safe work australia

Guide to managing the risks of tree work

Guidance material

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Disclaimer

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Safe Work Australia works with the Commonwealth, state and territory governments to improve work health and safety and workers' compensation arrangements. Safe Work Australia is a national policy body, not a regulator of work health and safety. The Commonwealth, states and territories have responsibility for regulating and enforcing work health and safety laws in their jurisdiction.

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1. Introduction

Tree work, including tree trimming and removal work, can pose work health and safety (WHS) risks. This Guide provides information for duty holders, primarily for persons conducting a business or undertaking (PCBUs), on:

- their duties and obligations under the model WHS laws,
- identifying and assessing risks associated with tree work
- control measures to manage the risks, and
- planning and safely undertaking tree work.

A range of terms are used across the tree industries including lopping, trimming, pruning, thinning, felling and removal. This Guide uses 'tree work' to cover the range of terms used in industry and the WHS Regulations.

1.1 What is tree work?

Tree work includes lopping, pruning, trimming, repairing, maintaining and removing trees and vegetation as well as ground operations relating to tree work like wood chipping, stump grinding and root pruning. This guide also contains information which may be relevant to similar tasks, including tree climbing for cabling, installation of habitat, tree access and inspection. It does not include commercial forestry work and growing and managing forests.

1.2 Who should use this Guide?

This Guide provides practical guidance to assist duty holders, primarily PCBUs, to manage risks to health and safety associated with tree work.

You have duties if you:

- engage workers, or cause workers to be engaged, to undertake tree work
- influence or direct workers in undertaking tree work, or
- have management or control of a workplace, or the fixtures, fittings or plant at a workplace, where tree work is undertaken.

Duty holders include arborists, tree surgeons, tree loppers, vegetation management workers, horticulturalists, gardeners, general tree workers, landscapers, builders, developers and others involved in the arboricultural or vegetation management industries, as well as those who climb trees for other purposes including scientific or environmental undertakings.

This Guide may also be useful for workers, and others in the workplace who may be affected by tree work, including members of the public.

This Guide does not apply to commercial forestry or work done in relation to growing and managing forests. Guidance on forestry and growing and managing forests is in the *General guide for managing risks in forestry operations* and *Guide to growing and managing forests*.

More specific information on the requirements to manage the risks from falls, machinery and other hazards associated with tree work like noise and hazardous manual tasks is available on the Safe Work Australia website.

1.3 How to use this Guide

This Guide provides information about the duties and obligations under the model WHS laws and the application of the WHS risk management process to hazards, risks, and control measures that are commonly encountered with tree work. The Guide is not able to cover all hazards, risks and control measures in detail. However, examples have been included to assist duty holders in identifying, assessing and managing the risks of tree work at their workplace.

In managing the risks, duty holders should also seek the advice of a competent person—for example, an arborist who is qualified to perform the planned work—and refer to relevant industry guidance material and standards. This will ensure you have the most comprehensive information about hazards and risks and the most effective control measures available for the particular workplace.

The arboricultural industry has developed a range of 'Minimum Industry Standards' which provide technical guidance for the tasks described in this Guide.

Conforming with industry guidance and standards for tree work does not mean a duty holder is complying with their duties under the model WHS laws. This Guide, together with other information available from Safe Work Australia, will assist you to meet your duties and obligations under WHS laws. The Guide should be read in conjunction with the following:

- Model Code of Practice: *How to manage work health and safety risks*.
- Model Code of Practice: *Managing the risk of falls at workplaces*.

This Guide includes references to the legal requirements under the model WHS Act and model WHS Regulations. These are included for convenience only and should not be relied on in place of the full text of the model WHS Act and model WHS Regulations.

In this Guide the word 'must' indicates a legal requirement that must be complied with. The word 'should' indicates a recommended course of action.

2. Who has health and safety duties?

Everyone in the workplace has a work health and safety duty. A range of people have specific duties in relation to tree work, including:

- designers, manufacturers, importers, suppliers, and installers of plant and structures
  - persons with management or control of the workplace
  - officers such as company directors, and
  - workers.

The main duty holders are set out in Table 1.

As a duty holder, you must ensure the WHS duties are met, even if others also have the same duty. If you do not take the required action yourself, you must ensure another duty holder is doing so. This requires duty holders to communicate with each other to identify hazards and risks, talk about health and safety concerns, and work together to minimise the risks.

Table 1: **Duty holders in relation to tree work.**

Who	Duties
A person conducting a business or undertaking (PCBU)	Must ensure, so far as is reasonably practicable, the health and safety of workers, including volunteers, workers the PCBU engages to carry out work, or workers the PCBU directs or influences in carrying out work. Must ensure that the health and safety of other people is not put at risk from work carried out by the business or undertaking. The PCBU with management or control of fixtures, fittings or plant at a workplace must ensure, so far as is reasonably practicable, that the fixtures, fittings and plant are without risks to the health and safety of any person. The PCBU with management or control of a workplace must ensure, so far as is reasonably practicable, the means of entering and exiting the workplace and anything arising from the workplace is without risks to health and safety. These duties require the PCBU to manage health and safety risks by eliminating them so far as is reasonably practicable, and if this is not reasonably practicable, by minimising those risks so far as is reasonably practicable. In the model WHS Regulations a PCBU also has a range of other duties in relation to tree work, including: • managing the risk of falls (regulations 78-80) • managing the risks of plant (regulation 203) • ensuring plant is maintained, inspected and tested (regulation 213) • managing the risks of musculoskeletal disorders relating to hazardous manual tasks (regulation 60) • ensuring suitable and adequate information, training, and instruction are provided to workers (regulation 39), and • maintaining a secure workplace from unauthorised access (regulation 298).
Designers, manufacturers, importers and suppliers or installers of	Must ensure, so far as is reasonably practicable, the plant, substance or structure they design, manufacture, import, supply or install is without risks to health and safety. This duty includes carrying out analysis, testing or an examination, and providing specific information about the plant, substance or structure.

Who	Duties
plant, substances or structures	Information should be passed on from the designer through to the manufacturer and supplier to the end user.
Officers	Must exercise due diligence to ensure the business or undertaking complies with the model WHS Act and Regulations. This includes taking reasonable steps to ensure the business or undertaking has and uses appropriate resources and processes to eliminate or minimise risks to health and safety.
Workers and others	Must take reasonable care for their own health and safety, comply with reasonable instructions, and not adversely affect the health and safety of other people. Workers must also co-operate with reasonable policies and procedures.

2.1 WHS laws in your state or territory

WHS laws are not the same across Australia. The Commonwealth, state and territory WHS regulators are responsible for enforcing WHS laws in their jurisdiction, investigating incidents and taking enforcement action.

If you need help understanding the WHS requirements in your jurisdiction, please contact your WHS regulator.

3. Managing health and safety risks

As a PCBU, you must manage the health and safety risks associated with tree work.

Use the following steps to ensure, so far as is reasonably practicable, workers and other persons are not exposed to health and safety risks associated with tree work

Further information on the risk management process is in the model Code of Practice: *How to manage work health and safety risks*.

3.1 Consultation

As a PCBU, you must consult, so far as is reasonably practicable, with your workers and their health and safety representatives (if any) when deciding how to manage the risks of tree work. By drawing on the experience, knowledge and ideas of your workers you are more likely to identify hazards and choose effective control measures.

If there is more than one business or undertaking involved at your workplace or if the workplace is managed or controlled by another PCBU, you must consult them to find out who is doing what and work together, so risks are eliminated or minimised so far as is reasonably practicable.

This may involve discussing workplace-specific control measures including exclusion zones, traffic management, and re-scheduling work that may interfere with the safety of tree work.

Further guidance on consultation can be found in the model Code of Practice: *Work health and safety consultation, co-operation and co-ordination*.

3.2 The risk management process

Risk management requires you to think about what could go wrong at your workplace and what the consequences could be. Then you must do whatever is reasonably practicable to eliminate or minimise those risks. This process will be implemented in different ways depending on the size and nature of your business or undertaking.

Risk management involves four steps:

- **Identify hazards**—find out what could cause harm.
- **Assess risks, if necessary**—understand the nature of the harm that could be caused by the hazard, how serious the harm could be and the likelihood of it happening. This step may not be necessary if you are dealing with a known risk with known control measures.
- **Control risks**—implement the most effective control measure that is reasonably practicable in the circumstances and ensure it remains effective over time.
- **Review hazards and control measures** to ensure they are working as planned.

Determining what control measures are reasonably practicable includes consideration of the availability and suitability of control measures. Cost may also be relevant, but you must only consider this after you have assessed the extent of the risk and the available ways to eliminate or minimise the risk.

Managing the risks of tree work requires a high level of competency. You should seek the advice of a competent person, for example a qualified arborist, and refer to relevant industry guidance to ensure you have the most comprehensive information about hazards and risks and use the most effective control measures available for the particular workplace.

Identify the hazards

Identifying hazards associated with tree work involves finding what could potentially cause harm to people, damage to infrastructure or disruption to systems.

The following can help identify potential hazards:

- Observe the workplace to identify how work will be carried out. Consider the physical work environment; equipment; materials and substances used; work tasks and how they are performed; and work design and management.
- Ask workers about problems they have found at the workplace.
- Assess the workplace environment, including sunlight, wind, weather, and ground conditions.
- Consider the potential for falling objects like tools, debris, and equipment.
- Consider other work activities at the workplace, including those above, below, within or near a tree work area.
- Consider overhead and underground utility infrastructure which may be present at or near the site, such as powerlines, communications cabling, and gas pipelines
- Discuss the risks in carrying out tree work with the operators of cranes or other machinery in use at the site.
- Inspect plant and equipment before and after use to ensure they are not damaged or excessively worn.
- Talk to manufacturers, industry associations, suppliers and health and safety specialists
- Review your incident and injury records including near misses.

People who perform or work near tree work are most at risk. Hazards associated with tree work can include:

- tree hazards
- slips, trips and falls, including falls from height
- hazardous manual tasks, i.e. lifting, pushing, pulling, repetitive movements, holding machinery
- contact with energised overhead electric lines or underground services
- crush injuries, entanglement, cuts and abrasions from tree equipment and machinery, including. chainsaws, woodchippers and stump grinders
- collisions with people, plant or structures
- falling objects
- punctures and cuts from tree branches
- allergic reactions to trees and poisonous plants
- biting or stinging hazards including ants, bees, wasps and snakes, and
- environmental conditions, including solar ultraviolet (UV) radiation, rain, lightning, or wind.
- respiratory reactions associated with tree parts such as pollen or inhalation of fungal spores.

Assess the risks

In many cases the risks and related control measures will be well known. In other cases you may need to carry out a risk assessment to identify the likelihood of somebody being harmed by the hazard and how serious the harm could be.

A risk assessment can help you determine what action you should take to control the risk and how urgently the action needs to be taken.

Examples of risk factors to consider include:

- stability and integrity of the tree:
  - Is the tree decayed or dead and unsafe to climb or be attached to?
  - Is the species or the particular tree susceptible to branch failure when under load?
  - Is the tree stable in the ground?
  - Is the crown of the tree leaning heavily in one direction?
  - Is the tree suitable to be climbed?

- overhead electric lines
- ground surface condition including type of soil, underground services, underground tanks, leach drains and gradients of ground surfaces
- correct selection, use and maintenance of plant and equipment
- access by people and management of traffic
- animals and insects
- weather conditions including heat, humidity, and wind speed
- vines, creepers in crown, nails and wire, and
- competency and experience of the person conducting the task.

Take action to control the risks

As a PCBU, you must eliminate risks to health and safety so far as is reasonably practicable. If it is not reasonably practicable to eliminate the risks, you must minimise the risks so far as is reasonably practicable. You will most likely need to use a range of control measures to protect your workers from the risks associated with tree work.

Controlling risks should involve discussing site-specific requirements (for example, the type of plant used on the site or the presence of any known hazards). The ways of controlling risks are ranked from the highest level of protection and reliability to the lowest. This ranking is known as the hierarchy of control measures. You must work through this hierarchy to manage health and safety risks associated with tree work.

Elimination controls

The first thing you must consider is whether a risk can be completely removed from the workplace. When planting trees, select a species and a planting location that eliminates the need to later undertake tree work. For example, do not plant tall growing trees underneath overhead electric lines. To eliminate the risk of a fall, complete tasks on the ground.

If it is not reasonably practicable to completely eliminate the risk, then risks must be minimised, so far as is reasonably practicable, by implementing one or more of the following controls:

- substituting the hazard for something safer
- isolating the hazard from people
- implementing engineering controls.

Substitution controls

Substituting the hazard for something safer can be an effective control measure. For example, using a handsaw or electric saw instead of a chainsaw to eliminate a noise hazard. To minimise the risk of a fall, provide a fall prevention device, such as an elevating work platform, to gain access to a tree rather than climbing the tree.

Isolation controls

Isolation involves physically separating the source of harm from people. For example, using powered mobile plant to isolate the operator from falling objects and other hazards, or using a physical barrier to prevent people from entering an area.

Engineering controls

An engineering control is a control measure that is physical in nature, including a mechanical device or process. For example, using a telescopic stick to manually prune from the ground.

Administrative controls

If risks remain, they should be minimised by implementing administrative control measures, so far as is reasonably practicable. Administrative control measures include:

- rotating jobs and varying tasks to minimise the risks associated with repetitive manual handling

- work methods or procedures that are designed to minimise exposure to a hazard
- warning signs
- supervising access to an exclusion zone
- information, training and instruction needed to ensure workers can work safely, and
- supervising work to ensure safe work procedures are followed.

Administrative controls are less effective than other control measures because they do not control the hazard at the source and instead rely on human behaviour and supervision. Generally, administrative controls should only be used to supplement other higher level control measures, as a short-term measure or where there are no other practical control measures available.

Some administrative measures will be necessary to ensure substitution, isolation and engineering control measures are implemented effectively, for example, following safe work procedures when using equipment.

Personal protective equipment

Personal protective equipment (PPE) is the least effective method for controlling risk in isolation, however it can be effectively used in conjunction with higher level controls to minimise residual risk.

If workers are required to use PPE at the workplace, you must provide it unless it has been provided by another PCBU. You must ensure it is selected to minimise risk to health and safety. This includes ensuring the PPE is:

- suitable for the nature of the work and any hazard associated with the work
- of suitable size and fit, and
- reasonably comfortable for the worker who is to use or wear it.

PPE that may be appropriate includes:

- gloves to protect against cold weather or injury
- slip-resistant footwear with suitable toe protection
- face and eye protection
- hearing protection where noise levels could cause risk of hearing damage
- safety helmet
- cut-resistant leg protection
- reflective high visibility clothing
- arc flash protective clothing
- respiratory protective equipment where there is a risk of inhalation of harmful chemicals or dust, and
- sun protection.

You must also ensure PPE is maintained, stored, repaired and replaced so it continues to minimise risk to the worker who uses it. This includes ensuring the equipment is clean and hygienic, and in good working order.

If you direct the carrying out of work, you must train workers in how to properly use, wear, store, and maintain the PPE. A worker must, so far as reasonably able, use or wear the PPE as instructed and must not intentionally misuse or damage the equipment.

Maintain and review control measures

Check your control measures regularly to ensure they are working as planned. Control measures need to be regularly reviewed to make sure they remain effective, taking into consideration any changes that have affected your work activities, the nature and duration of the work and whether the system is working as planned.

If a Safe Work Method Statement (SWMS) has been prepared due to high risk construction work being done, the SWMS must also be reviewed and revised where necessary.

3.3 Training and supervision

As a PCBU, you must ensure workers are trained to perform their work safely. This includes providing information, training, instruction, and supervision as necessary to protect all persons from WHS risks arising from the business or undertaking. This must take into account the nature of the work, the associated risks and the control measures to be implemented. You must ensure this is provided in a way that is readily understandable by the worker, so far as is reasonably practicable. You must also ensure workers and supervisors are trained in emergency procedures, including aerial rescue techniques when working at height.

Workers, including supervisors, should complete relevant competency-based training before undertaking tree work. Most tasks carried out in tree work are covered by national qualifications developed by the arboriculture industry.

Practical tree work, including working at height in trees, is a dangerous process that should only be carried out by people assessed as competent against the relevant national qualification.

The level of supervision required will depend on the level of risk and the experience of the workers involved. High levels of supervision are necessary where workers are expected to follow new procedures or carry out difficult and critical tasks. You should ensure supervisors of tree work have the necessary knowledge, skills, and experience to competently supervise the work. This includes competency in preparing work plans, inspecting and maintaining equipment, and monitoring and reviewing the effectiveness of control measures.

As well as tree trimming and removal, arboriculture work can include tree care and maintenance, planting, site and hazard assessment, and tree and vegetation identification. There are a number of recognised qualifications available for anyone who wants to work in the arboriculture industry. These qualifications include a Certificate III in Arboriculture and a Diploma of Arboriculture.

For information about recognised qualifications for the arboriculture industry and registered training organisations that are approved to deliver the training throughout Australia, you can visit the Australian Government's training website.

4. Planning the work

Planning is the first step in ensuring tree work is undertaken safely. Planning includes:

- developing a scope of work
- selecting the appropriate staff and equipment to complete the work
- identifying hazards and assessing risks
- selection of appropriate control measures, and
- providing a safe system of work, including planning for emergencies.

Planning for tree work should start as early as possible, including during the vegetation planting, during routine vegetation maintenance, or the design of a plant or structure, and should involve consultation with all relevant persons. This may include the tree owner, a principal contractor, a building owner, equipment supplier, electricity supply authority, designer, project manager, arborists, and other workers. Effective planning will help identify ways to protect persons who are:

- directly involved in tree work, including people performing the work and those supporting them
- selecting, installing, commissioning, inspecting, and dismantling plant used in tree work
- performing other work activities at the workplace in an area adjacent to the tree work, including a public area or private property.

When developing safe systems of work for tree work, you should seek advice from a competent person, for example a qualified arborist, and refer to relevant industry guidance material and Australian standards.

4.1 Emergency procedures and first aid

As a PCBU, you must ensure an emergency plan is prepared for the workplace. This includes establishing and testing emergency procedures and providing relevant workers the information, training and instruction they need to implement these procedures.

This means ensuring help is provided promptly to any worker who needs it. You should ensure tree workers do not work alone. You must ensure relevant workers are trained in emergency procedures, including rescue techniques and the risks of suspension intolerance.

Where crew members are working at heights, for example conducting tree climbing or EWP work, you must have a rescue plan for the event of an accident or injury occurring. For climbing work, this includes a plan to access where the climber is working in the tree and rescue them to the ground. At least one other member of the crew on site should be trained and competent in the task being completed. and should hold the applicable national qualification in aerial rescue.

You must maintain the emergency plan so it remains effective. This includes ensuring rescue equipment is present and ready for immediate use. This equipment should be sufficient to carry out a rescue from any situation on the site, so far as is reasonably practicable. The rescue plan should also include contact details for local emergency services and, if electric lines are present at the site, the direct emergency contact number for the electricity business.

However, some rescues may be too complex or too hazardous for the rescuer to attempt, for example if suspended loads remain in the tree, or if there are electric lines involved in the incident. A rescuer must not attempt a rescue that is beyond their skill level and must take reasonable care for their own health and safety during the rescue.

You must ensure workers have access to first aid equipment and facilities for the administration of first aid. You must also ensure an adequate number of workers are trained to administer first aid or the workers have access to people trained in first aid.

Further information can be found in the:

- Model Code of Practice: *Managing the risk of falls at workplaces*

- Model Code of Practice: *First aid in the workplace*.

4.2 Remote or isolated work

Worksite communication methods should be agreed before workers start work. The way workers communicate will depend on the tasks being carried out, the equipment being used, noise implications and the location of workers at the worksite.

Workers accessing a tree are often isolated from assistance, including rescue, medical assistance, or attendance by emergency service officers. If you cannot eliminate the WHS risks associated with remote or isolated work, you must minimise these risks by providing a safe system of work. This includes providing effective communication with any isolated worker. You should ensure workers do not work alone and can effectively communicate with each other, and anyone else as necessary, at all times.

A safety spotter, or safety observer, is a person who works from the ground and communicates with a worker in a tree or elevating work platform (EWP) to inform them of their proximity with surrounding hazards such as electric lines as well as to ensure help is provided promptly when needed. A safety spotter/observer function should be a designated role. They should not be distracted from assisting the worker in the tree or EWP by carrying out other tasks or duties.

The type of communication system will depend on the site-specific conditions, such as the size of the workplace, noise, and weather conditions. Expert advice and local knowledge may be needed to assist with the selection of an effective communication system. You should consider if the workers—and anyone they may need to communicate with—have the right equipment to do so effectively.

Further information can be found in the model Code of Practice: *Managing the work environment and facilities*.

4.3 Visual inspection

The integrity of a tree is critical to the safety of those working in, under and around it.

Before accessing or working on a tree by any method, a visual tree assessment should be carried out by a competent person. The assessment should include the overall condition and structural integrity of the trees being accessed, with consideration given to structural faults like decay, hollows, growth habit, species of tree and root plate failure. The assessment should also consider wind loading, ground conditions, and tree location.

This information should inform whether the tree is safe to access, the method to access and attach to the tree, emergency rescue measures along with rigging and removal techniques.

4.4 Work environment hazards

Tree work is generally performed outdoors, often in remote or isolated conditions where workers are exposed to a range of environmental hazards.

Common hazards that should be considered before undertaking tree work include:

- Wind – Strong winds can damage or weaken trees, impact communications, affect the stability of plant or workers in or near a tree, cause conductors to sway unexpectedly and dislodge hanging branches.
- Wet – Some plant and equipment may perform differently when wet or may be more easily damaged. Water can an also increase electrical risks.
- Cold – Hypothermia and frostbite can occur when working in cold conditions.
- Heat – Working in the heat can result in a range of health issues including heat rash, fainting, heat exhaustion, burns and heat stroke.
- Solar UV radiation – risk of skin cancer, sunburn and adverse health effects to the eyes. Solar UV radiation can also damage equipment if exposed for long periods.

- Lightning.
- Non-environmental hazards – for example infrared radiation from rooftop transmitters. Proximity to high and low voltage power lines is addressed below at 4.6 – Overhead electric lines.

It is important to access a local weather forecast and site information prior to accessing a tree and to get regular updates to ensure conditions remain safe. Where working in potentially hazardous conditions, appropriate equipment, clothing, PPE and facilities must be provided to manage the risks.

Further information on managing the risks associated with the work environment and facilities can be found in the model Code of Practice: *Managing the work environment and facilities*.

4.5 Hazardous manual tasks

Work around trees involves manual tasks, whether working on the ground or in a tree or EWP.

As a PCBU, you must eliminate hazardous manual tasks, for example by designing the work so hazardous manual tasks are not required. If this is not reasonably practicable, you must minimise the risks of hazardous manual tasks so far as is reasonably practicable in accordance with the hierarchy of control measures.

A hazardous manual task is one requiring a person to lift, lower, push, pull, carry or otherwise move, hold or restrain any person, animal or thing, that also involves repetitive or sustained force, high or sudden force, repetitive movement, sustained or awkward posture, or exposure to vibration. For example, climbing a tree, using a chainsaw, or carrying a branch.

Control measures may include:

- planning work to make the task less hazardous. For example, working from the ground or using an EWP to access a tree.
- providing and ensuring mechanical aids are used where possible.
- ensuring the design of tools, equipment and PPE minimise the risks of manual handling.

When deciding what control measures to implement, you must consider all relevant matters that may contribute to a musculoskeletal injury, including:

- postures, movement, forces and vibration
- duration and frequency of the task
- the nature, size and weight or number of things involved in carrying out the hazardous manual task.

Further information can be found in the model Code of Practice: *Hazardous manual tasks*.

4.6 Overhead electric lines

Electric lines pose significant risks, including electrocution, arcing, explosion, fire causing burns, unpredictable cable whiplash and electrifying other objects including signs, poles, trees or branches. Whether carrying voltage of 400,000V or 230V, contact with electric lines can be fatal. It is not necessary to touch an electric line to be electrocuted. A ‘flashover’ or ‘arc’ can electrocute a person close to a line conductor.

As a PCBU, you must ensure, so far as is reasonably practicable, that no person, plant or thing at the workplace comes within an unsafe distance of an overhead electrical line. No Go Zones are designed to ensure distance between persons and plant and electric lines.

If it is not reasonably practicable to ensure a safe distance, you must ensure that a risk assessment is conducted for the proposed work and control measures implemented are consistent with the risk assessment and any requirements of an electricity supply authority where it is responsible for the electric line.

Further information can be found in the model Code of Practice: *Managing electrical risks in the workplace*.

Table 2: Examples of control measures when operating in the vicinity of overhead electric lines
• contacting the state or territory Electricity Supply Authority or Electricity Regulator to find out the extent of work zones, approach distances and specific work requirements that apply to working in the vicinity of overhead electric lines such as, getting a permit to work when likely to come within approach distances • ensuring no person, plant or equipment goes too close to overhead electric lines by using a safety observer (spotter) on the ground who has received training on working in the vicinity of overhead electric lines • providing and maintaining insulated tools and equipment for example, an EWP which is tested regularly for electrical insulation, • connecting the chassis of an EWP or other plant to the ground by braided copper cabling or metal earthing spikes when working near high voltage electric lines • using PPE such as cotton or fire retardant long sleeve clothing, insulating gloves, protective non-slip safety boots and a safety helmet

4.7 Exclusion zones

An exclusion zone is used to prevent people from entering an area. Generally, this includes measures such as signs, physical barriers, and supervising access to the exclusion zone.

As a PCBU, you should ensure an exclusion zone is established below or near a tree being accessed to help minimise the risk of objects falling on people.

Sometimes exclusion zones are useful at other locations, such as balconies, that are within or near an area that a tree is being accessed.

5. Accessing trees

As a PCBU, you must eliminate the risk of a fall from one level to another if the fall is likely to injure a worker or any other person, such as by working on the ground or on a solid construction.

If it is not reasonably practicable to eliminate the risk of a fall, you must provide and maintain a safe system of work to minimise this risk. This safe system of work must provide adequate protection against the risk of a fall.

A safe system of work for accessing trees at height includes:

- providing a fall prevention device (such as an elevated work platform),
- if a fall prevention device is not reasonably practicable, providing a work positioning system, or
- if neither of these are reasonably practicable, providing a fall arrest system.

The model WHS Regulations notes that a combination of these controls may be used to minimise risks, so far as is practicable, if a single control is not sufficient.

Providing a fall prevention device or work positioning system may not be enough to minimise the risk of a fall. In most circumstances it is reasonably practicable to provide further protections. For example, providing a backup system to arrest a fall should other controls fail to safely support a worker. This is standard practice when using an EWP but must be considered when using any fall prevention device or work positioning system.

For more information on managing the risk of a fall at your workplace, see the model Code of Practice: *Managing the risk of falls at workplaces*.

Table 3: Common risks and hazards of accessing trees

- falls from height
- being struck by falling objects
- coming within an unsafe distance of overhead electric lines
- musculoskeletal disorders from awkward positions
- wildlife related injuries such as from wasps, bees, birds, possums
- environmental conditions like heat, cold, rain, and wind
- dehydration and fatigue

Table 4: Examples of control measures for accessing trees

- conducting a site-specific hazard and risk assessment
- ensuring that all workers are sufficiently competent for the task(s) they are conducting
- checking the location of overhead electric lines before starting work
- providing an EWP
- providing a rope access system
- providing a fall arrest system
- establishing and maintaining an exclusion zone
- having a spotter to ensure that no-go zones around electric lines are not entered while work is being done in the tree
- planning a clear access route
- checking the tree for bees, wasps or other animals before accessing
- having an emergency plan including an aerial rescue procedure

5.1 Working on trees from the ground

The risk of a fall can be eliminated by performing tree work from the ground. This can include using:

- powered mobile plant, such as a telehandler with tree cutting attachment, a feller buncher, or a boom mounted pruner
- a manual tool, such as a pole saw or a pruner on a telescopic stick, or
- felling a tree from the ground.

Using powered mobile plant can help isolate the operator from falling objects and some other hazards related to tree work. Such plant must be fitted with operator protective devices, for example seat belts, roll over protective structures (ROPS), and falling object protective structures (FOPS).

Using powered mobile plant can introduce additional significant health and safety risks. Further information can be found in the model Code of Practice: *Managing risks of plant in the workplace*.

Using manual tools from the ground can include tools that are petrol, electric, hydraulic or manually powered. This can expose workers to the risks of falling objects, musculoskeletal disorders, electric shock and tripping hazards. Managing these risks are discussed further at 6.4 Pole saws.

Felling a tree from the ground is not always possible and often takes significant preparation to perform safely. Further information is provided at 7 Tree Felling.

5.2 Elevating work platforms

An EWP should only be provided if it is not reasonably practicable to work from the ground or a solid construction. When using an EWP, the following should be considered:

- Is it safer to trim or remove the tree from the ground?
- Are there obstacles, structures like buildings and other trees present at the site posing a risk to health and safety or make access impossible using an EWP?
- Are there underground services present, for example water, gas, telephone, electricity that may restrict access or locations to set up temporary platforms?
- Do overhead electric lines create a risk for a worker because of the EWP's position?
- Is the ground level, uneven, sloping, firm or loose and could this lead to the EWP overturning?
- Is the EWP stable with adequate control, stabilisers or dunnage to maintain stability in operation?
- Can the EWP safely reach the height necessary to trim or remove the tree?
- Does the worker need to lean outside the structure of the EWP?
- Will the cutting or lowering of the limb, branch or section of the tree be impeded by the use of the EWP?

Types of EWPs commonly used to access trees for work include:

- trailer mounted EWPs (see Figure 2)
- self-propelled EWPs with telescoping boom including knuckle boom (see Figure 3), and
- vehicle mounted EWPs (see Figure 4).

Figure 1 Trailer mounted EWP

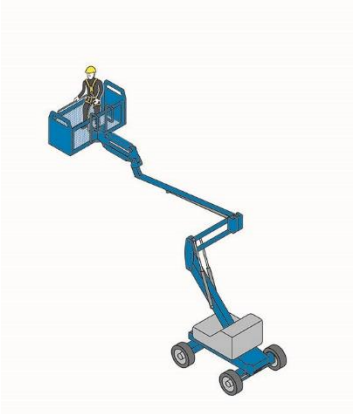

Figure 2 Self-propelled EWP

Figure 3 Vehicle mounted EWP

Scissor lifts are another common type of EWP but their use in tree work is limited because they have a greater risk than a boom-type EWP of being struck or knocked over by falling branches or trunks. This is because their supporting structure is directly underneath the working platform. Their use is also generally restricted to flat and firm unsealed surfaces. Scissor lift-type EWPs should not be used unless the risk of falling branches or trunks striking the unit can be eliminated.

Other plant with lifting mechanisms, such as a telehandler or Integrated Tool Carrier, are considered EWPs when a work platform is attached.

Selecting the right EWP

The correct type of EWP must be selected for the type of work being carried out. When selecting the type of EWP to be used the following things should be considered:

- the ground bearing capacity
- weather conditions
- access limitations
- the type of tree work to be done
- the height and reach required
- the number of workers required on the EWP, and
- the lifting capacity required.

You should also consider the needs of the workers. Where possible, select machines that have the same controls. Ensure workers are trained or appropriately licensed where required for the EWP they are using. This is particularly important in workplaces where multiple EWPs are used as there may be differences in the controls on the EWPs.

EWPs may not be reasonably practicable to use where:

- a worker cannot get close enough to the tree to trim the tree safely
- the tree's structure or the drop zone prohibits the safe use of an EWP
- the EWP may impede the cutting or lowering of the limb, branch or section of tree
- the ground is sloping or unstable, or
- there are buildings or other infrastructure in the way, for example overhead electric lines.

Common risks and hazards of using an EWP are outlined in Table 5.

Table 5: Common risks and hazards of using an EWP for tree work
• coming within an unsafe distance of overhead electric lines • windy conditions

Table 5: Common risks and hazards of using an EWP for tree work
• falls from height • unstable, sloping, uneven or soft ground such as recently filled excavations that could lead the EWP to overturn • being struck by falling objects • wildlife related injuries, for example from wasps, bees, birds, possums • mechanical failure of the EWP

Registering an EWP

Boom-type EWPs must be registered before they can be used in the workplace. Registrable EWP designs must be design registered before being supplied and before being commissioned for use. The EWP manufacturer or supplier must provide the design registration number with the EWP.

The EWP design registration certificate number must be readily accessible in the vicinity of the EWP at all times. If a person modifies an EWP, they then have the responsibilities of a manufacturer and are to ensure the modified EWP is safe and the new design is design registered.

Operator training and licensing

You must ensure a worker using an EWP can do so safely. Operators of EWPs should be assessed as competent against the relevant national qualification. As different types of EWP require different competencies to operate, training in the specific type of EWP being used for the work should be provided.

A worker using a boom-type EWP with a boom length of 11 metres or more must hold an EWP high risk work licence.

A copy of the operator's manual should be kept with every EWP. Operators should read the manual and be familiar with it before operating the machine. EWPs should be operated according to the manufacturer's instructions.

Pre-use safety checks

A pre-start safety check should be carried out on the EWP in accordance with the manufacturer's instructions to identify damaged or faulty equipment and to ensure the EWP is safe to operate. The safety check should also ensure the emergency descent is functioning correctly.

In addition to the above, Table 6 outlines control measures that should be considered when using EWPs for tree work.

Table 6: Examples of control measures for using an EWP for tree trimming
Control measures for EWP use include: • Ensuring every person in the EWP wears a suitable harness attached to the purpose-built anchor points provided on the EWP with a suitable lanyard. • Checking the location of overhead electric lines before starting work. If overhead electric lines are present the state or territory Electricity Supply Authority or Electricity Regulator should be contacted to find out the extent of the work zones, approach distances and any specific work requirements that apply to working in the vicinity of the overhead electric lines. • Ensuring the rated weight capacity, or the safe working limit, of the EWP is not exceeded. The rated capacity includes the weight of the operator, any other person on the platform, tools and branches or other debris. • Not operating the EWP on gradients that exceed the manufacturer's instructions and where possible keeping the EWP's boom on the uphill side of the EWP's base.

Table 6: Examples of control measures for using an EWP for tree trimming

- Ensuring traffic control measures are in place within the established exclusion zone when working on or above roads. All parts of the EWP should remain clear of traffic hazards. Operators should be aware of potential tail or knuckle swing into traffic areas.
- Not using the EWP when wind speeds exceed the manufacturer's recommendations.
- Ensuring tyres are inflated to the correct pressure in accordance with the manufacturer's recommendations. This is critical for the stability of EWPs when outriggers are not being used. If outriggers are required for stability they should be engaged before the platform is raised.
- Ensuring ground surface conditions are checked. Soft soil, underground services, tanks, drains and pipes can collapse under the weight of the EWP or outriggers and cause the EWP to tip over.

Suggested controls for working from the EWP include:

- Not positioning the EWP under the branch to be trimmed or removed. The EWP should be located at or above the level of the cut.
- Keeping the platform free of debris and tree off cuts. Hand tools carried within the platform should be secured.
- Ensuring no fuel is carried in the EWP and refuelling is done on the ground outside the EWP cage or bucket.
- Not attaching ropes between the EWP and any part of the tree. An EWP is not to be used as a crane. An independent rope should be used to lower offcuts.
- Wearing PPE, such as a safety helmet, gloves, eye protection and safety footwear. Chainsaw operators should also wear cut-resistant leg protection and hearing protection.
- Always keeping harnesses attached to the anchor points within the EWP using a suitable lanyard.
- If climbing from the EWP into a tree, the climber should be attached to the tree—having loaded the anchor point and tested their climbing system —before releasing the anchorage on the EWP. Please refer to the next section on *Climbing a tree* for more information.

Further information on the safe use of EWPs is in Safe Work Australia's *Guide to managing the risks of elevating work platforms*.

5.3 Climbing a tree

Tree climbing is a hazardous and complex activity. Tree climbing should only be undertaken if it is not reasonably practicable to work from the ground or a solid construction, or to provide an EWP or other fall prevention device.

Tree climbing is a dangerous process that should only be carried out by people assessed as competent against the relevant national qualification or when adequately supervised by a competent person.

If tree climbing is undertaken, you must minimise the risk of a fall by providing and maintaining a work positioning system, so far as is reasonably practicable. For example, providing a rope access system.

Providing a single work positioning system may not be enough to minimise the risk of a fall. You must consider if it is reasonably practicable to use a second attachment point (for example the use of a climbing lanyard or a second rope system), particularly when:

- undertaking cutting work in a tree
- there is a risk of an uncontrolled swing, or

- there is a risk of failure of the main climbing line or primary anchor point.

Determining what is reasonably practicable will depend, in part, on determining the suitability of ways to eliminate or minimise a risk. A risk control may be effective in some circumstances or environments and not effective or suitable in others, because of things such as the workplace layout, skills of relevant workers, or the particular way in which the work is done. A risk control is *suitable* if it:

- is effective in eliminating or minimising the likelihood or degree of harm from a hazard
- does not introduce new and higher risks in the circumstances, and
- is practical to implement in the circumstances in which the hazard or risk exists.

Table 7: Common risks and hazards when climbing trees

- falling from branches due to failure of anchor points
- falling from height due to incorrect use of ropes, harness and devices like descenders
- laceration or cut by sharp objects such as chainsaws, hand pruning tools, sharp edges.
- being struck by falling objects
- coming within an unsafe distance of overhead electric lines
- musculoskeletal disorders from awkward positions
- wildlife related injuries such as from wasps, bees, birds, ants or snakes
- dehydration and fatigue
- toxic or dangerous plant parts

Table 8: Examples of control measures for climbing trees

- conducting a site-specific hazard and risk assessment
- ensuring that all workers are sufficiently competent for the task(s) they are conducting, and that both the climber and rescue climber hold the applicable Units of Competency
- ensuring correct use of PPE as per the manufacture's specifications and task requirements.
- not positioning cutting tools in a way where contact with the body can be made.
- ensuring climbers are trained and qualified in aerial rescue techniques.
- checking the location of overhead electric lines before starting work
- discussing and determining a suitable rope access system
- ensuring that all equipment is suitable for the intended use, configured correctly and has been inspected prior to use
- ensuring that a second point of attachment (for example the use of a climbing lanyard or a second rope system) is used whenever cutting work is undertaken, or there is a risk of an uncontrolled swing or failure of the main climbing line or primary anchor point
- ensuring a climber wears a suitable climbing harness
- ensuring the harness and climbing spikes fit correctly and are comfortable
- planning a clear access route and emergency procedure, including an aerial rescue
- checking anchor points thoroughly before use
- establishing and maintaining an exclusion zone
- having a rescue climber while work is being done in the tree
- having a spotter while work is being done in the tree in the vicinity of electric lines
- checking the tree for bees, wasps or other animals before accessing

Training and supervision

Rope access systems require a high level of competency on the part of the workers and supervisors to ensure safe use. You must ensure a worker climbing a tree can do so safely. Tree climbers and rescuers should be assessed as competent against the relevant national qualification and undergo refresher training where necessary.

The level of supervision required will depend on the level of risk and the experience of the workers involved. High levels of supervision are necessary where inexperienced workers are expected to follow new procedures or carry out difficult and critical tasks. You should ensure supervisors of rope access work have the necessary knowledge, skills, and experience to supervise the rope access work. This includes competency in preparing work plans, inspecting and maintaining equipment, and monitoring and reviewing the effectiveness of rope access systems.

Equipment selection, care and maintenance

A rope access system includes all the components that connect a rope access worker to an anchorage or anchorages, including the main and backup systems, safety lines, harness, and other devices.

Equipment used for tree climbing should be designed, manufactured, selected, used and maintained in compliance with relevant standards.

You should ensure that a competent person inspects equipment before and after each use. This includes personal equipment such as harnesses, lanyards and fall arrest devices and common use equipment such as hardhats, ropes, slings, and mobile attachment devices. A ***competent person*** means a person who has acquired through training, qualification or experience the knowledge and skills to carry out the task.

Ropes and other equipment should be packed away after use, for example when work finishes for the day, and not left set up. This helps ensure it is inspected again before use.

Equipment should be subject to periodic inspection, even if not used regularly, in line with the manufacturer's recommendations and relevant standards.

Any equipment that has arrested a fall or shows a defect should immediately be withdrawn from service and tagged, not be used until a competent person can decide whether the equipment should be destroyed, repaired, or returned to service. If repaired or returned to service, the equipment should be inspected by a competent person.

All equipment should be maintained in accordance with manufacturer instructions and be stored to ensure it is not exposed to unnecessary strain, pressure, heat, humidity, moisture, solar UV radiation, or chemicals.

Further information on using rope access systems can be found in the:

- Model Code of Practice: *Managing the risk of falls at workplaces*
- *Guide to managing the risks of industrial rope access systems*.

5.4 Other methods

Crane access method

Another method of accessing trees for tree work is by lifting or suspending a person in a harness with a crane—Regulation 221 of the model WHS Regulations. You should contact your regulator to determine if this is an acceptable practice in your state or territory.

Ladders

There are significant risks accessing trees using ladders. Tree trimming or removal work should not be done from ladders.

5.5 Use of tools and other work equipment

You must minimise the risk of an object falling on a person by providing and maintaining a safe system of work. This safe system must provide adequate protection, including by:

- preventing an object from falling freely, e.g. attached to worker's harness, or
- if this is not reasonably practicable, providing a system to arrest an object's fall, so far as is reasonably practicable, e.g. safety net or catch platform.

You may need a combination of controls to sufficiently minimise the risk of falling objects. This may include establishing an exclusion zone below the work area.

Tools and work equipment should:

- be suitable for the intended work, and
- not impair the function of the systems protecting a worker from a fall.

Some tools are capable of cutting through working lines and safety lines. This includes power tools, like chain saws and hand saws. You must eliminate this risk, so far as is reasonably practicable, by ensuring the work is performed on the ground or a solid structure. If this not possible, you must minimise the risk, so far as is reasonably practicable. This could include substituting the tool for something safer or using engineering controls to protect the rope.

Tools such as chainsaws should be securely attached to the worker's harness using cords or lanyards. Small items may also be secured in buckets or bags.

Bulky, awkward or heavy tools and equipment that have the potential to interfere with the worker's ability to work or the systems protecting a worker from a fall, should be suspended with a separate rope system secured to an independent anchor point.

6. Machinery and equipment

As a PCBU, you must ensure operators of machinery and equipment have the relevant skills, knowledge, and experience to use the plant safely. This generally requires being trained and supervised in the operation of the specific machinery and equipment the worker will use, including any safety features and manufacturer instructions.

Tree workers, including supervisors, should complete relevant competency-based training before performing tree work. See Training and Supervision for more information.

6.1 Woodchippers

Woodchippers are used in tree work to reduce tree waste—generally tree limbs and branches—into wood chip or mulch. Although the design of individual woodchippers may vary they all use the same principle—a rotating disc or drum fitted with hardened steel blades to chip the wood.

Table 9: Common risks and hazards of woodchipper operation

- being drawn into the machine from in-feed rollers
- coming into contact with the blades
- becoming entangled in the branches or attached ropes and drawn into the woodchipper
- being struck by ejected material
- being struck by in-feeding branches, limbs or logs
- crush injuries
- exposure to noise from the woodchipper
- being struck by a passing vehicle when the woodchipper is parked on the road
- manual handling injuries

The woodchipper operator should stand to the side of the infeed chute and feed tree waste into the woodchipper butt end first. Once the vegetation is caught by the in-feed rollers the worker must stand clear to avoid contact with the branches or log. A push-stick or another branch should be used for shorter branches to avoid reaching into the infeed chute (see Figure 4). This activity creates a hazard for workers with the potential for serious injury or death if the woodchipper operator becomes entangled or material is ejected from the woodchipper during the feeding process.

Figure 4 Using a push-stick to feed shorter branches into a woodchipper

Table 10: Examples of control measures for woodchipper operation

- Parking the machine off the road wherever possible. If this cannot be achieved ensure adequate traffic management is in place. Consider using another vehicle (shadow vehicle) to serve as a barrier to the workers at the infeed chute. Feed from the verge side of the chipper and not the road side.
- Ensuring guards for all dangerous parts such as cutting discs, drive shafts, belts and pulleys are in place, secure and undamaged.
- Stopping the machine, isolating the power and waiting for moving parts to stop spinning before attempting to remove blockages.
- Ensuring a plant isolation process is carried out as per manufacturer's instructions.
- Ensuring the woodchipper is set up with sufficient clearance from the immediate working area or drop zone to remove the risk of entanglement from climbing or lowering ropes.
- Conducting pre-start checks to ensure equipment has been set up correctly and systems are performing adequately.
- Ensuring emergency stops and control bar are functioning properly.
- Operating the machine in accordance with the manufacturer's instructions.
- Ensuring operator controls on the machine are clearly labelled to indicate their nature and function.
- Ensuring operating teams consist of at least two people competent in the use of wood chipping machines who have received specific training on the individual machine being used.
- Ensuring the material to be chipped is free from metal, stones, plastic, rope and other forms of contamination that could damage and effect the safe operation of the machine.
- Feeding branches into the machine (usually) butt first and releasing the material when it is gripped by the in-feed rollers.
- Feeding branches off the centre line. Where reasonably practicable, the operator feeding the branches into the woodchipper should do so from the kerb side.
- Using a 'push-stick' at least 1.5 m long or another branch to feed shorter material into the machine (see Figure 5).
- Never reaching into the in-feed chute without stopping the in-feed rollers.
- Fitting the drop down table at the rear with a stop bar.
- Ensuring no rings, watches, necklaces or other jewellery are worn by operators.
- Ensuring the woodchipper is not left unattended while in full operation.
- Ensuring operators wear PPE. This should include appropriate head and face protection, hearing protection, close-fitting clothing without loose cuffs, straps or strings. Gloves should have long close-fitting cuffs that can be tucked into the sleeves.

Rotating in-feed rollers and the cutting disc or drum

Rotating in-feed rollers and the cutting disc or drum are the most hazardous components of wood chipping machines.

The in-feed rollers and cutting disc are shown in Figure 6. It is these rollers and cutting disc that can cause serious injury to the woodchipper operator if they reach into the machine past the safety curtain or control bar.

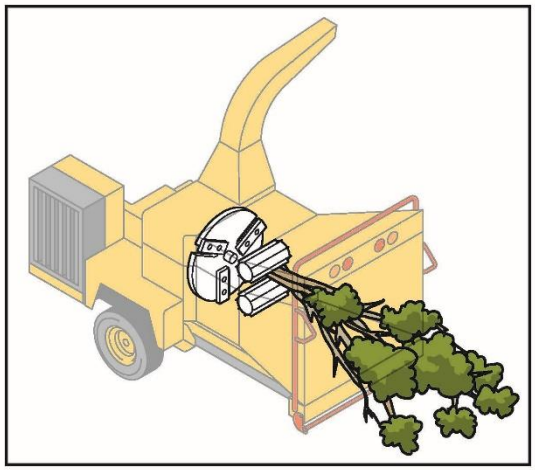

Figure 5 Disc-type woodchipper showing in-feed rollers and cutting disc

Workers operating woodchippers can also become entangled while standing beside or in front of the in-feed chute or while they are feeding material into the woodchipper. If ropes, clothing or gloves are caught on a branch being fed into the woodchipper, the worker can be dragged past the safety curtain and the in-feed rollers onto the cutting blades.

Woodchippers require access to the cutting disc or drum for maintenance, operation and cleaning purposes. The hatch should not be opened until the chipper has come to a complete stop and the keys have been removed to avoid the risk of entanglement, cutting and being hit by ejected fragments of vegetation or cutting blades.

You can prevent access to the in-feed rollers by:

- ensuring the design of the in-feed hopper or chute includes a suitable minimum-reach distance guarding (1500 mm is recommended) from the leading edge of the feed hopper to the in-feed rollers, and
- ensuring the side panels of the in-feed chute are also of a sufficient height to prevent a person reaching the in-feed rollers or prevent access from the side or top of the unit by a fixed or interlocked guard.

Before accessing the inside of a woodchipper, the controls for the chipper should be isolated to prevent inadvertent operation of the unit. One method is to have the starter key in the possession of the worker inside the woodchipper. This will minimise another worker being able to turn on the machine with someone inside.

An emergency stop or emergency shut-off device that shuts down power to the machine should also be provided. This device should immediately stop the in-feed rollers and cut the power to the cutting disc or drum which will typically have a run down time. These devices should be immediately accessible to the operators in an emergency and tested and verified to be functioning properly during the pre-start check each time the woodchipper is to be used.

The operator control device used to set the rotation of the in-feed rollers from feed to reverse should be clearly identified showing the four stages of operation – reverse, neutral/stop, feed and reverse (see Figure 7).

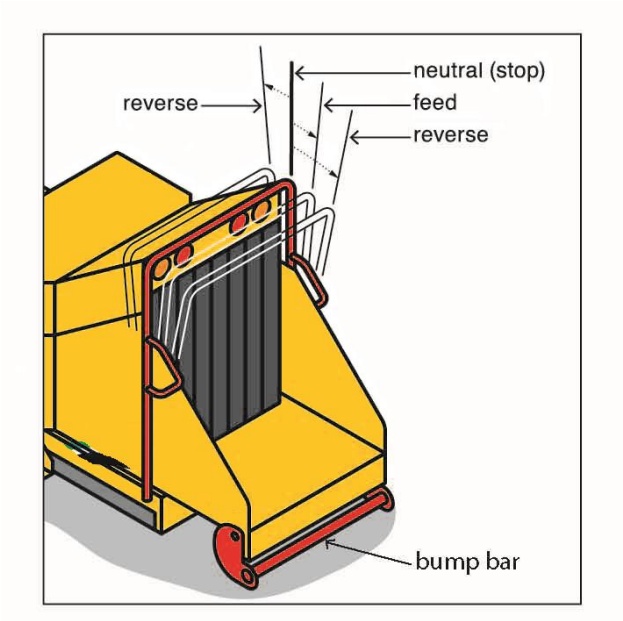

Figure 6 Four stages of woodchipper operation

For extra protection, consideration should be given to retro-fitting existing woodchippers with an in-feed stop control device also known as a push bar or bump bar, along the bottom leading edge of the in-feed chute. This device should stop the in-feed rollers when a person uses body pressure to push against the bar.

On woodchippers where the tray of the in-feed chute is less than 600 mm high, consideration should also be given to fitting side in-feed stop control bars that have the same function as the push bar devices and are also activated by limb or body pressure.

Woodchippers not fitted with an in-feed stop control device or where the tray of the in-feed chute is less than 600 mm high should be operated by two operators to ensure unhindered access to the emergency stop button.

Access to the cutting disc or drum can be prevented by providing interlocked physical barriers. These may include:

- electronic interlocked systems such as. motion control sensors or timed solenoids, or
- mechanical interlocking systems for example. the method of attachment (bolts, screws) of any access hatch or cover over the cutting disc or drum requires the time taken to remove the bolts or screws is longer than the time taken for the disc or drum to come to a complete stop after the power has been isolated (run down time)—a disc or drum chipper can have a run down time of up to five minutes if it is an un-clutched system.

The cutting disc or drum should be maintained to the manufacturer's specifications. A mechanical means of preventing the disc or drum from rotating should be used while performing maintenance operations.

Winches

Woodchippers can be fitted with a winch to assist in pulling branches or trunks toward the chipper.

Anyone operating a woodchipper with a winch attached should maintain any ropes that form part of the winch and ensure the ropes are inspected on a regular basis.

All workers should ensure they stand well clear of the winch and load once it is connected. When the load is drawn in the worker should stop the winch operation to allow final engagement and disconnection of the winch rope from the load.

Great care should be taken to avoid the winch cable from being drawn into the chipper or entangling workers as the forces created can cause serious injury or death.

The operator should have line of sight when winching loads and a spotter should be used if this cannot be maintained.

Great care should also be taken when using redirects for winching. Rigging components must be suitable for the loads applied.

6.2 Stump grinders

Stump grinders use a rotating cutting disc or wheel to grind away stump wood and surface roots to below ground level. Figure 8 shows an example of a stump grinder.

Figure 7 Example of a stump grinder

Stump grinders can create hazards for workers and other people who may be near the stump grinding operation.

Table 11: Common risks and hazards of stump grinder operation

- roll-over of plant
- coming into contact with grinding disc or wheel
- being struck by ejected material
- exposure to noise from the stump grinder
- arm or hand vibration
- manual handling injuries
- dust inhalation
- contact with live underground services

Before stump grinding is carried out a number of precautions should be considered including:

- Checking for underground services around the stump (contact Before You Dig Australia) if the penetration exceeds 200mm below surface or where there are concerns regarding underground services.
- Establishing an exclusion zone.
- Looking for loose stones, pipes, metal, concrete or other debris that could affect the safe operation of the machine or become dangerous projectiles.
- Manually excavating and exposing buttress roots.
- Ensuring machine guards and debris curtains are suitable to the task and securely in place.

- Making sure teeth and teeth mounting pockets on the cutting wheel are sharp and secure.
- Checking the safety cut-off or emergency stop is in working order during the pre-start check each time the grinder is used.

Contact with the stump should be with the lower-outer quadrant of the grinding wheel to prevent a kickback reaction.

Stump grinders should be used in accordance with the manufacturer's instructions.

Respiratory protection should be used for dust and when chemicals have been used to poison stumps.

A protective screen or barrier (see Figure 9) should be set up to separate people from the stump grinding operation if there is public access to the site. The barriers should also stop flying debris and warn people stump grinding is in progress.

When stump grinding operations are carried out close to road verges or footpaths the cutting head should be positioned to direct wood chips away from passing traffic and pedestrians.

Figure 8 Protective barriers separating people from stump grinding operations.

Table 12: Examples of control measures for stump grinder operation
• Setting up an exclusion zone to ensure pedestrians are kept a safe distance from stump grinder operations. • Not leaving the controls while the cutting wheel is moving. • Avoiding working downhill from the machine wherever possible. • Ensuring the cutting wheel is not moving before cleaning excess grindings away from the grinding area. • Stopping the machine, isolating the power and waiting for moving parts to stop spinning before attempting to clear blockages. • Wearing PPE including respiratory, eye, head, hearing and foot protection.

Control measures may be needed to ensure excavations do not create a trip hazard for pedestrians or other workers once the stump grinding operations are completed.

6.3 Chainsaws

Chainsaws are potentially dangerous types of plant that can cause fatal or major injuries especially if used by untrained workers.

Chainsaws should not be operated above shoulder height due to the risk of musculoskeletal disorders, vibration and reaction forces from the chainsaw. Chainsaws (including top-handled

chainsaws) should not be operated one handed. A pole saw may be used for small branches above shoulder height. For larger branches an EWP or other alternatives should be considered.

Table 13: Common risks and hazards of chainsaw use in tree trimming
• chainsaw kickback, push-back and pull-in reactions • severe lacerations • eye injuries from wood fragments • being struck by falling trunks, branches and other objects • exposure to high levels of noise and hand/arm vibration • musculoskeletal disorders • fire from fuel source of chainsaw • cutting life support systems whilst working aloft and falling • burns from hot exhausts • fumes when working in confined spaces

Chainsaw selection

Chainsaws should be selected for their suitability for the intended work. In general, a chainsaw with the shortest practicable guide bar length for the work to be done should be selected. For tree work, this may mean a range of chainsaws with different guide bar lengths will be required.

You should ensure the saw chain is tensioned correctly and sharpened to the manufacturer's specifications paying particular attention to the depth gauges.

Working with chainsaws

When starting a chainsaw, operators should maintain a safe working distance from other people and ensure the saw chain is clear of obstructions. After refuelling the chainsaw, move away from the fuel source before starting the engine.

When starting a chainsaw with a cold engine, operators should:

- place the saw on level ground and apply the chain brake
- set the controls as stated in the manufacturer's instructions
- secure the saw by placing a foot on the rear handle base plate and a hand on the front handle (see Figure 10), and
- pull the starter cord firmly.

Figure 9 Position to start a cold chainsaw

When starting a chainsaw with a hot engine, operators may choose the alternative method of:

- gripping the rear handle firmly between the knees and applying the chain brake
- holding the front handle with their left hand, and
- pulling the starter cord with their right hand.

When preparing to use a chainsaw in a tree the chainsaw should be checked, fuelled, started and warmed up on the ground before it is sent up to the operator in the tree.

Before restarting the saw in the tree, operators should ensure the chain brake is applied and the chain tension is adjusted correctly. The saw chain is to be clear of tree climbing equipment, protective clothing and parts of the tree.

Chainsaws should not be drop-started, that is, holding the front handle with one hand and moving the saw in a downward motion while pulling the starter cord up with the other hand.

Chainsaw reaction forces

Kickback

The reaction known as kickback may occur when the saw chain on the upper quadrant of the guide bar tip (see Figure 11) touches an object. In most cases, tip contact may cause a rapid reverse reaction, kicking the guide bar up and back towards the operator.

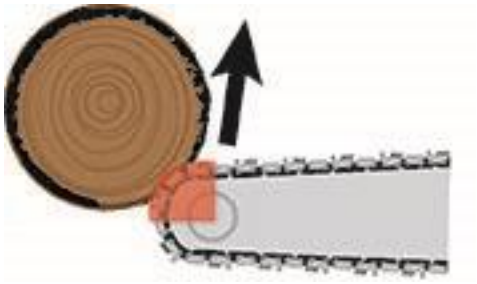

Figure 10 Kickback zone of a chainsaw guide bar

Pushback

The direction of movement of the chain causes Pushback when the top of the bar is used for cutting. Using the top of the bar is advantageous in some instances however the operator should brace for the saw response.

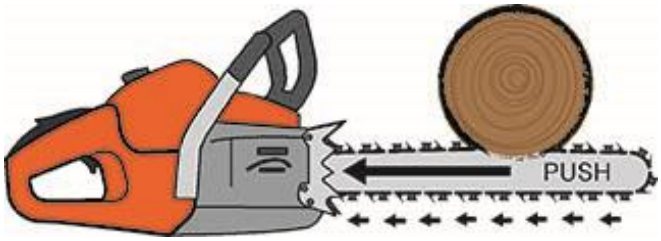

Figure 11 Chainsaw pushback

Pull-in

The direction of the chain movement causes either the saw to be pulled towards the tree part being cut, or the tree part towards the saw depending on the mass of the tree part. Light branches may be pulled towards the operator or the saw may pull towards heavier tree parts.

The operator should place the bumper spike of the saw against the wood to negate this reactive force.

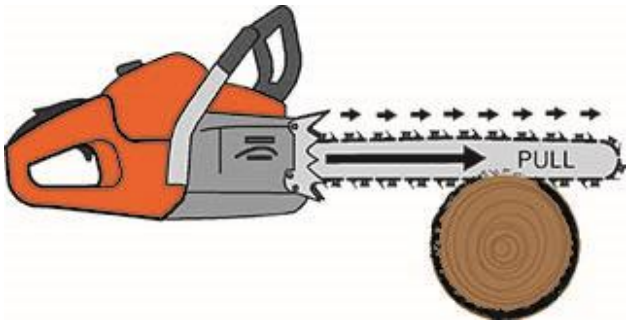

Figure 12 Chainsaw pull-in

Where the saw contacts an unexpected obstacle, for example a nail in the wood, the severity of these sudden reactions may cause the operator to lose control of the chainsaw which could result in serious injury.

Chainsaw operators should consider the measures outlined in Table 14 to help prevent injuries from the reaction forces that may occur during chainsaw operation.

Table 14: Examples of control measures for chainsaw reaction forces

- The operator is trained and competent to use a chainsaw. Understanding potential reaction forces and when they could occur—an understanding and awareness of kickback, push-back and pull-in can eliminate or reduce the element of surprise.
- Establishing secure footing and maintaining correct balance throughout the cutting operation—operator to stand with the left leg forward to support their back and stabilise them.
- Keeping a firm grip on the chainsaw with both hands when the engine is running. The right hand should be on the rear handle and the left hand on the front handle with the thumbs and fingers encircling the chainsaw handles (see Figure 14). Chainsaws are not designed for left hand use and left-handers need to operate the chainsaw in the same manner as for a right-handed person. A firm grip will help operators reduce kickback and maintain control of the saw.
- Never operating any saw one-handed.
- Ensuring the cutting area is cleared of unnecessary people, plant, and things and not letting the nose of the guide bar contact a log, branch or other obstruction while the saw is being operated.
- Starting the cuts at full or high engine speeds and slowing down towards the end of a cut when there is a danger of hitting the ground.
- Only cutting one piece at a time and ensuring it is stable before starting the cut.
- Being aware of potential contact with the kickback zone when re-entering a previous cut and not twisting the chainsaw when withdrawing the guide bar from an undercut or bore cut.
- Checking the wood for nails or other obstacles and removing them before cutting.
- Starting a cut with the spiked bumper or body of the chainsaw in contact with the wood.
- Following the manufacturer’s sharpening, tensioning and maintenance instructions for the saw chain.
- Wearing appropriate PPE, including chainsaw-protective (cut resistant) clothing and boots, a helmet, eye protection, ear protection and gloves.

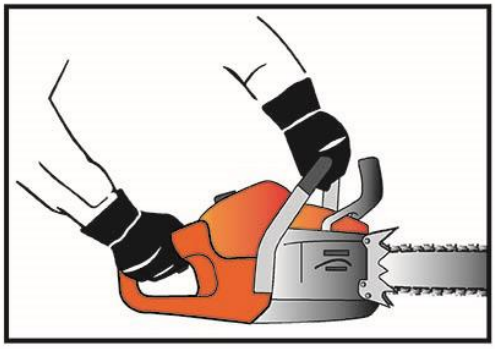

Figure 13 Correct chainsaw hold

Working with chainsaws in trees

The size of the chainsaw used should be appropriate for the work task being performed. When a tree climber carries equipment including chainsaws, ensure the total weight of the climber and the equipment is within the working load limit of the climbing system.

When working in a tree above ground the chainsaw should be attached to the climber at all times. A tool lanyard can be used to maintain this attachment. The tool lanyard should be long enough to allow full reach and for the chainsaw to hang in a position that will not hinder the climber's free movement or create a hazard for the climber or other workers when not in use. The attachment may vary and depend on the task being performed. For refuelling or changing chainsaws a rope is used to lower the chainsaw to the ground.

Table 15: Examples of control measures when operating a chainsaw in a tree

- Starting or operating chainsaw only when in a safe and stable working position.
- Using two points of attachment when operating the chainsaw, as far as is reasonably practicable, the two points of attachment should be from independent anchor points.
- Starting the chainsaw close to the working position and ensuring the chain is clear of the operator, obstacles and equipment before starting.
- Using two hands to operate a chainsaw and not operating the chainsaw above shoulder height.
- Switching the chainsaw off when moving between work positions and applying the chain brake between cuts.
- Sharpening, refuelling or maintaining chainsaw out of the tree.
- Wearing appropriate PPE, including chainsaw-protective (cut resistant) trousers or chaps, boots with a protective toe cap, a helmet, eye protection, ear protection and gloves.

Chainsaw use on elevating work platforms

When starting a chainsaw on an EWP, the chainsaw should be started outside the bucket or platform. The chainsaw should be attached to the operator, bucket or platform by a tool lanyard.

Personal protective equipment

Chainsaw specific PPE, for example a safety helmet, hearing, eye, leg and foot protection should be worn when using chainsaws for tree work.

Cross-cutting

Cross-cutting is cutting wood fibres across the grain and is the most common practice carried out by a chainsaw operator in tree work (see Figure 15).

Operators should stand to the left of the cut when cross-cutting and should not put pressure on the saw when reaching the end of a cut, as excessive pressure may cause the rotating chain and guide bar to suddenly exit the cut and strike the operator.

Figure 14 Cross-cutting the trunk of a felled tree

Operators should assess the felled tree, its location and stability for conditions likely to affect the safety of cutting activities.

Operators need to identify the stresses within the tree or section to be cut. Operators should determine the location of the cuts by considering these stresses and plan their sequence of cuts to:

- maintain safe control of the chainsaw and the cut sections, and
- minimise cutting problems.

Compression and tension are the two stresses encountered and these will vary in strength depending on the size and position of the log.

It is the compression forces that normally cause pinching of the chain and jamming of the saw. Normally, compression wood needs to be cut first to avoid jamming (see Figure 16).

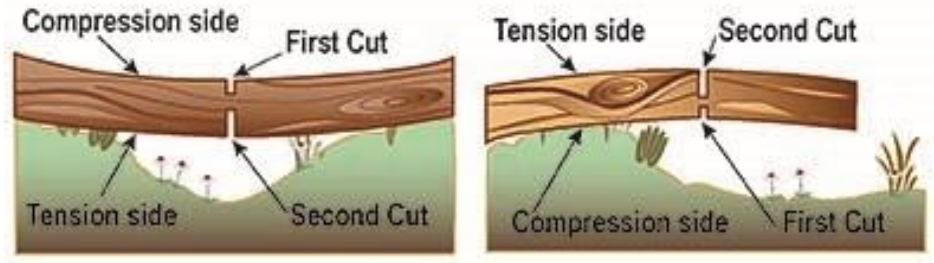

Figure 15 Compression and tension forces and cutting sequence

During the cutting process operators should continually assess the tensions and resultant movement to minimise the risk of jamming. Operators should be aware that a kickback hazard may occur if the upper tip of the guide bar is pinched in the cut. They should adjust their cutting techniques in response to any movement in the tree or limbs being cut. Wedges should be used as required to avoid pinching.

When cross-cutting on slopes there is a risk of the log rolling. Control measures should be implemented to prevent logs rolling down hill, for example planning cut locations to leave downhill branches attached; securing the log with rope or chocking; and having operators working on the uphill side.

De-limbing

The removal of branches and limbs from felled trees can be a dangerous process due to the number of potential chainsaw kickback hazards and inherent internal stresses.

It is common for branches and limbs on the sides and under-side of the tree to be under extreme tension or compression from the tree's overlying weight.

Table 16: Common risks and hazards of de-limbing
• kickback from the chainsaw • recoil of springing branches • rolling or sudden movement of the tree

It is important to identify the tension and compression forces in branches before the removal process starts. This can be done visually by examining the branch and assessing where the tension is, or manually by lifting or pushing against the branch to feel where the tension exists.

Monitor the kerf to determine the reactive force present. If the kerf is closing, then there is compression. If it is opening, then there is tension present.

In addition to identifying the compression and tension forces in limbs and branches, operators should also observe the control measures outlined in Table 17 when performing de-limbing operations.

Table 17: Examples of control measures when de-limbing
• Working on the upper side of the tree when on slopes or in situations where the tree may roll. • Maintaining a safe working position by adopting a secure and balanced stance and not using the chainsaw above shoulder height. • Activating the chain brake when moving along or around the tree.

Figure 16 De-limbing

Boring or plunge cutting

A boring or plunge cut is the term used to describe a cut where the nose of the guide bar is pushed into the tree or log. There is a high risk of kickback if the operation is not carried out correctly, and it should not be attempted by inexperienced chainsaw operators.

In situations where it is necessary to use the boring cut, operators should implement the control measures outlined in Table 18 to minimise the risk of kickback.

Table 18: Examples of control measures for boring or plunge cutting

- Running the chainsaw at full speed before making contact with the wood and maintaining full speed as contact is made.
- Making the cut using the following technique:
    - Starting the cut at an angle to the direction in which the boring cut is to be made (see Figure 18).
    - As the saw enters the wood allowing it to feed itself without placing undue force on the guide bar.
    - Gradually pivoting the saw when the tip of the guide bar is covered by the log and is boring straight into the wood.
- Keeping out of the line of the guide bar during the cutting operation.

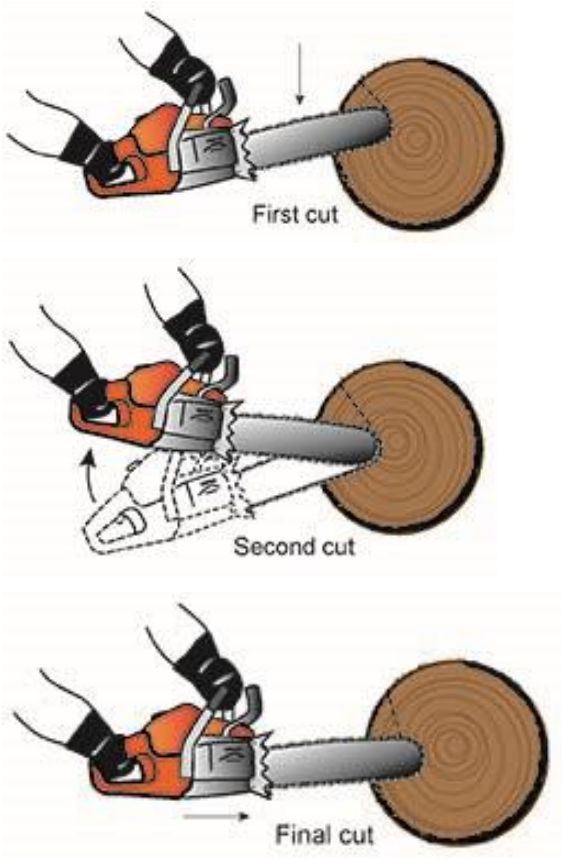

Figure 17 Cutting sequence for boring or plunge cutting

6.4 Pole saws

Pole saws are designed for light to medium trimming of elevated tree limbs and branches. They can be petrol, electric (battery or mains), hydraulically or manually powered.

Pole saws are available in a variety of rigid, fixed length; and extendable models (see Figure 18).

Operators should not stand directly under the branch being removed. Care should also be taken to minimise the risk of musculoskeletal disorders when using such equipment as long-handled tools can become difficult and tiring to operate after prolonged use.

Operators should also take care to avoid jamming the saw when attempting to cut branches with a diameter greater than the length of the guide bar. Avoid trying to finish the cut in the compression side of the branch.

Operators should be aware of surroundings when moving about the jobsite with lengthy tools. In particular be aware of locations of overhead electric lines and ensure a safe distance. It is not necessary to touch an electric line to be electrocuted.

Figure 18 Extendable pole saw

Table 19: Common risks and hazards of using a pole saw
• coming within an unsafe distance of overhead electric lines • being struck by falling objects such as, branches, leaves, other debris • musculoskeletal disorders • tripping on cut debris • fatigue from looking up and operating saw • instability of saw in long-reaching position • fire or electric shock

Table 20: Examples of control measures for using a pole saw

• Identifying and assessing the type, quantity and stability of trees to be trimmed for conditions likely to affect the safety of tree trimming operations.
• Ensuring the pole saw does not go near overhead electric lines. See Tree work near overhead electric lines.
• Avoiding long periods of use.
• Sharing the work load with others.
• Conducting pre-start up checks on equipment to ensure:
  ○ it has been set up correctly
  ○ is operating to optimum performance, and
  ○ systems are performing correctly.
• Planning tree trimming work in line with site procedures.
• Not performing tree trimming work in adverse weather conditions, such as strong winds, rain, or lightning.
• Not starting or operating the pole saw unless the operator is in safe and stable working position.
• Establishing an exclusion zone to prevent people from entering the cutting area.
• Operating the pole saw with two hands and not operating it at heights without an attachment in place to stop the saw from falling to the ground.
• Switching the pole saw off, ensuring the chain rotation has come to a stop, when moving between work positions.
• Not sharpening or refuelling the pole saw on an EWP or in an elevated position.

Table 20: Examples of control measures for using a pole saw
• Operating the pole saw in line with the manufacturer's recommendations and using recognised industry accepted cutting techniques for branch removal (see Figure 20). • Keeping the work site clear of cut branches and related debris. • Taking special care when operating a pole saw in slippery conditions such as damp, snow or ice, on slopes or uneven ground. • Fitting the blade guard or scabbard before transporting or storing the tool. • Carry the tool in a manner to avoid overhead electric lines if present at the worksite. • Wearing PPE such as respiratory, eye, head, hearing and foot protection and a harness.

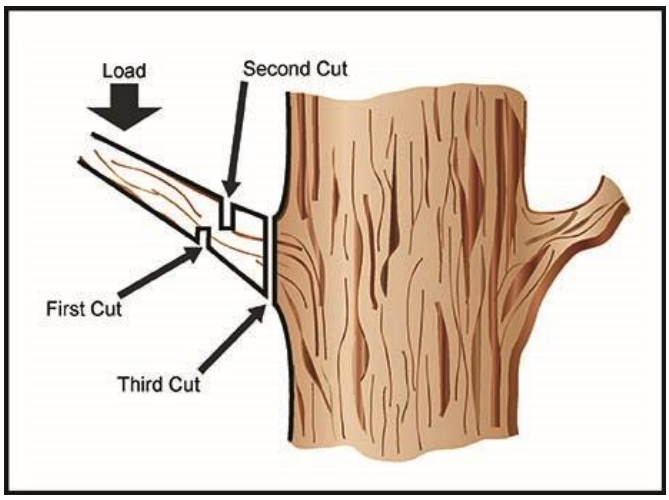

Figure 19 Three cut method of branch removal

6.5 Powered hedge trimmers

Hand-held powered hedge trimmers are commonly used in arboriculture for cutting hedges, shrubs, scrub and similar material (see Figure 21).

Whether petrol or electrically powered, safety procedures must be followed to avoid contact with the sharp, high-speed cutting blades.

Figure 20 Powered hedge trimmer

Table 21: Common risks and hazards of using a powered hedge trimmer
• coming in contact with cutting blades and other moving parts

Table 21: Common risks and hazards of using a powered hedge trimmer
• coming within an unsafe distance of overhead electric lines, including service lines to houses • being hit by debris • fire or electric shock • falling from height • hand and arm vibration • musculoskeletal disorders • instability of the machine in long-reaching positions

Table 22: Examples of control measures for using a powered hedge trimmer
• Selecting the appropriate type of trimmer for the work task, for example, using a trimmer with an adjustable cutter bar to trim the tops of hedges instead of standing on a ladder or elevated platform. • Conducting a pre-start-up check on the trimmer to ensure it has been assembled correctly and is in good condition. • Ensuring operators are well-balanced and have secure footing when starting and operating the trimmer. • Holding and operating the trimmer firmly with both hands on the handles—the trimmer should be held so the cutting blades are always away from the body. • Watching the cutting area—operators should not cut areas of hedges they cannot clearly see. • Checking there are no bystanders in the general work area. When cutting tall hedges, operators should always check the other side of the hedge before starting work. • Taking special care when operating trimmers in slippery conditions such as damp, snow or ice, on slopes or uneven ground—cuttings, fallen branches and scrub should always be cleared away. • Avoiding using electric hedge trimmers in wet or damp areas. If this is not reasonably practicable a residual current device (RCD) should protect the power supply. • Fitting the blade guard or scabbard before transporting or storing the trimmer—the trimmer should only be carried by the handle with the cutting blades behind the operator. • Wearing PPE, including gloves, eye, head, hearing and foot protection.

6.6 Personal protective equipment

As a PCBU, if workers are to use PPE at your workplace, you must provide it unless it has been provided by another PCBU. You must ensure it is selected to minimise risk to health and safety. This includes ensuring the PPE is:

- suitable for the nature of the work and any hazard associated with the work
- of suitable size and fit, and
- reasonably comfortable for the worker who is to use or wear it.

For example, a suitable helmet should always be worn when working on a tree. Further personal protective equipment that may be appropriate includes:

- gloves to protect against cold weather or injury and assist with grip
- eye protection where debris is being cleared or material is being removed, or where chainsaws, woodchippers, stump grinders or other machinery with the potential to cause eye damage is in use.

- respiratory protective equipment where there is a risk of inhalation of harmful chemicals or dust
- hearing protection where noise levels could cause risk of hearing damage.
- boots including toe protection where the risk of crush or cut injury exists
- high visibility clothing whenever there is a risk of struck-by injuries
- buoyancy or life jackets when working over water, and
- sun protection.

Clothing should generally be close fitting and of high-visibility. If using a chainsaw, pants should be cut-resistant.

You must also ensure PPE is maintained, repaired and replaced so it continues to minimise risk to the worker who uses it. This includes ensuring the equipment is clean and hygienic, and in good working order.

If you direct the carrying out of work, you must ensure the worker is trained in how to properly use, wear, store, and maintain the PPE. A worker must, so far as reasonably able, use or wear the PPE as reasonably instructed and must not intentionally misuse or damage the equipment.

7. Tree Felling

As detailed in the Chapter 4 Planning the work of this guide, before attempting to fell a tree by any method, a visual tree assessment should be carried out by a competent person. This assessment should form the basis of a site-specific risk assessment to determine the safest method to bring down the tree.

Three common methods of felling are:

- directional felling
- controlled directional felling, and
- sectional felling.

Directional felling is the process of felling whole trees or standing trunks from the ground where there is a minimum of two tree lengths of open space in all directions from the base of the tree. Directional felling is not a common option in urban environments as the minimum clear zone of two tree lengths is often hard to establish.

Controlled directional felling is the process of felling whole trees or standing trunks from the ground where there is less than two tree lengths of open space in every direction from the base of the tree. Controlled directional felling should never be attempted by the untrained or inexperienced and should only be executed by those trained in the relevant advanced felling techniques or persons with substantial felling experience.

Sectional felling is the process of felling a tree by working at height to gradually cut the tree into sections and allowing each section to fall to the ground or be lowered to the ground in a controlled manner.

Managing the risks of tree felling requires a high level of competency. You should seek the advice of a competent person and refer to relevant industry guidance material to ensure you have the most comprehensive information about hazards and risks and use the most effective control measures available for your circumstances.

8. Glossary

competent person is a person who has acquired through training, qualification or experience the knowledge and skills to carry out the task.

duty holder is any person who owes a work health and safety duty under the WHS Act including a person conducting a business or undertaking, a designer, manufacturer, importer, supplier, installer of products or plant used at work (upstream duty holder), officer or a worker.

fall means a fall by a person from one level to another.

fall arrest system means plant or material designed to safely stop a worker falling an uncontrolled distance and to reduce the impact of the fall. This includes an safety net, a catch platform, or a safety harness system.

fall prevention device is material or equipment—or a combination of both—designed to prevent a fall for temporary work at heights, that once in place after initial installation does not require any ongoing adjustment, alteration or operation by any person to ensure its integrity. This includes secure fencing, edge protection, working platforms and covers.

may indicates an optional course of action.

must indicates a legal requirement exists that must be complied with.

person conducting a business or undertaking (PCBU) is an umbrella concept which intends to capture all types of working arrangements or relationships. A PCBU includes a:

- company
- unincorporated body or association
- sole trader or self-employed person.

Individuals who are in a partnership that is conducting a business will individually and collectively be a PCBU. A volunteer association or elected members of a local authority will not be a PCBU.

person with management or control of plant at a workplace is a person conducting a business or undertaking to the extent that the business or undertaking involves the management or control of fixtures, fittings or plant, in whole or in part, at a workplace.

plant includes machinery, equipment, appliance, container, implement and tool components or anything fitted or connected to those things. Plant includes items as diverse as rope access systems, lifts, cranes, computers, machinery, conveyors, forklifts, vehicles, power tools, quad bikes, mobile plant and amusement devices.

restraint technique is a work positioning system used to control a person's movement by physically preventing them from reaching a position at which there is a risk of a fall, for example an unprotected edge. It consists of a harness that is connected by a lanyard to an anchorage or horizontal line.

risk of a fall is a circumstance that exposes a worker while at work, or other person while at or in the vicinity of a workplace, to a risk of a fall that is reasonably likely to cause injury to the worker or other person. This includes circumstances in which the worker or other person is:

- in or on plant or a structure that is at an elevated level
- in or on plant that is being used to gain access to an elevated level
- in the vicinity of an opening through which a person could fall
- in the vicinity of an edge over which a person could fall

- on or in the vicinity of a surface through which a person could fall
- on or near the vicinity of a slippery, sloping or unstable surface.

should indicates a recommended course of action.

worker is any person who carries out work for a person conducting a business or undertaking, including work as an employee, contractor or subcontractor (or their employee), self-employed person, outworker, apprentice or trainee, work experience student, employee of a labour hire company placed with a 'host employer' or a volunteer.

workplace is any place where work is carried out for a business or undertaking and includes any place where a worker goes, or is likely to be, while at work. This may include offices, factories, shops, construction sites, vehicles, ships, aircraft or other mobile structures on land or water.

work positioning system means any plant or structure, other than a temporary work platform, that enables a person to be positioned and safely supported at a location for the duration of the relevant work being carried out. This includes restraint technique or a rope access system.