

FELL SMALL TREES



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PUBLICATION NOTES

BHP Billiton Iron Ore is proud to support Greening Australia to provide valuable conservation and land management training to communities throughout the Pilbara through the Indigenous Training Program.

This Learning Guide series has been developed as part of our partnership of the program.

Gavin Price, Head of Environment, BHP Billiton Iron Ore

Greening Australia is proud to produce and provide the comprehensive suite of new ALEP Learning Guides. The guides are compatible with the new horticulture and conservation industries training package and are suited to developing skills in Indigenous communities within remote areas of the country where employment opportunities are limited. We would like to thank BHPBIO for their generous support in the development of the guides.

Brendan Foran, National CEO, Greening Australia

The second series of ALEP Guides is aligned with a number of units of competence from the *Training Package AHC10 – Agriculture, Horticulture and Conservation and Land Management* (Release 8.0). The units selected are frequently used within Certificates I to III in Horticulture and Conservation and Land Management. As such they cover, where possible, the elements, performance criteria and required skills and knowledge of each unit.

The principal goal of these resources is to support the learning process; the learning activities may complement a trainer's assessment plan. The intent is that they will be used in an interactive manner with learners rather than as self-paced study guides. The structure and sequence have been designed to follow the logical steps of the practical tasks wherever possible. Concepts are introduced and then consolidated with discussion and/or practical activities.

The writers consider that these guides can provide a sound technical foundation but also strongly encourage trainers to complement the guides with additional, authentic resources from relevant industry texts and websites. The guides can be used in part or in their entirety but should always be linked to practical activities to strengthen the teaching and learning.

Genuine consideration was given to the level of language used in the guides. The goal has been to find a balance between simplifying the language to an accessible level and ensuring that the vocational concepts are addressed. The writers contend that with appropriate support these texts can provide an opportunity for students to strengthen their language, literacy and numeracy skills, which may be required for pathway progression.

A number of Aboriginal people have been involved in developing this ALEP Guide, which is considered suitable for use within a program based on Aboriginal pedagogies.

INTRODUCTION

Welcome to *Fell small trees*. This learning guide provides information about the process of small-tree felling. The program covers the following topics:

- Workplace health and safety
- Get ready at your base
- Assess and prepare the site
- Fell the tree
- Finish the job and clean up

You need to already have the skills and knowledge about chainsaw maintenance and use that were covered in the ALEP Guide *Operate and maintain chainsaws*.

To be competent in assessment for this unit, it is also necessary that you have undertaken first aid training. Knowledge of emergency and first aid procedures is a requirement of this unit but is not covered in this guide.

RESOURCES REQUIRED

To complete this training you will need the following:

1. Appropriate Personal Protective Equipment (PPE)
2. Tools for doing maintenance on chainsaws
3. Manufacturer's instructions for the chainsaw being used
4. A chainsaw
5. Access to small trees to fell

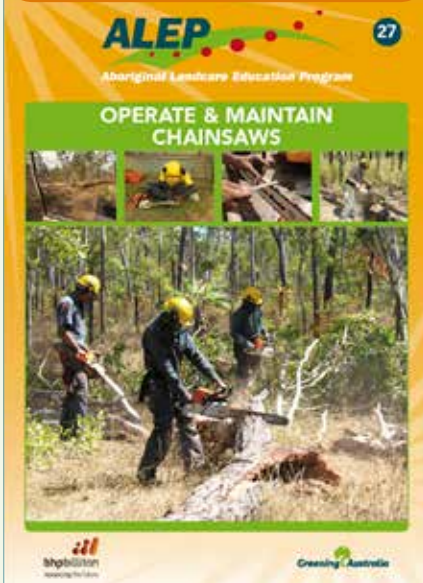
LEARNING ACTIVITIES

There are three kinds of activities to complete. These activities may go towards your final assessment.

SECTION	ACTIVITY	SATISFACTORY (Y/N)	DATE
DISCUSSION ACTIVITIES			
1.1	Workplace policies and procedures		
1.2	Hazards and Standard Operating Procedures		
2.1	Local government regulations		
2.2	Job roles and communication		
2.5	Plan tools and equipment		
3.1	Tree and site assessment (2 scenarios)		
4.8	Complex jobs		
PRACTICAL ACTIVITIES			
2.2	Communication and hand signals		
2.3	Job Safety Analysis		
2.6	Pre-start checks		
3.1	Tree and site assessment		
4.9	Practice sawing		
PROJECT			
5.4	Putting it all together		



Much of the training for this unit should be completed on the job.



WORKPLACE HEALTH & SAFETY (WHS)

In this unit, your workplace is wherever you are doing the work. This might be in bushland on Country or be in a home garden or community area such as in a park, a school or accommodation area.

1.1 WHAT WE ALREADY KNOW

Everything from the ALEP Guide *Operate and maintain chainsaws* is relevant to the work you will do in this unit. It is recommended you access this guide and do a quick revision of the following topics:

- Hazards, risks and controls
- Legal requirements (standards)
- Policies and procedures
- Manufacturer's instructions



DISCUSSION ACTIVITY

List the policies and procedures in your workplace that relate to felling a tree. If you don't have any, use the Standard Operating Procedure (SOP) from the *Resources* section.

With your work team, read through and discuss the document(s).



See *Resources R1* and *R2*, pages 38 & 40

1.2 ADDITIONAL HAZARDS

There are more hazards present when you use a chainsaw to fell trees than when you just use it to cut timber on the ground. Many of the hazards are the same, but the tree, the surrounding area and the felling activity present some additional hazards.



DISCUSSION ACTIVITY

What are the hazards listed in the SOP or Safe Work Method Statement (SWMS) you will follow?






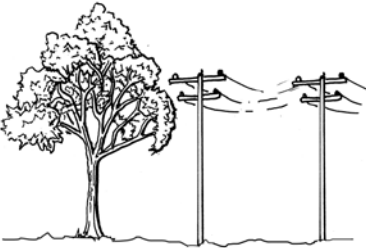


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Once you have identified the hazards, it is important to do a risk assessment.

We'll look at this in *Section 2.3*.

HAZARDS	CONTROLS
<p>FALLING LIMBS & TIMBER</p> <p>Risk of: Crushing, cuts and bruises, broken bones</p> 	<ul style="list-style-type: none"> • Follow SOP • Avoid felling onto other trees • Wear appropriate PPE
<p>SLOPING GROUND</p> <p>Risk of: Crushing, cuts and bruises, broken bones caused by timber rolling down the slope</p> 	<ul style="list-style-type: none"> • Assess tree according to SOP • Set up exclusion zone • Chainsaw operator stands on uphill side of tree while sawing • Remove plant, equipment and bystanders from downhill area • Wear appropriate PPE
<p>WIND GUSTS</p> <p>Risk of: Crushing, cuts and bruises, broken bones caused by tree falling unpredictably during felling or other debris falling</p> 	<ul style="list-style-type: none"> • Do not fell trees in very windy conditions • Monitor wind direction • Wear appropriate PPE
<p>BOULDERS, STUMPS & OTHER TREES</p> <p>Risk of: Crushing, cuts and bruises, broken bones caused by tree moving unpredictably as it hits other objects or gets hung up</p> 	<ul style="list-style-type: none"> • Assess tree according to SOP • Fell a tree into a clear area, avoid other objects • Wear appropriate PPE
<p>FORKED OR DAMAGED TREES</p> <p>Risk of: Crushing, cuts and bruises, broken bones caused by tree splitting or falling unpredictably during felling</p> 	<ul style="list-style-type: none"> • Assess tree according to SOP • Use appropriate sawing techniques • Wear appropriate PPE • Seek specialist assistance if required
<p>UTILITIES & SERVICES</p> <p>Risk of: Electrocution, crushing, burns</p> 	<ul style="list-style-type: none"> • Conduct site assessment according to SOP • Use equipment such as elevated work platform to avoid damage to utilities and services • Use felling techniques to avoid damage to utilities and services • Apply for disconnection permit prior to work



NOTE

A near miss is a kind of incident that should be treated in the same way as an accident.

A near miss is when someone is nearly injured but is not actually injured.

1.3 DUTY OF CARE

'Duty' means a legal obligation – something you must do. So 'duty of care' means that legally, you must care for yourself and those around you. Under Workplace Health and Safety law, employers and employees have responsibilities.

EMPLOYER RESPONSIBILITIES

The key responsibility of an employer is to show a duty of care towards their employees. They do this by:

- Providing a safe workplace that is free from unnecessary hazards
- Supplying the required PPE and safety equipment for all employees working with equipment that presents a hazard
- Supplying equipment and tools that meet Australian Standards
- Making sure all employees who need to work with equipment that presents a hazard are trained appropriately
- Listening to and acting on feedback from employees

EMPLOYEE RESPONSIBILITIES

The key responsibility of an employee is to show a duty of care to themselves and others. They do this by:

- Completing the training provided by the employer and following the processes learnt
- Using and looking after PPE and safety equipment as directed
- Following the workplace policies and procedures
- Reporting any accidents and near misses
- Following manufacturers' safety instructions on equipment and when using dangerous materials
- Making suggestions as to how to reduce risks in the workplace

1.4 EMERGENCY PROCEDURES

If you are involved in an emergency situation, it might be the result of:

- Something related to the felling work
- Something else happening at the site where you are working

For your work, follow emergency procedures in your SOP or Job Safety Analysis (JSA), or follow the directions of your supervisor. These might require you to call emergency services and/or administer first aid. For ambulance, police or fire brigade, call 000.

At a site managed by others, you need to follow their procedures. You might have learnt about these at a site induction. At all times, you need to follow the safety directions of authorised personnel such as emergency services or the site Health and Safety Officer.

Make your way to the muster point or safe area and work with your supervisor to check that you know where everyone in your work team is.



2

GET READY AT YOUR BASE

Before you begin the job, you need to make sure you are clear about the work that needs to be done. Work with your team to do a JSA and gather together the PPE and equipment you need. Finally, you need to check that your equipment works properly so it will be safe to use.

2.1 LOCAL GOVERNMENT REGULATIONS

Some local governments require you to apply for a permit before felling a tree. There are a number of reasons why local governments have these regulations. They generally aim to protect:

- The way the town looks
- Trees that are important to the community for cultural or historic reasons
- Endangered or protected species
- Community members from injuring themselves
- Buildings, services or other infrastructure



DISCUSSION ACTIVITY

Talk with your supervisor about the local government regulations in your region.
Are there any specific requirements you need to follow on the job you are doing?



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2.2 JOB ROLES & COMMUNICATIONS

Communicating clearly is one of the easiest ways to reduce the risk of injury in a hazardous workplace. There are three areas of communication that you need to understand:

1. Make sure you understand the work that needs to be done.

This includes knowing:

- Your role
- Other people's roles
- Who can make decisions and answer your questions
- The location of the worksite
- Emergency contacts and who can give first aid

Your supervisor will explain this. You need to ask questions so you feel confident that you understand what is required of everyone in your work team.



DISCUSSION ACTIVITY

With your supervisor and work team, discuss the job you will be doing. Remember to ask questions to make sure you understand.

2. Communicate with others by using signs, safety cones and barrier tape to stop other people from entering areas of danger. Someone in your team should have the role of 'spotter'. Their job is to keep an eye out for anyone who might enter the work area. The spotter will be able to help bystanders understand that they can't access the area until it is safe again.

3. Communicate with your team by speaking face-to-face or using UHF radio. You can also use hand signals when it's too noisy. You will need to work this out before the job starts so everyone in the team knows what each signal means.

IMPORTANT

Work with your team until everyone understands and can use the signals and signs before the job starts



PRACTICAL ACTIVITY

With your supervisor and work team, work out the hand signals you need to use. These might include:

- Getting the attention of a chainsaw operator.
- "Stop what you're doing and turn off your chainsaw."
- "All OK, keep going."
- "Get out quickly, emergency!"
- "Come over here."
- "Time for a break."

Create signals you think might be needed for other situations.

Practice using these hand signals with your work team until everyone understands and can use the signals.



2.3 JOB SAFETY ANALYSIS (JSA)

The easiest way to do this is by completing a JSA using the following steps:

STEP 1

Identify the job tasks and hazards, for example, load vehicle, maintain equipment, drive to site, refuel equipment, fell trees, remove timber.

STEP 2

Consider the site conditions, for example, distance from base, road condition, isolation, weather forecast, phone coverage, terrain, buildings, power lines.

STEP 3

Assess the risk (see the Risk Assessment Table on facing page)

RISK RATING	ACTION
Extreme Risk	Do not proceed until risk can be reduced
High Risk	Do not proceed until risk can be reduced
Medium Risk	Reduce the risk and proceed
Low Risk	Reduce risk if possible and proceed

STEP 4

Identify controls to reduce the level of risk, for example, follow SOPs such as conduct tree assessment, set up exclusion zones on site, change usual work practice such as use a bigger chainsaw, stop work if conditions change, practise effective communication with supervisor and team, wear appropriate PPE.

STEP 5

Re-assess the risk with controls applied and if it's not acceptable, identify more effective controls or make the decision not to do the job at this time. For example, an elevated work platform might be needed, or you might need to reschedule work for a day with better weather conditions.

RISK ASSESSMENT TABLE

	SERIOUSNESS			
	MAJOR e.g. death/ disability	SERIOUS e.g. injury/ lost time	MINOR e.g. first aid injury	INSIGNIFICANT e.g. incident, but no injury
LIKELIHOOD				
VERY LIKELY will almost certainly happen	Extreme	High	High	Medium
LIKELY will probably happen at some time	High	High	Medium	Medium
UNLIKELY could happen at some time	High	Medium	Medium	Low
VERY UNLIKELY might happen very rarely	Medium	Medium	Low	Low



PRACTICAL ACTIVITY

With your supervisor and work team, complete a JSA for the job you are planning to do. Use your workplace form or you can use the one from the Resources section.



See Resources R3,
page 42

Hazard Job	Risk Rating	Control strategies	JSA	Risk Rating Revised	low med high
Chainsaw use chain on backwards bar oil empty chain sprocket clogged air filter clogged bar bent not operational chain bent	L-m L L m-H L-m	undertake training, follow instructions, develop skills re maintenance + pre start routine Dismantle, clean, check, fuel/fill reassemble, report faults DON'T USE IF DAMAGED - ASK Don't rush, be thorough Do at start + end of day		L	
operator Starting stance control kick back trips or debris other people safety gear not being operational familiarity	H H H H H H H	Never drop start, chain brake on undertake training, follow instruction "boxing stance" balanced stance avoid upper lip of bar clean work area avoid 'forks' PPE: helmet earmuffs, visor, chaps boots 7 features must be operational train on new gear, always be aware go steady, breaks, water, shade clothing food		m (m-H)	

2.4 PERSONAL PROTECTIVE EQUIPMENT (PPE)















PPE is needed when working with chainsaws. Not all of the following items are needed while you do maintenance. It is recommended industry practice to use all of it while operating a chainsaw.

PPE USED WITH CHAINSAWS			
Long-sleeved cotton shirt and trousers		Chainsaw chaps	
Steel-capped boots with good ankle support and non-slip soles		Combination helmet with visor and earmuffs	
Well-fitting gloves		Clear or tinted safety glasses	



2.5 TOOLS & EQUIPMENT

Following is a list of tools and equipment you might need while using a chainsaw. Whether or not you need these will depend on the task and where you are doing the job.

Signage and barriers		Axe	
Wedges		Sharpening tools	
Spanners to tension chain and for other minor maintenance		Fuel	
Tape measure		Oils	
Two chainsaws (one for a back-up)		Communications equipment	
Rake		First aid kit with materials relevant to chainsaw injuries	
Blower		Water	



DISCUSSION ACTIVITY

With your work team and supervisor, work out the equipment you will need for the job you are doing. You might have seen these in the SOP or JSA.



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Will you use any other larger equipment such as a skid steer, wood chipper or stump grinder?

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2.6 PRE-START CHECKS & MAINTENANCE

Pre-start checks are an important way to:

- Ensure the equipment is safe to use
- Look after the equipment

You need to do all pre-start checks before you start the chainsaw and every time you use it. This will minimise the risk of injury to you. Doing these checks properly is part of your duty of care.

If any of the parts or features are not OK, and you can't fix them, you need to apply an out-of-service tag. Follow your workplace procedures to notify your supervisor or work team members.

The process of doing pre-start checks and maintenance is described in detail in ALEP Guide *Operate and maintain chainsaws*.

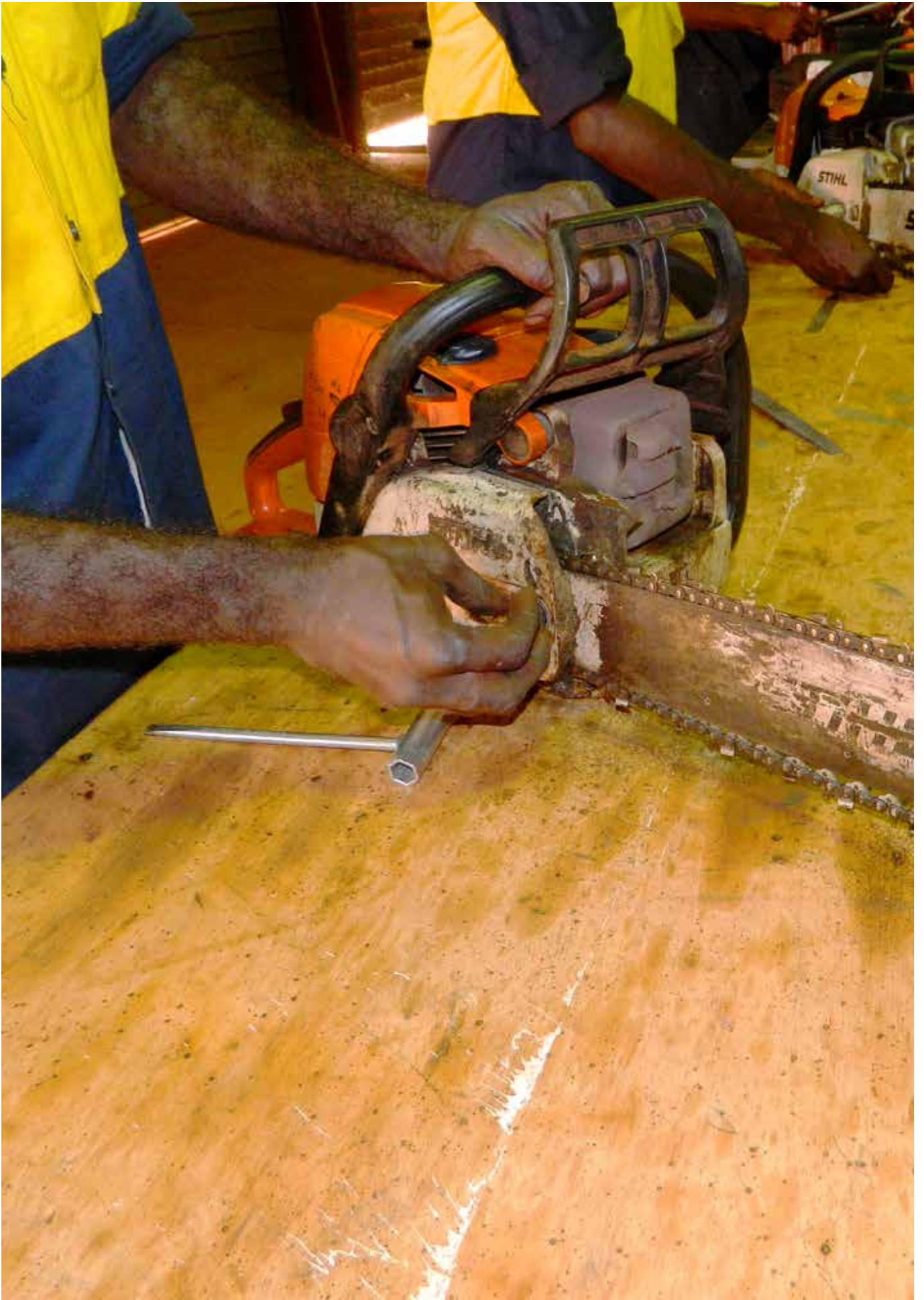


PRACTICAL ACTIVITY

Do all pre-start checks and maintenance on the chainsaw you will be using for the job you are planning to do. As you go, complete the Pre-Start Checklist in the *Resources* section.



See *Resources R4*, page 43



3

ASSESS & PREPARE THE SITE

IMPORTANT

You need to walk around the site to look at the tree from different positions.

When you arrive on site, there are some things you will need to do before you start felling trees.

3.1 TREE & SITE ASSESSMENT

It is really important to look at the tree and work out the safest way to fell it. You will need to think about all of the following things that will affect the job.

LEAN The lean of the tree will help you work out which way the tree will want to fall. You will work with the lean when felling the tree.



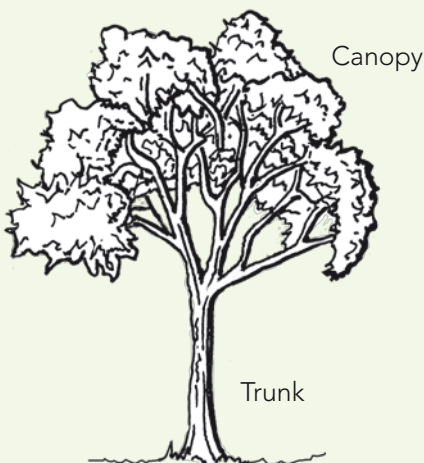
Notice the natural lean of the tree and consider this in light of the slope of the ground



Notice the lean of the trunk compared to the canopy



This is a forward-leaning tree



TERRAIN Notice the slope of the ground and how that might affect the direction the tree falls in light of the way it's leaning. Also notice if the soil is muddy, as the tree might slide when it hits the ground.

WEATHER Notice the direction and intensity of the wind. Think about how this might affect the way the tree falls. If the wind is steady, it is easier to plan for the conditions. If the wind is gusty, it is more difficult to predict what might happen.

Unless essential, avoid working during rain, storms and lightning. Try to do the job before or after this kind of weather.

You should not use a chainsaw in a bushland setting on days when a Total Fire Ban has been issued.

EXTERNAL DEFECTS The external structure of the trunk will affect the way the tree can react during felling. Look for anything that is out of the ordinary, such as:

- Significant fire damage and burnt hollows
- Trunk damage caused by decay
- Double leaders



Significant fire damage and burnt hollows



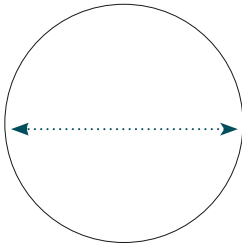
Trunk damage caused by decay

Double leaders



NOTE

Diameter is the measure across a circle



SIZE We're only looking at small trees at this stage. While you're learning, it's best to fell trees that are smaller than 10 metres or that have a trunk narrower than 400 mm in diameter. Be guided by your supervisor or trainer.

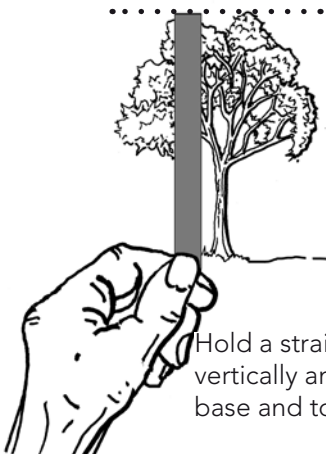
You need to think about size to know:

- The area the tree will take up on the ground
- What size chainsaw to use
- The type of wedges you might need
- The amount of time it will take to clear the site
- If any machinery is needed to clear the site, for example, skid steer, front end loader

ESTIMATING & MEASURING HEIGHT

You can estimate the height by following the steps given in the diagram below.

If accuracy is important, you can use a laser height-measuring tool.



Hold a straight stick vertically and note the base and top of the tree



Rotate to horizontal and find a suitable marker point



Pace out in metre-long steps or use a tape measure

CANOPY You need to think about this in terms of size and configuration.

Look up into the canopy and notice if the branches are:

- Large or small
- Dead or broken and might fall as you begin sawing or hitting in a wedge
- Entwined with other trees
- Distributed more heavily on one side than the other

Also notice the foliage of the tree. Does it:

- Seem dense or sparse?
- Have vines or branches entwined between it and other trees?
- Make one side of the canopy heavier than the other?

Think about how these factors will affect the way the tree falls.



INTERNAL DEFECTS It is important to work out how solid the timber is. If it is rotting or has been hollowed out by termites, the tree might fall more quickly than expected or change direction. You need to be aware this might happen and plan for it. There are a few things to look for to identify potential problems.

Look at the:

- Foliage to see if the colour indicates that it is deficient, dead or dying
- Branches to see if they are dead or have stunted growth
- Trunk or lower branches for fungi
- Trunk for fire damage
- Trunk for signs of termites or other borers

Specialist equipment and methods can be used to carry out core sampling and density testing. This will tell you if the tree is hollowed out or has rotted inside. These methods can be done more simply if accurate results are not needed to keep the risk low and the job safer for you.

- **Core sampling** can be done using a wood drill – feel for a hollow centre or notice if the sawdust is powdery, indicating termites or other borers
- **Resonance tapping** can be done by hitting the tree with the back of an axe – listen for a hollow sound





ENVIRONMENT Look at the area around the tree, and think about how this will affect the safety of the job.

Notice **other trees** that might get in the way as your tree falls. You want to avoid the tree hitting other trees on the way down. There are three things that can happen that cause additional risks for the saw operator:

- The collision of trees may cause the falling tree to twist or turn and move in a different direction than planned.
- A hang-up is when the falling tree gets stuck in another tree on the way down. This can be very dangerous, as the fallen tree can slip and fall unpredictably at any time. The other tree might also shatter, split and/or fall unpredictably. It is also then very difficult to remove the tree and get the timber safely on the ground.
- The movement and landing of your falling tree can also cause dead limbs on nearby trees to fall and injure the operator.

Notice the **infrastructure** such as buildings, powerlines or other services that might be damaged if the tree falls the wrong way.

Notice any **obstructions** on the ground where the tree could fall, such as:

- Stumps
- Large rocks or boulders
- Other fallen trees
- Dirt mounds

Look out for nests or evidence of native animal habitat. This might be in the tree itself or anywhere on the ground where the tree will fall. Also think about other plants that will get crushed by the tree you are felling. Are they endangered, providing food or a nesting site for wildlife? Work out how you can fell the tree without causing damage.

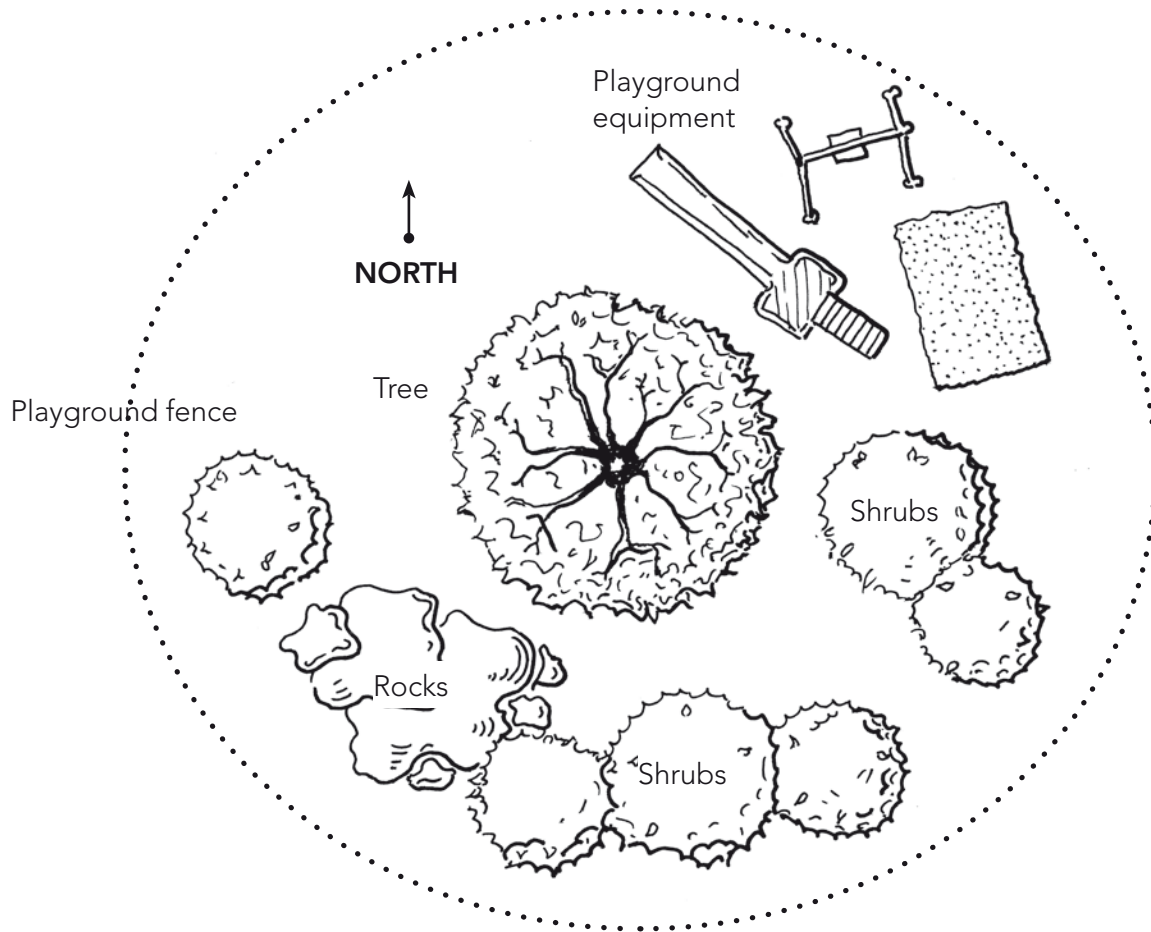
Felling across large rocks, stumps or dirt mounds can cause the tree to bounce back and injure the saw operator. It also makes it difficult to cut up and remove the tree.



SCENARIO 1

A team of rangers was asked by their community council to fell a 7 metre tree in the kids' playground area. If the tree was felled to the north, it would have damaged the playground equipment. If the tree was felled to the south, it would have damaged the shrubs or fallen over the rocks.

The tree was leaning toward the west. The rangers estimated the height, looked at the canopy and worked out it would definitely damage the playground fence.



DISCUSSION ACTIVITY

What options did the rangers have?



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SCENARIO 2

A ranger group wanted to cut some firewood for the old people in their community. They found a dry, dead tree in a bush area nearby. This is a mud map of the area.



What options do the ranger group have if the prevailing wind is coming from the north?

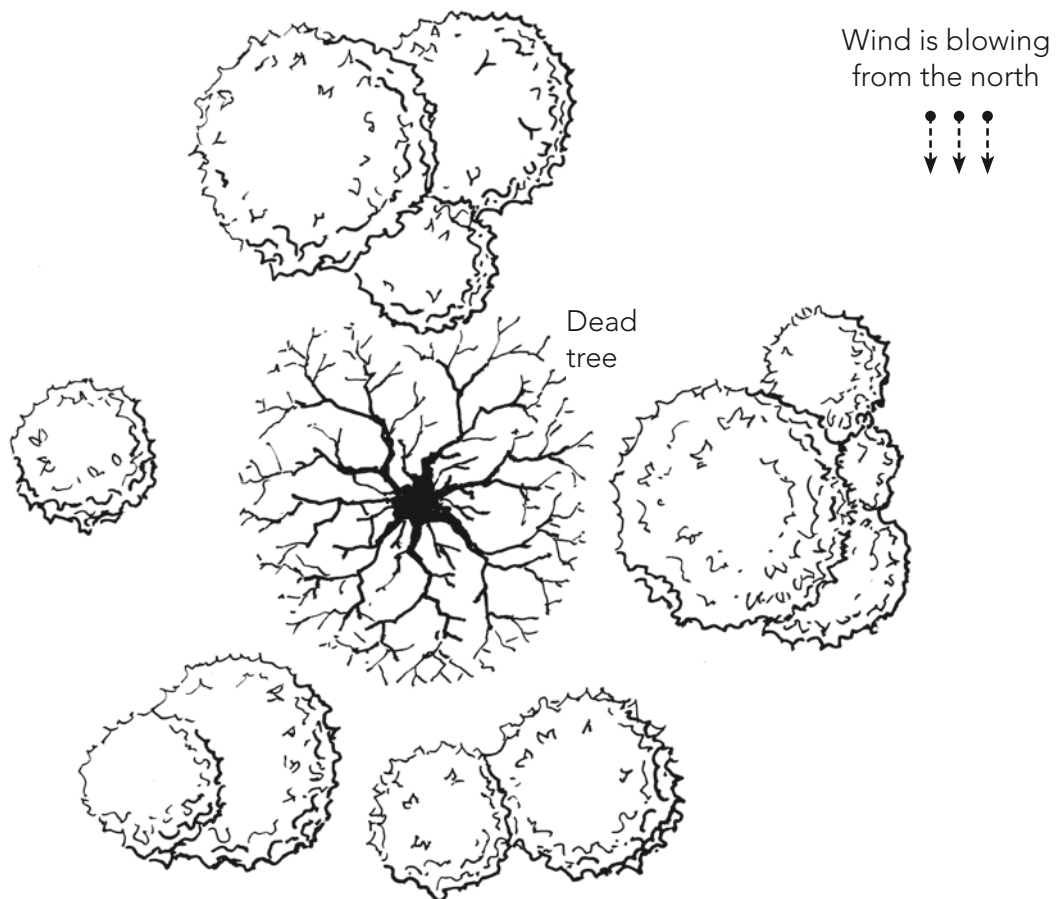
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PRACTICAL ACTIVITY

Go outside and look at some trees around your training area. Imagine you need to fell one of these trees. Conduct a tree and site assessment with your work team. You need to think about:

- Lean
- Terrain
- Weather
- External defects
- Size
- Canopy
- Internal defects
- Environment

Can the tree be felled safely into a clear area?

Would you need to get someone with other equipment to help fell the tree safely?

3.2 REVIEW JSA

The work team needs to come together to review the JSA after the tree and site assessment. The team might need to alter the JSA when they have a good understanding of all the above aspects of the worksite.

Update the JSA to reflect any differences from your initial plan that are noticed on site.

It is important that your supervisor confirms that it is safe for you to do the work.

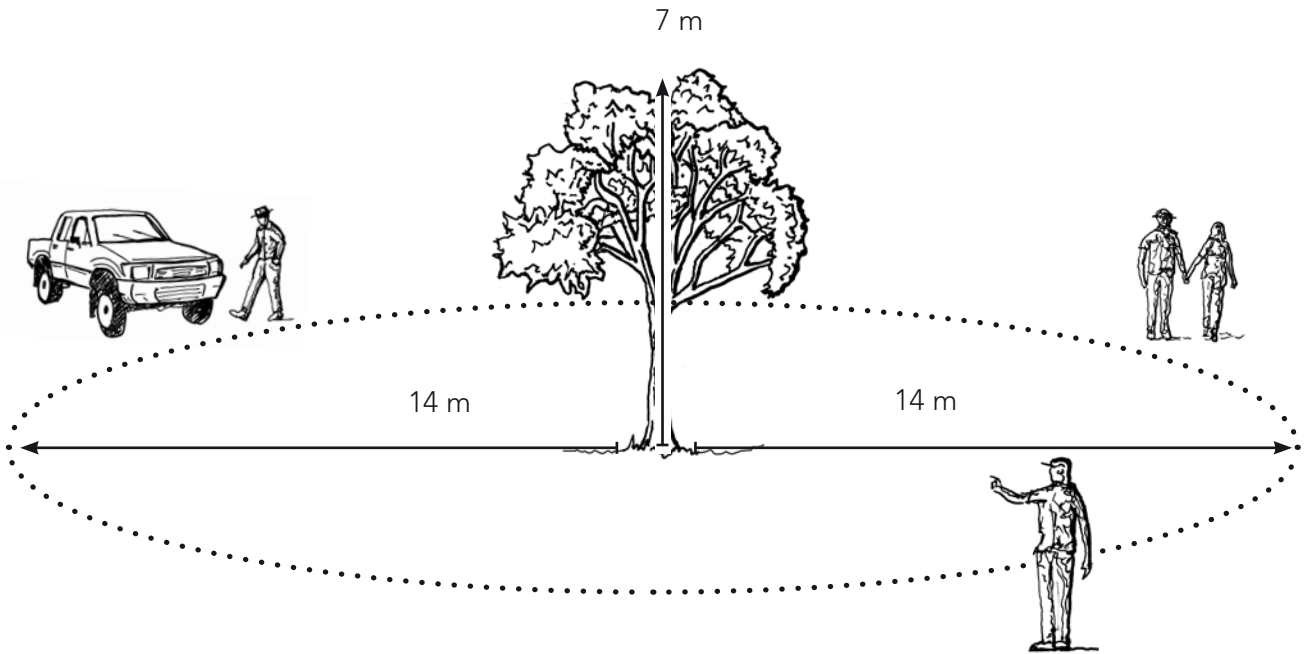
The things you will have worked out from the tree and site assessment are:

- If it is safe to fell the tree
- Any important habitat or infrastructure that must be protected
- The direction in which you can safely fell the tree
- Any other equipment that is needed
- The area that will be set up as the felling zone

3.3 SET UP THE FELLING ZONE

The felling zone is the area around the tree where the tree could fall. Generally, this extends around the tree for about two tree lengths. This allows for branches being thrown out of the tree as it hits the ground.

If the tree is 7 metres high, the felling zone will extend at least 14 metres in each direction around the tree.



You need to make sure all vehicles, plant and people are outside of the felling zone.

If the felling zone is on a significant slope, you should be felling the tree so it falls straight down the slope. Extend the felling zone at least an extra half-length, as the tree could slide once it falls.

Remove the obstacles you can from the felling zone. If there are buildings or other infrastructure, you need to be very sure the tree will fall in the way you have assessed.

In a parkland setting, you sometimes need to fell a tree onto lawn or cement paths. You might be able to use old tyres to protect cement. In the same way, you could use old carpet or rubber matting to protect lawn.

If the tree cannot be felled safely, your supervisor might decide to get help from someone such as:

- A tree climber
- Someone licensed to use an elevated work platform



3.4 THE EXCLUSION ZONE

Only the people involved in felling the tree should be in the felling zone during tree felling. During work, the felling zone becomes the exclusion zone. Everyone else is excluded.

It is important to make sure nobody walks into this area during tree felling. If you are working in a public area, you need to mark the felling zone with flagging tape. Signs can also be helpful. The spotter watches the perimeter of the exclusion zone and makes sure no one enters who shouldn't.



4

DO THE FELLING JOB

The best way to improve your tree-felling skills is to practise. Following is some general information. You need to go out with your trainer and apply this information on the job. You should follow your workplace SOP or SWMS at all times.

4.1 WEAR YOUR PPE

ESSENTIAL ITEMS

- Hard hat with visor
- Hearing protection
- Safety glasses
- A long-sleeved shirt and gloves are good to have, but gloves are not essential
- Chaps
- Steel-capped boots



4.2 PREPARE EQUIPMENT

Make sure that everything you need to complete the job is where you can easily get it. This will include:

- Your chainsaw
- A backup chainsaw
- Wedges
- Sledgehammer or axe

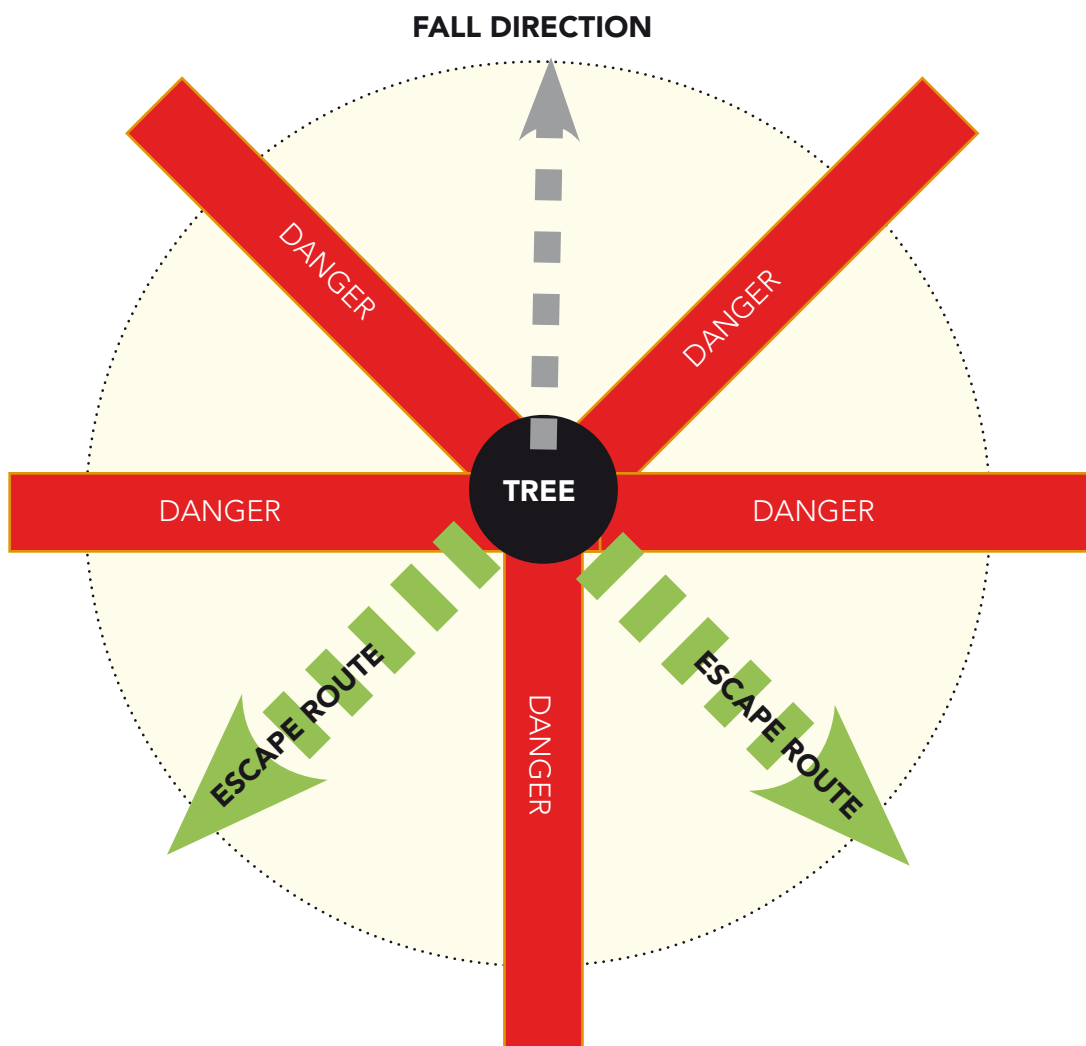


4.3 CLEAR YOUR ESCAPE ROUTE

You need to prepare two escape routes. You will choose one of the routes to move away from the tree when it begins to fall. The route you take will depend on which side of the tree you finish your final cuts.

Make sure both the escape routes are clear of obstacles for at least 6 metres. This will allow you to move away from the tree easily and safely.

If there are obstacles you can't clear, make sure you are aware of these so you can still move quickly and safely.



4.4 CLEAR HAZARDS

Clear any smaller saplings or dead timber that the tree will fall onto. If you don't clear this, material can be flung back towards you and could cause injury.

Clear the area around the base of the tree where you will be standing. You need to have room to move your feet around as you work, without tripping. If there are hazards that you can't move, then you need to be aware of these and plan how you will move around them safely.

4.5 CHECK EVERYTHING IS GOOD TO GO

There are a few final checks before you start sawing. Check that:

1. The conditions have not changed, for example, wind or rain. If they have changed in a way that might affect the job, speak with your supervisor.
2. The exclusion zone is clear. Do not start until you have the 'all clear' from the spotter.
3. Your chainsaw and backup saw have enough fuel and are sharp and ready to use.
4. You have time to complete the job. Once you begin sawing, you should not leave the tree until it is safely on the ground.



4.6 FELL THE TREE

While you are learning, it is best to work on trees with a diameter of less than 400 mm. Ideally, your saw's bar length is bigger than this. If this is the case, you can use the standard felling technique using only three cuts.

- Two for the scarf
- One for the back cut

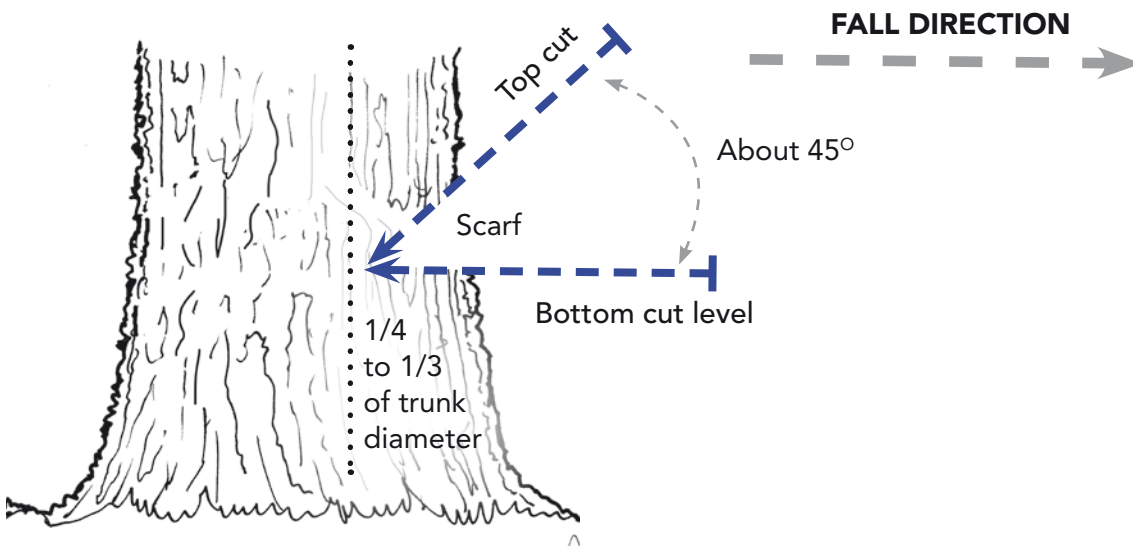


MAKE THE SCARF

The first cuts you saw will make the scarf. This is a wedge-shaped cut that must open exactly in the direction you want the tree to fall.

The diagram shows:

- The scarf is about 1/4 to 1/3 of the diameter of the trunk
- The top cut and bottom cut must meet precisely (no over or under cuts)
- The bottom cut needs to be level (90° to the trunk)

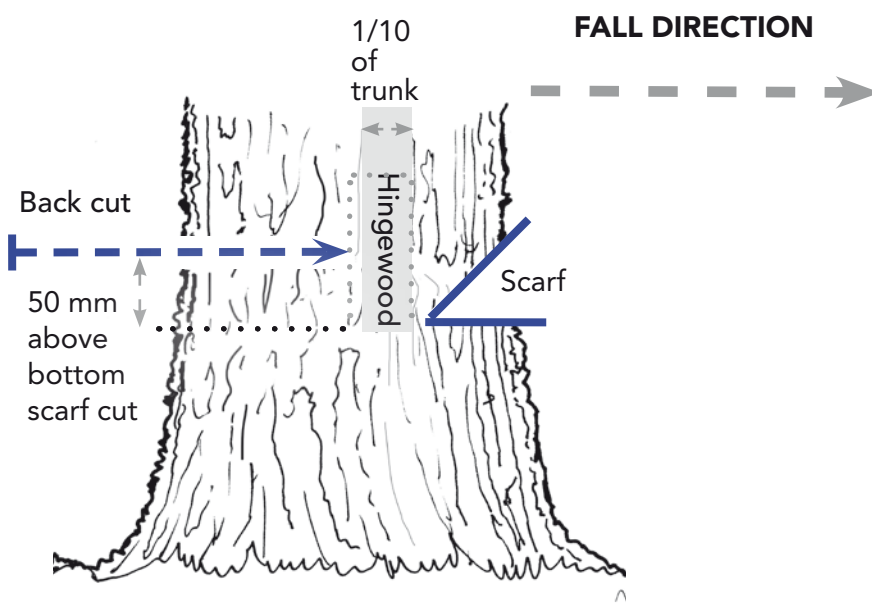


MAKE THE BACK CUT

The back cut is sawn from the opposite side of the trunk. This cut will make the tree fall. There are two important estimates to make before making the back cut.

- The hingewood needs to be about 1/10 of the trunk diameter, beginning at the back of the scarf
- The back cut needs to be above the bottom cut by about 50 mm

These estimates are shown in the diagram. This also shows that the back cut should be level (90° to the trunk).



NOTE

Hingewood is the part of the trunk between the scarf and the back cut. It helps control the direction and rate of the fall.

Never cut through the hingewood.

Once you have worked out where your back cut will be, have a look around to make sure everything is still safe for the tree to fall. It is good to let the spotter know you are now making the final cut and the tree will fall. Wait for them to give you the all clear again before making the back cut.

When the tree begins to fall, move away from the base using the closest escape route. If your saw is stuck, just leave it. Walk at a reasonable pace but don't run. Keep an eye on the tree in case it suddenly starts to fall or twist backwards. Also watch out for branches that might flick out towards you as the tree is falling.

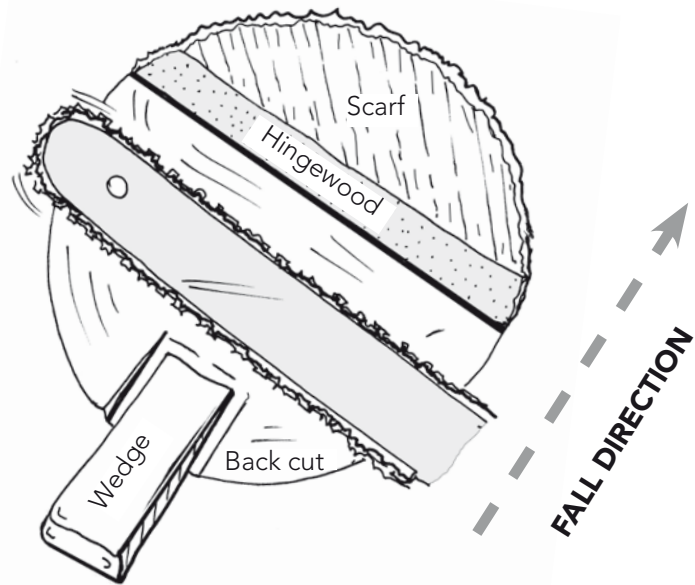
Never stand directly behind a falling tree or move across to the other side. This can be very dangerous, as the tree could split as it falls or push backwards over the stump as it hits the ground.

Do not enter the felling area until everything has settled and all movement has ceased. Watch out for new trip hazards.



4.7 USING A WEDGE

If the tree is very straight with a balanced canopy, it is useful to use a wedge. While sawing the back cut, you can hammer the wedge in behind the saw bar to reduce the chance of the saw getting jammed. This also puts a bit more pressure on the trunk in the planned direction of fall.

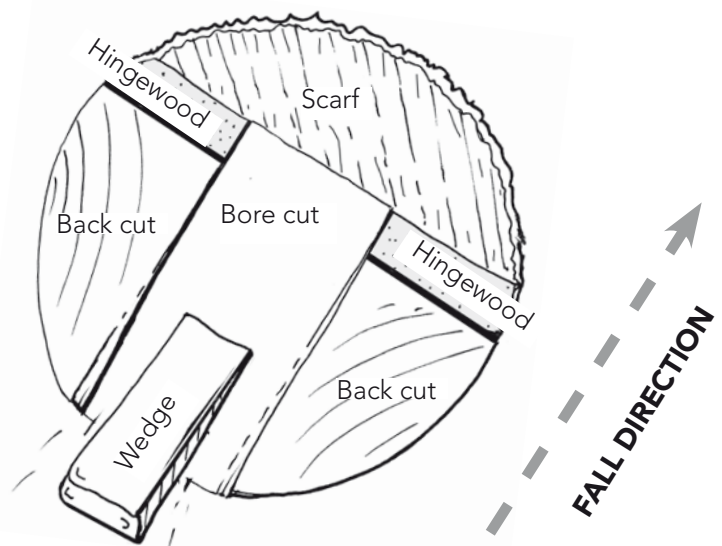
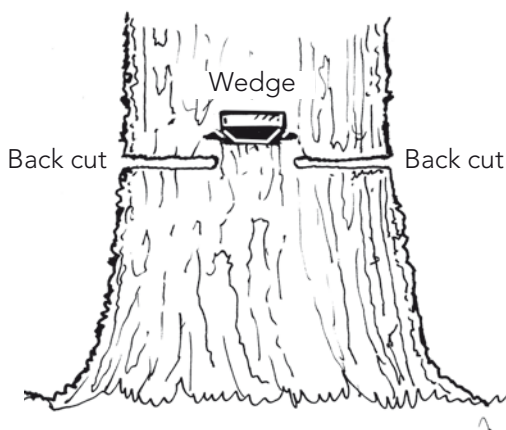


This is where the wedge was



If the diameter of the trunk is small, then you don't have enough room to hammer in a wedge behind the saw. You can use a boring technique to help with this. This can only be used with a smaller saw and bar.

- Create the scarf as usual
- Using the bottom side of the tip of your saw, bore straight through from the middle of the scarf right through the trunk
- Hammer in the wedge at the back of the trunk
- Make the back cuts on either side of the wedge. Cut from the back towards the scarf about 25 mm lower than the bottom of the wedge. Remember to leave the hingewood.
- You can then knock the wedge in until the tree begins to fall





4.8 COMPLEX TREES

If the tree you need to fell is not a standard shape, then you will need to discuss with your supervisor how to approach the job.

Double or multiple leaders that divide close to the ground should be treated as separate trees. Fell one first and then the other.

You need to use advanced sawing techniques to fell trees with a significant lean or burnt-out hollows. At this stage of your learning, you need to ask for help from other people.

Forward-leaning trees At this stage of your learning, you will fell small leaning trees in the same way as other trees. The direction of fall will be determined by the lean of the tree.



Double leader



Burnt hollow



Heavy forward-leaning



Old, heavy, forward-leaning trees are prone to splitting up the trunk while the back cut is being made. These trees can be very dangerous to work with, and you will need to learn advanced felling techniques. You should not attempt to fell these trees at this stage of your learning.



DISCUSSION ACTIVITY

The photos above and the ones on pages 14 and 15 show trees that are not standard. Discuss with your trainer or supervisor:

- Which trees you could fell
- How you would find someone with the skills and equipment to help with the ones you can't.

4.9 OTHER THINGS THAT MIGHT HAPPEN

Even with a good tree and site assessment, other problems can come up while you're sawing. You need to be prepared for these and manage them with guidance from your trainer or supervisor.

- You might notice your saw starts to struggle while making the back cut. This could be because the tree has started to sit back onto the bar or the sawdust has not cleared. You may need to slide your saw back and forth to clear debris or insert a wedge quickly behind your saw so you can finish your cut.
- When you cut the scarf, you might notice the tree is decaying inside. If this happens you will need to leave the hingewood thicker. This will help control the tree's fall. While you are learning, it is important to be guided by your trainer.
- Use your backup saw if you have problems with your chainsaw part way through.
- You might need to stop and wait for a minute if a gusty wind picks up as you are about to do your back cut. The wind could affect the direction the tree falls.
- A hang-up is when the tree you fell gets caught in other trees and doesn't fall to the ground. This can result if the tree falls in a slightly different direction than planned. You will need to reassess the situation with your supervisor or trainer. It is not recommended to leave a hung-up tree, as it may fall later, causing injury or damage.



Tree decay



PRACTICAL ACTIVITY

Your trainer will demonstrate the techniques explained. You can then practise cutting a scarf and making a back cut on the stump.

When your trainer feels you are ready, you can move on to your first small tree.

5

FINISH THE JOB & CLEAN UP



When the tree is safely on the ground, you will cut up the timber for use and take it away with you. You need to dispose of any unwanted branches in an appropriate way.

5.1 USING THE TIMBER

You might use the timber for:

- Building
- Firewood
- Fence posts

If you are using the wood, you will need to sort the timber into useable pieces and saw these into appropriate lengths. You will most likely need to load these into a vehicle or trailer to move them. Remember to follow the safety information and sawing techniques covered in ALEP Guide *Operate and maintain chainsaws*.

If you are going to use a wood chipper to make mulch, you will need to be trained to use the equipment correctly.

5.2 CLEAN UP THE SITE

Cleaning up the site can help keep the area safe and assist in looking after the environment.

If you are in a bushland setting and there are timber and branches you are not taking away, you should:

- Make sure tracks are accessible
- Ensure timber is lying flat on the ground and won't fall on anyone
- Keep firebreaks clear
- Move any debris that might block access to feeding, watering or breeding sites for native animals or stock

In a park or community environment, piles of timber can look untidy, damage grass and block access. You should also move the timber so it doesn't present any of the following safety hazards to children or other community members.

- Fire hazard
- Trip hazard
- Habitat for spiders and snakes

You might use equipment such as a skid steer, front end loader or stump grinder. You must be trained to use this equipment correctly before operating it.

After the timber is removed, you can clean up the site:

- Pick up and dispose of all rubbish
- Pick up all tools and equipment and load them into your vehicle
- Use a blower or rake to clean up leaves, twigs and sawdust piles



5.3 CLEAN & STORE EQUIPMENT & PPE

When you return to base, you need to maintain and store the chainsaw and any other tools and equipment you used. In some workplaces, the same maintenance procedure is followed as for the pre-start checks.

This reduces:

- The risk of future injury caused by the equipment having been damaged
- The chance of the chainsaw or tools being misplaced or lost
- The time taken to be ready in the case of an emergency during a storm, when trees may have fallen across a road or onto a house

MAINTENANCE TASKS

- Carry out all pre-start checks
- Apply an out-of-service tag if there are any faults
- Report any faults or damage to your supervisor

Chainsaws are best stored sitting flat and off the ground in a clean, dry area. You can buy a case that helps to protect the saws when they are being stored or transported. They should never be kept in an area where people smoke, there are sparks (grinding or welding) or fires are lit. A 'flammable liquid' hazard sign should be attached to the door. Store fuels and oils in a locked area.

You also need to clean and store your PPE so it is ready to use next time you need it. It is useful to store PPE in a plastic tub to keep it dry and free from dirt and damage. Follow the manufacturer's instructions if your chaps require cleaning.

Let your supervisor know if you need any new parts, fuel, oil or PPE and if any equipment is lost, damaged or needs extra maintenance.

5.4 REPORTING

The kind of reporting you need to do will depend on your workplace and the job you have done. Many workplaces use a simple job sheet to:

- Show progress against a plan
- Let people know what you have done
- Plan future work
- Record any maintenance of tools and equipment





PROJECT

In this project you will use all of the skills and knowledge discussed in this Learner Guide.

With your work team, carry out a job that requires you to fell a tree. This could be one of the following or another job required by your trainer or supervisor.

- Removing a dead tree or living tree for safety reasons
- Felling trees to gather firewood
- Felling trees to harvest timber for a building project

Show your trainer that you can do all of the following steps and compile a portfolio to prove this.

1. GET READY AT BASE

- Follow your workplace SOPs (or the ones in the *Resources* section)
- Actively help complete a JSA – your supervisor will coordinate this
- Communicate with your work team about the job
- Select and prepare the correct PPE and equipment (fill in the *Project Planning Sheet* on page 36)
- Do all pre-start checks and maintenance and complete the Pre-Start Checklist & Maintenance Log in the *Resources* section



See *Resources R1, R2 and R3*, pages 38, 40 & 42



See *Resources R4*, page 43

2. GET READY ON SITE

- Conduct a tree and site assessment and discuss this with your supervisor
- Identify natural direction of fall
- Discuss ways to manage trees outside of your skill level
- Actively help complete a JSA – your supervisor will coordinate this
- Communicate with your work team about the job
- Confirm the tree and technique with your supervisor
- Clear felling zone and set up exclusion zone
- Identify escape routes
- Confirm spotter and first-aider
- Prepare tools and equipment for tree felling

3. DO THE FELLING JOB

- Use correct PPE
- Follow your workplace SOPs (or the ones in the *Resources* section)
- Operate a chainsaw safely
- Communicate with your work team using hand signals
- Use the appropriate technique as discussed with your supervisor
- Follow plan or instructions if conditions change
- Use the escape route as the tree begins to fall

R1

R2

See *Resources R1* and *R2*, pages 38 & 40

4. FINISH UP

- Clean up the worksite using machinery if required
- Clean and store the chainsaw and PPE
- Complete workplace reporting (use the Job Sheet in the *Resources* section if your workplace doesn't have one)

R5

See *Resources R5*, page 44





PROJECT PLANNING SHEET

PPE I need

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Tools and equipment I need

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PROJECT

PORTFOLIO

Create a portfolio to show your skills and knowledge. This might include any of the following.

- The completed JSA
- The SOPs you followed
- Photos of the trees and sites
- Photos of you in your PPE felling the tree
- Photos of how you marked the exclusion zone
- A completed Job Sheet



STANDARD OPERATING PROCEDURE

CHAINSAW USE (PETROL ENGINE)

Training is required prior to chainsaw use; ongoing supervision is recommended for new operators.

PPE REQUIRED

- Chainsaw chaps (cut-resistant trousers with no obvious damage or tears)
- Steel-capped work boots
- Earmuffs, safety glasses and hard hat (or use a combination helmet with a mesh screen and earmuffs; this is an industry standard in some situations)
- Tinted or clear safety glasses (can be worn under the mesh screen)
- Cotton workwear clothing
- Non-slip, well-fitting gloves

Always wear the correct PPE when starting or using a chainsaw.

PRE-START SAFETY CHECKS

- Check starter handle and cord
- Clean engine body and air intakes
- Clean air filter and check for fuel leaks
- Check guide bar is clean and not damaged
- Check the chain drive links, depth gauges and cutter teeth for excessive wear or damage
- Check the sprocket for wear
- Check that the safety features are in place and fully operational:
 1. Chain brake works (activated by the front hand guard)
 2. Anti-vibration rubbers or springs are in place and not damaged
 3. Chain catcher is fitted
 4. Throttle trigger and throttle lockout are fully operational
 5. Front and rear hand guards and all engine covers are in place and not damaged
 6. On/off switch is working
 7. Muffler has no holes, and spark arrestor mesh is in place
- Replace covers, and check nuts and screws
- Ensure the chain has been sharpened and correctly tensioned and the depth gauges are set
- Fill up the fuel and bar oil reservoir and check for leaks. Do this in a well-ventilated area away from sparks and other running machinery.

If any of the above items are faulty, do not operate the machine. Apply an out-of-service tag and notify your supervisor.

CHAINSAW OPERATIONS

- Ensure you are wearing your PPE
- Do not smoke while operating a chainsaw
- Start the chainsaw on the ground in an area free of rocks, dirt and debris
- Always use the chainsaw with your left hand firmly on the front handle and your right hand on the rear handle, ensuring your thumbs are wrapped around the handles. Never operate a chainsaw one-handed. Never operate a chainsaw left-handed.
- Maintain a proper balanced stance, keeping the chainsaw slightly to the right side of your body when cutting
- To prevent kickback, avoid hitting any obstructions with the tip of the guide bar while the chain is rotating
- Use the chainsaw at peak revs when making all cuts
- Be aware of pull-in and push-back when cutting with the chainsaw
- Ensure you have considered the tension and compression situations for the wood that you are cutting. Do not allow the tip of the guide bar to be pinched in the wood.
- Be aware of cut material moving, falling or rolling towards you
- Clear your work area of cut material as you go to avoid slips, trips and falls
- Do not operate the chainsaw above shoulder height
- Do not lean your head or body over the running chain when cutting
- Regularly clean accumulated sawdust and debris from the cooling vents and from under the side cover of the chainsaw
- After use, ensure you fully clean, sharpen and check the condition of the chainsaw before returning it to the store. Check with your supervisor if you are unsure about any aspect.
- Stop work if the weather conditions become unfavourable, for example, high temperature, rain, high winds, fog or smoke
- Stop work if you feel fatigued or unwell
- Drink plenty of water while working
- Do not operate a chainsaw by yourself in isolated areas
- Always carry a suitably stocked first aid kit and have a communications plan in place

HAZARDS

- Noise
- Flying debris
- Slips, trips and falls
- Sharp chain teeth
- Manual handling
- Vibration
- Flammable fuel
- Powerful equipment

SMALL-TREE FELLING

This SOP is supplementary to the Chainsaw Use – Petrol Engine SOP, which all chainsaw operators should follow at all times.

This document offers additional procedures that must be followed when felling trees.

A chainsaw operator felling trees must follow recommendations in both SOPs.

Undertake a thorough assessment of the tree you intend to fell:

- Check canopy weight distribution and lean
- Note composition of foliage and stems
- Check for dead branches, decay and other defects
- Check trunk lean and overall weight
- Be aware of fire damage to the trunk or limbs
- Check for climbing vines and linking branches from adjoining trees, as these can affect the fall of the tree
- Note the wind direction and speed and its effect on the canopy

Do not continue if it is raining, if high winds develop, if smoke is blowing across the worksite, if temperatures are excessively high or if visibility is poor.

Do not attempt to fell trees beyond your skill level and/or saw capacity.

Do not work in isolated areas alone.

Inform your supervisor or other colleagues of your work plan.

Ensure you secure the fall zone perimeter to approximately two times the tree height in all directions.

Ensure wind direction is constant and allows the tree to be felled safely.

Make sure that you establish two escape routes from your tree and that they are clear of debris and trip hazards.

Make sure you have an axe, small sledgehammer and suitable wedges on hand to assist in the tree felling as required.

Always ensure your scarf is facing in exactly the intended direction of fall and is the correct shape and size.

Always make your back cut approximately 50 mm or greater above the bottom cut of your scarf, and do not cut all the way through the trunk into the hingewood.

Do not fell your tree into other trees or across high stumps.

Move away from the tree into your escape route once the tree has started to fall.

Be wary of forked trunks, as they can split when being cut; avoid them if possible or if you are not suitably experienced.

Never leave a tree standing in your work area that has been scarfed or partially cut, caught in another tree canopy or is hanging on vines. The safest place for a cut tree is on the ground.

Ensure you have an adequate first aid kit on site that is suitable for injuries that could be caused by a chainsaw or felling activity.

Ensure you have established a suitable worksite communications plan.

HAZARDS

- Noise
- Fatigue
- Weather conditions
- Flying debris
- Falling limbs and timber
- Uneven ground
- Slips, trips and falls
- Heavy dangerous equipment
- Manual handling
- Chainsaw kickback
- Flammable materials

JOB SAFETY ANALYSIS

JSA

Organisation

Job

Location

Procedure developed by

Approved by

Date

Tick the box for the PPE required.



Task

Steps in the job

Hazards Identified

What could cause injury?

Risk Score

Controls

What can be done to minimise the risk of injury?

Final Risk Score

PRE-START CHECKLIST & MAINTENANCE LOG – CHAINSAWS

R4

Chainsaw identification

Form completed by

Date

CLEAN & CHECK

COMMENTS

Starter handle and cord OK

Engine body and air intakes cleaned

Air filter cleaned

No fuel leaks

Guide bar is clean and not damaged

Chain OK – drive links, depth gauges and cutter teeth not worn or damaged

Sprocket is not worn

SAFETY FEATURES

COMMENTS

Chain brake works (activated by the front hand guard)

Anti-vibration rubbers or springs are in place and not damaged

Chain catcher is fitted

Throttle trigger and the throttle lockout fully operational

Front and rear hand guards and all engine covers in place and not damaged

On/off switch working

Muffler has no holes and spark arrestor mesh is in place

Any covers you removed are replaced and nuts and screws tightened

MAINTAIN THE CHAIN

COMMENTS

Chain sharpened

Chain tensioned

Depth gauges set

FUEL & OILS

COMMENTS

Fuel reservoir filled

Bar oil reservoir filled

No fuel or oil leaks

Please circle In service Out of service (apply tag)

Describe further work required or any problems

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Date..... Completed by.....

Site name.....

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Work team members.....

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Work completed.....

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Further work required due to deterioration and wear or threats from other sources

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GLOSSARY

WORD	MEANING
Unpredictably	When something is unpredictable, you can't work out what it is going to do. If something falls unpredictably, you don't know what direction it will go or where it will land.
Muster point	The muster point is the area where everyone should go if there is an emergency.
Configuration	The configuration of something is the way its parts are arranged in relation to each other. With a tree, this refers to the way the branches are shaped and touching each other.
Add your own words and meanings here	

REFERENCES

ForestWorks. (2011). *Tree faller's manual: techniques for standard and complex tree-felling operations*. Collingwood, Victoria: CSIRO.

NOTES

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NOTES

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NOTES

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ALEP

Aboriginal Landcare Education Program



FELL SMALL TREES

This learning guide provides information about the process of small-tree felling.

Topics include:

- MAINTAINING EQUIPMENT
- TREE & SITE ASSESSMENT
- SETTING UP THE FELLING & EXCLUSION ZONE
- STANDARD FELLING TECHNIQUES
- FINISHING UP THE JOB

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