# 4. Environmental management for forestry operations

## 4.1 Protecting and managing landscape features

**➲ The Code reference: 4.1, Table C**

Landscape features have special conservation value because of their unique characteristics, for example they have high numbers of threatened or rare species, provide critical habitat components, or have special heritage significance. It is the landholder's responsibility to determine if any of these landscape features occur in the area proposed for forestry operations.

### 4.1.1 Ecological communities and populations

The Threatened Species Conservation Act 1995 identifies three categories for listing and special protection:

1. Endangered ecological communities (EECs)
2. Endangered populations
3. Vulnerable ecological communities

These require special protection measures to ensure that forestry operations do not result in further risk to the viability of the species and communities represented.

As part of the PNF PVP process, DECCW will provide a list of EECs that may occur on your property. If they are present, then specific approvals or prescriptions may be required (e.g. an ecological harvesting plan must be approved prior to harvesting in EECs) or harvesting may be excluded from the area.

**Ask an expert**

If you are unsure whether an EEC is on your property then you should seek further advice from DECCW.

### 4.1.2 Rainforest and old growth forest

Rainforest and old growth forest have special biodiversity value because they contain rare habitat elements. These unique elements are important for biodiversity conservation and management. If old growth forest or rainforest has been mapped on your property, they will be included on the PNF PVP map provided by DECCW. Forestry operations, apart from maintenance of existing roads, must not occur in rainforest or old growth forest.

**? How do I…**

**Review old growth forest or rainforest on my property.**

The Code allows for landowners to request that DECCW review the old growth forest and rainforest maps provided by DECCW if the landowner considers that they are inaccurate. DECCW will undertake new mapping to identify old-growth or rainforest. The landowner must identify the area in dispute and provide evidence to DECCW, including photographs, logging records or other disturbance history. For more information, refer to DECCW's Private Native Forestry Code of Practice Guidelines 2 and 3.

### 4.1.3 Geographic landscape features

A number of geographic features require specific protection under the Code. This is because they represent special habitat elements which can readily be damaged during forestry operations. The Code specifically excludes forestry operations from these areas, and from a buffer area around them, in order to maintain their special values. They include:

- Wetlands (+20 metre buffer)
- Heathland (+20 metre buffer)
- Rocky outcrops (+20 metre buffer)
- Cliffs, caves, tunnels and disused mineshafts (+10 metre buffer)

### 4.1.4 Cultural heritage

Forest landscapes can be rich in cultural heritage. This can be either Aboriginal cultural heritage, in the form of objects or places of significance, or post-European settlement cultural heritage. Where objects or places of cultural heritage importance are identified, these must be protected.

Heritage items are listed in Environmental Planning Instruments–check with your local council. DECCW will provide you with information about any known Aboriginal objects or places on your land. If you discover a heritage item or Aboriginal object on your land, do not disturb it, and contact DECCW.

### 4.1.5 Soils and geology

Some landscape features are important to protect because they represent an increased risk of land degradation, through soil erosion or mass movement. They include:

- Steep slopes (>30 degrees)
- Areas of existing mass movement
- Dispersible and highly erodible soils

In these areas, forestry operations must be modified and restricted in order to minimise the risk of soil erosion and subsequent water pollution. In the case of slopes greater than 30 degrees, forestry operations are excluded.

Soil erosion and mass movement are further discussed in Section 4.4.1.

## 4.2 Protecting habitat features

### 4.2.1 What is a protected tree?

**➲ The Code reference: 4.2, Tables D, E**

A protected tree is any tree that needs to be retained by the Code because they provide habitat and/or food for native wildlife. These trees must be protected from forestry operations.

Protected trees include habitat trees (i.e. hollow bearing trees, roost and nest trees, feed trees, food resource trees) as well as grass trees, forest oaks and *Banksia*. Habitat trees must be retained according to Table 2.

*Table 2: Minimum standards for tree retention*

**➲ The Code reference: 4.2, Table D**

| Trees that must be retained |
|---|
| 10 hollow bearing trees per 2 hectares, where available |
| One recruitment tree from the next cohort and representing a range of species in the forest before forestry operations commenced must be retained for every hollow bearing tree |
| Where the total number of hollow bearing trees is less than 10 trees per 2 hectares, additional recruitment trees must be retained to bring the total number of retained hollow bearing and recruitment trees up to 20 trees per 2 hectares |
| Up to half of all required recruitment trees can be located in a riparian buffer zone where the subject 2-hectare area is within 200 metres of, and partly includes, that riparian buffer zone |
| A minimum of 6 feed trees per 2 hectares should be retained where available |
| All feed trees that have marks or 'V' notches from sap-feeding mammals must be retained |
| All roost, nest or food resource trees must be retained |

## Hollow-bearing and recruitment trees

### ➲ The Code reference: 4.2(6)

***Hollow bearing trees:*** Many forest-dwelling animals live in hollows in native trees. Hollows or cavities in trees are usually formed as a result of broken branches, lightning strike or fire and/or termite, insect or fungal attack (Figure 4.1). The occurrence of a natural range of hollow sizes, depths, volumes and positions helps to ensure that a diversity of hollows are available for hollow dependent animals.

*Figure 4.1 (a) (b) (c): Examples of different types of hollows*

*(a) Stem Hollow*

*(b) Branch Hollow*

*(c) Fire scar* PHOTO: PF Olsen Australia

***Recruitment trees:*** Some large trees that are likely to develop hollows must be retained. These are called recruitment trees. Retention of recruitment trees is important for the long-term replacement of existing hollow bearing trees as the older trees die and fall of natural causes.

## Roost and nest trees

**➲ The Code reference: 4.2(6)**

***Roost trees:*** Roost trees are used by many bird species and some bats. They are often identified by the presence of faecal matter on branches where animals have been roosting, and on the ground under the tree.

***Nest trees:*** Nest trees of any large raptor must be retained. Raptor (birds of prey e.g. powerful owl) nests are generally quite large and distinctive (Figure 4.2).

*Figure 4.2: Nest tree*

PHOTO: Forests NSW

### Feed trees and food resource trees

**➲ The Code reference: 4.2(6)**

The Code 4.2(6), Table E specifies feed tree species which must be targeted for retention. These are tree species that are preferred by specific animals because of their pollen, nectar or sap. Trees with evidence of active sap feeding, specifically V-notch (Figure 4.3) or other incisions which have not healed over, must also be retained.

*Figure 4.3: V-notch tree*

### Other trees to be retained as protected trees

**➲ The Code reference: 4.3(3)**

All grass trees (any tree of *Xanthorrhoea*) and forest oaks (any tree of *Allocasuarina spp*.) and *Banksia* must be retained.

## 4.2.2 Protection of retained trees

**➲ The Code reference: 4.3(1&2)**

As far as practicable, retained trees must not be damaged during forestry operations.

There are three specific actions that must be taken:

1. **Do not heap harvesting debris** such as branches, leaves, logs and bark, around protected trees. This increases the risk of the tree being killed or damaged during operations or a fire (Figure 4.4a).

2. **Do not damage trees with machinery.** Careless operation of heavy machinery can damage protected trees, especially during snigging operations (Figure 4.4b).
3. **Use directional felling techniques.** Falling trees can cause significant damage to retained trees. Direct falling trees away from retained trees.

*Figure 4.4:*

*(a) Harvesting debris stacked around trees* PHOTO: PF Olsen Australia

*(b) Machine damaged tree* PHOTO: PF Olsen Australia

## 4.3 Protecting threatened species

### 4.3.1 What are threatened species?

Threatened species are listed under the *Threatened Species Conservation Act 1995* as being considered in danger of extinction.

### 4.3.2 Identifying the presence of threatened species

**➲ The Code reference: Appendix**

The presence or potential presence of threatened species can be identified from:

#### Known records

DECCW maintains the NSW Wildlife Atlas which is a store of all known records of threatened species in NSW. DECCW will advise you if there are any known listed species records within the property and within 10 kilometres of the property.

#### Site evidence

Many threatened fauna species leave evidence of their presence. This can include distinctive scats (faecal pellets, Figure 4.5a), chewed seed cones (Figure 4.5b), nests, roosts, active hollows, latrine sites (where animals defecate and mark scent), fur and bones. Confirmed sightings of a species can also be site evidence.

*Figure 4.5:*

*(a) Koala scats*

*(b) Chewed seed cones*

**Ask an expert**

If in doubt about the identification or presence of threatened species you should seek advice from DECCW or other ecological expert.

### 4.3.3 What to do if threatened species are present

**➲ The Code reference: Appendix**

The Code Appendix lists threatened fauna (animals) and flora (plants) and their relevant prescriptions which must be applied to the forestry operation to ensure that the habitat requirements for those species are maintained.

The types of prescriptions which apply vary between species. They include:

- Exclusion and buffer zones
- Additional tree retention
- Increases in width of stream exclusions

**Note**

Refer to the Code Appendix for specific threatened species prescriptions. The Code Appendix can be found attached to the back of the Code at www.environment.nsw.gov.au/pnf/.

### Exclusion zones

Exclusion zones are established around known locations of threatened species or on both sides of a stream where required. Forestry operations are not permitted within exclusion zones. This means that machinery must not enter the zone, new road construction cannot occur and trees must not be felled into or out of the zone. The exclusion zone must be clearly marked in the field. Operators must use directional felling to ensure that trees are felled away from exclusion zones.

### Buffer zones

Buffer zones provide additional protection around exclusion zones. Forestry practices are modified in the buffer zone to ensure that the values of the exclusion zone are further protected. Buffer zones **must** be clearly marked in the field. Modifications to practices can include:

- Additional retention of trees to meet food or habitat requirements
- Limitations on felling (for example directional felling) and machinery access
- Limitations on roadworks

### Additional tree retention

In some cases, threatened species require the retention of additional trees for food or habitat throughout the relevant part of the forestry operations area, to ensure the ongoing viability of the species in the area.

### General threatened species prescriptions

Three general conditions apply for threatened species protection. These conditions recognise that habitat elements can be the same for different species in a complex forest system:

- Retained trees can count as habitat trees if they meet the requirements.
- Riparian exclusion zones can count as habitat exclusions if they overlap and meet the habitat needs.

» Buffer and exclusion zones that form the edge of the forestry operation must be marked and the marking must remain visible throughout the operation.

**FOP note**

The locations of all threatened species records must be recorded in the FOP. Buffer and exclusion zones related to these recorded locations are to be marked in the field (within the forestry operation area).

## 4.4 Protecting soil and water resources

Soils contain nutrients, minerals and small organisms that contribute to forest growth and diversity. Careless forestry operations can result in major damage to or loss of soil. Soil erosion is the biggest cause of water pollution in forestry operations and can lead to increased stream sediment and nutrient loads with adverse effects on fish and other aquatic fauna and water quality.

### 4.4.1 Soil erosion and mass movement

Forestry operations can contribute to land degradation if not undertaken appropriately.

Land degradation includes:

» Accelerated soil erosion
» Mass movement
» Degradation to watercourses

#### Soil erosion

Soil erosion results from concentrated water flow. It is worse in highly erodible or unstable soil types, and where bare soil is exposed to flowing water. Forms of soil erosion include:

» Sheet erosion (Figure 4.6a)
» Rill erosion (Figure 4.6a)
» Gully erosion (Figure 4.6b)

*Figure 4.6: Types of erosion and turbid water*


*(a) Rill and Sheet erosion*

*(b) Gully erosion*

PHOTO: PF Olsen Australia

***Soil erosion hazard:*** Soil erosion hazard is determined from:

- **Rainfall energy** (amount of **rainfall** and frequency of **storms**)
- The **steepness** of the land
- **Soil type** (indicates **erodibility**)
- Amount of **groundcover**

Operational factors which can influence soil erosion include:

- **Timing** of activities
- **Machinery** type
- **Groundcover** and soil disturbance
- Extraction **track and road** patterns

***Mass movement:*** Mass movement is where large amounts (more than 10 cubic metres) of soil and earth shift downslope. It includes land slips, landslides and avalanches. Mass movement risk can be affected by:

- Past land management practices
- Poor road and track location and construction
- Excessive clearing and removal of groundcover and trees
- Geology (the underlying rocks)
- Soil type and depth
- Rainfall
- Slope

## 4.4.2 Drainage features

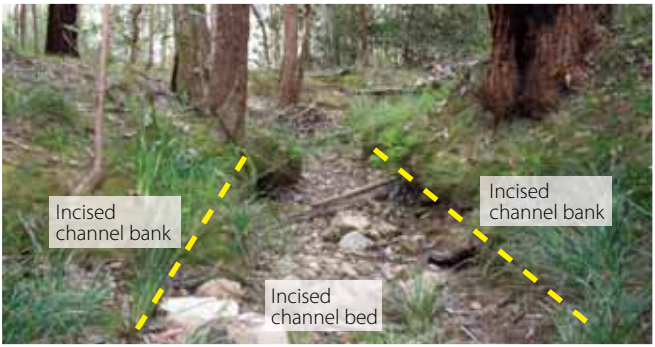
**➲ The Code reference: 4.4**

A **drainage feature** is any part of the landscape that naturally conveys or holds concentrated water flow. Drainage features include natural drainage depressions (Figure 4.7), which occasionally carry water, through to rivers and lakes which permanently carry water. Drainage features must be protected to:

- Minimise bank erosion
- Minimise pollution
- Provide refuge for aquatic and terrestrial biodiversity

*Figure 4.7: Types of drainage features*

*(a) Drainage depression*



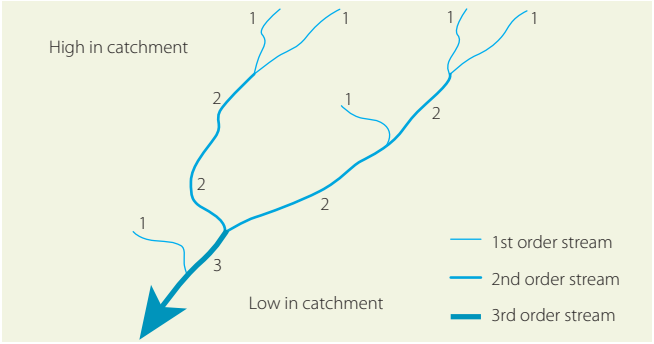

*(b) Drainage line* PHOTO: PF Olsen Australia

## Stream order

### ➲ The Code reference: 4.4(3)

The natural drainage pattern of catchments is a branching network of drainage features. Stream order refers to the different levels of branching of drainage features that are shown on topographic maps (Figure 4.8). The Code prescriptions to protect streams are based on the level of stream order. Higher stream orders have greater protection in the Code.

*Figure 4.8: Stream order (adapted from the Code Appendix, Figure 3)*



## 4.4.3 Managing soil and water

**➲ The Code reference: 4.4(2,5,6&7)**

### Prevention of soil erosion and water pollution

Soil erosion and water pollution resulting from forestry operations can be limited by:

- **Minimising** disturbance of groundcover and soil
- **Restricting** the speed and volume of flowing water
- **Protecting** drainage features
- **Minimising** streambed and bank disturbance during crossing
- **Trapping** sediment at the source using sediment traps (although prevention of erosion is the preferred method)

### Protection of drainage features

The Code ensures drainage features are protected from soil erosion and water pollution by:

- Listing prescriptions for the construction, maintenance and use of forest infrastructure (see section 5.3 Forest Infrastructure); and
- Limiting forest operations within and around drainage features by applying riparian exclusion and buffer zones.

The intent of these exclusion and buffer zones is to protect habitat features along waterways, and to prevent soil erosion and water pollution from forestry operations.

### Riparian exclusion zones

**➲ The Code reference: 4.4(1,11&13)**

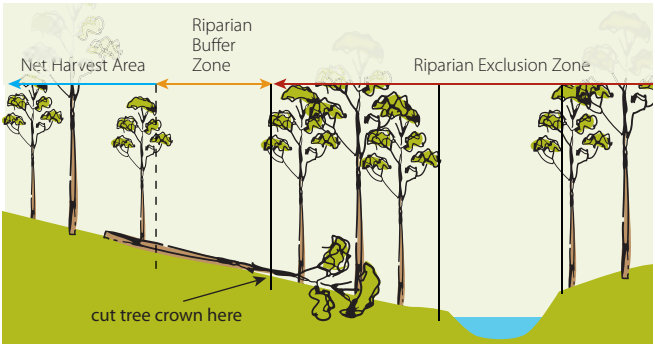
Riparian exclusion zones extend from the banks of the drainage feature out to the distance specified in the Code 4.4(1), Table F (also see Table 3 and Figures 4.10c & 4.10d in this guide). All forestry operations are excluded from riparian exclusion zones, except where specifically permitted for drainage feature crossings and road construction or maintenance. This means that machinery must not enter riparian exclusion zones, and trees cannot be felled into

or out of the zones. Debris from tree harvesting must not be allowed to enter riparian exclusion zones. If a tree is accidentally felled into an exclusion zone, the tree crown must be cut off at the boundary of the exclusion zone and left where it fell, before any saleable log can be removed (Figure 4.9). Machinery must not operate in the exclusion zone.

**Note**

It is recommended that exclusion zones be marked in the field and operators must use techniques such as directional felling to ensure that harvested trees do not enter the zone.

*Figure 4.9: Accidental falling into exclusion zone*




## Riparian buffer zones

**➲ The Code reference: 4.4(2,5,6&7)**

Riparian buffer zones are on the outside of riparian exclusion zones. The width of these zones varies depending on the stream order (see Table 3 and Figures 4.10c & 4.10d). Forestry operations are limited in these zones:

- Only one snig track per ridge line or spur
- Machinery to operate using walkover techniques only
- Retain all rainforest species and hollow bearing trees
- Only 30% of the pre-harvest basal area can be removed in any 10-year period, whilst retaining the minimum basal area limit (the Code 3.1(2), Table A)

- Trees must be felled away from the drainage line
- If a furrow is created from the removal of logs, it must be treated to ensure that concentrated water flow does not occur
- Clearing and disturbance is minimised

Where there is no other alternative trees can be felled into riparian buffer zones, as long as no more than six trees are felled in a 200-metre-long section of the boundary and the tree crown is not removed from the buffer zone.

### Unmapped drainage features

**➲ The Code reference: 4.4(8,9,10,14,15)**

Not all drainage features appear on maps.

***Unmapped drainage depressions:*** Machinery can operate in unmapped drainage depressions, however disturbance must be minimised by using walkover techniques, minimising skewing the machinery tracks, operating with the blade up, and not snigging along the depression (Figure 4.10a).

***Unmapped drainage lines:*** Where an unmapped drainage line is found in the forestry operations area, it must be protected by a machinery exclusion zone of 10 metres from the top edge of the drainage feature bank (Figure 4.10b).

### Machinery exclusion zones

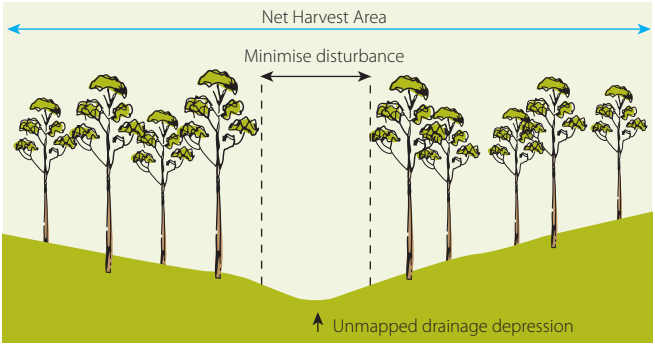
Forestry operations are allowed in machinery exclusion zones; however, specific limitations apply:

- Machinery can only operate using walkover techniques, where vegetation and groundcover is retained
- Trees must be felled away from the drainage line
- If a furrow is created from the removal of logs, it must be treated to ensure that concentrated water flow does not occur
- Groundcover (grasses, herbs and forest litter) must be retained, or reinstated

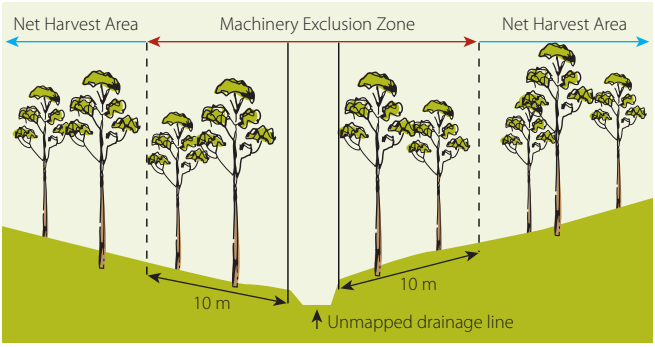
*Table 3: Riparian exclusion and riparian buffer zones (adapted from the Code 4.4(2), Table F)*

| Drainage feature | Riparian exclusion zone distance from drainage feature | Riparian buffer zone distance beyond riparian exclusion zone |
|---|---|---|
| Unmapped drainage depression | No buffer, but minimise disturbance | |
| Unmapped drainage line | 10 metre machinery exclusion zone | |
| Mapped first-order streams | 5 metres | 10 metres |
| Mapped second-order streams | 5 metres | 20 metres |
| Mapped third-order or higher streams | 5 metres | 30 metres |
| Prescribed Streams | 20 metres | 15 metres |

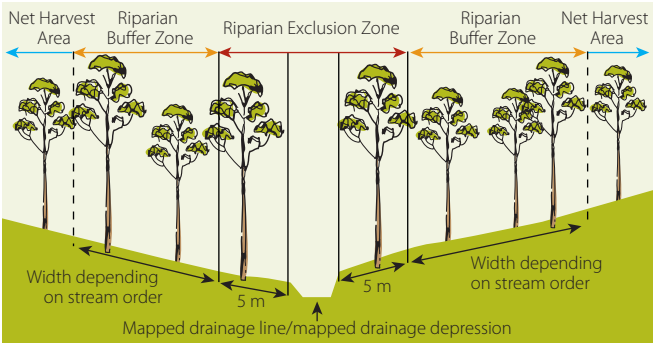
*Figure 4.10: Protection of drainage features*



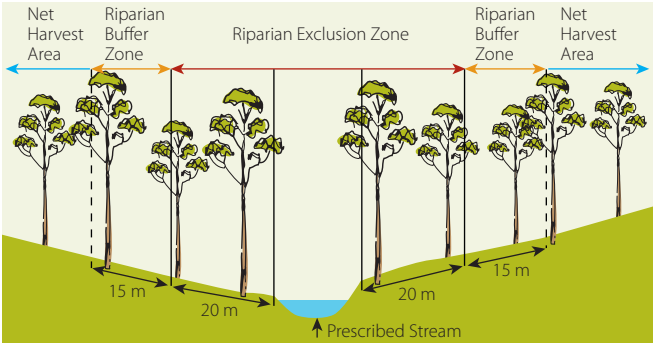

*(a) Unmapped drainage depression*




*(b) Unmapped drainage line showing machinery exclusion zone*




*(c) Mapped stream (1st , 2nd , 3rd order and greater)*

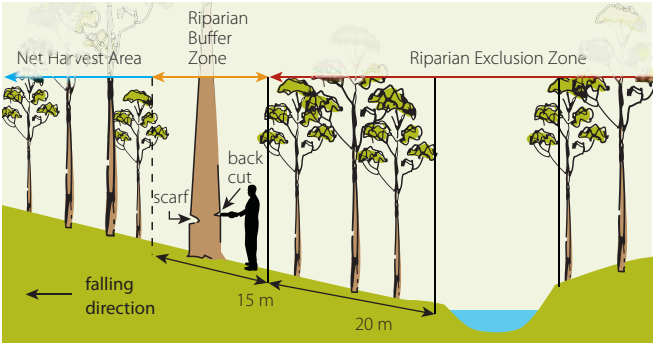



*(d) Prescribed Stream*

### Directional felling

Directional felling is a harvesting technique where an experienced operator is able to guide the falling direction of a tree away from an exclusion zone or similar, by careful placement of the scarf and backcut (Figure 4.11).

*Figure 4.11: Directional felling out of a Riparian Buffer Zone*




## 4.5 Additional resources

DECCW documents (available on the DECCW website at www.environment.nsw.gov.au/pnf/ ):

Private Native Forestry advisory notes 1 to 15

Identification guidelines for endangered ecological communities