the [South African Government Online](#) website for more information.

1. Legal right to harvest (legal or customary tenure, water use authorisation)

1.1 Land tenure and management rights

- Property rights, freehold land: Title Deeds, Lease Agreement
- Property rights, communal land: Interim Protection of Informal Land Rights Act (Act No. 31 of 1996)
- Ingonyama Trust Act (Act No. of 1994)

1.2 Water use authorisation

- National Water Act (Act No. 36 of 1998)

2. Taxes and fees

- National Water Act (Act No. 36 of 1998)
- Local Government: Municipal Property Rates Act, 2004 (Act No. 6 of 2004)
- Value Added Tax Act (Act No. 89 of 1991)
- Income Tax Act (Act No. 58 of 1962)

3. Timber harvesting activities

3.1 Timber harvesting regulations - no legally binding regulations in SA

- National Forests Act (Act 84 of 1998)

3.2 Protected sites and species

- National Heritage Resources Act (Act No. 25 of 1999)
- National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
- NEMBA (No. 10 of 2004) Threatened or Protected Species Regulations, 2013
- KwaZulu-Natal Heritage Act (Act No. 5 of 2008)

3.3 Environmental requirements

- National Water Act (Act No. 36 of 1998)
- National Environmental Management Act (Act No. 107 of 1998)
- National Environmental Management Amendment Act (Act No. 56 of 2002)
- National Environmental Management Laws Second Amendment Act (Act No. 30 of 2013)
- National Environmental Management Laws Amendment Act (Act No. 25 of 2014)
- National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
- National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
- National Environmental Management: Waste Act (Act No. 59 of 2008)
- National Environmental Management: Waste Amendment Act (Act No. 26 of 2014)
- National Environmental Management: Air Quality Act (Act No. 39 of 2004)

- National Environmental Management: Air Quality Amendment Act (Act No. 20 of 2014)
- NEMA EIA regulation 2014. Listing Notices
- NEMBA (No. 10 of 2004) Alien and Invasive Species Regulations, 2014
- NEMBA (No. 10 of 2004) Alien and Invasive Species List, 2015
- National Veld and Forest Fire Act (Act No. 101 of 1998)
- Conservation of Agricultural Resources Act (Act No. 43 of 1983), as amended 2001
- Agricultural Pests Act (Act No. 39 of 1983)
- Animal Disease Act (No. 35 of 1984)
- Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No. 36 of 1947)
- Hazardous Substances Act (Act No. 15 of 1973)
- Hazardous Chemical Substances Regulations (Government Notice R1179, 1995)
- Environment Conservation Act (No. 73 of 1989)
- KwaZulu-Natal Nature Conservation Management Act (Act No. 9 of 1997)
- Mpumalanga Nature Conservation Act (Act No. 10 of 1998)

3.4 Health and safety

- Occupational Health and Safety Act (Act No. 85 of 1993)
- National Health Act (Act No. 61 of 2003)
- Compensation for Occupational Injuries and Diseases Act (Act No. 130 of 1993)
- National Road Traffic Act (Act No. 93 of 1996)
- Tobacco Products Act (Act No. 83 of 1993)
- Foodstuffs, Cosmetics and Disinfectants Act (Act No. 54 of 1972)
- Nursing Act (Act No. 33 of 2006)
- Health Professions Act (Act No. 56 of 1974)
- Medicines and Related Substances Act (Act No. 101 of 1965)
- Firearms Control Act (Act 60 of 2000)
- Water Services Act (Act No. 108 of 1997)

3.5 Legal employment

- Constitution of the Republic of South Africa Act (Act 106 of 1996)
- Basic Conditions of Employment Act (No. 75 of 1997)
- Sectoral Determination 12: Forestry Sector
- Labour Relations Act (LRA), 1995 (Act No. 66 of 1995)
- Employment Equity Act, 1998 (Act No. 55 of 1998)
- Unemployment Insurance Act, 2001 (Act No. 63 of 2001)
- Skills Development Levies Act, 1999 (Act No. 9 of 1999)
- Protection of Personal Information (Act No.4 of 2013)

4. Customary rights, rights to land and restitution of land rights

- Extension of Security of Tenure Act (No. 67 of 1997)
- Prevention of Illegal Eviction from and Unlawful occupation of Land Act (No. 19 of 1998)
- Land Reform (Labour Tenants) Act (No. 3 of 1996)
- The Interim Protection of Informal Rights Act (No. 31 of 1996)
- Restitution of Land Rights Act (No. 22 of 1994)

5. Trade and transport

There are no national laws, local laws, ratified international conventions and obligatory codes of practice that explicitly apply to the trade and transport of plantation forestry species in South Africa. The National Road Traffic Act regulates timber transport.

6. Anti-corruption

- Prevention and Combating of Corrupt Activities Act (Act No.12 of 2004 (PCCAA))

7. Miscellaneous

- Fencing Act (No. 31 of 1963)
- Minerals and Petroleum Resources Development Act (No. 28 of 2002)
- National Building Regulations and Building Standards (No. 103 of 1977)
- National Road Traffic Amendment Act (No. 21 of 1999)
- Plant Breeders Rights Act (No. 15 of 1976)
- Plant Breeders Act (Act No. 22 of 1964)
- Plant Improvement Act (Act No. 53 of 1976)
- Animal Protection Act (No. 71 of 1962)

South Africa is a signatory to:

- Convention on Biological Diversity
- Convention on International Trade in Endangered Species (CITES)
- International Labour Organisation Conventions (ILO)

These international agreements, where relevant, are enshrined in the legislation listed above.