PART THREE
SPECIFIC OPERATIONS

7 SITE ACCESS AND ROADING
8 TIMBER HARVESTING
9 LOG EXTRACTION
10 LOG LANDINGS, LOADING AND UNLOADING
11 IN-FIELD PROCESSING
12 SILVICULTURE
13 FIRE MANAGEMENT

7 SITE ACCESS AND ROADING

Planning

The planning of roads, traffic management, and other requirements to enable safe access and egress from the site is an important responsibility of landowners and forest managers. It is a key part of the hand over process outlined in previous sections. Information about hazards should be passed on to any contractors, and the site safety plan (SSP) should cover roading and site access. The SSP should be understood by all operators working on the site.

For requirements for road and bridge construction, refer to Chapter 6 of the WHS Regulations and the related Safe Work Australia approved Code of Practice *Construction work*.

The risk assessment and safety planning approach in these regulations is closely aligned to the approach in this Code. However, duty holders should ensure construction activities are done in such a way that they comply with their regulatory duties.

The related issue of log landings is covered in *Section 10 Log landings, loading, and unloading*.

Site access and roading 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:

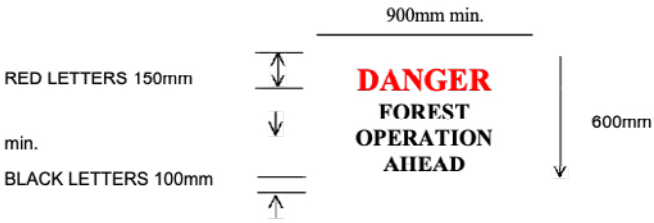
- Traffic flow and traffic levels that create collision risks
- Poor line of sight and blind intersections
- Inadequate visitor controls
- Unclear or inappropriate signage
- Inappropriate speed limits
- Undefined evacuation routes
- Type and specifications of vehicles (e.g. width or axle load) that create vehicle instability and damage to road
- Inadequate passing bays for expected traffic
- Road specifications (width, surface and drainage)
- Poor haul route planning

The **essential risk controls** are all relevant to roading and site access work.

Activity-specific controls are listed below:

Signage and traffic control

- Display clearly legible, suitable signage both to control traffic on access roads and to mark any harvesting operations that could present a risk to others, including signs to:
  - show road closures
  - warn of infrastructure such as power lines
  - advise of personal protective equipment (PPE) requirements and communications protocols
  - give adequate warning to anyone approaching
  - direct visitors to contact points
- Use signs at the entrance to the coupe or site and to areas where high-risk forestry operations are underway (e.g. felling, log landing, or spraying)
- Ensure signage conforms to:
  - *AS 1319-1994 Safety signs for the occupational environment*
  - *AS 1743:2018 Road signs – Specifications*
  - *AS 1742.1-2003 Manual of uniform traffic control devices – Part 1: General introduction and index of signs*
- Use typical signs such as the following:



- For more detail, refer to the Australian Forest Products Association's *Safety signage in forestry operations* guideline
- Manage traffic or close the road when trees are being felled/pushed within two tree lengths of a road

Road construction

- Build roads in line with construction-specific regulations (e.g. with a safe work method statement (SWMS) and white cards)
- Remove hazardous trees or identify them with marking or tape and add them to the SSP
- Ensure each road is capable of carrying the intended vehicles
- Where road lines are not harvested before road construction, pull/push all trees that have been felled or pushed over so they are clear of standing trees and leave them in a safe position
- Fell or push over standing trees that have had their roots disturbed or undermined by roading activity to eliminate the risk of accidental fall
- Adopt traffic control measures, including signage, during construction
- Follow the operator competencies in *Section 15.4*
- Use equipment that conforms to the standards in *Section 15.1*

Visitor control

- Display signs to direct visitors to contact points
- Have a designated person in the crew at the main work site who is responsible for meeting and inducting visitors
- Establish and follow a sign-in process for visitors that informs them of site hazards, site procedures, emergency procedures, and the PPE they must wear
- Ensure visitors remain in safe zones separated from the activity by the designated distance (e.g. two tree lengths or outside chain shot danger zones)
- Ensure visitors are aware of their duty to follow all reasonable instructions (e.g. following agreed safe work practices and wearing required PPE)

Unauthorised persons	● If unauthorised persons enter a work site (e.g. protestors or illegal firewood collectors), follow this process: – Cease activity – Secure the site and equipment – Request people leave if safe to do so – Contact the relevant authorities – Collect any relevant information – Inspect the site and equipment to ensure nobody is at risk before restarting work
Communications	● Use communication systems for access to the coupe and for communication between operators in machines and operators on the ground ● Use an effective ultra-high frequency (UHF) radio system for access, work on site, and emergency purposes ● Follow a radio protocol that is documented and understood by all workers ● Test the radio system to ensure all workers can communicate their intended movements and be confident that messages are heard and understood ● Display the UHF channel used in the coupe on entry signs ● Ensure the radio system allows communication of: – an operator exiting a machine or truck – an operator moving into or out of a safe work area – a worker or visitor entering the site – movement on access roads to warn other drivers ● Ensure that the 'owner' of an exclusion zone directs communication when another worker seeks to enter that zone, and that any request is answered before entry ● Do not allow the use of mobile phones in vehicles or machines while they are operating ● Adopt backup hand or voice signals where the radio system is not operable ● Have a backup emergency contact system, in case the primary system fails (e.g. location of nearest farmhouse and mobile phone transmission point) ● Equip ground workers, such as manual fellers, with radio units, global positioning systems (GPS) or other working alone technologies (e.g. man down alarms) to enable both safe work and emergency communication

8 TIMBER HARVESTING

The type of felling method will be determined during the planning stage of new operations. The options available include:

- **manual felling**
- mechanised felling
- a combination of both methods.

Traction-assisted methods may also need to be considered for sleep slopes.

8.1 Manual felling

Planning

Planning should assess and outline the type or combination of felling methods. This assessment should involve all operators involved in felling and extraction.

The plan should detail issues such as:

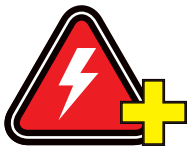
- What felling method will be used first and why?
- How will the system of work maintain safe separation distances?
- How will any manually felled trees be fallen into clear and open areas?
- How will ground hazards be eliminated or minimised for the manual feller?
- How will overhead hazards be eliminated for the manual feller?
- How will any remaining hazards be identified?
- What system of communication will be used between the mechanical felling machines, extraction machines, and manual fellers if they are felling and extracting at the same time?

Consultation, cooperation, and coordination

Specific operational plans and methods should be supplemented by a walk through before operations start. They should then be adjusted when there are significant changes in operating conditions (e.g. weather, wind, visibility, or traction).

Crew meetings should also be held before work starts to ensure all workers and contractors understand the specific felling plans.

Manual felling 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: △ Standing vegetation in the intended direction of fall △ Worker being struck by the butt of the tree △ Kickback or recoil from the chainsaw △ Weather conditions including heat, wind, rain, and cold △ Slips, trips, and falls △ Noise △ Fatigue
	These **activity-specific risk factors** also apply: ● Tree species and characteristics ● Tree felling boundaries and information on any adjacent mechanised felling operations ● Environmental restrictions ● Felling direction, and extraction method and direction

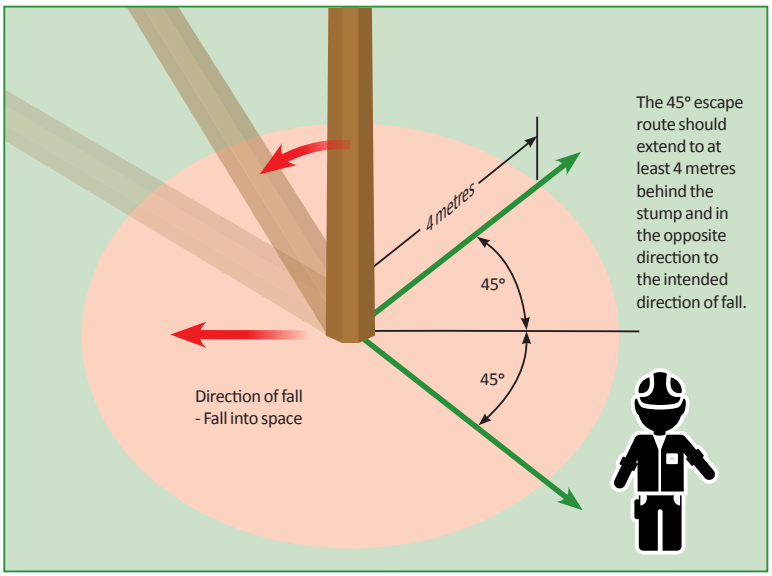
To safely fell a tree manually, specific control measures are necessary and depend on the nature of the work area. The **essential risk controls** are all relevant to manual felling.

	**Activity-specific controls** are listed below:
 **Safe work procedures**	● Identify all hazardous trees (see *Section 14.2*) ● Use mechanical help where possible for trees with excessive natural lean away from the intended direction of fall (see *Section 15.6*) ● Carry out ongoing checks for hazards, especially overhead hazards and changing conditions ● Stop operations in a strong breeze (see *Section 14.16*) ● Limit felling to daylight hours
 **Exclusion zone and safe work areas**	● Maintain a separation distance of two tree lengths ● When a trainee feller is under instruction, ensure the supervising or instructing feller is located at the immediate base of the tree and able to intervene in the procedure ● On steep ground where there is a risk of felled trees sliding or rolling downhill, ensure nobody is working below the tree feller ● Maintain radio communication with other forest workers ● Use signs and manage traffic where the work area is close to roads ● Close roads if needed (e.g. felling within two tree lengths of road)

Escape routes

- Where escape routes are impeded by undergrowth, remove material around the base of the tree using the blade of a machine before felling
- Extend a 45-degree escape route to an area at least 4 metres away from the stump (see *Figure 12*)

Figure 12: Escape route and direction of felling



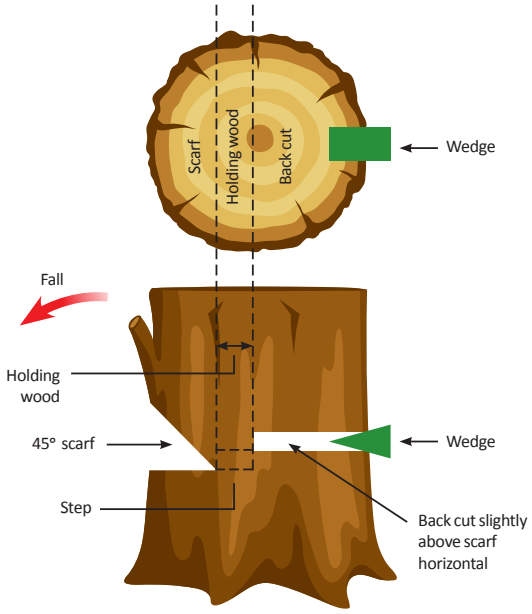
Safe use of chainsaws

- Hold the relevant national competency qualification FWPHAR3221: Harvest Trees Manually (advanced), which is mandated by industry for commercial harvesting operations
- Follow safe work practices, for example as in the *Chainsaw Operators Manual* and *Tree Fallers Manual* (see also *Figure 12* and *Figure 13*).
- Ensure equipment is maintained, including the chainsaw's safety features (e.g. hand guard and chain brake)
- 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, hand protection, high-visibility clothing, safety footwear, and leg protection)
- Ensure PPE is reasonably comfortable for the wearer and well maintained

Minimising of risks from elevated hazards

- Fell trees into an open area where possible
- Ensure falling trees do not strike brush or other standing trees as they fall
- Avoid using wedges where there is a chance limbs may be dislodged
- Consistently apply suitable felling methods, such as in as in the *Chainsaw Operators Manual* and *Tree Fallers Manual* (see also *Figure 12* and *Figure 13*)

Figure 13: Tree felling



- Except for trees with a clear lean in the intended felling direction, insert a holding wedge into the back cut of each tree manually felled with a chainsaw
- If a tree sits back during felling, the tree feller should follow a safe system of work in line with the accepted procedures (refer to Safe Work Australia's *Forestry: Guide to managing risks of timber harvesting operations*, Appendix A

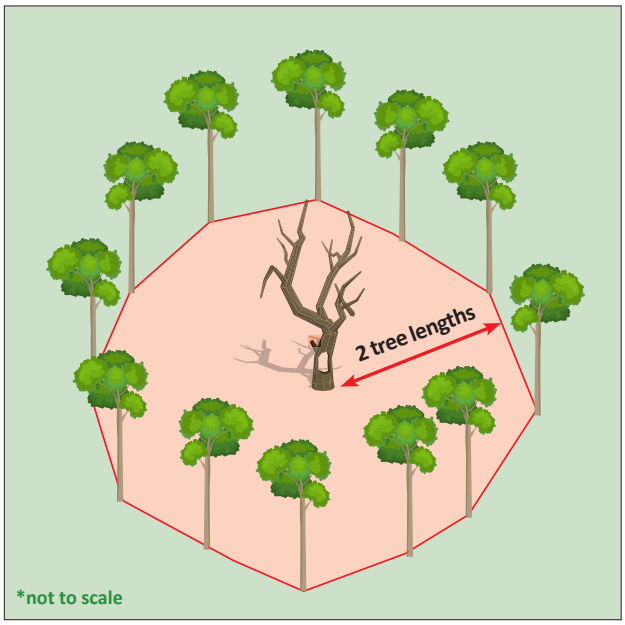
8.2 Felling hazardous trees

Dead or hazardous trees (see *Section 14.2*) are unpredictable – for example, these trees are more likely to fall unexpectedly or have branches break off. Extra care should be taken to identify hazards and put control measures in place to protect the feller.

A qualified advanced feller should only fell a hazardous tree that is within their competency. They should check for the presence of any features shown in *Section 14.2*.

The **essential risk controls** are all relevant to felling hazardous trees.

Activity-specific controls are listed below:

Prohibition of work near hazardous trees	• If the tree is assessed as being too high-risk to fell, clearly identify the tree without placing anyone at risk • Mark the tree with a red and white hazard tape if safe to do so • Clearly mark the hazardous area around the tree with high-visibility tape to a distance of two dominant tree lengths (see *Figure 14*) • Record the tree's location on site documentation with methods such as GPS way point • Do not carry out any work in the hazardous zone until the tree is brought down ***Figure 14: Hazardous tree exclusion zone*** 
Use of mechanical equipment as the first option	• If the hazardous tree is assessed as high risk, first consider using mechanical equipment to fell it • Use a harvester, dozer, excavator, or skidder with a protective structure to remove the tree
Manual felling assessed as manageable	• Where the risk is assessed as manageable by manual felling techniques, ensure the system of work has the following minimum risk control measures in place: – Ensure the feller is assessed as competent against the national unit of competency for the manual harvesting of trees and has current industry experience – nobody else should fell the tree – Maintain a separation distance of two tree lengths from other workers – Use a recognised safe felling method (e.g. as in the *Chainsaw Operators Manual* and *Tree Fallers Manual*) – a hand feller may place preliminary cuts in the tree before using a machine to push the tree – When felling a widow maker or brittle top, work under a protective structure – Ensure the area around the base of the tree is scrub rolled mechanically, where possible, and escape routes are in place – Maintain radio communication between all operators

In addition, there are specific hazards found in manual felling that require assessment and specialist felling techniques. They include:

- delimbing
- machine-assisted tree felling
- tree driving
- wind throw
- **thinning**
- tree jacking.

Information on these techniques can be found in *Section 15.6*.

8.3 Mechanical felling

Many of the hazards for manual felling also apply to mechanical felling. However, some risks are minimised because the machine provides protection for its operator. For more information, refer to the National Institute for Forest Products Innovation (NIFPI) final report on Project NS025, *Development of best practice guidance for protective guarding of mobile plant used in Australian forests*.

Machinery used for mechanical felling includes custom-built feller-bunchers, single grip harvesters, and processors and excavator-type machinery with aftermarket felling heads.

Planning

Before mechanical harvesting starts, a similar planning process to that described in *Section 8.1* should be completed.

Hazards identified in the SSP should also be considered, and confirmed by a site assessment.

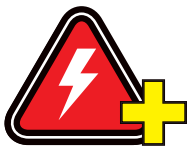
Consultation, cooperation, and coordination

Specific operational plans and assessments should be supplemented by a walk through before operations start. They should then be adjusted when there are significant changes in the operating conditions (e.g. weather, wind, visibility, or traction).

Crew meetings should also be held before work starts to ensure all workers and contractors understand the operational plans. It is then important to:

- use radios or other communication systems to maintain oral and visual communication between workers
- establish and maintain relevant falling and traffic signage.

Mechanical felling 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:

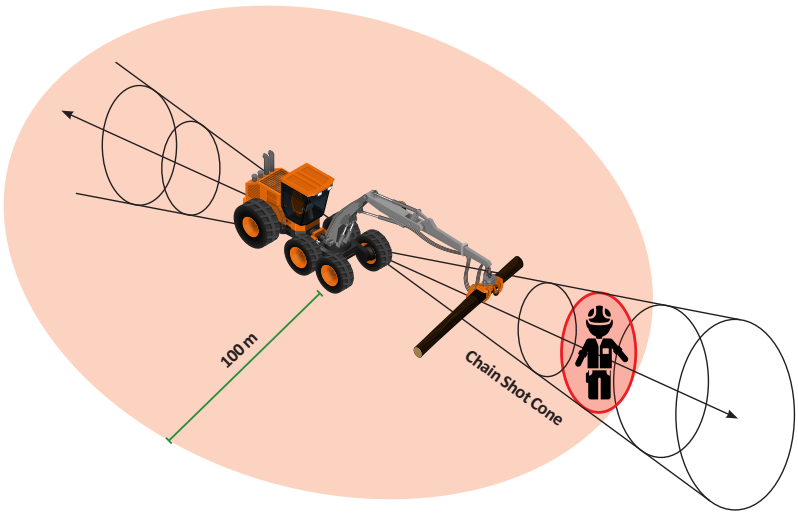
- Unsuitable machine selected to harvest the tree size in the coupe or harvesting site
- High winds affecting the fall direction
- Slips, strains, and falls as workers get on or off the machine for either operation or maintenance
- Loose objects in the operator's compartment
- A machine fire
- Onsite machine maintenance while the machine is energised
- Mechanical failure

The following **activity-specific risk factors** also apply:

- Environmental issues and constraints
- Boundaries
- Condition and lean of timber
- Traffic flow and management in the harvesting area

The **essential risk controls** are all relevant to mechanical felling.

Activity-specific controls are listed below:

Equipment design and operation	• Ensure the weight and power of mechanical harvester is suitable for the site conditions and tree size • Ensure the machine is operated in line with manufacturer's specifications • Ensure the machine is fitted with the following protective structures consistent with the NIFI best practice guide referenced above: – a suitable **rollover protective structure (ROPS)** – a suitable **falling object protective structure (FOPS)** – suitable **operator protective structures (OPS)** to provide front, side, and rear protection using screens and guards • Ensure all protective structures are suitable for the machinery, the conditions, and the size of trees being felled, and they conform to the relevant technical standards (see *Section 15.1*) • Ensure cabin visibility allows the operator to see and check for hazards, especially overhead, and changing conditions • Install a chain shot guard or catcher and, where relevant, a limit switch to prevent the saw operating at angles (e.g. saw bar directly aligned with the cab) where operators are at risk • Keep handrails and steps clean and well maintained • Shut down and isolate machines, and ground attachments, during routine maintenance such as greasing and changing bars and chains
Exclusion zone and safe work areas	• Ensure operation is within a defined exclusion zone with at least two tree lengths separation from others • Keep others at least 100 metres away from harvester and away from the 'shot cone', which is the likely path of chain shot and around 15 degrees either side of the plane of the saw bar (see *Figure 15*) • Work at least two tree lengths away from overhead power lines, fall in parallel or away from lines, or arrange for power to be switched off if necessary ***Figure 15: Chain shot cone*** 
Operator competencies	• Ensure machine operators hold a statement of attainment in relevant competency units, such as the single grip harvester and feller buncher (see *Section 15.4*) • Ensure the operator is trained in the working limits of machine and techniques for different trees and ground conditions • Ensure the operator's seat is maintained, and the seat belt worn • Wear PPE that is suitable for use and correctly maintained (e.g. high-visibility clothing, safety footwear, hearing protection, safety helmet when outside the cabin, and two types of protective gloves for handling fuels or sharpening chains (see *Section 15.2*))

8.4 Steep slope harvesting

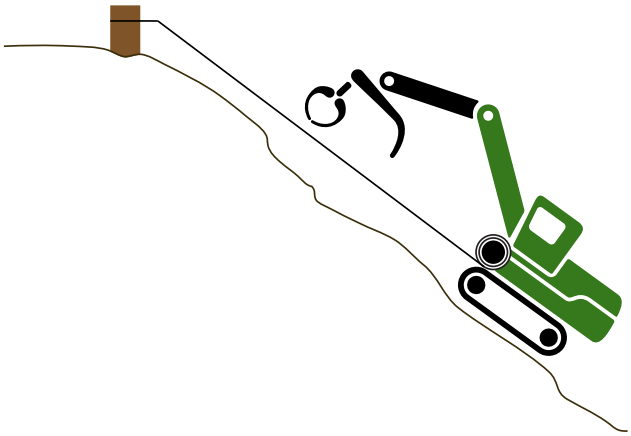
To enable mechanical harvesting on steeper slopes that might otherwise be designated for manual felling, a winch assist system may be used in several configurations.

Winch assist systems consist of a cable winch mounted on a piece of equipment that is either mobile or stationary.

On steep slopes, the mechanical influence of the winch assist system enhances traction and mobility (often called 'traction assist') or safety (preventing machine sliding and overturning).

A winch may be fitted to a harvesting machine such as a feller buncher, harvester, or forwarder either as an integrated part of the machine or as an aftermarket winch attachment. The cable is anchored to another machine or a suitable stump (see *Figure 16*). This is often referred to as a 'tethered' system.

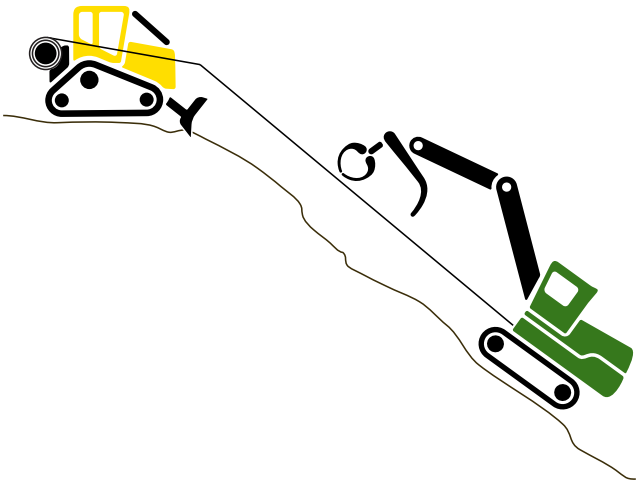
Figure 16: Winch fitted to machine



The machine moves uphill, and the tether provides stability and support. The machine is typically winched up the slope using the tether. This method helps prevent the machine from rolling back down the slope and provides a controlled means of uphill movement.

Another variation is that the machines are anchored by cable to a winch fixed on or attached to another machine that acts as an anchoring point (see *Figure 17*). The winch helps the machine in climbing or descending slopes, providing additional traction and control.

Figure 17: Winch attached to anchor machine



Planning

Decisions to use steep slope machinery should be based on the information prepared by the landowner or forest manager. The contractor should then incorporate this information into the SSP. Traction-related issues require consideration alongside road access, location of landings, roadside stockpiles, tree species, and harvest timing. Relevant issues include the type of soil and erodibility.

The distance that winch assist machines can operate at should also be considered. This distance is based on winch range, load limitations, and the impact on other harvesting and extraction methods. A risk assessment can help determine what methods of harvesting should be used in various parts of the coupe and how they should be managed.

Information should be sought from equipment suppliers on the suitability of winch-assisted operations for the proposed harvesting method.

The slope that wheeled or tracked machines can safely operate on within design limits is particularly important, along with the machine's stability features.

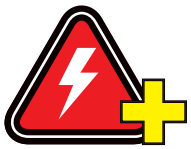
A manufacturer and equipment supplier has a duty to provide information and training to the end user on the equipment's safe operation. For steep slope machinery, this should include:

- the purpose for which the machine or winch attachment was designed and manufactured
- the design limits of the machine relating to:
  - slope
  - traction
  - manoeuvrability
  - load and lifting
  - stability
- any risk assessments or other calculations related to the matters above
- the frequency and type of maintenance required
- information on access to and safe use of the equipment
- information on emergency procedures (e.g. exit or rollover)
- information on the operator qualifications or competencies required to safely operate the machine.

Winches, wires, and attachments such as shackles are also covered by the manufacturer and supplier's duty of care. They should supply similar, relevant information.

The selected machinery should be able to operate safely on the terrain before additional issues related to winch assist are considered. Winch assist systems or tethering machines reduce some risks (e.g. rollover because of loss of traction on steep slopes) but are primarily ways of extending the range of machinery that can be considered for use on slopes.

Winch-assisted steep slope harvesting 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: △ Incorrect wire rope tension or overloading △ Poor visibility and traction loss due to slash and downed logs in front of machine △ Wire rope **side wash** by bending around stumps at greater than 45 degrees creating overload or slipping off stump △ Broken or damaged wire, shackles, or connections on felling machine or base machine △ Base machine sitting on soft edge or shoulder of road △ When a stump is used as an anchor, incorrect notching of stump (too shallow, too deep, or too close to top of stump) △ Anchor stump not suitable species or lacking root strength △ Incorrect strap angle when attaching strap to stump
	The following **activity-specific risk factors** also need to be considered: ● Soil condition and erodibility ● Topography ● Space for base machine position ● Suitability of tracked or wheeled machines for all the above factors

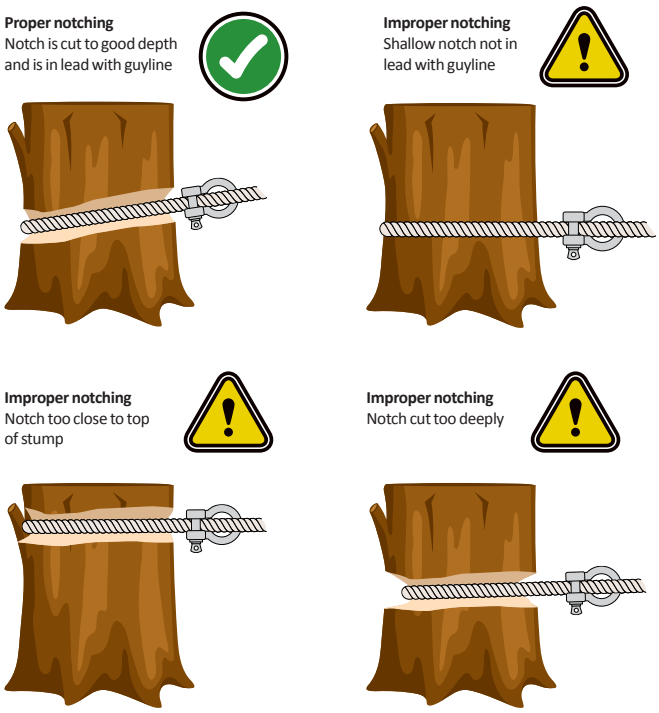
The **essential risk controls** are all relevant to winch-assisted steep slope harvesting.

	**Additional activity-specific controls** are listed below. These should be read with the safe operating specifications of the machines in normal use (e.g. FOPS, ROPS, or OPS requirements).
 **Equipment design and operation**	● Ensure the machine is designed for steep slope work using a winch assist system ● Ensure the machine has an overriding braking system in case it loses power ● Ensure the machine has a system to monitor how much wire rope is left on the winch drum, with an alarm and automatic stop mechanism when the wire is less than five wraps on the drum ● Have a way of monitoring wire tension and the safe working load ● Keep within 33% of breaking load ● Have a way of measuring slope, such as a clinometer ● Have sensors that indicate any stability movement in the base machine ● Ensure all wires, shackles, connectors, and other winch assist attachments conform to relevant technical standards (e.g. shackles meet the specifications of *AS 2741-2002 Shackles*) ● Keep tracks facing downhill and do not operate across a side slope ● Minimise use of stumps to **side wash** wire, and if this directional technique is used, ensure the angle is less than 45 degrees ● Regularly inspect and maintain all wires, shackles, connectors, and other winch assist attachments
 **Attachment to base machine**	● Ensure the base machine is capable of receiving the live wire tension status from the felling machine ● Ensure the base machine has: – an automatic stopping system in case of mechanical failure or excessive machine movement – the same warning devices about wire as the felling machine – buckets and blades dug into the ground to improve stability (e.g. use the anchor machine's blade or bucket to secure the machine by placing the blade or bucket against a stump, or dig it into the ground) – sensors that detect movement in the base machine that are communicated to felling machine ● Regularly inspect and maintain all wires, shackles, connectors, and other tethering attachments

Attachment to stump anchor

- If a stump is used to anchor the felling machine, ensure that the stump:
  - has a high holding capacity indicated by root system and soil density
  - is tied back to distribute load, if necessary, using straps
  - is correctly notched (see *Figure 18*)

Figure 18: Notching of anchor stump



- Ensure all wires, shackles, connectors, and other winch assist attachments:
  - conform to relevant technical standards
  - are regularly inspected and maintained
  - have straps attached to the stump at the correct angle (less than 90 degree angle of strap eyes)

Exclusion zone and safe work areas

- Have a clear plan of the harvesting process, particularly when manual felling is used, so that clear exclusion zones and separation distances are identified
- If manual felling is required for parts of the coupe, do this before the steep slope harvesting process begins
- Create a separation distance around the base machine and on the slope below during operation so that the area is clear of ground workers

Operator requirements

- Have experience operating the machine before using any winch assist system
- Work on lower slopes where the winch effect is minimal and gradually advance to higher slopes where it is safe to do so
- Have a map of the operational area, including hazards and 'No Go Zones'
- Understand the importance of the wire tension and safe working loads
- Have knowledge and experience in using **side wash** techniques
- Understand the procedure for emergencies and breakdowns on steep slopes

9 LOG EXTRACTION

Log extraction includes **forwarding**, **skidding**, and **snigging**.

In this section, extraction on both level ground and steeper slopes is covered. Steep slope work covers common hazards and controls, but where winch-assisted or tethered systems are used, additional measures are required. These largely reflect the controls used with winch-assisted felling.

Planning

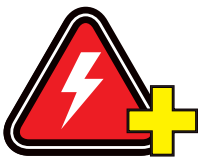
Extraction methods should be included in the information provided by the forest manager and the SSP. Identified hazards should be confirmed by a site assessment before work starts.

Consultation, cooperation, and coordination

All plans and assessments should be supplemented by a walk through before operations start. They should then be adjusted when there are significant changes in operating conditions (e.g. weather, wind, visibility, or traction).

Crew meetings should also be held before work starts to ensure all workers and contractors understand the operational plans.

Extraction 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: △ Materials striking trees and spars while being moved, causing them to be pulled over △ Inadequate and unreliable communication systems △ Equipment failure △ Objects penetrating the cabin △ Instability of machinery and risk of rolling over or sliding △ Slips, strains, and falls when workers are getting in and out of machinery
	The following **activity-specific risk factors** also need to be considered: ● The proposed felling and extraction plan and pattern of work ● Communication systems for ground workers and machine operators ● Traffic flow and management in the harvesting area

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

	**Activity-specific controls** are listed below:
Equipment design and operation	● Ensure the weight and power of machines such as a forwarder is suitable for the terrain and tree size ● Ensure the machine is operated in line with the manufacturer's specifications ● Ensure suitable protective structures are fitted consistent with the NIFPI best practice guide referenced in *Section 8.3* ● Ensure cabin visibility allows the operator to see and check for hazards, especially overhead, and changing conditions ● Use handrails and steps ● Ensure extraction **tracks** are clear and suitably located
Operator requirements	● Ensure the operator is trained in the working limits of the machine and techniques for different trees and ground conditions ● Ensure the operator's seat is maintained, and the seat belt worn ● Wear PPE that is suitable for use and correctly maintained (e.g. high visibility clothing, safety footwear, hearing protection, safety helmet when outside the cabin, and two types of protective gloves for handling fuels or sharpening chains (see *Section 15.2*)

Exclusion zone and safe work areas	• Carry out operation within a defined safe work area, with at least two tree lengths' separation from others • Be aware of the chain shot cone around harvesting machines
Communications	• Use radio, GPS, or other communication or location-finding systems to maintain oral and visual communication with other workers

9.1 Steep slope extraction

Where log extraction takes place on steeper slopes using conventional methods, there is a higher risk from the instability of machines and felled logs.

The **essential risk controls** are all relevant to steep slope extraction.

	**Activity-specific controls** are listed below:
Forwarders	
Equipment design and operation	• Never load the loader or carrier over the manufacturer's specifications or above the level of the headboard or stanchions • Do not extend the stanchions without the manufacturer's authorisation
Safe work procedures	• Drag logs closer to the forwarder before lifting • Avoid travelling across side slopes in excess of the manufacturer's specifications • Load the uphill side of the log bunk or truck first • Do not overload the grapple • Do not overload the log bunk • When loading on sloping ground, park straight up or down the slope • Ensure logs being loaded in the loader are fully encircled by the holding jaws when the jaws are closed
Snigging with skidder or dozer with winch or grapple	
Safe use of plant	• Do not extract logs on gradients or side slopes greater than those specified by the equipment designer, manufacturer, importer, or supplier
Safe work procedures	• When snigging heavy logs downhill, hook up 'short' and low to the ground to avoid logs overtaking the skidder or dozer • When snigging heavy logs uphill, raise the log, and if necessary, use a series of 'winch – move forward – winch again' moves • Avoid turning the machine on a slope • Avoid travelling across side slopes in excess of the manufacturer's specifications • When travelling downhill, keep the winch rope taut so the snig does not bump or pass the rear of the machine • Avoid winching logs at a sharp angle to minimise the risk of rolling over

9.2 Winch-assisted log extraction

Winch-assisted systems are likely to be used on steeper slopes that are beyond the normal operating limits of wheeled or tracked machines.

The risk controls for log extraction on steep slopes using winch assistance should again be read with the safe operating specifications of the machines in normal use (e.g. falling object protective structures (FOPS), rollover protective structures

(ROPS), operator protective guards (OPS) requirements).

The **essential risk controls** are all relevant to winch-assisted extraction, as are the risk controls for winch-assisted felling machines. This is because the winch assist systems are similar, but there are some additional controls relevant to extraction.

	**Activity-specific controls** are listed below:
 **Equipment design and operation**	• Use stability-improving options (e.g. wheel spacers and wide 'flotation' tyres) • Consider using tracked machines or purpose-built machines • Ensure tracked machines have tracks that are in good condition and outfitted to provide superior traction
 **Safe work procedures**	• Make smaller turns to avoid overloading or overbalancing the machine • Carry logs as low to the ground as possible without hanging up on stumps and rocks

10 LOG LANDINGS, LOADING AND UNLOADING

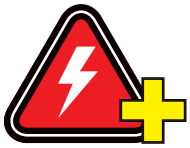
The log landing brings together ground workers and machinery operations, creating risks that should be carefully managed. Planning and construction of the log landing to ensure the safe and efficient handling of logs and workflow will minimise problems.

 **Planning**

The timber harvest plan should detail the location and size of log landings. The design principles for safety include:

- position the log landing on the flattest area as practicable and where the slope of the ground enables good drainage
- make the log landing large enough for activities to be safe and with as little intrusion as possible between tasks
- clear all hazardous trees for a distance of at least two tree lengths
- ensure the log landing is clear of any power lines
- keep it clear of hazardous debris
- have safe pedestrian access and visitor control procedures
- allow space for:
  - the safe passage of other traffic needing to pass the operation
  - the safe storage of logs at the volume to be handled
  - the parking, turning, maintenance, and storage of fuel and chemicals
  - a safe area for ground workers to retreat to for sharpening saws and other tasks
- locate the log landing to allow safe rehabilitation after the forest operation.

Work on log landings 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: △ Moving machinery △ Uncontrolled movement of logs △ Chain shot or other material thrown or moved by machinery working on landing △ Slips and trips △ Skin exposure to hazardous chemicals
	The following **activity-specific risk** factors also need to be considered: • Communication systems for ground workers and machine operators • Control of visitors to the landing

Risk controls for all operations on the log landing aim to minimise interaction between operations and protect ground workers.

Those working under a canopy should rely on the risk controls set out for machinery (e.g. operator protective guards (OPSs)) outlined in *Section 6.2.1*.

The **essential risk controls** are all relevant to log landings and loading.

	**Activity-specific controls** are listed below:
 **Exclusion zone and safe work areas**	• Display warning signs at entry to the site • Where practicable, ensure there is a physical barrier (e.g. a log stack or another machine) between machines and ground workers • While a machine is handling logs, ensure nobody enters the area within the full swing radius plus half the log length in the beak (or the manufacturer's specified safe working distance, whichever is greater) • Ensure the intended path of travel for skidders and forwarders is clear of ground workers • Do not swing logs above or within the reach of ground workers • Ensure separation distances to protect ground workers from chain shot injury (see *Figure 15* in *Section 8.3*) *Figure 15* shows a cone-shape danger zone. This zone changes as the cutting head is repositioned. A minimum 100 metre exclusion zone is required for unprotected workers unless effective protective barriers are used.
 **Communication**	• Use radio communications to monitor movement onto and within the landing • Ensure that anyone entering a designated work area has the permission of the area controller • Do not allow snigging machinery to enter the landing until it is safe to do so (e.g. when they are signalled to enter by the authorised person like the landing attendant, processor operator, or loader operator) • Ensure operators of snigging machinery communicate with landing workers, reduce speed when entering the landing, and fully drop logs before unhooking
 **Safe use of mobile plant**	• When using a mechanical processor or cut off saw, ensure the line of the cut is never directed at ground workers to avoid the chain shot zone • Ground the machine's implements when parked, including the log grab or grapple (for forwarders, the safest place for grapples is in the bunk of the machine) • Do not allow workers to walk under an implement supported only by the machine's hydraulics • Only approach logs when they are considered stable • Ensure machinery operators do not carry logs over ground crew • Ensure ground workers on the landing face the operating machines
 **Minimising of slips, trips, and falls**	• Assess the work area for uneven surfaces and high edges • Ensure bark and other debris is regularly removed from the work area of ground workers • On corded landings, do not walk on the corded area while machines are operating • Arrange the work area so the ends of logs can be marked or painted while standing on the ground • Ensure safety footwear is in good condition and does not have worn soles • Use handrails and steps when climbing up onto and stepping down from a machine • Ensure safe ground-based access to the landing area for operators
 **Stability of log stacks**	• Ensure there is enough separation between stacks and machines to minimise the risk of disturbing any stacked logs • Keep log stacks to a safe height on level ground and angled to maximise stability • Make no log stack higher than the capacity of the log-handling equipment • Avoid working at the base of or downhill from a log stack • Chock logs or place them on a notched log to stop rolling when cross cutting or measuring • Use bearer logs under log stacks to avoid rocks or other contamination being loaded onto log trucks and becoming a danger to road users • Work on the topside of a log when manually cross cutting, grading, or measuring • Avoid exposure to hazards from moving logs by not working in front of, climbing onto, or working on logs placed in log stacks or dumps • Do not use chainsaws to cut logs on a log truck or climb on the load for any reason

10.1 Log preparation, measurement, and marking

Where logs are prepared, measured, and marked at the log landing, ground workers are at risk from being hit or crushed. It is important to put in place precautions that minimise this risk to health and safety.

The **essential risk controls** are all relevant to log preparation, measurement, and marking.

	**Activity-specific controls** are listed below:
For all activities	
 **Exclusion zone and safe work areas**	● Ensure machine operators are aware of where any ground workers are ● When logs will be marked or measured with an excavator, set up the landing so the marker or measurer approaches the operator's door on the excavator, not the boom side, coming from their work area
 **Operator competency**	● Ensure machine operators hold the relevant national operator competency qualification such as FWPHAR2207: Trim and Cut Harvested Trees, which is mandated by industry for commercial harvesting operations
Log preparation	
 **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
Log measurement	
 **Safe work practices**	● Check hazards to workers and equipment before measuring starts ● Use electronic measuring devices ● Put the log in a designated area away from other working operations and in a safe position for measuring (e.g. on a notched log) ● Inspect the log to ensure it is adequately chocked to prevent it rolling or sliding ● Place tape around the centre of the log and do not go below the log at any time ● Measure the length by hooking the tape on the lower end of the log and reading from the raised end ● Ensure there is space to swing the hammer when branding the raised end of the log
Log marking	
 **Exclusion zone and safe work areas**	● Stay in the marking work area and out of the machine's work area until the load or beak is grounded and stable and the operator has given permission to enter ● Give the machine operator permission to restart work after the marker has left the machine's work area

Safe work practices	• Keep the area around the log clear of obstructions that could impede the use of marking or tagging tools • Keep the walkway to where logs are marked or tagged free of obstacles and debris that could become slip and trip hazards • Use log marking paint or grease according to the instructions on the label and the safety data sheet

10.2 Loading

The persons conducting a business or undertaking (PCBUs) who arrange for forest produce to be loaded and transported from the forest should plan this activity to ensure safety.

The PCBUs with this responsibility could include:

- the forest manager
- the harvesting contractor
- the haulage contractor
- the receiver of the forest produce, such as a saw mill or pulp processor.

Planning

The planning should include:

- ensuring that the log form and specification reduces the risk of losing logs during transport
- estimating the likely friction characteristics of logs to be transported
- ensuring vehicles are fitted with the right equipment to transport logs safely
- ensuring loader operators and drivers are trained to construct safe loads.

Loading 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: △ Driver injured while tensioning lashings △ Exposure to extreme weather △ Slips and trips while checking load △ Strains from throwing lashings △ Over-centre lever load binders (dogs)
COMMON RISKS	The following **activity-specific risk factors** also need to be considered: ● Communication systems for ground workers and machine operators ● Control of visitors to the landing

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

ESSENTIAL CONTROLS	**Activity-specific controls** are listed below. For more detailed advice on loading, especially safe work areas, refer to the Australian Forest Products Association (AFPA) *Log loading guideline* and the *Log Haulage Manual.*

Exclusion zone and safe work areas

- If you are the truck driver, establish communication with the loader operator on arrival at the workplace
- If you are the loader operator, ensure that the area in the immediate vicinity is clear of people during loading operations
- Ensure all people, including the driver, are at least 4 metres away from the front of the truck being loaded, 10 metres from the opposite side to that being loaded, or 10 metres from the rear (see *Figure 19*)
- Maintain contact with the loader operator throughout the loading operation
- In multi-bay configurations, ensure the driver is not in the cabin while the front bay is loaded (once the front bay has been secured, the driver may return to the cabin for the rest of the loading)

Figure 19: Safe viewing area for drivers during loading

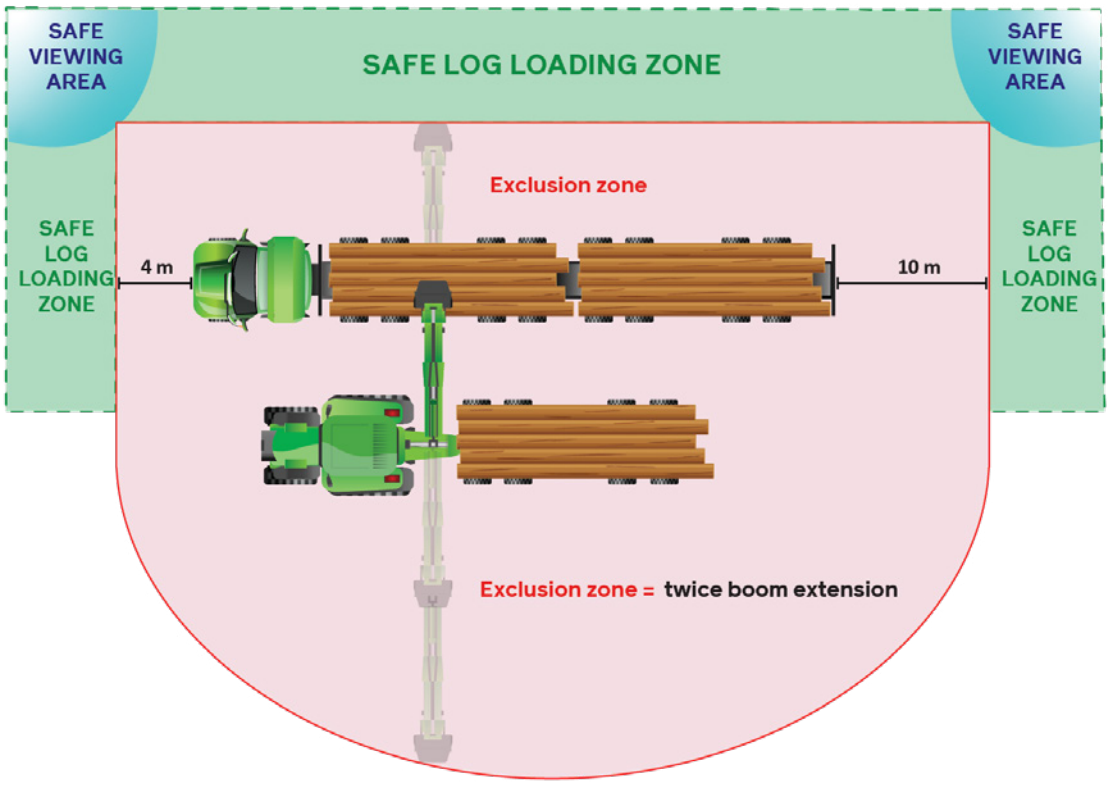


Figure extracted from AFPA's *Log loading guideline.*

- If the driver has to wait during loading, provide adequate shelter and amenities
- Ensure the driver notifies loader operators and receives an acknowledgement before entering an exclusion zone to:
  - check scales, load construction, or the lay of logs
  - secure the load with relevant **lashings**

Self-loading trucks

- Ensure self-loading trucks are fitted with outriggers and stabilisers that firmly stabilise the unit while loading
- Ensure outriggers and stabilisers conform to *AS 1418.5-2013 Cranes, hoists and winches – Part 5: Mobile cranes*.
- Provide a positive means to prevent a free fall of the boom if there is a malfunction
- Provide a safe means of access to the log loading position

Load design	● If you are the driver, ensure the load is constructed so that it meets the requirements of the National Transport Commission (NTC) *Load restraint guide* ● Place the load on the vehicle to ensure the load: – can be restrained effectively – does not destabilise the vehicle – remains stable when applying and removing lashings – is not contaminated with items that can fall from the vehicle in transit ● Ensure no more than 50% of the end diameter of any log is above the top of a cab guard, headboard, tailboard, or stanchion ● Ensure outside logs that are in contact with the stanchion have no part of that log above the height of the stanchion ● Crown all loads of logs to allow proper clamping ● Ensure outer ends of the outside logs extend 300 mm beyond the stanchions ● Secure all logs by at least two load lashings, either directly by contact with the stanchion or restraint, or indirectly if bound by surrounding logs ● If you are the driver, ensure that: – logs are secure before moving the vehicle – lashings are regularly checked to correct the tensions during transit – loose bark is removed – if necessary, the loading configuration is adjusted by suitable log-handling equipment
Correct load restraint	● Ensure load restraint devices are designed to conform to the NTC's *Load restraint guide* ● Apply lashings using a method that minimises the risk of manual strain injuries (e.g. use light weight extension pole) ● Regularly inspect and maintain lashings and tensioners to ensure they are fit for purpose ● Where practical, fit a rear restraint device to prevent logs sliding from the back of the load ● Where stanchion extensions are used, fasten them securely

10.3 Unloading

As with loading, the PCBUs involved in unloading forest produce should plan this activity to ensure safety. These parties could include:

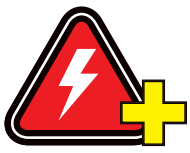
- the forest manager
- the haulage contractor
- the receiver of the forest produce, such as a saw mill or pulp processor.

Planning

The planning should include:

- a risk assessment of the unloading site and the receiver's unloading process
- induction materials for truck drivers, including safe work procedures developed by the receiver on the unloading process, traffic management, and scheduling
- signage and communication protocols to be used in the unloading process.

Unloading 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 another vehicle
- △ Being struck by a log when releasing lashings
- △ Being struck by straps, chains or shackles when removing lashings
- △ Strains from removing lashings
- △ Slips, strains and falls when workers are getting in and out of machines
- △ Cramped unloading zone
- △ Tripping on uneven or muddy ground

	The following **activity-specific risk factors** also need to be considered: ● Logs that may have moved in transit ● Poor light conditions ● Hours of operation and schedules that may create fatigue ● Variation in practices at different processing facilities ● Debris in unstrapping zone that may lead to slips and trips

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

	**Activity-specific controls** are listed below. For more detailed advice on unloading, especially safe work areas, refer to the AFPA *Log loading guideline*.
Exclusion zone and safe work areas	● Physically separate the unstrapping zone from other trucks and site traffic, including a traffic-free zone at least 5 metres beside the truck so the driver can move clear of the restraint drop zone ● If you are the loader operator, ensure the immediate vicinity is clear of people during unloading operations ● Ensure all people, including the driver, are at least 4 metres to the front or 10 metres to the rear of the vehicle being unloaded ● During machine-assisted unstrapping, if you are the driver, notify the loader operator and receive an acknowledgement before entering an exclusion zone to remove lashings ● If the driver has to wait during unloading, provide adequate shelter and amenities ● Where appropriate, mark safe work zones
Plant used to unload	● Ensure machines used to unload trucks are specifically designed to lift the logs they handle over the top of pins and stanchions ● Use specific-purpose loading bays where available
Safe work procedures	● If you are the driver, inspect the load for signs of possible movement before unstrapping ● Ensure the unloading facility has an arrangement to secure logs on top of the load if the driver suspects movement ● Unload all logs above the height of a stanchion using a machine-assisted unloading procedure ● Use a machine-assisted unstrapping procedure if the load has become unstable or lashings jammed ● Ensure the driver steps back from the load after binders have been released and watches the top of the load for any signs of instability ● Where a dog is used to tension chains, stand clear of the dog handle when releasing the tension
Machine-assisted unstrapping procedure	● Ensure this procedure is followed for machine-assisted unstrapping: – Driver requests a loader operator for assistance – Driver drives truck to the unloading zone – Driver moves to the driver safe area – Loader operator secures load and advises the driver when it is safe to approach – Driver removes the lashings – Driver moves back to the driver safe area and notifies the loader operator that is safe to begin unloading – Driver and loader operator communicate with each other via two-way radio – Loader operator controls this operation
PPE	● Wear a helmet, high-visibility clothing, safety footwear and eye protection while removing lashings ● Wear night-rated high-visibility clothing if working in poor light conditions
Communication	● When the truck arrives at the receiving point, establish communication between the truck driver and loader operator ● Follow the processing facility's communication and unloading rules (e.g. speed limits and signs)

11 IN-FIELD PROCESSING

Planning

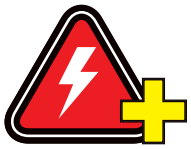
The planning and risk assessment in the site safety plan (SSP) should apply to in-field processing activities such as chipping, portable sawmilling, and firewood collection. The space should always be suitable to complete these activities safely and protect others working in the same area. Refer to *Section 10* on the related issue of log landings.

In-field chipping involves moving large volumes of logs to a dedicated location, removing branches and bark, and processing the logs into chips. Careful planning is important to help ensure:

- the site is big enough
- products are removed from the processing site as they are generated to prevent clutter.

Commercial firewood collection requires a permit or agreement with the landowner or forest manager. It must be done in line with their health and safety policies.

In-field processing operations are 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:

In-field chipping

- Workers struck by falling metal cowls and guards
- Contact with rotating chipper disc or flails
- Entrapment
- A machine fire
- Falling from height
- Noise

Portable sawmilling

- Material from saw blade flying towards operator
- Operator's fingers or limbs coming into contact with saw blade
- Workers moving and locating logs manually

Product processing

- Kickback or recoil from the chainsaw
- Chain breaks and possible exposure to chain shot
- Contact with other machines

Firewood cutting

- Sudden uncontrolled movement of either the stump or the log where it is resting on roots or under tension
- Workers manually lifting and stacking firewood, boards, posts, or sleepers
- Operator's hand or arm crushed by moving axe, wedge, pressure plate, or wood when using mechanical log splitter

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

- Potential line of throw of failed equipment parts or cutting line of saw
- Communication systems for ground workers and machine operators
- Traffic flow and management in the work area

The risk controls for in-field processing are highly dependent on the design and selection of machinery. *Section 2.3* outlines the duty of designers, manufacturers, and suppliers to provide equipment that can safely undertake the task and reduce risks to operators.

The **essential risk controls** are all relevant to in-field processing. In particular, all in-field processing should be done by operators with the relevant competencies (see *Section 15.4*).

ESSENTIAL CONTROLS	**Activity-specific controls** are listed below:
In-field chipping	
Exclusion zone and safe work areas	• Create designated safe work areas for truck drivers, record them on the site-specific risk assessments and ensure all truck drivers who visit the site sign the relevant risk assessment • Establish and maintain exclusion zones (two tree lengths from ground workers and further if needed in front of debris chute) for all items of plant and equipment
Safe work procedures	• Ensure the operator is trained in the working limits of the machine • Wear suitable and correctly maintained personal protective equipment (PPE) for the work (e.g. high-visibility clothing, hearing protection, and safety gloves when handling fuels or chipper blades)
Safe use of plant	• Only ever operate plant and equipment within the manufacturer's specifications • Isolate plant and equipment before servicing or repairs • Use interlocks on chipper hoods to ensure they cannot be opened while the chipper disc is running down
Communication	• Establish radio communication or other effective means of contact with other forest workers
Portable sawmilling	
Safe use of plant	• Only ever operate plant and equipment within the manufacturer's specifications • Isolate plant and equipment before servicing or repairs • Guard saw blades using a suitable means • Never operate the machine while hands are still in contact with the material being cut • Ensure any machine that moves or lifts logs is fitted with rollover protective structures (ROPS) and falling object protective structures (FOPS).
Exclusion zone and safe work areas	• Establish and maintain exclusion zones for all items of plant and equipment
Safe work procedures	• Ensure the operator is trained in the working limits of the machine • Stand clear of the cutting line of the saw • Wear suitable and correctly maintained PPE for the work (e.g. eye protection, high visibility clothing, and hearing protection).