

PART **3**

# River and Stream Operations



This code applies to those involved in tree work in rivers and streams carried out by local authorities under the Soil Conservation and Rivers Control Act 1941 and the Land Drainage Act 1908.

## **Acknowledgements**

Members of the steering committee responsible for this code of practice were:

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# Notice of Issue



I have issued this *Approved Code of Practice for Health and Safety in Tree Work; Part Three; River and Stream Operations* which is an approved code under section 20 of the Health and Safety in Employment Act 1992, being a statement of statutory requirements, rules and provisions, based on preferred work practices and arrangements, for the purpose of ensuring the health and safety of persons to which this code applies and persons who may be affected by the code.

J M Chetwin  
Secretary of Labour

# Foreword



The code of practice has an important part to play in the prevention of harm to employees in the place of work.

I have approved this statement of statutory requirements and rules and provisions, based on preferred work practices and arrangements, When a code is approved, a Court may have regard to it in relation to compliance with the relevant sections of the Health and Safety in Employment Act. This means that if an employer in an industry or using a process to which an approved code applies can show compliance with that code in all matters it covers, a Court may consider this to be compliance with the provisions of the Act to which the code relates.

Hon M Bradford  
Minister of Labour

# About this Code



## PURPOSE

This code sets out sound work and safety and health practices for those involved in tree work carried out in rivers and streams by local authorities under the Soil Conservation and Rivers Control Act 1941 and the Land Drainage Act 1908. It describes obligations under the Health and Safety in Employment Act and Regulations, general safety rules, safety clothing and equipment, noise, safe use of chainsaws and mobile plant, tree felling, lopping and layering, tree slotting and trenching in river and stream work.

## ACKNOWLEDGEMENT

The Occupational Safety and Health Service acknowledges the assistance given by the industry with the contents of this part of the code. In particular, thanks to Graeme Hansen, Hawke's Bay Regional Council, and Tony Dunlop, Environment Bay of Plenty, for their contribution.

It is hoped the code will continue to provide practical guidance to workers and management alike, and that observance of the minimum work standards it sets out will achieve the desired objective of all concerned in making tree work in rivers and streams and related operations a safer occupation.

## TERMINOLOGY

A number of conventions are followed in the terminology of this code which are intended to aid clarity.

Firstly, all specific recommendations are presented as numbered clauses within the booklet's numbered sections. Less specific background information that may be of use to the reader is usually included as unnumbered paragraphs at the beginning of each section.

When reading the code, it should be remembered that:

**shall:** denotes a mandatory requirement.

**should:** denotes an advisory recommendation.

## TRAINING

The interaction between training and safety is a strong one, and it is inevitable that there be material which may apply to both. In this section of the Rivers and Stream Code, reference is made, where appropriate, to "Industry Qualifications", which are the appropriate unit standards registered with the NZ Qualifications Authority where assessment has been carried out and competence verified. This is to establish a level of competency required for the various operations.

## FURTHER INFORMATION

At the end of some sections of this booklet, references for further information are given.

These lists are not necessarily exhaustive, but are given for user convenience.

You can get further information on the occupational and safety aspects of logging from your nearest office of the Occupational and Health Service. There are branches in each of the following centres, with the location of Inspectors (Forest Operations) indicated by an asterisk (\*).

* Whangarei	* Gisborne
Takapuna	Napier
West Auckland	* Palmerston North
Penrose	Lower Hutt
Manukau	Wellington
* Hamilton	* Nelson
* Rotorua	* Christchurch North
	Christchurch South
Tauranga	* Dunedin
New Plymouth	Invercargill

# Health and Safety in Employment Act 1992



## GENERAL

The Act's principal objective is to provide for the prevention of harm to employees at work.

To assist in managing hazards, the following are mandatory requirements:

### *Active Management Commitment:*

A policy statement that reflects commitment to the health and safety of employees, employers and others.

### *Hazard Identification and Control:*

A systematic identification of the hazards in the workplace including appropriate controls.

### *Information, Training and Supervision:*

Systems in place to ensure workers have the training or supervision to do the work safely and efficiently.

### *Accident Reporting, Recording and Investigation:*

Documentation of accidents in the workplace.

### *Emergency Procedures:*

Plan covering procedures during emergencies

which may occur on the job.

These elements are best incorporated in a written plan.

## 1.0 REQUIREMENTS ON EMPLOYERS

### *(a) General Duties*

- Provide and maintain a safe working environment.
- Provide and maintain facilities for the safety and health of employees.
- Ensure that machinery and equipment is safe for employees.
- Ensure that working arrangements are not hazardous to employees.
- Provide procedures to deal with emergencies that may arise while the employees are at work

### *(b) Duties to Manage Hazards*

Employers are required to have a three-step systematic system in place for:

- Identifying hazards to employees at work;
- Assessing hazards; and
- Managing hazards so that people are not harmed.

#### **Step One: Identify Hazards**

A hazard is any activity, situation or substance that can cause harm.

## Step Two: Assess Hazards

Assess which hazards are likely to cause the most harm to people.

The Act uses the term “significant hazard”. This is defined as one that can cause:

*Serious harm*: this includes death, serious injury or disease. (See pages 18-20 for the legal definition of serious harm.)

*Harm*: the severity of which depends on how often or how long a person is exposed to the hazard. (e.g. exposure to noise over a long period may cause gradual and permanent deafness.)

*Harm* that can't be detected until a significant time after the exposure has occurred. (e.g. exposure to certain chemicals may cause health problems years later.)

## Step Three: Control Hazards

If the hazard is significant, the Act sets out the process the employer must go through.

1. If practicable, you must *eliminate* the hazard. This means removing the hazard so that people can't be harmed.

The key word is practicable.

2. If it's not practicable to eliminate the hazard, it must be *isolated*.

This means putting some kind of barrier or distance between the hazard and the person.

3. If it's not practicable to eliminate or isolate the hazard, it must be *minimised*.

Minimising the hazards includes:

- Following safe and accepted work practices;
- Providing for suitable protective clothing and equipment;
- Maintaining equipment properly;
- Training employees in safe work methods;
- Supervising young or inexperienced employees;
- Monitoring employees' exposure to the hazard;
- With the employees' consent, monitoring their health.

#### *(c) Duties to Inform Employees*

Employers must, without identifying individuals, give employees the results of any monitoring of their health or the workplace as described above.

Employees must also be informed about:

- What to do if an emergency arises while they are working.
- The hazards they are exposed to or create while at work.
- How to minimise hazards to themselves and other people.
- Where the necessary safety clothing and equipment is kept.

#### *(d) Duties to Train and Supervise Employees*

Employers have specific responsibilities for training and supervising anyone they employ in a

river and stream operation.

Employers shall take all practicable steps to ensure that employees who do any kind of work, use plant, or deal with substances of any kind either:

- have; or
- are so supervised by a person who has, the knowledge and experience to ensure that they and others are not harmed.

Employers shall ensure that employees are adequately trained in the safe use of all plant, objects, substances and protective clothing and equipment provided that the employee may use.

#### *(e) Health and Safety Procedures*

Every employer has a duty to ensure that employees have an opportunity to be involved in the development of procedures for health and safety.

#### *(f) Recording, Investigating and Notifying Accidents*

The Act requires that a register of work-related accidents and serious harm be kept. A record of every accident that harmed (including near-miss accidents where someone might have been harmed) shall be maintained in relation to:

- Any employee at work;
- Any person in a place of work;

Employers are also required to investigate all recorded accidents, harm and near-misses to determine whether they were caused by a significant hazard and document remedial action taken.

The *serious harm* that has occurred to employees while at work shall be notified to the Occupational Safety and Health Service.

## **2.0 REQUIREMENTS ON EMPLOYEES**

While at work, all employees have duties under the Act. They must take all practicable steps, including using safety equipment as instructed, to ensure their own safety and the safety of others while at work.

## **3.0 IF YOU EMPLOY CONTRACTORS**

Local bodies, or those acting as an agent for a local body, who hire contractors or subcontractors, are principals and must take all practicable steps to ensure that they, and their employees, are not harmed while carrying out the work they are engaged to do.

Principals are responsible for hazards or activities which may include ensuring contractors are:

- competent;
- have the means to safely carry out the work they are engaged to do;
- have available information in relation to the operation such as:
  - unsafe access roads and bridges;
  - hazardous terrain;
  - any unusual or abnormal conditions.

Contractors who have employees are classed as employees, and their duties are outlined in

previous sections.

Any person who is in control of a place of work (this could include the principal, the contractor and the subcontractor) must ensure that people in the place of work, or in its close vicinity, are not harmed by any hazard that arises out of or from work activities.

#### **4.0 IF YOU ARE SELF-EMPLOYED**

Self-employed persons must take all practicable steps to ensure that no action or inaction while at work harms either themselves or any other person.

#### **5.0 RESPONSIBILITIES TO THE PUBLIC**

The Act places duties on employers, self-employed people and employees to ensure that their work activities do not harm other people. For forest operations, this could include visitors and other people passing the operation and the general public who may be in the vicinity of an operation.

The best means to safely restrict access and inform people of work-related hazards must be decided upon by the contractor in consultation with the principal.

#### **6.0 CODES OF PRACTICE/REGULATIONS UNDER THE ACT**

The Act allows for the development and approval of statements of preferred work practice, known

as “approved codes of practice”. These are recommended means of compliance with provisions of the Act, and may include procedures which could be taken into account when deciding on the practicable steps to be taken. They are the result of consultation between the Occupational Safety and Health Service of the Department of Labour and affected industry members.

Compliance with codes of practice is not mandatory. However, a Court may consider that compliance with the Code in all matters it covers is compliance with the Act to which the code relates.

### *Further Information*

Health and Safety in Employment Act 1992.

*OSH, A Guide to the Health and Safety in Employment Act 1992.*

*OSH, How to Identify and Control Hazards; A Work Book.*

*OSH, The Small Business Guide to the Health and Safety in Employment Act 1992.*

## **7.0 SERIOUS HARM**

The following is a definition of “Serious Harm” from the First Schedule of the Health and Safety in Employment Act 1992.

## Section 2 (4) FIRST SCHEDULE SERIOUS HARM

- 1 Any of the following conditions that amounts to or results in permanent loss of bodily function or temporary severe loss of bodily function:
  - respiratory disease
  - noise-induced hearing loss
  - neurological disease
  - cancer
  - dermatological disease
  - communicable disease
  - musculoskeletal disease
  - illness caused by exposure to infected material
  - decompression sickness
  - poisoning
  - vision impairment
  - chemical or hot metal burning of eye
  - penetrating wound of eye
  - bone fracture
  - laceration
  - crushing.
2. Amputation of body part.
3. Burns requiring referral to a specialist registered medical practitioner or specialist outpatient clinic.
4. Loss of consciousness from lack of oxygen.
5. Loss of consciousness, or acute illness

requiring treatment by a registered medical practitioner, from absorption, inhalation, or ingestion of any substance.

6. Any harm that causes the person to be harmed to be hospitalised for a period of 48 hours or more commencing within seven days of the harm's occurrence.

## 8.0 HEALTH AND SAFETY IN EMPLOYMENT REGULATIONS 1995

The regulations lay down duties of employers to provide and maintain certain suitable facilities sufficient for the place of work and also duties relating to the management of particular hazards in any workplace. Obviously, in a mobile workplace it is not practicable to maintain the full range of facilities and amenities outlined in the regulations, but any facilities provided should be sufficient for the place of work.

## 9.0 NOTIFIABLE WORK

This is defined in the Health and Safety in Employment Regulations 1995 in relation to Forestry Work, Regulation 2 Interpretation—  
**“Notifiable work”** (b) Any logging operation or tree felling operation, being an operation that is undertaken for commercial purposes:

“Logging”

(a) means felling trees by manual or mechanical means for the purpose of extracting logs, poles,

and posts; and

(b) includes extracting logs to an area for processing and loading:

“Tree felling” means felling trees by manual or mechanical means for any purpose —

(a) Other than extracting logs, poles, and posts; but

(b) Including the purposes of —

(i) Harvesting firewood commercially;

(ii) Land clearance;

(iii) Maintaining shelter belts for horticulture;

(iv) Maintaining trees in the vicinity of power lines;

(v) Managing and caring for trees in the general community;

(vi) Silviculture;

(vii) Willow layering and any other work in catchment soil erosion operations.

### *Notification*

An employer must not commence any notifiable work unless they have notified in writing, at least 24 hours before the work commences, to the nearest OSH office the following details:

(i) the nature and location of the work; and

(ii) the name, address and the contact details of the employer; and

(iii) The intended date of commencement of the work; and


(iv) the estimated duration of the work.

Notification forms can be obtained at any OSH office.

Systems are in place to handle notification requirements by employers engaged in continuing work of a short-term nature or ongoing work within the same catchment or general area. Inspectors (Forestry) will allow notification periods of up to 12 months for such work.

Certain types of construction work, such as trenches over 5 metres deep where the depth is greater than the top width, are notifiable work. Work of this type can be included in the tree work application.

# 1: Definitions for the Purpose of this Code

- 
- 1.1 “Adequately trained” means a person who can demonstrate the skill and knowledge derived from experience and/or training for the type of work in which the person is employed.
  - 1.2 “Close supervision” means direct and constant one-to-one supervision.
  - 1.3 “Competent person” means a person suitably qualified either by experience or by training (or both) for the type of work in which the person is engaged and authorised to do by the person in charge of the river and stream operation.
  - 1.4 “Contractor” means a person engaged by a person (otherwise than as an employee) to do any work for gain or reward. (HSE Act)
  - 1.5 “Co-operative contract” means a contract where two persons or more are contracted to carry out work on a co-operative basis. One person is to be nominated as the person in charge and as such becomes the employer.
  - 1.6 “Employee” means a person employed by any other person to do any work (other than residential work) for hire or reward; and in relation to any employer, means an employee of the employer. (HSE Act)
  - 1.7 “Employer” means a person who or that employs any other person to do any work for hire or

reward; and in relation to any employee, means an employer of the employee. (HSE Act)

- 1.8 “Industry qualifications” means unit standards registered with the NZ Qualifications Authority where assessment has been carried out and competence verified.
- 1.9 “Inspector” (Forestry) means a health and safety inspector for the time being appointed under Section 29(1) of the HSE Act.
- 1.10 “Layering/lopping” means felling/lowering a tree whilst maintaining an adequate connection with the stump. See Section 18 of this Code.
- 1.11 “Machinery” or “machine” means as defined in the Health and Safety in Employment Act 1992 — “an engine, motor or other appliance that provides mechanical energy derived from compressed air, the combustion of fuel, electricity, gas, gaseous products, steam, water, wind or any other source . . . ”
- 1.12 “Mobile plant” means any self-propelled mechanical mobile plant designed to move under its own motive power with an operator at its controls and includes wheel and crawler tractors, excavators, skidders, graders and loaders.
- 1.13 “Person who controls the place of work” in relation to a place of work, means a person who is—
- (a) The owner, lessee, sublessee, occupier, or person in possession, of the place or any part of it; or

- (b) The owner, lessee, sublessee, or bailee, of any plant in the place. (HSE Act)
- 1.14 “Principal” means a person who or that engages any person (otherwise than an employee) to do any work for gain or reward. (HSE Act)
- 1.15 “River and stream operation” includes any work detailed under the definition of “River and stream work”.
- 1.16 “River and stream work” means any work carried out using trees, plants or vegetation for the purpose of establishing or maintaining flood control. This can include, but is not restricted to, felling, clearing, lopping and slotting activities in the bed or berm areas of rivers and streams.
- 1.17 “Tree work” means any work on trees outside a forest situation and includes willow layering and any other work with trees in catchment or soil erosion operations, maintenance of shelter belts for horticulture, agriculture or farming, maintenance of trees in the vicinity of overhead power lines and “arboriculture” which is the management and care of trees in the general community.
- 1.18 “Slotting/trenching” means the re-utilisation of whole trees placed in excavated slots or trenches for river and stream bank protection and stabilisation works.
- 1.19 “Standard” means a standard approved by the Standards New Zealand or any other reputable Standard which embodies the same or more stringent criteria as the standard cited.

An item may be verified by a qualified person such as a relevant registered engineer that the criteria of the Standard is met by that item.

Should any Standard quoted at the time of publication be updated or superseded, the latest version shall take precedence.

- 1.20 “Subcontractor” means a person engaged (otherwise as an employee) by any contractor or subcontractor to do for gain or reward any work the contractor or subcontractors has been engaged (as a contractor or subcontractor) to do. (HSE Act)

# 2: Emergency Procedures



## 2.1 GENERAL

- 2.1.1 The employer or person in charge shall issue instructions on procedures to be followed when dealing with emergencies and shall ensure that persons at the work site are fully aware of and understand these procedures.
- 2.1.2 Access to work sites shall be kept open at all times or machines available, capable of clearing the way, to enable immediate access in the event of injury to workers or an emergency. Otherwise, alternative procedures or arrangements shall be organised.
- 2.1.3 At work sites, all practicable steps shall be taken to ensure that means are available to obtain help in the case of an emergency.
- 2.1.4 When emergency work is being undertaken, work practices may have to be varied from that carried out in normal operations. However any variation from normal practice shall only be allowed after hazard assessment carried out shows that employees are not put at extra risk of harm.

## 2.2 FIRST AID

- 2.2.1 A person with basic first aid training offered by a range of organisations such as St Johns shall be present at each work site. Where crew work is

taking place with, as a guide, four or more persons, a holder of a current first aid certificate issued by a recognised organisation shall be present.

2.2.2 A first aid kit or box shall be kept in each vehicle and at each work area. Vehicle kits or boxes can substitute for those required at each work area provided the vehicle remains at the work site.

2.2.3 Every box or kit shall be kept fully stocked. Minimum kits for individuals are detailed in clause 2.2.4. Crew kit guidelines are as follows:

### ***Mobile Crew First Aid Kit for up to 10 People***

Individual sterile adhesive wound dressings, assorted	6
Individually wrapped triangular bandages	2
Safety pins	2
Sterile individually wrapped unmedicated wound dressings	2
Individually wrapped cleansing wipes	6
Pair disposable gloves	1

Additional items such as resuscitation mask, thermal blanket, scissors, adhesive tape and additional sterile dressings could also be considered.

Kits shall be stored so as to ensure that the contents are protected against contamination by dust, heat, moisture or any other source.

- 2.2.4 All chainsaw operators, unless working close to a first aid crew kit, should carry on their person a first aid kit consisting of at least two large sterile wound dressings. This kit must comply with the requirements for protection against contamination contained in Clause 2.2.3.
- 2.2.5 Where a worker suffers any injury, the employer or person in charge shall take immediate action to ensure adequate or necessary medical assistance is provided as soon as possible. If there is risk of complication of the injury, the injured shall be made comfortable until qualified medical advice is available.
- 2.2.6 Where there is no radio or telephone communication available, a vehicle shall be kept available at all times while work is in progress for use as a means of transporting or obtaining assistance for injured workers.

# 3: General Safety Rules



These rules shall be observed by all persons employed in, engaged in, or visiting any river and stream work.

## 3.1 PERSONNEL

3.1.1 Every person undertaking river and stream operations shall be;

- Qualified to industry standards; or
- Competent; or
- Adequately trained; or
- Under close supervision.

3.1.2 A competent person shall be in charge of each operation, and that person shall exercise such supervision as will ensure that the work is performed in a safe manner at all times.

3.1.3 Employers shall ensure that all workers are properly instructed and trained in the work they are required to perform and the dangers or hazards involved in each operation are systematically developed.

- (a) Should any employer hire an experienced worker, the new employee shall (before being allowed to work unsupervised) be required to visually demonstrate to the employer or the person in charge their competence to safely accomplish the work the person may be

required to perform. Workers holding a valid and approved training qualification will be considered experienced in those skills or special skills in which they have qualified.

(b) Should an employer hire an inexperienced worker, the employer shall provide the instruction or training required and ensure close supervision until the employee demonstrates their competency to work safely in the job they are to perform.

- 3.1.4 Workers should be assessed and should not be required to carry out work beyond their physical capabilities.
- 3.1.5 All workers shall acquaint themselves with the relevant safety provisions of this code for each operation, and shall take all necessary precautions to ensure their own safety and health and that their actions do not harm anyone else.
- 3.1.6 No person shall be required to work on their own unless all practicable steps are taken to ensure they have means of getting help in an emergency. These steps could include:
- voice or visual contact;
  - an audible alarm device;
  - radio or cellphone contact.
- 3.1.7 However, if persons are required to work alone, timetables for work should be followed and they should be checked on a regular practicable basis.
- 3.1.8 Where workers are required to work at heights of more than three metres, means, suitable for the purpose, are to be provided to prevent the

employee from falling.

- 3.1.9 All persons approaching an operational area shall, where practicable:
- draw attention to their presence and intention by calling out loudly or by some other effective means;
  - notify the person in charge of the place of work of their intentions;
  - not enter the operational area until acknowledged and signalled to do so;
  - while machinery is operating, approach, where practicable, from in front and above or level with the operation.
- 3.1.10 No person shall work at, or be on, a river and stream operation while under the influence of drugs or alcohol.

## **3.2 HEALTH**

- 3.2.1 The employer shall ensure that each worker who is exposed to a hazard in the workplace which may cause an occupational disease receives regular medical examinations to identify and treat these.
- 3.2.2 The employer shall involve employees in identifying health hazards in the workplace.
- 3.2.3 The employer shall provide employees with information and training about health hazards arising from the workplace.
- 3.2.4 The employer shall provide adequate rest periods to avoid overexertion in physically demanding work and working hours shall be organised which include:

- short breaks during working hours;
- sufficient breaks for meals;
- daily or nightly rest;
- weekly rest.

3.2.5 Where equipment used in a task may cause occupational overuse syndrome (OOS), the employer shall take all practicable steps to firstly eliminate the hazard.

3.2.6 Where practicable, the employer shall ensure that wholesome drinking water is available.

3.2.7 Employers shall ensure that adequate protection is made available for protection from inclement weather.

### **3.3 OPERATIONAL**

3.3.1 Where any river and stream operation becomes dangerous because of high winds, wet weather, poor visibility or other adverse conditions, the employer or person in charge shall suspend all such operations while such conditions exist. In the event of a situation where emergency works are required, the employer or person in charge shall take all practicable steps to minimise the potential risk to employees.

3.3.2 Where night work is required, the employer shall ensure that the level of illumination does not cause a hazard.

### **3.4 VISITORS AND VISITOR GROUPS**

3.4.1 No person under the age of 15 years shall,

without the permission of the person in charge of the place of work and unless under the constant supervision of a responsible person, be permitted in the vicinity of any river or stream operation while work is being carried out.

3.4.2 Where public have access to the work area, a sufficient area shall be designated as the work area and marked prior to work starting by the erection of warning signs and if necessary, by the placing of ropes, hi-visibility tape or some other method to exclude them from the actual work area.

3.4.3 Visitor groups to river and stream operations shall have prior approval of the principal's representative or person in charge of the place of work. That person shall ensure that visitor groups are designated a safe area or guided in such a manner that they are not harmed in the place of work. Persons in charge of the place of work shall stipulate the minimum requirements as to protective clothing and equipment that are acceptable.

### **3.5 PLANT AND VEHICLES**

3.5.1 All vehicles and mobile plant used in connection with river and stream operations shall have, where appropriate, a relevant, valid Warrant or Certificate of Fitness.

3.5.2 All drivers of vehicles and, where applicable, operators of mobile plant, shall have a relevant, valid licence to drive or operate.

# 4: Protective Clothing and Equipment



## 4.1 GENERAL

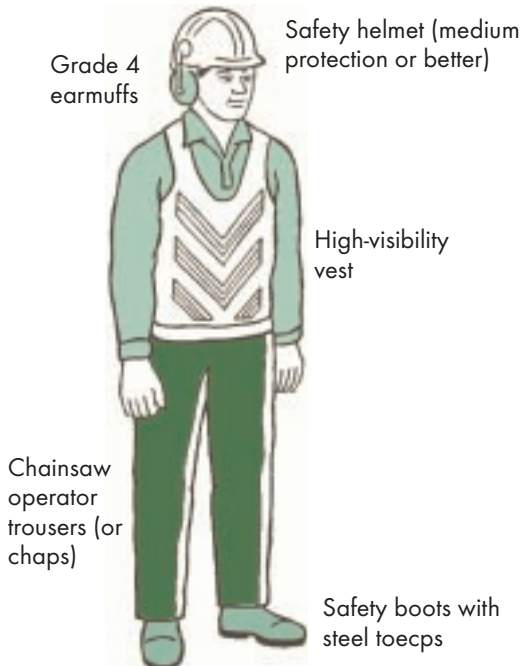
- 4.1.1 Protective clothing, equipment and appliances are complimentary to, not a substitute for, full instruction, sufficient training and adequate supervision.
- 4.1.2 It is necessary that all protective clothing and equipment be kept clean, properly maintained, repaired when necessary or replaced if not properly functional due to being worn out, faded, damaged or beyond the “use-by” date.

## 4.2 CLOTHING AND EQUIPMENT

- 4.2.1 Where there is a hazard to employees at work, the employer shall take steps to ensure that there is provision for, or access to, suitable clothing (including footwear) and equipment to protect employees from any harm that may be caused by or arise out of the hazard in the place of work.
- 4.2.2 Where such hazards exist, all workers shall wear protective clothing or equipment suitable for the work being performed.
- 4.2.3 All clothing and equipment shall be comfortable and allow free movement. In selecting protective clothing and equipment, consideration shall be

given to fit and comfort and the protection offered.

- 4.2.4 Personal protective equipment shall be kept clean and properly maintained. Damaged clothing and equipment shall be properly repaired or discarded.
- 4.2.5 No person shall interfere with or misuse any clothing, equipment, means or appliance provided for their protection and health
- 4.2.6 During daylight hours, clothing of high-visibility colours shall be worn by those entering or working in river and stream tree work areas.



*A fully equipped chainsaw operator.*

- 4.2.7 During the hours of darkness, reflectorised upper clothing or clothing with reflectorised strips shall be worn. The minimum requirement for reflectorised material is 150 cm<sup>2</sup>, front and back.

#### *Further Information*

AS/NZS: 1906.4:1997 *Retroreflective materials and devices for road traffic control purposes: Part 4.*  
BS/EN: 471:1994 *High-visibility warning clothing.*

### **4.3 RESPIRATORY PROTECTIVE DEVICES**

- 4.3.1 Where persons in the workplace are exposed to dust, gases or fumes they shall use suitable respirators that comply with AS/NZS 1715:1994 *Selection, use and maintenance of respiratory protective devices* and 1716: Amendment 1 February 1996 *Respiratory protective devices* or any other Standard which embodies the same or more stringent criteria.

### **4.4 LEG PROTECTION**

- 4.4.1 All workers required to use a chainsaw shall wear safety leg protection complying with AS/NZS 4453.3:1997 *Protective clothing for users of hand held chainsaws Part 3 Protective legwear*, or any other Standard which embodies the same or more stringent criteria.

### **4.5 SAFETY FOOTWEAR**

- 4.5.1 Footwear shall have steel toecaps and comply

with AS/NZS 2210.1:1994 *Occupational protective footwear Part 1: Guide to selection, care and use* or any other Standard which embodies the same or more stringent criteria.

- 4.5.2 Spiked footwear shall be worn where slipping or sliding is likely to be a hazard.

## **4.6 SAFETY HELMETS**

- 4.6.1 Safety helmets shall be worn at all times by all persons in or about river and stream tree work operations except as provided in Clause 3.22 “Visitors and visitor groups” and Clause 4.5.2 below.
- 4.6.2 Machine operators who are fully protected by an approved canopy need not wear helmets. However, should the operator cease to be fully protected by the canopy, then a safety helmet shall be worn.
- 4.6.3 All safety helmets shall comply with AS/NZS 1801:1997 *Occupational protective helmets* or any other Standard which embodies the same or more stringent criteria.
- 4.6.4 Safety helmets for chainsaw operators shall be fitted with at least Grade 4 earmuffs and have provision for the fitting of visors.
- 4.6.5 Safety helmets shall be of high-visibility colours for daytime work and have reflectorised material, attached by the manufacturer, for night work.
- 4.6.6 Helmets should not be stored in a place where they are exposed to direct sunlight. Paints, oils, petrol, solvents or stick-on labels shall not be

applied to helmets as they can cause deterioration. Any identification markings should be done by or have the approval of the manufacturer.

- 4.6.7 Helmets shall be inspected regularly and shall be replaced as recommended by the manufacturer or earlier if they have suffered any damage or deterioration.
- 4.6.8 Harnesses shall be inspected regularly to check the clearance level is correct and that fittings and straps are not damaged, shall be washed as required and replaced if damaged or deteriorated.

## **4.7 HEARING PROTECTION**

- 4.7.1 Hearing protection shall be worn where exposure to noise levels is above or likely to be above 85 dB(A) levels.
- 4.7.2. Owners of machinery shall take all practicable steps to minimise, at source, excessive noise levels that are likely to impair the workers' hearing.
- 4.7.3 All chainsaw operators shall wear at least Grade 4 earmuffs.
- 4.7.4 If earmuffs cannot be worn because of a medical condition, suitable earplugs may be worn with medical approval.
- 4.7.5 Hearing protectors shall comply with AS/NZS 1270:1988 *Acoustics: Hearing protectors* or any other Standard which embodies the same or more stringent criteria.

- 4.7.6 To reduce harmful noise:
- Do not unnecessarily approach or remain in high-noise areas without adequate hearing protection.
  - If possible, separate the machine or equipment and people by distance. If this is not possible, the machine or operator can be enclosed to reduce noise levels.
  - Fit and regularly inspect and maintain silencers on exhausts.
  - Earmuffs should be inspected regularly and maintained to the highest standard.
  - Hygiene kits are available and should be used at least annually.
  - Store earmuffs in a proper container when not in use.
- 4.7.7 The table on page 42 shows a range of noise levels, decibel level bench marks and the grade of hearing protection required for a working day.

## 4.8 EYE PROTECTION

- 4.8.1 Eye protection equipment shall be used where there is the potential for injury from excessive dust or flying debris or where there is danger of material from vegetation entering the eyes
- 4.8.2 Any eye protection equipment shall comply with AS/NZS 1337:1992 *Eye protectors for industrial applications: Amendment 1 September 1994: Amendment 2 October 1997*, or any other Standard which embodies the same or more stringent criteria.

Source	Decibels	Decibel exposure level for a working day	Hearing protection required
Jackhammer	120	Over 115	Seek expert advice
Sandblasting	112	110 - 115	Grade 5 earmuffs
Chainsaws	106-109	104-109	Grade 4 earmuffs
Brushcutter	104-106		
Disco	100-110		
Petrol-driven tools	100	93-103	Grade 3 earmuffs
Pneumatic drill	100		
Boiler shop	100		
Older machinery	90-95	92-97	Grade 2 earmuffs or earplugs
Modern machinery	85-90	86-91	Grade 1 earmuffs or earplugs
Average factory	80-90		
Busy traffic	75	85 and below	No protection needed
Ordinary speech	66		
Average home	50		
Quiet office	40		
Whisper	30		

4.8.3 Eye protection equipment shall be maintained to the highest standard. Proper storage facilities shall be provided for equipment not in use. Damaged equipment shall be repaired or replaced.

## **4.9 GLOVES**

4.9.1 Where gloves are provided for protection when handling materials and substances, or for general protection in the workplace, they shall comply with NZS 5812:1982, Reconfirmed 1989, *Industrial protective gloves* or any other Standard which embodies the same or more stringent criteria.

## **4.10 SAFETY BELTS, HARNESSES AND ANCILLARY EQUIPMENT**

4.10.1 Safety belts and harnesses shall comply with AS/NZS 1891.1:1995 *Industrial fall arrest systems and devices: Part 1: Safety belts and harnesses: Amendment 1 March 1 1997: Amendment 2 October 1997.* or any other Standard which embodies the same or more stringent criteria.

# 5: Safety with Fires



- 5.1 Contact the local Fire Authority to determine what restrictions are in place and what permits are required.
- 5.2 As a guideline, the following clothes are suitable as a minimum dress standard to avoid exposure to direct radiant heat, protect from physical injury and reduce the effects of dehydration:
- (a) Boots;
  - (b) Headwear: either a safety helmet or woollen cap, hat, beret or similar headwear;
  - (c) Heavy cuffless trousers and long-sleeved shirt (woollen or wool-based are preferable).
- Additional useful items of protective clothing and equipment are goggles, dust mask, balaclava, and leather gloves.
- 5.3 Avoid wearing nylon or synthetic clothing and dressing in a singlet without a shirt or shorts.
- 5.4 Avoid smoke drift across roads, accessway and buildings, especially houses, by using favourable wind direction.
- 5.5 Ensure that fires are not lit under or near powerlines as electrical discharge through the smoke may occur.
- 5.6 Do not use petrol to start a fire or as an accelerant.

- 5.7 Fires shall not be left while still burning.
- 5.8 Persons shall be instructed as to the effects of dehydration, and ample drinking water shall be available.

# 6: Chainsaws



## 6.1 GENERAL

6.1.1 All chainsaws shall comply with NZS 5819:1982 *Chainsaw safety, reconfirmed 1989*.

6.1.2 No person shall be required to work on their own with a chainsaw unless all practicable steps have been taken to ensure that they can obtain help in an emergency.

Such steps could include:

- visual or voice contact;
- an audible alarm device;
- radio or cellphone contact.

## 6.2 EMPLOYERS' DUTIES AND RESPONSIBILITIES

6.2.1 Employers shall ensure that no operator works with or uses a chainsaw unless fully instructed as to the dangers which may arise in such an operation and the precautions to be observed, and unless the operator:

- is competent; or
- is adequately trained in the use of the chainsaw; or
- holds the valid and approved training qualification to industry standards; or
- is under close supervision by a person who has a thorough knowledge of and experience with chainsaws.

- 6.2.2 As a guideline, the operator should have reached the appropriate industry unit standards registered in the NZQA framework.
- 6.2.3 It shall be the employer's responsibility to ensure that all relevant protective equipment and appliances are used to afford protection and safeguard health.

### **6.3 OPERATORS' DUTIES AND RESPONSIBILITIES**

- 6.3.1 Operators shall not engage in chainsaw use beyond their physical or operational capabilities.
- 6.3.2 Notwithstanding Section 6.2.1, operators shall ensure that they competent or have adequate training in the correct use and safe operation of chainsaws.
- 6.3.3 Operators shall not operate defective chainsaws, tools or protective equipment until they have been restored to a safe condition.

### **6.4 PERSONAL PROTECTIVE EQUIPMENT**

- 6.4.1 Protective equipment, clothing and appliances are complimentary to, not a substitute for, good work practices, full instruction, sufficient training and adequate supervision.

### **6.5 CHAINSAW CUTTING ACTIONS**

- 6.5.1 The different reactive forces caused by the cutting saw chain should be understood in order to avoid dangerous situations or accidents. The forces are caused by different types of cutting actions.

## 6.5.2 *The Down Cut*

6.5.2.1 The down cut using the chain on the bottom of the guide bar causes the saw to be drawn towards the cut and away from the operator. This is called traction. It is the safest and easiest of the cuts. For safe operation:

- Ensure, where practicable, that the bucking spike or body of the saw is firmly placed against the material being cut.
- Be alert for movement of the material which may cause the cut to close on the chain along the underside of the guide bar.
- Ensure that no material apart from that being cut is drawn into the cut.



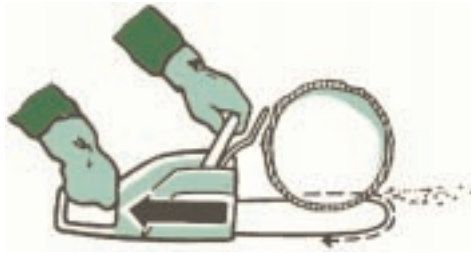
*The down cut draws the saw towards the cut*

## 6.5.3 *The Up Cut*

6.5.3.1 The up cut using the chain on the top of the guide bar causes the saw to push away from the cut towards the operator. This is called recoil.

For safe operation:

- Be alert to situations that may cause the pinching of the chain along the top of the guide bar.
- Do not twist the saw when withdrawing the bar from an up or bore cut.
- Cut only one log at a time.



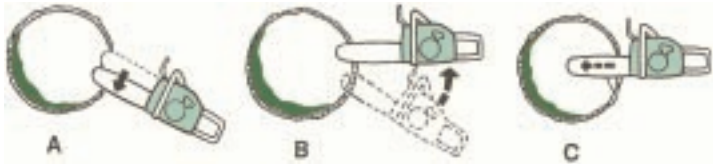
*The up cut pushes the saw away from the cut*

### **6.5.4 The Boring Cut**

6.5.4.1 This cut starts by using the bottom portion of the nose of the bar and then the upper portion as the cut proceeds. There is likelihood of kickback from this cut.

Proceed as follows:

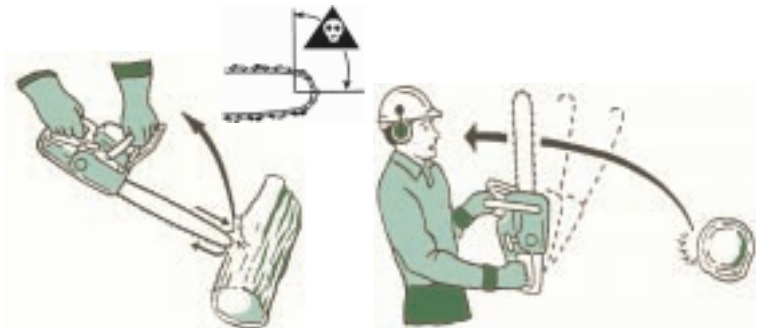
- Using the lower tip of the guide bar, cut until the depth is about bar width.
- Align the saw towards the horizontal with the saw at full throttle.
- Still at full throttle, press the guide bar straight into the log.



*The boring cut*

### 6.5.5 Kickback

- 6.5.5.1 One in twelve serious forestry work accidents are caused by kickback.
- 6.5.5.2 Kickback can take place when making any type of cut on any angle. It may occur when making a horizontal scarf cut, a bore cut, while trimming, when the saw gets pinched in a cut, and while cutting off a log sloven.
- 6.5.5.3 Kickback occurs while, in making a cut, the top of the bar nose contacts a solid object or is pinched. This causes a reactive force that may



*The chainsaw kicks back when the critical area of the bar nose contacts wood or is pinched*

throw the guide bar in an uncontrolled arc towards the operator. Using proper techniques and equipment will help reduce the likelihood of kickback and subsequent injury.

6.5.5.4 To reduce the likelihood of kickback:

- Ensure that all safety devices are operable.
- Make sure that there are no loose screws, nuts or bolts.
- Have the chain tensioned, sharpened and the depth gauges set to the manufacturer's instructions.
- Use an anti-kickback chain and the correct bar and chain combination.
- Unless unavoidable, do not use the tip of the guide bar for cutting
- Be aware of the location of the bar nose at all times and avoid it contacting any objects.
- Be especially careful when cutting small limbs or light material that may move and catch in the chain.
- Use extreme caution when making a bore cut or re-entering a cut.
- Avoid cutting more than one stem at a time.

## 6.6 CHAINSAW SAFETY

6.6.1 All chainsaws held directly by hand shall have a clearly marked and positive ON-OFF switch and one of the following :

- a safety mitt or glove; and
- a hand or inertia chain brake.

- 6.6.2 The chainsaw shall be inspected before work is begun to ensure it is in safe working condition.
- 6.6.3 Except for fine-tuning of the carburettor, no cleaning, oiling or adjustments shall be carried out while the motor is running.
- 6.6.4 All operations relevant to tensioning the saw chain and any other maintenance shall be carried out in a safe manner and to the manufacturer's specifications or recommendations.

## **6.7 STARTING THE CHAINSAW**

- 6.7.1 A chainsaw motor shall be started only when it is clear of all obstructions or people.
- 6.7.2 Approved starting methods are:
  - (a) Cold start method on clear ground.
  - (b) Step over method for warm starting. The throttle lockout should not be used when using this method.

There are two points of control: the front handle bar and the rear guard.

**Drop starting a chainsaw is prohibited.**

### ***Cold Start Method***

1. Place the chainsaw firmly on the ground.
2. Have the left arm straight, with the front handle bar firmly cradled between the thumb and fingers. The hand must be in the mitt.
3. Place the front of the right foot in the rear handle. Alternatively, secure the saw by placing a knee on the body of the saw.

4. Place the other leg to provide stability.



*Cold start method on clear ground*

### ***Step Over Method (See over page)***

1. Place left hand in safety mitt. Keep left arm straight.
2. Position saw on left thigh, pointing left.
3. Step over rear handle and secure saw behind a bent right knee.
4. Start with short, sharp pulls on starter cord.
5. If the saw does not start, revert to starting on clear ground.



*Step over method for warm starting*

6.7.4 For starting and use of a chainsaw above ground, see Section 24 of *Safety Code for Tree Work: Part 1—Arboriculture*.

## **6.8 CHAINSAW OPERATION**

6.8.1 Operators shall use all protective equipment, appliances or other means to afford protection and safeguard health.

6.8.2 Operators shall not operate or carry a chainsaw in a manner likely to endanger themselves or others.

6.8.3 A chainsaw shall not be used if:

- the saw chain does not remain stationary when the motor is idling;
- the saw will not idle correctly;
- the cutter bar, handles or control levers are loose;

- any parts are damaged, missing or ineffective.
- 6.8.4 Operators shall ensure that, where practicable:
- all obstructions in the path of the chainsaw are removed before cutting operations begin;
  - a good footing and safe, comfortable, balanced working position are maintained;
  - during operation, the chainsaw is held firmly with both hands, with the front handle bar cradled between the thumbs and fingers and mitt used;
  - they watch what and where they are cutting; and
  - they avoid overreaching with the chainsaw.
- 6.8.5 Where necessary, plastic or soft metal wedges shall be used to keep the cut open, thus reducing the likelihood of binding (pinching or jamming).
- 6.8.6 Operators shall pay particular attention to the dangers of carbon monoxide poisoning and avoid working in situations where restrictions on the dispersal of exhaust fumes are encountered.
- 6.8.7 The chain brake shall be activated by the operator at least every work period to test its effectiveness under operating conditions.
- 6.8.8 While being carried by hand, except for short unobstructed distances, the chainsaw motor shall be stopped or the chainbrake activated.
- 6.8.9 To reduce the possibility of kickback and vibration, and to ensure smooth cutting, the manufacturer's instructions for sharpening and maintaining the saw chain shall be adhered to.

- 6.8.10 The chainsaw should always be carried at the side of the body with the bar pointing to the rear, so it can be thrown clear in case of a slip or fall. It shall not be carried on the shoulder.
- 6.8.11 As a general rule, chainsaws should not be used with the body of the motor above shoulder height. However, use may be permitted in the following circumstances, providing hazard assessment has been carried out.
- (a) When for operational reasons it is necessary to remove occasional branches above shoulder height, the following steps will assist in saw control:
- Hold the saw as close to the body as practicable.
  - Make sure the body is in a firm and stable position.
  - Avoid extending or overreaching.
  - Use the lightest saw practicable for the job.
- (b) For more regular operations, the saw shall be fitted with either a straight or horn-type top blade cover to protect the operator from kickback.

## **6.9 REFUELLING THE CHAINSAW**

- 6.9.1 The following rules shall be observed when refuelling:
- Stop the motor.
  - Place the saw on clear ground. Fill the oil tank first to allow the saw to cool down.

- Avoid spilling fuel on hot engine components, as excessive heat can cause ignition.
- Do not smoke or have any sparking or open flame near the fuelling point.
- When completed, wipe excess fuel from the saw.
- Move at least 3 metres away from the refuelling site before restarting.
- Take special precautions in periods of high fire danger.

## **6.10 REDUCTION OF VIBRATION DISEASE**

6.10.1 The following points should be observed to minimise the hazard of vibration disease:

- Maintain and check the security of all antivibration mounts, absorbers, the guide bar and chainsaw body parts.
- Maintain the correct carburettor adjustments.
- Maintain a firm but not rigid grip on the chainsaw handles.
- Try to maintain warm hands.
- Maintain depth gauge settings and chain sharpening to the manufacturer's recommendations.

### *Further Information*

LFITB FIRS Module 1.6: *Chainsaw Maintenance and Operation.*

OSH, *A Guide to Safety with Chainsaws.*

# 7: Portable Tools and Equipment



## 7.1 BRUSH CUTTERS

- 7.1.1 Check that the blade is undamaged, correctly sharpened to the manufacturer's instructions and securely fixed.
- 7.1.2 Any harness for supporting the machine shall be fitted, worn and adjusted to the manufacturer's instructions. Ensure that any emergency release system for the harness is working effectively.
- 7.1.3 Check that the weight of the saw is evenly spread and the blade is in the correct position. Make sure the handles give a comfortable working stance. Adjust as necessary.
- 7.1.4 Although it is not mandatory to wear safety legwear when using a brushcutter, debris and stones can get thrown towards the operator and some form of leg protection is recommended. Legwear suitable for chainsaw safety protection does not give ample protection from circular saws.
- 7.1.5 To start, place the machine on level ground with the blade clear of debris.
- 7.1.6. Ensure the blade is stationary when the motor is idling. Do not touch or adjust blade while the motor is running.
- 7.1.7 Always work the greater of 3 metres or twice the length of the material being felled away from

other workers. These distances may need increasing in adverse conditions.

- 7.1.8 Release throttle when the blade jams, and switch off if jamming persists.
- 7.1.9 Cover or remove the blade when the saw is not in use or is being carried to the workplace or conveyed in a vehicle.

## **7.2 POWER AND HAND TOOLS**

- 7.2.1 All tools and implements used in any river and stream work shall be kept in good working condition and, where applicable, be properly sharpened. They shall be restricted to the use for which they were designed.
- 7.2.2 Handles shall be securely and correctly attached to tools. Do not use tools with loose handles. All wooden handles shall be of firm, straight-grained stock and free from defects.
- 7.2.3 Where necessary, suitable hand grips shall be fitted to metal handles.
- 7.2.4 Split axe heads, and damaged or mushroomed wedges, hammers and similar equipment, shall be properly repaired or replaced.
- 7.2.5 A maul or other suitable tool shall be provided for the driving of wedges. Steel wedges must be driven with a soft maul.
- 7.2.6 When sharpening hand cutting tools, follow these guidelines:
  - File away from the cutting edge, not towards it.

- All files shall be fitted with proper handles.
- Where practicable, tools shall be held in a suitable fixed clamp when being sharpened. Tools shall not be left unattended in a fixed clamp.
- When sharpening a cutting tool in the field where no fixed clamp is available, make sure the tool is firmly held and the method used is such that the risk of injury is minimised.

7.2.7 Hand tools shall be carried in a manner which minimises the risk of injury to yourself and others and in such a manner that they can be thrown away from the body in the event of a slip or a fall.

7.2.8 When using hand cutting tools in the field, workers shall keep whichever is the greater of 3 metres apart or twice the height of tallest vegetation involved. Extra care is required in wet or slippery conditions, when the spacing between workers may need to be increased.

# 8: Storage and Cartage of Flammable Liquids



## 8.1 GENERAL

8.1.1 Petrol and other flammable liquids shall be conveyed, stored and packed in containers that comply with the requirements prescribed under the Dangerous Goods Act 1974 and Dangerous Goods Regulations 1985.

## 8.2 BULK CARTAGE

8.2.1 Containers shall:

- be made of metal or other approved material;
- be of such construction that the contents cannot escape in either liquid or vapour form;
- if made of plastic, be approved and be marked with the LAB approval number. (See Clauses 8.3.1 - 8.3.3 for use in temporary transportation.)

8.2.2 Flammable liquids shall not be transported in containers mounted on, or protruding over, the front or rear bumpers of any vehicle.

8.2.3 No flammable liquid shall be carried or stored in the same compartment of a crew bus or vehicle used to carry passengers.

8.2.4 When it is necessary to carry flammable liquids in vehicles also used for transporting passengers, the container or containers shall be secured in a

properly constructed and vented compartment separate from that used to carry passengers. Such a compartment shall be accessible only from the exterior and be vented to the exterior.

- 8.2.5 The Dangerous Goods Regulations require that least two hand fire extinguishers designed for fighting class “B” fires shall be immediately available and be of suitable capacity in relation to the quantity of flammable liquid being carried on every tank wagon or trailer.
- 8.2.6 No person shall smoke while transporting or attending to any flammable liquid tank wagon or tank trailer, or while refuelling equipment or vehicles.

### **8.3 TRANSPORTATION BY FOOT**

- 8.3.1 Only approved containers with a LAB number shall be used to carry fuel for on site refuelling. Such containers must not be used for the storage of fuel. Glass containers are prohibited for carrying oil or fuel.
- 8.3.2 On filling, an air gap of 5 percent by volume shall always be left in the container.
- 8.3.3 Containers shall be regularly checked and shall be discarded if they show signs of damage.

### **8.4 STORAGE**

- 8.4.1 Flammable liquids shall not be stored in any facility used for rest or meal purposes.
- 8.5.2 Places for the bulk storage of flammable liquids

- shall not be situated within 15 metres of any explosives or any fire or other source of ignition.
- 8.5.3 No person shall light a fire or bring a naked flame or other source of ignition to within 15 metres of any area set aside for the bulk storage of flammable liquids. Adequate precautions shall be taken to prevent fires or explosion and no unauthorised person shall enter such a storage area.
- 8.5.4 A container that has held flammable liquids shall not be repaired by any process involving heat unless the container has been first cleaned of residues of flammable liquid and vapour by steaming out or other suitable process.
- 8.5.5 When it is necessary to store or keep containers exceeding 20 litres capacity which have contained flammable liquid, they shall be tightly closed and kept either in a place reserved for the storage of flammable liquids or in the open, away from buildings.

### *Further Information*

Dangerous Goods (Class 3- Flammable Liquids)  
Regulations 1985

# 9: Use of Explosives



- 9.1 When explosives are used on rivers and stream work, notification under the Health and Safety in Employment Regulations is required. Check with the Inspector (Forestry) or nearest OSH office.
- 9.2 Persons using explosives shall hold a certificate of competency as a construction blaster issued under the Health and Safety Regulations 1995.
- 9.3 Only competent persons over the age of 18 years shall be in charge of any blasting operations.
- 9.4 Explosives shall be stored, transported and used in accordance with the safety rules laid down by the Explosives Regulations 1959.
- 9.5 Explosives shall not be carried on any vehicle used for transporting flammable liquids or goods.
- 9.6 Explosives and detonation devices shall be carried in separate packages.

## *Further Information*

Explosive Regulations 1959.

# 10: Wire Rope Used for Hauling or Lifting



- 10.1 The following rules shall be followed for wire ropes used for hauling and lifting purposes:
- No wire rope shall be used unless it has been certified as to its breaking strength by the manufacturer or vendor.
  - Eyes shall be formed by splicing the ends tucked in not less than three times one side and two the other, or held by clamping devices giving at least the same strength.
  - Knots shall not be used in any wire rope used for lifting or hauling.
  - Wire rope which shows signs of excessive wear, corrosion, kinking, stranded wires or having been burnt, shall be replaced.
  - Wire rope shall comply with NZS/BS 302: Part 5:1987 *Specification for ropes for hauling purposes* or any other Standard which embodies the same or more stringent criteria.
- 10.2 Wire rope shall be cut either:
- using a specialist non-percussion cutting tool; or
  - if using a percussion tool, with a softened hammer; or
  - by gas.

# 11 • Transportation of Workers



- 11.1 In addition to any provisions contained in any Act, award, or employment contract, all vehicles used for conveying workers shall comply with the:
- Transport Act 1962;
  - Traffic Regulations 1976;
  - Passenger Vehicle Construction Regulations 1978;
  - Transport (Vehicle Standards) Regulations 1990;
  - Any rules made under the Transport Act 1993 which replace or supersede the above regulations.
- 11.2 Only persons directly concerned with the river and stream operation, or others authorised by the person in charge of the operation, shall be permitted to travel in vehicles.
- 11.3 No loose hand or portable tools and equipment shall be carried in the passenger compartment of a vehicle conveying workers.
- 11.4 When it is necessary to carry flammable liquids in vehicles also used for transporting passengers, the container or containers shall be secured in a properly constructed and vented compartment separate from that used to carry passengers. Such a compartment shall be accessible only from the

exterior and be vented to the exterior.

- 11.5 All vehicles used for conveying workers shall be provided with, where applicable, a means of communication between the passenger compartment and the driver for use in case of an emergency.
- 11.6 Each person authorised to travel in a vehicle conveying workers shall have a suitable place to sit, under cover, in a properly fastened seat.

*Further Information*

Land Transport Safety Authority, *Guide to Vehicle Standards Light Vehicles and Heavy Vehicles*.

# 12: Mobile Plant and Equipment



## 12.1 COMPLIANCE WITH STATUTORY REQUIREMENTS

12.1.1 Mobile plant used in river and stream operations shall comply with the Health and Safety in Employment Act 1992 and the Health and Safety in Employment Regulations 1995.

12.1.2 A seat belt to AS 2664:1983 *Earth-moving machinery - Seat belts and seat anchorages* or other operator restraint device which embodies the same or more stringent criteria shall be fitted to mobile plant and worn at all times by the operator while the machine is in motion.

12.1.3 Mobile plant (except hydraulic excavators) which is not operated on level ground at all times shall be fitted with an adequate and suitable roll over protective structure (ROPS) to ISO 8082:1994 - *Self-propelled machinery for forestry - Roll over protective structures - Laboratory tests and performance structures*, or any other standard which embodies the same or more stringent criteria.

Refer also to 12.2.1 and 12.2.2 which detail requirements for specific circumstances.

Mobile plant not required to have ROPS includes:

- cars, vans, trucks and buses;
- cranes;

- drag lines;
- forklifts with telescopic boom;
- power-operated elevating work platforms;
- log haulers;
- machinery weighing less than 700 kg.

12.1.4 For mobile hydraulic excavators, there is no ROPS standard for plant over 6000 kgs. An alternative structure known as a COPS (cabin operator protective structure) locally designed and made to meet the requirements of the ISO Standards shall be fitted to mobile hydraulic excavators above 6000 kg used in river and stream work.

12.1.5 Any alterations to mobile plant protective structures which alter the design outside of the manufacturer's specifications shall have the approval of the manufacturer or manufacturer's agent.

### *Further Information*

Occupational Safety and Health Service,  
*Approved Code of Practice for Operator  
 Protective Structures on Self-propelled Mobile  
 Plant.*

## **12.2 REQUIREMENTS FOR RIVER AND STREAM OPERATIONS**

12.2.1 For all machines except hydraulic excavators, FOPS, OPS and ROPS can be met by the same structure. For hydraulic excavators, the

requirements may be met by a COPS structure.

- 12.2.2 Mobile plant that is required to work where there is danger from falling material or in standing trees, shall be fitted with a falling object protective structure (FOPS) to the standard ISO 8083:1989 *Machinery for forestry: Falling object protective structures, Laboratory tests and performance requirements* or any other reputable standard which embodies the same or more stringent criteria.
- 12.2.3 On mobile plant where there is a danger to the operator by objects entering the cab, shall be fitted with an operator protective structure (OPS) to ISO 8084:1993 *Machinery for Forestry: Operator Protective Structures* or any other Standard which embodies the same or more stringent criteria.

### *Further Information*

*OSH, Approved Code of Practice for Operator Protective Structures for Self-Propelled Mobile Plant.*

- 12.2.4 Inspections, six-monthly, shall be made by a competent person of all mobile plant used at an operation and not subject to the Transport Act to ensure that such plant is maintained in good working order and can be safely used. Details of these inspections shall be recorded and confirmation suitably displayed on the mobile plant or at a recognised depot.

12.2.5 No machinery shall be used on river and stream operations unless it is:

- suitable for the operation in capacity and design;
- operated by a competent person or person training under adequate supervision;
- where appropriate, equipped with brakes capable of holding the mobile plant on any gradient on which it is operated.

12.2.5 All mobile plant required to work at night shall be equipped with lights for both forward and reverse travel. In addition, if any river and stream work such as felling or removing of trees is carried out at night, the operation shall be fully illuminated.

12.2.7 Instructions or warning signs shall be prominently displayed where the following situations exist:

- Where operating noise levels are likely to cause damage to hearing, an ear protection warning sign shall be displayed and the operator shall wear appropriate hearing protection.
- Mobile plant that have booms, telescoping masts or other attachments that may be able to come in contact with overhead power lines, shall have a warning concerning this displayed.
- Any danger zone specified by the manufacturer must be clearly marked on the machine.

- Machine control and float functions shall be clearly marked.
- The reach of any boom and safe working loads shall be clearly displayed on the boom.

## **12.3 INSPECTIONS AND SERVICING OF MACHINES**

- 12.3.1 In addition to the six-monthly inspections required under Clause 12.2.3, machines shall be inspected daily by the operator or other competent person to ensure that it is properly maintained in a sound and safe condition.
- 12.3.2 Any machinery that has become unsafe shall be shut down until the machine repairs are made. The machine shall be inspected and tested before returning to full service.
- 12.3.3 No machine shall be cleaned, lubricated or repaired with the engine running except where final adjustments require it. Adjustments shall never be made when the machine is in motion.
- 12.3.4 If fuel is spilt while refuelling a machine, ensure that it is correctly cleaned up to lessen the chance of fire or explosion.
- 12.3.10 To further lessen the chance of fire, sump guards and manifolds shall be kept clear of debris. Regularly check the security of all hydraulic fittings and keep batteries properly secured, with clean terminals, and isolate them when not in use.
- 12.3.6 No person shall work under any raised blade, load or accessory, or any machine raised for repairs, unless supports or other devices are used to

ensure that the object cannot be dropped or lowered.

## **12.4 OPERATIONAL RULES AND GUIDELINES FOR MOBILE PLANT**

- 12.4.1 Operators shall only operate plant they are authorised by the employer to use.
- 12.4.2 Where practicable, avoid operating mobile plant alone in isolated areas. Use the following methods to handle the situation:
- Work mobile plant in pairs where possible; or
  - Employ an observer to avoid working alone on hazardous work.
  - If mobile plant is operating alone in isolated areas on nonhazardous work, it shall be equipped with radio, mobile telephone or other aids to summon assistance in the event of an emergency.
- 12.4.3 If felling of trees is involved, mobile plant, except for machines assisting with the felling or specialist felling machines carrying out the felling, shall be at least twice the height of the tallest tree away while tree felling is taking place.
- 12.4.5 Where mobile plant is working on or close to roads or road verges or areas where other persons have access, appropriate signs shall be used to warn other users and the work area suitably demarcated. Section 13: Working on or About Roads contains further details.
- 12.4.6 Care shall be taken when working near the edge of banks or overhanging material. The vibration

and weight of your machine may cause the edge to give way or overhanging material to fall.

- 12.4.7 In general operations, no person shall:
- get on or off a moving machine;
  - hook or unhook strops while the machine or winch rope is moving;
  - attempt to guide ropes on to drums or through fairleads by using their hands or feet.
- 12.4.8 Where the mobile plant operator is required to attach strops to logs, loads or trees, the blade, if fitted, shall be grounded, the brake applied and the winch be in the free spool position. Winches shall not be operated from outside the canopy or cab.
- 12.4.9 No machine shall be left unattended for extended periods with the engine running. If mobile plant is stationary for a period, the brakes shall be applied and any attachments such as blades, forks or the load shall be lowered to the ground.
- 12.4.10 When the machine is shut down, blades and accessories lowered by gravity or hydraulics shall be resting on the ground.
- 12.4.11 Loose objects shall not be carried in the cab of mobile plant.
- 12.4.12 If the manufacturer has recommendations for operating on slopes, these shall be followed.
- 12.4.13 If the manufacturer does not specify maximum slopes, site specific hazard control procedures shall be developed after assessing site hazards such as:

- side slope travel;
- pulling a load;
- winching angle;
- soil types;
- ground moisture;
- roughness of terrain;
- weather conditions;
- visibility.

Machines restricted to tracks may be able to work on steeper slopes provided that specific workplace procedures are in place.

- 12.1.14 No operator shall be required to work on slopes greater than the capacity of the machine or their own ability or confidence.

## **12.5 WHEELED MOBILE PLANT**

- 12.5.1 Adequate allowance shall be made when forming tracks to ensure that machines are not operating on loose fill.

- 12.5.2 Load-carrying height should be adjusted to suit the skidding or carrying conditions.

- Skidding down hill the load may sway and bump against the machine, causing instability if the load is carried too high.
- Care shall be taken when turning with a raised load especially on sloping ground.
- Carrying the load low increases stability.
- Avoid overloading.

12.5.3 When driving along roads, speed shall be kept to safe levels, with consideration given to the fact that wheeled machines can become unstable at even relatively low speeds. Excessive ground speed can cause enough bounce for control to be lost.

## 12.6 SKIDDERS

12.6.1 All skidders shall be fitted with suitable side protection on the canopy.

12.6.2 Rollovers can be reduced by taking particular care in the following situations:

- Turning on slopes. This changes the centre of gravity to the downhill side, increasing the possibility of a roll over.
- Incorrect fleet angle, especially when on slopes.
- Turning unloaded off a formed track on to a steep slope. Avoid this where possible. If there is no alternative, align the skidder parallel to the slope as it is driven off the track.
- Driving down a steep slope without a load. This situation transfers weight to the front of the machine, causing the rear to become lighter and liable to lift, causing instability.

### *Further Information*

Workers Compensation Board of British Columbia, *Ground Skidding Handbook*.  
Manufacturer's Operational Handbooks, LIRO Reprint.

## **12.7 MECHANISED OPERATIONS**

- 12.7.1 Mobile plant shall only enter within two tree lengths of a felling face when felling has ceased.
- 12.7.2 When operating on sloping ground, the mobile plant shall be parked as near as practicable, straight up and down the slope, to lessen any chance of roll over.
- 12.7.3 Before moving off, the bucket or harvesting head shall be in the correct transport position.
- 12.7.4 When mobile plant are used as working platforms, they shall be stationary while the work is being done and the operator shall be at the controls.

### **12.7.5 *Felling***

- 12.7.5.1 Felling shall not take place within two tree lengths of other operating machinery. If other mobile plant or any person comes within two tree lengths of any felling operation, the felling shall be stopped until the area is safe.
- 12.7.5.1 Machines shall be operated using the techniques and within the limits specified by the manufacturer.

### **12.7.6 *Extraction***

- 12.7.6.1 Where grapples are in use, the jaws of the grapple shall fully enclose the load or tree when possible to avoid slipping or dropping.

## 12.8 PEOPLE WORKING AROUND MOBILE PLANT

12.8.1 No person shall enter an operational area where machines are working unless:

- they draw attention to their presence and intention by calling out loudly, hand signals or some other means;
- they approach the area, where practicable, from above or level with the operation;
- they do not enter the operational area until acknowledged or signalled to do so.

12.8.2 Workers shall make sure the operator is fully aware of their presence and stay in sight unless they have informed the operator what they intend to do and how long they intend to be out of sight.

12.8.3 No person shall:

- Mount a stationary machine without the approval of the operator.
- Be directly in front of, between the wheels, close alongside, on the tracks or directly behind a machine being started or operated.
- Ride on a machine not designed to carry passengers. To carry passengers, a seat and seat belt or restraint device shall be provided and both the operator and passenger shall be protected by the required protective structure as outlined in Sections 12.1 and 12.2 (Exception: See Clause 2.4 concerning emergency work).
- Ride on a drawbar, dozer blade, frame or materials being pulled or pushed by a machine.

- Work below a machine while it is operating as materials may be dislodged and roll or fall into your work area.

## **12.9 SHIFTING MOBILE PLANT**

- 12.9.1 If the mobile plant is to be shifted by transporter or other vehicle, the machine operator or other competent person shall be present to load the machine.
- 12.9.2 On narrow or one-way roads, a pilot vehicle shall be used.
- 12.9.3 When skidders, loaders and some types of wheel tractors are driven on roads when shifted or along formed tracks, extreme care shall be taken to ensure that the gear being used is not too high, so that if engine speed is reduced, the hydraulic system still has sufficient pressure to properly operate the steering and braking systems.

## **12.10 ALL TERRAIN VEHICLES**

- 12.10.1 ATVs are involved in more accidents in the rural community than any other machine, highlighting the need for proper training and proper understanding of riding techniques.
- 12.10.2 Unless allowed by the manufacturers, ATVs are single-rider machines. Passengers shall not be carried.
- 12.10.3 ATVs require a special riding style and actively using the body weight to help the stability of the machine when it is operated carrying loads, towing trailers and on slopes and rougher ground.

- 12.10.4 ATVs are designed to operate “off road”. Do not attempt to ride on roads or tracks until you can competently handle the machine in the “off-road” situation.
- 12.10.4 When using the fitted carriers to convey loads, do not exceed the manufacturer’s recommended loading. Stack the load so that the weight distribution is as even as possible. Remember that loads will alter the centre of gravity, making the machine less stable on slopes and rougher ground.
- 12.10.5 When using trailers:
- Do not exceed the manufacturer’s recommended loadings.
  - Try and keep the centre of gravity as low as possible and the correct weight on the draw bar.
  - Ensure that the load is properly secured so that it is not able to shift and create driving problems.

### *Further Information*

NZ Motorcycle Distributors Association, *ATV Skills*.

## **12.11 POWER-OPERATED WORK PLATFORMS**

- 12.11.1 All power-operated platforms used in a river and stream operation shall have an engineer’s certificate stating that the work platform is capable of safely elevating, sustaining, lowering and where applicable, slewing or transporting its designated safe working load (SWL).

12.11.2 Operators shall:

- Operate the work platform safely and in accordance with the operating instructions and the *Approved Code of Practice for Power-Operated Elevating Work Platforms*.
- Ensure that the SWL of the work platform is not exceeded.
- Never approach within 4 metres of overhead powerlines, without written consent of the line's owner or operator.

12.11.3 Safety harnesses shall be worn at all times the platform is being used. They shall have a maximum fall distance of 1.5 metres so as to prevent fall injuries.

12.11.4 Workers shall not overreach when working from a platform, and shall have an anchorage to which a safety harness lanyard is attached at all times.

12.11.5 The platform shall not be used over other workers, and workers shall not move under the platform.

12.11.6 A chainsaw shall not be started from inside a bucket or platform unless:

- a fixed starting bracket is fitted to the bucket walls or platform guard rails, so that the bar and chain are outside the working area when the saw is started; or
- the saw is warmed up on the ground and then, with the chainbreak on, restarted outside the bucket, holding with a straight right arm and short sharp pulls of the starter cord.

12.11.6 The work platform shall be inspected and load tested after an accident or modification or

otherwise every six months by a competent person.

*Further Information*

Occupational Safety and Health Service,  
*Approved Code of Practice for Power-Operated  
Elevating Work Platforms.*

# 13: Working on or About Roads



- 13.1 The Transport Act defines a road as follows:  
“Road” includes a street; and also any place to which the public has access, whether by right or not; and also includes all bridges, culverts, ferries, and fords forming part of any road, street, or place as aforesaid.
- 13.2 There are a range of activities when working on or near roads that require the provision of signs to protect the worker or the worksite, or guide traffic and pedestrians around the worksite or hazard.
- 13.3 International Convention format shall be used for all road traffic control signs. All signs shall be kept properly secured and be legible at all times. “Home-made” signs shall not be used.
- 13.4 Permanent signs shall comply with the *Manual of Traffic Signs and Marking*, published by Transit NZ/ LTSA.
- 13.5 All temporary traffic control signs shall comply with Transit New Zealand’s handbook *Temporary Traffic Control and Safety at Roadwork Sites*. Temporary signs shall be removed or covered when no longer valid. This would apply when work has ceased. Examples of flagman use and road closing are given on pages 84-85.
- 13.6 On roads where there is likelihood of the operation impacting on road users, formal

authorisation by the road controlling authority shall be obtained if required, and compliance achieved with any conditions set by the authority before any signs warning of operations are placed and work commences.

## FLAGMAN TO DIRECT ROAD USERS

Place advance warning sign  
"Tree Felling".



Place direction warning  
sign "Flagman".



Locate flagman  
Use "Stop"/"Go"  
paddles where  
there is limited  
space or only one  
lane is available.



## **ROAD CLOSED**

Place advance warning sign “Tree Felling”.



Place detour sign if appropriate.



Place “Road Closed” sign.  
Run high-visibility tape across the road.



# 14: Hazard Assessment and Safety Plans



## 14.1 GENERAL

- 14.1.1 The identification of hazards and the promotion of safe methods of work are essential and these should also reflect responsibilities to third parties.
- 14.1.2 The public is primarily concerned where river and streams operations are being carried out adjacent to public roads, access tracks or on areas where they have access.
- 14.1.3 Every operation, no matter how small, should be planned. Safety planning at the start of the operation will always be more cost-effective than safety introduced midway through the operation.
- 14.1.4 Managers (including principals, agents of principals, and employers) of river and streams operations must lay a solid foundation for safety by adopting safe systems of work, and employees must co-operate to ensure that their actions do not compromise safety.

## 14.2 SITE ASSESSMENT

- 14.2.1 Check the site prior to commencement for likely hazards. These may include:
  - Terrain:** slope range, ground roughness, ground vegetation, soil firmness, rock

outcrops with loose materials and areas affected by floods are critical features often not visible on maps, so the block should be walked and terrain hazards noted.

**Tree factors:** species, average size and range, presence of flood damage or windthrow. These factors may vary considerably within a site. Some of this information may be available from inventory data.

**Services location:** power and telephone lines, underground services such as sewerage, gas, power, communication or water. Their presence and location may restrict the operation and be a significant hazard.

**Environmentally sensitive areas:** spawning streams, or those used for food collection, native vegetation, historical sites. What site-specific procedures will need to be followed to safely and carefully work adjacent to these areas?

**Public areas:** pedestrians, river and stream users such as fisherman and canoeists, access tracks, roading and bridges, public use or vehicle movements passing the site. Will the operation be able to be undertaken without creating risks? Will it be necessary to mark off areas for public safety?

## 14.3 SIGNIFICANT HAZARDS

- 14.3.1 Identify which hazards are present or could be present. Determine which of these hazards are of

significant concern. Then decide upon control steps for these hazards which will firstly eliminate the hazard; and if this is not practicable, isolate the hazard; and finally if this is not practicable, minimize the risk of harm from the hazard.

- 14.3.2 Identification and control of hazards should be documented for easy verification.

## **14.4 HAZARD MANAGEMENT DURING OPERATIONS**

- 14.4.1 The worker is exposed to many hazards which can result in serious injury or death.
- 14.4.2 The Health and Safety in Employment Act requires that information about hazards, and steps to control them, is given to employees in a form and manner that employees are reasonably likely to understand.

## **14.5 OPERATIONS SAFETY PLAN**

- 14.5.1 The employer is responsible for providing a safe work environment and ensuring that employees and other people are not harmed. These requirements suggest that the following practicable steps shall be taken.
- 14.5.2 To ensure the safety of workers who might be endangered by the operation, the employer of every operation shall make available to those workers written procedures to be followed in the operation. These documents would cover health and safety policies and procedures and apply broadly to all operations. They should describe:

- the type and extent of the work;
- the type of machinery to be used;
- information for employees on the following:

**Training:** The Health and Safety in Employment Act requires that each employee is “adequately trained” in the safe use of all the plant, objects, substances, and protective clothing and equipment that the employee is or may be required to use or handle.

**Supervision:** if the employee does not have “adequate training” then they shall be under the supervision of a person who does have adequate training.

**Emergency procedures:** information shall be given on what to do if an emergency arises while the employee is working.

**Personal protection equipment:** information on where all the necessary safety clothing, devices, equipment and materials are kept and how to use this equipment and look after it.

**Rules:** information shall be given on the duties the employee has including:

- crew safety rules;
- company safety rules and;
- safety legislation.

This shall include safety inspections, hazard identification and reporting, and accident investigations and injury reporting.

Each individual operation is different. There are many varying hazards. At each new site, hazard identification shall be carried out to ensure that all hazards are identified.

**Hazards:** all employees shall be involved in hazard identification in each new site. Significant hazards shall be determined by employee involvement.

**Hazard control:** steps shall be shown to minimise the likelihood that hazards will be a cause or source of harm to the employee or other people.

# 15: Manual Tree Felling Operations



For layering/lopping of trees, refer to Section 18 of this code.

Tree felling is a hazardous operation. Safety, therefore, depends on the skill, experience, common sense and judgement of the feller. Consequently, every emphasis must be placed on following basic safety rules, training, clear instructions and supervision.

## 15.1 ENTERING TREE FELLING AREAS

15.1.1 Every person approaching a felling operation shall:

- Before entering the felling area, notify the person in charge of the felling operation of their intention;
- Exercise care when approaching workers engaged in any felling operation;
- Draw attention to their presence and intention by calling out loudly or by some other effective means; and
- Not enter the area until acknowledged or signalled to do so.

## 15.2 PREPARATION FOR FELLING

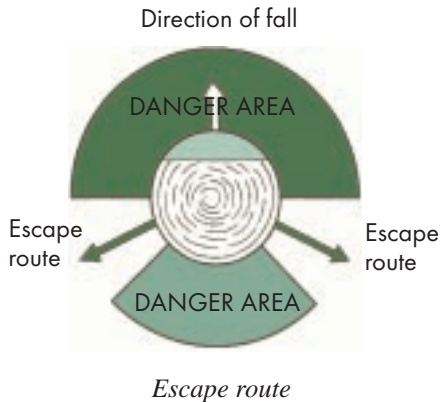
15.2.1 All felling operations shall be under the direct control of a competent person, fully experienced

in the kind of work to be undertaken. The person in charge of felling operations shall exercise control and supervision of the work to ensure adequate safety precautions are being observed.

- 15.2.2 Employers shall ensure that no person works on felling operations unless they are:
- competent; or
  - adequately trained; or
  - hold the valid and approved training qualification to industry standards; or
  - are under close supervision by a person who has a thorough knowledge of felling operations.
- 15.2.3 If overhead wires, gas lines or underground cables of any kind are present in the felling area, the appropriate authority shall be consulted and their requirements complied with.
- 15.2.4 Trees that are within two tree lengths of road or rail traffic, pedestrians or public places shall not be felled unless suitable precautions are taken to warn oncoming traffic and people in the vicinity. Signs and conditions shall be in accordance with Section 13: Working on or About Roads.
- 15.2.5 All dead or defective trees which could cause danger to persons using roads, skids or tracks shall be felled before operations begin. This includes trees which have been disturbed during road or skid construction.
- 15.2.6 Before felling commences, a careful check shall be made to ensure that there is no danger that

dead material, branches or dead tops may be dislodged and fall.

- 15.2.7 Scrub, vines, and similar obstacles shall be cleared from around the tree to be felled, to provide an adequate work space and a clear escape route.
- 15.2.8 The escape route shall be diagonally to the rear at approximately  $135^\circ$  from the direction of fall (see illustration below). If this is not possible, it shall be as close as practicable to the diagonal and to the side and rear.



- 15.2.9 The escape route shall be kept clear of tools and other material that would impede a quick exit.
- 15.2.10 Persons felling trees shall ensure that no other person, or machinery, operations or any operating ropes are within the two tree lengths of the tree being felled. On steep slopes this distance shall, if necessary, be increased to cover the movement of trees after felling.

- 15.2.11 No persons shall approach a tree felling operation closer than twice the length of the tallest tree being felled unless:
- assisting with felling;
  - supervising;
  - under training;
  - training others; or
  - authorised by the person in charge.
- 15.2.12 On steep slopes, the two tree lengths may have to be increased to cover tree movement after felling.
- 15.2.13 Every feller shall carry on their person either:
- At least three wedges suitable for the size of trees being felled and a suitable tool for driving those wedges; or
  - For smaller trees, a felling lever or some other felling tool suitable for the size of trees being felled.

### **15.3 MANUAL TREE FELLING OPERATIONS**

- 15.3.1 Trees shall be felled towards a clear open space unless there is absolutely no alternative.
- 15.3.2 All scarfing and back cutting shall comply with the accepted felling methods in Section 15.6.
- 15.3.3 Where two fallers are working within two tree lengths, only one saw shall be operated at a time and the person not felling shall observe with saw switched off.
- 15.3.4 When felling of a tree is started, the scarf and back cut shall be completed before starting on the next tree.

- 15.3.5 Any tree severely damaged by a felled tree should be felled before moving forward to trim the felled tree.
- 15.3.6 Special care should be taken when felling dead trees, as parts may fall backwards into the work area as the tree falls.
- 15.3.7 Particular care should be taken when felling uphill as this creates extra hazards with trees likely to roll or slide back towards the operator.

## **15.4 HUNG UP AND CUT UP TREES**

- 15.4.1 Where a tree is “hung up” or “cut up”, it shall be brought to the ground immediately or the offending tree isolated from the operation. A hung up or cut up tree shall not be left standing, nor shall the faller leave the area before the tree has been brought to the ground, other than to seek assistance to do so.
- 15.4.2 Where practicable, machine assistance shall be used for hung up or cut up trees.
- 15.4.3 No person shall move forward within two tree lengths of the intended direction of fall of any cut up tree. (Exception 15.4.5).
- 15.4.4 No person shall move forward within two tree lengths of the direction of fall of any hung up tree. (Exception 15.4.5).
- 15.4.5 No machine shall operate within two tree lengths of any felling operation while felling is in progress, or forward of any hung up or cut up tree, unless to assist in safely bringing the tree to the ground.

- 15.4.6 On steep slopes, distances may have to be increased to allow for tree movement after getting the tree to the ground.

## 15.5 TREE DRIVING

- 15.5.1 Tree driving is not acceptable as a normal felling practice. In the interests of safety, it may be used to help fell difficult or dangerous trees.
- 15.5.2 Where the initial drive of one on one is unsuccessful and a further tree is necessary, a competent person shall be required to act as a feller observer to watch and warn on the movement of the trees.

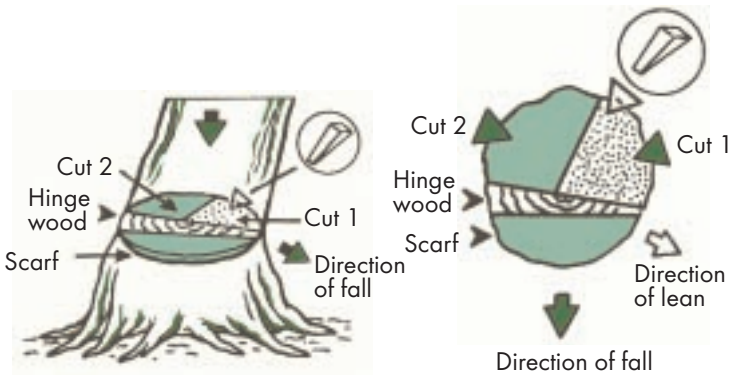
## 15.6 ACCEPTED MANUAL FELLING METHODS

- 15.6.1 The scarf and back cut shown below shall be used on all trees above 200 mm in diameter.



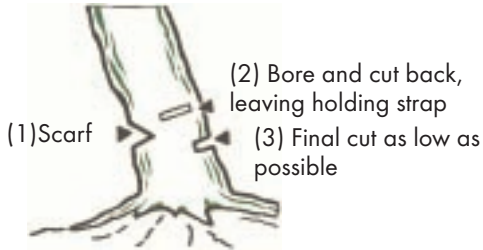
*Scarf and back cut to be used*

- 15.6.2 The top cut of the scarf shall always be put in first, followed by the bottom cut.
- 15.6.3 There may be occasions when, because of lean, the opening of the scarf may have to be reduced or enlarged to suit unusual circumstances. However, careful consideration should be given before using other than the accepted practices.
- 15.6.4 Wind-damaged trees without tops should be scarfed deeper than normal but not more than half the diameter. Special consideration should be shown if the tree shows signs of rot or decay.
- 15.6.5 Where there is doubt as to the lean of a tree, a wedge shall be inserted in the back cut and driven home as soon as practicable.
- 15.6.6 A tree's direction of fall can be altered from the natural lean by inserting and driving wedges into the back cut and varying the hingewood depth.



*Felling in variation to natural lean*

15.6.7 Forward-leaning trees, or those affected by wind, require special techniques. The amount of forward lean dictates the distance between back cuts. The greater the lean, the greater the distance.



*Felling cuts for forward-leaning trees*

# 16: Back Pulling

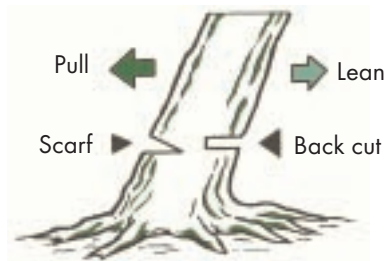
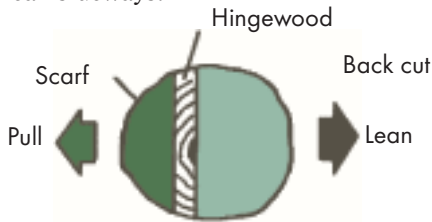


## 16.1 MECHANICALLY ASSISTED BACK PULLING

- 16.1.1 The provisions for tree felling outlined in Section 15 shall be followed where applicable. In addition, the following special provisions for mechanically assisted back pulling shall apply.
- 16.1.2 All persons carrying out a back pulling operation shall be competent or training under adequate supervision. Machinery and equipment shall be adequate to handle all aspects of the operation.
- 16.1.3 Persons other than the faller and the machine operator, as detailed in 16.1.8 overleaf, shall be at least two tree lengths away from the operation.
- 16.1.4 The feller and machine operator shall have an effective means of communication. This may require the use of an intermediary in some circumstances.
- 16.1.5 The rope should be secured as high as practicable on the tree, having regard for tree size, lean and height and the machine's pulling capacity.
- 16.1.6 The feller shall be responsible for the amount of tension applied, and the machine operator shall follow the feller's instructions.
- 16.1.7 If two tree lengths clearance is possible, the tree may be pulled towards the machine as follows:
- Drive the machine to two tree lengths distance in the opposite direction of the lean,

and tension the rope just enough to hold the tree in position.

- Scarf the tree in the normal manner but opposite to the lean. Back cut, ensuring adequate holding wood is retained. Use wedges if necessary.
- Retire to a safe position before signalling for the pull to commence.
- Apply tension on the pulling rope and then commence the pull, slowly at first and then increase speed until felling cuts take control
- If pulling is stopped prematurely, the tree may break sideways.

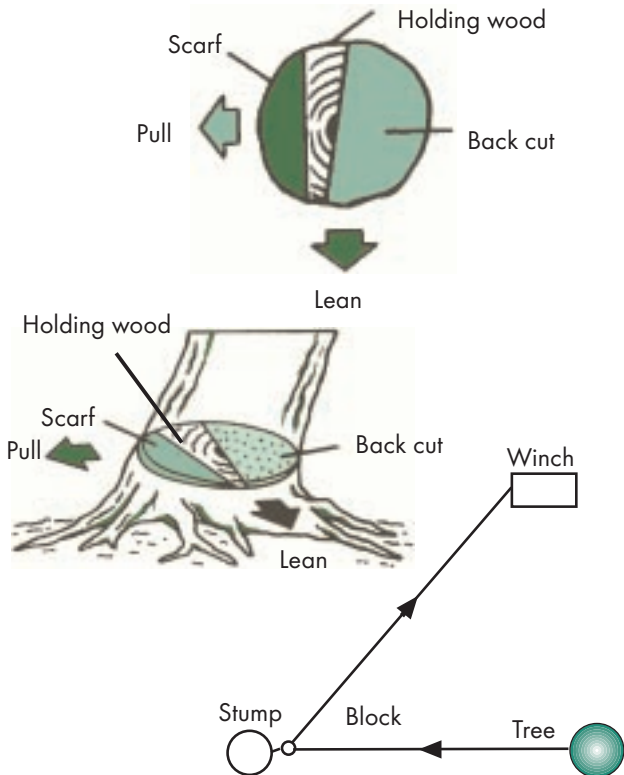


*Direct pull with winch or machine further than two tree lengths away*

16.1.8 If it is not possible to get two tree lengths clearance, use one of the following methods:

**Using stumps or anchors:**

- Position as in the layout below.
- Scarf and start the back cut, leaving more holding wood away from the lean.
- Begin the pull and continue the tension until the felling cuts take control.



*Using stumps or anchors less than two tree lengths away*

## Using a winch or machine only

- Drive the machine out to an angle of about  $80^{\circ}$  opposite the lean as illustrated (overleaf).
- Tension the rope just enough to hold the tree in position of fall.
- Scarf and back cut, leaving more holding wood on the side opposite the lean.

The tree will free fall, swinging on the rope, thus eliminating the need to pull the tree towards the machine.

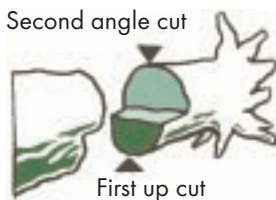


*Back pulling without stumps or anchor*

# 17: Wind Damage

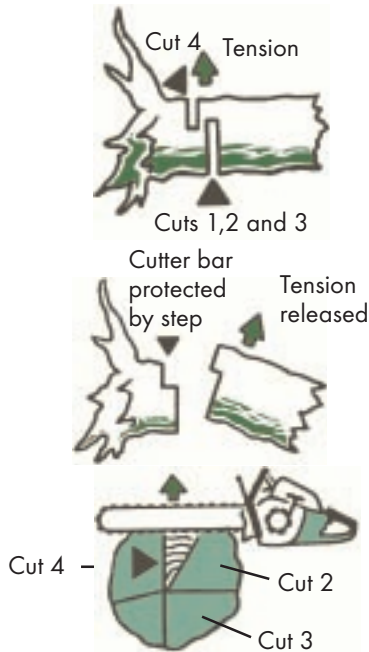


- 17.1 Wind-damaged trees present particular problems resulting from uprooting, breakages, bending and interlocking of stems. The following rules shall be observed:
- 17.1.1 Workers shall approach with caution, and examine each tree to see if it is under any tension or compression and determine the correct work method.
- 17.1.2 Where practicable, machines should be used to handle or assist to handle wind-damaged trees to release tension or compression so that they can be safely worked on.
- 17.1.3 Extreme care is required when dealing with bent or heavy-leaning trees. In such cases, uprooting with a machine should be used.
- 17.1.4 When a tree is resting on its upturned roots, the worker shall ensure that the cut is made in such a manner that neither the feller nor other workers are in a position of danger from movement of either the rootmat or the log. All cuts shall be made from the compression side.



*Butting off a log that may spring up and sideways*

- 17.1.5 When butting off a tree under tension, it is important that guide bars are of adequate length to complete the butting operation from the safe side of the tree. In general, the greater the tension, the larger the step.



*Butting a tree under tension*

- 17.1.6 Trees without tops should be scarfed deeper than normal but not more than half the diameter. Special consideration should be shown if the tree shows signs of rot or decay. When wedging dead or fractured spars, care must be taken because of the likelihood of the top breaking away and falling on the operator.

# 18: Tree Lopping and Layering



## 18.1 DESCRIPTION

18.1.1 The process of felling existing trees on to the ground while maintaining an adequate connection with the stump such that vigorous regrowth is encouraged. When lopping or layering willow trees, consideration should be given to the particular species and the time of the year when the activity is being carried out.

18.1.2 Employers shall ensure that no person works on lopping/layering operations unless they are:

- competent; or
- adequately trained; or
- hold the valid and approved training qualification to industry standards; or
- are under close supervision by a person who has a thorough knowledge of felling operations.

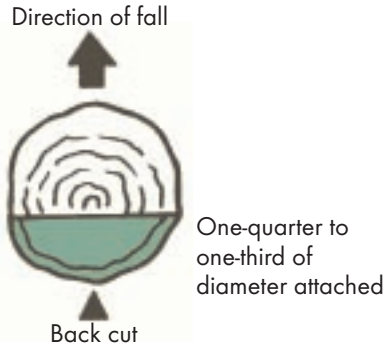
NB. All practicable steps should be taken to lop/layer trees when under 300mm diameter, recognising this to be the optimum diameter and age for this activity.

## 18.2 TREES LESS THAN 300MM IN DIAMETER

18.2.1 The back cut technique as shown below shall be used on all trees under 300mm in diameter.



*Back cut for trees less than 300mm*



*Layered tree less than 300mm*

- 18.2.2 The back cut shall be from 0-20° angle, depending on the position/situation of trees.
- 18.2.3 Where possible, a minimum connection of one-quarter to one-third of the tree's diameter must remain attached to the stump, as shown above.

### **18.3 TREES FROM 300MM TO 450MM IN DIAMETER**

- 18.3.1 Three methods are offered as being suitable for this size trees.

#### ***18.3.2 Back Cut and Safety Clamp Method***

- 18.3.2.1 The back cut method, in conjunction with a lopping/layering safety clamp device as shown

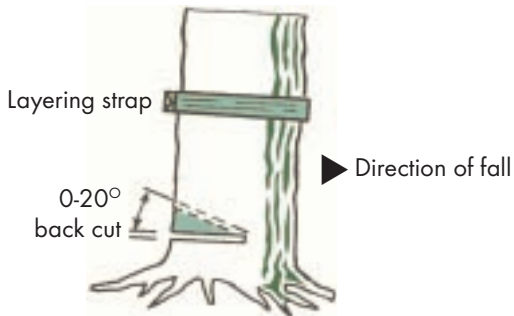
below, shall be used on all trees between 300 mm and 450 mm diameter.

18.3.2.2 The use of a clamping device to control longitudinal splitting of the trunk during lopping/layering is a recommended method.

The clamping device shall:

- have a nominal capacity of 50 kN (5 tonnes);
- be placed 1 to 1.25 diameters above the proposed cut position;
- be placed no more than snug tight around the tree (use of a ratchet-type device for tightening the clamp is not recommended);
- be inspected regularly for signs of wear and tear and any worn or defective parts replaced accordingly.

18.3.2.3 **Commentary:** The nominal capacity of the clamping device is the capacity of the weakest element of the device (excluding any strength reduction factors). It is preferable that the



*Back cut and strap to be used on trees 300mm to 450m*

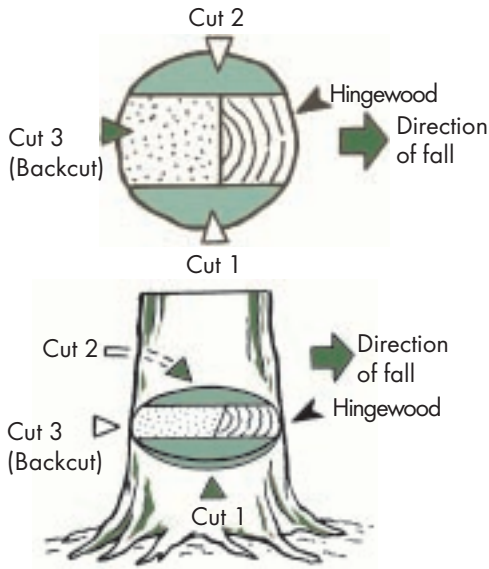
weakest element fails in a gradual manner such as yielding of steel or slipping of a friction connection.

18.3.2.3 The operator performing the saw cut shall aim to achieve a cut which leaves a minimum connection of one-quarter to one-third of the tree diameter attached to the tree stump.

18.3.2.4 The back cut shall be from 0-20 degree angle depending on the position/situation of trees.

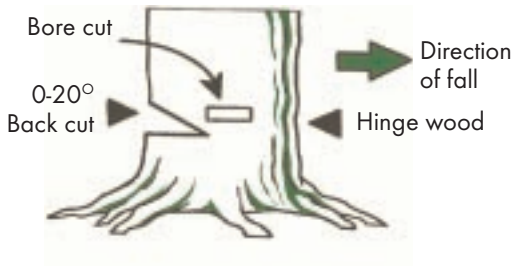
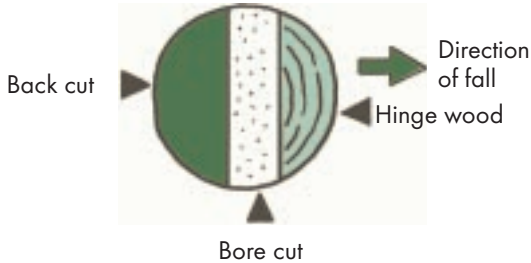
### 18.3.3 *Side Cutting and Back Cut*

- Place side cuts either side as low as possible
- Make back cut above the side cuts leaving hinge of wood.



### 18.3.4 *Bore Cut and Back Cut*

- Bore directly into and through the tree at right angles to the direction of fall.
- Complete felling cut with back cut as low as possible.



*Bore and back cut method*

## 18.4 **TREES IN EXCESS OF 450MM IN DIAMETER**

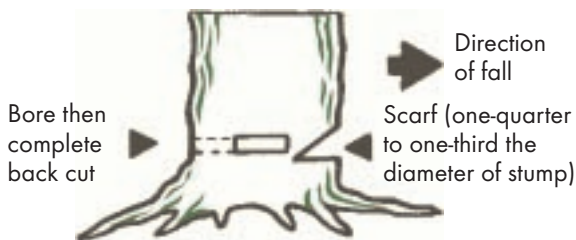
18.4.1 Two options are available for layering trees in excess of 450mm diameter. They are:

- Scarf and back cut (optional bore cut);
- Back cut only and mechanical layering.

## 18.4.2 Scarf and Back (Optional Bore) Cut

18.4.2.1 These techniques shall be carried out in accordance with Section 15: Manual Felling Methods.

- Complete scarf to control direction of fall.
- Bore cut through stem.
- Complete with back cut.



*Scarf with bore cut*

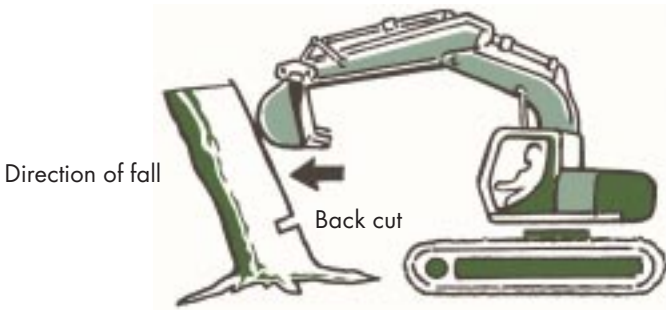
18.4.2.2 The alternative is to complete the back cut after the scarf is completed. This should only be done on trees not under tension.

## 18.4.3 Back Cut Only and Mechanical Layering

18.4.3.1 Before the operation commences, a site-specific hazard assessment shall be carried out, paying particular attention to ensure the safety of the person carrying out the chainsaw work.

- Only competent staff should be involved with this technique.
- The chainsaw operation is to be carried out independently of the mechanical operation.

- The back cut depth shall be one-quarter to one-third of the diameter of the tree being lopped/layered.
- After the back cut has been completed, the chainsaw operator shall stand well clear of the tree being layered and the machinery carrying out the layering activity.
- Any machinery involved in the pushing of back cut trees is to have the appropriate cab and window protection.

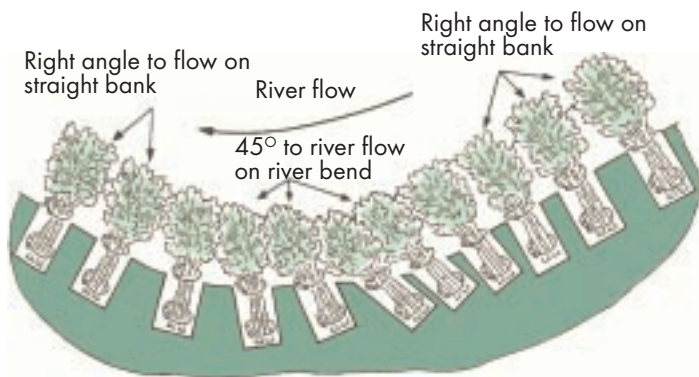


*Mechanical layering*

# 19: Tree Slotting and Trenching

## 19.1 DESCRIPTION

- 19.1.1 The use of existing live trees for river protection works where trees are removed in part or whole and placed horizontally in excavated trenches. The trees may be anchored with a combination of wire ropes and deadman anchors as necessary. There are many methods and designs for this work.

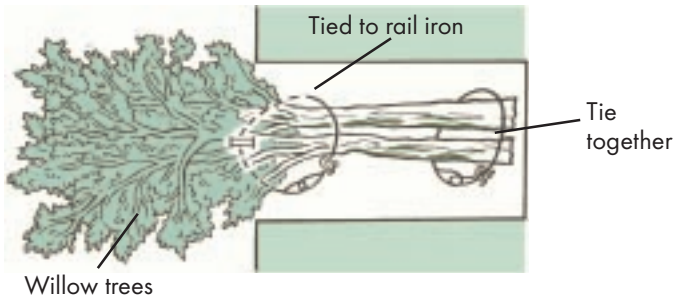


*Typical example of completed slotting work*

## 19.2 TRENCH EXCAVATION

- 19.2.1 No person shall enter the excavated trench prior to the placement of any trees.
- 19.2.2 Excavated material shall be placed at a reasonable

distance from the trench to minimise the possibility of bank collapse or slumping.



*Plan view of typical example of trench*

### **19.3 TREE REMOVAL**

19.3.1 Any trees being removed for the purposes of re-use for river and stream operations shall only be removed by mobile plant complying to the requirements of Section 12.2 as to operator protection and general suitability.

19.3.2 During removal operations, people not assisting with the operation shall remain at a safe distance of at least twice the length of the tallest tree being removed unless:

- assisting with removal;
- supervising;
- under training;
- training others; or
- authorised by the person in charge.

Where trees may slide, roll or move after removal, the distance shall be increased to suit the circumstances.

## **19.4 TREE HAULING AND PLACEMENT**

- 19.4.1 The person in charge of operation shall have a clear, unmistakable system of signalling.
- 19.4.2 Only one person shall give the signals, with the exception that any person may give an emergency stop signal.
- 19.4.3 Winch ropes shall be of sufficient length to reach all parts of the working area so that machines are not put in hazardous situations such as backing up or down short steep slopes, positioning off formed tracks, on loose fill or close to banks or drop-overs in order to reach logs or trees.
- 19.4.4 Before hauling starts, the machine shall be positioned so that the rope from the tree or log to the winch, through the fairlead, if fitted, is as straight as possible. Pulling at acute angles shall be avoided, as it leads to machine instability.
- 19.4.5 Before signalling the hauling to start, any person in the vicinity shall move to a safe position, in clear view if possible:
- out of the rope bight;
  - to the uphill side of the drag on slopes;
  - out of reach of any tree or log swinging or upending (particular care is needed with any short logs in the drag);
  - in a position where movement will not be restricted;
  - in a position where they can move quickly out of the way in case the machine operator is unable to obey the stop signals.

- 19.4.6 The load shall be winched as close as possible to the fairlead or winch before hauling is started. This will reduce lateral movement of the load and the possibility of the drag fouling on stumps and obstructions.
- 19.4.7 Unstropped logs riding in a drag should either be dropped from the drag or properly stropped before proceeding with the drag to the landing.
- 19.4.8 If multiple trees are being placed in a single trench, care should be taken in their placement to ensure their stability within the trench.
- 19.4.9 No person shall be in close proximity to the trench during the placement of any trees or covering of any tree butts with backfill.
- 19.4.10 Trees requiring any form of anchoring shall have wire rope anchors placed around the tree prior to being placed in the trench, or ropes placed in the trench prior to tree placement.

# Appendix: Glossary of Terms



- Back cut:** The final saw cut in felling a tree, opposite the scarf and the intended direction of fall.
- Backpulling:** Method of using a rope from a machine or winch to pull a tree to enable it to be felled against its natural lean.
- Bar (of chainsaws):** (Cutter bar, guide bar) Grooved flat steel bar around which the saw chain travels.
- Boring:** Using the tip of the guide bar to cut into a tree or log.
- Bore cutting:** Means of relieving the internal tension in a tree by means of a saw cut.
- Bottom cut:** Lower cut in a scarf.
- Butt:** Bottom (stump) end of a felled tree, or the larger end of a log.
- Chainbrake:** A safety device on a chainsaw designed to stop the chain in the event of kickback.
- Chainsaw:** A powered saw where the cutting action is performed by a series of linked teeth which travel around a guide bar.
- Competent person:** A person suitably qualified either by

experience or by training (or both) for the type of work in which the person is employed.

- COPS:** Cabin operator protective structure. A structure designed to reduce the likelihood of harm to the operator should the plant rollover, receive a blow from a falling object, tip over or where an object may enter the cab.
- Directional felling:** Felling trees according to a predetermined pattern to reduce breakage or to facilitate breaking out and delimiting.
- Drag:** A log or number of logs skidded or hauled from stump to skid in a cycle.
- Drop start:** Unsafe and illegal method of starting a chainsaw by holding the start cord and dropping the saw.
- Escape route:** A predetermined or prepared track by which fellers move away from a tree or log during felling or crosscutting to avoid danger.
- Fairlead:** A device containing sheaves or rollers used to guide rope on to a drum.
- Fell:** To sever a standing tree from its stump and bring it to the ground.
- FOPS:** Falling object protective structure. A structure designed to reduce the likelihood of harm to the operator should the plant receive a blow from a falling object.

<b>Hang up:</b>	A cut, wind-thrown or pushed-up tree caught in or against another, thus preventing it from falling to the ground.
<b>Hinge:</b>	The wood left between the scarf and the back cut, used to control the direction of fall.
<b>Kickback:</b>	(a) The action of a tree in springing back off its stump as it falls; (b) A sudden force acting through the bar of a chainsaw causing it to rotate about its centre of mass. This force is initiated when the moving chain strikes an obstruction while passing around the tip of the bar.
<b>Layering:</b>	Process of felling existing trees onto the ground while maintaining adequate connection with the stump.
<b>Lean:</b>	The inclination of a tree from the perpendicular
<b>Lopping:</b>	Process of felling existing trees onto the ground while maintaining adequate connection with the stump.
<b>Mitt:</b>	A leather protective mitt attached to the front handle of a chainsaw to keep the hand on the saw in case of kickback.
<b>NZ Standard:</b>	Means any standard approved by the Standards New Zealand.
<b>OPS:</b>	Operator protective structure. A structure designed to reduce the

likelihood of harm to the operator by objects entering the cab.

- Protective legwear:** Safety trousers or chaps with ankle to groin protective padding for chainsaw operators.
- ROPS:** Roll over protective structure. A structure to protect the operator and reduce the likelihood of harm in the event of plant rollover.
- Safety boots:** Working boots fitted with steel toecaps.
- Safety code:** Occupational Safety and Health Service publication *Safety Code for Forest Operations or Tree Work*.
- Safety helmet:** Headgear designed to protect the wearer's head: see NZS 5806: 1980 *Specification for industrial safety helmets (medium protection)*.
- Scarf:** Notch cut in a tree stem near the base to establish its direction of fall.
- Skidder:** A self-propelled extraction machine with wheels or tracks specifically designed to partly support logs during skidding.
- Slotting:** The use of existing live trees for river and stream protection works where they are removed and placed in excavated trenches.
- Splice:** Section of rope woven into another piece of rope to form a join or back into itself to form an eye.

<b>Strop</b>	Short length of wire rope, chain, or synthetic fibre rope, furnished with hooks or other connecting devices, which forms a noose round the end of the log and which is used for connecting logs to the main extraction rope.
<b>Top cut:</b>	The upper cut, usually angled, of a scarf.
<b>TOPS:</b>	Tip over protective structure. A structure designed to reduce the likelihood of harm to the operator should the plant tip over.
<b>Trenching:</b>	The use of existing live trees for river and stream protection works where they are removed and placed in excavated trenches
<b>Wedge:</b>	Tapered plastic or metal tool which is driven into the backcut to prevent a tree from sitting back, or to lever it towards the desired direction of fall.