Product processing	
 **Safe use of plant**	● When using a mechanical processor or cut off saw, ensure the line of the cut is never directed at ground workers ● Where a chainsaw is fitted to a machine and used for preparing logs, limit the risk of chain shot by keeping the shot cone area clear of other workers (see *Figure 15*) ● Remove bark away from the swing path of the loader boom ● Whenever chainsaws are used, follow the techniques in *Chainsaw Operators Manual and Tree Fallers Manual* and secure logs before cutting
 **Safe work procedures**	● Wear suitable and correctly maintained PPE for the work (e.g. hearing protection, eye protection, and safety gloves) ● Use log marking paint according to the instructions on the label and the safety data sheet
 **Communication**	● Establish radio communication or other effective means of contact with other forest workers
Firewood cutting	
 **Safe use of plant**	● Only ever operate log splitters within the manufacturer's specifications ● Provide suitable guarding of the wedge, axe, and pressure plate on the mechanical splitter ● Use mechanical aid to lift boards, posts, or sleepers
 **Safe work procedures**	● Wear suitable and correctly maintained PPE for the work (e.g. high visibility clothing, hearing protection, eye protection, and safety gloves)

12 SILVICULTURE

In this Code, silviculture refers to the science and practice of managing the establishment, growth, health, and protection of stands of trees or forests. This includes a wide variety of activities to maximise the value of timber production, such as:

- burning operations (refer to *Section 13 Fire management* for relevant safety information)
- harvest residue management
- site and soil preparation
- seed collection
- tree planting
- chemical use for nutrient and weed management
- competition control
- protection of crops from browsing animals
- pruning and thinning.

This section has three subsections:

- generic hazards and risks associated with the machinery and equipment used across silvicultural operations
- specific hazards and risk associated with establishing a new forest
- specific hazards and risk associated with maintaining a plantation or forest.

The use of hand tools is included in the sections that address specific hazards.

12.1 Machinery and equipment used across silvicultural operations

The silvicultural operational cycle involves a range of tasks using manual methods, ground-based mechanical methods, and aerial operations.

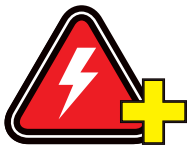
Ground-based mechanical methods use machinery and equipment such as tractors, **all-terrain vehicles (ATVs)**, bulldozers, tractors and excavators, chainsaws, and brush cutters. These each have generic ways of reducing risk to users and other workers that are covered in the section that follows. The generic risk controls focus on equipment use and design, and operator requirements.

Aerial operations can use equipment such as drones, helicopters, and light planes. These operations also have some common risks and controls.

Specific hazards and risks relating to the use of machinery and equipment in individual silvicultural activities are covered in the later sections.

12.1.1 Ground-based machinery and equipment

The use of ground-based machinery and equipment in silvicultural work is carried out in an environment in which most of the **critical hazards** and **common risk factors** are present.



The following **activity-specific hazards** need to be considered:

- Vehicle rollover and run over
- Vehicle instability when carrying or pulling loads
- Falls or strains accessing or exiting machine
- Unbalanced loads or overloading
- Loads shifting in transit
- Excessive loads being towed with unbraked equipment
- Entanglement with unguarded drive and power take-off (PTO) shafts
- Fitting and use of custom-built attachments like chopper rollers, ploughs, and spray units
- Onsite machine maintenance
- Interaction with ground-based workers
- Brush cutter and chainsaw hazards such as lacerations, kickback, and one-handed use

The following **activity-specific risk factors** also need to be considered:

- Steep and/or uneven ground
- Ground conditions
- Communication systems for ground workers and machine operators
- Dust
- Noise
- Extreme weather
- Working in isolation

The **essential risk controls** are all relevant to ground-based machinery and equipment use.

Activity-specific risk controls are listed below:

Generic equipment design and operation controls

- Operate the machine and attachments in line with the manufacturer's specifications (e.g. slope, tyre pressure, load, and towing)
- Guard any moving parts and other hazards on tractors and attachments
- Ensure the machine is suitable for slope and work pattern
- Ensure that protective structures (e.g. rollover protective structures (ROPS), falling object protective structures (FOPS), and operator protective structures (OPS)) are suitable for the machinery, conditions, and type of work and conform to the relevant technical standards (see *Section 15.1*)
- Ensure operators wear seatbelts and there are no loose objects inside the machine's cabin
- Ensure the machine has handrails and steps
- Shut down and isolate machinery completely during maintenance

 **Generic operator requirements**	• Ensure the operator either holds a statement of attainment for the unit of competency relevant to the skill or machine required (see *Section 15.4*) or can demonstrate progress to meeting the performance standard on which the competency is based • Ensure the operator is trained in the working limits of the machine and techniques for use (e.g. limits for working on steep slopes) • Ensure the operator is aware of any identified site hazards, such as power lines and underground assets
 **Safe use of chainsaws**	• Follow safe work practices, for example as in as in the *Chainsaw Operators Manual* and *Tree Fallers Manual* • Ensure equipment is maintained, including the chainsaw's safety features (e.g. guards and chain brakes) • Carry felling equipment, including an axe or suitable size hammer, wedges suitable for the trees to be felled, a two-way communication device, wound dressings, chainsaw fuel and oil in approved containers • Use personal protective equipment (PPE) suitable for the task (e.g. a safety helmet with hearing protection, eye protection, high-visibility clothing, safety footwear, and leg protection) • Ensure PPE is reasonably comfortable for the wearer and well maintained
 **Brush cutters**	• Follow *AS 3575-1995 Clearing saws, brush cutters and grass trimmers – Safety requirements* and *AS/NZS 3576-1998 Clearing saws, brush cutters and grass trimmers – Guide to safe work practices* • Ensure equipment is maintained, including any safety features (e.g. guards)

12.1.2 Aerial operations

Aircraft such as helicopters, light planes and unmanned vehicles (drones) can be used for a range of purposes during silviculture. These include mapping, identifying diseases, applying fertiliser, planting, and evaluating forest growth and post-harvesting waste.

The Civil Aviation Safety Authority (CASA) is the regulatory body for aircraft operation.

Helicopters and light planes are covered by the *Civil Aviation Safety Regulations 1998 (CASR)*. These include:

- compliance with airspace rules
- compliance with pilot qualifications
- operating according to manufacturer's specifications.

Part 101 of the CASR – Unmanned aircraft and rockets – outlines requirements relevant to drones.

For more information, see CASA's advisory circulars:

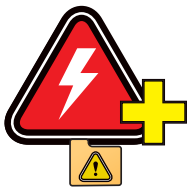
- *Guidelines for helicopters – suitable places to take off and land*, advisory circular AC 91-29 v1.3
- *Remotely piloted aircraft systems – licensing and operations*, advisory circular AC 101-01 v5.1.

Drone safety rules need to be followed and a remotely piloted aircraft operator's certificate (ReOC) is required for the commercial use of drones. A ReOC permits a business to conduct a range of remotely piloted aircraft (RPA) operations – subject to approval – that are not available to other operators.

An exemption exists for use over your own land, but operators still need to be accredited by CASA and registration is likely in the future.

These matters are not covered here and the focus is on interaction with ground-based operations in forestry.

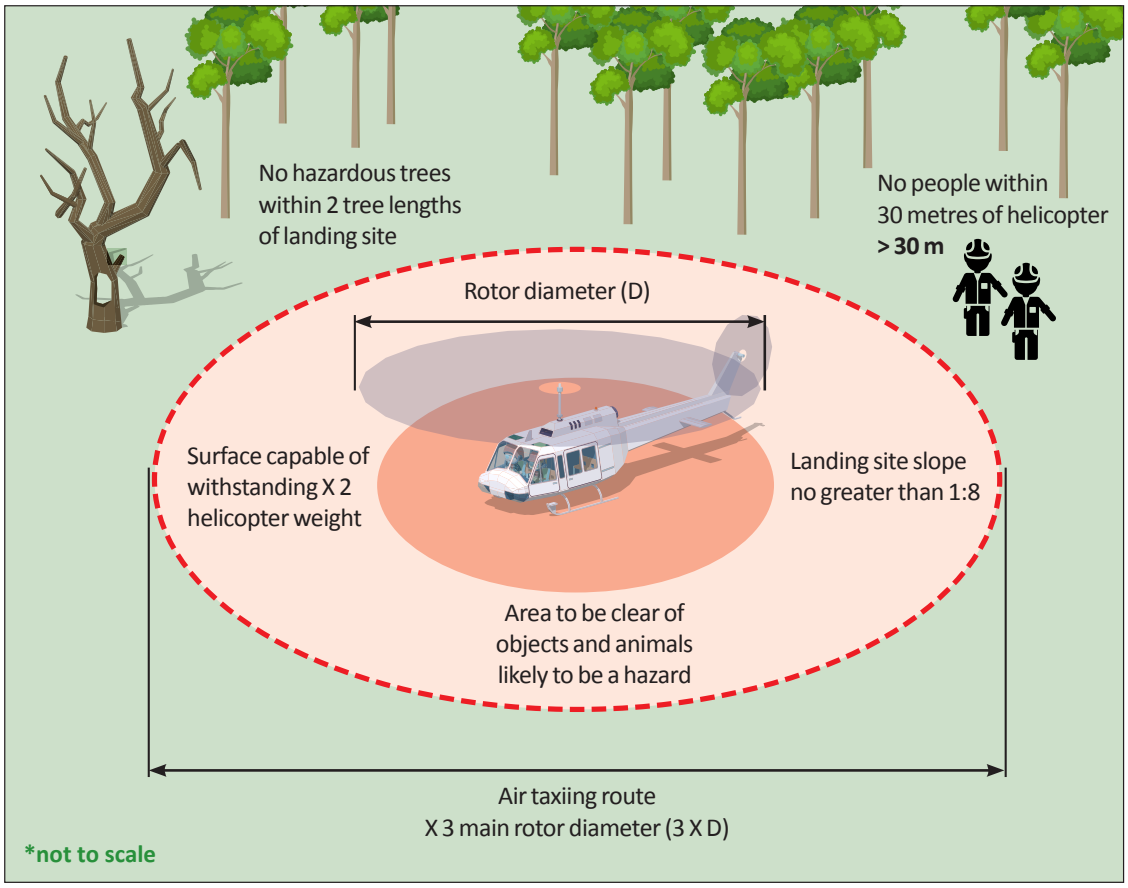
The use of aircraft in silvicultural work is carried out in an environment in which most of the **critical hazards** and **common risk factors** are present.

	The following **activity-specific hazards** need to be considered: △ Extreme weather conditions △ State of landing areas △ Impact of adjacent operations △ Poor visibility
	The following **activity-specific risk factors** also need to be considered: ● Change in weather conditions that impact controlled delivery of service (e.g. wind, mist, rain, or smoke) ● Change in line-of-sight capacity

The **essential risk controls** are all relevant to the use aerial operations.

	**Activity-specific controls** are listed below:
 **Safe work practices for drones**	● Engage contractors who comply with CASA requirements ● Use suitable take-off and landing areas that do not impact on other operations ● Communicate flight plans and schedules to adjacent operations ● Assess collision risk (e.g. from power lines or infrastructure) and maintain separation distances ● Establish emergency procedures for collisions, medical emergencies, loss of control, malfunction, and fires (e.g. as a result of battery malfunction or faulty electronic wiring)
 **Safe work practices for helicopters**	● Use a suitable landing site on flat ground, free of loose debris, and separated from hazards (e.g. trees or objects) to achieve a safe landing zone (see *Figure 20*) ● Plan operations so that anyone affected is aware of the scope and timing ● Have a clear line of control between the helicopter and ground staff through a designated ground controller ● Restrict access to the landing zone to authorised persons ● Follow standard safety precautions for entering and exiting helicopter (e.g. remove loose items, approach from front visible to pilot, and follow hand signals to enter rotor zone) ● Ensure emergency plans include helicopter evacuation and relevant information, such as type of helicopter to be called and compatibility with first aid arrangements (e.g. size of stretcher) ● Follow the more detailed guidance on helicopter safety in Section 12 of the Safe Work Australia *Guide to growing and managing forests*
 **Safe work practices for light aircraft**	● Do not approach the aircraft while the engine(s) are starting up, running or running down ● Do not approach the aircraft until directed to do so by the pilot ● Approach the aircraft from the side, preferably in view of the pilot ● Plan operations so that anyone affected is aware of the scope and timing ● Restrict access to the landing zone to authorised persons ● Communicate flight plans and schedules to adjacent operations ● Assess collision risk (e.g. from power lines or infrastructure) and maintain separation distances

Figure 20: Safe work around helicopters



Further information on aerial spraying can be found in *Section 14.6 Hazardous chemicals*.

12.2 Forest establishment

Planning for planting and replanting is an opportunity to:

- design in safety aspects for future operations
- learn from risks evident in the previous rotation or operation.

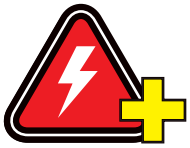
To minimise risk, planting methods should account for future harvesting and reforestation risks, identified site hazards, and the use of existing landings.

Use of machinery and equipment should be appropriate for the area, accounting for hazards identified by the forest manager or landowner. Information on any adjacent operations and their work schedules should be used to minimise the impact on others working on the site.

12.2.1 Mechanical site preparation

Machinery such as bulldozers, excavators, or large tractors may be used to prepare the site. Often they help to manage the residue of the previous tree crop. This process may involve pushing debris into windrows or chopper rolling. Preparing the soil may also involve machinery-dependent processes known as mound ploughing, deep ripping, or mechanised spot cultivation.

Site preparation is carried out in an environment in which most of the **critical hazards** and **common risk factors** are present.

	△ The following **activity-specific hazards** need to be considered: △ Hazardous trees within or adjacent to area △ Stumps left from previous rotation △ Unstable ground △ Rocky ground △ Fatigue from physical work for extended periods of time △ Exposure to snake and insect bites and stings △ Exposure to extreme weather conditions
	△ The following activity-specific risk factors also need to be considered: △ Debris from previous rotation (e.g. windrowing or mechanical cultivation) △ Timing and scheduling of work

The **essential risk controls** are all relevant to site preparation.

	**Activity-specific controls** are listed below:
 **Safe work practices**	● Avoid operating machines directly above other machines and ground workers where stumps, rocks, or logs may roll or slide down the slope ● Form windrows and heaps with larger stumps or logs at the base of the windrow/heap and smaller material around them to increase stability ● Park machinery on flat, level ground whenever possible
 **Personal protective equipment**	● Wear personal protective equipment (PPE) that is suitable for use and correctly maintained (e.g. high-visibility clothing, safety footwear, hearing protection, and safety helmet when outside the cabin (see *Section 15.2*)
 **Exclusion zones and safe work areas**	● Ensure separation distances and safe work areas are identified and maintained ● Ensure the machine (and any material it is pushing or pulling) remains more than two tree lengths away from any people on the ground ● Where two tree lengths is not applicable, maintain a safety zone of no less than 100 metres ● Remove any hazardous trees (or create an exclusion zone if the trees cannot be removed, e.g. a habitat tree) that impinge on safe work areas ● Maintain suitable separation distances from overhead power lines and other infrastructure, and comply with any 'No Go Zones'
 **Communication**	● Maintain oral and visual communication with other workers ● Establish and maintain relevant warning signage

12.2.2 Tree planting

This section addresses mechanical and hand planting of trees. These processes can involve lifting and carrying trees, frequent bending, and heavy physical work.

Planning

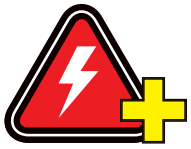
Part 4.2 of the WHS Regulations on hazardous manual handling applies to this activity.

Generally, tree planting activities are repetitive, involve high force, and are carried out in dynamic and unpredictable work environments. Tree planting meets the definition of a hazardous manual task under the WHS Regulations.

A person conducting a business or undertaking (PCBU) must manage health and safety risks relating to musculoskeletal disorders associated with hazardous manual tasks. For more guidance, refer to the Safe Work Australia approved Code of Practice *Hazardous manual tasks.*

Use of machinery should be appropriate to the task and site conditions. It should also meet the generic requirements in *Section 12.1.1*.

Tree planting is carried out in an environment in which most of the **critical hazards** and **common risk factors** are present.



The following **activity-specific hazards** need to be considered:

- Body pain or strain from carrying excessive weight, containers, or trees large distances before planting
- Body pain or strain from the repetitive and sustained application of force, awkward posture, or frequent bending or kneeling during planting
- Blisters and dry skin from handling hand tools and soil
- Fatigue from physical work for extended periods of time
- Exposure to snake and insect bites and stings
- Exposure to extreme weather conditions
- Debris flicking up into the face or eyes

The following **activity-specific risk factors** need to be considered:

- Ground conditions following use of particular harvesting methods
- Site preparation and debris from previous rotation (e.g. windrowing or mechanical cultivation)
- Type and size of planting stock
- Carrying distances
- Timing and scheduling of work

The **essential risk controls** are all relevant to tree planting.

Activity-specific controls are listed below:

Mechanical tree planting

- Complete a site assessment to ensure the machine is suitable
- Ensure the operator is protected from stick and logging debris
- Use transfer mechanisms to minimise the handling of seedlings

Manual handling practices

- Use a machine to carry stock to the planting site
- Use planting tools (e.g. purpose-built spades) that minimise or eliminate the need for bending and minimise force
- Ensure carrying frames are adjusted for each individual
- Restock carry frames on the ground or have someone else do it to avoid twisting and lifting while wearing the frame
- Perform warm-up and warm-down exercises before and after planting sessions
- Provide information and training on techniques to reduce risks (e.g. neutral postures and change of hands) and to identify the best ground for planting

Personal protective equipment and first aid

- Make first aid available for specific risks such as stings and bites
- Plan communications for emergency situations
- Wear suitable protective clothing, including non-slip safety footwear with ankle support, high-visibility outer garments, long pants, long sleeves, gators, wet weather gear, and ultraviolet radiation (UVR) protection

Slips, trips, and falls	• Review site for hazards before work starts • Follow a suitable work–rest regime for the conditions (e.g. heat) • Provide access to drinking water • Use safety footwear
Exclusion zone and safe work areas	• Do not work directly above other workers on steep slopes • Stay at least 10 metres away from ATVs and other machinery on site • Comply with all warning signs on site
Communication	• Determine communication methods between planting crew members before starting on a new site • Provide access to a mobile phone or other reliable communication device for emergency calls

12.2.3 Weed control

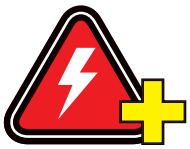
This section covers manual and machine weed control practices. Manual weed control involves frequent bending and heavy physical work using tools like axes, shears, and hand-held motorised plant. Where chemical herbicides are applied – either by workers using spray units or by machines with spray units or booms – different issues arise related to exposure to hazardous chemicals.

Planning

Both manual and mechanical methods are bounded by regulations on hazardous manual handling, hazardous chemicals and agricultural chemicals. The *Code of practice for the use of agricultural and veterinary chemicals in Western Australia* must also be followed.

Initial coupe planning and risk assessment should provide information on soil types and vegetation. This information will inform the most appropriate weed control methods and scheduling. Other site hazards should be identified, and controls established before work starts.

Weed control is carried out in an environment in which most of the **critical hazards** and **common risk factors** are present.

	The following **activity-specific hazards** need to be considered: △ Muscular pain or strain from manual weed control work △ Muscular pain or strain from handling and storing chemicals and application methods (e.g. using harnesses) △ Exposure to chemicals △ Exposure of others working near chemicals △ Exposure to snake and insect bites and stings △ Walking or working with machines on steep ground
	The following **activity-specific risk factors** also need to be considered: • Weight and shape of chemical containers • Toxicity of chemicals • Walking distances • Weather conditions that may affect spray drift • Timing and scheduling of work • Ground conditions following use of particular harvesting methods

Eliminating or minimising risk is the starting point for deciding what controls should be used (e.g. using machines rather than manual work or less hazardous chemicals). The **essential risk controls** are all relevant to weed control.

	**Activity-specific controls** are listed below:
Chemical weed control	
 **Aerial spraying**	● Develop a spray plan in line with the *Code of practice for the use of agricultural and veterinary chemicals in Western Australia* ● Take precautions to avoid spray drift
 **Machines with spray units**	● Identify safe routes for vehicles ● Check on weight and load distribution before operation ● Select machines that have enclosed cabins and air conditioning units with appropriate air filters ● Calibrate application equipment ● Use pumps to deliver chemicals and water into spray tanks ● Use chemical-proof PPE when checking and calibrating nozzles
 **Manual application**	● Use manufacturers and suppliers who can provide product in smaller, lighter packaging and provide lifting points or aids to minimise the use of force ● Supply chemicals in smaller containers where they will be physically handled by workers ● Follow a suitable work–rest regime for the conditions (e.g. heat)
 **Exclusion zone for ground-based operations**	● Maintain a distance of more than: – two tree lengths between machine-based chemical spraying (dozer/tractor) and other operations – 5 metres between vehicles or trailers fitted with spray units and other ground workers – 5 metres between ATVs fitted with spray units and other ground workers – 5 metres between individuals using spray units and other ground workers
 **Personal protective equipment and first aid**	● Wear suitable PPE, including a safety helmet, eye protection, and non-slip safety footwear with ankle support, as well as more specific equipment such as: – protective chemical-proof overalls – chemical-proof gloves – a dust-proof filter mask for powders or granules as specified in the safety data sheet – a vapour-proof chemical mask for liquid chemicals as specified in the safety data sheet ● Wear suitable PPE when using an ATV (e.g. a helmet conforming to *AS/NZS 1698:2006 Protective helmets for vehicle users* or an equivalent standard, and eye protection) ● Make first aid available for specific risks such as stings and bites and in line with safety data sheet requirements, including arrangements for emergency eye washing and spill kits after eye washing

Mechanical weed control	
 **Mulchers and slashers**	● Ensure custom attachments are matched to the capacity and design of the base vehicle ● Ensure mulchers or slasher have deflectors, chain curtains, or other suitable guarding, mounted at the intake and discharge areas
 **Personal protective equipment**	● Wear suitable PPE, including a safety helmet, eye protection, and non-slip safety footwear with ankle support

12.2.4 Fertiliser

Fertiliser may be used at several stages when a forest is being established. It may be applied by aerial spraying, machine spreaders or manual methods.

Planning

The type of fertiliser to used, the application rate and timing of application, may have implications for health and safety. Planning how fertiliser will be spread in a safe way should be assessed before work starts.

Fertiliser application is carried out in an environment in which most of the **critical hazards** and **common risk factors** are present.

	The following **activity-specific hazards** need to be considered: △ Chemical reaction to extreme conditions (e.g. heat or other chemical contamination) △ Slips, trips, and falls walking around the site △ Sprains and strains restocking fertiliser bags △ Exposure to dust and chemicals △ Burns or skin irritation △ Exposure to solar UVR
COMMON RISKS	The following **activity-specific risk factors** need to be considered: ● Walking distances ● Timing and scheduling of work ● Ground conditions following use of particular harvesting methods

The **essential risk controls** are all relevant to fertilising.

ESSENTIAL CONTROLS	**Activity-specific controls** are listed below:
Aerial spraying	● Develop a spray plan in line with the *Code of practice for the use of agricultural and veterinary chemicals in Western Australia* ● Take precautions to avoid spray drift
Mechanical spreaders	● Ensure suitable guarding of the hopper top and front spinning guards, spinner at the bottom of the fertiliser spreader, and the cultivation blades inside the hopper
Manual application	● Use manufacturers and suppliers who can provide product in smaller, lighter packaging and provide lifting points or aids to minimise the use of force ● Supply fertiliser in smaller containers where it will be physically handled by workers ● Follow a suitable work–rest regime for the conditions (e.g. heat)
Exclusion zone for ground-based operations	● Maintain a distance of more than two tree lengths between a machine-based fertiliser spreader and other operations

Personal protective equipment and first aid	• Wear suitable PPE, including a safety helmet, eye protection, and non-slip safety footwear with ankle support, as well as more specific equipment such as: – gloves – a dust-proof filter mask for powders or granules as specified in the safety data sheet • Make first aid available for specific risks such as stings and bites and in line with safety data sheet requirements, including arrangements for emergency eye washing

12.3 Maintenance

Maintenance operations prevent damage to the tree crop and maximise its growth and value. Other biological organisms including fungal diseases, insects, and animals (e.g. rabbits and deer) may damage crop trees.

Planning should outline what maintenance activities are required. Regularly monitoring forest health enables a timely response to any issues. Forest growth is generally measured via specific inventory programs.

Monitoring and inventory programs require workers to walk under forest canopies – often through heavy undergrowth where most of the **critical hazards** and **common risk factors** are present.

	The following **activity-specific hazards** need to be considered: △ Hazardous trees △ Branches △ Heavy undergrowth that may be spiky △ Snakes and insects △ Slips, trips, and falls walking around the site △ Exposure to solar UVR
COMMON RISKS	The following **activity-specific risk factors** also need to be considered: • Timing and scheduling of work • Working at night

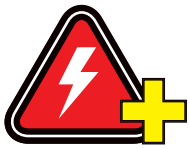
The **essential risk controls** are all relevant to maintenance operations.

ESSENTIAL CONTROLS	**Activity-specific controls** for monitoring and inventory work are listed below:
Safe work procedures	• Review site for hazards before work starts • Plan operations to minimise walking through rough terrain • Pre-assess night operations • Follow a suitable work–rest regime for the conditions (e.g. heat) • Provide access to drinking water • Use safety footwear
Personal protective equipment and first aid	• Make first aid available for specific risks such as stings and bites • Plan communications for emergency situations • Wear suitable protective clothing, including non-slip safety footwear with ankle support, high-visibility outer garments, long pants, long sleeves, gators, wet weather gear, and UVR protection

Exclusion zone and safe work areas	• Comply with all warning signs on site from other operations

12.3.1 Protection from insect or fungal infestation

Insect and fungal disease control is carried out in an environment in which most of the **critical hazards** and **common risk factors** are present.

	The following **activity-specific hazards** need to be considered: △ Exposure to chemicals △ Exposure of others working near chemicals △ Exposure to snake and insect bites and stings △ Walking on steep ground
	The following a**ctivity-specific risk factors** also need to be considered: • Toxicity of chemicals • Weather conditions that may affect spray drift • Timing and scheduling of work

Eliminating or minimising risk is the starting point for deciding what controls should be used (e.g. machine rather than manual work or less hazardous chemicals). The **essential risk controls** are all relevant to pest management.

	**Activity-specific controls** are listed below:
Aerial spraying	• Develop a spray plan in line with the *Code of practice for the use of agricultural and veterinary chemicals in Western Australia* • Take precautions to avoid spray drift
Machines with spray units	• Identify safe routes for vehicles • Check on weight and load distribution before operation • Select machines that have enclosed cabins and air conditioning units with appropriate air filters • Calibrate application equipment • Use electric pumps to deliver chemicals and water into spray tanks • Use chemical-proof PPE when checking and calibrating nozzles
Manual application	• Use manufacturers and suppliers who can provide product in smaller, lighter packaging and provide lifting points or aids to minimise the use of force • Supply chemicals in smaller containers where they will be physically handled by workers • Follow a suitable work–rest regime for the conditions (e.g. heat) • Use well-maintained and calibrated subsoil seedling injectors
Exclusion zone for ground-based operations	• Maintain a distance of more than: – 5 metres between vehicles or trailers fitted with spray units and other ground workers – 5 metres between individuals using seedling injectors and other ground workers

Personal protective equipment and first aid	● Wear suitable PPE, including a safety helmet, eye protection, and steel-toe lace-up footwear with ankle support and non-slip soles, as well as more specific equipment such as: – protective chemical-proof overalls – chemical-proof gloves – a dust-proof filter mask for powders or granules as specified in the safety data sheet – a vapour-proof chemical mask for liquid chemicals as specified in the safety data sheet ● Wear suitable PPE when using an ATV (e.g. a helmet complying with *AS/NZS 1698:2006 Protective helmets for vehicle users* or equivalent standard, and eye protection) ● Make first aid available for specific risks such as stings and bites and in line with safety data sheet requirements, including arrangements for emergency eye washing

12.3.2 Protection from animal browsing

Animal browsing can destroy or damage crop trees in planted forests. Protection operations aim to remove the threat until trees are large enough to withstand damage.

Non-lethal control involves the use of:

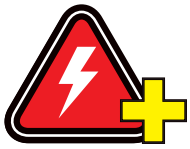
△ repellants – where specific products are applied to the seedlings to discourage browsing
△ tree guards – where fluted plastic tubes encase seedlings
△ fencing – where fence barriers protect high value crops such as seedling stocks.

Lethal control (culling) involves the use of:

△ firearms
△ trapping
△ poisons.

Planning

The type of control used may have implications for health and safety. Planning should assess how pest management will be done safely, before work starts.

	The following **activity-specific hazards** need to be considered: △ Firearm injuries △ Noise △ Off-target poisoning △ Injuries from carrying and handling tree guards or fencing materials
	The following **activity-specific risk factors** also need to be considered: ● Isolation ● Impacts on neighbours ● Working at night ● Slips and trips

The **essential risk controls** are all relevant to protecting crops from animals.

	**Activity-specific controls** are listed below:
Non-lethal control	
 **Safe work procedures**	• Plan operations to reduce risk of strain injuries • Wear a safety helmet and safety footwear • Wear high-visibility clothing • Wear eye protection and leather gloves while fencing • Make first aid available for specific risks such as stings and bites and in line with safety data sheet requirements, including arrangements for emergency eye washing
Lethal control - firearms	
 **Safe work procedures**	• Hold the appropriate firearms licence for any firearms being carried or used • Always have a functional communication system • Wherever possible, be accompanied by another person • Ensure that you have a functional GPS tracking device and spare batteries • Notify all neighbours before starting operations on a site • Ensure that firearms and ammunition are stored in line with the state's firearms regulations • Adhere to all basic firearm safety requirements • Ensure that firearms are secured (restrained) and not loaded while travelling in a vehicle in line with relevant legislation • Know the range of the ammunition being used • Identify the target before shooting
 **Exclusion zones**	• Do not shoot at a target if what is behind the target cannot be seen • Do not shoot over public roads or tracks • Do not shoot over property boundaries
 **Personal protective equipment and first aid**	• Wear well-maintained hearing protection • Ensure that anyone within 5 metres of a shooter (e.g. a passenger) also wears hearing protection • Wear a safety helmet and safety footwear • Wear high-visibility garment(s) • Wear eye protection

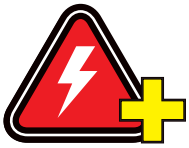
12.3.3 Pruning

Pruning is the removal of branches from the main trunk of a tree to improve the quality and value of the timber produced.

 **Planning**

Many of the hazards and risk controls for tree climbing (see *Section 15.7*) apply to pruning and a limited number of hazards are covered here. The planning and risk assessment issues for tree climbing also apply to pruning.

Tree pruning is carried out in an environment in which most of the **critical hazards** and **common risk factors** are present.



The following **activity-specific hazards** need to be considered:

- Falling from height
- Slipping on ladders when climbing up or down
- Pruning tools coming loose while working
- Chainsaw hazards such as kickback or one-handed use
- Ladder sway when pruning in windy conditions
- Exposure to snake and insect bites and stings
- Cuts and abrasions from mishandling pruning equipment
- Being struck by falling limbs or other debris
- Carrying ladders while walking through thick undergrowth

The following **activity-specific risk factors** also need to be considered:

- Ground conditions following use of particular harvesting methods
- Individual tree integrity, including:
  - age and species
  - health
  - condition of the crown
  - decay
  - proximity of other trees

The **essential risk controls** are all relevant to tree pruning.

Activity-specific controls are listed below:

Safe climbing practices

- Work from ground level where practicable (e.g. use a pole saw)
- Assess each tree, particularly for prune height and access method
- Ensure cutting methods do not cause limbs to fall into the ladder or climber
- Do not carry out pruning operations during extreme weather when the movement and dynamic loading on the tree can be unpredictable
- Establish a clear walking path before moving from one tree to the next
- Use other controls in line with *Section 15.7*

Ladders

- Use a purpose-built ladder attached to the tree trunk at its top and secured at the base
- If working from a ladder at height, use a work-positioning harness and a steel core, rope flip-line attached to the tree to reduce the risk of a fall
- Use other controls in line with *Section 15.7*

Pruning equipment

- Always use a scabbard or holster to carry pruning equipment (e.g. shears, secateurs, loppers, or saws) and always pick up loppers using the handles
- Ensure chainsaw operators follow the safety precautions in as in the *Chainsaw Operators Manual* and *Tree Fallers Manual.*
- Regularly maintain pruning equipment

Personal protective equipment and first aid

- Wear suitable PPE, including a safety helmet, eye protection, cut resistant gloves, and steel-toe lace-up footwear with ankle support and non-slip soles
- Make first aid available for specific risks such as stings and bites
- Plan communications for emergency situations

12.3.4 Thinning

Planning

Thinning is a selective felling operation and may include one or more of the following:

- **Ecological thinning** – thinning to improve the health and vitality of a natural forest
- **Commercial thinning** – thinning to extract small piece size material, and thinning for saw log and small produce
- **Non-commercial thinning** – thinning to waste and thinning for stand improvement.
- **Coppice management** – reducing the number of **coppice** stems on a single stump.

The safety procedures for thinning operations are like those for felling other trees. Refer to and apply requirements of *Section 8*. In particular, the following controls should also be used by everyone involved in thinning operations:

- Identify hazardous trees by referring to the features in *Section 14.2*.
- Ensure fellers keep watch on the falling tree and look out for limbs and branches that may be thrown back.
- Remove dead or defective trees in the intended fall direction before starting thinning operations.
- Bring hung-up trees to the ground as soon as possible.
- Ensure the feller does not leave the area until the tree is grounded, except to seek assistance. Before leaving to seek assistance, the feller should make other people in the immediate area aware of the danger and should mark the hung-up tree as per hazardous tree marking procedures (see *Section 14.2*).
- Whenever a tree cannot be completely felled, do a risk assessment to find an alternative way of bringing it to the ground safely.

Non-commercial thinning and coppice management requires the felling of smaller trees and stems. Where practical, a mechanical system should be used.

Manual non-commercial thinning and coppice management is carried out in an environment in which most of the **critical hazards** and **common risk factors** are present.

	The following **activity-specific hazards** need to be considered: ⚠ Being struck by small branches and falling trees ⚠ Lacerations from chainsaws or brush-cutters ⚠ Exposure to snake and insect bites and stings ⚠ Exposure to extreme weather conditions ⚠ Debris flicking up into the face or eyes
COMMON RISKS	The following **activity-specific risk factors** also need to be considered: ● Chainsaw sharpening and bar maintenance ● Handling of fuels and oils ● Noise and vibration ● Mental and physical fatigue ● Slips, trips, and falls

The **essential risk controls** are all relevant to manual non-commercial thinning and coppice management.

ESSENTIAL CONTROLS	**Activity-specific controls** are listed below:
Safe work practices	● Scarf trees if the sum of the height in metres and diameter in centimetres exceeds 25 (e.g. height 15 m + diameter 12 cm > 25, so scarf is required) ● If regularly falling coppice that has to be scarfed as above, carry an axe or hammer to drive wedges and at least 2 wedges; keep these items available on site at all other times ● Fell trees to an open area ● Establish a clear walking path before moving from one tree to the next ● Follow other controls as set out in *Section 8*

13 FIRE MANAGEMENT

Uncontrolled fire is a threat to forests that needs to be minimised. Fire is also a tool that can be actively used to:

- reduce the threat of uncontrolled fire
- make sites safer for other operations
- provide ecological benefits.

The following section explains how fire-related operations must be done, to protect the health and safety of workers and to ensure others are not impacted by those operations.

The landowner, forest manager and contractor all have responsibilities – both shared and individual – to eliminate or minimise health and safety risks. This means suitable fire suppression equipment should be installed in machines and vehicles. When the risk of unplanned fire is high equipment to suppress fires and monitor fire weather is expected on site.

General planning

The key documents outlining requirements for fire management are the:

- *Guidelines for plantation fire protection* published by the Fire and Emergency Services Authority of Western Australia
- *Code of practice for timber plantations in Western Australia* published by FIFWA
- *FIFWA Minimum Fire Season Requirements for Working in WA Plantation Forests*.

These documents require a fire management plan and outline what should be included.

Fire management plans more generally should cover:

- features of the forest area pertinent to fire risk
- arrangements to monitor fire season weather
- responsibilities and cooperative arrangements
- communication protocols and emergency plans
- purpose-specific equipment, as well as supplementary fire equipment, for forest machines and vehicles
- adequate staff resources and suitable training.

More specific requirements for different fire management operations are as follows.

Prescribed burns

Prescribed burning may be done for plantation site preparation, fuel reduction, ecological reasons, or forest **regeneration.** As a planned forest operation, it must be done in a way that eliminates or minimises health and safety risks from fire and related risks.

Planning for these activities should include all the general matters with a particular emphasis on:

- all the requirements, such as permits and notifications, of Western Australian law
- written and approved burn plans
- public, neighbour, and stakeholder notification
- specific training in prescribed burning practices.

Response to uncontrolled bushfire

Planning for bushfire response on owned or managed land must be done in a way that eliminates or minimises health and safety risks from fire and related risks. It should include:

- regular assessment of fire fighters' health and fitness
- regular inspection and maintenance of fire-fighting equipment in line with the manufacturer's recommendations.

The workplace health and safety requirements of the agencies governing the control and allocation of resources should be reviewed for adequacy and followed where practical.

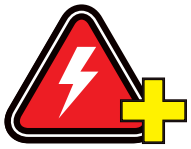
Consultation, cooperation, and coordination

Managing fire risks – whether to prevent fires or when responding to them – requires parties to consult, cooperate, and

coordinate. This includes:

- consultation with workers about risks to health and safety in planned and unplanned fire situations
- consultation and coordination with and between landowners, forest managers, and contractors on applicable fire management standards
- consultation and coordination with adjacent properties, stakeholders, or operations that may be impacted by fire activity
- consultation, cooperation, and coordination with lead fire agencies and any memorandum of understanding or interagency protocols.

Fire management is carried out in an environment in which most of the **critical hazards** and **common risk factors** are present.

	The following **activity-specific hazards** need to be considered: △ Exposure to smoke and heat △ Working around aircraft and machinery △ Fatigue △ Entrapment by fire △ Lack of signage about access and egress in road system △ Slips, strains, and falls when workers are getting in and out of machinery △ Manual handling △ Working at night △ Handling combustible materials
	The following **activity-specific risk factors** also need to be considered: ● Weather history and patterns ● Quantity, type, and arrangement of fuels ● Forest operations using equipment such as chainsaws, cables, machinery, vehicles, or tools with potential to create fire hazards ● Coupe accessibility ● Availability of water

The **essential risk controls** are all relevant to fire management.

	**Activity-specific controls** are listed below:
 **Safe work practices**	● Where fire management includes the felling and cutting of trees, follow *Section 8.2 Felling hazardous trees* whenever practicable ● Follow the forest manager's fire weather monitoring requirements and thresholds for suspending or stopping work ● Monitor fire weather in the work area and advise the forest manager if work is suspended or stopped ● Do not work alone, as either a ground worker or a machine operator ● Follow a work–rest regime suitable for the current and forecast conditions ● Ensure there is availability of and opportunity for frequent hydration ● Work from a secure anchor point and avoid being in the unburnt area ahead of, above, or to the flank of the fire ● Pass burning trees on the uphill side or above the lean
 **Exclusion zone and safe work areas**	● Provide information and instruction to ensure everyone knows where the escape routes are ● If cut off by the fire, try to move to an area that has already burnt ● Park vehicles in the direction of the escape route, with doors closed, windows up, and keys in the ignition, and in a position to allow other vehicles to pass ● Close roads and tracks in the area to exclude anyone not involved in fire fighting ● Establish communication between machine operators and ground workers to maintain safe separation distances ● Use communication between an aircraft's pilot or authorised ground personnel and ground workers to maintain safe separation distances in the aircraft's drop zone

 **Competencies and readiness**	● Ensure workers in planned fire management operations have the relevant competencies to complete the task safely ● Ensure workers responding to unplanned fire management events have the relevant competencies to complete the task safely ● Ensure crew leaders have additional fire management competencies including: – understanding of how weather and topography affect fire behaviour – understanding and practical application of fire-fighting strategies and tactics ● Ensure fire-fighting duties are only undertaken by those who have been assessed for their physical capacity to do the anticipated tasks ● Do not carry out fire-fighting duties while affected by alcohol or drug consumption ● Ensure workers meet the requirements of relevant drugs and alcohol policy. ● Workers volunteering as part of an industry fire suppression crew are required to report for duty with a BAC of less than 0.05% unless that worker was rostered on for fire duty in which case the worker is required to report for duty with a BAC of 0.000%.
 **Personal protective equipment (PPE) and first aid**	● Provide PPE to protect workers in fire management operations (see *Section 15.2*) including: – overalls or a long-sleeved shirt/trouser combination of a suitable material to protect against heat radiation and sparks, in a highly visible colour – safety helmets suitable for bush fire fighting – goggles and smoke masks when conditions require – gloves that protect against cuts, punctures, and heat penetration – laced or zipped leather steel-capped boots with non-slip soles and good ankle support
 **Design and operation of plant**	● Ensure fire-fighting equipment is suitable for the relevant fire management operations ● Regularly inspect, test, and maintain the equipment in line with the manufacturer's recommendations ● Keep the equipment close to active operation, so that it is readily available when required ● Equip any machines that operate at night with at least one forward and one rear light to permit safe working ● Calibrate and maintain weather monitoring equipment (e.g. digital wind meter or fire danger meter) in line with the manufacturer's instructions
 **Use of drip torches**	● Ensure that the weather conditions are suitable and compatible with the prescribed burn ● Notify neighbours and use signage to warn of burning operations ● Check the effectiveness of emergency communication equipment before the operation starts ● Keep fire-fighting equipment close to active operation, so that it is readily available when required ● Ensure all fuel is stored in labelled containers and handled in line with the safety data sheet ● Use and maintain equipment in line with the operator's manual ● Ensure drip torches are not leaking ● While refilling torches, wear impervious gloves and have a fire extinguisher readily available ● Ensure that the system of work minimises the risk of the fire getting out of control: – only light manageable areas not the whole area – burn edges into the wind where possible, in strips ● Wear leather gloves when handling lit drip torches