

# ACT Code of Forest Practice

Version 1

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environment ACT 



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This document has been prepared by Katie Littlejohn, Environment ACT, with support from MBAC Consulting Pty Ltd and the Environment Protection Authority.

## Foreword

The ACT Code of Forest Practice represents a highly successful partnership between relevant government agencies that have an interest in the management of the forested areas of the ACT. Representatives of these agencies provided substantial input into the drafting process of the document. This final version has received endorsement from Environment ACT and Environment Protection Authority.

As the ACT Code of Forest Practice is a dynamic document, we look forward to future collaboration with relevant groups to ensure that forest management continues to provide a standardised approach that accounts for environmental and cultural values.

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# EXECUTIVE SUMMARY

The purpose of the ACT Code of Forest Practices ("The Code") is to provide a set of principles that apply to land managed by ACT Forests. It is anticipated that, in the future, this code will apply to all forested land in the ACT to achieve sustainable forest management for multiple objectives.

The Code provides a standardised approach to forest management that accounts for environmental values, including water quality and flow, soil protection, flora and fauna conservation and cultural heritage values.

Due to the nature of forest operations, this document is dynamic and will undergo regular review to ensure that current best practices are maintained.

The Code contains policies and practices which have been sourced and developed as a result of ongoing research and practical experience, as well as consultation with other land management agencies and stakeholders both inside and outside the ACT. Material in The Code has been drawn from the codes of practice produced by Forests of NSW, the NSW Department of Infrastructure, Planning and Natural Resources, Forestry Tasmania, and the Department of Sustainability and Environment Victoria.

# 1 INTRODUCTION

The ACT has a substantial estate of forest land that comprises native forest, plantation forests and other land which is managed as part of the forest estate. The estate is managed for environmental conservation, recreation and timber production.

Much of the estate lies within the Cotter catchment where the cities of Canberra and Queanbeyan derive a substantial proportion of their water supplies. Management of the forest in the catchment has potential impact on water quality.

The ACT Code of Forest Practice provides a set of guidelines and standards for forest operations. The aim of these guidelines is to provide practical measures that will help protect environmental and cultural values during forest operations including:

- water quality and flow
- soils
- flora, fauna, and
- cultural heritage.

The Code recognises that various operations should not be undertaken in some areas such as riparian zones and areas of cultural heritage; these areas are defined as Exclusion Zones.

In some situations the environmental standards applied in the past may not match current standards. In such cases specific arrangements may be required; for example timber harvesting may be permitted as a "once-off" in Exclusion Zones along riparian strips where commercial plantations are not to be re-established. Operations that do not comply with the Code and impact on environmental and cultural values will require approval from the ACT Environment Protection Authority (EPA) or the ACT Heritage Council.

The Code also recognises that specific events, such as a catastrophic fire, may require some variations to procedures in order to rehabilitate lands. In this case specific arrangements may be required; for example removal of debris or weeds in Exclusion Zones. Where exceptional situations develop and a short-term variation is required, the Environmental Authorisation that permits the activity may be varied by the EPA in consultation with the relevant land management agency.

Other manuals and technical instructions support The Code.

It is intended The Code will undergo periodic review that will take account of government and community values, research findings, and experience gained during implementation of The Code. The first review is to be in 2008 and subsequent reviews every five years thereafter.

The relevant agency is to establish and implement an appropriate monitoring audit system designed to measure compliance of the Operational Plan with the conditions of The Code. This system is to be in place prior to the first review of The Code.

## 2 PLANNING

The planning of forest management is generally undertaken at two levels; strategic and operational. Planning also recognises that exceptional situations occur that require variations to normal management practices; the most recent example being the fires of January 2003 that impacted on a large proportion of the forests in the ACT. Policy decisions to handle such events are developed as Strategic Plans with specific issues handled through a set of Schedules that can be applied in particular circumstances. The Code focuses on planning at the operational level and encompasses the implementation of Environmental Authorisations.

### 2.1 STRATEGIC PLANNING

Strategic planning is undertaken to provide guidance on specific land management issues. Strategic Plans incorporate a statement of intent and principles that reflect government policy on forest land management. Strategic Plans are typically long-term with periodic review.

Strategic Plans may be issues-based or area-based. Strategic Plans that are area-based may apply to the whole of the ACT or a specific area within the ACT (e.g. the Cotter Catchment).

The purpose of Strategic Plans can vary and may include:

- defining responsibility for land management
- management of water quality and watercourse systems
- conservation of cultural heritage (e.g. Conservation Heritage Management Plan)
- conservation of flora and fauna
- management of roads
- timber production
- fire control (e.g. Strategic Fire Management Plan)
- recreation

In response to the 2003 bushfire that impacted severely on the forests of the ACT, the ACT Government developed a Fire Debris Removal Strategy. This strategy provides a mechanism to allow the debris resulting from the fire to be handled in a relatively short time period and recognises that some of the principles that would normally be applied in a "business-as-usual" case need to be varied.

#### 2.1.1 Environmental Authorisation

Under the Environment Protection Act 1997, certain activities that pose environmental risk require an Environmental Authorisation. Environmental Authorisations are one of the most important regulatory tools available to the EPA, as they set out conditions for activities carrying with them the greatest environmental risk. Each activity attracts different requirements to prevent environmental harm and these requirements are commonly detailed in the standard conditions of an Environmental Authorisation.

ACT Forests currently hold five environmental authorisations:

- forest operations

- AgVet chemical application
- hazard reduction burning
- firewood sales
- motor sport events.

Of these, the authorisation for forest operations (Authorisation No. 288) is most relevant to The Code. Aspects of the AgVet chemical application and hazard reduction burning authorisations are also included in The Code.

Individual agencies are responsible for their own compliance with the Act and the relevant Environmental Authorisations. The EPA will undertake an annual review of the Environmental Authorisations, and conduct regular audits for compliance with the conditions of the authorisations.

In some situations specific environmental management plans may need to be prepared for activities within forests. All rock and gravel pits, for example, require an Environmental Management Plan to be submitted for approval by the EPA. This activity may also require an Environmental Authorisation.

### ***Schedules***

ACT Forests is currently operating within the guidelines of Environmental Authorisation No. 288 and the associated schedules. These schedules are:

- Schedule 1: General
- Schedule 2: Slopes
- Schedule 3: Watercourse Management
- Schedule 4: Roads

The conditions of these schedules have been incorporated into The Code. If conditions of the schedules cannot be met then the relevant agency must seek written approval from the EPA for the proposed works.

## **2.2 OPERATIONAL PLANNING**

Operational planning defines the principles and procedures relevant to a specific forest operation. Operational Plans must be developed for all operations and have the following characteristics:

- describe the operation
- apply to a defined geographic area
- specify the operatives (including contractors)
- specify a time frame (usually less than 12 months)
- provide detailed specifications

Examples of Operational Plan include:

- timber harvest plans
- debris removal plans
- burn plans
- roading plans

### 2.2.1 General Principles

All operations carried out within the forest are to be conducted according to an Operational Plan based on the provisions of The Code.

All forest operations will comply with relevant legislation and Australian Standards.

Formulation of the Operational Plan involves the collection of site information and analysis of the potential effects of an operation.

The factors that require consideration include:

- soils (including Forest Soil Erodibility Class)
- water quality and flow, and riparian zone protection
- air quality
- site productivity
- biodiversity
- landscape, including topography and slope
- cultural heritage
- access.

For each type of Operational Plan (e.g. a Timber Harvest Plan) there will be a set of operational principles that guide the implementation of that activity. These principles are designed to be succinct and consistent.

A number of principles are common to all Operational Plans. These include:

- Operational Plans must be approved by the Director of the relevant agency prior to commencement and signed off at completion by the Supervising Officer
- operations that do not meet the conditions outlined in the relevant Environmental Authorisation or The Code require written approval from the EPA
- all provisions within Operational Plans will be consistent with safe working practices
- persons carrying out operations under an Operational Plan will comply with all relevant laws, including the conditions of any authorisations, permits and other authorities issued
- persons carrying out operations under an Operational Plan will sign that they have read and understand the contents of the Plan

Other principles would be specific to a particular operation.

## 2.2.2 Operational Principles

For each Operational Plan there will be a set of information and standards that relate to the operation concerned and included in the plan. These include:

- overall description of the operation
- a map showing the boundaries of the planned operation, the location of watercourses Stream Class 4 and above, and the location of any Exclusion Zones where carrying out of the proposed operation is restricted or prohibited by The Code, with the relevant restriction or prohibition identified
- duration and timing of operation
- site safety plan
- basic features of the area covered by the Plan:
  - current management
  - topography including identification of slopes  $>20^\circ$  and relative percentage of this within the operational area
  - soil type and erodibility, including an assessment showing areas of unstable soil
  - specific erosion mitigation strategies
  - drainage characteristics, including watercourse classifications
  - access/roads
- specific features of the block:
  - presence of protected or significant flora/fauna
  - presence of cultural heritage sites
  - specific management requirements
  - requirement for additional access or improvements to existing access, i.e. roads and bridges
- measures to be undertaken to protect water quality, catchment and channel stability, riparian zones and biodiversity in aquatic ecosystems
- specific details of the procedures to be adopted in the operation, including equipment to be used
- wet weather plan, including actions to protect watercourses from forest operations
- work instructions (written and may include diagrams) for the carrying out of the proposed operation that identify:
  - the procedures required to be used in the operation
  - any restrictions or prohibitions required to be considered in undertaking the operation.

The following matters must be included in the operational records of the Plan:

- any change in the size of the area that was subject to the operation from that marked on the map in the Operational Plan
- any departure from, or variation to, the work instructions given in the Operational Plan, that was applied during the actual operation.

## 3 OCCUPATIONAL HEALTH AND SAFETY

### 3.1 GENERAL PRINCIPLES

All forest operations will comply with relevant legislation. Specific emphasis is given to the Occupational Health and Safety Act 1989.

All operations carried out within the forest are to be conducted according to the relevant agency's Occupational Health and Safety policy. All activities within ACT Forests' estate are to comply with the ACT Forests' Occupational Health and Safety Management Manual.

All forest operations will take into account the relevant Australian Standards. Risks will be identified and managed in accordance with AS/NZS 4360:2004: Risk Management.

### 3.2 OPERATIONAL PRINCIPLES

#### 3.2.1 Personnel in Forests

The following safety rules must be observed at all times:

- all staff and Contractors must wear high visibility vests or clothing while working in the forest, on or adjacent to any road
- an industrial safety helmet (hard hat) meeting the relevant Australian Standard must be worn & correctly fitted when working within two tree lengths of any tree that is above head height, when working within 150 m of heavy plant, or working in or around a sawmill.
- lace up steel cap safety boots must be worn at all times
- ear protection shall be worn by all personnel exposed to noise levels of 85 decibels or greater.
- eye protection shall be worn at all times when there is a risk of eye injury from foreign objects.
- broad brim hat to be worn when working outdoors any time a hard hat is not required (see above)
- SPF30+ sunscreen is recommended to be worn at all times when working outdoors
- appropriate personal protection equipment (PPE) must be worn at all times during fire operations, chainsaw or brushcutter operations, and / or weed spraying operations.
- no person shall be allowed on any operation in an intoxicated or drugged condition or while suffering from any known physical or mental impairment that may endanger him / her or other persons in the forest.
- no person carrying out operations shall work alone out of reasonable contact with another worker.
- all Contractors and staff shall keep a fully operational first-aid kit available at each place in the forest where any operation is being carried out.

- all accidents/incidents (including near-misses) must be reported to the officer supervising the operation immediately.
- all personnel involved in any forest operation must complete an initial induction of the safety procedures before entering areas where the operation will be undertaken. Persons not directly involved in the operation may be permitted in an area where operations are taking place but must be accompanied by a person who has been inducted in the safety procedures and must obey safety directives from such person.

### 3.2.2 Machinery

The following safety rules must be observed at all times:

- if possible contact the machinery operator via mobile phone or UHF (as per the Site Safety Plan) prior to arriving at the operation site.
- never park a vehicle below machinery.
- approach machinery from the side, taking care to attract the operators attention before getting within safe working distance. Two tree lengths is a safe working distance around heavy machinery. For excavators and backhoes the safe distance is 1.5 times the boom length.
- stand back from the machine until the operator acknowledges you by dropping the blade on the ground or the boom is retracted. Do not approach any machinery until the operator opens the door or signals to approach.
- all plant operations require appropriate warning signs to be located at least 100 m from the operation boundary from all approaches. Appropriate warning signs must be displayed in accordance with the relevant Australian Standard. Such signs will be supplied, erected and removed by the relevant agency.
- all tractors and other machines used in the forest shall be fitted with a Roll Over Protection Structure which complies with AS2294-1990.

### 3.2.3 Roads

The following safety rules must be observed at all times:

- road laws must be adhered to at all times within the forest
- vehicles must be registered, unless otherwise approved by the Supervising Officer or is an authorised event
- road speeds within the forest shall be such that the driver shall be able to control the vehicle at all times within the limits of visibility and under existing conditions of grade, curvature, surface, weather, light or other limiting factors. Maximum speed on roads and tracks within the forest shall be 50 km/h for loaded vehicles and 60 km/h for unloaded vehicles except where roadside signs indicate a lower speed limit
- in the event of a truck or tractor being parked on a road or track in the forest after dark, safety reflecting triangles shall be positioned on the road either side of the vehicle at a distance of not less than 50 m.

### 3.2.4 Loading & Haulage

Forest operations include the loading and haulage of timber or machinery to and from the forest estate. All personnel involved in loading and haulage must have completed an initial induction of the safety procedures before entering areas where forest operations are being undertaken.

Loading and hauling shall be carried out in a manner and by such methods that shall result in a minimum of soil disturbance. The Contractor responsible for loading and haulage shall make good, to the satisfaction of the Supervising Officer, any soil disturbance caused by the Contractor.

Unless specifically approved by the Supervising Officer, the Contractor responsible for loading must ensure that debris resulting from loading operations is removed from the road surface and from drainage structures at the completion of each day's operations.

#### *Loading*

The following safety rules must be observed at all times:

- all loading and unloading of articulated heavy plant and equipment must not be undertaken alone in the forest area
- all loading and unloading of heavy plant and equipment must be undertaken in safe areas with good visibility and appropriate surface conditions
- risk assessment of the unloading/loading environment must be carried out that takes into consideration factors such as slope, surface traction, ground conditions, climatic conditions and a communications plan for the operation. The communication plan should include notification of current location and expected return time
- only heavy plant and equipment with an approved Roll Over Protection Structure can be loaded and unloaded in forest areas
- all transport vehicles must be fitted with appropriate ramps or unloading platforms
- binder chains, wire ropes, belts, hooks, coupling links and toggles must be of adequate length and strength and shall be at least equal to 5mm 'alloy' high tensile chain
- when trucks are operated in an area where timber or machines are being loaded, truck drivers must either remain in the cab of the truck or be a minimum distance of 15 m from the truck and remain in view of the loading operator at all times once the truck is parked and ready for loading
- the truck driver is not to approach the truck until loading has been completed and the loading operator has given the all clear
- passengers are to remain in the cab of the truck at all times while on site
- before commencing strapping the driver must conduct a risk assessment of the load and instruct the loading operator to redress any safety issues
- protruding limbs, loose bark, and trailing debris or unsafe overhangs of any kind on trucks are not permitted and must be removed before leaving the loading point.

## *Haulage*

On forest roads load weights and dimensions may be set by the Supervising Officer according to vehicle and/or trailer type, axle combinations, road legislation and road conditions.

Vehicles must at all times comply with relevant legislation. Relevant legislation may include the ACT Motor Vehicles (Dimensions and Mass) Act 1990 and, where applicable, the NSW Motor Traffic Act 1909, the (NSW) Local Government Act 1919 and the (NSW) Occupational Health and Safety Act 2000.

The Contractor is responsible for haulage and shall haul along routes in the forest as set out in the Operational Plan. Any changes to the route must be approved by the Supervising Officer and noted on the Operational Plan. Within the built-up area of Canberra all haulage traffic will obey legislation regarding approved transport routes.

## 4 MAINTENANCE OF SOILS

### 4.1 GENERAL PRINCIPLES

The protection of soils must be considered of high importance in the management of forest land. Soil disturbance has the potential to cause soil erosion with adverse impacts on water quality and soil fertility.

Forest soil care involves the control and prevention of unacceptable rates of erosion, nutrient and organic matter loss, mass movement, excessive compaction, and puddling, during and after forest operations.

Forest operations commonly involve some level of soil disturbance and measures to mitigate the impact of soil disturbance are an integral feature of all Operational Plans. The Code classifies the land into Forest Soil Erodibility Classes. These Classes define the erodibility level of an area of land, when subject to disturbance. From these classes, best management practices are determined for each forest operation, to limit erodibility during operations.

### 4.2 OPERATING PRINCIPLES

#### 4.2.1 Soil Erodibility Classification

The classification of soil erodibility is determined by the inherent nature of a soils ability to withstand environmental forces, such as wind and rain, when disturbed. There are five Forest Soil Erodibility Classes within the ACT, including Low, Moderate, High, Very High and Extreme erodibility. These classes are determined through basic measurements of:

- soil physical erosion potential
- soil chemical erosion potential
- presence of erosion
- regolith stability

These Classes allow appropriate management to be applied to limit erosion and degradation (such as organic matter loss) for each separate forest operation.

Please refer to ACT Forests' Soil Erodibility Classification Manual to determine soil erodibility classes.

#### ***Soil Physical Erosion Potential***

The inherent physical nature of the soil influences how likely a soil is to erode when disturbed. Soil physical properties, which may influence soils erodibility, include stoniness, structure, depth, and position in landscape, permeability and drainage. Vegetation cover can also affect the soil physics, and is included in the soil physics assessment.

### ***Soil Chemical Erosion Potential***

Soil chemistry affects the erosive potential when disturbed. Two vital soil chemical tests include sodicity (the presence of 'free' sodium in a soil) and organic matter. The level of sodicity within the soil will exacerbate erosion potential when machinery is used. The organic matter content of a soil determines its structural ability to resist erosion forces.

### ***Presence of Erosion***

The presence of erosion may affect the management strategy of a classified area. The type, severity and reclamation of the erosion will determine the management of the area, based on its requirements for rehabilitation and limitations to the operation. Understanding what caused the erosion in the area will aid in understanding best management practices of different soil types and erodibility classes.

### ***Regolith Stability***

The stability of the regolith and its exposure to environmental forces, may increase the risk of mass movement. Mass movement can include land slips, rock falls and rock slides. This is particularly important to large-scale earthworks, such as road building and maintenance.

## **4.2.2 Soil Erodibility Management Guidelines**

Figure 1 outlines the guidelines required for operations according to the Soil Erodibility Class for a given area. The comments field refers to work that may be implemented if the Supervising Officer perceives an overall benefit to the operation.

**Figure 1 Soil Erodibility Class management guidelines**

Soil Erodibility Class	Management Considerations	Comments
Low	<ul style="list-style-type: none"> <li>▪ normal operations</li> <li>▪ all roads, temporary tracks and log dumps to be appropriately treated following operations</li> </ul>	<ul style="list-style-type: none"> <li>▪ during operation, and up to 6 months after completion, monitor area for erosion after heavy rainfall</li> </ul>
Moderate	<ul style="list-style-type: none"> <li>▪ normal operations</li> <li>▪ all roads, temporary tracks and log dumps to be appropriately treated following operations</li> </ul>	<ul style="list-style-type: none"> <li>▪ during operation, and up to 6 months after completion, monitor area for erosion after heavy rainfall</li> </ul>
High	<ul style="list-style-type: none"> <li>▪ normal operations, where weather conditions permit</li> <li>▪ all roads, temporary tracks and log dumps to be appropriately treated following operations</li> <li>▪ retain vegetative cover where possible</li> <li>▪ during operation, and up to 6 months after completion, monitor area for erosion after heavy rainfall</li> <li>▪ high impact recreational activities may be cancelled during periods of wet weather and extreme drought</li> <li>▪ planned treatment of pipe outlets implemented during roading operations</li> </ul>	<ul style="list-style-type: none"> <li>▪ grass seeding, mulching and/or fertilising compartment, roads, recreation areas and/or log dumps after operations may be beneficial, particularly if unplanted for 6-12 months depending on seasonal conditions</li> </ul>
Very High	<ul style="list-style-type: none"> <li>▪ low impact machinery should be considered</li> <li>▪ erosion mitigation, including work to temporary tracks and log dumps, to be implemented following operations</li> <li>▪ erosion mitigation to be implemented concurrently during roading operations</li> <li>▪ operations should be scheduled during dry periods</li> <li>▪ during operation, and up to 6 months after completion, monitor area for erosion after heavy rainfall</li> <li>▪ retain vegetative cover where possible</li> <li>▪ high impact recreational activities may be cancelled during periods of wet weather and extreme drought</li> <li>▪ planned treatment of pipe outlets implemented during roading operations</li> </ul>	<ul style="list-style-type: none"> <li>▪ grass seeding, mulching and/or fertilising compartment, roads, recreation areas and/or log dumps after operations may be beneficial, particularly if unplanted for 6-12 months depending on seasonal conditions</li> </ul>
Extreme	<ul style="list-style-type: none"> <li>▪ low impact machinery should be used</li> <li>▪ erosion mitigation to be implemented concurrently, including work to roads, temporary tracks and log dumps</li> <li>▪ operations should be scheduled during dry periods</li> <li>▪ during operation, and up to 6 months after completion, monitor area for erosion after heavy rainfall</li> <li>▪ retain native plants where possible</li> <li>▪ avoid windrow burning if predicted rain event</li> <li>▪ high impact recreational use avoided where possible</li> <li>▪ planned treatment of pipe outlets and grass seeding implemented during roading operations</li> </ul>	<ul style="list-style-type: none"> <li>▪ considerations of future use of site to be made following appropriate operations</li> <li>▪ grass seeding, mulching and/or fertilising compartment, roads, recreation areas and/or log dumps after operations may be beneficial, particularly if unplanted for 6-12 months depending on seasonal conditions</li> <li>▪ roading operations to be avoided where possible</li> <li>▪ increased drainage points, reduced gradient of batters, and spooned cut outs may be beneficial during roading operations</li> </ul>

### 4.2.3 Machinery

When selecting machinery for operations in areas where low impact machinery is required, for example areas of very high soil erodibility and/or an Exclusion Zone, the following should be considered when assessing machine capability:

- soil compaction and rutting depth
- potential impact on water quality in watercourses
- retention of stumps in the ground
- retention of ground cover
- retention of regenerating native vegetation, if applicable to the operation
- performance efficiency for particular operation
- cost effectiveness

Examples would include using excavators or manual operations, such as hand falling, in areas rather than a bulldozer.

## 5 MAINTENANCE OF WATER QUALITY

### 5.1 GENERAL PRINCIPLES

Streams and water bodies within the forest estate require careful management to maintain and protect water quality and protect riparian values. The type of protection required depends on:

- the significance of the riparian ecosystem
- status of individual species within
- size, permanence, nature and volume of the watercourse or water body

All Operational Plans will be consistent with the objectives of maintaining water quality and conserving riparian values while recognising operational requirements.

Operational constraints will be applied to forest operations close to watercourses with the aim of preventing the possibility of erosion, sedimentation and other sources of degradation. These areas are broadly termed Exclusion Zones and, in the case of areas close to watercourses, are specifically known as Riparian Management Zones.

Relevant land management agencies are required to classify the stream network and develop an appropriate network of Riparian Management Zones throughout the forested estate. These Riparian Management Zones will include riparian zones, where present, as defined in Think Water, Act Water; Volume 2.

Relevant land management agencies will ensure that when planning, developing and undertaking forest operations, the following environmental care principles will be taken into account:

- watercourses and water quality will be given special consideration during the planning of any forest operation
- stream flow will be maintained by carefully planned operations to ensure minimum disturbance
- forest operations will be suspended when adverse weather conditions could lead to damage of water and/or soil values in accordance with The Code
- the actual protection measures applied will depend on the type of soils and topography, type of operation and the riparian habitat value.

### 5.2 OPERATIONAL PRINCIPLES

No forest operations involving track based machines, aerial and ground application of AgVet chemicals, road maintenance, prescribed burning and fertilizer application will occur in Riparian Management Zones of Stream Class 4 or above without specific approval from the EPA.

Forest operations within Exclusion Zones consisting of drainage lines and drainage depressions, may occur if appropriate machinery is selected that maintains vegetative cover. Please refer to section 4.2.3 for further guidelines when assessing machinery capability.

## 5.2.1 Identification and Classification

The following classification structure (Table 1) will be used to identify and classify all watercourses in forests in the ACT.

**Table 1: ACT Watercourse Classification**

Class	Description	Average Channel Width (m)
RES (Reservoir)	Identified water storage for town or house water	na
WTL (Wetland)	Wetlands - areas of marsh, swamp, bog, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing	na
SC-1 (Stream Class 1)	A watercourse that carries water for varying periods of the year in most years. Displays a defined stream bed that shows an obvious incision with evidence of active erosion	$\geq 20$
SC-2 (Stream Class 2)	As above	$\geq 5 < 20$
SC-3 (Stream Class 3)	As above	$\geq 1.5 < 5$
SC-4 (Stream Class 4)	As above	$< 1.5$
DL (Drainage Line)	A channel with a clearly defined bank and bed, where surface water naturally concentrates and flows, conveying water during and immediately after heavy rainfall. These features often show evidence of active erosion or deposition, such as a sand bed, gravel, or rock	
DD (Drainage Depression)	An open depression with a smoothly concave cross-section that conveys runoff during or immediately after heavy rainfall. These features may be subject to seasonal waterlogging or spring activity and vegetation type often indicates a wetter environment than the surrounding country	

*The areas highlighted are typically defined as Riparian Management Zones.*

These classifications will be used as the initial source for the classification of Riparian Management Zones and other Exclusion Zones.

### ***Riparian Management Zones***

Riparian Management Zones will be identified along watercourses. This typically includes watercourse class SC-4 or higher (including reservoirs and wetlands). The boundaries of these zones are to be generally consistent with easily recognisable features, while maintaining the required buffer width, such as roads or the interface between native vegetation and plantation. The Riparian Management Zones (RMZs) do not include drainage depressions or drainage lines that only carry surface water during rainfall events.

Typical cross-sections of forest landscapes are shown in Figure 2 and Figure 3.

Figure 2: Cross-section of watercourse showing Riparian Management Zone (undulating terrain)

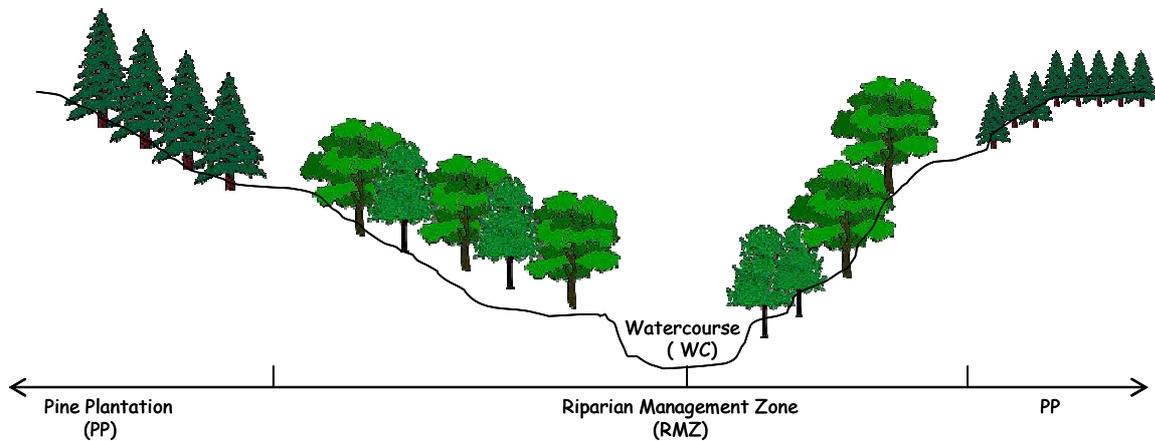
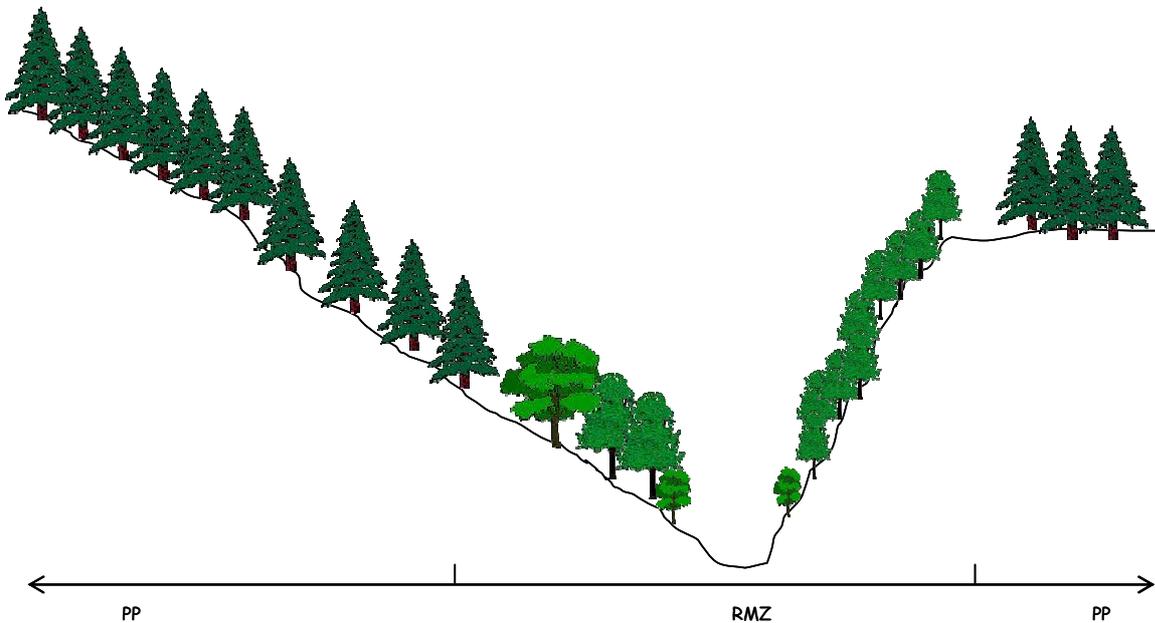


Figure 3: Cross-section of watercourse showing Riparian Management Zone (steep terrain)



### RMZ - Vegetation Classification

The vegetation on Riparian Management Zones will be categorised by the following criteria:

- **Native** - currently supporting retained native vegetation
- **Grass** - carrying generally exotic grasses from past agricultural land use but may contain, or be dominated by, native grasses.
- **Mature** - Currently planted with pine, not to be harvested if unacceptable damage would occur to riparian values (areas with steep slopes or highly erodible soils). If harvested these areas are to be replanted with native species.

- **Degraded** - Native vegetation that has been invaded by exotic species. Careful consideration and planning required for removal of exotic species. If it is considered that the removal operation would result in unacceptable damage then the area will be left untouched.
- **Production** - Currently planted with commercial forest species and to be managed as an ongoing commercial crop.

### Riparian Management Zone - Minimum width

The minimum width of a Riparian Management Zone is defined in Table 2, as required in the Act Government's *Think Water, Act Water* strategy at the time of publication. The requirements of the strategy may change at some point in the future.

**Table 2: Minimum widths of Riparian Management Zones**

Watercourse Class	Minimum width (measured from each side of the bank)
RES	50 m
WTL	30 m
SC-1	50 m
SC-2	30 m
SC-3	20 m
SC-4	20 m

The width is to be assessed on site and is measured horizontally from the top of the identified watercourse bank to the extent of the required width on each side of the watercourse. For example, a watercourse of 10m width is classified as SC2. The width of the Riparian Management Zone for this class is 30m either side of the watercourse. The total width, including the watercourse and riparian management zone, is 70m.

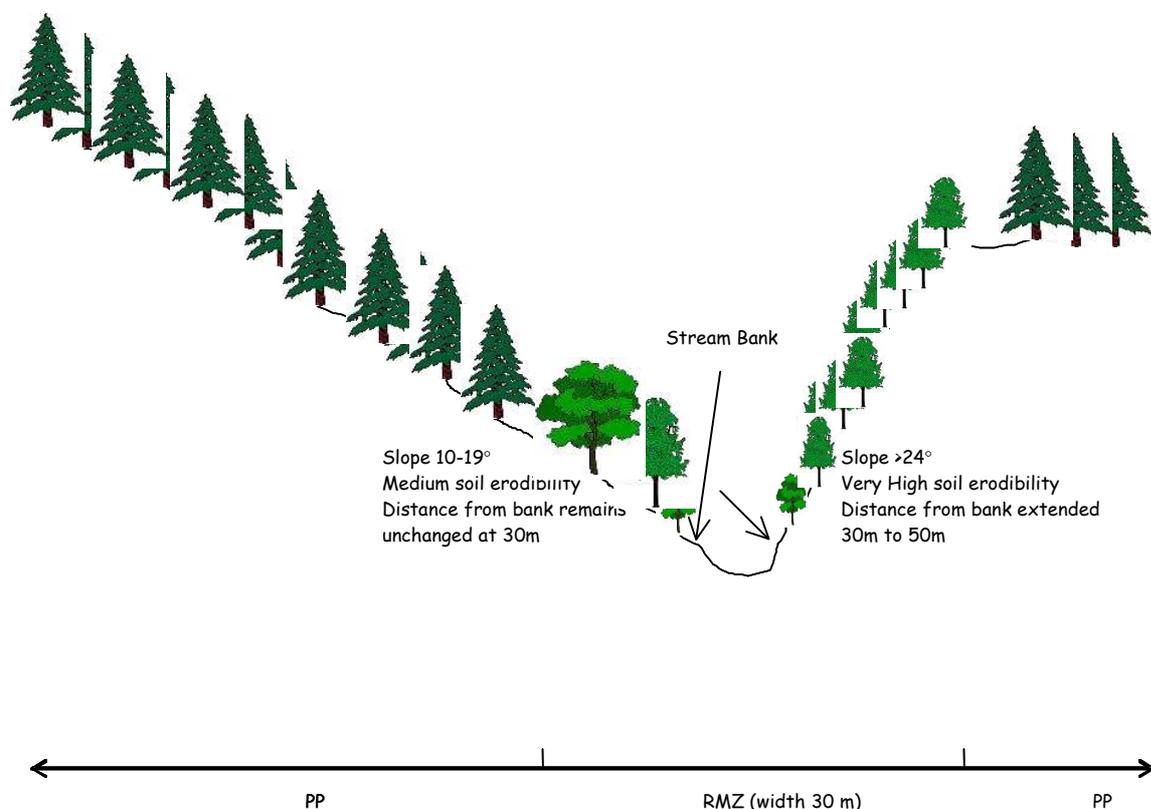
### RMZ - Extension to prescribed minimum width

The minimum width of Riparian Management Zones will vary according to the surrounding terrain; factors include slope and soil type. Table 3 below indicates the extensions that should be made to the width of a Riparian Management Zone depending upon soil and slope. Extensions to the width of the Riparian Management zone may be different on either side of the watercourse due to changes in slope and/or soil. Figure 4 illustrates an example of this.

**Table 3: Extension to prescribed minimum width (measured from each bank in metres) of a Riparian Management Zone based on slope and soil erodibility class**

Soil Erodibility Class	Slope			
	0-9°	10-19°	20-24°	>24°
Low	0	0	5	10
Medium	0	0	5	10
High	0	5	10	15
Very High	5	10	15	20
Extreme	5	10	20	40

**Figure 4: Impact of slope and soil and width of Riparian Management Zone**



### ***Drainage Lines and Depressions***

Where drainage lines and drainage depressions are present, an Exclusion Zone is formed. The minimum widths of this form of Exclusion Zone are defined in Table 4. The width of a drainage line and drainage depression is measured horizontally from the centre of the identified watercourse to the extent of the required width of the watercourse.

**Table 4: Minimum widths of Drainage Lines and Depressions**

<b>Watercourse Class</b>	<b>Minimum width (measured from centre)</b>
DL	10 m
DD	10 m if identified as being important, eg erosive soils, steep slopes

### 5.2.2 Monitoring Water Quality

The Code lays down governing principles for forest management and specifies various operational procedures. The EPA requires authorised land management agencies to conduct water sampling and analysis as stipulated in the relevant water monitoring protocol to:

- identify operations that may have a significant effect on water quality and check compliance with the operational procedures within The Code, and
- check that the specifications contained within The Code are achieving their stated aim.

The results of the water monitoring for a month are to be provided to the EPA by the 30<sup>th</sup> day of the following month.

Significant or recurring problems as noted in the relevant protocol shall be reported, in writing, to the EPA within 2 working days of the sample analytical results becoming available.

### 5.2.3 Wet Weather Requirements

During wet weather, forest operations may have an adverse impact on water quality and restrictions on such activities may be applied.

Restrictions will apply during prolonged periods of wet weather or periods of heavy rainfall in order to maintain soil and water quality values. In wet weather the Supervising Officer will cease operations when required to comply with the wet weather close-down provisions of the Operational Plan, or when directed to by the Supervising Officer.

Forest operations will cease:

- when soils are saturated; and/or
- when turbid water is flowing for more than 10 m; and/or
- when machinery causes rutting to a depth of more than 200 mm below the original ground level over a 15 m section; and/or
- haulage on natural surface roads must cease when there is runoff from the road surface (still allowing for trucks to complete their journey)

## 6 PROTECTION OF NATURAL AND CULTURAL HERITAGE

### 6.1 GENERAL PRINCIPLES

The protection of natural and cultural heritage is also important in managing forest land. The natural heritage of the ACT includes threatened species of flora and fauna, the range of ecological communities and extends to such features as geomorphology and landscape. The cultural heritage of the ACT includes that of both aboriginal and other Australians.

Natural and cultural heritage both within, and adjacent to, the forest estate should be considered during the preparation of Operational Plans.

Measures taken to conserve natural and cultural heritage will be consistent with effective fire management, silvicultural practices and safety requirements.

### 6.2 OPERATING PRINCIPLES

#### 6.2.1 Flora and Fauna

Flora and fauna considerations must be considered in an Operational Plan. This should be consistent with a Strategic Plan for the conservation of flora and fauna on all forest land in the ACT.

Conservation of flora and fauna is assisted by the maintenance and restoration of habitat, enhancement of opportunities for re-colonisation of disturbed areas, water quality and the linking of forest areas to allow genetic interchange.

Maintenance of the genetic resources of native forest is assisted by the retention of native flora and fauna in formal and informal reserves including wildlife habitat strips and streamside reserves dispersed throughout the forest, and the use of seed sources native to the site when regenerating forests.

The general requirements and guidelines for conservation of significant flora values are outlined in Environment ACT's Action plans for protecting threatened species and ecological communities, vegetation maps, the flora databases held by various sections of Environment ACT and advice from specialists.

Disturbance to native vegetation and watercourses in localised environments (such as rocky knolls, swamps, heaths, stream flow and streambanks) should be avoided or minimised. These environments are associated with plant communities and species with a priority for conservation, and are important in maintaining diversity at a local level.

Fauna conservation will be considered in all stages of forest management, particularly the requirements of threatened species and communities, including stream and land habitats.

## ***Exclusion Zones***

Exclusion zone requirements and the buffers for these should be based on the guidelines for conservation of significant flora values as outlined above. Factors that are to be considered in deciding whether an area of native vegetation is suitable for retention and therefore, part of an Exclusion Zone for operations are:

- whether it occurs on an area that is generally too steep for plantation
- size of the patch - should generally be in excess of 0.1 ha
- fire protection of the surrounding plantation estate will not be a major issue
- whether large hollow bearing trees form all, or part, of the patch
- presence of endangered ecological communities
- proximity to riparian management zones
- potential for use as corridors and/or habitat.

Where individual trees, or small patches, that cannot be managed effectively need to be removed, the relevant agency will seek a licence from Environment ACT on the clearance of native vegetation in accordance with the Nature Conservation Act 1980.

### **6.2.2 Cultural Heritage**

The cultural heritage of all groups (e.g. Aboriginal and other Australians) will be considered in the preparation of an Operational Plan.

The Operational Plan will detail how protection of cultural heritage is to be achieved. Known Aboriginal heritage sites are identified on the ACT Heritage Register. If a suspected Aboriginal site is discovered during operations, ACT Heritage must be informed within five working days of the discovery to avoid penalty under Section 51 of the Heritage Act 2004. ACT Heritage will advise a suitable course of action. Details of historic places not on the Heritage Register can be provided by the Relevant Officer or by contacting ACT Heritage direct. Contact details for ACT Heritage: Aboriginal sites phone 6207 7946, historic sites contact 6207 2167 or the Manager of ACT Heritage on 6207 7378.

Where sensitive areas are identified, surveys will be completed prior to the commencement of forest operations if site conditions are suitable. The type of survey to be undertaken will depend on environmental conditions and management requirements.

## ***Exclusion Zones***

Any heritage place or object that has already been identified on the ACT Heritage Register has a defined buffer in order to protect the site; this buffer forms the Exclusion Zone. If any works are proposed within a cultural heritage Exclusion Zone, then ACT Heritage Council must endorse the proposal.

Where an unregistered Aboriginal place or object or European site is located, the relevant agency will consult with ACT Heritage on the management procedure for the site.

When any cultural heritage site or features associated with them (e.g. rock overhangs, sawmill remains) are not identified in the Operational Plan but are located during forest operations, the Relevant Officer must be notified and operations must cease. The Relevant Officer is to contact ACT Heritage in order for the site to be assessed and recorded prior to further disturbance. ACT Heritage will recommend a suitable buffer, which will form the Exclusion Zone for that site. The Relevant Officer will then amend the Operational Plan appropriately and notify the Contractor to continue work.

The width of the buffer zone of any heritage place or object is to be measured from the grid reference unless otherwise stated in the ACT Heritage Register.

Protection of significant sites should be achieved by maintaining confidentiality, management prescriptions such as physical protection works, changing the location of operations, reservation, or special management areas.

Site management will be in accordance with the conditions set down in the ACT Heritage Register. If a Conservation Management Plan is endorsed by the Heritage Council for the relevant agency then the guidelines within this plan will supersede the prescriptions set out in The Code.

## 7 ROADS AND TRACKS

### 7.1 GENERAL PRINCIPLES

All roading operations are to conform to the relevant authorisation. An Operational Plan for the management of roads (Roading Plan) will be prepared for roadwork within each operational area. The road network comprises roads, tracks and fire trails (collectively identified here as roads). Roads will be managed in order to balance the need for efficient forest management, fire protection, recreational access and maintenance of water quality.

Operational Plans for Roading must include the following:

- Measures to minimise the pollution of waters. This must include an assessment of the environmental impact of the proposed operation, particularly in regard to its proximity to watercourses and potential for erosion.
- Measures to minimise harm or damage to Riparian Management Zones and ecological communities
- Identification of roads that are to be decommissioned, the rehabilitation methods for these, and timing of any proposed works
- Outline any mitigation strategies required, including site specific soil stabilisation, erosion and sediment control techniques.

All active road works must be inspected by the Supervising Officer within two working days of storm events. Additional sediment and erosion control measures will be implemented where required.

Tracks are to be minimised and closed where appropriate in areas with a slope greater than 20° or where network density exceeds the required amount. Rehabilitation works are to be undertaken if required.

Road related erosion control measures will be properly installed and constructed and maintained in a manner so that they are in a proper and efficient condition. These measures must be regularly inspected, particularly after storm events.

### 7.2 OPERATIONAL PRINCIPLES

Please refer to the Department of Urban Services Fire Management Unit Strategic Fire Access Network Principles, Policy and Planning Procedures for more detailed prescriptions of roading operations. For operations within ACT Forests' estate, also refer to the ACT Forests' Roading Manual.

### 7.2.1 Road Location and Design

Roads will be designed to a standard capable of safely carrying the anticipated traffic, whilst minimising their potential environmental impact.

The location, design and maintenance of existing roads will be re-evaluated at intervals to ensure compliance with current policies. Specific operations may trigger a re-evaluation of the location and design of roads.

The construction of any new road will require an Operational Plan (Roding Plan). New roads should be located away from Exclusion Zones. The only sections of new roads that may be located in an Exclusion Zone surrounding a drainage feature are those:

- that are necessary to cross that drainage feature, or
- whose location in the Exclusion Zone will result in less environmental damage than if located on any practicable alternative route that would avoid the Exclusion Zone.

The location of new roads must include consideration of:

- environmental impacts
- cultural impacts
- aesthetic impacts
- operational requirements

New roads should be located along natural ridges and benches wherever possible and should generally not be located on steep slopes or unstable ground.

### 7.2.2 Crossings over Drainage Features

The construction of road crossings (bridges, causeways or culverts) over watercourses of stream class 4 and above will require approval by the EPA. Measures to minimise environmental harm must be implemented, including the use of materials unlikely to produce water turbidity during normal use of the crossing.

Approval is required from the EPA if the extraction of material (other than water) is required.

The construction of any crossing must be carried out in a manner that minimises the depositing of any loose material into the drainage feature and any disturbance to its bed or banks.

The crossing must be designed to allow the peak flow from a 1 in 5 year storm event to pass unimpeded. The crossing must also have an approach drainage installed between 5 - 30 m of the bank either side of the drainage feature.

An accepted method of catchment discharge calculation for determining pipe density and size should be used. This method must include:

- catchment size,

- topography, and
- ground cover

Acceptable methods include the Modified Rationale Method (Pilgrim, 1987 and Weeden, 1993) and the Tables for Foresters (Forestry and Timber Bureau, 1975 as described in Appendix 2).

### 7.2.3 Road Construction and Drainage

Trees, stumps and other woody debris must not be used to provide road and batter fill.

Any fill batter must be stabilised by one or more of the following methods:

- allowing/promoting revegetation of the batter
- placing a protective cover over the batter
- placing appropriate mulch over the batter

All reasonable steps must be taken to minimise erosion from roads and tracks. The following measures may be used:

- establish or maintain a vegetative cover
- cover the ground with debris
- drain the road or track with outfall or infall drainage or by shaping to a crown to ensure water drains both sides
- construct drainage structures to convey water away from the road (rollover cross-banks, crossdrains, mitre drains, relief culverts).

When designing transverse drainage, careful consideration will be given to the spacing between the drains. This spacing will be determined after considering scouring of longitudinal drainage, minimising concentrated flows of water downstream of the road, the need for erosion protection at the downstream end of the transverse drain and the length of the overland flow path from the discharge point to the receiving stream.

Drainage structures must be designed to convey the flow from a 1 in 5 year storm event.

Drainage structures must be established along a road or track according to the maximum spacing as shown in Table 5.

**Table 5: Maximum Drainage Structure Separation Distances**

Road Grade (degrees)	Maximum Distance (metres)	Road Grade (degrees)	Maximum Distance (metres)
1	250	11	55
2	200	12	50
3	150	13	45
4	125	14	40
5	100	15	40
6	90	16	25
7	80	17	25
8	70	18	25
9	65	19	25
10	60	20	25
		>20	20

Drainage structures must be located such that water discharges onto a stable area or a structure capable of filtering runoff water and trapping sediment.

Any temporary fire trail that is constructed during fire fighting must have drainage structures installed, or be planted with grass, or be rehabilitated as soon as practicable after the fire event.

Earth windrows resulting from road construction or upgrading operations must be removed from the shoulders of all roads, unless specifically constructed to prevent erosion of fill batters or where infall drainage is used. In these cases, windrows must be cut through at regular intervals to ensure that water flow, or potential water flow does not exceed the distances in Table 5.

**7.2.4 Road Maintenance**

Regular inspection and maintenance of all roads must be undertaken to ensure they are in effective working order.

The following requirements apply to any road that is no longer being used or intended to be used for any purpose:

- the road must be closed to traffic, and
- any crossing must be removed unless its removal would cause greater disturbance to the environment than if left in place. In accordance with the Water Resources Act 1998, approval from the EPA Water Unit is required.

Inspection of the effectiveness of new transverse drainage measures will be undertaken after each significant rainfall event for 1 year after the drainage is installed. Any defects found during the inspection will be notified to the EPA and rectified. The Relevant Agency shall

maintain records of inspections, any defects found and subsequent rectification works undertaken.

Ideally, where maintenance grading is undertaken, it is generally expected that part of the maintenance procedure will include compaction of the graded material. Maintenance grading should also ensure that the crown is retained and the existing crossfall is not reduced and is preferably maintained in the range of 4 to 6% (~2° to 3°30'). No windrows of loose material are to remain in the table drain after grading.

### 7.2.5 Rock and Gravel Pits

All rock and gravel pits require an Environmental Management Plan to be submitted to the EPA for approval. If more than 30 000 tonnes of material per year is produced an Environmental Authorisation is required. The Environmental Management Plan must place the development in the context of the local and regional environment and must:

- describe all components of the proposal/existing development
- show that environmental impacts resulting from the development, including cumulative impacts, can be acceptably managed
- provide a document that sets out the reasons why the proposal/existing development should be judged to be environmentally acceptable.

Rock and gravel pits will be planned and designed to minimise off-site soil erosion, mass soil disturbance and movement, water quality deterioration, and minimise effects on landscape values.

When no longer required rock and gravel pits will be rehabilitated. A rehabilitation plan must be submitted to the EPA for approval.

## 8 FOREST ESTABLISHMENT AND MAINTENANCE

### 8.1 GENERAL PRINCIPLES

Forest plantations may be established to produce commercial timber or to rehabilitate degraded areas.

The principles of management of forest plantations are to:

- conserve soil and water quality
- maintain biodiversity
- maintain long term site productivity
- reduce visual impact, and
- protect other natural and cultural values.

During the establishment phase particular emphasis on these principles is required without EPA approval. All operations undertaken in plantations must be in accordance with an appropriate Operational Plan.

No operations are to occur in blocks where more than 5% of the area is greater than 20° slope.

### 8.2 OPERATIONAL PRINCIPLES

The ACT Forests' Silviculture Manual provides detailed prescriptions of establishment and maintenance operations.

#### 8.2.1 Site Preparation

Site preparation techniques should be designed to:

- assist in the initial establishment and subsequent growth of the crop trees
- minimise soil erosion and other detrimental environmental effects, particularly in regards to water quality.

Site preparation treatments are a high impact operation. Specific issues to be considered include:

- retention of slash to retain nutrients on site and retain sediment
- site cultivation method and direction of cultivation
- slope limits on cultivation
- erosion control measures
- water quality protection measures
- drainage

## ***Site Preparation Techniques***

Cultivation of the soil will be undertaken in a manner that minimises the risk of soil erosion and adverse impacts on water quality. Operations that are typically used include:

- rolling
- ripping
- ripping and mounding
- spot cultivation

The procedures are to be included in the relevant Operational Plan.

The optimum conditions for undertaking soil cultivation are when the soil is dry. This aims to minimise erosion, reduce puddling, mixing and compaction, and improve effectiveness of ripping by increasing earth shatter.

### **8.2.2 Planting**

Only flatter areas and isolated pockets of 0.5 ha that exceed 20° will be considered for planting with plantations species. Riparian Management Zones are to be planted with native vegetation where appropriate. Where there is a steep slope adjacent to the stream, then the planting should extend to the stream bank.

Native forest species and provenance selection should be based on the native overstorey species endemic to the area to be planted, including structure and composition requirements.

The Contractor must:

- adhere to the requirements stipulated in the Operational Plan
- provide training to all workers prior to the commencement of the planting operation
- ensure that workers are using the correct planting technique
- plant in areas that have different types of site preparation and spacing requirements

### **8.2.3 Chemical Use**

Chemicals are commonly used during tree establishment. Such chemicals include fertilisers, herbicides and pesticides. It is the responsibility of the relevant agency manager and contractor to ensure that the conditions of the Environment Protection Act 1997 and the subsequent Environmental Authorisation are met.

Chemicals are not typically to be used in Exclusion Zones. Where it is proposed to use chemicals in an Exclusion Zone, the use of non-chemical means of control should be investigated and used unless it can be demonstrated that chemical control poses a lesser environmental risk than other practical options. Techniques such as wick-wiping and spot or shrouded strip application should be considered. Where a decision is made to use chemicals in an Exclusion Zone, those specifically

designed for particular applications should be used (e.g. Roundup Bioactive would be an appropriate herbicide for streamside applications).

Agricultural chemical use will comply with the Environment Protection Act 1997. EPA must receive notification prior to chemical application near watercourses and/or water supply catchments. All chemicals used must be registered for forest use by the Australian Pesticides and Veterinary Medicines Authority (APVMA). All chemical use must be applied in accordance with the label or have an approved off-label permit from the APVMA.

In areas that are greater than 20° slope all herbicide application will be undertaken using either aerial or hand based techniques, such as knapsack spraying. Aerial spraying should not be conducted when there is a risk of unplanned drift into an Exclusion Zone. Boundaries of Exclusion Zones should be clearly mapped and be visible, marked or delineated by electronic means.

The handling, use and application of chemicals will only be conducted by suitably qualified persons. Contractors conducting chemical application services on forest areas, except aerial spraying, will be authorised as required by the relevant Environmental Authorisation.

The person responsible for chemical application will ensure that chemicals do not enter an Exclusion Zone, except where an Operational Plan specifically approves the use of chemicals for direct application in this zone.

Aerial applications shall not release, discharge or apply any AgVet chemical within a horizontal distance of 150 m from the boundary of:

- any occupied property, such as a dwelling or school, or
- a water body, unless otherwise allowed for on the product label of a chemical currently registered by the Australian Pesticides and Veterinary Medicines Authority, or an off label permit approved by the same Authority

Fertiliser application will be planned and carried out so as to minimise the chance of fertilizer being dropped or drifted onto any surface waters (streams, lakes, storages, swamps or wetlands). Fertiliser application will not be used in Exclusion Zones without EPA approval.

Following approval from the EPA and at least one week prior to the application of a chemical, the relevant agency shall notify ActewAGL of the type of chemical to be applied, the location and the estimated total quantity and duration of the application.

Prior notification to the ACT community is required for the application of any chemical classified as Schedule 7 Poison. Notification requirements are dependent upon degree of operation, and may include public notices in *The Canberra Times* and/or signposts placed in the relevant areas of the operation.

The type and quantity of all commercial applications of chemicals is to be reported to the EPA for each financial year.

## ***Pollution Control***

Operators will ensure that:

- above and below ground fuel storage tanks must comply with the requirements laid out in Environment ACT's Water Pollution Environment Protection Policy.
- fuel oils and chemicals are stored and handled in compliance with the requirements of the relevant sections of the Environment Protection Act 1997, Dangerous Goods Act 1984 and the Poisons and Dangerous Drugs Act 1933.
- Material Data Safety Sheets must be kept for all stored chemicals and be available to all relevant personnel.
- mobile fuel tanks are not to be located within 10 m of an Exclusion Zone, or in a location where fuel may enter a waterbody
- the transportation and storage of fuel and chemical and the refuelling of equipment is to be carried out in a manner which prevents the pollution of surface and ground waters as a result of the escape of fuel or chemical
- plant and equipment and other substances and materials must be handled, operated, moved and stored in proper and efficient manner for the purposes of preventing the pollution of surface and ground waters
- vehicles used to transport chemicals must be prominently marked with the appropriate warning signs in accordance with the Dangerous Goods Act 1984.
- all servicing and repairs of equipment are carried out in a manner, which prevents the pollution of surface and ground waters
- all forest operations must have spill kits available for fuel, oil and or chemical spills
- operators of machinery must not deliberately or negligently discharge any type of oil, fuel or fluids onto the forest floor from machinery operating within the forest
- oils and fluids associated with machinery servicing is to be collected and stored in suitable containers and disposed of in an appropriate manner
- waste is to be removed from the forest and disposed at regular intervals during operations, and within seven days of the completion of any forest operation. It must be disposed in accordance to the product label instructions.
- any operator or officer representing a relevant land management agency who detects a pollution incident which may have been caused by a forest operation must report the incident without delay to the EPA on 6207 9777 during office hours or the Duty Officer on 132 281 outside office hours. The relevant agency will also need to report the incident to the EPA in writing within 2 working days of becoming aware of the event.
- any spillage of chemicals shall be cleaned up immediately unless it is impractical to do so. In such cases the spillage will be immediately contained and cleaned up at the first possible opportunity. Spill kits may be used where appropriate. Such clean up should include decontamination or removal of any material that becomes contaminated with a chemical. If this spillage is deemed an emergency then the ACT Fire Brigade must be contacted immediately on 000. If not deemed an emergency, but could potentially cause environmental harm then the spillage must be reported to the EPA.

## 8.2.4 Plantation Health

The general principle is to maintain a healthy forest. Forest health can be affected by pests, disease and nutritional deficiencies. The key elements are:

- regular monitoring of the estate
- early detection of health issues
- implementation of appropriate actions

Please refer to the ACT Forests Pest & Diseases Manual for more detail of pests and diseases common to the estate.

### ***Pests and Diseases***

Planting stock used to establish a plantation or re-vegetate a damaged area should be free of disease.

Should Sirex wasp populations be identified, nematode inoculation programs will be carried out in accordance with industry guidelines.

Baiting programs in accordance with current industry guidelines will be applied when feral animals, such as pigs, rabbits and dogs, are identified as a problem.

Other pest and diseases common to the ACT include *Diplodia pinea*, Monterey Pine Aphid (*Essigella californica*), Bark beetles (*Ips grandicollis* and *Hylastes ater*), Woolly Pine Aphid, (*Pineus pini*), *Dothistroma*, *Cyclaneusma* and *Macrophomina*, Root-rotting Fungus (*Phytophthora cinnomorni*), Autumn Gum Moth (*Mnesampela privata*), and Wingless Grasshopper (*Phaulacridium vittatum*).

## 9 FOREST HARVESTING

### 9.1 GENERAL PRINCIPLES

Timber harvesting is not undertaken in native forest. All timber harvesting operations carried out in forest plantations shall be carried out with regard to the requirements of The Code. An Operational Plan for the management of harvesting (Timber Harvest Plan) will be prepared for all harvesting operations.

Timber harvesting will not be undertaken in Exclusion Zones.

### 9.2 OPERATING PRINCIPLES

The ACT Forests' Harvesting Manual provides detailed prescriptions for harvesting operations.

Timber harvesting will be designed to:

- ensure maximum and efficient utilisation of felled trees by the conversion of various tree parts to the highest value added products; and
- maintain and conserve the long term sustainability of the range of environmental, cultural and social values on that forest site

Planning for timber harvesting will take into account:

- resource inventories of plantation stands from pre-harvesting assessments
- assessment of the economic factors relevant to the harvesting plan
- supply agreements with forest industries
- natural, scientific and cultural values
- protection and maintenance of water quality

#### 9.2.1 Harvesting Operations

Timber is normally transported from the point of harvest with forwarders or similar machines. These machines normally only operate within the plantation. Timber may also be extracted by skyline systems where logs are supported on a cable way stretched between two points. Skyline systems are normally only operated on steep slopes.

Extraction of logs shall be carried out in a manner and by methods that shall result in a minimum of soil disturbance. Any damage caused by the operation must be repaired by the Harvesting Contractor.

Soil exposure should be minimised by use of slash, litter and other ground cover, and the use of walkover extraction techniques.

All stockpiles and log dumps must be in accordance with the relevant Operational Plan and shall be within the plantation being harvested, unless agreed by the Supervising Officer.

No log dump will be located on culverts or in drainage lines or within 10 m of an Exclusion Zone.

### ***Timber Extraction Tracks***

Temporary timber extraction tracks are required to allow vehicles operating within the plantation to transport timber to the edge of a road.

Tracking pattern and track specifications should be designed to:

- allow access to all trees within the stand
- minimise soil disturbance
- minimise adverse hydrological impacts
- minimise damage to retained trees

Consultation will occur between the Supervising Officer and the Contractor to ensure that the patterns and specifications of timber extraction tracks outlined in the Operational Plan facilitate the efficient use of machinery.

Where practicable, timber extraction tracks (tracks) will follow planting rows. Width may vary with row spacing where tracks follow planting rows.

### ***Tree Felling***

All felling, trimming and cross-cutting shall be carried out with a minimum of damage to standing trees.

Tree fallers are not obliged to fall any trees designated for felling that the faller considers is beyond their competency to fall safely.

Hang-ups must not to be left standing and must be felled immediately. Hang-ups include:

- trees that have been scarfed but not felled
- partly felled trees that are leaning or lodged against standing trees.

The faller must only leave the site if it is to facilitate the felling; in such a situation the hang-up must be clearly marked.

### ***Stump height***

Unless otherwise directed, all trees are to be felled leaving a stump height above the general soil level of not more than 100 mm or 25% of the diameter (whichever is less).

Stump height is measured from the general soil level on the uphill side of the stump to the level of the top of the back cut and the height is to be assessed prior to any movement of machinery or vehicles in the area.

In the case of salvage of windblown trees, stems must still be cut no further than 100 mm from where the ground level would have been unless specific approval is gained in writing from the Harvesting Manager.

### ***Processing***

Processing involves the mechanical felling of trees and the subsequent delimiting and cross-cutting to make logs in a single process.

Mechanical felling shall not be carried out by a machine that causes damage to any portion of the log which renders the log or portion of the log unacceptable for the purpose for which it was cut.

The Contractor shall trim and cross-cut all trees felled into logs for removal from the forest with a minimum of waste in order to maximise the recovery of logs. Log specifications will be included in the Operational Plan; these may be varied on instruction from the Supervising Officer.

Mechanical delimiting shall be carried out within the compartment and without undue concentration of the slash. Where operational reasons require the concentration of delimiting and cross-cutting activities the Harvesting Contractor will seek the approval of the Harvesting Manager for the location of such delimiting and cross-cutting sites. Such permission will be conditional on an agreement to spread the debris over the site so that it does not interfere with the subsequent logging or replanting operations.

The tops and branches of all trees felled shall be lopped or crushed so as to lie as close as possible to the general level of the ground. All tops, slash and other debris shall, unless otherwise directed by the Supervising Officer, be cleared from roads, fire breaks, drainage lines, landings and logging tracks and be stacked around the plantation outside row of trees or stumps and clear of standing trees.

# 10 FOREST REHABILITATION

## 10.1 GENERAL PRINCIPLES

As a result of the 2003 bushfires, some 10 500 ha of commercial softwood plantations were destroyed. ACT Forests implemented the Fire Debris Removal Environmental Management Plan to guide operations to manage the burnt debris. The Plan also provides a framework to minimise impacts such as:

- soil movement and water quality
- introduction and spread of weeds and plant pathogens
- native vegetation and biodiversity
- smoke and air pollution.

An Operational Plan for the management of the debris removal and soil erosion mitigation operations will be prepared for all rehabilitation operations in the forest estate and be submitted for approval to the EPA.

## 10.2 OPERATIONAL PRINCIPLES

The ACT Forests' Fire Debris Removal Environmental Management Plan and the ACT Forests' Silviculture Manual provide more detailed prescriptions for debris removal and soil erosion mitigation.

No operations are to occur in areas where more than 5% of the area is greater than 20° without operational approval from the EPA.

In areas with a slope greater than 20° and that are being returned to native forest, operations must reduce the destruction of regeneration through the use of excavator removal and stacking of the burnt pine, leaving natural understorey and regeneration in place where possible.

As far as is practicable, windrows or heaps should be free of soil. Stick rake blades on bulldozers or excavators should be used to move and stack debris.

### 10.2.1 Debris Removal Operations

All standing and felled plantation trees greater than 10 cm in diameter and greater than 2 m in length within the plantation estate are to be debris removed, or at the direction of the Supervising Officer.

Bulldozers will be used in the flatter areas of the debris removal operation using chaining and pushing techniques to heap the burnt pine. These heaps and/or windrows are to follow the contour. Bulldozers must be fitted with a root rake to prevent scouring of the soil surface and removal of topsoil. The root rake should have at least 200 mm spaces between rakes.

All windrows must be tightly packed heaps, no longer than 100 m. Spacing between windrows should not be less than 30 m. The width of windrows can be no wider than 20 m to minimise impact to ground cover and aid burning. There is to be no heaps and/or windrows within an Exclusion Zone without approval from the EPA.

Clearing techniques used on steeper slopes will aim to ensure that the root balls of the trees are not disturbed and that felled trees are heaped rather than pushed or dragged into heaps. Heaps and/or windrows will not necessarily be on the contour.

### 10.2.2 Soil Erosion Mitigation Strategies

The following initial stabilisation works will be undertaken either concurrently with the debris removal operation or immediately following. The initial stabilisation works in each compartment shall be completed within two weeks of the completion of debris removal operations in that compartment:

- on roads passing through or draining into a sub-catchment within the operational area, the roads will be upgraded to prevent concentrated water flow
- contour ripping may be considered (one degree fall from gully to ridgeline) at 50 m spacings on slopes less than 20°
- erosion mitigation strategies (silt fences, hay bales, bedded logs etc) will be installed as required.

Inspection of the effectiveness of the above initial stabilisation works will be undertaken after each significant rainfall until the cleared area is stabilised. Any defects found during the inspection will be rectified and the EPA notified. The relevant agency is to maintain records of the inspections, any defects found and the subsequent rectification works.

# 11 FIRE MANAGEMENT

## 11.1 GENERAL PRINCIPLES

Fire management activities will take account of the legislative obligations to manage fuel hazards, as well as to minimise the impact of smoke on air quality. Fire management will also consider biodiversity, cultural heritage and water quality objectives.

All operations will be conducted in accordance with the Strategic Fire Management Plan, relevant legislation and procedures.

Fire management policies, plans and practices will take into account the requirements to protect life and property, including plantation assets from the damaging effects of fire.

Fire management comprises two elements - suppression of wildfires and hazard reduction burning.

## 11.2 OPERATIONAL PROCEDURES

Hazard reduction burning operations are to be in accordance with the Relevant Agency's environmental authorisation and attached schedules. ACT Forests complies with Environmental Authorisation No. 0412 for hazard reduction burning operations.

The ACT Forests' Fire Management Manual provides more detailed prescriptions for fire management.

### 11.2.1 Wildfire Suppression

Roads and water points are to be managed to facilitate rapid suppression of wildfires.

Unless otherwise authorised, Contractors shall at all times keep open to fire-fighting and other relevant vehicles all roads or tracks adjacent to or affected by, their operations.

In the event of a fire occurring in the forest or being likely to spread to the forest, Contractors shall, upon request of the fire controller, immediately make available to the relevant authority, such persons, vehicles or equipment as they may have available for the purpose of combating the fire.

All roads must be signposted as per the Department of Urban Services Fire Management Unit's Strategic Fire Access Network Principles, Policy and Planning Procedures document.

At any other time the Relevant Officer may impose restrictions on access to the forest during the Bushfire Season.

### 11.2.2 Hazard Reduction Burning

Fire hazard can be reduced substantially by reducing fuel loads. Prescribed burning is the method normally used to reduce fuel loads.

Fire management planning will ensure that:

- fuel hazards are managed in a strategic manner to reduce risks
- strategic fuel modified zones may be created and maintained within and/or around land managed by ACT Forests using accepted techniques for hazard reduction
- prescribed burning operations will comply with the relevant environmental legislation.
- approval will be sought from the EPA where burning is proposed in areas where more than 5% of the burn area is greater than 20° slope
- an appropriate smoke management plan, including conditions based on airshed, atmospheric stability, wind direction, and volume of smoke produced, will be proposed for all prescribed burning.

An Operational Plan (Burn Plan) will be prepared before each prescribed burning operation is conducted. The Plan is to be consistent with the relevant environmental authorisation and the EPA is to be notified on the day that the burn will be conducted. A permit to burn must be obtained from the Emergency Services Authority. During the fire season, this permit is issued in writing; outside of this season, approval is only required orally.

At least one week prior to burning, the Relevant Agency shall notify ActewAGL of the location and the estimated duration of the burning.

Where the drainage path from an ash bed to a stream is less than 50 m, a silt fence shall be erected and the ash beds will be seeded no later than 1 week after the burn so as to trap any ash washed from that ash bed.

### 11.2.3 Forest Closure

Plant and equipment use during forecast and actual Very High and above Fire Danger Index (FDI) and Total Fire Bans days are required to:

- plant and equipment use that may cause accidental ignitions must be suspended when the local area FDI exceeds 30, except as permitted under conditions 6 to 11 below. The local area FDI may be based on weather data from nearby fire towers, weather stations or local weather observations. Fire towers will broadcast FDI on an hourly basis.
- Agencies are responsible for monitoring FDI and notifying internal and contract operators working on their estate when the FDI exceeds 30. This responsibility may be delegated to the contractor, who should record instances of stand-downs, times and conditions.
- machinery may operate from early morning and work until 10:00am or until directed to suspend operations by the relevant Agency, based on the local area FDI exceeding 30.

- on days of Total Fire Ban, where slashers work in the morning, slashing is to be restricted to areas within the suburbs or irrigated areas. No work is permitted on the urban edge or in flood ways.
- where machinery has operated for part of a day and subsequently been closed down by the FDI exceeding 30, a machine operator must remain on site for a period of not less than 30 minutes after the close down of the machine to ensure no fires ignite from their operations.
- for graders, dozers, front-end loaders and backhoes, work may only continue when the local area FDI exceeds 30 where there is no rock present (limited chance of accidental ignitions) or where there are discontinuous fuels.
- for slashers, stump grinders, chippers and chainsaws, work may only continue when the local area FDI exceeds 30 where there are discontinuous fuels (small inner urban reserves, recently burnt forest).
- on days of Total Fire Ban, graders, asphalt pavers, dozers, front-end loaders, rollers, brooms and backhoes may continue to work on ACT roads in urban areas only (within the built up areas of Canberra, and not in rural areas).
- welding and oxyacetylene cutting may only be undertaken in the field when the FDI is less than 30. Operators must have the capacity and equipment to extinguish either fires started by the activity or fires on the welding or oxyacetylene equipment: a pressure operated water fire extinguisher to AS 1841 Pt 2, minimum capacity 16 litres, or a knapsack spray, minimum capacity 16 litres to extinguish fires started by the activity, unless it is supported by a chaser vehicle with either this equipment or a spray/slip on unit, plus either two serviceable powder type fire extinguishers to AS 1841, Pt 5, minimum capacity 0.9 kg, or one 1.8 kg or larger extinguisher to extinguish fires on the equipment.
- on days of Total Fire Ban, bitumen spraying can continue in urban areas only (within the built up areas of Canberra, and not in or near rural areas) on ACT roads. No bitumen is to be heated in the ACT during Total Fire Bans.
- no contractor will use a naked flame, this includes linemarking, asphalt laying and bitumen sealing works during Total Fire Bans.
- the Relevant Officer may liaise with the Rural Fires Service Duty Co-ordinator and identify instances where the FDI is likely to just exceed 30 (e.g. and not reach significantly higher values), and limited plant and equipment operations may be approved to proceed.

#### 11.2.4 Plant & Equipment Requirements

Plant and equipment must be equipped and maintained in order to minimise the risk of igniting a fire, and have the capacity to extinguish a fire either on or caused by the machine.

During the declared fire season:

- all internal and contract plant (dozers, graders, backhoes, mulchers, slashers, front end loaders, chippers) and equipment (chainsaws, jackhammers, post-hole borers) must be:
  - maintained and operated in a way that it will minimise the risk of a fire starting, or catch fire itself

- fitted with a securely fixed, spark free exhaust in good, serviceable condition
- free of excessive build-up of either surplus oils, dust impregnated with oil, and/or vegetative matter.
- every plant item must carry either a pressure operated water fire extinguisher to AS 1841 Pt 2, minimum capacity 16 litres, or a knapsack spray, minimum capacity 16 litres to extinguish fires started by the plant, unless it is supported by a chaser vehicle with either this equipment or a spray/slip on unit
- every plant item must carry either two serviceable powder type fire extinguishers to AS 1841, Pt 5, minimum capacity 0.9 kg, or one 1.8 kg or larger extinguisher to extinguish fires on the plant. *(Note that local experience indicates that the capacity of a single 0.9 kg extinguisher has not been sufficient to stop a fire on a machine that is burning hydraulic hoses and oil)*
- fuel must be stored consistent with AS 1940
- refuelling must occur where the ground is clear of flammable material for a distance of not less than 1.5 m from the edge of the machine
- fuel and oils spills must be cleaned up, recovered or covered with not less than 5cm of non-flammable material
- if an incident occurs that requires the use of a fire extinguisher, the plant involved cannot continue operating until it has been inspected and deemed safe by the relevant agency supervisor and the extinguisher has been replaced/refilled.

## 12 GLOSSARY

**Aboriginal place** - any place defined in section 9 of the Heritage Act 2004 as a place of particular significance to Aboriginal people because of either or both of the following: (a) Aboriginal tradition; (b) the history, including contemporary history, of Aboriginal people.

**Aboriginal object** - any object defined in section 9 of the Heritage Act 2004 as a place of particular significance to Aboriginal people because of either or both of the following: (a) Aboriginal tradition; (b) the history, including contemporary history, of Aboriginal people.

**Agreement** - means an agreement between the Territory and another party under which some logging is to be carried out by the other party and includes a purchase of pine timber agreement, a pine logging contract, and any other agreement that refers to the Code of Practice.

**Batter** - means an earth slope formed during road construction either by the placing of fill material or by cutting into the natural hillside.

**Bay (when used in relation to plantations)** - term used in the harvesting of timber from plantations. A "bay" is typically five rows of trees. The typical spacing between tree rows is 2.5 m and the width of a "bay" is typically 15.0 m.

**Bay (when used in relation to log trucks)** - term used to describe the area where logs are stored on a log truck. Typically the bay has stanchions on either side of the load and at either end of the bay.

**Biodiversity** - means the variety of life forms—different species of plants, animals and micro organisms, the genes they contain and the ecosystem they form.

**Buffer** - typically defines the distance from a feature, such as a stream, to the edge of an Exclusion Zone.

**Burn Plan** - an Operational Plan describing prescribed burning operations.

**Causeway** - means a natural or constructed crossing (other than a bridge) that enables vehicles to cross a drainage feature.

**Clearfelling** - a method of harvesting whereby all trees are felled and merchantable logs are removed.

**Contractor** - means any person or company being a party to an agreement with the Territory to log or deliver wood on behalf of the ACT Government and includes any servants, agents, employees, co-contractors or sub-contractors of the contractor.

**Crop Tree** - means those trees with which the compartment was established.

**Crossbank** - means a mound of earth placed across a road or track to divert water from the surface, which may be consolidated or unconsolidated.

**Crossdrain** - means a drain excavated across the full width of a road or track to divert water (for example, a spoon drain, crossbank or rollover bank).

**Cross-fall drainage** - means drainage caused by shaping a road so that all water drains across and off the road surface rather than along it. Drainage created by a cross-fall can be infall, outfall, or crowned (the latter being drainage caused by shaping a road so that water drains to both sides of the road).

**Culvert** - means one or more adjacent enclosed pipes or open drains that are used to convey water underneath a road.

**Cut** - means a portion of land where earth has been removed by excavation.

**Director** - the Chief Executive Officer of ACT Forests and includes any person for the time being performing the duties of the Chief Executive whether known by title or not.

**Drainage depression** - An open depression with a smoothly concave cross-section that conveys runoff during or immediately after heavy rainfall. These features may be subject to seasonal waterlogging or spring activity and vegetation type often indicates a wetter environment than the surrounding country.

**Drainage line** is a channel with a clearly defined bank and bed, where surface water naturally concentrates and flows, conveying water during and immediately after heavy rainfall. These features often show evidence of active erosion or deposition, such as a sand bed, gravel, or rock.

**Earthworks** means any operation involved in moving, loosening, depositing, shaping, compacting or stabilising soil and rock for the purpose of construction (for example, of a road or log dump).

**EPA** means ACT Environment Protection Authority, Department of Chief Ministers.

**ESP** means exchangeable sodium percentage.

**Erosion** means the wearing away of land by running water, rainfall, wind, ice or other geological agents.

**Exclusion Zone** means an area where operations (including timber harvesting and roading) are generally precluded; specific areas include Riparian Management Zones and areas set aside for the protection of Aboriginal and European Heritage.

**Extraction** means the transportation of trees, stems or logs from the point of felling to a processing or roadside loading area (usually a log dump or landing).

**Extraction track** means a track used for extraction. (Extraction tracks include snig tracks, along which logs are dragged, either wholly on the ground or supported at one end)

**Fill** means excavated material that is used to raise (fill) the surface of an area to a specified level.

**Fire Danger Index** - an index used to measure fire danger

**Fire trail** means a way that is used for either or both of the following purposes:

- to provide access for fire control vehicles,
- to prevent or check the spread of fire during fire fighting or prescribed burning operations. A fire trail may be a track or a road, depending on whether or not it is constructed.

**Forest** - land comprising native forest and land managed for forest plantations.

**Forest Plantation** - see Plantation.

**Forest estate** - any land under the control of a relevant forest land management agency, whether carrying forest or not and includes any road, break, track, camp, settlement, building, dam, fence, plant growth or other improvement now or hereinafter in, growing, erected or constructed on such land.

**Forest operations** - any operation carried out in that component of the forest estate managed for timber production.

**Forwarder** - a vehicle used to transport logs within a plantation; logs are fully supported off the ground.

**Groundcover** - any type of herbaceous vegetation (including native grassland of high conservation value). Groundcover is only regarded as native vegetation if it occurs in an area where not less than 50% of the herbaceous vegetation covering the area comprises indigenous species. In determining that percentage, not less than 10% of the area concerned must be covered with herbaceous vegetation (whether dead or alive).

**Ground slope** - the slope of the natural land surface at any given point in the landscape.

**Infall drainage** - drainage caused by constructing the surface of the road with an inward slope in the opposite direction to that of the side slope of the natural surface, allowing runoff to be shed to the high terrain side of the road.

**Harvesting Contractor** - entity contracted by the ACT Government to undertake a timber harvesting operation.

**Harvesting Manager** - the Operational Manager responsible for the management of forest harvesting operations.

**Line ripping** - ripping lines in the ground (for example, with multi-tine equipment or a wing or wide-foot plate on a ripper) to shatter the compacted layer of the soil.

**Log** - means wood in log form

**Logging** - means any operation involved in the harvesting, loading and delivery of logs. This includes the felling, extraction, loading and hauling processes.

**Log dump or log landing** - an area where logs or parts of logs are assembled for sorting and preliminary processing (for example, crosscutting) before being loaded on to trucks for transport from the plantation. Log dumps or landings do not include areas set aside for stockpiling logs.

**Manual cultivation** - tilling the soil in preparation for planting using only hand tools.

**Mounding** - the cultivation of soil to form mounds.

**Native grassland of high conservation value** - native grassland has been extensively cleared from the region. Native grassland of high conservation value exhibits one or more of the following features:

- is relatively large in area, or is an area that connects two other large areas of native vegetation
- is in unusually healthy condition (that is, it is in much the same condition, and has much the same species composition and community structure, as may have existed a hundred or more years ago)
- includes a diversity of native species (that is, not just grass species, but a diversity of forbs that grow between the grass tussocks, such as native legumes, orchids, daisies and lilies)
- is a habitat for rare and threatened species of native plants and animals
- has very few weeds and has had only minimal past disturbance from ploughing, spraying or fertilising, and
- is determined by the relevant agency to be native grassland of high conservation value.

**Native vegetation** any of the following types of indigenous vegetation:

- trees
- understorey plants
- groundcover
- plants occurring in a wetland.

**New plantations** - first rotation plantations, not including small newly planted areas within second rotation areas.

**Non-Plantation Areas** - areas within the plantation estate that are not used for the production of timber; includes Exclusion Zones and areas of native forest or grasslands.

**Object** - as defined in the Heritage Act 2004 as a natural or manufactured object, including an Aboriginal object, but does not include a place.

**Operational Plan** - a plan covering a specific type of forest operation. Examples include Timber Harvest Plans, Roding Plans and Site Preparation Plans)

**Operation Report** - a report prepared at the completion of an Operational Plan that includes details of any deviations from the Operational Plan.

**Operator select thinning** - thinning operation where the harvesting machine operator does selection of the trees to be removed during the operation.

**Outfall drainage** - drainage caused by constructing the surface of the road with an outward slope in the same direction as that of the side slope of the natural surface, allowing runoff to be shed to the low terrain side of the road.

**Peak flow** - the highest flow rate of the drainage feature concerned during or following a specific rainfall event.

**Permanent road** - a generally high standard road required for the continuing management of the forest.

**Pesticide** - a compound used for the control of pest plants and feral animals.

**Place** - as defined in the Heritage Act 2004, a place includes the following: (a) a site, precinct or parcel of land; (b) an item at the place; (c) a building or structure, or part of a building or structure, at the place; (d) an object at the place that could be registered separately; (e) an item historically or physically associated with the place, if the primary importance of the item derives, completely or partly, from that association; (f) equipment, furniture, fittings and articles at, or historically or physically associated with, the place.

**Plantation** - a forest stand established by the planting of trees (or the spacing of natural regeneration following earlier plantings) of either native or exotic species managed intensively for timber production and other uses.

**Prescribed burning** - a method used to reduce fuel loads and reduce fire hazard by igniting areas of forest under prescribed conditions.

**Relief culvert** - a drainage structure that transports water collected (generally by a table drain) from the road surface under the road for controlled discharge down slope.

**Riparian** - of, pertaining to, or situated on, the banks of a stream or dam.

**Riparian Management Zone** - a form of Exclusion Zone within an identified area along a stream or reservoir managed to maintain stream water and the aquatic environment; most forest operations are not permitted within such zones without specific approval. The buffer for each zone is determined in Table 2 and 3 and must be consistent with the ACT Government's *Think Water, Act Water* strategy.

**Riparian Zone** - "that region along lakeshores, streams and rivers where the existing or original emergent vegetation has distinctly different structure and/or floristics from that of adjacent terrestrial areas" (ACT Government, 2004)

**Road** - a way that is constructed primarily for vehicles by means of earthworks involving the cut or fill (or both) of the natural surface on the way. A road may include a track or fire trail if it is so constructed.

**Rollover bank** - a type of cross-drain and may be:

- a shallow drain (sometimes used in combination with a compacted low earth cross-bank called a rollover cross-bank) that is constructed across the full width of a road or track, or
- a rollover drain, which is used on moderate to steep sections of roads or tracks and sized so that the road or track remains trafficable. Rollover drains help to prevent erosion of the road or track surface by discharging water at numerous points on the low terrain side of the road or track.

**Rotation** - the planned number of years between the regeneration of a forest and its final harvesting.

**Running track** - extraction track with the primary purpose is to allow machinery to move to and from other working areas without travelling on forest roads

**Runoff water** - the portion of precipitation falling on a catchment area that flows from the catchment past a specified point.

**Rutting** - soil disturbance caused by the sinking of the wheels or tracks of vehicles or machinery.

**Second (and subsequent) rotation plantations** - plantations re-established with a tree crop following harvesting of plantation trees. This includes small newly planted areas within second rotation areas.

**Sediment** - particles of soil material that have been transported or deposited by water flow.

**Shovel Logging** - harvesting systems using excavators or tracked loading machines with log grabs to lift and move logs while the harvesting machine is stationary.

**Silviculture** - the art and science of managing forest establishment, composition and growth.

**Site preparation** - the preparation of the ground to provide conditions suitable for the planting of seedlings and/or cuttings.

**Slash** - tree debris left following the felling, processing and extraction of logs.

**Snigging** - the towing or winching of a log by a tractor or dozer from the stump to the landing site.

**Stanchions** - metal posts on a log trailer that stand upright to secure logs on the trailer.

**Stand condition** - the health, age, height, size class distribution and stocking of a forest stand.

**Stocking** - the density of any given forest stand, usually expressed as the number of trees per hectare.

**Stockpile** - an accumulation of logs ready for loading onto trucks

**Stream** - synonymous with watercourse

**Supervising Officer** - the person appointed by the relevant agency to manage a forest operation under an Operational Plan.

**Table drain** - a drain constructed along the side of a road between the shoulder and a cut batter that collects and drains runoff water away from the road surface and also intercepts runoff water from cut batters that might otherwise flow onto the road surface.

**Territory** - means the Australian Capital Territory, a body politic established under Section 7 of the Australian Capital Territory (Self Government) Act 1988 (Commonwealth).

**Thinning** - the felling of part of a forest stand or crop, with a view to increasing the growth rate of the retained trees.

**Timber extraction tracks** - temporary tracks within a plantation that allow vehicles operating within the plantation to transport timber to the edge of a road. Within the context of Section 9 the term "track(s)" is applied to timber extraction tracks

**Timber harvesting** - includes tree felling, snigging, and the making, sorting and loading of forest produce within a forest plantation.

**Timber Harvest Plan** - an Operational Plan detailing the requirements for implementation of timber harvesting in forest plantations.

**Track** - a way primarily for vehicles that is not constructed.

**Track (timber extraction)** - a way used to extract logs from the forest.

**Walkover extraction techniques** - involves the use of suitable logs, bark or vegetation to spread the weight of the load and separate machine tyres or tracks from direct soil contact during harvesting operations, thus reducing ground pressure and rutting. With matting a complete cover over the soil is created using an excavator before machinery operates over the site.

**Watercourse** - means any of the following:

- a reservoir, such as the Cotter Dam
- a wetland,
- a river or stream,
- a drainage line,
- a drainage depression

**Water body** - means a watercourse.

**Wetland** - generally include marshes, billabongs, swamps and sedge lands. Characteristics include:

- covered by a shallow body of water (being a body of water that is not the result of unusual flooding, high rainfall, temporary water diversion, or a marked permeability break in the soil profile leading to the development of a perched water table)
- inundated cyclically, intermittently or permanently with water
- under normal circumstances, predominantly vegetated with plant communities adapted for life in saturated soil conditions
- characterised by soils that exhibit reducing conditions.

**Windrow** - a row of largely woody material resulting from the clearing of a forest in preparation for the establishment of a plantation. Windrows are common in plantations that were established on land that was cleared of native vegetation.

**Wood** - any log or utilisable portion of a standing or fallen tree.

**Woody native vegetation** - native trees and shrubs.

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# APPENDIX 1: FEDERAL AND STATE LEGISLATION

## LEGISLATION

All operations will be supervised to ensure compliance with The Code. All contract and departmental operations will comply with the ACT Occupational Health and Safety Act (1989).

All operations will only be undertaken by employees or approved contractors.

Guides to the principal Acts of Parliament and ACT legislation and their Regulations and Ordinances where relevant to various aspects of forest management and timber harvesting operations are briefly described below. It is important to note that legislation may be amended from time to time or repealed at any time and persons using the land must comply with the legislation as it stands at the time that such users carry out any activity in relation to the land.

### **Federal**

- Aboriginal and Torres Strait Islander Heritage Protection Act 1984
- Agricultural and Veterinary Chemicals Act 1994
- Environment Protection and Biodiversity Conservation Act 1999

### **Australian Capital Territory**

- ACT Motor Vehicles (Dimensions and Mass) Act 1990
- Emergency Services Authority Act (2004)
- Occupational Health and Safety Act 1989
- Emergencies Act 2004
- Land (Planning and Environment) Act, 1991
- Heritage Act 2004
- Water Resources Act 1998
- Environment Protection Act 1997
- Nature Conservation Act 1980
- Dangerous Substances Act 2004

### **New South Wales**

- Occupational Health and safety Act 2000
- NSW Motor Traffic Act 1909
- Local Government Act 1919

## AUSTRALIAN STANDARDS

The following is a guide to the most relevant Australian standards that apply to forest management and timber harvesting operations; the guide is not comprehensive and users must conform to the appropriate standard. Australian Standards are constantly being revised and updated; users must comply with the most recent standard applicable.

- AS/NZS 4360:2004: Risk Management
- AS/NZS 1270:2002 : Acoustics - Hearing protectors
- AS/NZS 1800:1998 : Occupational protective helmets - Selection, care and use
- AS/NZS 1801:1997 : Occupational protective helmets
- AS/NZS 1801:1997/Amdt No. 1-1999 : Occupational protective helmets
- AS/NZS 1336:1997 : Recommended practices for occupational eye protection  
AS/NZS 1336-1997/Amdt 1-1997 : Recommended practices for occupational eye protection
- AS/NZS 1337:1992 : Eye protectors for industrial applications
- AS/NZS 1337-1992/Amdt 1-1994 : Eye protectors for industrial applications
- AS/NZS 1337-1992/Amdt 2-1997 : Eye protectors for industrial applications
- AS/NZS 2210.2:2000 : Occupational protective footwear - Requirements and test methods
- AS 2294.1-1997 : Earth-moving machinery - Protective structures - General
- AS 2726.1-1995/Amdt 1-1997 : Chainsaws - Safety requirements - Chainsaws for general use
- AS 2726.2-1995 : Chainsaws - Safety requirements - Chainsaws for tree service
- AS 1019-2000 : Internal combustion engines - Spark emission control devices
- AS/NZS 4360:2004 : Australian Standard on risk management
- AS 1742.3-2002 : Manual of uniform traffic control devices - Traffic control devices for works on roads
- AS2294-1990 : Roll Over protection structures

## APPENDIX 2: PIPE DIMENSIONS FOR CROSSINGS OF WATERCOURSES

The size of pipes required to handle the likely flow of water from small catchments following rainfall events depends on a range of factors. Table 6 provides a guide to the dimension and number of standard size concrete pipes that would be required to handle the flow from a 1 in 20 year storm event assuming a 0.2 m head of water above the pipe entrance. The sectional area of pipes required to handle a 1 in 5 year storm event is approximately 50% of the 1 in 20 values.

**Table 6: Pipe sizes for crossings of watercourses (adapted from Tables for Foresters - Forestry & Timber Bureau, 1975)**

Area (ha)	Topography	Condition	Sectional area (m <sup>2</sup> )	Number of pipes	Internal diameter (mm)
10	Gentle	Good	0.13	1	450
		Poor	0.73	1	1050
	Hilly	Good	0.19	1	525
		Poor	0.91	1	1200
	Steep	Good	0.25	1	600
		Poor	1.10	1	1200
50	Gentle	Good	0.35	1	675
		Poor	2.46	1	1800
	Hilly	Good	0.52	1	825
		Poor	3.07	2	1500
	Steep	Good	0.69	1	300
		Poor	3.69	2	1650
200	Gentle	Good	0.76	1	1050
		Poor	5.70	3	1650
	Hilly	Good	1.14	1	1200
		Poor	7.12	3	1800
	Steep	Good	1.52	1	1500
		Poor	8.55	4	1650

Topography is defined as:

- steep - average slopes >25°
- undulating - average slopes range from 10 to 25°
- gentle - average slopes less than 10°.

Condition (of catchment) is described as:

- good - full tree stocking, continuous litter, understorey and ground vegetation present
- poor - incomplete tree cover, extensive areas of exposed soil, sparse understorey.

Another system that can be used to determine pipe density and size is the Modified Rational Method. Please refer to the work conducted by Weeden 1993 and Pilgrim 1987 for more information.