

GUIDE TO GROWING AND MANAGING FORESTS

DECEMBER 2013



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TABLE OF CONTENTS

| 1. | INTRODUCTION | 4 | | |
|---|--|----|--|--|
| 1.1 | Who should use this Guide? | 4 | | |
| 1.2 | What is growing and managing forests? | 4 | | |
| 1.3 | What planning and preparation should be carried out? | 4 | | |
| 2. | REGENERATION BURNING | 5 | | |
| 3. | MECHANICAL SITE PREPARATION | 8 | | |
| 4. | SEED COLLECTION | 10 | | |
| 4.1 | Collection by hand from joined operations | 10 | | |
| 4.2 | Collection from above hand height | 12 | | |
| 5. | TREE PLANTING | 14 | | |
| 6. | CHEMICAL USE | 16 | | |
| 6.1 | Register of hazardous chemicals | 16 | | |
| 6.2 | Safety data sheets | 16 | | |
| 6.3 | Exposure standards | 16 | | |
| 6.4 | General precautions | 17 | | |
| 7. | COMPETITION CONTROL | 18 | | |
| 8. | TREE CLIMBING | 19 | | |
| 8.1 | Climbing equipment | 20 | | |
| 9. | TREE PRUNING | 21 | | |
| 10. | NON-COMMERCIAL THINNING | 24 | | |
| 11. | TRACTORS, LIGHT UTILITY VEHICLES AND QUAD BIKES | 26 | | |
| 11.1 | Selection of vehicle | 26 | | |
| 11.2 | Operator protective devices | 29 | | |
| 12. | AIRCRAFT | 30 | | |
| 12.1 | Safety precautions | 30 | | |
| 12.2 | Helicopter landing sites | 32 | | |
| 12.3 | Guidelines for aeroplane landing areas | 34 | | |
| APPENDIX A – SAMPLE GROWING AND MANAGING FORESTS MANAGEMENT OF RISK PLAN | | | | |



1. INTRODUCTION

1.1 Who should use this Guide?

This Guide provides practical guidance for persons conducting a business or undertaking and workers on how to manage health and safety risks associated with growing and managing forests. It does not apply to amenity tree work.

It should be read and used with the Code of Practice: *Managing risks in forestry operations* (the Forestry Code) which provides advice on planning, co-ordinating and preparing work health and safety practices for forestry operations. The Forestry Code also provides guidance on identifying hazards and common control measures for specific forestry operations also relevant to forest growth and management.

1.2 What is growing and managing forests?

Growing and managing forests is the practice of managing the establishment, growth, composition, quality, health, protection and utilisation of stands of trees or forests.

The growth and management of forests encompasses a wide variety of activities ranging from regeneration burning, site and soil preparation, seed collection, tree planting and chemical use through to tree competition control, pruning, thinning and harvesting. Each of these activities present their own unique range of hazards and risks, for example hazardous manual tasks, exposure to chemicals, falls from height and the operation of plant and equipment.

1.3 What planning and preparation should be carried out?

The forest growth cycle includes the processes of forest regeneration and re-planting following the completion of a harvesting operation. These are forestry operations as defined in the Forestry Code.

Before starting work at the site a forest operations management of risk plan should be developed in consultation with the land owner or forest manager and contractors. A sample template is in <u>Appendix A</u>.

Work health and safety consideration in the planning stages of the forest cycle can help minimise potential hazards arising later in a rotation. For example, at the planting and replanting stages you should ensure the method of planting does not increase risks associated with future harvesting activities.

Hazards like mine shafts and land slips should be recorded on maps for reference later in the cycle. Further information on planning is in Chapter 3 and Appendix C of the Forestry Code.



2. REGENERATION BURNING

The burning of harvest coupes, windrows and heaps is a work practice widely used as the first stage in regenerating a harvested forest coupe or re-establishing a plantation.

The prescribed burning should provide a safe system of work and should:

- be thoroughly planned
- involve consultation with workers involved in the tasks
- follow safe working practices
- be controlled, and
- have outcomes monitored and recorded.

Planning for burning operations should provide for the safe conduct of the operation, based on clearly defined objectives. Planning should also be aimed at minimising the risk of the fire escaping from the defined burn area.

Fire line construction

In minimising the risk of the fire escaping the intended burn area, operators should first establish clear fire breaks or lines around the designated area to be burnt.

Fire breaks are normally constructed using bulldozers, graders or excavator-type machinery and are constructed in a way to provide a bare earth surface free of vegetation so a running fire cannot cross it. They also provide a clear means of access for people lighting the fire and for fire controllers and their vehicles.

 Table 1 Common hazards of fire line construction

Common hazards

Constructing fire breaks can present the following hazards:

- Hazardous trees standing outside of the area to be burnt e.g. an unharvested area may fall without warning into the area being cleared for the fire line.
- Operation of machinery on steep slopes may result in a roll over or the machine sliding down hill in an uncontrollable manner.
- Objects may fall onto the machine operator's cabin or enter the operator's cabin through the cabin windows.
- Machine operators walking over rough terrain from the work vehicle to the location of the machine.



Table 2 Control measures for fire line clearing

Control measures

Examples of control measures for fire line clearing may include:

- Before starting the fire line clearing operation an assessment should be carried out to identify hazardous trees that may fall into the fire line work area.
- Identified hazardous trees should be felled within two dominant tree lengths of the boundary of the work area before the fire line clearing operation starts.
- The use of machinery suitable for the task and terrain.
- Side slope of the land must be within the limits of the machine's safe operational capacity.
- Machines fitted with roll-over protective structures (ROPS) and falling object protective structures (FOPS).
- Machine operators should wear seatbelts where fitted and should ensure there are no loose objects inside the machine's cabin.
- Oral, visual or radio communications with other forest workers on the site.

Prescribed burns

Before lighting a prescribed burn, the person in charge should brief people involved in the operation on the burning plan, their role and the safety precautions to be observed.

Information provided to people involved should include but not be limited to:

- identified hazards and specific safe systems of work and precautions including arrangements for monitoring the safety of individuals, escape routes and areas of refuge
- objectives of the operation
- a map illustrating the layout of the burn
- fire lighting pattern
- constraints in the conduct of the burn
- communication plan
- emergency plan including assembly areas, and
- specific tasks and responsibilities.

 Table 3 Common hazards of prescribed burns

Common hazards

Common hazards found in prescribed burns include:

- Changing weather conditions.
- Unexpected fire behaviour.
- Fire escaping containment lines.



 Table 4 Control measures for prescribed burns

Control measures

Examples of control measures for prescribed burning may include:

- ensuring fire breaks are established around prescribed burn sites
- · ensuring fire control units are on site during prescribed burning activities
- ensuring fire crews and their supervisors are competent to manage fire fighting operations
- carrying out continual weather monitoring
- establishing safe escape routes, and
- ensuring fire fighters are provided with suitable personal protective equipment (PPE).

The person in charge of the prescribed burn should also be satisfied the area has been cleared of people and property not directly involved in the operation. They should ensure control measures have been put in place to deal with restricted visibility likely to be caused by smoke affecting air, ground or water traffic.

The person in charge of a prescribed burn should also ensure the lighting plan is followed and the operation is monitored for progress and the safety of people involved.

Prescribed burns should be made safe by the prompt and effective suppression of escapes and thorough mopping up and patrol until declared safe by the person in charge.

In some jurisdictions it may be necessary to obtain a permit and carry out mandatory notification requirements before lighting fires in open areas. Before starting prescribed burning activities you should contact your local rural fire authority for the particular requirements in your state or territory.



3. MECHANICAL SITE PREPARATION

Preparation of the soil and planting site may involve machinery-dependent processes known as *windrowing, ripping, spot cultivation, chopper rolling* and other forms of cultivation like *disc trenching* and *mound ploughing* (see Figures 1-5).

Each activity presents similar hazards for both ground workers and operators of machinery.

Table 5 Common hazards for mechanical site preparation

Common hazards

Common hazards in mechanical site preparation may include:

- Hazardous trees still standing within or adjacent to the clearing operation.
- Stumps left from a previous rotation.
- Machine roll-over due to side slope of the ground.
- Unstable sites including mine shafts, wells and sink holes.
- Items of plant coming into contact with each other or people in the work area.
- Unstable windrow materials.
- Ground workers being struck by rolling logs or other debris.
- Sheet rock, large rocky areas.

Table 6 Control measures for mechanical site preparation

Control measures

Examples of control measures for mechanical site preparation may include:

- conducting a thorough site assessment to identify hazards before starting operations
- operators are competent and trained in the safe use of machinery and system of work, e.g. the national units of competency included in the Forest and Forest Products Training Package
- the removal of hazardous trees within two tree lengths of the work site
- the use of machinery suitable for the task and terrain
- side slope of the land must be within the limits of the machine's safe operational capacity - work up or down the slope where possible
- machines fitted with operator protective structures including ROPS and FOPS
- operators should wear seatbelts and ensure there are no loose objects inside the machine's cabin
- oral, visual or radio communications with other forest workers on the site
- conduct operations within safe work areas at least two tree lengths away from other manoeuvring plant or ground workers
- form windrows with larger stumps or logs at the base of the windrow and other smaller material around them to increase windrow stability, and
- where more than one machine is working on a slope or where machinery and ground workers are working on the site simultaneously, machine operators should avoid operating directly above other machines and ground workers where there is a possibility stumps, rocks or logs may roll or slide down the slope.



Figure 1 Ripping between windrows



Figure 3 Roller chopping



Figure 5 Mound ploughing



Figure 2 Spot cultivation



Figure 4 Disc trenching





4. SEED COLLECTION

Seed collection methods vary from using seed traps to capture natural seed fall, collection by hand from trees felled during forestry or land clearing operations, collection from taller trees by using pole pruners or long-handled secateurs, climbing or by using firearms.

 Table 7 Common hazards of seed collection

Common hazards

Common hazards associated with seed collection include:

- falls from height
- impact from items of plant
- being struck by falling timber and other debris and objects
- cuts and scratches to the body, face and eyes
- trips and falls from uneven ground and forest debris
- bites and stings from insects, snakes and other wildlife, and
- hazardous manual tasks.

4.1 Collection by hand from joined operations

The safest method of collecting seed is when it is within hand's reach of people standing safely on the ground. This method is normally associated with land clearing or forestry operations. Where seed collection is to take place with other forestry or land clearing operations, the person conducting the business or undertaking (PCBU) and the person in control of the forestry or land clearing operation should consult and work together in a co-operative and co-ordinated way to ensure risks are eliminated or minimised so far as is reasonably practicable.

Jointly identify hazards and carry out a risk assessment of the potential dangers of the operations before starting activities and ensure control measures are implemented.

The seed collectors' work area should be clearly defined so it is a safe distance away from other forestry operations. In general, seed collectors working in joint operations should maintain a distance of at least two dominant tree lengths from fellers, operating machinery and the working extremes of cable logging hauling lines. Where possible seed collectors should always work on the uphill side of felling, log hauling or log loading operations.



Use of machetes

Machetes are commonly used for seed removal in hand collection operations.

 Table 8 Common hazards when using machetes

Common hazards

Common hazards associated with using machetes include:

- cuts to the hand or forearm from not holding the tool correctly
- the tool may slip from the users hand during the cutting operation putting the safety of other workers at risk, and
- slipping and falling onto the tool.

Table 9 Control measures when using machetes

Control measures

Examples of control measures when using machetes include:

- A cut resistant gauntlet type glove should be worn on the hand not holding the tool.
- A wrist strap should be attached to the tool handle and the operator's wrist to prevent the tool flying from the operator's hand during the cutting action.
- When walking the tool should be carried inside a scabbard or where this is not practicable, it should be carried so the cutting blade is facing towards the ground.
- Maintain a safe working distance of at least 5 metres from other workers.



4.2 Collection from above hand height

Above 2 metres in height, seed collectors require a device to provide longer reach or an elevated platform on level ground to stand on.

A variety of tools are available for this purpose including flexible cutting saws, long-handled secateurs and telescopic pole pruners (see Figures 6 and 7). Care should be taken to minimise the risk of musculoskeletal disorders when using such equipment as long-handled tools over 4 metres in length can become difficult and tiring to handle.





Figure 7 Using a flexible saw



Elevated work platforms

The use of elevated work platforms may not be practical for most seed collecting operations as their use should be limited to flat sites with no stumps or broken ground.

Ladders

Ladders are an effective means of increasing the working height of extended pruning or cutting equipment. If ladders are used they should be purpose-built for tree work, in safe working condition and the legs should be anchored by:

- being tied to the tree, or
- penetrating the ground (see Figure 9), or
- some other means to prevent slipping.

The treads of the ladder should be non-slip and wide enough to allow two feet to be placed on them at a time. The top of the ladder should be secured to the tree before seed collection activities begin. The worker collecting the seed should use a fall protection device like a safety harness or a pole strap attached to the tree. Three points of contact should be maintained while ascending or descending the ladder. Further information on the safe use of ladders is in AS/NZS 1892 (Series): *Portable ladders*.



Lassoing the tree

Another common method of seed collection is to use weighted ropes or cords which are thrown over branches up to about 12 metres off the ground. Once the branch is 'lassoed' in this way, workers have the option of pulling the branch down into the reach of pole pruners and secateurs, or attaching a flexible saw blade to the rope and sawing through the branch. A rope saw uses either a chainsaw chain or a flexible saw with a cord attached to each end. This method needs two workers to operate the saw and branches may fall close by. PPE should be worn including a hard hat with a chin strap, eye protection and protective gloves.

Workers should not stand directly under branches or limbs being cut and workers should be at least two pole lengths apart when working.

Pruning or cutting equipment should be carried in a forward facing direction and protective scabbards or holsters should be used to prevent contact with cutting surfaces.

Climbing trees

Tree climbing for seed collection purposes should be carried out in accordance with Chapter 8 of this Guide.

Firearm use

Rifles are an effective means of dislodging small amounts of seed from a large number of trees and this method is commonly used in seed collection for research purposes. The use of firearms for the dislodgement of seeds requires great care and specialised training in firearms use. It also requires relevant firearms licences or permits and compliance with jurisdictional firearms laws.

Using this technique should be limited to:

- sparsely populated areas where the area downrange of the intended target can be closely monitored
- areas of forest away from access roads
- areas where other workers in the vicinity are located in a safe position behind the shooter
- trees with open crown stands to provide clear shooting lines and to minimise the risk of dislodged branches and seed pods becoming entangled in the tree canopy or other branches
- daylight hours and weather conditions that provide clear visibility to the target area, and
- calm conditions where wind is not moving the tree branches.

Shooters should wear PPE including a hard hat with a chin strap, eye and hearing protection and position themselves to minimise the risk of being struck by falling branches and seed pods.



5. TREE PLANTING

Tree planting involves lifting and carrying trees, frequent bending and heavy physical work. These activities are performed on a repetitive basis, normally involve high force and are often carried out in dynamic and unpredictable work environments. Tree planting meets the definition of a hazardous manual task under the Work Health and Safety (WHS) Regulations.

Hazardous manual tasks are tasks requiring a person to lift, lower, push, pull, carry or otherwise move, hold or restrain any person, animal or thing involving one or more of the following characteristics:

- repetitive or sustained force
- high or sudden force
- repetitive movement, or
- sustained or awkward posture or exposure to vibration.

Regulation 60: A person conducting a business or undertaking must manage risks to health and safety relating to a musculoskeletal disorder associated with a hazardous manual task.

 Table 10 Common hazards for tree planting activities

Common hazards

Common hazards found in tree planting activities include:

- Back pain or strain from carrying containers or trees large distances before planting or from the repetitive and sustained application of force, awkward posture and frequent bending or kneeling when planting trees.
- Slips and trips from tripping on debris from previous tree crops or rough cultivated soil.
- Blisters and dry skin from handling hand tools and soil.
- Fatigue from physical work for extended periods of time.
- Exposure to extreme weather conditions.
- Debris flicking up into the face or eyes.

Table 11 Control measures for tree planting activities

Control measures

Examples of control measures for tree planting activities include:

- Use a machine to carry trees to the planting site.
- Where possible remove trees from containers and carry them in a planting bag.
- Ensure the planting bag design restricts the number of plants carried as determined by a hazardous manual task risk assessment.
- Use planting tools that minimise or eliminate the need for bending and minimize force.
- Perform warm-up and warm-down exercises before and after planting sessions.



- Use a technique that avoids impact force and utilises leg strength wherever possible.
- Use lace-up boots with ankle support.
- Wear gloves and other PPE including eye protection.
- Ensure tree planters have access to drinking water and bring nutritious food.
- Ensure work arrangements allow tree planters to have rest breaks.
- Ensure shade is available in hot weather.
- Ensure suitable protective clothing, a wide brim hat and sunscreen is used to protect workers from UV radiation. For workers wearing hard hats, a range of attachments are commercially available that can provide an equivalent level of sun protection as a wide brimmed hat.
- Ensure warm and wet weather clothing is used as necessary and access to shelter is provided.

Workers should:

- precondition their body
- pace themselves during a 'phase-in' or 'warm up' work period
- choose the correct equipment, and
- use planting techniques that minimise the risk of injury from tree planting activities.

Further information on managing the risks of hazardous manual tasks is in the Code of Practice: *Hazardous manual tasks*.



6. CHEMICAL USE

Using chemicals like fertilizers, fungicides, herbicides and insecticides is often necessary at various stages in the establishment and growth of forests.

The WHS Regulations include specific duties for a PCBU to manage the risks to health and safety associated with using, handling, generating and storing hazardous chemicals at a workplace. Amongst others these duties include:

- maintaining a register and manifest—where relevant—of hazardous chemicals
- obtaining the current Safety Data Sheet (SDS) for the chemical from the manufacturer, importer or supplier if not already provided
- transporting, storing and using hazardous chemicals in accordance with the manufacturer's or importer's recommendations
- ensuring exposure standards—where applicable—are not exceeded, and
- controlling ignition sources and the accumulation of flammable and combustible substances.

6.1 Register of hazardous chemicals

The register is a list of the product names of hazardous chemicals used, handled or stored at the workplace accompanied by the current SDS for each hazardous chemical listed. Each SDS in the register must not be more than five years old.

6.2 Safety data sheets

The SDS contains information on the identity of the product and any hazardous ingredients, potential health effects, toxicological properties, physical hazards, safe use, handling and storage, emergency procedures and disposal requirements specific to the chemical.

6.3 Exposure standards

Many hazardous chemicals have mandatory exposure standards. An exposure standard represents the airborne concentration of a particular substance or mixture that must not be exceeded. They do not identify a dividing line between a healthy or unhealthy working environment. Natural biological variation and the range of individual susceptibilities mean some people might experience adverse health effects below the exposure standard. Therefore, exposure standards should not be considered as representing an acceptable level of exposure to workers. They establish a statutory maximum upper limit. All reasonably practicable steps must be taken to eliminate or minimise exposure to a level well below the exposure standard.

Many other substances and mixtures do not have a mandatory exposure standard and are hazardous to human health when used in workplaces. It is essential the airborne concentration of hazardous chemicals are kept as low as is reasonably practicable to minimise the risk to health, regardless of whether or not there is an exposure standard or what the value of the exposure standard is.



6.4 General precautions

Eliminating the hazard by removing the hazardous chemical from the workplace is the most effective control measure and must be considered before other control measures. Where this is not reasonably practicable remove potential exposure by purchasing pre-mixed or diluted chemicals instead of manually mixing or diluting chemicals at the workplace.

If it is not reasonably practicable to eliminate the use of the hazardous chemicals consider substituting their use with less hazardous chemicals that present lower risks, for example:

- substituting a highly flammable liquid with one that is less flammable, and
- using hazardous chemicals with a single hazard class rather than those with multiple hazards.

Before working with a hazardous chemical, workers should understand how to work safely with the chemical and how to use and maintain control measures including PPE required to eliminate or minimise exposure. This includes:

- reading and fully understanding the product label and SDS content
- following instructions for the safe use, storage and disposal of the product including the required PPE to be used as defined on the label and in the SDS
- the arrangements for site control, training, storage of hazardous chemicals, use and maintenance of engineering controls and PPE and clothing, and
- the requirements for protecting the health and safety of workers and visitors not directly working with the hazardous chemicals.

If a hazardous chemical is decanted or transferred from the container in which it was originally packed or supplied and will not be used immediately, the container into which the chemical was decanted must be labelled with:

- the product identifier—a unique name or number, and
- a hazard pictogram or hazard statement consistent with the correct classification of the chemical.

Where the entire amount of the decanted chemical will be used immediately labelling its container is not required.

A decanted hazardous chemical is only considered to be 'used immediately' in situations where:

- it is not left unattended by the person who decanted it
- the decanted chemical is used only by a person present at the decanting process, and
- the container is subsequently rendered free from any hazardous chemical immediately after use.

More detailed information on hazardous chemicals and managing their risks is in the Code of Practice: *Managing risks of hazardous chemicals in the workplace*. Further information on the labelling of hazardous chemicals is in the Code of Practice: *Labelling of workplace hazardous chemicals*.

For chemicals which are regulated by the Australian Pesticides and Veterinary Medicine Authority (APVMA), further information on their safe use can be obtained by contacting the APVMA or your local regulator of agricultural and veterinary chemicals.



7. COMPETITION CONTROL

Competition or manual weed control involves frequent bending and heavy physical work using implements like axes, shears and hand-held motorised plant.

These activities are performed on a repetitive basis, normally involve high force and are often carried out in dynamic and unpredictable work environments. Like tree planting, manual weed control also meets the definition of a hazardous manual task under the WHS Regulations.

 Table 12 Common hazards for manual weed control work

Common hazards

Common hazards of manual weed control include:

- Muscular pain or strain from repetitive and heavy physical work.
- Slips and trips from tripping on debris from previous tree crops or rough cultivated soil.
- Eye stick injuries from falling into or colliding with vegetation.
- Blisters and dry skin from handling hand tools and soil.
- Fatigue from physical work for extended periods of time.
- Contact with cutting implements for example blades and saws.
- Dehydration and heat stroke from working in hot weather.
- Sunburn and skin cancer from prolonged exposure to ultraviolet (UV) radiation.

 Table 13 Control measures for manual weed control work

Control measures

Control measures for manual weed control activities include:

- Ensure operators are accredited and competent using tools and equipment.
- Ensure there is a safe working distance between workers.
- Warm-up and warm-down exercises are done before and after competition control sessions.
- Use lace-up boots with ankle support when performing manual weed control work.
- Wear gloves and other suitable PPE like eye protection and cut-proof trousers where there is heavy undergrowth.
- Ensure workers have access to drinking water and have nutritious food.
- Ensure work arrangements provide workers with rest breaks.
- Ensure shade is available in hot weather.
- Ensure suitable protective clothing, a wide brim hat and sunscreen are used to protect workers from UV radiation. For workers wearing hard hats, a range of attachments are commercially available that can provide an equivalent level of sun protection as a wide brimmed hat.

Further information on managing the risks of hazardous manual tasks is in the Code of Practice: *Hazardous manual tasks*.



8. TREE CLIMBING

When growing and managing forests, tree climbing may be necessary for tree mensuration and seed collection activities.

The main risk associated with tree climbing is the potential to fall from height.

Regulation 78: A person conducting a business or undertaking must manage the risk of a fall from one level to another that is reasonably likely to cause injury to the person or another person.

Before climbing a thorough inspection of the tree should be carried out by a competent person. This inspection should include an assessment of the tree's structure, growth habit, stability and growing environment. The inspection should consider hazards, condition, wind loading, structural integrity and location. This information should inform decision-making on whether the tree is safe to climb, the method chosen to access the tree and emergency rescue measures.

Further information on managing the risk of falls is in the Code of Practice: *Managing the risk of falls at workplaces*.

 Table 14 Common hazards for tree climbing

Common hazards

Common hazards of tree climbing include:

- tree felling on adjacent forest operations
- being struck by falling objects
- ants, bees, wasps, snakes and other biting or stinging hazards, and
- adjacent trees, dead limbs and intertwining branches.

Table 15 Control measures for tree climbing

Control measures

Control measures to consider before tree climbing operations begin include:

- Tree climbing should only be done by people who are trained and assessed to a minimum relevant Australian Qualification Framework (AQF) or equivalent unit. For example the relevant AQF units for tree climbing are:
 - AHCARB204A (Undertake standard climbing techniques)
 - AHCARB307A (Undertake complex tree climbing), and
 - AHCARB306A (Undertake Aerial Rescue).
- Tree-climbing workers should receive training and instructions on the correct use of equipment and methods of climbing (see above).
- The climber should establish if the tree is safe to climb. Consider the presence of widow makers, evidence of deterioration e.g. rot, malformation, split stems or other faults weakening the stem.
- Climbers should be aware of the strength of limbs and branches of the trees to be climbed and the particular characteristics of the tree species.



- Tree climbing should only be done by people who are physically fit and not suffering from disorders or affected by alcohol or drugs including prescribed medication which may affect or impair their working at heights.
- Climbing crews should consist of at least two people competent in tree climbing operations who have received training. This should include regular refresher training in first aid and aerial rescue.
- Climbing crews should have documented climbing and emergency procedures including a rescue plan to quickly recover workers suspended in a harness.
- The second climber should also check the primary climbers gear to ensure equipment e.g. ropes, harnesses, karabiners and friction devices are in a safe working order, free of defects and correctly attached.
- A complete spare set of climbing equipment should be available at the worksite for use in an emergency. The climbing crew should be made aware of the location of this equipment.
- Climbing trees should not be attempted during wet or windy conditions or during thunderstorms.
- Noisy plant and equipment should not be operated in the area where a climber is working when the noise generated by the equipment will interfere with the climber's signals.
- No one should work in a position directly below a climber.

8.1 Climbing equipment

Climbing equipment should be suitable for its intended use. It should be inspected and assessed by the climber before each use. A competent person who is not the regular user of the equipment should also check the equipment regularly for example every six months.

Work positioning harnesses and related work positioning equipment should be used when working above 2 metres in height.

Work positioning or tree climbing harnesses and their associated equipment should comply with AS/NZS 1891.1-2007: *Industrial fall-arrest systems and devices – Harness and ancillary equipment* or an equivalent standard.

Climbing equipment should be used, maintained, inspected, tested and stored according to the manufacturer's recommendations.

Fall arrest systems using full body harnesses with rear dorsal attachment points are not suitable for tree climbing, and should not be used.

Climbing irons or spikes should only be used on trees scheduled for removal.

Two points of attachment should be used when aerial operations are carried out. A single point of attachment may be used when moving around the tree.

Tools carried and used by the climber should be safely secured when not in use. If the climber is using a chainsaw the climber should be secured to the tree using steel-core rope flip-lines that provide two points of attachment at all times.

The chainsaw should be secured to the climber in a way that allows 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.



9. TREE PRUNING

As for tree climbing one of the main risks associated with tree pruning are potential falls from height.

 Table 16 Common hazards of tree pruning work

Common hazards

Common hazards of tree pruning work include:

- ladder sway when pruning in windy conditions
- cuts and abrasions from mishandling pruning equipment
- being struck by falling limbs or other debris, and
- carrying ladders while walking through thick undergrowth.

The preferred method of managing the risk of falls when carrying out pruning work is to eliminate the need to work at height by performing the work from the ground.

This may be achieved by using loppers or a saw on an extendable pole so the pruning work can be done from the ground. However this is only a solution for short-term pruning as it involves a hazardous manual task that may result in injury for example muscle strain.

If it is not reasonably practicable to do the pruning from the ground the following options should be considered in priority order:

- 1. using a boom-type elevating work platform or travel tower (see Figure 8) with a fall protection harness to move from tree to tree during pruning tasks, or
- 2. using a ladder with a fall protection harness if working above 2 metres in height.

Elevating work platforms come in a number of configurations. It is important to ensure the correct equipment is chosen for each particular job. A pre-start site assessment should be used to accurately gauge the requirements for each task. In general, elevating work platforms should be limited to flat sites with no stumps or broken ground. They are not safe to use in windy conditions, near overhead electric lines or on steep, unstable or sloping ground.

If a ladder is used for pruning activities it should be purpose-built for tree work (see Figure 9) in safe working condition and anchored at the base. It should also be secured to the tree at the top of the ladder.

If working above 2 metres in height, the person doing the pruning should use a work positioning harness and a steel core, rope flip-line attached to the tree.

A PCBU who implements a fall-arrest system as a control measure must establish emergency and rescue procedures. The rescue of a worker who is suspended in a body harness must occur quickly to prevent suspension intolerance.

Workers should not use fall-arrest systems unless there is at least one other person on the site who can rescue them if they fall.

Pruning equipment should be carried in a scabbard or holster so both hands can be used to climb the ladder.

Further information on the safe use of ladders is in AS/NZS 1892 (Series): Portable ladders.



Table 17 Control measures for tree pruning work

Control measures

Examples of control measures for tree pruning activities include:

- Where practicable, perform the pruning work from the ground or from a stable platform like an elevating work platform.
- When working above 2 metres in height always use a work positioning harness or pole strap attached to the tree.
- Workers performing above ground pruning should be qualified for the work, for example hold the AQF units:
 - o AHCARB203A Perform above ground pruning, and
 - AHCARB303A Implement above ground pruning.
- Use a purpose-built ladder attached to the tree trunk at its top and secured at the base. If working from a ladder is unavoidable this should be done with a work positioning harness and a steel core, rope flip-line attached to the tree.
- Ensure cutting methods do not cause limbs to fall into the ladder or climber.
- Do not carry out pruning operations during extreme weather conditions when the movement and dynamic loading on the tree can be unpredictable.
- Workers should be provided with information, training and instruction on the work procedures and safe system of work to perform the pruning task.
- Always use a scabbard or holster to carry pruning equipment and always pick up loppers using the handles.
- Wear PPE including a safety helmet, eye protection, steel-toe lace-up footwear providing ankle support and a non-slip sole.
- Wear clothing and sunscreen to protect against exposure to UV radiation.
- Establish a clear walking path before moving from one tree to the next.



Figure 8 Using a boom-type elevating work platform





Mechanical pruning

Where mechanical or gas-operated pruning equipment is used the operator should comply with the safety specifications, information and instructions recommended by the designer, manufacturer, importer or supplier.

Chainsaws used for pruning operations should comply with AS 2726.2-2004: *Chainsaws* – *Safety requirements - Chainsaws for tree service.* They should be fitted with a chain guard and chain brake to prevent injury from kickback.

Chainsaw operators should be trained for the work, for example hold the AQF Unit AHCARB205A Operate and Maintain Chainsaws.

Chainsaw specific PPE for example hearing, eye, leg and foot protection should be worn when using chainsaws for pruning purposes.

Safety belts should be used when medium to high pruning is done with a chainsaw. Pole straps or securing belts should provide two points of attachment and contain cut resistant material to prevent accidental cutting by the chainsaw.

Further information on managing the risk of falls is in the Code of Practice: *Managing the risk of falls at workplaces.*

Figure 9 A purpose-built ladder for tree work



10. NON-COMMERCIAL THINNING

The Forestry Code describes the hazards relating to commercial thinning and harvesting of trees and the most relevant control measures to be used for these operations.

Table 18 Common hazards of thinning operations

Common hazards

Common hazards in thinning operations include:

- people being hit by a tree, limbs or machinery
- felled trees falling into other trees causing limbs to fly back towards the feller
- hung up trees
- chainsaw kickback and severe lacerations, and
- crush injuries from sliding logs and logs falling off machinery.

In general, tree felling carried out for thinning activities should be done in accordance with the Forestry Code. This Code states workers must be trained and have the relevant skills to carry out tasks safely. It recommends the national units of competency included in the Forest and Forest Products Training Package are suitable for people involved in forestry operations.

The Forestry Code also recommends the use of a recognised safe felling method, for example AS 2727-1997: Chainsaws – *Guide to safe working practices*. However AS 2727 does not specify the minimum size tree a faller should place a scarf cut in when felling the tree.

As non-commercial thinning normally involves the felling of smaller diameter trees and stems, the following specifications for scarf cuts may also be considered:

- trees of 150 mm diameter or greater at falling height should be felled in accordance with the recommendations in the Forestry Code
- trees of less than 150 mm diameter at falling height should be felled using a technique considered safe for small trees, for example:
 - o conventional scarfing
 - $\circ~$ backing down, or
 - o shallow kerf front.

In selecting the technique to be used the faller should consider:

- the tree height
- lean
- free splitting characteristics of the species to be cut, and
- prevailing weather conditions.

Whether harvesting or thinning, workers should first observe the same precautions of identifying, isolating and if reasonably practicable, removing hazardous trees within the harvesting or thinning area as detailed in Chapter 6 of the Forestry Code.

Thinning operations should not be carried out by anyone who has not received the relevant training and does not have the skills and experience to carry out the particular tasks safely.



 Table 19 Control measures for thinning operations

Control measures

The safety procedures for thinning operations are similar for felling other trees, however the following control measures should also be observed by people engaged in thinning operations:

- Carry out tree felling in accordance with the Forestry Code or the recommendations for scarf cuts listed above.
- Establish a separation distance or safe work area a minimum of two tree lengths around the tree felling work area.
- Ensure warning signs are erected before harvesting operations start.
- Establish a clear escape route away from the falling tree.
- Fall or otherwise remove dead or defective trees positioned in the intended direction of fall before thinning operations start.
- Ensure people on the work site are inducted and informed of the hazards and safe systems of work.
- Only engage fallers who are competent in using directional falling techniques.
- Ensure effective communication systems are in place between workers.
- Fallers should keep watch on the falling tree and keep a sharp lookout for limbs and branches thrown back by contact with adjacent trees.
- Ensure hung up trees are safely brought to the ground as soon as possible.
- People to obtain permission from the felling operator to ensure felling activity stops before they entering the work area.
- Select items of plant suited to the task and always use the plant in accordance with the manufacturer's recommendations.
- Ensure effective remote or isolated working procedures are in place.
- Ensure correct selection and use of PPE, for example eye and hearing protection, hard hats, protective footwear and cut resistant pants.

Items of plant used to pull logs from the stump to a place where they can be further processed or loaded onto a vehicle must be fitted with operator protective structures, for example ROPS and FOPS.

Quad bikes and tractors are not designed to pull trees of any size and should not be used for this purpose. Forestry machines like harvesters and skidders are designed and manufactured for the specific purposes of felling and moving trees.



11. TRACTORS, LIGHT UTILITY VEHICLES AND QUAD BIKES

This chapter provides guidance on the selection and use of tractors, light utility vehicles and quad bikes for various applications in growing and managing forests.

Chapter 10 of the Forestry Code also provides guidance on the selection, use, modification and maintenance of plant and machinery for general forestry operations.

 Table 20 Common hazards when using tractors and quad bikes

Common hazards

Common hazards when using tractors their attachments and quad bikes include:

- vehicle rollover and run over
- vehicle instability when carrying or pulling loads
- falling objects, limbs and debris striking the operator, and
- entanglement with unguarded drive and power take-off (PTO) shafts.

11.1 Selection of vehicle

Careful consideration should be given to selecting and using the safest machine or vehicle for the job. The improper selection of plant for the task can create significant hazards like plant instability or operators being crushed due to the lack of ROPS and FOPS.

When selecting a vehicle you should first identify your needs and relevant operator safety issues. Things to consider include:

- What do you need it to do?
- Will the vehicle be used for towing trailers or other attachments or implements?
- What are the most common conditions it will be used in? E.g. is the terrain likely to affect the stability of the vehicle?
- What protective equipment is required?
- What loads will be carried?

You should then compare the available vehicle options to your needs.

While quad bikes have a light footprint and are an economical single person vehicle for off-road use, they may not be the safest option for activities related to growing and managing forests. Quad bikes may also create an increased risk to the user over and above those known to exist for tractors and light utility vehicles.

Light utility vehicles or side-by-side vehicles (see Figure 11) have an increased load carrying capacity and are more stable than quad bikes and less inclined to roll over. They can also be fitted with a ROPS and seat belts.



Tractors

Tractors are commonly used in growing and managing forests for ground spraying and maintenance operations like slashing (see Figure 10). They can be fitted with a variety of attachments and implements and each particular attachment will introduce a new set of hazards, even if the tractor itself is set up for safe use.

Figure 10 A tractor fitted with a slasher



Light utility vehicles

Light utility vehicles are also commonly referred to as side-by-side vehicles. They often have a bench-type seat, a steering wheel and are designed to transport more than one person. They are equipped with four or more low pressure high flotation tyres and generally have a tray-back designed for carrying small loads. They can also be fitted with ROPS and seat belts.

When selecting the most suitable vehicle for the job you should consider whether a side-by-side vehicle would be a safer vehicle than a quad bike.

Figure 11 Typical light utility vehicle





Quad bikes

Quad bikes, or four-wheeled motorbikes, are commonly used in growing and managing forests for transportation, weed and insecticide spraying and towing hand-direct seeders and utility tool trailers.

Despite their usefulness quad bikes are a major cause of incidents each year with most of these associated with vehicle rollover.

Quad bikes can roll over for a variety of reasons even when travelling slowly. The risk of rollover is increased if the quad bike:

- is traversing slopes
- is travelling at high speed
- is towing an implement
- is travelling over steep, rocky or uneven ground
- is carrying a heavy or unstable load e.g. liquids for spraying, and
- has tyres under-inflated or unevenly inflated.

 Table 21 Control measures for using tractors, light utility vehicles and quad bikes

Control measures

In managing the risks of using tractors, light utility vehicles and quad bikes for activities relating to growing and managing forests the following points should be considered:

- select and use the most suitable vehicle for the task
- vehicles should be fitted with operator protective structures e.g. ROPS and FOPS or a suitable ROPS or FOPS compliant cabin
- quad bikes may be fitted with a crush prevention device
- where tank attachments are used ensure the design incorporates baffles to improve stability
- moving parts and other hazards on tractors and attachments should be guarded
- vehicles should only be operated within the manufacturer's specifications
- the manufacturer's recommended load and towing limitations should not be exceeded
- where fitted, operator's should wear a seat belt when in the driving position
- · tyre pressures should be set according to the manufacturer's specifications
- · operators must be provided with relevant training, and
- operators should wear PPE e.g. a helmet complying with AS 1698:2006 or equivalent standard and eye protection. When protective equipment is specified by the manufacturer or supplier, this equipment should be worn.



11.2 Operator protective devices

Regulation 215: A person conducting a business or undertaking with management or control of powered mobile plant at a workplace must ensure, so far as is reasonably practicable, that a suitable combination of operator protective devices for the plant is provided, maintained and used.

Tractors, light utility vehicles and quad bikes used in forestry operations should have ROPS and FOPS fitted where the vehicle is working under or near tree canopies.

The unique active riding characteristics of quad bikes generally prevent fitting traditional protective devices like seat belts or roll over protective devices like a ROPS on a tractor. However crush prevention devices are commercially available and may assist to protect the rider in the event of a quad bike roll over.

Even with an operator protective device fitted you must still manage the risks of vehicle roll over occurring through a combination of vehicle selection, using seat belts, instruction and training and the safe use of attachments.

Further guidance is in the Code of Practice: Managing risks of plant in rural workplaces.



12. AIRCRAFT

While aircraft are regulated under separate aviation legislation, the risks associated with the interaction between ground workers and aircraft used for various activities in growing and managing forests must be eliminated or minimised so far as is reasonable practicable.

This chapter provides guidance on the general safety precautions to be observed when working near aircraft. It includes general design requirements for helicopter landing sites and aeroplane landing areas for agricultural operations.

Further information on the specific establishment and use requirements for landing sites is available from the Civil Aviation Safety Authority.

In this chapter:

Air Taxiing means the airborne movement of a helicopter at low speeds and at heights normally associated with ground effect.

Clearway means an area in which there are no obstacles penetrating a slope of 2.5 percent rising from the end of a runway over a width of 45 metres.

Final Approach and Take Off Area (FATO) means an area of land or water over which the final phase of a helicopter's approach to a hover or landing is completed and from which the take-off manoeuvre is started.

Ground Effect Area (GEA) means an area that provides ground effect for a helicopter rotor system.

12.1 Safety precautions

Before starting operations involving ground workers and aircraft, one person should be designated the controller of ground operations and the pilot of the aircraft is the person in control of aerial operations.

Before starting the operation, a full briefing session covering every stage of the operation should be held between the pilot, controller and other workers.

Helicopter safety

Smoking and other ignition sources should not be permitted within 50 metres of a designated helicopter landing site.

Proposed landing sites should be cleared of loose vegetation and other debris that could present a hazard due to downdraft from the rotors.

Tools and other equipment or devices should be carried in a horizontal position below waist height. Arms and equipment should not be raised above shoulder height.

No-one should travel in or work out of a helicopter without being trained in the correct procedures for helicopter entry and exit.

Do not approach or leave the helicopter until signalled to do so by the pilot.



When approaching helicopters with rotors turning you should:

- remove or secure hats, helmets, pockets and other loose items
- wear safety goggles with dust protection and hearing protection to a level >110 dBA
- approach the aircraft from the front and in clear view of the pilot
- before reaching the rotors, stop and seek permission from the pilot—using approved hand signals—to enter the danger zone under the rotors, and
- approach the nose of the helicopter and walk to the right—starboard—side but do not walk further than the nose side of the exhaust ports.

Before exiting from under the rotors approval to exit must be provided by the pilot. You should exit the danger zone via the nose of the helicopter and immediately stoop-walk away to the front or downhill toward the front of the helicopter until clear.

Aeroplane safety

Smoking and other ignition sources should not be permitted within 50 metres of a designated landing area.

A pilot should not use a landing area or have an aeroplane engine running unless the aeroplane is clear of people, animals, vehicles or other obstructions.

A pilot should not use a landing area without taking all reasonable steps to ensure the physical characteristics and dimensions of the landing area are satisfactory.

Aeroplanes should not be approached while the engine(s) are starting up, running or running down.

People should not approach an aeroplane until directed to do so by the pilot.

The aeroplane should be approached from the side and preferably in view of the pilot.

When chemicals are being mixed and loaded into an aeroplane, precautions should be taken to ensure the pilot, air crew and their clothing and footwear are not contaminated with chemicals.

In managing the risks of using chemicals with an aeroplane the following points should be considered:

- PPE should be worn to prevent exposure to the chemical.
- When the pilot or aircrew are involved in the mixing or loading process a complete change of clothing and footwear should be available.
- If a pilot or crew member's clothing or footwear becomes contaminated with a chemical the contaminated item should be removed before the person enters the aeroplane.
- If chemical contamination occurs inside the cockpit or crew area, the aircraft should not be operated until the contamination is removed and the air quality is safe for people to reenter the aeroplane.



12.2 Helicopter landing sites

Factors to be considered before using a helicopter landing site

Hazardous trees, as defined in the Forestry Code, within two dominant tree lengths of the landing site should be removed before the helicopter landing site (HLS) is used.

The pilot of a helicopter operating to, from or at the HLS should ensure:

- the HLS is clear of:
 - o people not essential to the helicopter operation
 - objects and animals likely to be a hazard to manoeuvring the helicopter—other than objects essential to the helicopter operation, and
- no person outside the helicopter—other than a person essential to the operation—is within 30 metres of the helicopter (see Figure 12).

A helicopter must not land at, or take-off from a HLS located within controlled airspace without clearance from the air traffic controllers.

If a proposed HLS is to be located near a city, town or populated area where noise or other environmental considerations make helicopter use undesirable, the HLS may be affected by the *Commonwealth Environment Protection Act* and associated State-based legislation.

Basic helicopter landing sites

A basic HLS should:

- only be used for infrequent, opportunity and short term operations in daylight hours
- · be large enough to accommodate the helicopter safely
- have a surface capable of withstanding the static and dynamic loads imposed by the helicopter e.g. twice the gross weight of the helicopter
- not exceed the maximum slope landing capability of the helicopter—generally 7.5 degrees or 1:8 vertical to horizontal
- have an air taxiing route at least three times the width of the main rotor diameter, and
- have a means of earthing the helicopter e.g. an earth stake.



Figure 12 Basic helicopter landing site



Standard helicopter landing site

A standard HLS is intended to be used for day and night operations. A standard HLS should comply with the following guidelines:

- The final approach and take off area (FATO) at a minimum, should have a circular area with a diameter equal to twice the length of the helicopter when the rotor(s) are turning (2 x L), which is free of obstacles likely to interfere with the manoeuvring of the helicopter.
- The ground effect area (GEA) at minimum, should have either a circular area with a diameter equal to the diameter of the main rotor of the helicopter, or if the helicopter is of the tandem rotor type, the GEA should be a rectangular area equal to the length of the helicopter and the width equal to the rotor diameter.
- The GEA should be within the final approach and take off area with the overall slope not to exceed 7.5 degrees or 1:8 (vertical to horizontal).
- The landing and lift off area (LLA) should have a minimum area equal in size to the undercarriage contact points plus 1 metre on all sides. If the LLA is not within the final approach and take off area, an air taxiing route with a width equal to twice the main rotor diameter should be provided between both areas.
- The LLA should be a cleared and stable area capable of bearing twice the gross weight of the helicopter. The overall slope should not exceed the maximum slope landing capability of the helicopter.
- The approach and departure path should extend outwards from the edge of the FATO as shown in Figure 13 and have an obstacle free gradient of 7.5 degrees measured from the edge of the FATO to a height of 500 feet above ground level.



Figure 13 Approach and departure path



Night operations

For night operations the following extra guidelines for standard HLS are suggested:

- Lighting the edge of the FATO should be defined by either omni directional white lights no higher than 25 cm above the FATO and spaced 8 metres apart, or by a combination or markings and floodlighting.
- Wind velocity information an accurate means of assessing wind speed and direction should be provided.
- Approach guidance the direction of approach should be marked by at least two omni directional green lights to either side of the FATO or one white lead-in light positioned 90 metres to the front of the FATO on the approach side.
- Any air taxiing route should be marked by either blue edge or green centre line lights spaced at 15 metre intervals or be floodlit.
- Except for air taxiing lights, lights should be visible from at least 5 kilometres in clear conditions.

12.3 Guidelines for aeroplane landing areas

The use of landing areas other than aerodromes is not recommended for aeroplanes with a maximum take-off weight greater than 5700 kilograms.

Hazardous trees—as defined in the Forestry Code—within two dominant tree lengths of the landing area should be removed before the landing area is used.

Physical characteristics

The recommended minimum physical characteristics of landing areas for agricultural operations are:

- Runway width for agricultural operations a 10 metre wide runway is the recommended minimum.
- Runway length for agricultural day operations, the minimum runway length is the greater of 75 percent of the take-off distance specified in the aeroplane's flight manual for the prevailing conditions with the balance as clearway, or the landing distance so specified. Runway lengths calculated for take-offs and landings should be increased by 50 percent for agricultural operations on one-way runways at night.



- Longitudinal slope the longitudinal slope between the runway ends should not exceed 12.5 percent for agricultural day operations and 2 percent for night operations. Where the overall slope exceeds 2 percent the runway should only be used for one-way operations – downhill for take-off and uphill for landing.
- Transverse slope for agricultural day operations the transverse slope should not be more than 3 percent over the runway and 5 percent over the runway strip.

Marking

Where extended operations are expected to be conducted at a landing area, the operator should be encouraged to provide markings similar to those found at government and licensed aerodromes. If markings are provided they should follow the colours and specifications set out in the Aeronautical Information Publication (AIP AGA).

Lighting

The recommended minimum lighting and layout for night operations is shown in Figure 14.

The lights should, under the weather conditions prevailing at the time of the flight, be visible from a distance of 3 kilometres.

Figure 14 Recommended runway lighting



Other factors

A method of determining the surface wind at a landing area is desirable. A wind sock is the preferred method.

The surface of a landing area should be assessed to determine its effect on aeroplane control and performance. For example, soft surfaces or the presence of long grass—over 150 mm—will increase take-off distances while moisture, loose gravel or material that reduces braking effectiveness will increase landing distance.

The presence of holes, cracks and ruts in the surface of a landing area will degrade aeroplane performance and handling and increase the possibility of structural damage. The smoothness of a runway can be tested by driving a stiffly sprung vehicle along the runway at a speed of 75 kph. If this can be accomplished without discomfort to the occupants the surface can be considered satisfactory.



APPENDIX A – SAMPLE GROWING AND MANAGING FORESTS MANAGEMENT OF RISK PLAN

SAMPLE ONLY

Growing and managing forests management of risk plan

| ontractor: | | |
|--------------------------|--|--|
| oupe number: | | |
| Assessment conducted by: | | |
| ite: | | |

| Specific task or activity | Potential hazard and risk | Risk control measures |
|---------------------------|---------------------------|-----------------------|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Contractor signature:

Other representative signature: