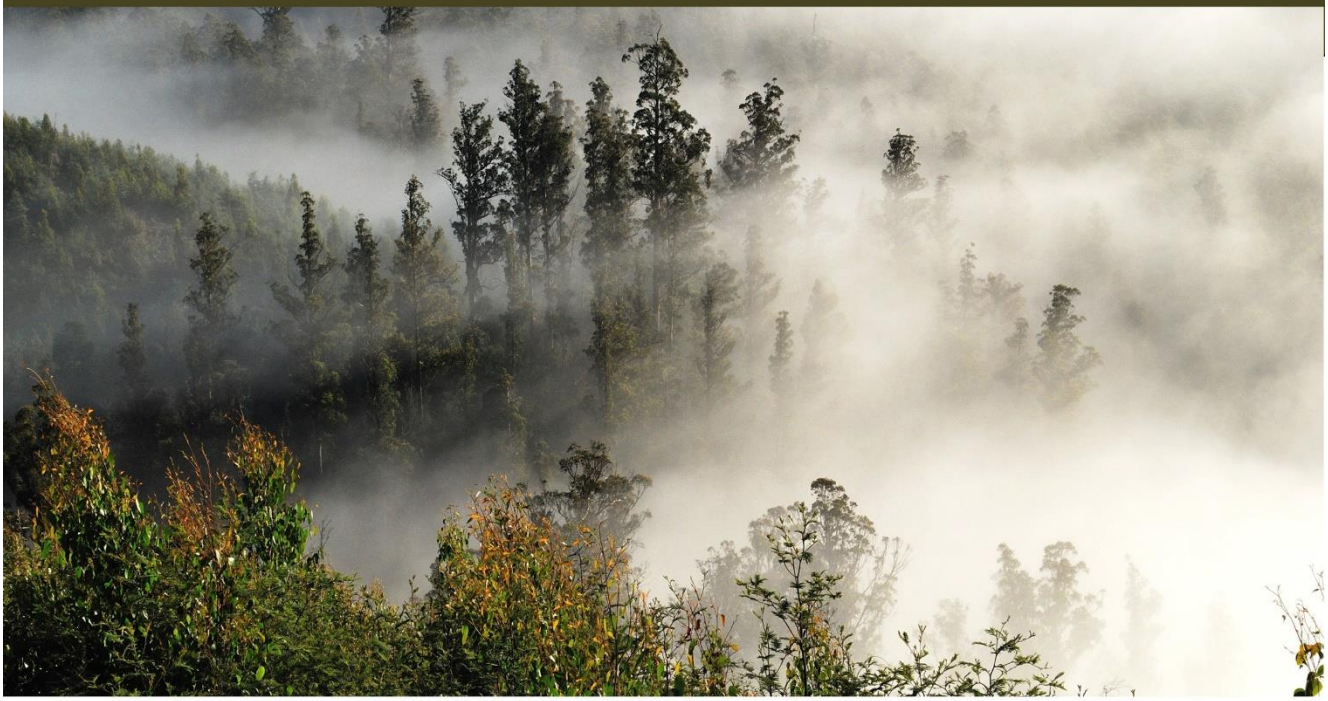
Forest Practices Code

2020



FPA

FOREST PRACTICES AUTHORITY

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2020

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Cover images: Top, Old growth and new growth in the Styx Valley. Photo by Nigel Richardson.
Bottom left, Forestry supervisor checking seedlings to ensure that the stocking target specified in the forest practices plan is reached. Photo by Forico.
Bottom middle, Forest workers marking the edge of the coupe with blue tape. Photo by FPA.
Bottom right, Forest Practices Officer (right) monitoring forest contractor's harvesting operation. Photo by FPA.

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Preamble

Tasmania is endowed with extensive forests. These forests contain natural, cultural and economic values that need to be managed in a sustainable manner to optimise the benefit to current and future generations. Good forest management entails reasonable protection of natural and cultural values during forest practices, and proper reforestation where forest cover is to be maintained.

The *Forest Practices Code* is a core element of the Tasmanian forest practices system, and, by extension, of its forest management system. Further information on the legislative and regulatory context for the forest practices system is available in *Tasmania's forest management system: an overview* (1), available on the Department of State Growth website.

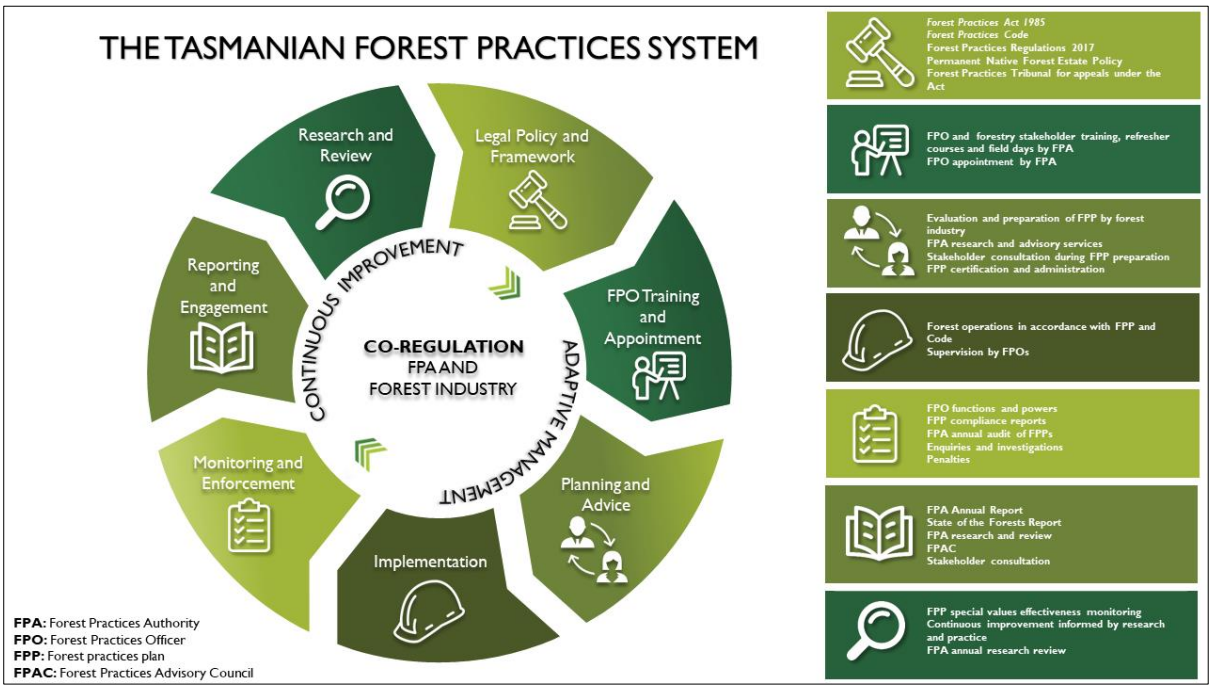
Most forest practices require a certified forest practices plan. Other elements of the forest practices system include legislation, policy, training, monitoring, review, research and enforcement.

Users of the forest practices system are encouraged to consult owners of land on which forest practices are planned, neighbours, and other affected stakeholders. Information about planned forest practices and the outcomes achieved is to be provided in a transparent manner.

The forest practices system provides training programs, planning tools and other resources to help competent users to achieve high standards of forest practices.

Persons conducting forest practices should make themselves aware of other applicable legal requirements, including work health and safety legislation and the *Forest Safety Code (Tasmania) 2007* (2).

The forest practices system is continually being improved through a process of adaptive management supported by ongoing research, monitoring, evaluation and review.



A. INTRODUCTION

A1. Tasmania's forest practices system

A1.1 Context

- The *Tasmanian Regional Forest Agreement* (RFA) provides a framework for the sustainable management of Tasmania's publicly and privately owned forests. The Australian and Tasmanian governments signed the Tasmanian RFA on 8 November 1997. It was varied on 18 August 2017 to extend its life to 8 November 2037 and to establish a mechanism for subsequent five-yearly extensions contingent on satisfactory completion of reviews.
- The forest practices system does not have jurisdiction over all components of sustainable forest management. In addition to the *Forest Practices Act 1985* (the Act), Tasmania has a suite of other legislation that also contributes to the regulation of forest management (see Appendix 1).
- The primary legislation supporting sustainable forest management in Tasmania is the Act, which states that forest practices are to be carried out with due care for the environment on public and private forest lands.
- The forest practices system operates in a manner that has regard to the statutory wood supply obligations for public Permanent Timber Production Zone (PTPZ) land prescribed in section 16 of the *Forest Management Act 2013.*
- The forest practices system is designed to ensure adequate re-stocking of public and private forests within the context of section 31(2) of the Act.
- The forest practices system has no role in determining how much forest is harvested (other than through specific restrictions on individual harvesting operations) or in the determination of appropriate sustainable yields for either public or private forests, or the economics or commerciality of forest operations.
- This Code does not directly deal with product utilisation standards or occupational health and safety, as these matters are addressed by other legislative and policy documents.

The *Forest Practices Act 1985*

- The Act contributes to sustainable forest management outcomes through the regulation of 'forest practices', which are defined in section 3 of the Act as activities relating to:

  (a) the processes involved in establishing forests, growing or harvesting timber, clearing trees or clearing and converting threatened native vegetation communities, and

  (b) works (including the construction of roads and the development and operation of quarries) connected with establishing forests, growing or harvesting timber or clearing trees.

- The objective of Tasmania's forest practices system is provided in Schedule 7 of the Act, as follows:
  - *The objective of the State's forest practices system is to achieve sustainable management of Crown and private forests with due care for the environment and taking into account social, economic and environmental outcomes while delivering, in a way that is as far as possible self-funding –*

    (a) an emphasis on self-regulation; and
    (b) planning before forest operations; and
    (c) delegated and decentralised approvals for forest practices plans and other forest practices matters; and
    (d) a forest practices code which provides practical standards for forest management, timber harvesting and other forest operations; and
    (e) an emphasis on consultation and education; and
    (ea) an emphasis on research, review and continuing improvement; and
    (eb) the conservation of threatened native vegetation communities; and
    (f) provision for the rehabilitation of land in cases where the forest practices code is contravened; and
    (g) an independent appeal process; and

(h) through the declaration of private timber reserves – a means by which private land holders are able to ensure the security of their forest resources.

- The Act is supported by the Forest Practices Regulations 2017 (the Regulations) which identify situations in which forest practices plans (FPPs) are not required, the fees associated with applications for certification of FPPs, and other fees.

National and international context

- Tasmania's forest practices system is designed to support and comply with national policies and international obligations for sustainable forest management.
- The Food and Agriculture Organization of the United Nations has defined sustainable forest management as 'a dynamic and evolving concept that aims to maintain the economic, social and environmental values of all types of forests, for the benefit of present and future generations' (3).
- Australia's *National Forest Policy Statement 1992* (4) provides a broad framework for the delivery of sustainable forest management, including three key objectives:
  - to maintain a permanent forest estate to retain the full suite of forest values over time
  - to set aside parts of the forest estate in formal reserves to safeguard special environmental and social values according to the principles of comprehensiveness, adequacy and representativeness
  - to manage forests outside reserves in a manner that contributes to sustainable environmental, social and economic outcomes.

Policy for Maintaining a Permanent Native Forest Estate

- The FPA has a statutory requirement (section 4C of the Act) to implement the Policy for Maintaining a Permanent Native Forest Estate.
- This policy prohibits broad scale clearing and conversion of native forest except in prescribed circumstances. These prescribed circumstances do not in themselves provide permission to impact on threatened species, threatened native vegetation communities or other special values as these are regulated under other legislative provisions, or elsewhere in this Code.

Forest carbon and climate change

- Forest practices should be conducted in a manner that maintains the sequestration and storage of carbon in a reasonably practical manner by:
  - avoiding unnecessary damage to forest growing stock and soils
  - maintaining site productivity
  - ensuring the prompt reforestation and growth of forests after harvesting.
- Forest practices should ensure that native forests are regenerated using seed from local or similar provenances in a manner that contributes to the maintenance of genetic diversity, taking into account the potential of ecosystems and species to adapt to climate change.

Threatened native vegetation communities

- Threatened native vegetation communities, for the purposes of the forest practices system, are those defined in Schedule 3A of the *Nature Conservation Act 2002*. These include both forest and non-forest communities.
- Applications for FPPs involving clearance and conversion of threatened native vegetation communities as defined in section 3A of the Act must satisfy one of the requirements of section 19(1AA) of the Act.
- For the purposes of forest practices planning, the *Forest botany manual* (5) will be used to assess the presence of threatened native vegetation communities.

Formal and informal reserves

- Tasmania's reserve system comprises formal reserves declared by the Governor, informal reserves created by public authorities through administrative instruments, and private reserves created under legislation or through management agreements or certified management systems.

- The forest practices system has no direct role in creating formal reserves, although the refusal of applications for private timber reserves (section 16 of the Act) and the refusal or amendment of FPPs (under section 19 of the Act) may, in certain circumstances, lead to land owners seeking to create conservation covenants over private land under the *Nature Conservation Act 2002*.
- The contribution of forests outside reserves to sustainable environmental, social and economic outcomes is achieved through both regulation and voluntary mechanisms.
- Tasmania's forest owners have access to voluntary mechanisms that can contribute to improved outcomes for sustainable forest management. These include government incentives and programs, as well as market-based devices, including forest certification schemes. The forest practices system has no direct role in the administration of voluntary mechanisms.

A1.2 How the system works

- The Act provides for the administration of the forest practices system by the Forest Practices Authority (FPA). The statutory objective of the FPA is set out in Schedule 7, and, as stated in section 4B of the Act, the Authority (the FPA) is to act in all matters in a manner that:
  - best advances the objective of the state's forest practices system
  - fosters a co-operative approach toward policy development and management in forest practices matters
  - takes into account social, economic and environmental outcomes of its decision-making process.
- The forest practices system combines self-regulation by the industry and landowners under this Code with independent monitoring and enforcement by the FPA.
- Compliance with the Act and Code is enforced through the provisions of the Act, with an emphasis on fostering improved standards through management systems, training and education or corrective actions and penalties for serious cases of non-compliance.
- The implementation and effectiveness of forest practices are assessed and publicly reported under the requirements of the Act (section 4G), including compliance reports for the discrete operational phases of all FPPs (section 25A), monitoring by the FPA (section 4E) and through research and monitoring programs.
- The Act provides for a Forest Practices Advisory Council (FPAC) (section 37A) to provide expert advice to the FPA and to foster communication and cooperation among stakeholders.
- The Act also contains compliance requirements in relation to monitoring and reporting on plans, this Code and other provisions of the Act. The FPA conducts independent audits of compliance, and the results are publicly reported in the FPA's annual report to Parliament (section 4X).
- The FPA may act with respect to offences under the Act, including proceedings and prosecutions (section 47), or prescribed fines as an alternative to prosecution (section 47B).
- The FPA appoints Forest Practices Officers (FPOs) (section 39) who are responsible for monitoring (section 40) and enforcement (section 41) of FPPs.
- Some FPOs are delegated by the FPA (section 43) to consider applications for certification of FPPs (section 18) and variations thereto (section 23).
- The FPA provides training in the preparation of FPPs in accordance with this Code and any instructions issued by the FPA.
- The Chief Forest Practices Officer (CFPO) is responsible for the day-to-day administration of the forest practices system (section 4K) and exercises functions and powers delegated by the FPA.
- Specialists are employed by the FPA to conduct research and provide training and practical management advice on natural and cultural values and the conduct of forest practices.

A2. The *Forest Practices Code*

- The Act (section 30) requires the FPA to issue a Code on the conduct of forest practices. The purpose of the *Forest Practices Code* (this Code) is to 'prescribe the manner in which forest practices shall be conducted so as to provide reasonable protection to the environment' (section 31 of the Act).
- The application of this Code must take account of social, economic and environmental factors (section 4B (2)(c) of the Act) and the legislated wood production supply obligations of the Forestry corporation (section 4DA).
- This Code is issued from time to time by the FPA, after extensive consultation and public comment. The first Code became operational in 1987, and has been revised in 1993, 2000, 2015, and 2020 (this version).
- This Code provides a practical set of guidelines and standards for the management of natural and cultural values during forest practices, in particular:
  - biodiversity
  - genetic resources
  - soils
  - water quality and flow
  - geodiversity
  - landforms
  - visual landscape
  - cultural heritage.
- This Code outlines an approach to forest practices developed through research and practical experience, including research and innovation by landowners, forest managers, contractors and the forest industry.
- This Code is reviewed regularly to incorporate research, field experience and public input. Progressive improvements are made so that environmentally sound, socially responsible and economically acceptable forest practices can continue.

A2.1 Scope

- This Code applies to all land tenures, including permanent timber production zone land, future potential production forest land, other public land and privately owned land.
- Section 31 of the Act provides that this Code shall prescribe the manner in which the following forest practices shall be conducted so as to provide reasonable protection to the environment:
  - the establishment and maintenance of forests including the standards to be complied with in the restocking of land with trees
  - the harvesting of timber or the clearing of trees
  - the construction of roads and other works connected with the establishment of forests, the clearing of trees or the growing or harvesting of timber.
- The provision of reasonable protection to the environment includes landscape management and the control of soil erosion (subsection 31(3)).
- This Code may authorise any matter or thing to be from time to time determined, applied, or regulated by an FPO (subsection 31(5)).
- This Code applies in all situations where an FPP is required (see A3.2), whether or not one has been prepared and certified.
- Where a certified FPP is required but forest practices are being conducted without one, the responsible person can still be requested to comply with this Code and to repair any damage under the Act (section 41).
- Where a certified FPP is not required, e.g. under the prescribed circumstances described in the Regulations, persons carrying out forest practices are encouraged to apply the provisions of this Code where practicable.

A2.2 Structure

- This Code contains both ‘general principles’ and an ‘operational approach’ for particular aspects of forest practices, and an ‘outcome’ to be achieved.
- General principles provide guidance about how specific aspects of forest practices should be approached.
- The operational approach provides specific prescriptions and requirements which should be transferred to FPPs where relevant and will assist in meeting the outcome.
- The outcome statements describe in a broad manner the result that is expected by applying the general principles and operational approach of a given section of this Code.
- There are two types of statements in this Code: ‘will’ statements and ‘should’ statements:
  - The ‘will’ statements must be applied in a practical manner to forest practices. ‘Must’ statements are considered equivalent to ‘will’ statements.
  - The ‘should’ statements show the desirable practice for most situations and are to be interpreted by a person taking account of local conditions. ‘Should’ statements are expected to be applied unless there are good reasons for an alternative approach that will achieve an equivalent environmental outcome. ‘May’ statements are considered equivalent to ‘should’ statements.
- In most cases, this Code provides the minimum standards that must be achieved. In certain cases, further protection of particular environmental values will require appropriate measures to be specified in FPPs.
- Sketches have been used throughout this Code to assist readers in understanding the operational approach. These sketches are indicative.

A2.3 Supporting documents

- This Code references other manuals and technical instructions that are endorsed from time to time by the FPA. Other supporting documents produced by the FPA and by other parties which contain background information on various topics are also referenced in this Code.
- Where supporting documents are cited in this Code with a clear directive (e.g. ‘The FPA’s evaluation sheets for natural and cultural values…will be used in the FPP preparation process.’), they must be consulted by persons planning or conducting forest practices, and their contents implemented where required.
- Where supporting documents are cited in this Code with an informative recommendation (e.g. ‘Further information can be found in *Native Forest Silviculture Technical Bulletin No. 1: Eucalypt seed and sowing*’), it is recommended that persons planning or conducting forest practices consult them for guidance.
- These supporting documents may contain recommendations regarding the conduct of forest practices. These recommendations are to be evaluated by persons developing management prescriptions for FPPs, and specialists consulted where required.
- Recommendations derived from these supporting documents may be developed into prescriptions containing either ‘will’ or ‘should’ statements, at the discretion of the planner, to address the particular circumstances of an operation authorised by an FPP.
- Where a ‘will’ statement in a supporting document is impractical, then an alternative prescription that will achieve an equivalent environmental outcome must be specified in the FPP and brought to the attention of the person considering the FPP for certification. Consultation with specialists may be required.
- Documents published and controlled by the FPA, and government policies, are amended from time to time, and persons interpreting this Code must use the latest version available. Other documents that are cited with their year of publication and/or version number indicate the version that must be used by persons interpreting this Code.

A3. Planning

A3.1 Strategic planning

- Proper planning at both the strategic and operational level reduces the risk of adverse environmental, social and economic impacts.
- Forest practices will be planned to provide due care for the environment and to maintain forest productivity in accordance with this Code and associated planning tools issued by the FPA, as applied in accordance with the Duty of Care provisions of this Code (see D).
- Three-year plans prepared under the Act (section 27) should reflect the strategic aims of managers of larger forest estates with respect to the location and scope of forest practices in the landscape.
- The legislative and policy framework within Tasmania provides a comprehensive basis for strategic and operational planning. Strategic planning will take into account, where relevant and appropriate:
  - the Tasmanian RFA
  - property management plans or forest estate-level management plans
  - private timber reserves (PTRs)
  - other legislative instruments.

A3.2 Forest practices plans

- The Act (section 18) requires forest practices to comply with a certified FPP prepared in accordance with this Code.
- The Act (section 17(4)) provides that any activity of the following kinds must not be carried out unless authorised by a certified FPP:

  (a) the establishment of forests

  (b) the harvesting of timber

  (ba) the clearing of trees

  (bb) the clearance and conversion of a threatened native vegetation community

  (c) the construction of a road in connection with an activity referred to in (a), (b) or (ba)

  (d) the operation of a quarry in connection with an activity referred to in (a), (b) or (ba).
- The Act (section 17(6)) provides exemptions from this requirement for an FPP in prescribed circumstances. These circumstances are described in the Regulations (section 4).

General principles

- Operational planning is generally carried out through the preparation of FPPs, and associated plans such as burning plans or chemical application plans.
- Soils, water quality and flow, air quality, site productivity, biodiversity, landscape, cultural heritage and landforms are potentially affected by forest practices and will be considered at the planning stage, using the evaluation processes detailed on the FPA website. It may be necessary to obtain advice from FPA specialists or other accredited specialists.
- The environmental effects of all forest practices proposed for an area, including access, harvesting, restoration, reforestation and maintenance, will be considered before they start.
- The approach to planning, and the type of FPP prepared, will reflect the risk of environmental impact arising from the forest practices, and include consideration of scale and location in the landscape.
- Planning will involve the collection of site information and consultation with relevant persons and organisations.
- The FPA's evaluation sheets for natural and cultural values, available on the FPA website, will be used in the FPP preparation process (see D).

- The information gathered during planning will be the basis for the FPP. A well thought out and prepared FPP is the key to good forest practices.
- Before an FPP is certified, all major matters pertaining to the plan should be resolved (e.g. future land use).

Operational approach

- When drawing up an FPP, the following factors will be considered:
  - location and land ownership, and any legal covenants
  - whether the land is declared as a PTR
  - the period of planned forest practices
  - the basic features of the area:
    - topography, geology, soil type, erodibility and landslide potential
    - rainfall and drainage characteristics, including watercourse classifications
    - type of forest
    - existing access
    - management requirements to ensure reasonable protection of natural and cultural values
    - risk assessment (6) where trees that are intended to be retained for landscape or other forest practices reasons may cause an increased risk to public safety
  - harvesting and reforestation prescriptions (where appropriate)
  - measures to ensure efficient timber harvesting and sustain site productivity, for example:
    - additional access or improvements to existing access i.e. roads and bridges
    - harvesting methods (e.g. wet and dry season harvesting areas, landings, extraction pattern)
    - restoration following harvesting
  - how any boundaries or other features are to be marked in the field (Appendix 2 shows the standard marking colours recommended for field use)
  - maintenance of the forest including fire management, pest, disease and weed control
  - for a quarry, details regarding establishment, management and planned rehabilitation
  - local government planning scheme requirements on private land that is not covered by a PTR
  - the potential off-site impact of plantation development on adjoining land such as:
    - shading of residences
    - adverse effects on crops
    - safety
    - pests and weeds
    - fire protection
    - potential effects on adjacent conservation reserves.
- All boundaries relevant to an operation (e.g. tenure change, harvesting boundary, wildlife habitat clump) must be specified clearly in the body of the FPP, as well as being shown on the FPP map. Boundaries will be described precisely in terms of their spatial relationship to natural and physical features. Important and unusual boundary features should be clearly described.
- FPPs will be certified by the FPA (or delegate) prior to the commencement of forest practices.
- FPPs will comply with this Code and with administrative instructions issued by the CFPO.
- Persons conducting forest practices under an FPP must also make themselves aware of other legal requirements before commencing.
- A copy of the FPP and a copy of this Code should be kept on site at all times while forest practices are in progress.
- All FPPs will include a prominent statement: ‘Forest practices will be conducted in accordance with the *Forest Practices Code*. All relevant *Forest Practices Code* mandatory statements (‘will’ statements) apply, whether or not they are referred to below. The specific requirements set out below also apply.’

Locating property boundaries

- In this section, a property boundary refers to a property identifier (PID) boundary.
- Coordinates derived from digital depictions of cadastral boundaries are often inaccurate and should not be relied upon. Locating boundaries on the ground should rely on survey techniques which locate the original corner marks or monuments or long-standing features that can be reliably related to original surveys and checked by accurate methods.
- Only a Registered Land Surveyor, or someone under supervision by a Registered Land Surveyor, is legally entitled to mark property boundaries.
- Persons locating boundaries should ensure that they have applied sufficient due diligence to ensure that the planned forest practices take place within the property boundaries.
- If there is any doubt, a Registered Land Surveyor should be consulted.

Boundary description and marking

- Boundaries should either be described precisely using grid references and/or clearly visible features (e.g. roads or fences) or described in text in general terms and with reference to precise specification using digital spatial software. Where such precise description is not possible, boundaries must be:
  - described as far as practicable in text
  - shown in an indicative manner on the map
  - properly marked on the ground prior to operations commencing or clearly depicted in a GPS mapping application which is in routine use by machinery operators.

Consultation and notification

- Consultation with local government will occur prior to certification of FPPs to identify:
  - special management zones identified by a local government planning scheme (for private land that is not covered by a PTR)
  - if construction of new access or major upgrading of existing access for timber transportation onto local government roads is required.
- Consultation with TasWater will occur (see D2.2) prior to certification of FPPs to identify:
  - operations which could affect water quality in a town water supply catchment
  - operations within 2 km upstream of a town water supply intake.
- In some municipalities local government approval may be required for some forest practices on private land that is not covered by a PTR.
- The consent of the Crown Land Services Division of the Department of Primary Industries, Parks, Water and Environment (DPIPWE) must be obtained prior to conducting any forest practices within Crown road reserves or other areas of Crown Land.
- Local government and landowners within 100 m of an operational boundary must be notified of the planned forest practices. This is to encourage effective communication and consultation with respect to proposed forest practices. The details of the planned forest practices should be provided at least 30 days prior to their commencement.
- Relevant information within FPPs should be made available to affected parties in an effective and efficient manner.

FPP maps

- FPPs will include a map at an appropriate scale that effectively portrays the details of the planned forest practices to those conducting them.
- All boundaries relevant to an operation (e.g. tenure change, harvesting boundary, wildlife habitat clump) must be clearly shown on the FPP map, as well as being described precisely in the body of the FPP.
- Where a sensitive boundary is not obvious at the overall map scale, then an excerpt of the map at sufficient scale to illustrate that boundary should be used.

- When firebreaks, tracks or roads form the boundary of an operational area, they should be described and shown as lying within the FPP area to ensure any required maintenance arising from the forest practices is authorised by the FPP and is subject to compliance reporting.
- An example of an FPP map is shown in Appendix 7. Note that each FPP map will need to be tailored to cover the range of features relevant to the site and FPP.
- More detail on what FPP maps must contain, and how they should be prepared, is given in Appendix 7.

Lifetimes of FPPs

- The FPA has determined that FPPs will expire within a maximum period of time from their certification as follows:
  - five years for FPPs that authorise plantation or native forest clearfelling and reforestation (to ensure reforestation is done in a timely manner)
  - up to 10 years for plantation thinning and native forest partial harvest operations where it is expected there will be multiple operations in that period
  - up to 10 years for forest quarry FPPs.

Outcome

An FPP that contains clear operational prescriptions and appropriately scaled map(s) relevant to the forest practices to be carried out.

B. BUILDING ACCESS TO THE FOREST

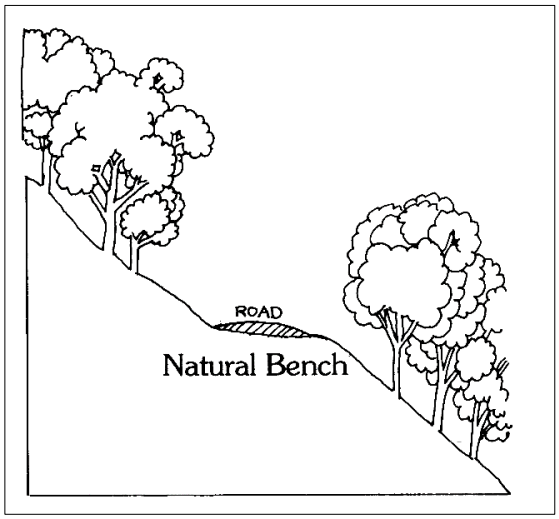
B1. Planning and locating new roads

General principles

- Ensure that road construction is appropriate for carrying the anticipated traffic.
- Fit the road to the topography so that the least alteration to the natural features is required. Use ridgetop roading where practicable. Midslope roads should be avoided as much as possible in steep country.
- Avoid locating roads in steep narrow valleys, swamps, landslide-prone or other unstable areas, very highly erodible soils, natural drainage channels, streamside reserves and locations containing significant natural and cultural values where road construction and use may have a detrimental effect.
- Identify unstable areas, and natural and cultural values by using local knowledge, this Code, consulting specialists and FPA planning tools.
- Limit the potential of roads to contribute to watercourse sedimentation and turbidity by minimising the number of watercourse crossings and providing adequate drainage.

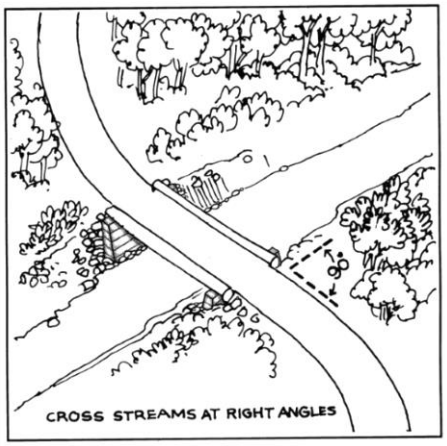
Operational approach

- Written approval from the Department of State Growth will be obtained for the construction of new road access or major upgrading of existing road access onto state highways before the forest practices plan (FPP) is certified.
- Local government will be consulted where construction of new or substantial upgrading of existing access onto municipal roads is required.
- New roads should be located to avoid unstable areas and locations where important natural and cultural values are known to be present.
- Roads will be located on natural benches (provided they are not back-slopes of old landslides), ridge tops and flatter slopes, wherever topography permits. Special measures are required if roads are to be built on very high erodibility class soils or on soils of high or very high erodibility prone to wind erosion.
- In plantations located on sand dunes near Strahan, *The Strahan guidelines* (7) should be taken into account where they are applicable.
- Roads will be located to avoid springs, caves, sinkholes, and stream sinks. Swamps will be avoided where practicable.
- Rocky or exposed knolls should be avoided, as they may be important for threatened species or threatened native vegetation communities or be visually sensitive.

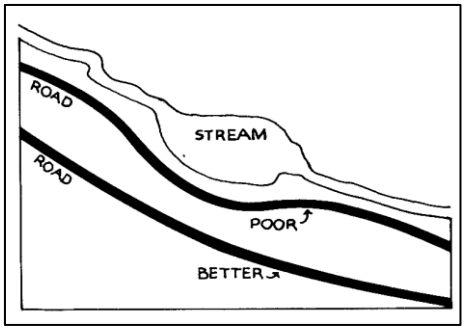


- New road construction should avoid known areas of *Phytophthora cinnamomi* (root-rot fungus).
- The FPA's *Flora Technical Note 8: Management of* Phytophthora cinnamomi *in production forest* (8) should be consulted where roading is planned through any area containing vegetation susceptible to *Phytophthora cinnamomi*.
- Where hygiene measures for *Phytophthora cinnamomi* have been incorporated into an FPP, and gravel to be used in constructing or maintaining roads is to be sourced from a quarry, the FPP should also specify that the quarry must be certified as being *Phytophthora cinnamomi*-free.

- Before coupe road location is finalised, consultation with stakeholders should occur to ensure that landing locations have been carefully considered, including reasonably level truck loading bays.
- Interference with natural drainage patterns will be minimised.
- Watercourse crossings should be at right angles to the watercourse



- New roads constructed parallel to a watercourse should be at least 100 m from a Class 1 or 2 watercourse and 40 m from all other watercourses (see Table 7 for definitions of different classes of watercourses).



Outcome

Well-located roads that are suited to the local topography and that result in minimal impact on soil, water quality, and other natural and cultural values.

B2. Road design

General principles

- Roads and tracks should be designed to withstand both the tonnage of wood to be extracted and the weather conditions anticipated.
- Consideration should be given to using formal road design techniques for unusual situations. A roading engineer, surveyor, or road locator may need to be consulted. Examples of such unusual situations are:
  - Class 1 and 2 roads where difficult terrain or heavy rock is encountered
  - environmentally sensitive sections of road where the extent of the earthworks must be controlled
  - difficult approaches to significant stream crossings, especially in steep terrain
  - roading in water supply catchments
  - midslope roading in steep country
  - road construction close to property boundaries.

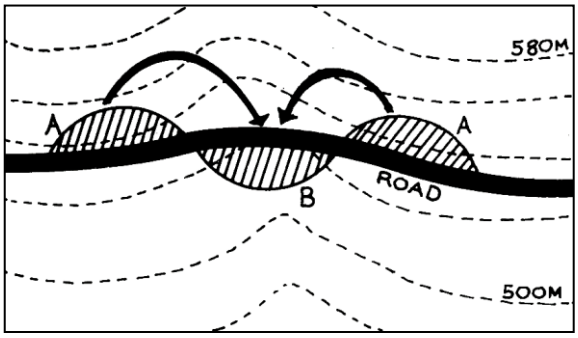
Operational approach

- Table 1 provides guidance for designing a road network.

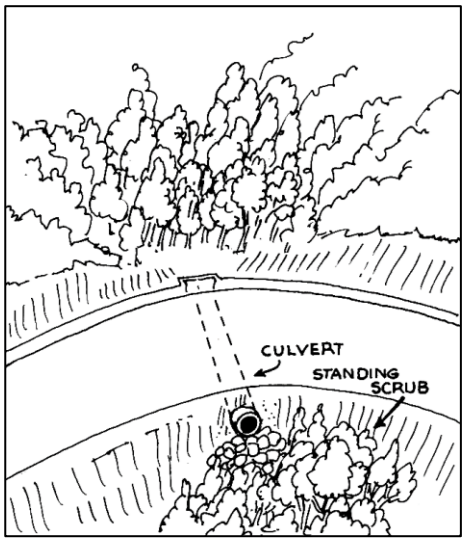
Table 1 A guide to road and access track design

	Class 1 Road	**Class 2 Road**	**Class 3 Road**	**Class 4 Road**	**Access Track**
Function	**Primary road in large network**	**Significant feeder road**	**Minor (spur) road**	**Minor (spur) road**	**Temporary track**
Pavement Type	Surfaced, all weather	Surfaced, all weather	Surfaced, all weather	All weather or unsurfaced	Dry weather cartage only, unsurfaced
Pavement Width	5.5–6.0 m	5.5 m	3.7–4.0 m	3.7 m	3.0–3.7 m
Shoulder Width	0.6–1.0 m	0.6 m	0.5 m –1.0 m	0.6 m	N/A
Desired Max. Gradients	+5%, –8%	+8%, –10%	+12%, –15%	+15%, –15%	+15%, –15%
Note: The above road design specifications are appropriate for tri-axle log trailers. Truck configurations such as B-doubles may require different specifications.					

- Roads will be fully drained with bridges, culverts, table drains, or other drainage structures as required.
- Cuts and fills should be balanced along the road, so that as much of the excavated material as is practicable can be deposited in the roadway fill sections.



- When construction of roads across unstable areas such as landslide zones is unavoidable, roads will be designed so that water is not directed onto landslides. Excess material should be removed to a stable area.
- Batter slopes will be designed to be stable, reducing the risk of massive slumping and surface erosion through rilling, and taking soil type into account.
- Management of batter slopes on very high erodibility class soils should take into account the FPA's *Earth Sciences Technical Note 1: A guide for operations on high and very high erodibility soils* (9).
- Drainage design should account for the likely increased water runoff after clearfelling, and may exceed the requirements in Table 2, especially in areas subject to high intensity rainfall (e.g. parts of eastern Tasmania).
- Culverts draining roads should be located so that discharge filters through vegetation or slash.



- The spacing of road drain outlets or culverts should be in accordance with Table 2.

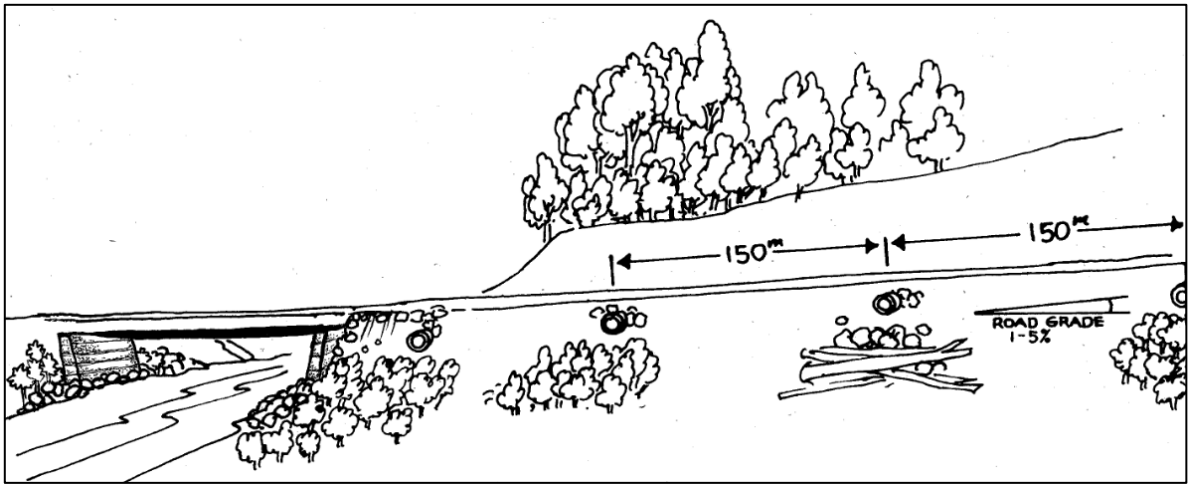


Table 2 Maximum spacing between table drain outlets or culverts for forest roads and access tracks

	Soil erodibility class[1]		
Road grade	**Low to moderate**	**Moderate – high to high**	**Very high**
1–5%	150 m	120 m	70 m
6–10%	120 m	90 m	40 m
11–15%	95 m	70 m	30 m
16–20%	50 m	35 m	30 m

Notes:

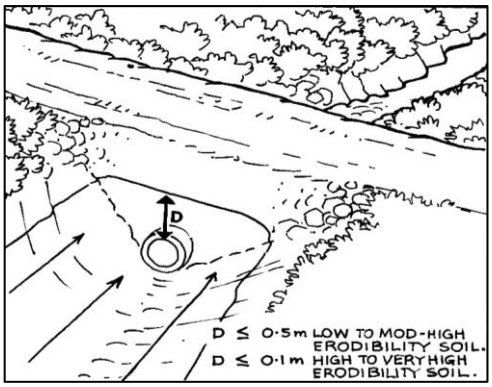
1. See Appendix 3 for soil erodibility classes.
2. Where large water flows are anticipated (e.g. after windrowing or site cultivation in plantation establishment) the above spacing should be reduced and/or the culvert size increased.
3. Culvert spacing on steep country midslope roads should be reduced to 75% of the distances given above.
4. Culvert location should not compromise potential landing sites where these are limited.

- The minimum diameter of culvert pipes will be 300 mm. The optimum size will depend on local knowledge of climate and conditions. Unless the installation is temporary or is otherwise specified in the FPP, the minimum diameter of culvert pipes should be increased to 375 mm in the following situations where the risk of culvert blockage or consequence of failure is high:
  - areas subject to high intensity rainfall (e.g. parts of eastern Tasmania)
  - areas with high or very high erodibility class soils
  - midslope roads in steep country.
- The *Rational* (10) or *RORB* (11) runoff routing methods may be useful for calculating the culvert size or opening required for watercourse crossings.
- Drainage structures for specific road classes will be designed for the flood recurrence intervals indicated in Table 3.

Table 3 Flood recurrence interval design requirements for different road classes

Road class	**Flood recurrence interval**
1	1-in-50 year
2	1-in-20 year
3, 4	1-in-10 year

- The top of the inlet to a drainage structure should not be submerged in peak flows by more than 0.5 m in low to moderate-to-high erodibility class soils or 0.1 m in high to very high erodibility class soils, unless specific measures are undertaken to minimise erosion where the water discharges at the downstream end.
- Drainage structures should be designed and installed to facilitate passage of aquatic fauna (see diagram in B6)**.**
- Culvert pipes should be of reinforced concrete or alternative material of sufficient strength to handle anticipated loads.



- In low to moderate erodibility class soils, up to three Class 4 watercourses close to one another can be serviced by a single culvert provided scouring of table drains, inlets and outlets is unlikely to occur.
- Authorisation from a professional engineer will be obtained if proposed construction methods vary substantially from this Code.

Steep country (slopes 20° and above)

- Single lane roads will be used where practicable to minimise the extent of the earthworks and visual impact.
- On majority slopes of 24° or above, roads will be designed in enough detail to enable an FPO to identify and approve the extent of the earthworks prior to construction. However, if an FPO has determined from field inspection that there will be no undue visual, road stability or environmental consequences, the road may be approved without full design.
- Stream culverts and drainage structures on all classes of roads will be designed to carry flows estimated for 1-in-50 year floods.

New access tracks

- Access tracks will be drained at intervals in accordance with Table 2 using spoon drains, or outsloped, or may be fully drained if future upgrading is intended (see B4).
- Where access tracks cross watercourses, consider gravelling the crossing and the track for 20 m either side of the crossing.
- In the last 20 m before any watercourse crossing, water will be drained off access tracks into sediment traps or vegetation by use of outsloping or trafficable spoon drains except in the following cases:
  - Access tracks not required for carting may cross watercourses at natural crossing points without the use of drainage structures provided disturbance to the watercourse beds and banks is minimised. The number of these crossings will be kept to the absolute minimum required for access.
  - Access tracks within coupes and across previously cleared ground (e.g. paddocks) can be used for carting, provided such tracks are effectively drained during use and are used for dry weather carting only. They will be restored with spoon drains and/or outsloped if required for ongoing, temporary access during the lifetime of the FPP. These tracks will be restored or revegetated on completion of the operation if no longer required, using the same standards as required for extraction tracks (see C6.1.2).

Outcome

Well-designed roads and access tracks that are appropriate for their intended use, and that incorporate bridges, culverts, table drains or other drainage structures as required.

B3. Road construction

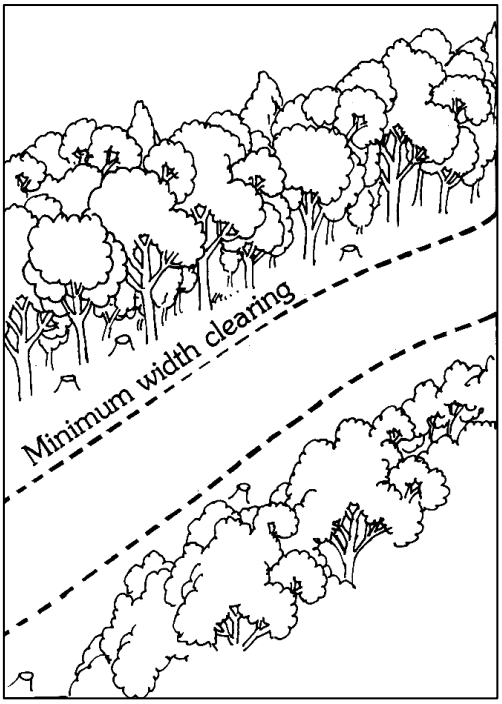
General principles

- Minimise soil exposure to lessen the potential for erosion.
- Plan for dry season construction.
- Allow for the proper consolidation of roads before carting, particularly roads to be used for wet weather carting.
- Carefully consider the use of appropriate equipment, make sure operators know what is required, and ensure proper supervision.

B3.1 Clearing and formation

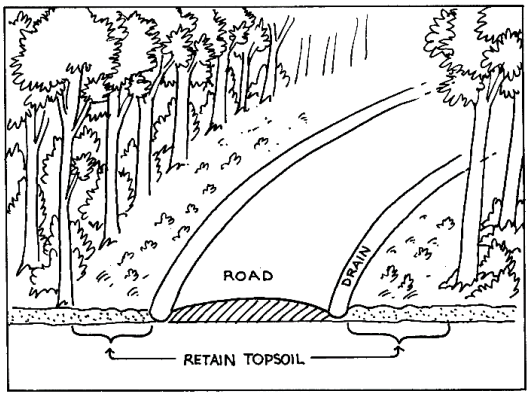
Operational approach

- Road lines should be harvested during or before road construction, and timber salvaged during, or soon after, construction. All trees pushed or felled should be left so that the timber can be recovered in a safe manner.
- Road clearing will be of minimum width to reduce the extent of soil disturbance, particularly within streamside reserves, but enough trees should be removed to allow the road to dry and provide adequate line of sight.

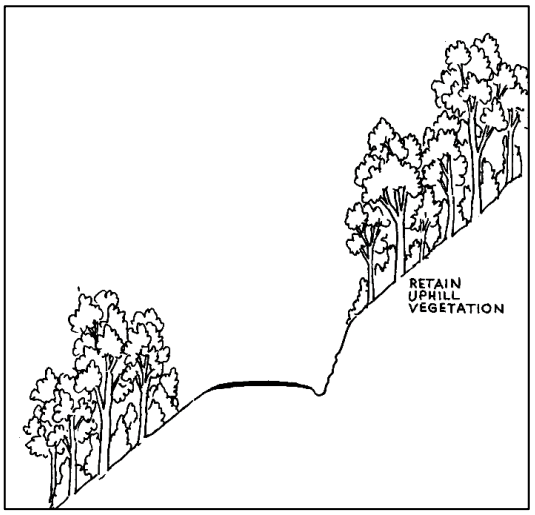


- Where a road passes through a streamside reserve, clearing of vegetation should be minimised and trees felled parallel to the road and away from the watercourse wherever possible.
- Hazardous trees which are likely to fall onto the road surface should be removed during construction. Where a hazardous tree is located in a reserve, prior approval from an FPO will be obtained before it is removed.

- Stripping of topsoil outside road construction limits will be minimised.
- Stripped topsoil should be used immediately or stockpiled in suitable accessible locations for future use on batter slopes, borrow pits, quarries and landings associated with the road.
- Material stripped from the road alignment will be disposed of, or stockpiled, in such a way that drainage is not impeded.
- Structural fill should not be placed over loose soil or timber debris.



- Surplus fill will be carted out of streamside reserves and Class 4 stream machinery exclusion zones.
- Fill will be placed so that it does not enter streams, or sinkholes in karst areas.
- Cording may be used to spread loads on wet ground.
- Where road construction through landslide-prone areas cannot be avoided, vegetation should be retained permanently for some distance upslope, in accordance with specialist advice.
- Where roads are constructed through areas containing myrtle *(Nothofagus cunninghamii)*, myrtle wilt disease is a risk. Machine and felling damage to the adjacent myrtle stands and heaping of debris into the undisturbed myrtle area should be avoided. Where practicable, live myrtle trees inadvertently damaged during construction should be removed. Measures should be implemented to avoid the spread of other diseases and weeds, as detailed in E3.
- Benching of cut batters should be considered to reduce the amount of debris falling onto the road or to improve visibility.



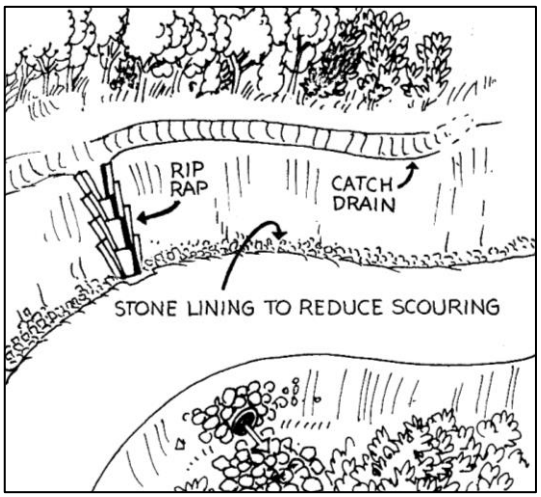
- Road clearing, road formation and management of cut batters should take into account the FPA's *Earth Sciences Technical Note 1: A guide for operations on high and very high erodibility soils* (9).
- If severe batter erosion is likely to occur or has occurred, batters will be treated by soil stabilising methods (e.g. respreading of topsoil, revegetating or spraying with emulsions).
- Road clearing and formation on sands in plantations near Strahan should take into account *The Strahan guidelines* (7) where they are applicable.

B3.2 Drainage of roads and access tracks

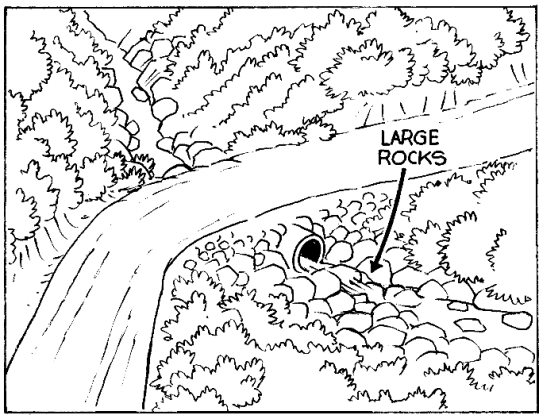
Operational approach

- In all phases of construction, adequate drainage will be provided to achieve a stable road structure. Wherever practicable, permanent drainage should be installed before other construction to keep the works as dry as possible. Temporary drainage will be provided if there is likely to be a significant delay in installing permanent drainage.
- Drainage will not be directed into sinkholes, and vegetation will be retained on the margins of sinkholes.

- On high and very high erodibility class soils, drains may require special treatment such as lining with stones, concrete, grass etc. to reduce scouring.
- Where unacceptable erosion of a road cutting face is likely, catch drains should be constructed along the top sides of the cuttings to collect surface run-off. Such drains should be gently graded and/or protected against scouring particularly in more erodible soils.

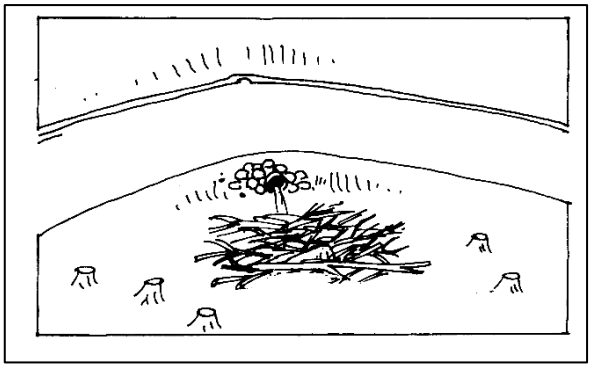


- Table drains should be constructed to a minimum depth of 300 mm below the level of the top of the formation at the outer edge of the shoulder.
- Adequate provision will be made at road culvert inlets (e.g. rock-lined or concrete sumps) and outlets (e.g. energy dissipaters) to minimise erosion caused by flow entering or discharging from the drain.
- Culvert outlets on watercourses should be protected by energy dissipaters such as large rocks where natural watercourse beds downstream do not provide sufficient protection against bed scour or erosion. Care should be taken to ensure that dissipaters do not cause or increase bank or bed erosion, or inhibit fish passage.
- Culverts should not discharge water onto landslides.

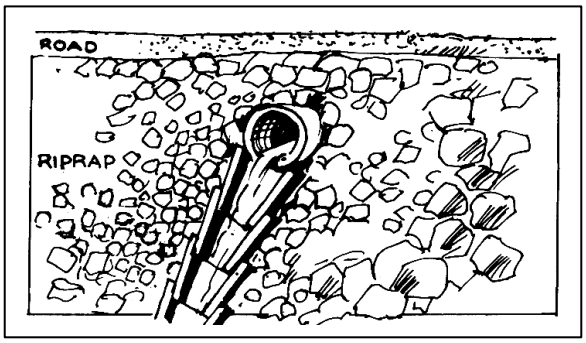


- Adequate provision of sumps or sediment traps will be made to prevent blocking of culverts in high and very high erodibility class soils.
- Culvert pipes should be laid on a grade of between ½° and 2° to minimise silting up of the pipes and excessive scouring at their outlets.
- The minimum cover of fill and/or surfacing material over culvert pipes should be 600 mm unless recommended otherwise in manufacturers' guidelines.

- Sediment traps such as logs or rocks will be used in drains if high flows of water are expected on high and very high erodibility class soils, and should be considered in other sensitive sites or in areas to be windrowed or cultivated.



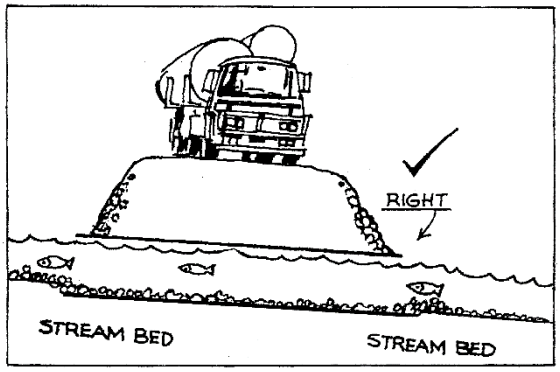
- Culverts will not discharge over fills without adequate protection to prevent erosion of the fill.

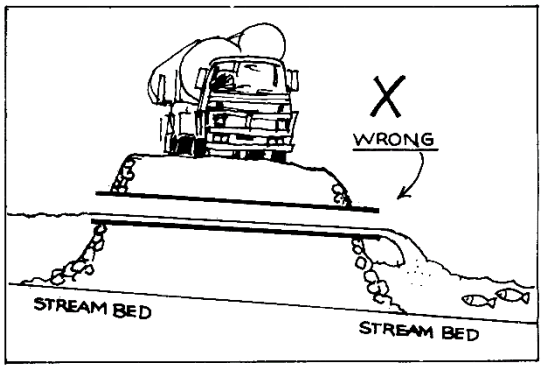


B3.3 Crossings of watercourses

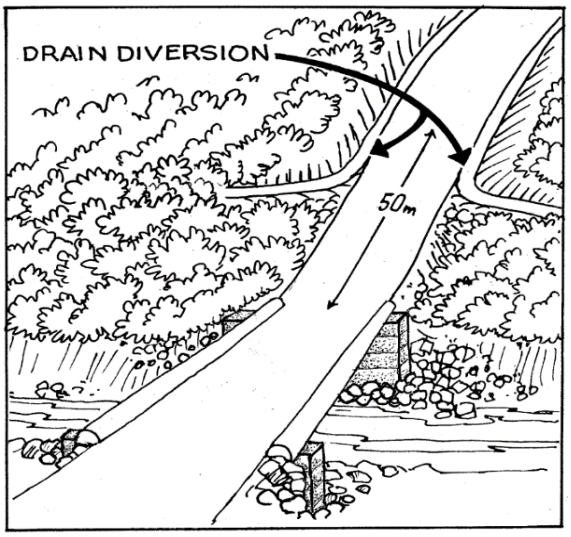
Operational approach

- New watercourse crossings will be designed and maintained to minimise disturbance to the passage of fish and other aquatic fauna. Consider replacing existing crossings which may be causing fragmentation of aquatic habitats. Specialist advice should be sought where required.
- Machinery activity in watercourses will be minimised at all times.
- Special prescriptions relating to culvert placement and design may be required for watercourses containing threatened aquatic species.
- Where possible, culvert pipes will be set at or marginally below the level of the natural watercourse bed to facilitate passage of aquatic fauna.

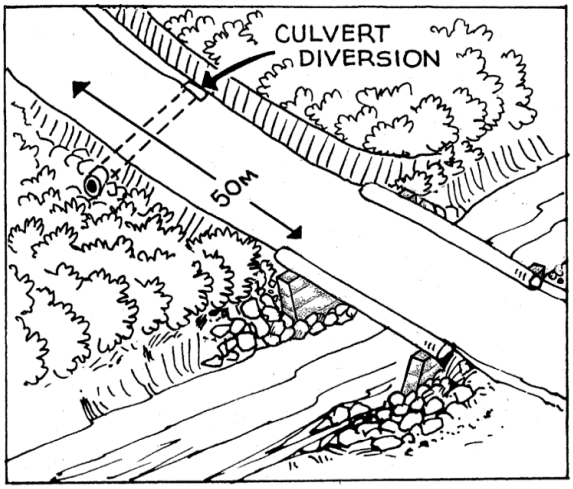




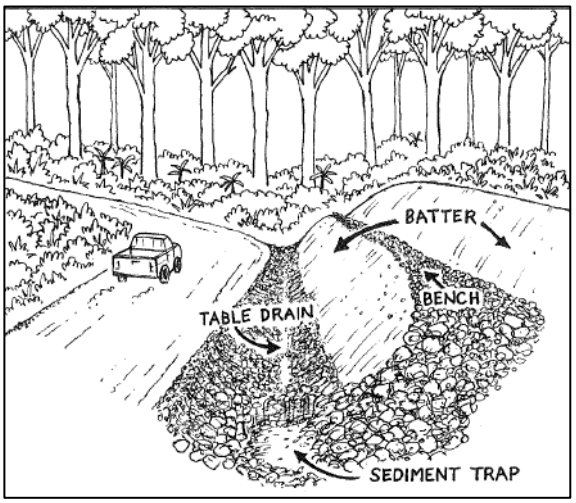
- During the last 50 m before a road crosses a watercourse:
  - where practicable, runoff flowing toward the watercourse will be diverted from table drains directly into the surrounding vegetation



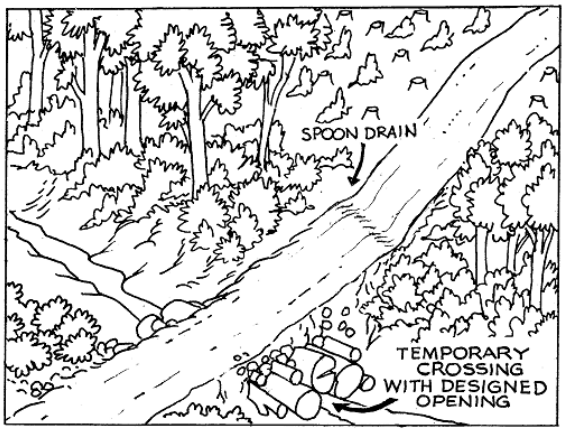
  - where the above measure is not practicable, installation of a culvert will be considered for Class 4 watercourses and will be undertaken for Class 1, 2 and 3 watercourses (including surface karst channels that may usually be dry)
  - either method for diversion of runoff should be applied as close as possible to the watercourse, while maintaining an effective filter strip (one which ideally allows a minimum of 30 m of dispersal of runoff over vegetated ground before entering the watercourse)



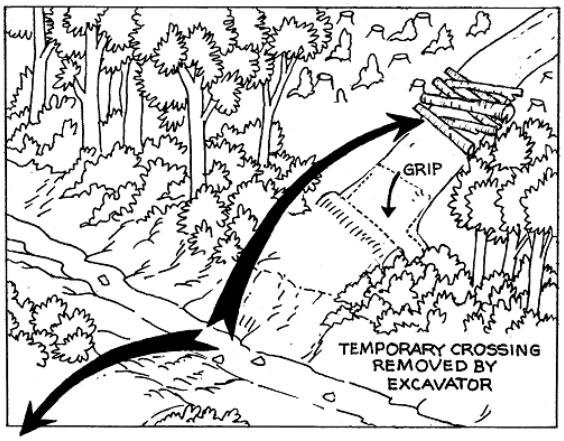
  - construction of sediment traps and rock lining in table drains should be considered where large silt input to watercourses would otherwise occur from table drain, batter or upslope erosion.



- Watercourse crossings will be constructed with minimum disturbance to banks and existing channels. Temporary crossings over Class 3 and 4 and dry Class 2 watercourses will provide a designed opening for water passage (e.g. log culvert, see diagram), unless they are being constructed solely to provide access by machines during road construction.



- Temporary watercourse crossings will be either:
  - removed with minimal disturbance to the watercourse prior to the expiry of the relevant FPP, and resulting road or track ends water barred to divert the road or track drainage into surrounding vegetation or,
  - upgraded to the standard for Class 3 or 4 road permanent watercourse crossings. Any potential erosion points will be stabilised.



B3.4 Road surfacing

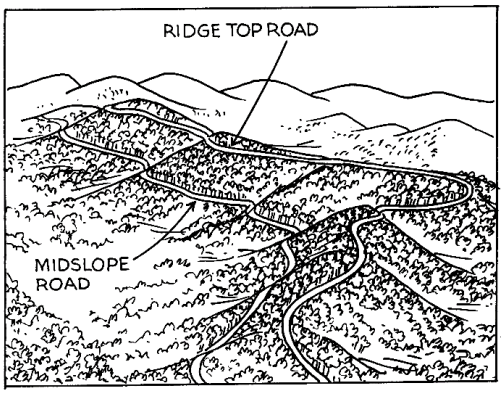
Operational approach

- The road pavement for all-weather permanent roads should be constructed with suitable material to produce a hard wearing and stable surface (preferably consisting of a mixture of evenly graded stone down to and including clay to bind it together).
- The thickness of the pavement required depends on the load-bearing characteristics of the formation, the quality of the pavement material, the traffic load and density. As a guide, the following minimum thicknesses are suggested:
  - Class 1 and 2 roads: 300 mm consolidated
  - Class 3 and 4 roads: 150 mm consolidated.

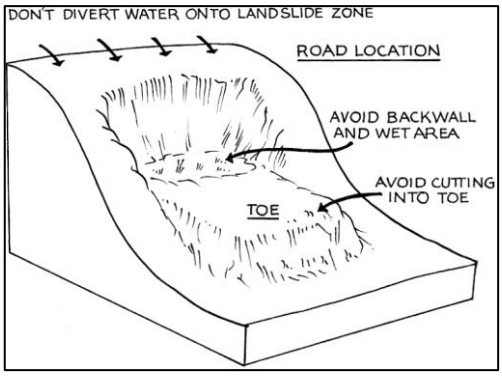
B3.5 Additional provisions for roading in steep country (slopes 20° and above)

Operational approach

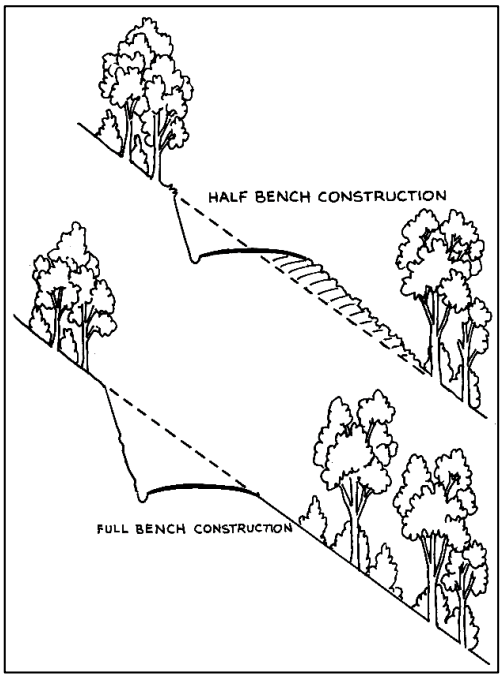
- Generally, cartage routes should use ridgetop roads, and the extent of the midslope roading network will be minimised. Plant communities with a priority for conservation and visual skylines will be avoided where possible (see D5.1).



- Care will be taken to avoid existing or potential landslide zones. Field evidence of such zones includes landforms with hummocky or irregular shapes (often associated with basalt talus), mounds and hollows of older landslide scars, tree stem deformation, vegetation types, soaks or springs and recent ground movements. Soil and geological contexts also need to be considered, particularly for the rock types given in Table 6. Consult with a soils or geotechnical specialist if in doubt.



- To reduce the risk of culvert blockages on midslope roads:
  - the minimum culvert diameter will be 375 mm
  - the maximum spacing between table drain outlets and culverts should be reduced to 75% of those specified in Table 2.
- On majority slopes of 31° or above, the type of construction will ensure the stability of the road structure and continued trafficability of the road (e.g. full benches).



- Surplus fill which would otherwise have entered a streamside reserve or a Class 4 machinery exclusion zone will be disposed of by end hauling, or otherwise contained.
- Upslope batters should be cut at the steepest possible angle, while minimising the risk of slumping, to reduce the volume of material to be excavated and the visual impact. Soil and ground cover should be maintained on top of the cut batter.
- During the construction and commissioning phase, a berm of fill material, sufficient to compensate for the settlement of material which has been side cast, should be retained on the outside fill shoulder. Ensure adequate draining through the berm.
- Tension cracks appearing in road shoulders should be sealed without delay with clay or unsorted fill to prevent slumping caused by the ingress of water into the fill. Geotechnical advice should be sought when large extension cracks occur, or when cracking occurs repeatedly.
- Where excessive scour is likely to occur, fill slopes on the discharge end of culverts will be protected (e.g. with armouring, rip rap, geotextile, steel or concrete drains). Refer to the diagrams in B3.2.
- Spoon drains should be constructed across roads no longer used for regular access in accordance with the spacings given in Table 2.
- If cable harvesting to a road, protect the road from excessive shoulder damage and keep table drains and culverts clear at all times so as not to concentrate water flows.
- Where culvert pipes are laid on fill, special consideration will be given to accommodating the anticipated movement of the pipes (e.g. by using rubber ring jointed pipes or external bands).

Outcome

Stable, well-drained, fit-for-purpose roads that will have minimum impact on soil, water and other natural and cultural values.

B4. Upgrading or rehabilitation and closure of existing roads and access tracks

General principles

- Substantial upgrading of existing roads and access tracks will be authorised by an FPP, and refers to road works that involve any of the following:
  - general earthworks, including new sidecuts
  - upgrading to a road class that involves the installation of drainage structures
  - any works with a high potential for environmental harm due to their location.
- Maintenance or minor upgrading may be done without an FPP and refers to works that only involve:
  - re-shaping or grading of the road surface
  - re-gravelling or patch gravelling
  - repair or replacement of culverts and crossings
  - localised activities such as the re-alignment of a corner or the installation of a culvert
  - clearing of batters and drains.

Operational approach

- Substantial upgrading of roads is regarded as road construction for the purposes of this Code, and the approach detailed in B3 should be followed.
- Existing roads and access tracks that do not meet current Code specifications, and that are causing or likely to cause adverse effects on soil and water values, should be upgraded or closed and rehabilitated. Adverse effects include one or all of the following:
  - a long-term increase in visible turbidity of water flowing in a watercourse alongside or downstream of a road or track, compared to water quality upstream of the road or track
  - blockage of watercourse channels
  - mass slumping or deposition of material into the watercourse
  - significant active erosion of table drains and/or the road surface, or associated earthworks such as batter slopes.
- Consider replacing structures which impede the passage of aquatic fauna with more appropriately designed structures.
- Roads not intended for future use will be outsloped, gripped, or otherwise left in a condition to minimise erosion, with functioning drains and a barrier to vehicular traffic. In some situations, it may be desirable to recover existing gravel pavements and rehabilitate the road by ripping and sowing a suitable native species seed mix.

Outcome

Effective upgrading or rehabilitation and closure of existing roads and access tracks that are causing, or likely to cause, adverse effects on natural and cultural values, in particular soil and water values.

B5. Quarries and borrow pits

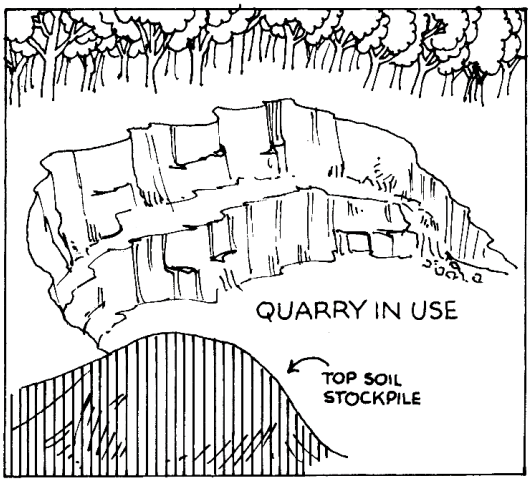
General principles

- Quarries and borrow pits may both be used to provide material for forest roads.
- Borrow pits are small areas along road construction alignments where earth/gravel may be taken for use in a specific project, such as road construction or maintenance. No rock crushing is permitted.
- Quarries are areas of land where earth and/or gravel is extracted for use on roads on an ongoing basis. Extraction, crushing, and screening of material is permitted in quarries.

- Management of quarries for forest roading should be consistent with the *Quarry Code of Practice 2017* (12).
- The number of quarries and borrow pits opened will be minimised.
- Weeds must be controlled such that forest quarries do not become a source of weed propagules to surrounding areas.

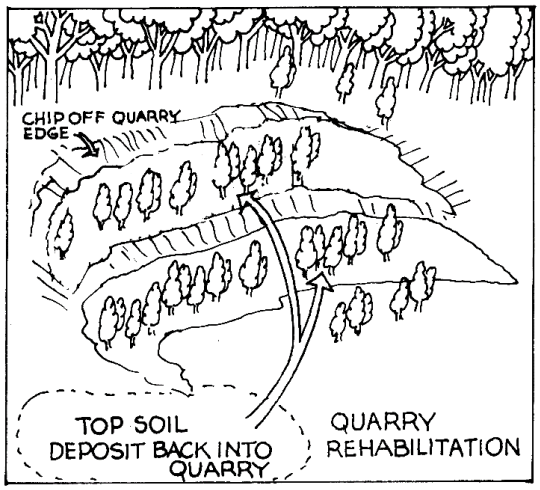
Operational approach

- Borrow pits operated in connection with the establishment of forests, the harvesting of timber, or the clearing of trees will be authorised in a non-quarry FPP. They will be located within the boundary of the FPP for which the material is required, and closed and rehabilitated within the lifetime of that FPP.
- Quarries that are exclusively for the sourcing of materials used in connection with the establishment of forests, the harvesting of timber, or the clearing of trees will be authorised by a quarry FPP. This quarry FPP will remain in place until the extraction has ceased, and the quarry has been rehabilitated.
- In addition to, or instead of, a quarry FPP, other approval(s) may be required:
  - A mining lease from Mineral Resources Tasmania (MRT) may be required where extracted material is not contained on the landowner's property or material is sold to outside parties as a commercial venture
  - An Environment Protection Notice from the Environmental Protection Authority (EPA) and a permit from local government may be required if a quarry exceeds the annual production limits of 5000 m^3 quarried or 1000 m^3 crushed/screened per annum
  - Local government approval may also be required on private land if no PTR is in place.
- Planners should seek advice from MRT or the EPA regarding the required approvals for their particular circumstance.
- The CFPO will be consulted before quarries are opened in areas underlain by bedrock types potentially containing karst features, such as Ordovician limestone, Precambrian dolomite and magnesite, Permian limestone and Tertiary limestone or calcarenite.
- Quarries or borrow pits authorised by an FPP will not be established within 40 m of any watercourse.
- When work on any quarry or borrow pit commences:
  - the area of disturbance and vegetation clearance will be kept to the minimum necessary (accepting that trees adjoining the site may need to be removed for safety reasons)
  - surface material (topsoil and organic debris) will be stockpiled, uncompacted, for use in the final rehabilitation of the site.



- Quarry FPPs will contain prescriptions to prevent the spread of declared weeds on soil, vehicles, machinery and product that are consistent with the *Weed Management Act 1999*.
- Hard rock quarries are less likely to have *Phytophthora cinnamomi* than weathered rock quarries, but may still be infected if the conditions are suitable and host species are present. To reduce the risk of contamination by mixing topsoil with quarry material, the surface material should be stockpiled on a dry elevated site. Runoff from this stockpile will be directed away from the quarry.
- To minimise the risk of spreading *Phytophthora cinnamomi* through mud and water, the quarry floor should be kept as dry as possible. If runoff from upslope is possible, cut-off drains will be installed to prevent runoff entering the quarry.

- All runoff from working areas should be collected in settling ponds before being discharged from the quarry's operational area. Water from washing, screening, or dust-reduction plants should be treated in the same way.
- Outlet drainage from settling ponds will not be discharged directly into any watercourse. The use of vegetated filter strips is recommended.
- Sediment traps and drains will be maintained to ensure their continuing effectiveness.
- Quarries and borrow pits will be rehabilitated after use, or progressively as sections are no longer required. This will be carried out as soon as possible using techniques such as grading slopes, ripping, respreading stripped surface material and revegetating with suitable species to prevent invasion by weeds.
- The approach to rehabilitation will consider whether the quarry is suitable for other activities in future (e.g. apiary sites, emergency meeting points, helicopter landing pads).



Outcome

Quarries and borrow pits that are located and operated to optimise the use of the material extracted, while minimising impact on soil, water quality, and other natural and cultural values.

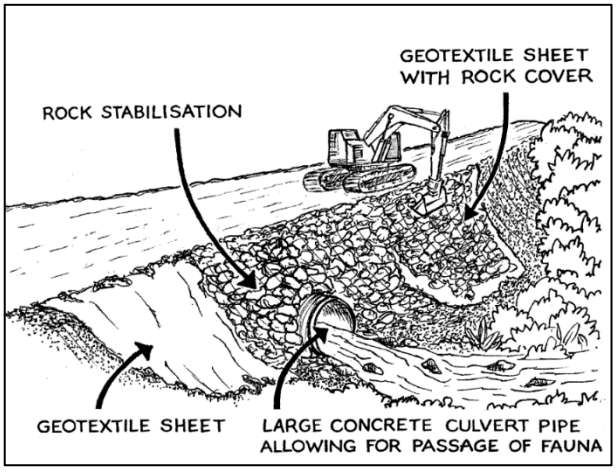
B6. Bridge, causeway and ford construction

General principle

- Bridges, causeways, fords and culverted crossings containing large amounts of fill should be constructed to withstand expected vehicular loads while minimising the impact on natural and cultural values.

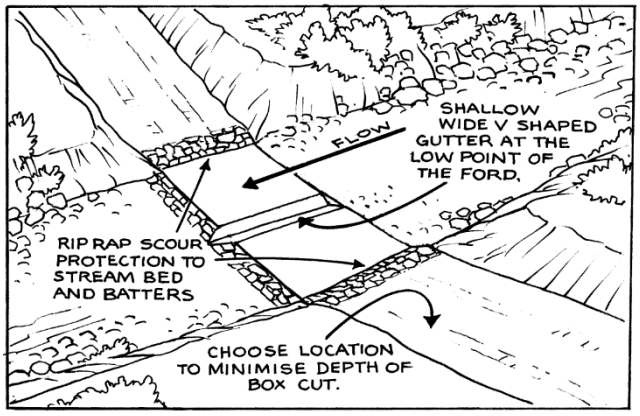
Operational approach

- Crossings over watercourses in town or domestic water catchments should be built from permanent materials (e.g. use cement platforms and culverts for bridges and large box methods or cement pipes rather than logs for culverts).
- Protect loose spoil with geotextiles and/or stabilise with rocks.
- Ensure that bridge, causeway and ford construction allows for passage of fish and aquatic fauna.
- Permanent bridges on Class 1 or 2 watercourses should be designed to withstand the 1-in-50 year flood level. For substantial bridges, engineering advice should be sought.

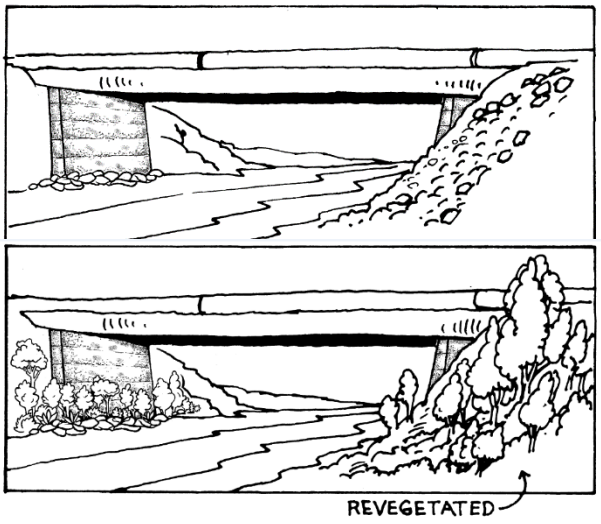


- Earth covered bridges over any watercourse should be constructed so that the opening is not submerged by the 1-in-20 year flood level.

- Causeways, fords and culverted crossings constructed with large amounts of fill will be located and constructed in a way that minimises disturbance to the streambanks, bed and natural flows:
  - avoid deep box cuts on the approaches
  - protect the road surface from scour by using materials such as concrete or flexmat
  - use geotextiles to stabilise fill
  - site the crossing on a stable substrate with either sheet stone or a scour resistant material immediately downstream.



- Causeways and fords will be designed and maintained to minimise disturbance to the passage of fish and other aquatic fauna. Specialist advice should be sought.
- Plan construction activities in watercourses to coincide with low water flows, unless advice indicates this may have unacceptable adverse effects on freshwater flora and fauna, especially threatened aquatic species, in sensitive localities.
- Construction and other equipment will operate in a manner that will cause the least disturbance to the watercourse bed and banks:
  - machinery will be kept out of the channel as much as possible, and points of entry will be located to minimise bank disturbance
  - fill will not be pushed into watercourses
  - surplus fill will be carted out of streamside reserves and Class 4 Machinery Exclusion Zones to locations where erosion of the fill will not result in adverse environmental impacts (see B3.1)
  - construction materials (e.g. concrete) will not be dumped into watercourses
  - care will be taken to avoid spillages.
- Watercourse beds around causeways, fords and bridge abutments should be stabilised (e.g. by armouring the bed with large rocks).
- Streambanks and bridge embankments will be protected to minimise erosion. Suitable materials for use include concrete, rock facing, timber, logs, vegetation or rip rap, in combination with geotextile where appropriate to prevent rilling and runoff of fine sediment.
- Wooden bridges and components will be secured properly where they are likely to be subjected to high water flows. Bridge abutments should be placed above flood level, or where this is not feasible, placed so that flow and channel characteristics are not significantly affected.



Outcome

Bridges, causeways and fords that contribute to an efficient transport network while minimising adverse impacts on soil, water quality, and other natural and cultural values.

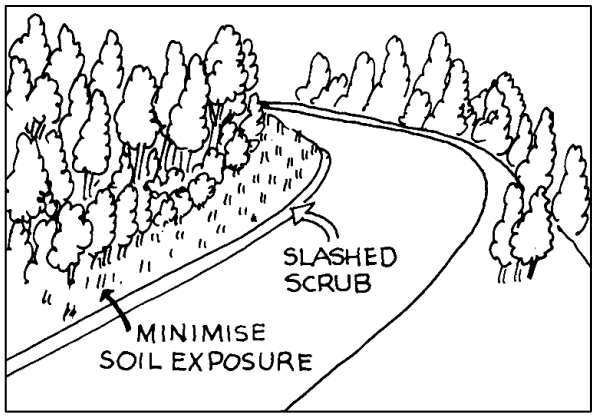
B7. Road maintenance

General principle

- Regular maintenance of roads is essential to ensure stable running surfaces and functional drainage systems. This is important to minimise sediment input to watercourses from roads.
- Road owners should have in place a system that ensures regular monitoring and maintenance of roads.

Operational approach

- Prior to expiry of the FPP, actions will be taken to prevent severe erosion or failure of roads, particularly in steep country, after heavy rains, or in town water or domestic water catchments. Such actions may include:
  - restoration of the road formation or construction of grips to prevent erosion
  - clearance of table drains and culverts
  - replacement of drainage structures before failure
  - protection at culvert outlets to prevent scouring
  - filling of settlement cracks.
- Sediment traps and sumps should be regularly inspected and maintained by clearing accumulated sediment, particularly in the first five years after construction.
- Control roadside vegetation only to the extent necessary to keep the road surface dry, to permit good visibility, and for weed and fire control purposes. Soil exposure on road verges should be kept to a minimum.
- On completion of harvesting, roads which are to be retained for fire control, forest management, etc., will be left with functioning drains and culverts to ensure long-term erosion is minimised.



- Drainage and crossing structures, particularly wooden structures, should be monitored and maintained on a regular and systematic basis. They should be replaced or removed prior to collapsing so as not to impede water flows.
- Where bridges or permanent crossings have been removed or collapsed, riparian areas will be stabilised using native vegetation for a minimum distance of 10 m from the watercourse.

Outcome

Running surfaces that are kept stable and drainage systems that are kept functional on roads being used for forest practices.

C. HARVESTING OF TIMBER

C1. Harvesting systems

General principles

- Harvesting and reforestation regimes appropriate to the specific forest type and site should be applied to ensure prompt re-stocking and the maintenance of local gene pools in native forest.
- Harvesting systems should be designed to complement planned reforestation methods.
- Harvesting should be dispersed across space and time to reduce localised impacts on natural and cultural values.
- Three-year plans prepared under section 27 of the Act are subject to consideration by the FPA, who may request that they be varied if the FPA is of the opinion that more effective use of routes for the transportation of timber could be achieved or that the plans indicate an excessive concentration of harvesting in a particular location (section 28 of the Act).
- Particular care will be taken to avoid sedimentation or other hydrological disturbance in town or domestic water supply catchments, or other catchments containing sensitive aquatic sites (see D2.2).
- The risk of accidental infection of vegetation that is susceptible to *Phytophthora cinnamomi* (root-rot fungus), such as swamps, heaths, sedgelands, dry lowland forest on sandy or poorly drained sites, and low altitude rainforest on infertile sites, should be reduced by implementing hygiene measures during harvesting. Sources of information include the *Tasmanian washdown guidelines for weed and disease control* (13) and the FPA's *Flora Technical Note 8: Management of* Phytophthora cinnamomi *in production forest* (8).
- Tree ferns (*Dicksonia antarctica*) may be harvested in certain situations. Persons harvesting and/or trading in tree ferns must comply with the requirements of sections 18A and 18B of the Act, section 4(f) of the Regulations, and the *Treefern management plan for the sustainable harvesting, transporting or trading of Dicksonia antarctica in Tasmania 2017* (14), as amended from time to time.

Operational approach

- The factors listed below will be considered prior to commencing forest practices. The relevant management prescriptions will be detailed in the FPP.
  - Management objectives, for example:
    - even-aged native forest
    - uneven-aged native forest
    - plantation
    - conversion to non-forest use
    - quarry rehabilitation
    - revegetation of degraded sites.
  - Nature of the existing forest, for example:
    - dominant forest community
    - main understorey species.
  - Site factors, for example:
    - altitude, exposure
    - slope
    - potential for invasion by grass and/or weeds
    - dryness, rainfall
    - soil type, erodibility, depth
    - drainage
    - natural and cultural values.
  - Felling prescriptions, for example:
    - intensity (e.g. clearfell, shelterwood, group selection)
    - distribution of remaining trees (e.g. number of seed trees/ha to be retained)

- selection criteria (e.g. number of trees below 50 cm DBHOB to be felled)
- methods to minimise damage to retained trees
- harvesting boundaries.

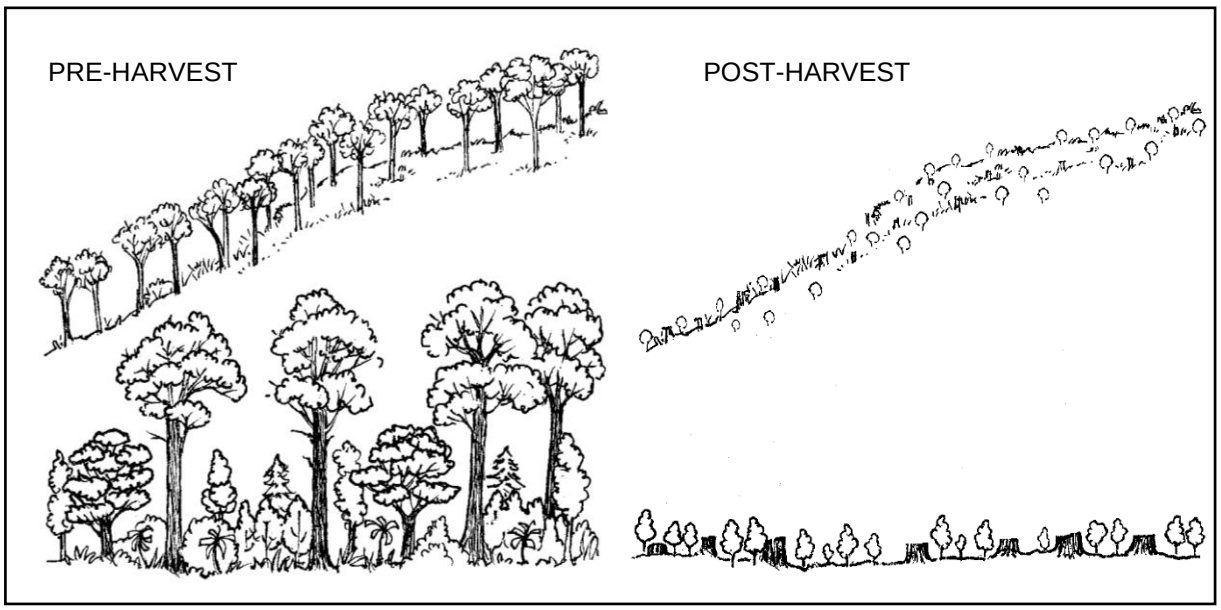
- In most situations the number of extraction tracks and landings used for timber extraction should be kept to a minimum, to limit the area of potential soil degradation.
- For steep country harvesting design considerations see C9.
- Harvesting boundaries will be marked before felling commences except in the following circumstances:
  - they are clearly delineated by a change in vegetation, such as a forest/pasture boundary or road, or
  - an operator's location and the boundary can be clearly identified in real time on a georeferenced map.
- The person or organisation responsible for the marking or preparation of a georeferenced map of boundaries will be stated in the FPP.
- Boundary marking will be consistent with A3.2.

C1.1 Native forest silvicultural treatments

- Harvesting techniques, regeneration of the forest, and assessment of regeneration (see E1.5) should be considered at the planning stage, and prescriptions included in the FPP.
- Silvicultural treatments should be chosen to suit the forest type being managed.
- For steep country harvesting design considerations see C9.
- For stocking standards and other requirements regarding regeneration see E1.5.
- The most common native forest silvicultural treatments, and the types of forest for which they are most suitable, are described and illustrated below. Other silvicultural treatments may be appropriate in particular circumstances.

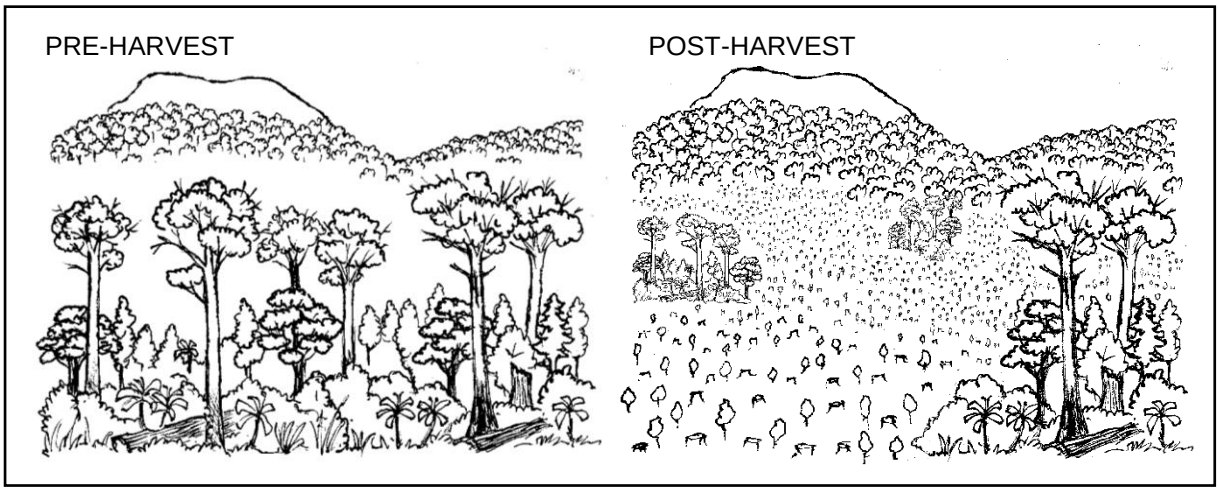
Clearfelling

- Suitable for wet eucalypt forests with a dense understorey, thick ground cover or litter layer, and dry forests on steep slopes harvested by cable or winch-assisted systems.
- Most or all stems in the harvest area are felled.
- A receptive seedbed is prepared by burning or mechanical disturbance. Seed is sown aerially.



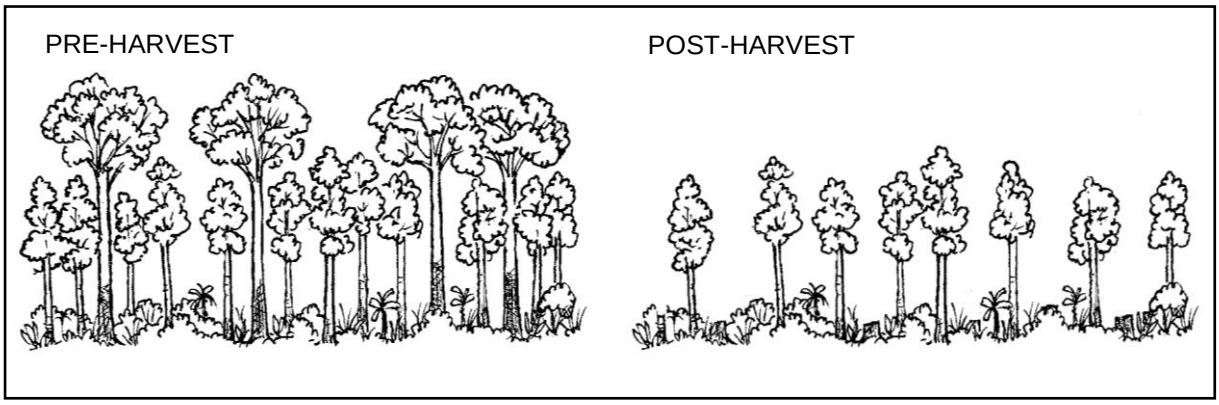
Aggregated retention

- Suitable for wet eucalypt forests, particularly those with >25% old-growth forest, and/or rich in specialty timbers.
- Harvested using ground-based operations.
- Aggregated retention may be preferred over clearfelling for stands with particular environmental or community significance.
- Clumps of forest are retained undisturbed along the edge of the harvest area or within it, sufficiently close to retained forest to facilitate recolonisation. All other stems are felled.
- A receptive seedbed is prepared by moderate intensity burning. Seed is aerially sown if the natural seed crop is insufficient.



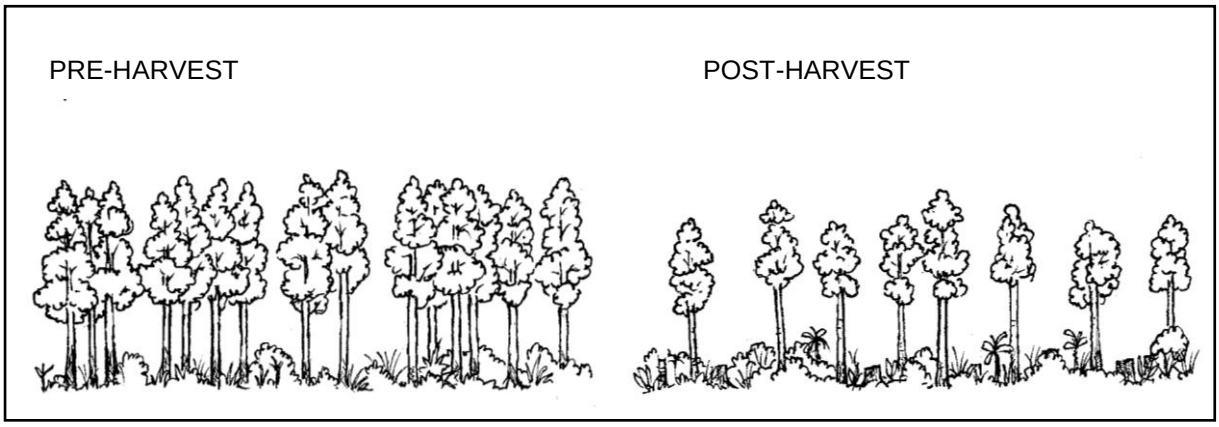
Potential sawlog retention

- Suitable for two-aged high-quality forests comprising small poles of good form (potential sawlogs) and a mature overstorey.
- All mature trees should be harvested and the potential sawlogs retained at 9–12 m^2/ha basal area.
- Disturbance from harvesting or low-intensity regeneration burning is used to provide a seedbed.
- If basal area is kept at or above 12 m^2/ha, no additional regeneration techniques are required.



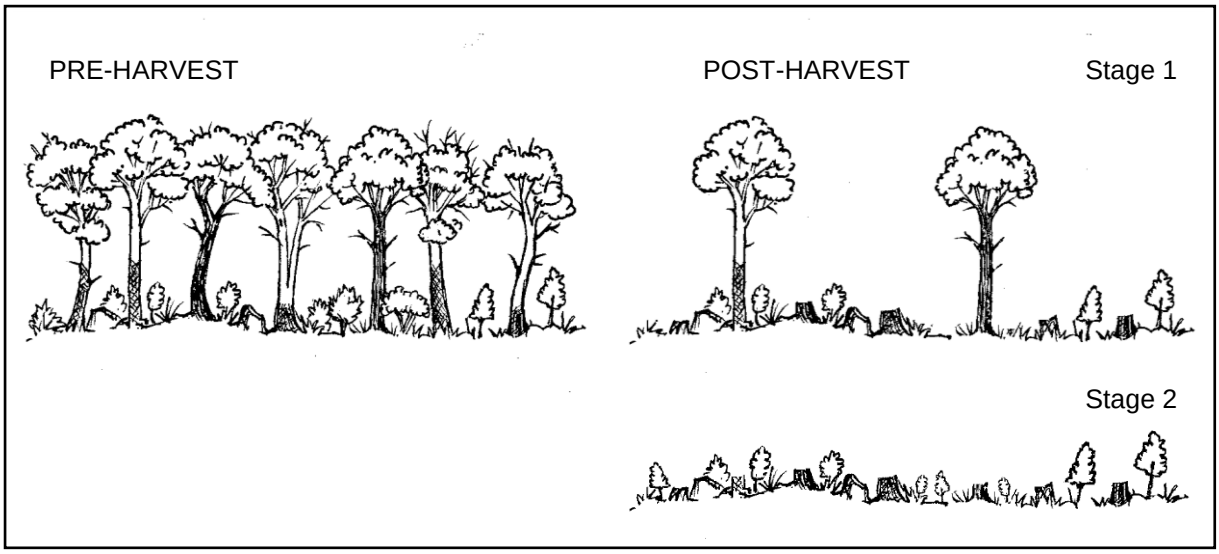
Thinning

- Suitable for well-stocked, even-aged regrowth on sites with good growth potential, with a pre-harvest stand basal area of at least 32 m^2/ha.
- Trees to be retained are chosen on the basis of form, size and spacing.
- Retained stand basal area should be about 16 m^2/ha.
- No additional regeneration treatment should be required, as the stand should be maintained in a stocked condition.



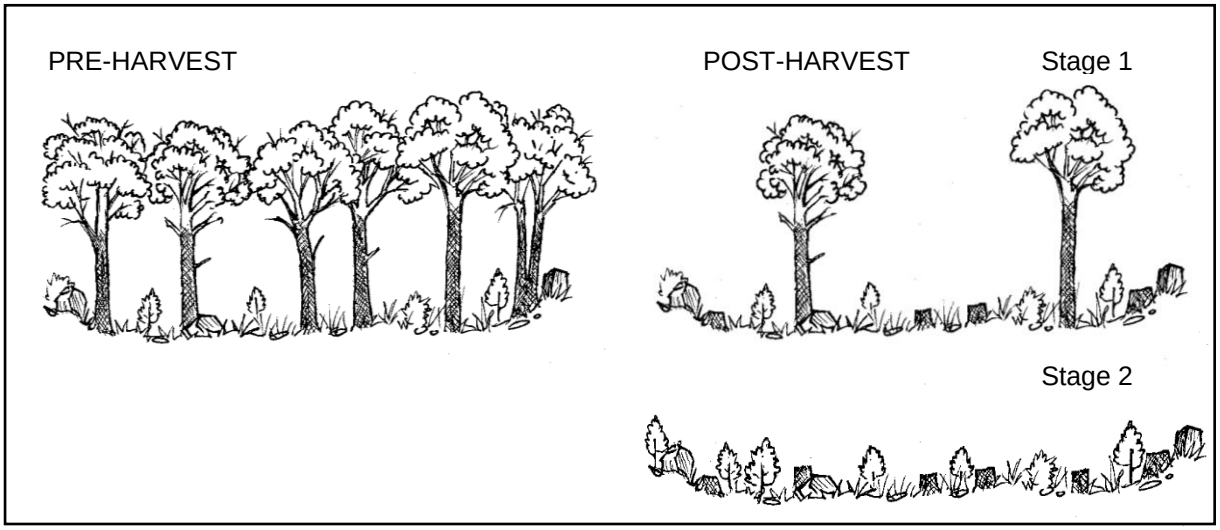
Seed tree retention (2-stage)

- Suitable for lower-quality dry forest that lacks advance growth or potential sawlogs.
- Good seed crops should be present.
- Seven to twelve healthy, well-spaced trees per ha with good seed crops are retained.
- A receptive seedbed is prepared by low intensity burning or mechanical clearing of slash from potential seedbed areas (e.g. excavator heaping).
- New seedlings should arise from seed shed from felled crowns, seed trees, and the release of advance growth.
- If basal area is kept at or above 12 m^2/ha, no additional regeneration techniques are required.
- Seed trees are removed once adequate regeneration is established.



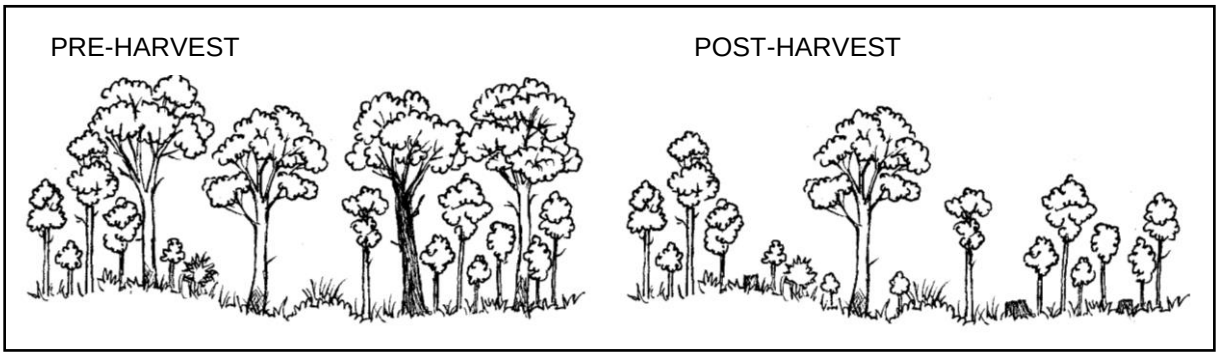
Shelterwood (2-stage)

- Suitable for high-altitude, exposed sites subject to cold air ponding (mainly sites with *Eucalyptus delegatensis* above 600 m) with little advance growth.
- Trees with good crowns are retained at 9–14 m^2/ha basal area.
- The overstorey should be removed when the average height of the regeneration is taller than 1.5 m.
- A low-intensity regeneration burn or scarification may be needed to create a seed bed.
- Regeneration arises from natural seeding, sowing, and/or release of advance growth.
- If basal area is kept at or above 12 m^2/ha, no additional regeneration techniques are required.



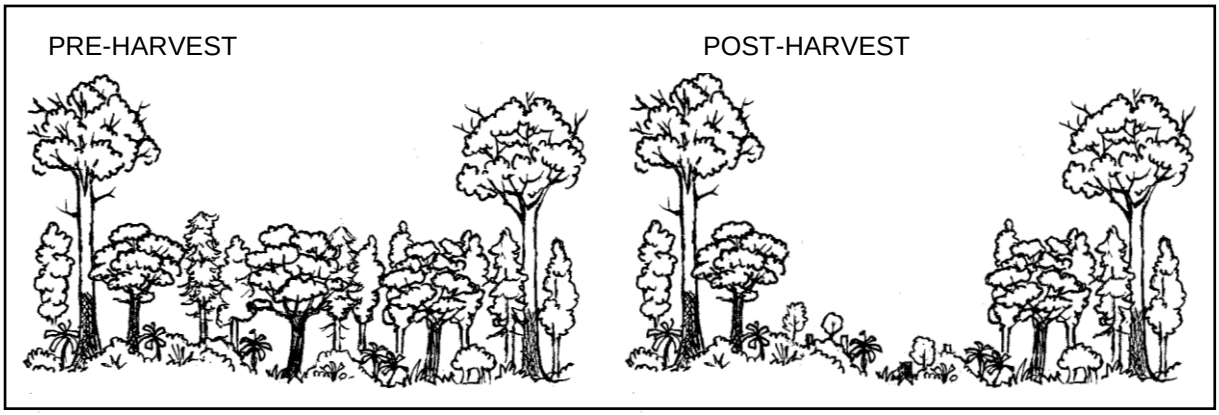
Advance growth retention

- Suitable for uneven-aged forests carrying an adequate stocking of vigorous advance growth with good potential for further growth.
- Mature stems are harvested where clumps of advance growth exist but retained where such clumps are absent.
- Disturbance from harvesting or low-intensity regeneration burning is used to provide a seedbed.
- Extra seeding is required if retained trees are not capable of restocking the site and natural seed sources are insufficient to colonise gaps.
- If basal area is kept at or above 12 m^2/ha, no additional regeneration techniques are required.



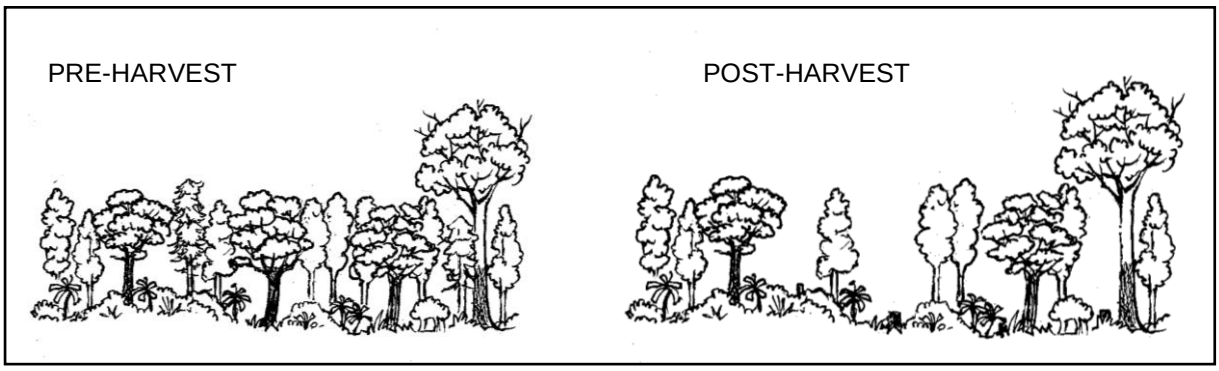
Group selection

- Suitable for taller forests with specialty timber species or stands with particular environmental or social significance.
- More than 50% of the canopy is retained after harvest.
- Groups (patches) of trees are harvested using gaps or strips that are up to two tree lengths wide. Almost all stems within the harvest area are felled although seed trees may be retained for visual management purposes if safe to do so.
- Extra seeding is required if retained trees are not capable of restocking the site and natural seed sources are insufficient to colonise gaps.



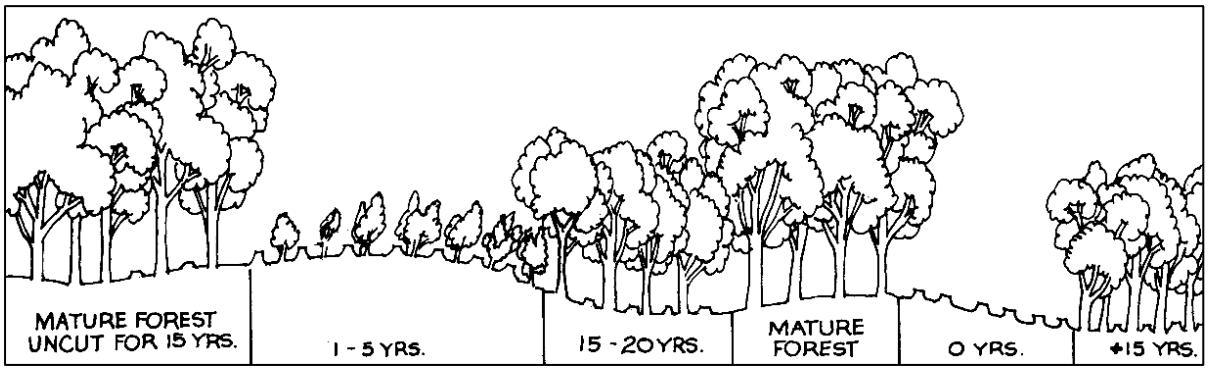
Single-tree / small group selection

- Suitable for shorter forests with specialty timber species.
- More than 50% of the canopy is retained after harvest.
- High value specialty trees such as blackwood, celery top pine and myrtle are harvested down to a specified minimum DBHOB limit.
- Regeneration arises from natural seeding and/or-release of advance growth.



C1.2 Coupe dispersal

- In native forest to be harvested by clearfelling and subsequently managed as native forest, planning should incorporate a dispersed coupe design to moderate peak stream flows and maintain landscape diversity. To achieve this:
  - a harvesting or regeneration unit should generally not exceed 100 ha, but the requirement for safe burning boundaries may over-ride this limit
  - the cutting sequence of regeneration units should, where practicable, be planned so that adjacent areas of native forest are not harvested until the dominant height of silvicultural regeneration adjoining or within 100 m of the harvested area is at least 5 m and an acceptable stocking standard is achieved.



- Dispersed harvesting is also desirable when partial or selective harvesting is employed. Where possible, harvesting should be planned to create a landscape mosaic of stands of different ages, shapes and types (e.g. native forest and plantations).
- If a strategic landscape-level management approach has been agreed between the FPA and a landowner or land manager, agreed procedures contained within the relevant agreement will apply where practical.
- Large blocks of plantation established at a similar time should be managed to increase dispersal over subsequent rotations.

Outcome

Harvesting systems appropriate for the forest stand and site conditions, that minimise long-term adverse impact on soil, water quality and other natural and cultural values, and maintain productivity of the site.

C2. Fire management planning

General principles

- The management of fire associated with forest practices will be conducted in a manner that meets legislative requirements, actively manages forest fuels and forest access to maintain forest health, regeneration and ecological functions, and reduces the risk and severity of damage from unplanned fires.
- Fire can be used as a silvicultural tool to reduce forest fuels resulting from harvesting to generate a seedbed and prepare the site for reforestation.
- Where forest practices are authorised by an FPP, the FPP will consider the requirements of any broader fire management planning document (e.g. at the estate, property or company level) that covers the area.
- If no such fire management plan applies to an FPP area, prescriptions for the management of unplanned fires will be specified in the FPP.
- Any planned burning to be done in conjunction with forest practices will be covered by prescriptions in an FPP, a fire management plan as above, or a site-specific burning plan (see E1.3).
- Contractors and other persons conducting forest practices must make themselves aware of fire prevention requirements in the *Fire Service Act 1979* and the Fire Service (Miscellaneous) Regulations 2017. The Tasmanian Forest Industry Fire Management Council (FIFMC) Fire Prevention at Forest Operations Procedures (15) also provide guidance.
- Contractors and other persons conducting forest practices must be prepared for planned and unplanned fires and have procedures in place for the suspension of activities during severe fire weather. Appropriate fire preparedness prescriptions may be placed in the FPP.

Operational approach

- During planning, consider whether regeneration burning will be required to reforest the site, and how this will be managed.
- When designing a coupe that will require regeneration or fuel reduction burning, consider how to prevent fire from damaging adjoining land, and how the coupe, once reforested, will be protected from unplanned fire.
- Fire management planners should consider:
  - landowners' and neighbours' assets requiring protection
  - proposed land use (e.g. harvesting, clearing and grazing)
  - source and direction of main fire threat
  - vegetation types and time since they were last burnt
  - fuel, distribution and flammability
  - fire detection
  - fire-fighting methods and equipment
  - resources for control and suppression, and their location
  - access, firebreaks and fuel reduction measures to be applied
  - natural and cultural values (e.g. archaeological sites, karst sinkholes, dolomite knolls, rare fire-susceptible flora, fauna requirements, risk of spreading soil-borne diseases and weeds in firefighting operations)
  - the need to avoid burning of streamside reserves
  - the need to minimise environmental damage to watercourses during construction of fire breaks and fire dams
  - smoke management issues (see F3).
- Burning of streamside reserves, and streamside vegetation adjoining Class 4 watercourses should be avoided where practicable.
- In some circumstances burning of streamside reserves may be required for hazard reduction or rehabilitation forestry purposes.

- Locally prevailing winds, proximity of fire hazards in the surrounding landscape, and the type of such fire hazards (including fire intensity and spread rate under catastrophic conditions) should be considered when designing operational areas.
- The ability to conduct planned burning safely and to minimise the risk of unplanned fires should be considered when designing the shape, size and boundaries of a coupe (e.g. where possible, choose natural fire boundaries such as ridgelines or moist gullies as operational boundaries).
- If constructed fire breaks are planned, avoid steep slopes into watercourses which may result in damage to retained vegetation, unnecessary earthworks, and difficult access for vehicles (see E1.7).

Outcome

Fire management planning that addresses the risks of planned and unplanned fires, both on-site and off-site, and meets legislative requirements for fire preparedness.

C3. Harvesting and extraction equipment and soil protection

General principles

- Planning for harvesting and extraction should consider the suitability of machinery for operating in wet and dry seasons and wet soil conditions (see C5).
- Timber harvesting equipment should be chosen to take account of the particular forest conditions at the time of harvesting.
- Harvesting machinery and techniques should be matched to forest conditions to limit the impact of harvesting on soils.
- The general level of training and skill of harvesting machinery operators should be progressively improved to assist in achieving environmental objectives.

Operational approach

- Table 4 is a guide to harvesting systems to be used under a range of site conditions. Harvesting systems include felling and extraction processes and equipment. Forest practices which are not addressed by Table 4 will only be undertaken in consultation with the CFPO.

Table 4 Guide to harvesting systems[1] for a range of soil erodibilities and slopes

Soil Erodibility Class [2]	Majority Slope							
	Flat – Rolling 0–11°		Hilly 12–19°		Steep [3, 4] 20–26°		Very Steep [3, 4] 27–35°	
	Dry or moist	Wet	Dry or moist	Wet	Dry or moist	Wet	Dry or moist	Wet
Low or moderate	A	A	A	A	A	B	C	C
Moderate-to-high	A	A	A	A	B	B	C	D
High	A	A	A	B	C	C	C	D
Very High	A	B	B	B	D	D	D	D

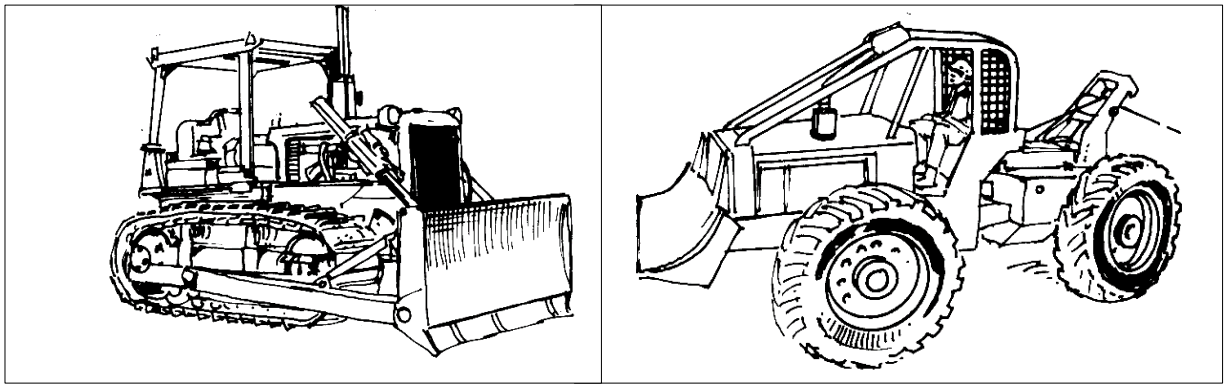
Notes:

1. Harvesting systems include both felling and extraction.
2. As defined in Appendix 3.
3. Note that for steep and very steep highly erodible sandy soils in the Strahan area, the FPA's *The Strahan guidelines* (7) should be applied.
4. On soils in karst areas no harvesting should occur on slopes of 20° or more

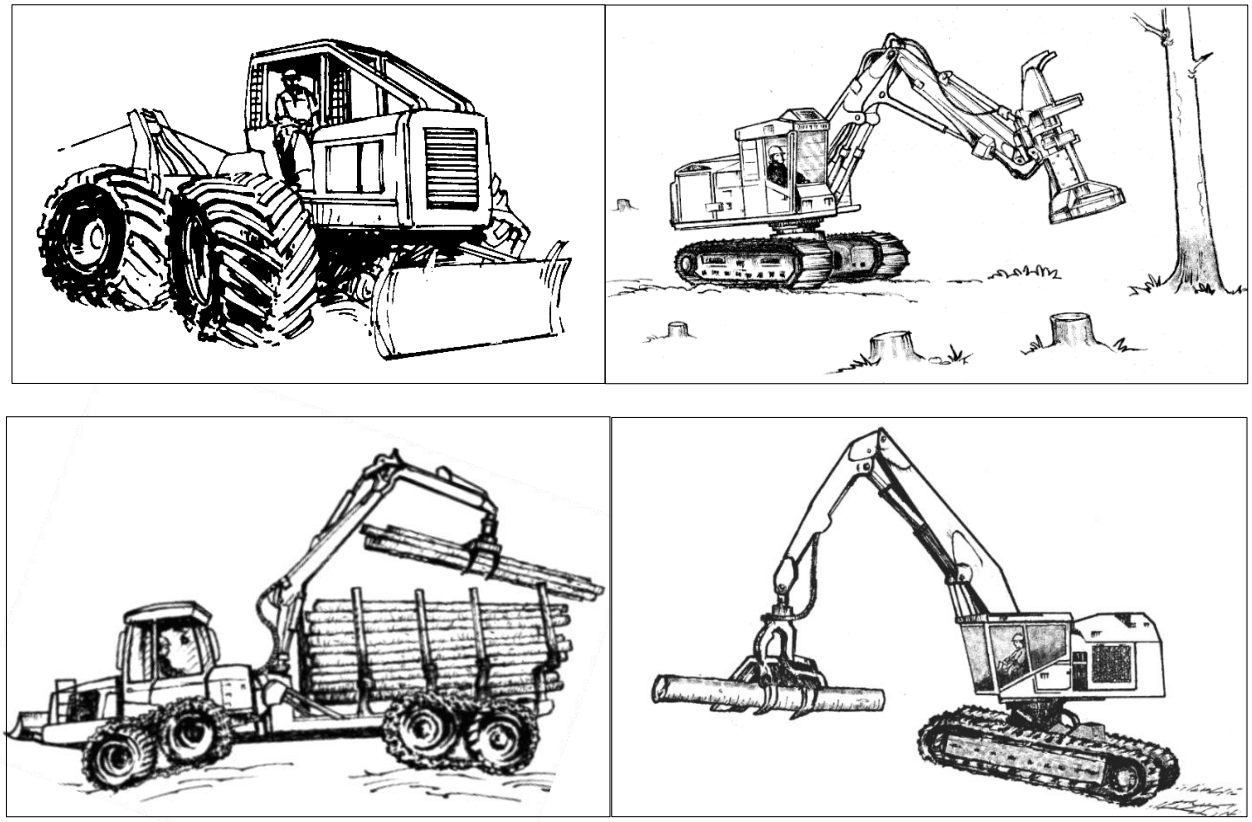
Suitable equipment for each system:

A	Conventional bulldozers and excavators not specifically designed for forest harvesting, skidders and narrow-tyred forwarders. Machines suitable for Type B and C systems also permitted.
B	Excavator-based felling machines and processors, forwarders with wide tyres or wide tracks, shovel logging systems. Machines suitable for Type C system also permitted.
C	Cable harvest systems and winch-assisted systems using machines suitable for Type B systems.
D	Generally no harvest

Examples of machinery suitable for Type A systems

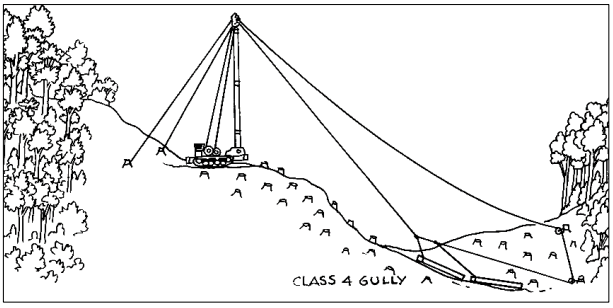


Examples of machinery suitable for Type B systems

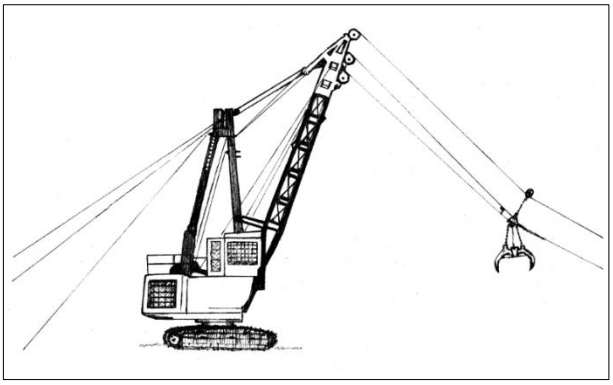


Examples of machines suitable for Type C systems

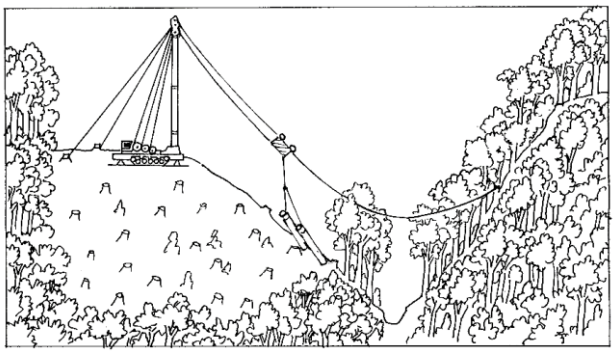
a) High lead cable system



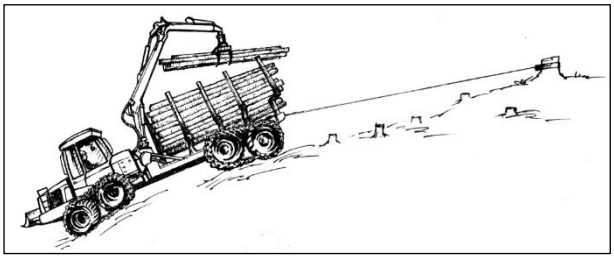
b) Swing yarder

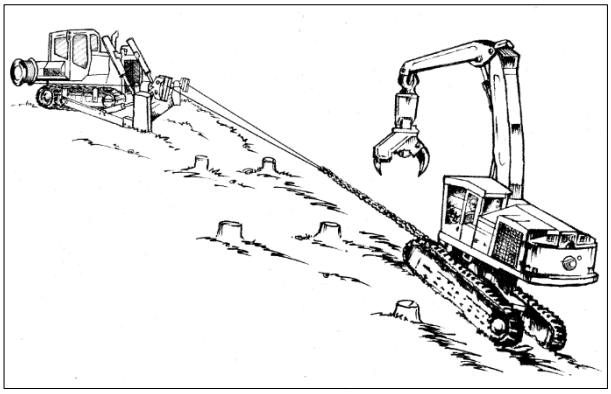


c) Skyline cable system



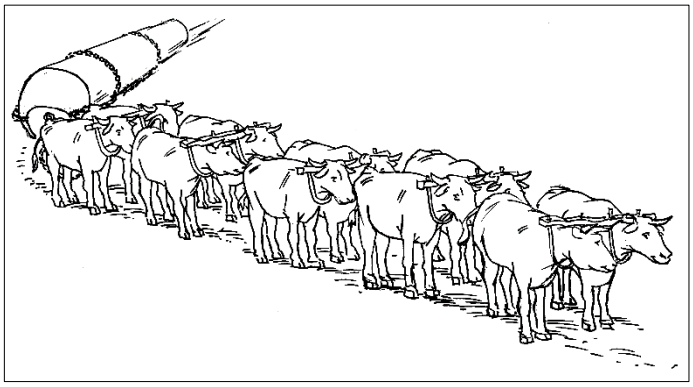
d) Winch-assisted systems





e) Non-conventional harvesting systems (e.g. heli-logging, bullock teams or other)

- Non-conventional harvesting systems will be subject to the natural and cultural values evaluation process, including an assessment of slope and soil erodibility. Consultation with FPA specialists will be required before such forest practices commence.
- For forest practices using exclusively non-conventional harvesting equipment, an FPO may specify prescriptions in the FPP additional to those described in C6.1.1.



Outcome

Equipment selection that is appropriate for the forest stand and site conditions, and minimises the risk of long-term adverse impact on soil and water values.

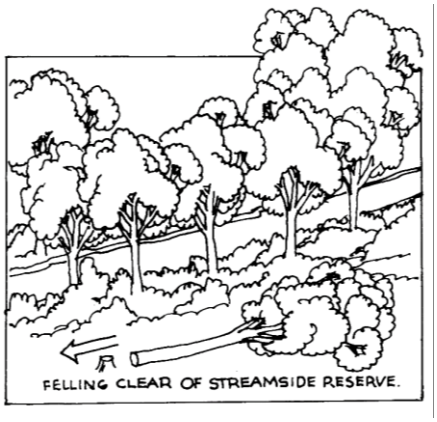
C4. Felling

General principle

- Trees should be felled in a systematic, controlled manner that has taken into consideration:
  - resource utilisation and product recovery
  - efficient extraction
  - natural and cultural values
  - safety and fire safety.

Operational approach

- Trees will be felled in a controlled manner to:
  - facilitate extraction
  - remain clear of watercourses and streamside reserves
  - reduce damage to retained trees and
  - improve recovery of useful products (see C4).
- Trees outside the harvesting boundary of the FPP will not be felled unless the primary reason is for safety or fire management, and permission has been obtained in writing from the landowner on whose land the trees stand.
- Felling of trees across harvest boundaries into areas reserved from harvesting should be avoided.



- Damage to retained vegetation around the perimeter of the harvesting area should be avoided. Any debris which falls outside the marked harvesting boundary should be carefully pulled back inside the harvesting boundary if it constitutes a fire hazard.

Outcome

Felling that is conducted in a controlled manner that facilitates extraction of undamaged products, and minimises the risk of adverse impacts on natural and cultural values.

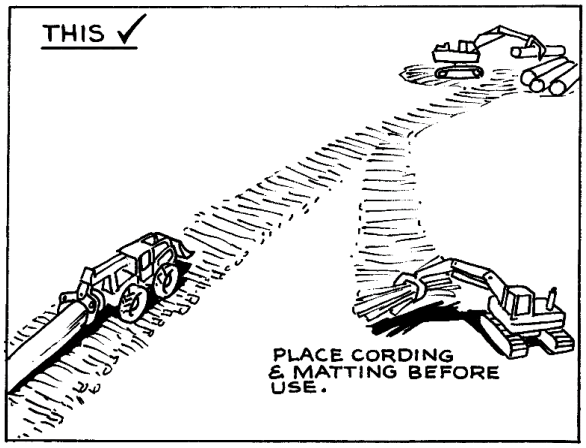
C5. Wet weather limitations

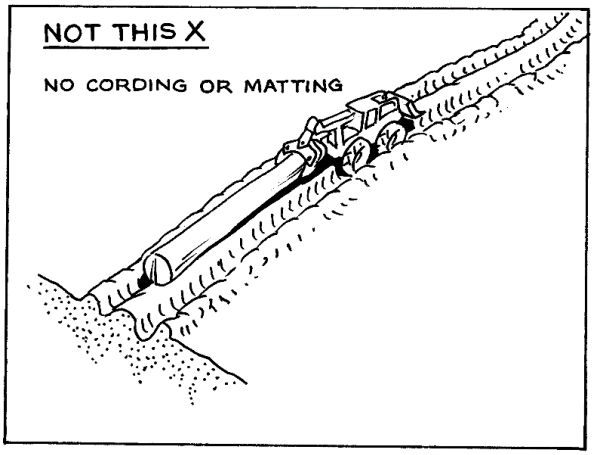
General principles

- Avoid the use of ground-based harvesting equipment on saturated soils (see Appendix 4) to minimise the risk of soil erosion, puddling, mixing or compaction, or adverse effects on water quality.
- Soils need to be allowed to drain after heavy rainfall and before forest practices begin or recommence.
- Avoid carting on wet, rutted roads to reduce excessive turbid runoff which may adversely affect water quality and may increase the need for road maintenance.
- A complete closure of forest practices including carting may be required during unfavourable weather such as prolonged heavy rainfall.
- Cording and matting of landings and major extraction tracks during dry conditions will reduce the potential for damage when soils are wet.
- The extraction track network will be planned to minimise the area impacted.
- The depth of rutting on extraction tracks will be minimised.

Operational approach

- Major extraction tracks to be used for harvesting during wet periods should be planned before forest practices begin. These extraction tracks should be corded or matted where appropriate and feasible.
- Cording or matting of all wet weather extraction tracks prior to use is recommended if suitable material is available.



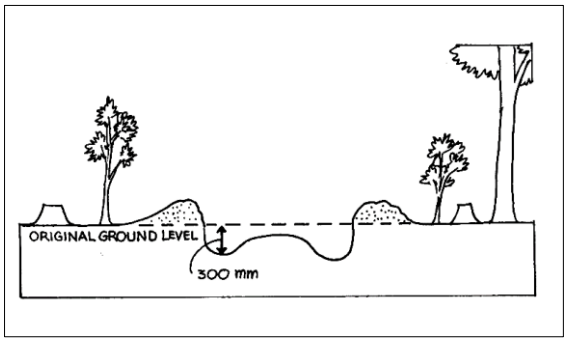


- High intensity extraction traffic will be confined to planned tracks, which should be located on high ground, so they drain naturally.
- The area of damaged soil resulting from landings and extraction tracks will be minimised.
- Harvesting on vulnerable karst soils will only be permitted in dry or moist soil conditions.

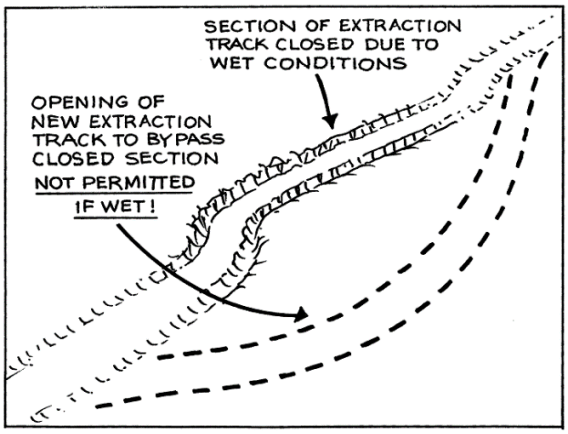
When to cease forest practices

- Ground-based extraction will cease on any section of a coupe where:
  - soils are saturated (see Appendix 4) and turbid water is flowing down an extraction track for more than 10 m, or
  - soils are puddled, forming mud or slurry along an extraction track to a depth of more than 200 mm over a 20 m section or longer, or
  - blading of mud or soil is required to maintain the trafficability of an extraction track, or
  - turbid water or mud is flowing from an extraction track into a watercourse or lake (in which case immediate action will be taken to divert the flow away from the watercourse), or

- where soils on a feeder extraction track are rutted to a depth of more than 300 mm below the original ground level over a 20 m section or longer.



- The affected section of the extraction track will not be by-passed by opening a new extraction track alongside or close by if on similar saturated ground. Operations may be shifted to another section of the coupe or another coupe with better ground conditions, or the tracks may be corded.



- Ground-based extraction in a section of a coupe may recommence only after water or mud ceases to flow on extraction tracks in that section of the coupe. An FPO may extend this temporary closure where it is necessary to allow further time for draining and drying. The extension will depend on the harvesting equipment in use, soil type and conditions.
- Carting will cease on wet roads when:
  - trucks are unable to travel under their own motive power, or
  - turbid water or mud runs in wheel ruts that are deeper than 100 mm in the running surface of the road for a distance greater than the required culvert distance for that section of the road.
- An FPO may also close cartage on new roads or other roads with poorly bound surfaces if damage including significant sediment runoff into watercourses is being caused, or is likely to be caused, by wet weather carting.

Outcome

Effective management of machinery that considers wet soil conditions, which may include temporary closure of forest practices.

C6. Extraction tracks and landings

General principles

- The area covered by extraction tracks and landings should be minimised.
- Extraction track location and direction will be planned prior to forest practices commencing and indicated on the FPP map.
- Planned extraction track and landing locations will result in less of the coupe being heavily disturbed, reduced extraction track grades and shorter average extraction distances.
- Careful attention will be paid to the location, construction and post-harvesting treatment of extraction tracks and landings to minimise erosion, compaction, soil puddling and mixing and excessive run-off.
- The amount of soil movement will be minimised. This can be facilitated by cording of extraction tracks and landings prior to use, where materials are available.
- Bark mixing with soil should be minimised as it can cause severe nutritional deficiency. If bark is used on corded or matted tracks it should be laid as a running surface only.

C6.1 Extraction tracks

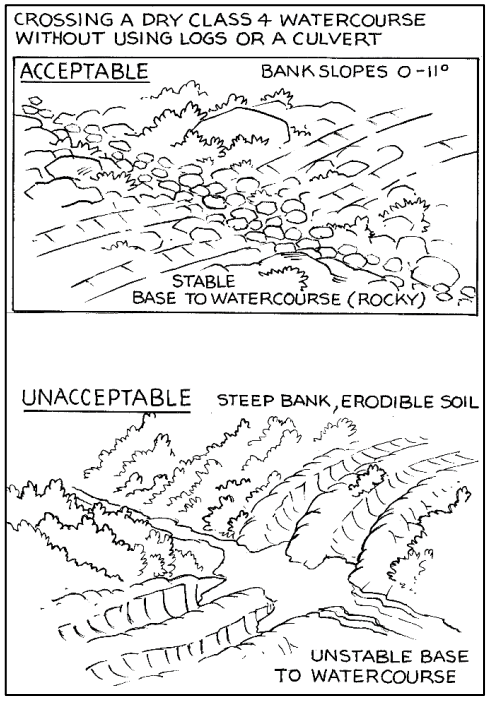
C6.1.1 Construction and use

General principle

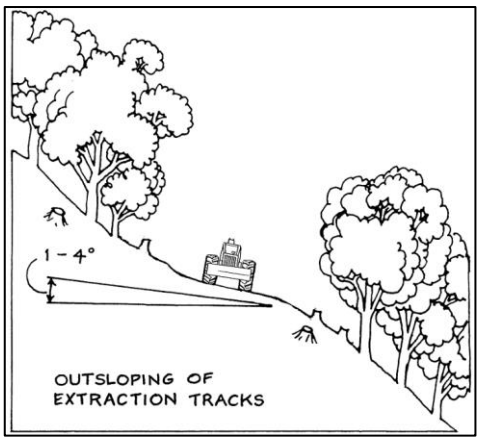
- The design of the extraction track system should be planned before commencing operations and discussed with the harvesting contractor. This should improve the efficiency of extraction and reduce the subsequent cost of restoration works.

Operational approach

- Forwarders may operate across a flowing Class 1 or 2 watercourse using a culverted or bridge crossing, or a ford when there is no water flow, provided measures to avoid sediment entering the watercourse (e.g. matting or gravelling of approaches) are implemented. Such crossings may also be used by other types of machines, provided they are unladen, to move around a coupe.
- Skidders may cross a flowing Class 1 or 2 watercourse using a culverted or bridge crossing, or a ford when there is no water flow, provided:
  - it is not feasible to use alternative extraction routes
  - measures to avoid sediment entering the watercourse (e.g. matting or gravelling of approaches) are implemented
  - CFPO approval is obtained.
- The number of crossings of Class 3 and 4 watercourses will be minimised and restricted to clearly marked crossing points (but see Thinning operations below).
- Crossing points on any watercourse should be at least 100 m apart.
- Temporary crossings will not be used while water is flowing over them.
- Dry Class 4 watercourses may be crossed without log crossings or culverts provided:
  - soils are dry and in low to moderate soil erodibility classes
  - banks into the water course are gently sloping (0–11°)
  - the number of crossings is minimised (but see Thinning operations below).



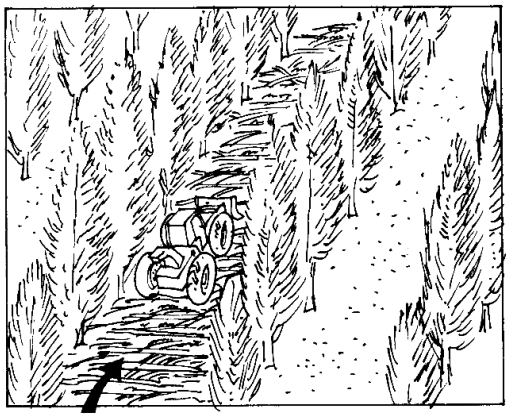
- Temporary culverts or log crossings will be provided in all other crossings.
- Crossings to be used for more than 12 months will be constructed with an opening (see diagram in C6.1.2) designed to cope with typical winter peak flows.
- Machine damage to streambanks should be avoided.
- Extraction will not be conducted along watercourses.
- Extraction will not be conducted along drainage depressions in native forest. However, extraction along drainage depressions in plantations may be authorised by an FPO provided:
  - soils are dry, and less soil disturbance will result than if an alternative route were used
  - soils are in the low to moderate-to-high erodibility classes
  - slopes along the drainage depression are no greater than 6°
  - the extraction track is matted prior to use.
- Specialist advice regarding the location and management of extraction tracks should be sought in karst areas and all potential cave areas.
- Extraction tracks will not cross shallow mapped caves that are near the surface, enter any karst depression, or divert or enter any watercourse in a karst area. Concentration of drainage will be avoided.
- New caves or stream sinks found during harvesting will be avoided, the FPA advised as soon as possible, and the area managed in accordance with specialist advice.
- Extraction tracks should be located and constructed so they can be effectively drained.
- Major extraction tracks should be located on high ground so that they can drain naturally.
- Uphill extraction will be maximised on very high erodibility class soils. In other areas, the extraction pattern should aim to minimise soil disturbance.
- Extraction tracks should be corded or matted during construction in wet areas and temporary culverts used to reduce soil degradation and maintain trafficability and water quality.
- Outsloping of extraction tracks should be considered to reduce scouring. The outslope should be about 1° but not more than 4° as logs slide off slopes greater than 4°.
- The crossing of table drains and road batters with machinery should be minimised. Stable crossing points should be used, avoiding culvert inlets and outlets. Any permissible use of a road by machinery may be specified in the FPP.



Thinning operations

- Harvesting machinery and thinning regimes that minimise soil compaction and damage to retained trees should be selected.
- Existing stabilised tracks within 10 m of a Class 4 watercourse may be used for extraction, provided:
  - extraction is undertaken in dry or moist soil conditions and streambanks are not damaged
  - no reasonable alternative exists
  - use is specified in the FPP
  - drainage of the tracks conforms to this Code.
- The wet weather limitations for major extraction tracks should be applied to outrow thinning tracks.

- In wet conditions where outrow or similar thinning techniques are being used, slash and branches will be placed on outrow extraction tracks to minimise soil and root damage.
- In outrow or similar thinning of plantations, non-ground skidding equipment (e.g. forwarders, felling machines, processors) can cross Class 4 watercourses where the outrow intersects the watercourse provided:
  - the watercourse is dry
  - riparian soils are dry or moist
  - damage to banks is avoided
  - no or minimal earthworks are required
  - slash is placed on the outrow crossing during harvesting and removed after harvesting.



LOGGING SLASH/DEBRIS ACROSS OUTROWS

C6.1.2 Management and restoration

General principles

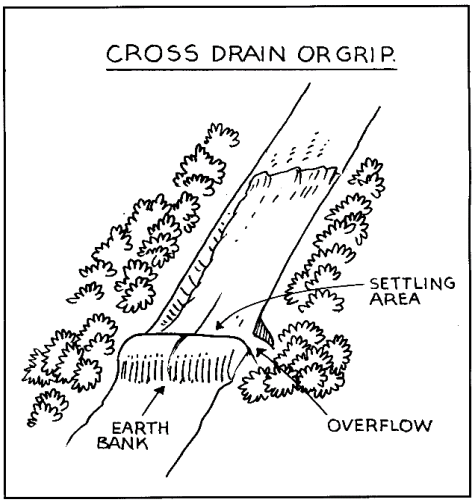
- Extraction tracks should be drained, if necessary, to prevent a build-up of running water during and after forest practices.
- Installation of grips and restoration of stream crossings, rutted extraction tracks and tracks on which cording and matting have been used should be undertaken on completion of a section of a coupe, provided conditions are dry enough for restoration works to be effective. If not dry enough, restoration should be done within a time specified in the FPP.
- Where extraction tracks are intended to be used for ongoing access, spoon drains (trafficable grips) may be constructed instead of grips.
- Good management of extraction tracks is especially important on steep country and landslide-prone land.
- Where there is no ground contact between logs and the soil (e.g. when forwarders are used), an FPO may determine whether drainage structures are required to reduce the risk of erosion.

Operational approach

- On soils in low to high erodibility classes, extraction tracks should be drained as soon as they are no longer needed for harvesting, or if harvesting is to be closed down for one week or more and it is practicable to do so, except where soils are very well drained (e.g. on dune sands).
- On soils in the very high erodibility class, the drainage and restoration of extraction tracks should take into account the FPA's *Earth Sciences Technical Note 1: A guide for operations on high and very high erodibility soils* (9).
- On soils of low, moderate, and moderate-to-high erodibility, forwarder tracks on slash-covered plantation outrows will not require drainage structures as specified in Table 5 unless the harvest planner or supervising FPO considers they are required because of the risk of erosion.
- Where machine clearing for plantations or agriculture is planned, or complete restoration prior to coupe clearance would not be effective due to unforeseen circumstances (e.g. sudden onset of a wet spell), then:
  - tracks will be partially restored to minimise erosion and measures will be taken to ensure that turbid water does not enter watercourses
  - complete restoration will be undertaken at the time of machine clearing or when conditions are dry enough to effectively restore the tracks, but always before the next burning season
  - if clearing has begun prior to harvesting contractors vacating the coupe, the clearing contractors may undertake the required restoration as part of their work.
- Where machine clearing does not directly follow harvesting, and when ground conditions are suitable for effective restoration, extraction tracks and access tracks will be drained to minimise

erosion, siltation and excessive run-off of water prior to clearance from a coupe or harvesting section, as follows:

- grips will be installed as specified in Table 5 (unless otherwise specified by an FPO), to minimise the concentration of water and to reduce its velocity, in order to reduce erosion and adverse effects on water quality
- grips will be constructed at approximately right angles to the water flow and have an outlet so that water discharges into the surrounding vegetation or slash and does not return to the track
- natural drainage points should be used
- spacing between grips will not exceed the distance specified in Table 5 for the applicable soil erodibility class and average track gradient.



- Where extraction tracks are rutted to a depth of more than 300 mm below the original ground level, over a 20 m section or longer, the extraction track will be restored by filling in and draining.
- Other rutted extraction tracks may be restored by backfilling provided such tracks are drained or gripped to prevent channelling of surface flows.
- Cording and matting should be loosened to facilitate burning or heaped to expose the seedbed where necessary.

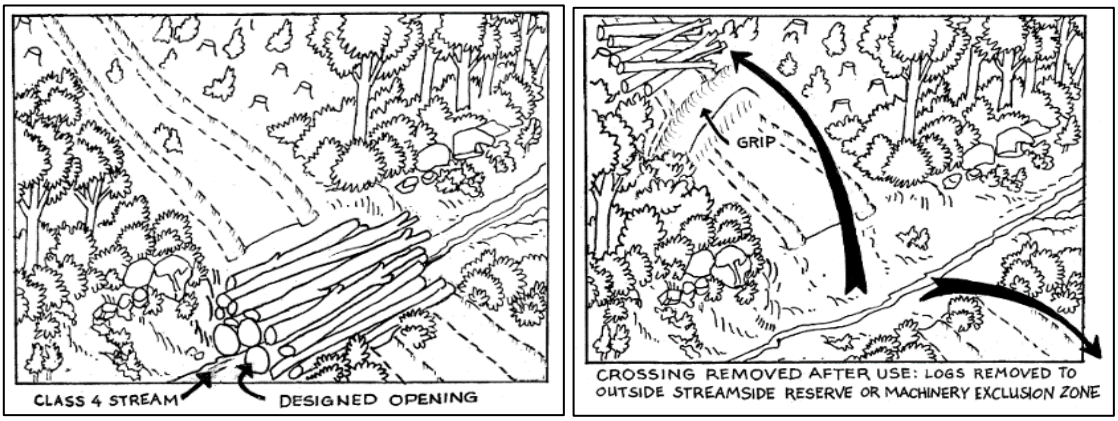
Table 5 Maximum spacing between grips on extraction tracks

	Soil Erodibility Class				
Gradient of Track	**Low**	**Moderate**	**Moderate-to-high**	**High**	**Very High**
0–3°	Nil	Nil	Nil	100 m	40 m
4–14°	120 m	100 m	80 m	60 m	30 m
15–19°	80 m	70 m	60 m	40 m	20 m
20–26°	40 m	35 m	30 m	20 m	NH
over 26°	20 m	20 m	NH	NH	NH

Notes:

1. Use drain spacing corresponding to the next highest soil erodibility class for the following situations:
   - tracks diagonally across contours
   - areas subject to periods of high intensity rainfall (e.g. eastern parts of Tasmania)
   - karst catchments.
2. On well-drained very sandy soils grips may not be required; seek specialist advice.
3. If the track is outsloped and water cannot flow for a distance greater than the required grip spacing, grips may not be required.
4. Apply grip standards for the high erodibility class on all soils in karst terrain. Sediment traps may be required.
5. NH = Generally no harvesting.

- On completion of harvesting or site preparation, temporary log crossings will be removed from watercourses to points outside the streamside reserve or machinery exclusion zone to allow unrestricted flow of the water along its original course. The streambanks will be left in a stable condition by constructing grips or other suitable drainage measures.
- If a stream is diverted onto an extraction track at a crossing point, water flow must be returned to its original watercourse. This must be done immediately unless an FPO specifies a delay until drier conditions prevail.



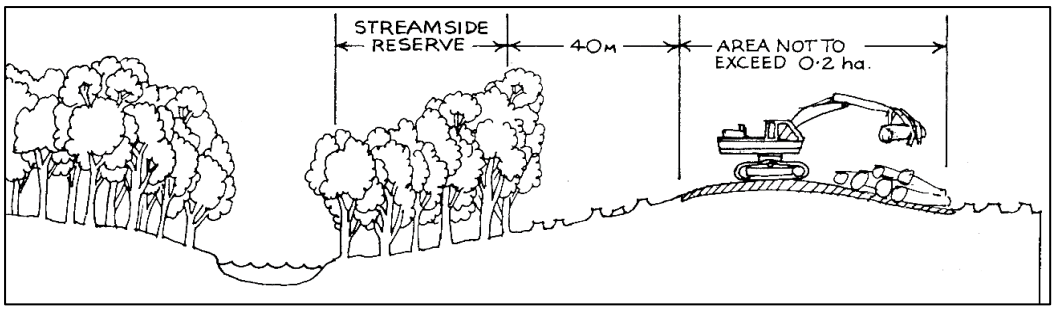
C6.2 Landings and stockpiles

C6.2.1 Construction and use

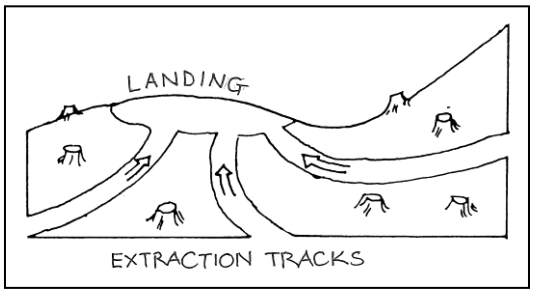
Operational approach

Landings

- Landings will be located so that mud and slush from them does not enter watercourses.
- A landing may be moved up to 50 m from the position indicated on the FPP map provided other provisions in this Code and within the FPP are complied with, and an FPO is notified of the intention to move the landing.
- In native forest, landings should be kept as small as practicable and will not exceed 0.2 ha (equivalent to 40 × 50 m), excluding stockpile areas. Landings of up to 0.3 ha are permitted if authorised in the FPP (e.g. for safety reasons) or where there are a number of log sorts.
- Landing size will be minimised in karst areas and landings will not be located within 20 m of karst depressions or sinkholes.
- Landings in areas with vulnerable karst soils will be drained into effective sediment traps which are properly maintained.
- Landings and harvesting debris will be kept as far as practicable from watercourses and drainage depressions. Landings will not be permitted within 40 m of a streamside reserve or a Class 4 machinery exclusion zone (see Table 7) unless designated in the FPP and provided specific measures (e.g. marking the landing boundary, drainage controls) are placed in the FPP to minimise risks to water quality.



- Landings should be located on well-drained sites wherever possible. If well-drained sites are not available, measures will be taken to minimise soil disturbance and control runoff.
- Mud and water should be prevented from entering landings from extraction tracks, and logs prevented from sliding uncontrolled into landing work areas. This is best achieved by ensuring extraction tracks approach landings from below.



- Wet season landings will be corded or matted if a rocky or suitably solid base is not available.
- Permanent landings (i.e. landings to be used frequently for thinning or selective harvesting) should be considered part of the long-term extraction network and be constructed along with the roads.

Continuous landings in plantations

- Continuous roadside landings can be used in plantations if authorised in the FPP, or where special equipment is used (e.g. cable swing yarder or cable thinning machine), provided:
  - drainage depressions are avoided
  - the continuous landing boundaries are marked on the road edge when near drainage depressions or streamside reserves.

Stockpiles

- Stockpiles should be located on well drained sites (not in drainage depressions) and at least 10 m further away from the streambank than the required width of any streamside reserve or machinery exclusion zone, as defined in Table 7, and at least 20 m from sinkhole margins.
- If necessary, cording and matting will be used to prevent soil disturbance and silt runoff at stockpile sites including the loading areas around them.
- Log stockpiles for forwarded and processed logs (generally from plantations) are not limited to a maximum area.
- Tracks adjacent to stockpiles will be managed as major extraction tracks (see C6.1).

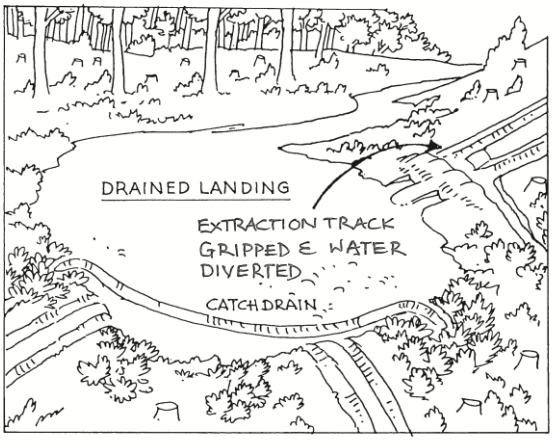
C6.2.2 Management and restoration

General principles

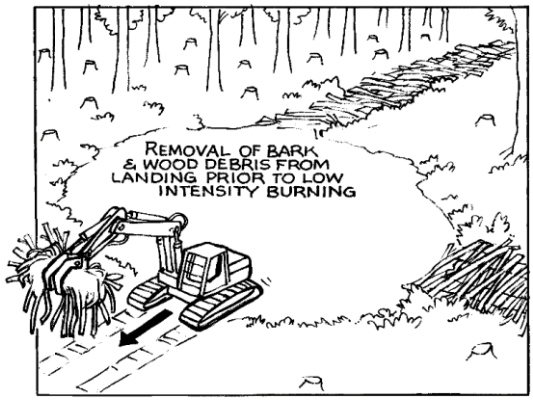
- Drainage of landings reduces soil erosion and turbid runoff.
- Management of bark and other landing debris is essential to reduce the risk of fire.
- Keeping landings tidy can reduce adverse visual impacts.

Operational approach

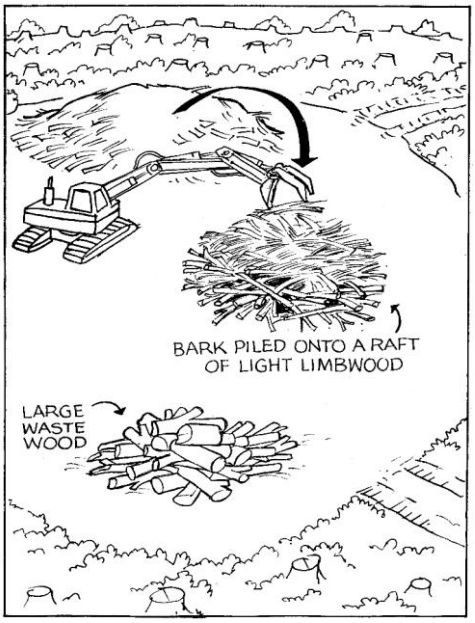
- On completion of each harvesting section, landings will be drained and water flowing towards landings will be diverted into the surrounding vegetation or sediment traps.
- Where complete restoration of a landing is not advisable due to wet conditions or other factors, temporary drainage will be undertaken before leaving the area. Complete restoration will be undertaken when conditions are dry enough to effectively do the work required and before the next burning season.



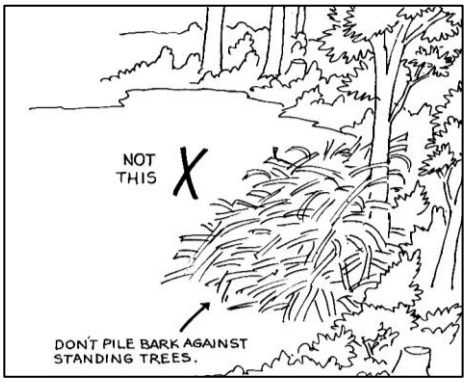
- Where harvesting slash is to be left unburnt or reduced by lower-intensity burning, the decision to leave bark and wood debris heaps on landings or to burn them must be authorised by an FPO who has taken into consideration the broader fire management implications.



- Where harvesting slash is to be burnt in a higher-intensity fire, the burning should comply with the following guidelines (where space permits):
  - large waste wood pieces (>25 cm diameter) should be heaped separately from bark
  - bark should be heaped onto a raft of light (<20 cm diameter) limb wood placed on a well-drained site previously cleared to mineral earth. If not part of a landing, the bark heaps should be isolated from adjacent flammable material by a 3 m firebreak cleared to mineral earth
  - bark heaps should not be compacted, and should be no greater than 4 m high where landing space permits
  - all heaps should be at least 40 m from a flammable coupe or reserve boundary
  - rubbish, metal, oil and other foreign matter will not be included in either bark or waste wood heaps
  - compacted bark should be aerated before being added to bark heaps
  - bark and waste wood heaps should not be ignited until the summer fire danger period has passed. Bark heaps which are still burning in spring will be extinguished when the local soil dryness index exceeds 50 mm.



- For temporary landings, after the completion of harvesting and treatment of bark as above:
  - the natural contours of the landing area should be re-established
  - highly compacted landings should be ripped to improve aeration and establishment of seedlings
  - landings will be reforested in the same manner as the surrounding harvested area.



- Rubbish, waste oil, etc. will be removed in accordance with section F.

Outcome

Extraction tracks and landings that are located, constructed and effectively restored in a manner that minimises adverse impacts to natural and cultural values, particularly soil and water values.

C7. Harvesting of trees adjacent to watercourses

General principles

- The ongoing integrity and function of streamside reserves in native forests is important to maintain riparian values and to minimise impacts on water quality.
- There should be no adverse long-term impacts on water quality and flow in streams exiting the operational area during, or as a result of harvesting operations.
- Where plantations are established on 'previously cleared and converted land', the riparian values of watercourses in the plantation should be rehabilitated where practicable.
- In plantations, harvesting should be conducted in a manner that is compatible with maintaining or rehabilitating riparian values over time.

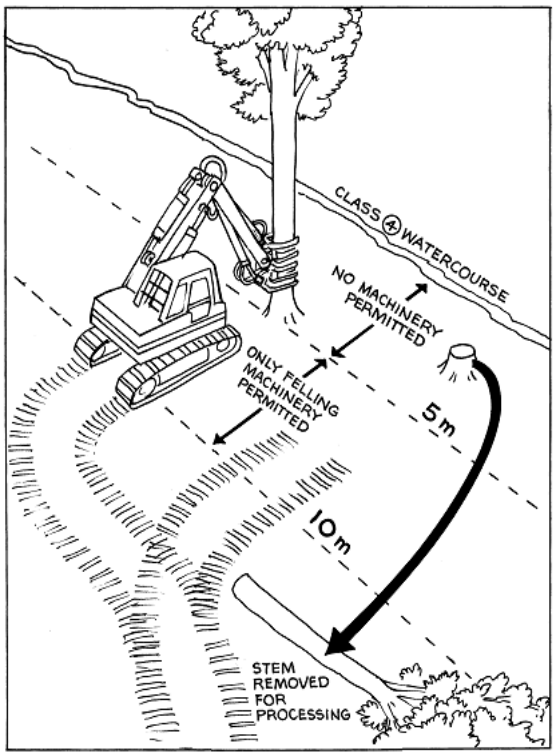
C7.1 Harvesting native forest in streamside reserves

Operational approach

- Native vegetation will be retained intact in:
  - Class 1, 2 and 3 streamside reserves as defined in Table 7
  - Class 4 streamside reserves prescribed in accordance with Appendix 5, or for biodiversity reasons, subject to other provisions in this Code permitting watercourse crossings and selective harvesting under certain conditions.
- Where harvesting is planned to occur adjacent to a streamside reserve, the boundaries of the streamside reserve will be clearly marked and/or their locations recorded on a georeferenced map, on which an operator's location can also be clearly identified, before harvesting commences.
- Trees should not be felled into a streamside reserve. If this occurs accidentally, the tree should be pulled clear unless unacceptable damage to the reserve is likely to occur. Damage to vegetation, particularly mature myrtle (*Nothofagus cunninghamii*), should be avoided.
- Trees should be felled away from Class 4 watercourses and damage to understorey vegetation should be minimised (see C4).
- Harvesting machinery will not enter streamside reserves except at designated watercourse crossings, unless:
  - an FPO has specifically approved machines such as excavators to carry out restoration work (e.g. removal of slash or windthrow from watercourses by machines working from the streambank) when soils are dry or moist, or
  - for CFPO-approved salvage works (see C8)
- Slash will not be pushed into or immediately adjacent to any streamside reserve or machinery exclusion zone on a Class 4 watercourse.
- Slash heaps should be sufficiently separated from reserves to reduce the risk of burning the reserves.
- Trees within Class 1, 2, and 3 streamside reserves will only be felled where authorised in the FPP for road construction (see B3.1), for extraction track crossings of Class 3 watercourses, for safety reasons, or they may be selectively harvested subject to the following conditions:
  - the remainder of the coupe is a partial harvest operation
  - slopes are less than 20° and soils are in the low, moderate or moderate-to-high erodibility class
  - the trees to be felled are marked by an FPO or delegate
  - harvesting takes place when soils are dry or moist
  - the trees are not felled into the watercourse
  - harvesting will not significantly damage retained trees
  - no harvesting machine enters the streamside reserve for the purposes of the selective harvesting
  - basal area of at least 12 m^2/ha is retained

- no trees are felled in the 10 m adjacent to a Class 1, 2 or 3 watercourses
- the selective harvesting is not within 2 km upstream of a town water supply intake
- damage to mature myrtles (*Nothofagus cunninghamii*) is avoided
- such harvesting is not likely to result in unacceptable substantial windthrow.

- Where specifically authorised in the FPP, excavator-type felling machines that can directionally fall trees may track to points no closer than 5 m from a Class 4 watercourse to which a streamside reserve has not been applied (see Table 7), subject to the following conditions:
  - slopes are less than 20°, and soils are in the low, moderate or moderate-to-high erodibility class
  - soils are dry or moist, and disturbance to the understorey and ground surface is minimised
  - trees are, wherever practicable, felled away from watercourses
  - the machine moves in and out of the machinery exclusion zone by the same path without slewing the machine's tracks
  - stems are removed for processing to a site at least 10 m from the streambank
  - all other machinery is excluded from the machinery exclusion zone except at designated crossing points.



- Where this approach is used, the 10 m machinery exclusion zone will be marked, and/or both the boundary and the operator's location will be clearly identified in real time on a georeferenced map. The person or organisation responsible for such marking, or preparation of such a map, will be stated in the FPP.
- Where there is dense undergrowth or where the watercourse is difficult to define, Class 4 machinery exclusion zone boundaries should be marked and/or their locations recorded on a georeferenced map, on which an operator's location can also be clearly identified.

C7.2 Harvesting plantations in streamside reserves

This section applies to the harvesting of plantations where trees have been planted within streamside reserves and Class 4 machinery exclusion zones.

Operational approach

- When harvesting in streamside reserves, care should be taken to maintain the condition of grass cover or other ground vegetation, which acts as a filter for sedimentation.

For plantations established on or after 1 January 2001:

- No plantations are to be harvested within 10 m of a class 1, 2, or 3 watercourse except when constructing roads through streamside reserves (see B1).

For all other situations:

- On low, moderate or moderate-to-high erodibility class soils, plantation trees may be harvested in Class 1, 2, and 3 streamside reserves and within 10 m of Class 4 watercourses subject to the following conditions:
  - felling machines approach to points no closer than 5 m from a streambank provided slopes are less than 20°
  - harvesting is only carried out when soils are dry or moist, or where measures are taken to

minimise soil disturbance
  - trees are, wherever practicable, felled away from watercourses
  - the machine moves in and out of the machinery exclusion zone by the same path without slewing the machine's tracks
  - remnant native vegetation is retained
  - stems are removed for processing to a site at least 10 m from the streambank
  - other harvesting machinery does not track within 10 m of the streambank except at designated crossing points or to remove substantial harvesting debris
  - the zone 10 m from the streambank will be marked, and/or both the boundary and the operator's location will be clearly identified in real time on a georeferenced map, or
  - alternatively, where visibility is high and streams are narrow, the stream channel itself may be physically marked or its location recorded as above
  - the person or organisation responsible for marking or preparation of the georeferenced map is stated in the FPP.
- On slopes 20° or more, machines will not track to points closer than 10m from any stream bank, unless using an existing track that does not require upgrading.
- On high or very high erodibility class soils, additional measures to those above will be included in the FPP, as considered appropriate (e.g. no machinery within 10 m of the stream).
- Outrow thinning across Class 4 watercourses may be carried out in accordance with provisions for Thinning Operations in C6.1.1.
- Selective harvesting or the felling of the planted streamside reserve at a different time to the remainder of the coupe should be considered.
- Harvesting debris which may result in altered watercourse conditions should be kept out of watercourses. The removal of substantial harvesting debris accidentally lodged in Class 1, 2 or 3 or Class 4 watercourses to areas where it will not be re-mobilised by high water flows may be authorised by an FPO, and should be done in a manner causing as little damage as possible to the streambank and reserve vegetation.
- Debris dams that have accumulated in streams should be removed where practicable. If machinery needs to work in the stream channel to remove debris, CFPO approval is required.

C7.3 Harvesting of rehabilitation or agroforestry plantings in riparian zones

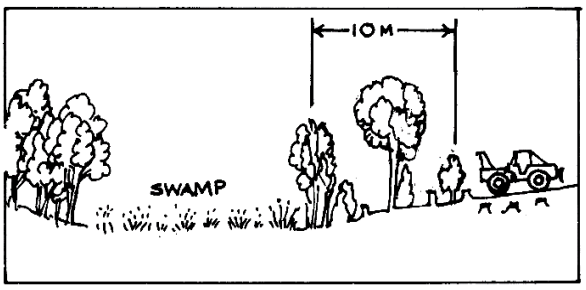
Operational approach

- Rehabilitation or agroforestry plantings may be harvested within streamside reserves and within 10 m of Class 4 streams subject to the following conditions:
  - it can be demonstrated that the risks of long-term impacts on riparian values, particularly water quality and flow, are low
  - a basal area of 12 m^2/ha is retained within 10 m of the streambank, and
  - machinery does not track to points closer than 5 m to the streambank
  - if soils in the riparian zone have high or very high erodibility, and/or stream banks show significant active erosion (e.g. slumping), technical advice is obtained from the FPA before harvest.

C7.4 Swampy ground and surface seepage areas

Operational approach

- Conventional harvesting in production swamp forests, e.g. blackwood (*Acacia melanoxylon*) swamps, should occur when soils are dry or moist, not waterlogged.
- For other swamps (including wetlands, marshes or bogs):
  - plantation trees established in the 0–10 m zone adjacent to a swamp before the publication of this edition of the Code may



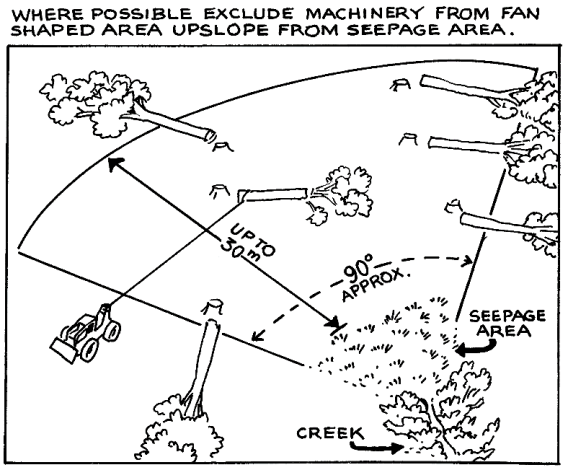
be harvested provided a 10 m machinery exclusion zone is applied. Subsequent plantation establishment will be no closer than 5 m to the swamp edge. During harvesting:

  - crossing points should be minimised and will be corded to avoid damage to the underlying soil
  - cording will be removed once harvesting or site preparation activities have been completed
  - plantation trees will be felled in such a manner that they do not fall into the swamp, unless their growth form makes such directional felling unachievable.

- in other situations:
  - a 10 m machinery exclusion zone will either be marked around the swamp or digitally defined (see A3.2) prior to the commencement of forest practices
  - if a stream flows through the swamp, streamside reserves as defined in Table 7 will apply
  - selective harvest of native trees, removing up to 50% of canopy cover, is permitted within the 10 m machinery exclusion zone, provided trees can be felled without falling into the swamp.
  - no ground preparation or plantation establishment will occur within 10 m of the swamp edge
  - crossing points should be minimised and will be corded to avoid damage to the underlying soil
  - cording will be removed once harvesting or site preparation activities have been completed
  - plantation trees will be felled in such a manner that they do not fall into the swamp, unless their growth form makes such directional felling unachievable

- Advice should be sought from a specialist when:
  - it is difficult to define a swamp,
  - the swampy area consists of multiple small patches each less than 400 m^2, or
  - the border of the swamp is poorly defined.

- Machinery should be excluded from seepage areas and catchments immediately upslope from them.
- Seepage areas may require additional upslope protection to prevent sediment entering watercourses.
- Where possible, roads and landings should not be located directly upslope of seepage areas and machinery should not operate in such areas when water is flowing overland towards the seepage area.



Outcome

Maintenance of water quality by managing watercourses, riparian areas and swampy ground to minimise the impacts of forest practices.

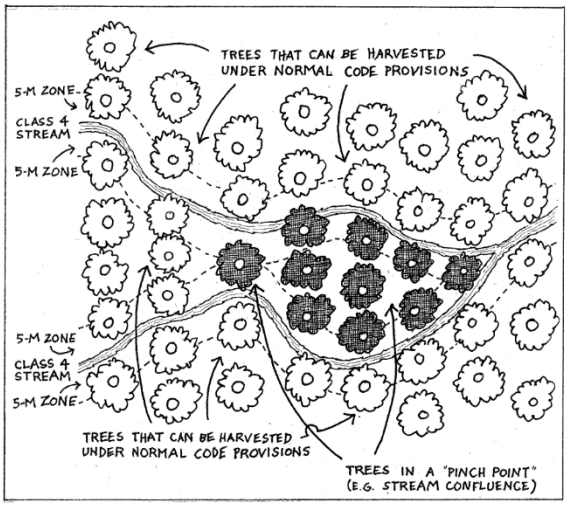
C8. Salvage operations

General principles

- Salvage operations involve forest practices which are not technically permitted by this Code but are desirable to achieve good long-term environmental outcomes by minimising potential or existing adverse environmental impacts and ensuring long-term forest cover on the site.
- Exemptions from some of the provisions of this Code may be made for salvage operations, however the general approach of this Code should be applied where practicable.
- Retrieval of merchantable timber may also be an objective of a salvage operation.
- Examples of salvage operations include removal of timber from streams following flooding, or harvesting of stands damaged by severe windthrow or fire.

Operational approach

- The forest practices may need to be considered in two sections:
  - areas outside the salvage area, to which this Code will apply
  - areas within the salvage area, for which the CFPO may exempt the forest practices from the provisions of this Code but will prescribe alternative provisions to be placed in the FPP.
- The salvage of timber from new dam sites must not be authorised by an FPP, as such activity is regulated by DPIPWE and the dam construction permit process under the *Water Management Act 1999.*
- Harvesting of trees from existing dams must be authorised by an FPP.
- Plans for salvage operations adjacent to streams should include requirements for revegetation.
- For small areas (typically 0.04 ha or less) of plantation planted before 1 January 2021, where trees cannot be machine harvested in accordance with this Code because machines are not allowed within 5 m of the streambank ('pinch points'), machine harvesting may be authorised in the FPP provided measures are taken to avoid environmental harm and the areas are not re-established to plantation.



Outcome

Effective salvage of timber that improves long-term environmental outcomes.

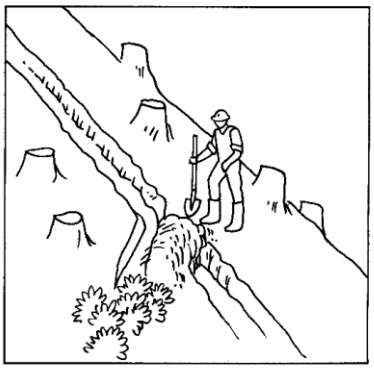
C9. Steep country harvesting (slopes 20° and above)

General principles

- Cable harvesting generally results in less soil disturbance and impact than ground-based extraction in similar conditions.
- Winch-assisted harvest using Type C systems on steep country will generally result in less soil disturbance and impact than using unassisted machinery on similar slopes.
- The provisions in this section of this Code are specific to steep country forest practices. Other relevant provisions of this Code apply regardless of slope.

Operational approach

- Areas with majority slopes greater than the threshold slope angle for the particular rock types shown in Table 6 will be assessed with respect to landslide hazard by a soils or other geotechnical specialist before harvesting can proceed.
- Plantations established on majority slopes steeper than the slope limit in Table 4 and the landslide threshold slope angle in Table 6 can only be harvested with written approval of the CFPO.
- Clearfell coupes in native forest should be dispersed in space and time (see C1.2), in the context of local topography, to manage the impact on the visual landscape or the risks of fire or erosion.
- Clearfell coupes in both native forest and plantations with majority slopes of 20° or more will be limited to 50 ha in size, unless approved by the CFPO, who will take into account potential hydrological impacts.
- Logs will not be pulled through native forest streamside reserve vegetation of Class 1, 2 or 3 watercourses. Cables may be pulled through this streamside vegetation but will not be dragged upstream or downstream if unacceptable damage to the streamside reserve vegetation will result (see diagram of Skyline Cable Systems in C3).
- Logs pulled through Class 4 streamside reserves must be pulled through defined corridors as specified in the FPP. The number of corridors should be minimised.
- Where practicable, suspended extraction that avoids ground contact should be used.
- Where practicable, understorey vegetation adjoining seepage areas or Class 4 watercourses on which streamside reserves have not been applied should be retained and disturbance minimised. All trees to be harvested should, where practicable, be felled away from Class 4 watercourses.
- Cable draglines which are rutted to a depth of more than 200 mm below ground level for a distance of 20 m or more should be drained by appropriate methods at maximum intervals of 20 m.
- Winch-assisted harvesting extraction or machinery tracks which are rutted to a depth of more than 200 mm below ground level for a distance of 20 m or more should be drained by appropriate methods at maximum intervals of 20 m.
- The restoration provisions for conventional harvesting described in C6.1.2 also apply to cable draglines and winch-assisted machinery tracks.



- Harvesting in steep country will aim to minimise the accumulation of harvesting debris in streams, streamside reserves and machinery exclusion zones.

Outcome

Minimal erosion of soil or adverse effects on soils and streams in steep country, based on the use of appropriate harvesting techniques.

D. MANAGING NATURAL AND CULTURAL VALUES

General principles

- Natural and cultural values, for the purposes of this Code, include biodiversity, genetic resources, soils, water quality and flow, geodiversity, landforms, visual landscape and cultural heritage.
- The evaluation of natural and cultural values will be done in accordance with the processes described in the planning tools on the FPA website. These processes involve site-specific evaluations and indicate when specialist advice should be sought.
- The FPA's evaluation sheets for natural and cultural values, available on the FPA website, will be used in the FPP preparation process described in this section of this Code.
- Significant natural and cultural values are those identified by the evaluation processes, and for which management prescriptions will be developed where required.
- Natural and cultural values should be assessed at the strategic or landscape level where practicable. If a strategic landscape level approach has been agreed between the FPA and a landowner, agreed procedures contained within the relevant agreement will apply where practical.
- Natural and cultural values in adjacent reserves should be considered during both the planning and implementation of forest practices.
- Management of multiple natural and cultural values should be integrated where possible.
- The location of some sensitive features may need to be kept confidential, and access to these sites may need to be restricted.

Duty of Care

- The overarching objective of the forest practices system is to achieve sustainable management of Crown and private forests with due care for the environment and taking into account social, economic and environmental outcomes (Schedule 7 of the Act).
- Under Section 4B of the Act, the FPA is to act in all matters in a manner that best advances this objective.
- The contribution of forest owners to the conservation of environmental and social values and the sustainable management of Tasmania's forests is determined by:
  - all measures that are required under relevant legislation which is identified in Appendix 1 with the annotation (RL), and
  - the prescribed Duty of Care for the purposes of this Code, which includes:
    - all measures which are required to protect soil and water values, as detailed in this Code, and
    - the exclusion of forest practices from areas containing other significant environmental and social values at a level of up to an additional 5% of the existing or proposed forest on the property for areas totally excluded from the forest operations, or at a level of up to an additional 10%, where partial harvesting of the reserve area is compatible with the protection of the values.
- In either case, conservation of values beyond Duty of Care levels is deemed to be for the community benefit and beyond what can reasonably be required of landowners, and should be achieved on a voluntary basis through relevant governmental and market-based programs and incentives.
- Management prescriptions in FPPs may stipulate more extensive reservation of areas than required by the Duty of Care if this is necessary to provide for the conservation of environmental and social values on the relevant land. It is possible that the facts and circumstances of a particular FPP application could cause the FPA to refuse to certify the FPP.

Operational approach

- The FPA planning tools, and other available information on the evaluation and management of natural and cultural values, will be consulted in accordance with the requirements and guidelines outlined on the FPA's website.

- Planning for harvesting of small planted woodlots may be based on a simplified evaluation process prior to the preparation of the FPP. Small planted woodlots include plantations in an agricultural setting planted as windbreaks, shelterbelts, block plantings or other such areas smaller than 10 ha.
- Location information regarding areas reserved from the harvesting of timber or the clearing of native vegetation for the conservation of natural and cultural values under the FPP should be recorded in a manner designed to aid future decision making and provide for continuity of management.
- Forest practices may be carried out in areas containing significant natural and cultural values. This may only occur where an evaluation of natural and cultural values has been conducted in accordance with the relevant evaluation process described on the FPA website, and the risks to those values are managed appropriately.
- Measures taken to conserve natural and cultural values will be consistent with effective fire management, silvicultural practices and safety requirements, and may affect the implementation of forest practices.
- The recommended actions delivered by FPA planning tools should be translated into a practical management prescription in the FPP, so that the intent is easily understood by all readers.

D1. Soils

General principles

- Proper care of forest soils is fundamental to sustainable forestry.
- Forest practices will be conducted in a manner that maintains soil fertility and does not cause significant deviations from natural rates of erosion and landslides.
- Care of forest soils during and after forest practices will be achieved by the control and prevention of unacceptable rates of erosion, nutrient loss, and landslides; and prevention of excessive compaction, puddling and mixing of topsoils and subsoils.

Operational approach

- During planning for forest practices, the erodibility, drainage, depth, susceptibility to landslides and nutrient loss of different soil types will be considered.
- Landslide hazard assessment is particularly important in planning road route*s.*

Soil erodibility

- Five classes of soil erodibility are used in this Code: low, moderate, moderate-to-high, high and very high, as described in Appendix 3 .
- Erodibility classes for commonly occurring Tasmanian soils are provided in *Forest soils of Tasmania* (16), the FPA's *Forest soil fact sheets* (17), and in detailed soil reports. A soils specialist should be consulted if the erodibility class cannot be determined from published information or field observations.
- The actual erosion risk on a given site is related to soil erodibility combined with soil depth and site factors such as slope and rainfall intensity.
- Soils with high or very high erodibility, or having a high erosion risk, require particular care. A specialist should be consulted during preparation of FPPs on these soils. The FPA's *Technical Note: Earth Sciences Technical Note 1: A guide for operations on high and very high erodibility soils* (9) should be taken into account, and *The Strahan guidelines* (7) may apply.

Karst

- In karst areas, soil can be eroded directly downward into subsurface drainage channels without surface runoff occurring, causing progressive, and potentially total, soil loss or accelerated sinkhole formation. Subsurface drainage should be assessed before any forest practices occur in a karst area or its catchment.

- Subsurface drainage directions in karst may be different to surface drainage shown on topographic maps or drainage directions evident on the surface.
- Remote sensing imagery of the ground surface features should be used where available (e.g. hillshade maps).
- Stream sinks and caves in karst areas make subsurface streams susceptible to contamination by chemicals such as fertiliser and herbicide. Specialist advice will be sought where stream sinks and caves occur.
- Clearfelling will not be permitted on areas with vulnerable karst soils or within 2 km of a town water supply intake, unless authorised by the CFPO.
- Careful management will be required to prevent slurrying and puddling on poorly drained soils which, when near saturation, lose soil structure and strength (e.g. soils in swamps, peats, deep clays and deep silts).

Soil depth

- Shallow soils, especially those having a planar rock contact (e.g. soils on 'slab' dolerite or limestone), should be managed to prevent the impacts of erosion.
- Rock outcrops and areas of very shallow soils should be left unharvested.

Managing nutrient loss

- In order to conserve nutrients and topsoil cover, burning on very high erodibility soils will be limited. Site-specific management prescriptions may need to be developed.
- Where forests are being managed on short rotations, consideration should be given to retaining slash on site and limiting burning, particularly on soils with moderate-to-high or high erodibility.

Landslide threshold slope angle

- Table 6 presents acceptable threshold slope angles for soils developed on various rock types. Slopes greater than these threshold angles are known to be susceptible to landslides.
- Areas with slopes greater than the threshold slope angle will be assessed for landslide hazard by a soils or other geotechnical specialist before forest practices proceed under the FPP. See also C9.
- A specialist should be consulted if unusual landform features such as hummocky ground, seepages or evidence of shallow subsurface drainage through the soil (e.g. intermittent disappearance of small water flows and minor collapse holes) occur.

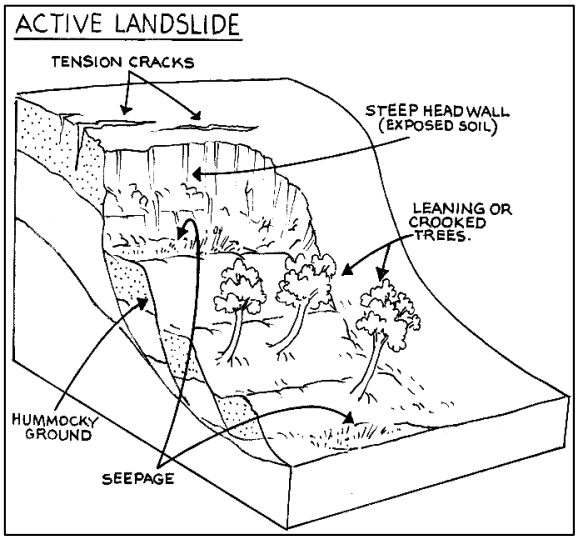


Table 6 Landslide threshold slope angles

Age	Rock type	Threshold slope angle[2] (degrees)
Quaternary	Dolerite slope deposits (talus) [1] Basalt slope deposits (talus) [1] Landslide debris	19° 15° 11°
Tertiary	Clay, sandy clay, lignite Basalt	11° 19°
Triassic	Basalt Mudstone, Siltstone, Shale Coal, coal measures Carbonaceous mudstone	19° 19° 15° 15°
Permian	Mudstone, siltstone Micaceous shale Carbonaceous shale and mudstone Coal, coal measures	19° 15° 15° 15°
Ordovician-Silurian-Devonian	Turbidites (sandstone and siltstone – Mathinna beds)	25°
Precambrian	Phyllite, schist	19°

Notes:

1. The FPA's *Forest management on soils in basalt talus* (18) and *Guidelines for forestry operations on soils formed in dolerite slope deposits (dolerite talus)* (19) provide further information.
2. Must be present over at least 10% of the coupe.

- Other rock types not shown in Table 6, and slopes below the threshold, may be subject to landslides. Where such landslides have occurred or occur during operations, they will be reported to the CFPO and the area assessed for landslide hazard.

Outcome

Maintenance of stable, productive soils capable of supporting future forests.

D2. Water quality and flow

General principles

- Forest practices will be planned and conducted in a manner that does not cause significant deviations from natural ranges (including natural disturbance such as bushfires and storms) of water flow and quality, and meets statutory objectives for water management and water quality standards by minimising the risk of sedimentation and pollution arising from forest practices.
- Water quality and flow should be considered at the planning stage. Coupe design, coupe dispersal, and the extent of harvesting within individual catchments should minimise impacts on stream flows through changes in runoff.
- Water quality and flow are affected by natural factors such as annual rainfall regime, vegetation types, vegetation cover and age, geology and geomorphology, soil type and exposure, topography, bushfires, and storms, and by human actions such as road construction and maintenance, timber harvesting, reforestation, land clearing, dam construction and chemical use.
- Acceptable water quality and flow, and channel stability should be maintained at the catchment and operational level.
- The principles and approaches in this Code are consistent with the State Policy on Water Quality Management.

D2.1 Watercourse management

General principles

- Water quality, catchment and channel stability, and biodiversity in aquatic ecosystems can be protected by minimising disturbance to watercourse channels and riparian (streamside) zones, and by reducing soil disturbance in and near watercourses. Potential downstream impacts also need to be considered.
- The type of management required depends on the nature of the catchment, size and permanence of the watercourse, the volume of water carried, and any natural and cultural values present.
- All streamside reserves should be managed to provide long term conservation and/or rehabilitation of riparian values.
- Establishment of native vegetation is encouraged as the best means to achieve reasonable protection and/or rehabilitation of riparian values.

Operational approach

- In native forest operations, native vegetation will be retained intact in Class 1, 2 and 3 streamside reserves as defined in Table 7, in Class 4 streamside reserves prescribed in accordance with Appendix 5, or for biodiversity reasons, subject to other provisions in this Code permitting watercourse crossings and selective harvesting under specified conditions (see C7.1).
- In plantations, forest practices in streamside reserves will be subject to the requirements of C7.2 and E1.2.
- Class 4 watercourses may be upgraded to Class 3 status by an FPO depending on local site conditions, particularly in eastern parts of Tasmania prone to high intensity rainfall.
- Wider streamside reserves may be specified in FPPs where necessary to provide reasonable protection for values identified during planning, for example:
  - significant recreational, water supply, landscape, habitat or conservation values (particularly threatened aquatic species, relict rainforest or karst)
  - apiary resource (e.g. dense leatherwood stands)
  - significant myrtle gullies at risk from myrtle wilt
  - fish-spawning or nursery areas
  - areas at significant risk of windthrow.

Table 7 Minimum streamside reserve or machinery exclusion zones widths

Watercourse type	**Minimum[1] horizontal width from watercourse bank to outer edge of reserve**
Class 1. Watercourses from the point where their catchment area[2] exceeds 2500 ha, lakes, artificial storages[3] and tidal waters	40 m [4]
Class 2. Watercourses that generally flow with water most of the year, with catchments[2] of 100–2500 ha	30 m
Class 3. Watercourses that generally flow with water most of the year, with catchments[2] of 50–100 ha	20 m
Class 4[5]. Watercourses with catchments[2] less than 50 ha carrying water for part or all of the year for most years	Reserve or 10 m machinery exclusion zone[6]

Notes:

1. Note the requirements of section D2.2 for greater minimum distances for clearfelling adjacent to watercourses within 2 km upstream of a town water supply intake.
2. All catchment areas should be confirmed prior to deciding upon reserve widths.
3. Excluding farm dams for on-farm water use, and impoundments solely for irrigation purposes.
4. For tidal waters, the 40 m starts from the high tide mark.
5. A Class 4 watercourse generally has at least one of the following features:
   - a gravelly, pebbly, rocky or sandy bed, indicative of flowing water
   - an obvious gully
   - a short steep section of streambank adjacent to the watercourse bed

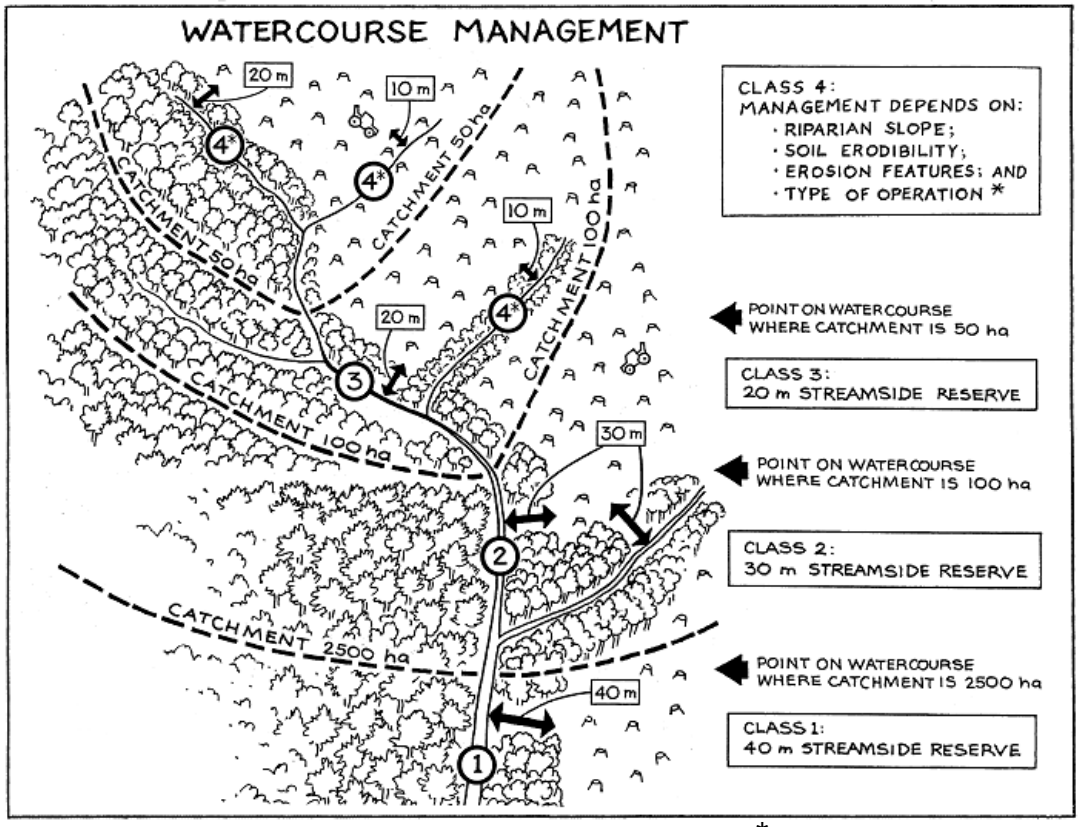
   and may also display a change in understorey vegetation from the streambank to the surrounding forest (e.g. riparian/moist vegetation on streambanks such as ferns, mosses, sedges).

   In contrast, a drainage depression does not have these features and topsoil is continuous across the depression.
6. Subject to Appendix 5, and biodiversity considerations

- Watercourse classifications should not be downgraded where there is a loss of water underground into subsurface conduits. Where the location of subsurface conduits is uncertain (e.g. in karst terrain or on low angle fans and on floodplains) consult a specialist for advice.
- Significant springs of unknown catchment size will be treated as Class 3 or 4 watercourses. Subsurface conduits emerging as springs may require extra protection upslope (e.g. extension of machinery exclusion zones).
- Interpretations on watercourse classifications and appropriate streamside reserve widths should be sought from the relevant specialist when considered necessary.
- For farm dams, or impoundments solely for irrigation purposes, on Class 4 watercourses, where soils are in the low, moderate or moderate to high erodibility class and slopes around the dam are 15° or less, apply a 10 m machinery exclusion zone extending from the high water mark of the dam or impoundment.
- For farm dams, or impoundments solely for irrigation purposes, on Class 1, 2 and 3 watercourses, where soils are in the low, moderate or moderate to high erodibility class and slopes around the

dam or impoundments are 15° or less, apply a minimum streamside reserve of 10 m extending from the high water mark of the dam or impoundment.

- For machinery exclusion zones and streamside reserves around farm dams or impoundments in all other situations, seek specialist advice.



* Refer to Table 7 and Appendix 5

D2.2 Water supply and other significant catchments

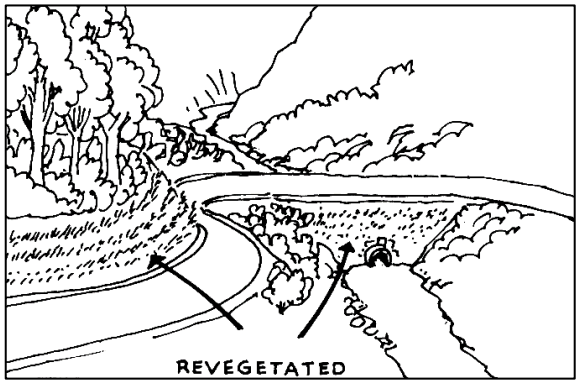
General principles

- In town water supply and domestic water supply catchments, freshwater aquaculture facility supply catchments and catchments important for threatened aquatic fauna, particular attention to soil and water care is needed.
- In these catchments, planning will minimise, as far as is practicable, the percentage of the catchment harvested, roaded or established to plantation in any one year.

Operational approach

- Town water supply catchments and town water supply intakes are available from the water management authority and as layers on *LISTmap* (20).
- No more than 5% of a town water supply's total catchment area should be clearfelled in any 12 month period ending 30 June. For partial or selective harvesting, a pro rata approach based on harvest intensity may be applied (see C1).
- The extent and location of harvesting in town water supply catchments should be considered during the three-year plan process.
- The locations of freshwater aquaculture facility intakes are available from the EPA and on the FPA Cover Page system.
- Town water supply intakes within 5 km downstream of planned forest practices will be identified in FPPs.

- Additional watercourse protection such as extended streamside reserves or other measures may be authorised in the FPP.
- Within 2 km upstream of a town water supply intake or freshwater aquaculture facility intake, specific prescriptions will be placed in FPPs, regarding:
  - timing of harvesting, plantation establishment, and road construction
  - use of chemicals (see E2)
  - wet weather limitations (see C5)
  - management of fuel, grease and oils (see F)
  - methods of construction of watercourse crossings, such as ensuring that earth is kept out of the watercourse, abutments are stable, earth on earth covered bridges is contained, and turbid runoff is minimised by using good quality hard wearing gravel without excess clay (see B3.3)
  - methods of road construction, such as using sediment traps, precast culvert heads and energy dissipaters at culvert outlets, and revegetating road batters, and lining drains with rip rap (see B3.2).
- These measures will also be considered for catchments which are important for threatened aquatic fauna.
- Within 2–5 km upstream of a town water intake, risks will be assessed and appropriate prescriptions will be placed in FPPs.
- Clearfelling in native forest will not be permitted within 50 m of a bank of a Class 1, 2 or 3 watercourse for a distance of 2 km upstream from a town water supply intake (see D2.2).
- Clearfelling in native forest will not be permitted within 10 m of a Class 4 watercourse for a distance of 2 km upstream from a town water supply intake, unless approved by the water authority in whose area the intake is located (see D2.2).
- Clearfelling in plantations within 50 m of a Class 1, 2, or 3 watercourse, and within 2 km upstream of a town water supply, will be subject to the approval of the CFPO.
- Clearfelling in plantations within 10 m of a Class 4 watercourse, and within 2 km upstream of a town water supply, will be subject to the approval of the CFPO.
- Revegetation or other methods of surface protection of areas of bare soil on road batters, borrow pits, landings and extraction tracks will be specified in the FPP.



- Within 2 km upstream of known and legally valid domestic water intakes, measures in addition to the standard provisions of this Code may be prescribed in FPPs. This is particularly important where a domestic water supply is derived wholly or predominantly from within an area of forest practices. Consult with a specialist if unsure whether disturbance is likely to significantly affect water quality.

Outcome

Forest practices which have effectively minimised adverse impacts on water quality and flow by utilising coupe dispersal and buffers of retained riparian vegetation, with particular regard to domestic and town water supplies and requirements for aquatic biodiversity.

D3. Geomorphology

General principles

- Forest practices will not cause undue harm to important geological and geomorphic features.
- Geological, landform, and soil sites may be important for their intrinsic, scientific, recreational, inspirational values, other uses, and the role geodiversity plays in sustaining natural processes. They vary in their vulnerability to damage.
- Survey, identification, recording, and assessment of geoconservation values should be carried out, where appropriate, prior to forest practices commencing. Protection of significant sites and landforms may be by management prescriptions or reservation.

Operational approach

- During preparation of the FPP, the area proposed for forest practices will be assessed for the following:
  - the presence of any landforms and/or sites as listed in the Tasmanian Geoconservation Database (21)
  - the presence of major bedrock types potentially containing karst features, such as Ordovician limestone, Precambrian dolomite and magnesite, Permian limestone and Tertiary limestone/calcarenite
  - whether any management issues are likely to arise in future as a result of the forest practices (e.g. easier public access to sensitive sites).
- Areas of potential geoconservation significance should be identified from available sources.
- A geomorphologist will be consulted to advise on the significance and management requirements in any of the situations identified above, or where sinkholes, caves, or sinking watercourses are present.
- FPPs will specify the significant features present in the operational and adjoining areas, and the management prescriptions to be implemented.

Outcome

Management of important geological and geomorphic features that avoids or minimises disturbance from forest practices.

D4. Biodiversity

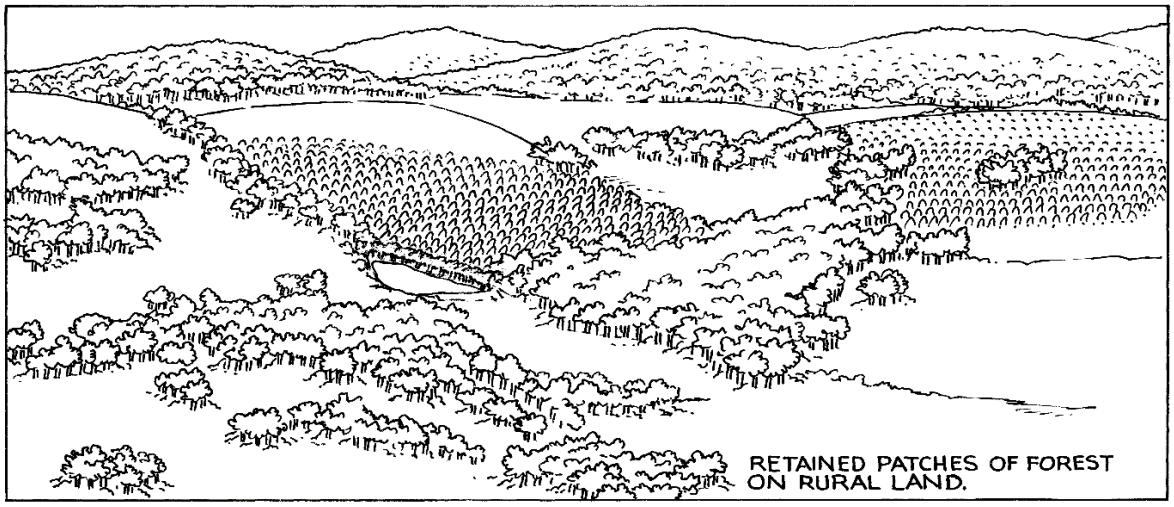
General principles

- Forest practices will be conducted in a manner that recognises and complements the contribution of the reserve system to the maintenance of biological diversity, ecological function and evolutionary processes through the maintenance of viable breeding populations and habitat for all species.
- Maintenance of biodiversity is assisted by managing and restoring habitat, enhancing opportunities for recolonisation of disturbed areas, and linking forested and other natural areas.
- Maintenance of the genetic resources of native forest is assisted by retaining native flora and fauna in formal and informal reserves such as wildlife habitat strips, wildlife habitat clumps, and streamside reserves dispersed throughout native forest, and using silvicultural practices and seed sources suitable for the site when regenerating native forest.
- Retention of forest with mature structural characteristics, where they are present, is generally preferable to retaining regrowth of the same forest type for biodiversity management.

- Coarse woody debris in native forest is an important component of biodiversity, and should be maintained in native forest, and where possible in plantation landscapes, at levels consistent with safe fire management.

Operational approach

- Planning for the management of biodiversity values should take account of the environment beyond the boundary of proposed forest practices where relevant.
- Consideration should be given to the type of forest practices intended and the attributes and context of the area within the landscape.
- Appropriate levels of initial planning may comprise the whole property, forest block, catchment or region. At such levels, strategies should be developed to maintain biodiversity, particularly in areas with extensive plantations and other substantially modified areas.
- Native forest coupes should be dispersed (see C1.2) and coupe dispersal should be considered for plantation coupes.
- The area proposed for forest practices will be assessed to determine:
  - the vegetation communities present
  - the known or likely presence of threatened native vegetation communities, as identified using the *Forest botany manual* (5)
  - known occurrences of, or potential habitat for, threatened species
  - species with disjunct or unusual distributions
  - sites with high species diversity.
- TASVEG is a vegetation mapping layer accessible through LISTMap (20), which provides an indicative distribution of vegetation communities. During planning, validation of threatened native vegetation communities will be carried out by on-ground survey and/or remote sensing methods appropriate for vegetation community identification and delineation of vegetation boundaries. Where native forest occurs mainly as relatively small patches of forest in substantially modified landscapes, consideration will be given to:
  - retention of native forest remnants to maintain local biodiversity
  - restoration of habitat including widening and linking wildlife habitat strips, particularly where significant biodiversity values are known to occur.

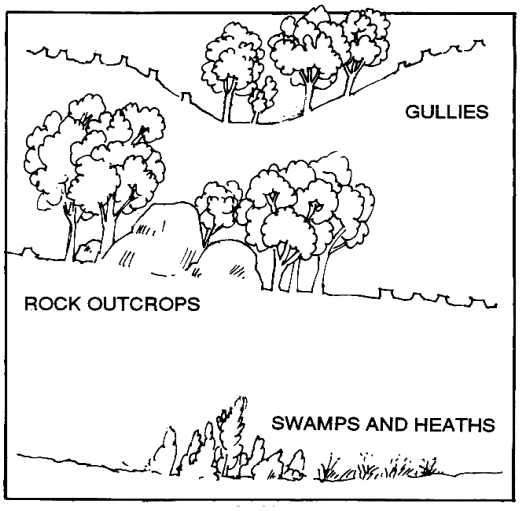


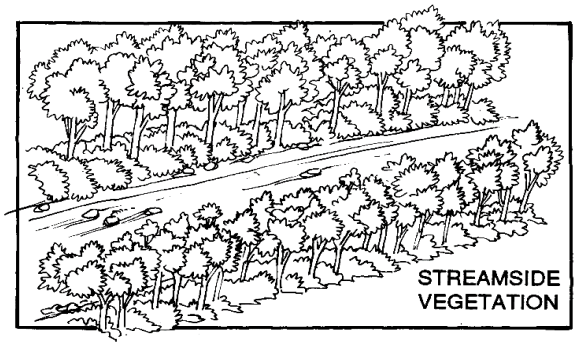
D4.1 Flora

Operational approach

- Disturbance to native vegetation in localised environments (such as rocky knolls, swamps, heaths, and streambanks) should be avoided or minimised.

- Consideration should be given to indirect impacts on localised environments, such as changes in microclimate from the removal of adjacent vegetation, and the effect of drainage on adjacent land (e.g. swamps). Localised environments are often associated with plant communities and species that are a priority for conservation and are important in maintaining diversity at a local level.





- The risk of accidental infection of vegetation that is susceptible to *Phytophthora cinnamomi* (root-rot fungus), such as swamps, heaths, sedgelands, dry lowland forest on sandy or poorly drained sites, and low altitude rainforest on infertile sites, should be reduced by implementing hygiene measures during relevant activities (e.g. road construction). Sources of information include the *Tasmanian washdown guidelines for weed and disease control* (13) and the FPA's *Flora Technical Note 8: Management of* Phytophthora cinnamomi *in production forest* (8).
- Reasonable protection of retained patches of myrtle (*Nothofagus cunninghamii*) rainforest from fire, damage and disease (notably myrtle wilt) should be provided. This may require buffering of some patches (e.g. by extending streamside reserves) and avoiding or minimising damage during road construction or maintenance (see B3.1).
- The risk of establishment of weed species (e.g. pampas grass, ragwort, blackberry or Spanish heath) and/or the incursion by plantation species into adjoining areas of native forest, particularly reserves, should be minimised (see E3.3). Native vegetation most at risk includes areas adjoining plantations, riparian areas, and drier forest types in general.
- Retaining an area of native forest as a buffer between plantations and native species susceptible to hybridisation should be considered to minimise the risk of genetic drift. Further information is available in the FPA's *Flora Technical Note 12: Management of gene flow from plantation eucalypts.* (22).
- Disturbance of localised environments rich in epiphytic species should be avoided or minimised, particularly in drier areas. Buffers of uncut forest may help maintain climatic conditions suitable for epiphytes.
- Trees should not be felled or dragged across environments rich in epiphytic species, partly to reduce the volume of slash and consequently the intensity of regeneration burns. Epiphytic species will recover more rapidly on sites that are not subjected to high intensity burning.

D4.2. Fauna

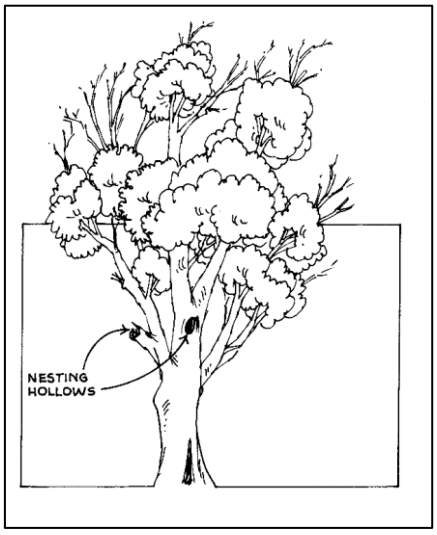
Operational approach

- At the landscape scale appropriate to the management context of an operation, wildlife habitat strips should be retained within or adjacent to operational areas to maintain habitat diversity.
- As a guide, strips of uncut native forest 100 m in width should be provided every 3–5 km from each other.

- Wildlife habitat strips should connect large patches of native forest which are not to be harvested, such as formal and informal reserves.
- Further information on the planning and management of wildlife habitat strips can be found in the FPA's *Fauna Technical Note 8: Wildlife habitat strips* (23).

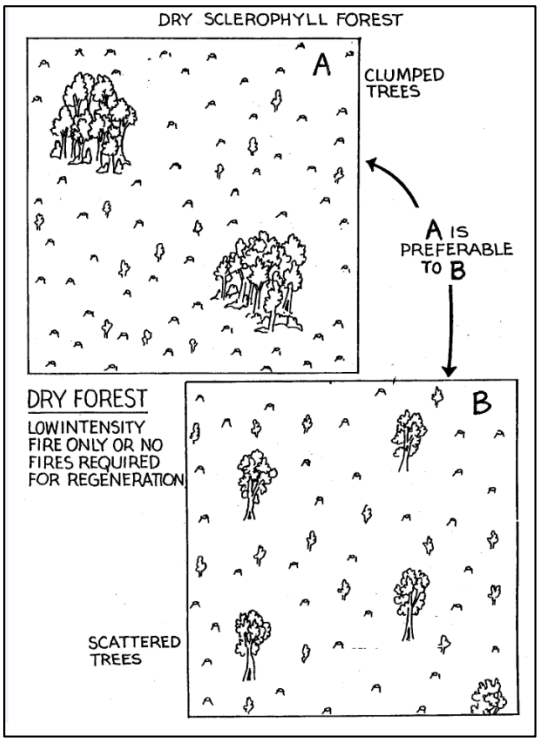
WILDLIFE HABITAT STRIPS IN NATIVE FOREST

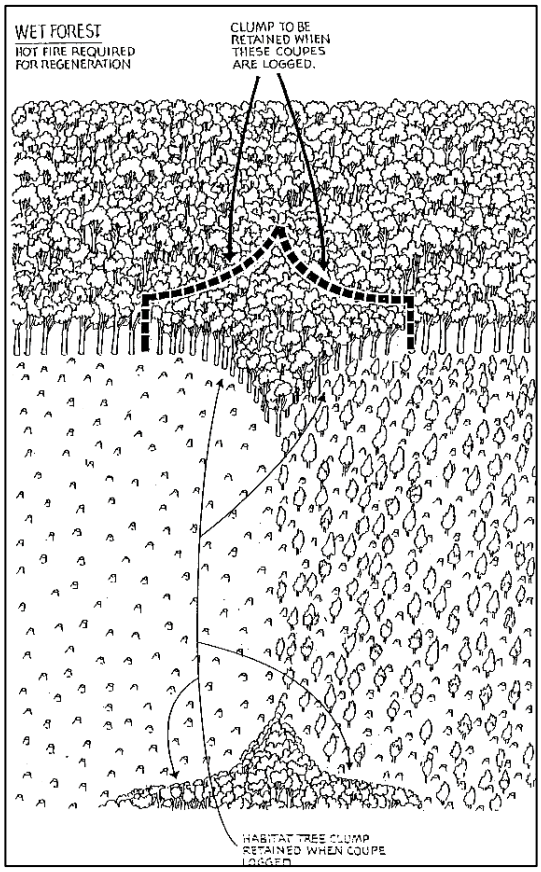
- Patches of mature native forest excluded from forest practices (wildlife habitat clumps) should be located to include habitat trees with nesting hollows and/or other mature structural elements.



- Retaining wildlife habitat clumps helps maintain the habitat requirements of mature forest-dependent fauna species, particularly hollow-dependent fauna, and enhances recolonisation of regenerating forest following harvesting.
- Distribution of habitat clumps in native forest should be based on the type of post-harvest planned burn:
  - Where no burning or light fuel reduction burning is planned, habitat clumps should be in areas that are not within 200 m of other retained areas, at a rate of approximately one clump every 5 ha. They should contain a minimum of two to three habitat trees and where possible a range of trees and shrubs of other ages.
  - Where higher intensity regeneration burning or cable harvesting is planned (as in clearfell coupes), habitat clumps should be retained along the boundary of the coupe where the risk of disturbance can be minimised. Clumps should occur at approximately 200 m intervals along a

coupe boundary in areas not within 200 m of other reserved areas, where appropriate. The clumps should be about 50 m × 20 m in size. Ideally, retain adjoining clumps when adjacent coupes are felled.





- Further information on the design and location of wildlife habitat clumps can be found in *Fauna Technical Note 7: Wildlife habitat clumps* (24).

D4.3 Listed threatened species and communities

General principles

- Management of listed threatened flora and fauna species and threatened native vegetation communities is covered by legislation and processes that include the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, the Tasmanian *Threatened Species Protection Act 1995*, the *Nature Conservation Act 2002*, the Act and its Regulations, and the RFA as amended from time to time.
- Based on these legislative and policy mechanisms, the conservation of listed threatened species and threatened native vegetation communities may be achieved by reservation, prescription in accordance with the Duty of Care provisions (see D), or through voluntary arrangements.

Operational approach

- See D4 and A1.1 for information regarding the assessment of threatened native vegetation communities.
- Threatened native vegetation communities, both forest and non-forest, listed under Schedule 3A of the *Nature Conservation Act 2002* will be managed in accordance with the requirements of the *Forest Practices Act 1985*.
- Threatened species listed in the schedules to the *Threatened Species Protection Act 1995* will be managed under the forest practices system in accordance with the *Procedures for the*

management of threatened species under the forest practices system (available on the DPIPWE website).

- The above procedures include a process to develop endorsed or site-specific management recommendations for the management of threatened species. The recommendations will be incorporated into the FPP.
- Endorsed management recommendations are delivered through the FPA's biodiversity planning tools which are available on the FPA website.
- Species or ecological communities that are listed only in the schedules of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, and not listed as threatened under relevant Tasmanian legislation, will be managed in accordance with the general principles and operational approach of D4 of this Code.
- Where forestry is not the primary purpose of the forest practices (e.g. in clearance and conversion situations), applicants should seek advice as to whether the activity requires separate approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*

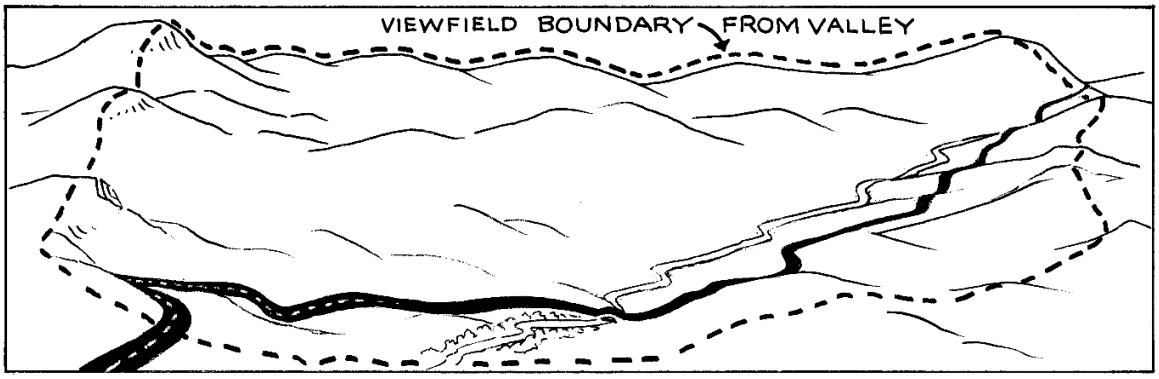
Outcome

Development and implementation of management prescriptions that contribute to the maintenance of biodiversity, ecological function and evolutionary processes by contributing to the maintenance of viable breeding populations and habitat for all species.

D5. Visual Landscape

General principles

- Forest practices will have regard to the sensitivity of visual landscapes and amenity values to alteration by forest practices.
- The impact of forest practices on visual landscapes will consider public sensitivity, the distance of forest practices from the viewer, and the scenic quality of the local area.
- Forest practices generally cannot, and need not, be hidden from public view.
- Sources of further information may include the FPA's *A manual for forest landscape management* (25), historical mapped data and computer modelling packages.



Operational approach

- The sequencing and timing of forest practices in relation to long-term cumulative visual effects will be considered during the planning process.
- The effects of forest practices on the visual landscape will be evaluated as outlined in the *FPA process for visual landscape special values assessment and planning* (26).

- Local government will be consulted regarding areas with landscape protection provisions in planning schemes.
- The risk of losing trees to windthrow in forest retained for visual management objectives (e.g. on skylines, in road and stream buffers) will be considered during the planning process. The retention of trees to meet visual management objectives may increase risks to public safety. Trees planned to be retained will be assessed using the FPA risk assessment form (6) and any resulting prescriptions included in the FPP.

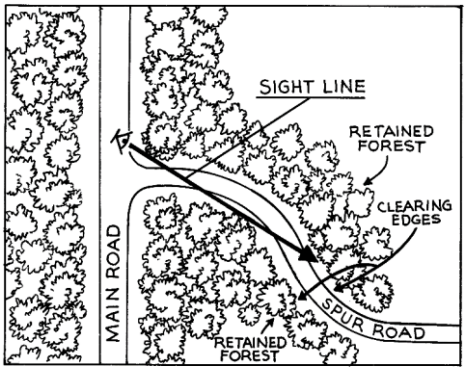
D5.1 Roads and quarries

General principles

- Roads, including constructed cable landings, and quarries can impact on forest scenery and introduce long term changes.
- Exposed rock and subsoil often contrast in colour and brightness with surrounding forest.

Operational approach

- Roads and quarries in visually sensitive locations should be designed to limit their visual exposure. Methods such as planting or spray seeding on fill slopes or exposed batters should be considered to lessen the impact of areas of high visual contrast.
- New spur roads should be designed and constructed to limit prolonged views into forest practices from tourist roads. A dogleg bend close to the junction should be considered where safe and practicable.



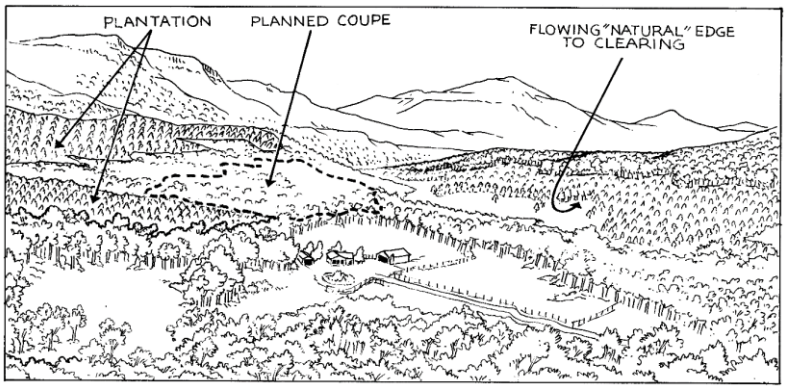
SPUR ROAD WITH DOGLEG BEND

- Roads and fire breaks should not be directly aligned with major viewpoints.
- New quarries should be located and designed to limit their exposure to public viewing.

D5.2 Harvesting

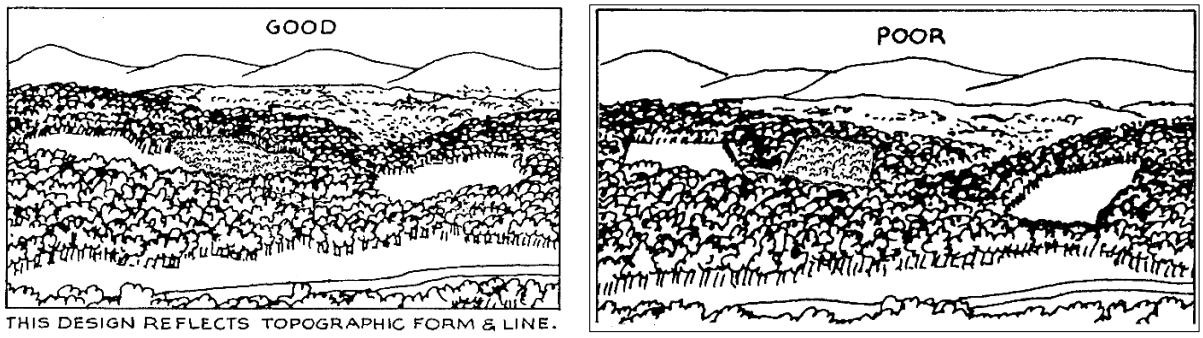
General principles

- The strong visual contrast with surrounding forests created by clearfelling should be considered during the planning process.
- The visibility, shape and size of coupes planned for clearfelling should be guided by existing patterns and features seen in the surrounding landscape. These include land use and vegetation patterns as well as topographical aspects, especially ridges and drainage gullies.

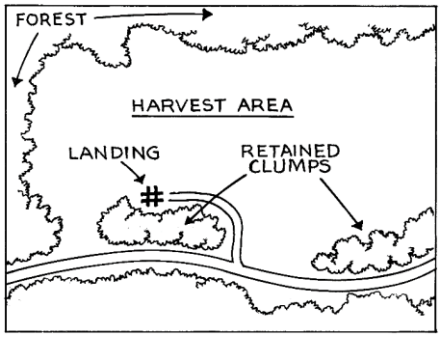


Operational approach

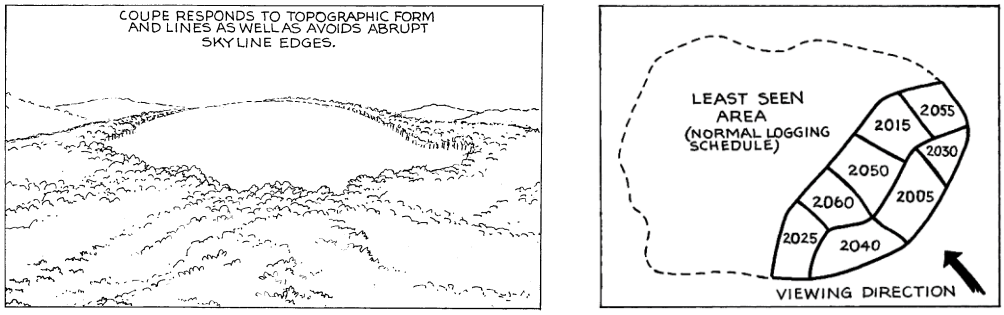
- Straight edges and box-like shapes should be avoided, especially in native forest.



- Roadside vegetation can limit the visual impact of forest practices. Strips of retained vegetation should be sufficiently wide to minimise windthrow.
- Where practicable, set landings back within the coupe and retain forest around them as a screen until the majority of the coupe has been harvested.



- Minimise disruption of forested skylines by using suitable coupe boundary design and/or by dispersing coupes in time and space.



- Forest practices should be managed to minimise the level of visual change from sensitive viewpoints from highways, lookouts, walking trails and township (see C1).
- In steep country, the visual management of forest practices should consider the greater prominence and exposure of steep slopes, on which land-use changes are more obvious.

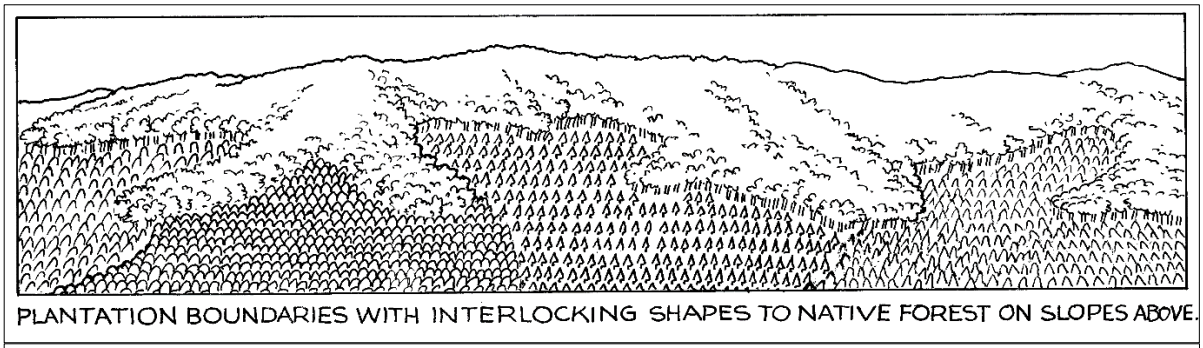
D5.3 Plantation development

General principles

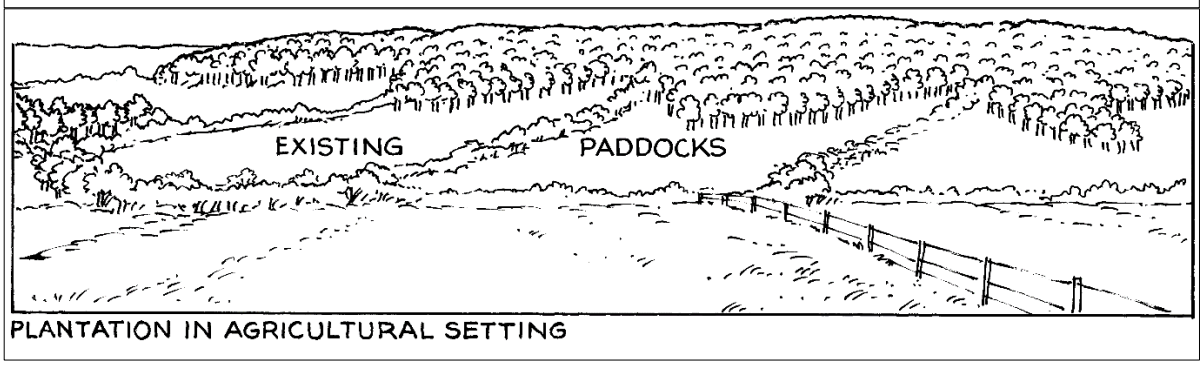
- Plantation forestry can alter the character of the scenery, especially in rural areas. Careful planning should be done to minimise visual impacts.
- The visual prominence of plantations arises from the contrast of their colour with surrounding vegetation and/or agricultural clearings, rectilinear boundaries, uniform canopy texture and height, and short rotation periods.

Operational approach

- Planning techniques designed to link new plantations into the surrounding landscape, to reduce their prominence, and to maintain visual variety should be considered:
  - avoid harvesting large areas in the same year
  - design plantations on hillsides so that they relate sympathetically to the topography as defined by watercourses and ridgelines
  - use interlocking coupe shapes, sizes, and age classes, as well as scheduling to create mosaics of land use within the landscape.



PLANTATION BOUNDARIES WITH INTERLOCKING SHAPES TO NATIVE FOREST ON SLOPES ABOVE.



PLANTATION IN AGRICULTURAL SETTING

Outcome

Coupe designs and harvesting schedules that consider the local character of visual landscapes.

D6. Cultural Heritage

General principles

- Forest practices will be conducted in a manner that respects and manages Aboriginal and historic cultural heritage through prescription or reservation in accordance with legislative requirements and the Duty of Care provisions in this Code (see D).
- The cultural heritage of all ethnic groups (e.g. Aboriginal and other Australians) will be considered in all stages of forest management. The need for consultation with stakeholders is acknowledged.
- Protection of cultural heritage should be achieved through identification, recording and assessment, and subsequent management by prescription or reservation.
- On-ground surveys for Aboriginal heritage will be conducted by a person who has received specialised training.
- Relevant legislation and processes, including those required under the *Aboriginal Heritage Act 1975* and the *Historic Cultural Heritage Act 1995*, will be delivered through FPPs in accordance with formal procedures agreed by the FPA and other relevant agencies.
- Discretion should be exercised regarding the sharing of information related to cultural heritage sites, as this may assist in their protection.

D6.1 Aboriginal heritage

Operational approach

- The FPA's *Procedures for managing Aboriginal cultural heritage when preparing FPPs* (PACH) (27) will be followed when planning and conducting forest practices.
- Other sources of information may include the database of site records maintained by Aboriginal Heritage Tasmania (AHT), proprietary databases, archaeological publications, and local knowledge.
- During the preparation of FPPs, any known (listed and newly discovered) Aboriginal heritage sites and any triggers for high sensitivity zones (as listed in PACH) will be identified.
- Specialist advice will be obtained if required by PACH.
- Operational management prescriptions, developed in accordance with PACH, will be listed in the FPP.
- If any Aboriginal cultural heritage sites or features associated with them (e.g. middens, artefact scatters) are identified during forest practices, the site will be left undisturbed, an FPO will be notified and the newly-identified site will be assessed and recorded in accordance with the procedures detailed in PACH.
- Known and newly found Aboriginal cultural heritage sites will be managed in accordance with the *Aboriginal Heritage Act 1975* and PACH.
- Where required by PACH, surveys of high-sensitivity zones will be completed.
- The person or organisation responsible for required surveys will be listed in the FPP.
- Protection of sites should be achieved by management prescriptions which may include reservation.

D6.2 Historic heritage

Operational approach

- The FPA's *Procedures for managing historic cultural heritage when preparing FPPs* (PHCH) (28) should be followed when planning and conducting forest practices.
- Other sources of information may include public and proprietary databases, archaeological publications, and local knowledge.

- During the preparation of FPPs, any known (listed and newly discovered) historic heritage sites will be identified.
- Specialist advice will be obtained if required by PHCH.
- Operational management prescriptions, in accordance with PHCH, will be listed in the FPP.
- If any historic cultural heritage sites or features associated with them (e.g. sawmills, stone walls) are identified during forest practices, the site will be left undisturbed and an FPO will be notified and the newly identified site will be recorded in accordance with the procedures in PHCH.
- New sites will be assessed, recorded and appropriate prescriptions implemented in accordance with PHCH.
- Known and newly found historic cultural heritage sites will be managed in accordance with the Historic Cultural Heritage Act 1995 and PHCH.
- Protection of sites should be achieved by management prescriptions which may include reservation.

Outcome

Management of Aboriginal and historic cultural heritage during forest practices, through prescription or reservation, that avoids disturbance and is in accordance with legislative requirements.

E. ESTABLISHING AND MAINTAINING FORESTS

E1. Reforestation and forest establishment

General principles

- Forest establishment is the process of regenerating native forest, establishing plantations, or establishing rehabilitation plantings.
- Forest establishment should aim to conserve soil and water quality, maintain biodiversity and long-term site productivity, and manage visual impact and other natural and cultural values.
- A range of forest establishment techniques may be applicable depending on the site and stand characteristics and the landowner objectives.
- The aim of establishing native forest regeneration should be to maintain the forest type, i.e. forest structure and species composition, unless specific management objectives such as enhancing habitat for fauna or adaptation to climate change are stated in the FPP.
- Forest establishment techniques should take account of how much tree cover is to be removed, what site preparation is required to promote growth, and the source of new growth *(*i.e. seed, nursery plants or advance growth of seedlings, coppice or lignotubers).
- For seed-based reforestation, most native forest species require mineral soil, light, and freedom from competing vegetation and browsing to grow successfully.
- Natural fire frequency is lower in riparian (streamside) forest than in non-riparian forest. An objective of fire management planning should be to avoid burning riparian vegetation.
- Where streamside reserves have previously been cleared, their rehabilitation by establishing native vegetation in riparian areas is encouraged.

E1.1 Planning

General principles

- The factors listed below will be considered prior to commencing forest practices, and relevant management prescriptions will be detailed in the FPP.
  - Site preparation techniques, for example:
    - use of fire
    - mechanical heaping of debris
    - scarification of the soil
    - application of herbicides
    - treatment of harvest residues.
  - Regeneration establishment and reforestation techniques, for example:
    - source of next crop (advance growth, sowing treatments or planting, seed source, species)
    - nature and timing of forest establishment
    - stocking rates.
  - Protection of the new crop, for example:
    - monitoring and browsing control
    - exclusion of domestic stock
    - fire protection.
  - Evaluation of stocking, for example:
    - timing of stocking assessment
    - stocking standard to be applied.

Operational approach

- The person or organisation responsible for forest establishment will be listed in the FPP.
- Forest establishment boundaries will be marked before activities commence, except in the following circumstances:

- where they are clearly delineated by a change in vegetation, such as a forest/pasture boundary or road, or
- where an operator's location and the boundary can be clearly identified in real time on a georeferenced map.

- The person or organisation responsible for the marking, or preparation of a georeferenced map of boundaries, will be stated in the FPP (see A3.2).

E1.2 Site preparation techniques

General principle

- Site preparation techniques should be designed to:
  - assist in the initial forest establishment and subsequent growth of crop trees
  - facilitate protection from unplanned fire
  - provide access for future tending or harvesting
  - minimise erosion
  - minimise other detrimental environmental effects, such as:
    - excessive soil compaction, puddling
    - mixing of topsoils and subsoils
    - nutrient depletion
    - excessive sediment runoff
    - damage to watercourse channels and habitats
    - introduction of weeds.

Operational approach

Native forest regeneration

- Various native forest reforestation techniques, and the types of forest in which they are most appropriate, are summarised in C1.1.

- Where mechanical scarification is used to prepare seed beds:
  - care will be taken that scarification does not result in unacceptable erosion, compaction, rutting or mixing of the soil
  - drainage depressions, streamside or other reserves will be protected in accordance with standard provisions of this Code
  - scarification will only be done when the soil is dry or moist and is not saturated (see Appendix 4).

- Where sufficient established trees and an adequate seed bed exist following harvesting, further site preparation may be unnecessary, but fire protection requirements should be considered.

Plantation establishment

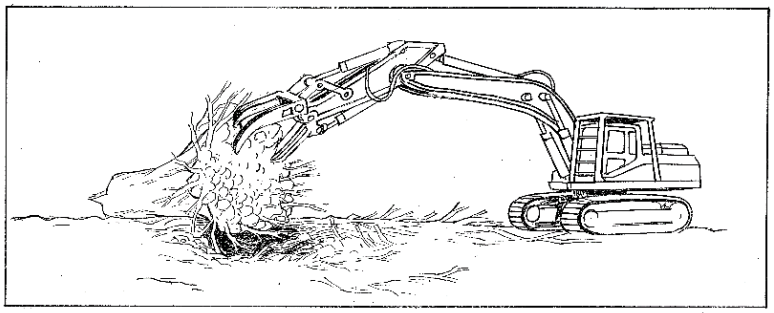
- The factors listed below will be considered prior to commencing forest practices and relevant management prescriptions will be detailed in the FPP:
  - slash management
  - nutrient management and retention on site
  - whether to burn and method of burning
  - site cultivation method and direction of cultivation
  - slope limits on cultivation
  - erosion prevention and control measures
  - water quality protection measures
  - drainage
  - species and stocking
  - control of declared and competitive weeds
  - browsing control
  - pest and disease control
  - fertiliser application.

- Soil cultivation will minimise the risk of significant erosion above natural levels. Particular care will be taken to limit erosion products such as fine sand, silt and clay reaching drainage depressions and streams. The preferred method in accordance with Table 8 should be applied where practicable unless alternative measures are recommended by a specialist and included in the FPP.

Table 8 Preferred mechanical cultivation methods on different slopes and soil erodibility classes

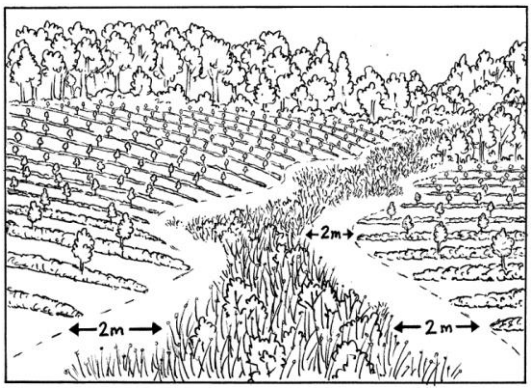
	Erodibility class			
Majority slope (degrees)	**Low or moderate**	**Moderate-to-high**	**High**	**Very high**
<3°	mounding or spot	mounding or spot	mounding or spot	mounding or spot
3–8°	mounding or spot	mounding or spot	mounding or spot	spot
9–11°	mounding or spot	mounding or spot	mounding or spot	spot
12–14°	mounding or spot	mounding or spot	spot	no cultivation
15–19°	mounding or spot	spot	no cultivation	no cultivation
20–26°	spot	no cultivation	no cultivation	no cultivation
>26°	no cultivation	no cultivation	no cultivation	no cultivation

- Weed control carried out during site preparation will minimise the risk of soil erosion and the movement of chemicals off-site (see E2).
- Advice will be sought from a soil specialist before plantations are established on sites with high or very high erodibility class soils. Appropriate prescriptions will be included in the FPP.
- Cultivation should be carried out when soils are dry or moist, not wet, to minimise erosion, reduce puddling, mixing and compaction, and improve effectiveness of ripping.
- After cultivation, soils should be friable and not smeared.
- If damage is likely to occur, cultivation and clearing will cease:
  - when soils are wet, or,
  - when turbid water is flowing for more than 10 m, or
  - when machinery causes rutting to a depth of more than 300 mm below the original ground level over a 20 m section.
- As far as is practicable, windrows or heaps should be free of soil. Raker blades or excavators should be used to move and stack debris. Dozer blades should only be used to move stumps and other large material into windrows. Soil movement should be minimised.



EXCAVATOR WITH RIPPERTINE ATTACHED USED TO EXTRACT STUMPS & MINIMISE SOIL ATTACHMENT TO ROOT BALLS.

- Runoff should be dispersed as much as possible. Water from culvert outlets should be directed onto stable ground, preferably vegetated or covered with slash (see B2). The area immediately below culvert outlets should generally not be cultivated. Allow for increased culvert sizes in areas to be cleared for plantations.
- Cultivation machinery may cross drainage depressions, but drainage depressions should not be cultivated (lift cultivation equipment at least 2 m from the edge of the drainage depression), and will not be cultivated on high or very high erodibility class soils.



- Site preparation machinery will not be taken within 10 m of the border of any swamp or area with obvious surface seepage except at properly corded crossing points. Where swamp or surface seepage areas are ill-defined, the edges should be marked before forest practices begin.
- Plantations will not be permitted on sites with vulnerable karst soils unless authorised by the CFPO.
- Mapped caves near the surface, karst depressions and stream sinks will be avoided by site preparation machinery. The FPA's *Forest operations around sinkholes* (29) will be consulted where appropriate.

Establishment of plantations adjoining watercourses

This section covers the establishment of plantations on land in streamside reserves and within 10 m of Class 4 watercourses.

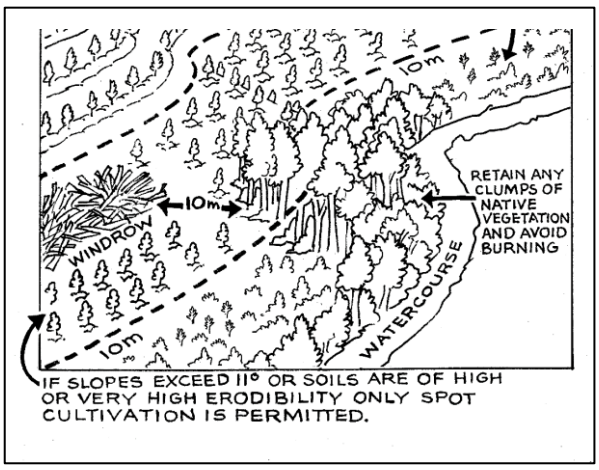
General principle

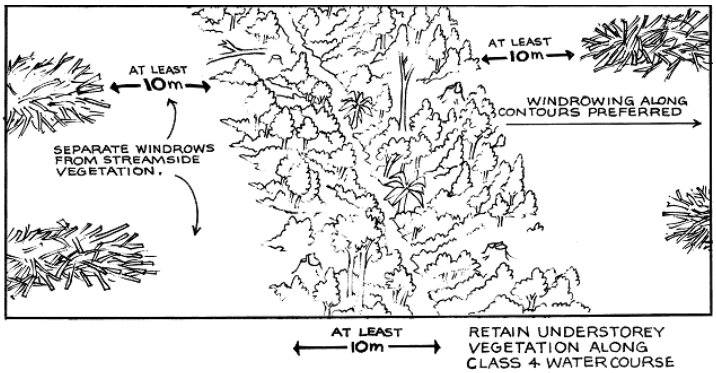
- The establishment of native vegetation in streamside reserves in plantations aims to increase riparian stability and biodiversity.

Operational approach

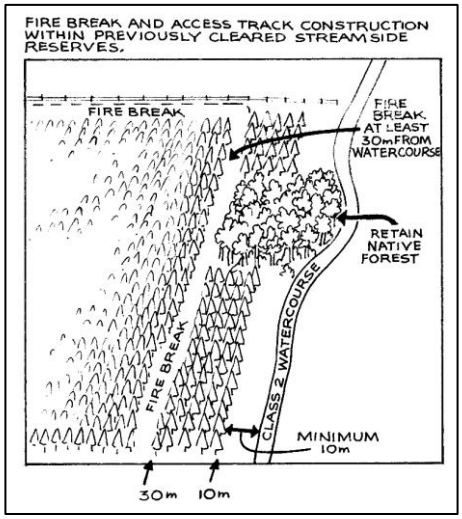
- Areas within Class 1, 2 and 3 streamside reserves, and within Class 4 streamside reserves established in accordance with Appendix 5 or for biodiversity reasons, should be managed to encourage the re-establishment of native species, especially in the 10 m closest to the streambank.
- Within Class 1, 2, and 3 streamside reserves plantation establishment will be permitted subject to the following:
  - patches of native vegetation will be retained
  - burning and damage to understorey vegetation will be avoided where practicable
  - no machinery will be permitted within 10 m of any watercourse except at points designated in the FPP
  - debris from previous harvest will not be placed within 10 m of any watercourse and windrows will be positioned at least 10 m from streamside vegetation
  - trees established within 10 m of any Class 1, 2, or 3 watercourse after 1 January 2001 will not be available for future harvest
  - pine wildings in streamside reserves rehabilitated with native vegetation may be removed by slashing, hand felling, stem injection, herbicide-painting or a combination of these methods (see E4) without a certified FPP
  - if slopes are over 11° or soils have high or very high erodibility, only spot cultivation will be permitted to establish plantations in the zone between 10–20 m from any watercourse
  - special measures will be implemented where required for the reasonable protection of significant natural or cultural values (e.g. to improve habitat for threatened fauna).

- Where a streamside reserve is not required under Appendix 5 or for biodiversity reasons, plantation establishment will be permitted within 10 m of Class 4 watercourses subject to the following:
  - burning will be avoided where practicable
  - if slopes are over 11°, or soils have high or very high erodibility, machinery will not track within 10 m of the watercourse (except at designated crossing points as below) and machine cultivation will not be permitted within 10 m of the watercourse
  - on slopes 0–11° or on soils which have low, moderate or moderate-to-high erodibility:
    - debris from previous harvest will not be placed within 10 m of any watercourse and windrows will be positioned at least 10 m from streamside vegetation
    - spot cultivation and debris removal may be undertaken by excavators reaching to points no closer than 5 m from the watercourse, provided patches of native vegetation are not damaged





    - on 'previously cleared and converted land' only, spot cultivation by excavators to establish plantations may occur to points no closer than 2 m from streambanks provided the excavator remains at least 5 m from the streambank
    - machinery will not be permitted within 10 m of a Class 4 watercourse except to access crossing points designated in the FPP, or as for cleared land above
    - cultivation will not be permitted in wet soil conditions or when water is running in surface channels (see Appendix 4)
    - plantations will not be established within 2 m of any watercourse
    - special measures will be implemented where required for the reasonable protection of significant natural or cultural values (e.g. to improve habitat for threatened fauna).
    - Construction of fire breaks and access tracks will not be permitted within the standard buffer widths for streamside reserves (as detailed in Table 7) or Class 4 machinery exclusion zones except to access crossing points designated in the FPP. Construction and drainage will comply with the provisions in E1.7. Existing fire breaks and access tracks can remain if stable and not causing environmental harm.



- The conditions that will apply to any future harvesting of plantation trees established in riparian zones are outlined in C7.2.

Establishment of trees adjoining watercourses for rehabilitation or agroforestry purposes

This section covers the establishment of trees on land in riparian zones, in predominantly agricultural land, for the purpose of agroforestry or rehabilitation plantings.

General principle

- The planting of native tree species in riparian zones on predominantly agricultural or ex-plantation land is encouraged as the best means to achieve reasonable protection and/or rehabilitation of riparian values (see D2.1).

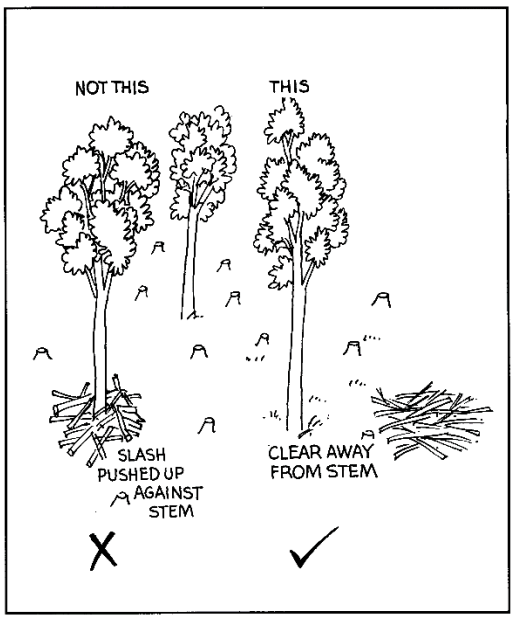
Operational approach

- For rehabilitation or agroforestry purposes, trees may be established in riparian zones subject to the following:
  - machines do not track within 5 m of the streambank
  - spot cultivation may occur to within 2 m of the streambank
  - if soils in a riparian zone are in the high or very high erodibility class, and/or stream banks show significant active erosion (e.g. slumping), technical advice from the FPA is obtained before establishment.
- The conditions that will apply to any future harvesting of trees established in riparian zones for rehabilitation plantings or agroforestry are outlined in C7.3.

E1.3 Post-harvest fire management

General principles

- Fire management planning following harvest should ensure the operational area is prepared for both planned burning and unplanned fire.
- Any planned burning to be done in conjunction with forest practices will be covered by prescriptions in a fire management plan, an FPP, or a site-specific burning plan (see C2).
- In plantations, leaving bark, branches and leaves on site provides nutrients and protection for the soil. Where harvest residues are to be retained on site, the risks of unplanned fires should be assessed and managed.
- Planned burning of harvest residues in plantations may reduce the risks from unplanned fires and make re-establishment more practicable. Where harvest residues are to be burnt, prescriptions to manage the burning should be included in the FPP or a site-specific burning plan.
- In native forest, re-distributing harvesting residues throughout the coupe may provide protection to growing stock, but should be evaluated against the increased risk from fire. If the harvest residues are not to be burned, appropriate fire protection measures should be taken to prepare the site for unplanned fires (e.g. establishing and maintaining trafficable firebreaks, maintaining fire dams).
- Where growing stock is retained (e.g. in partial harvesting systems such as advance growth retention), particular attention will be given to protecting it from fire damage.
- Fuel reduction burning should be considered for partially harvested coupes.
- Burning of native vegetation in streamside reserves and other areas excluded from harvest should be avoided where practicable, unless required as an essential part of hazard reduction or rehabilitation forestry.



Operational approach

Unplanned fire

- FPPs for areas to be reforested which are not covered by fire management plans should specify measures for the protection of the forest from unplanned fire, such as:
  - management of residues arising from harvesting
  - establishment and maintenance of fire breaks
  - maintenance of access network for fire protection.
- Further information on factors to be considered regarding the management of unplanned fire is given in C2.

Planned burning

- The decision to conduct a post-harvesting burn depends on site factors, regeneration requirements and the need to mitigate the risk of unplanned fires impacting on the next rotation of trees.
- Planned burning in native forest may include regeneration, fuel reduction, or ecological burning.
- Regeneration burning is designed to create seedbed and enhance conditions for reforestation.
- Fuel reduction burning is done to reduce and manage fuel loads, including those that may have been created by harvesting.
- Ecological burning is done to maintain and manage the values and health of native forest and native vegetation communities. It is generally done in vegetation types that depend on fire for regeneration and/or survival (e.g. button grass, grassy woodlands). Specialists can provide advice on fire sensitivity and appropriate burning frequencies for different vegetation types.
- Planned burning is also done on plantation sites to remove harvesting residues and prepare for establishment.
- The type of burn to be conducted and the methods by which it will be achieved (fuel preparation, fire containment, weather conditions, when and how to burn), should be in a burning plan.
- Further information on factors to be considered regarding the management of planned burning is given in C2.

Burning in karst areas

- Burning near cave entrances will be avoided.
- Advice will be sought from the CFPO concerning burning of areas with sinkholes.
- High intensity burning will be avoided where degradation of significant karst features is likely to result, such as sites with vulnerable karst soils on slopes above 12°.

Burning in steep country

- In steep country (slopes 20° and above):
  - in forest types where fire is not necessary for establishing regeneration, steep slopes should only be burnt if required for fire protection
  - regeneration burns should be used where essential to achieve good regeneration (e.g. wet forest types)
  - if no burning is planned, the risk of unplanned fire to the regenerating coupe and adjacent areas should be addressed in a fire management plan or in the FPP
  - low intensity burns should be the preferred option in dry forests
  - native forest harvesting should not proceed unless successful regeneration of eucalypts and understorey species within three years of completion of harvesting or burning can be reasonably assured by prescriptions placed in the FPP.

Burning for forest practices in peat soils, button grass and alpine grasslands

This section applies to peat soils, button grass and similar vegetation and should be applied in a practical manner.

- Peat soils have a very high organic content. Any burning on peat soils should be planned and conducted in a way that provides reasonable protection for the organic layers and minimises the loss of stored carbon.
- High intensity burning on peat soils should be avoided if depletion of the stored carbon is likely to be significant.
- Heaps of logging debris left for later burning will be minimised.
- Burning of debris on peat soils should only be undertaken when the peat is wet enough to reduce the risk of prolonged underground fires.

E1.4 Species selection

General principles

- Seed or seedlings should be of species suited to the soil and climate of the area to be reforested.
- Forest practices will ensure that harvested native forest is regenerated using seed from local or similar provenances and in a manner that helps maintain genetic diversity. Species selection should consider the potential effects of climate change.

Operational approach

Native forest

- Sow or plant a species composition similar to that of the natural canopy for the site. Allow for those species which will regenerate naturally.
- Other species should not be used or added to the sowing mix, except for control of forest diseases or for climate change considerations and following expert advice. For example, when a site at high risk of damage from *Phytophthora cinnamomi* (root-rot fungus) is being sown with eucalypts, a significant portion of the seed should be from *Phytophthora cinnamomi*-tolerant species, such as *Eucalyptus globulus* and *E. viminalis*. Background information can be found in FPA's *Flora Technical Note 8: Management of* Phytophthora cinnamomi *in production forest* (8).
- For native forest regeneration, seed should be sourced from the site to be reforested, where available, or from similar sites, to ensure maintenance of the genetic resource and suitability for local conditions.
- Further information can be found in *Native Forest Silviculture Technical Bulletin No. 1: Eucalypt seed and sowing* (30).

Plantations

- Species and provenances should be selected which are suitable for the site and climate, and are likely to provide sustainable growth rates.

E1.5 Stocking standards

General principles

- Section 31(2) of the Act requires this Code to include 'standards to be complied with in the restocking of land with trees'.
- Regeneration should restore the forest to its productive capacity and ecological condition so that it contributes to future wood supply and ecosystem services in accordance with the principles of sustainable forest management.
- Regeneration should be established in an effective and timely manner that is appropriate for the forest type.

- The management objectives for future land use will vary depending on landowner intentions but must remain consistent with the standards given in this Code.
- Regeneration stocking and/or post-harvest basal area will be assessed to determine whether the productive capacity of the forest has been maintained.

Operational approach

Native forest

- The intended future land use, stocking standard to be achieved, and the method and timing of the assessment of stocking will be stated in the FPP.
- The FPP will specify the reforestation establishment and assessment techniques, the reporting age for reforestation assessment, and the person or organisation responsible.
- The stocking standards summarised in Table 9 will be achieved in areas regenerated to native forest following harvesting.
- Regeneration will be assessed using a sampling process that is statistically valid and results in an objective assessment of the percentage of the area occupied by trees.
- On small coupes (less than 10 ha) with good visibility, a visual assessment may be sufficient. If regeneration levels appear marginal, a more formal sampling process will be used.
- The adequacy of stocking with retained trees in a partial harvest operation may also be demonstrated by indicative surveys performed during harvesting or immediately thereafter.
- For most forest types, at least 65% of the area must be stocked with healthy seedlings or saplings or retained standing trees with a basal area of at least 12 m^2/ha (or a combination thereof). In certain forest types, lower levels of stocking may be acceptable (see Table 9).
- Periodic checks of regeneration progress should be undertaken prior to the reporting age to identify if additional reforestation measures are required to re-stock the site to meet the regeneration targets specified in the FPP.
- Additional reforestation measures should be undertaken if target stocking levels have not been met by the reporting age and must be undertaken if the original forest type has not been maintained.
- Reforestation assessment results should generally be reported to the FPA within three years of the completion of regeneration treatments, or longer if remedial treatments need to be applied.

Table 9 Stocking standards for native forest regeneration

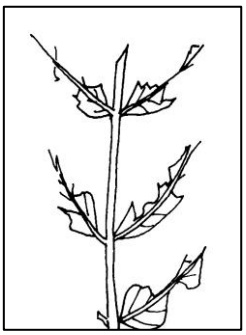
Forest type	**Silvicultural treatment**	**Proportion of harvested area required to have adequate stocking**
Lowland wet eucalypt forests	Clearfell, burn and sow Aggregated retention Group selection Single tree selection	65%
Lowland dry eucalypt forests	Seed tree	40%
Highland *E. delegatensis* forest	Shelterwood	65%
Uneven-aged eucalypt forest	Various forms of partial harvest	40% (dry forest) 65% (wet forest)

Plantations

- Plantations should aim to achieve the optimal stocking determined for the management system used. Spacing will depend on the management system used.
- The target stocking for a plantation, and the timing and method of assessment, will be specified in the FPP.
- Where survival in plantations is less than 50%, re-establishment should be considered provided reasons for failure can be identified and corrective action taken to ensure subsequent plantings do not fail.

E1.6 Protection from grazing and browsing

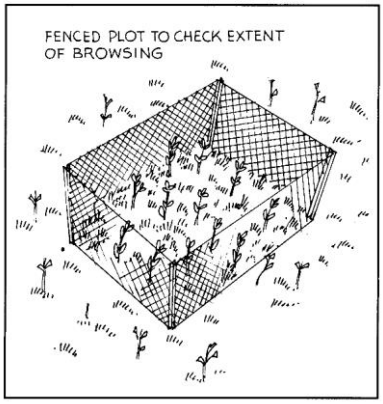
General principles



- Grazing and browsing of seedlings can severely reduce survival and growth.
- Seedlings may need to be protected from significant grazing and browsing damage.

Operational approach

- Monitor reforested areas regularly to identify damage, starting at the time of planting or sowing and continuing until the risk has reduced to an acceptable level.
- If damage is likely to be severe, control measures should be considered. Methods for control of browsing include:
  - fencing
  - individual tree protection
  - selecting species and provenances less susceptible to browsing
  - hardening of seedlings to reduce palatability
  - lethal control of browsing animals.
- Further information describing the monitoring and control of browsing in native forest is outlined in *Native Forest Silviculture Technical Bulletin No. 12, Monitoring and protecting eucalypt regeneration* (31).

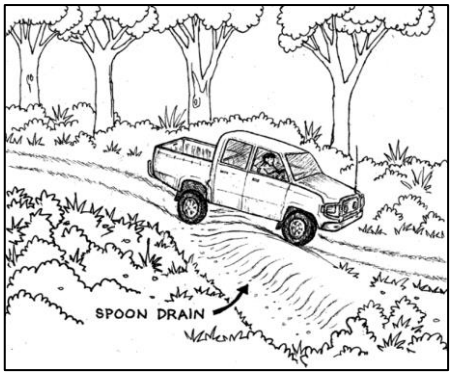


E1.7 Fire breaks and access tracks

General principles

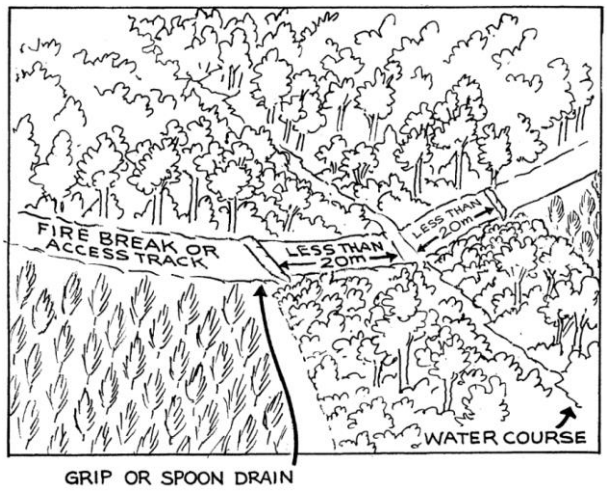
- Runoff will be slowed and diverted away from fire breaks and access tracks using measures such as outsloping, grips, and spoon drains. Where practicable, water should be diverted into vegetation or slash.
- Trafficable drainage measures (e.g. spoon drains) should be used where ongoing access for fire management or stand maintenance is required.

Operational approach



- For access tracks to be used for carting, the provisions in B will apply.
- Permanent fire breaks and access tracks constructed as part of the fire management system will be carefully located, effectively drained, and have minimal visual impact. Damage to mature myrtle (*Nothofagus cunninghamii*) trees should be minimised (see B3.1).
- Access tracks will be drained in accordance with Table 2.

- Fire breaks will be drained using grips or spoon drains in accordance with Table 5 or drained effectively using other water diversion measures.
- New access tracks and fire breaks will not be permitted within streamside reserves or Class 4 machinery exclusion zones except to access crossing points designated in the FPP; existing fire breaks and access tracks may be used if traffic will not cause watercourse siltation.
- Disturbance will be minimised at watercourse crossings. Grips or spoon drains (trafficable grips) will be constructed within the last 20 m before any crossing to divert runoff into sediment traps or vegetation before it enters the watercourse.



- Fire breaks should be maintained in a state that allows effective access. Methods that minimise soil disturbance are preferred.
- When maintaining fire breaks and access tracks, drainage structures will be retained or restored where necessary.
- Non-permanent fire breaks constructed during the fighting of bushfires should be restored while machines are still on the job, and if not, before the onset of the following wet season. Grip spacing will be in accordance with Table 5.
- Measures should be taken to exclude recreational vehicles from using firebreaks where vehicle use may result in significant erosion or erosion risk is high.
- Planning of fire dams and water storage areas should consider aquatic fauna values and erosion risk, especially during floods. Dams should preferably be built in drainage depressions, and locations in or adjoining watercourses should be avoided. Dam planning and construction approval may be required from DPIPWE.

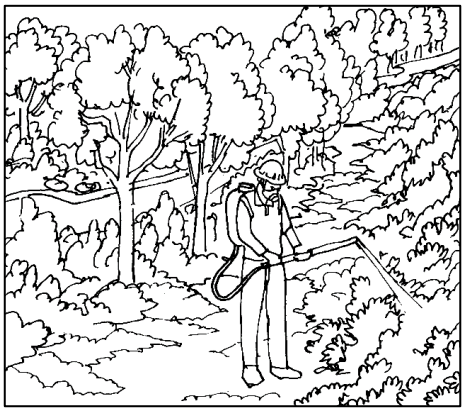
Outcome

Silvicultural regimes that meet Code requirements for reforestation and achieve landowner objectives.

E2. Use of chemicals

General principles

- When chemicals are applied during forest practices, the risks of off-site impacts will be avoided by ensuring that relevant legislation, guidelines and instructions are followed.
- If pesticide, herbicide or fertiliser application is planned, an application plan should be developed which identifies the environmental risks and how these risks will be managed.
- The chemical application plan should ensure that the risk of off-target chemical movement is minimised.



Operational approach

- Persons using chemicals while conducting forest practices should make themselves aware of the provisions contained in the current *Codes of Practice* (32) (33) published by DPIPWE and approved by the Agricultural, Silvicultural and Veterinary Chemical Council, under the *Agricultural and Veterinary Chemicals (Control of Use) Act 1995*.
- All chemicals used in forest practices must comply with the registration requirements of the Australian Pesticides and Veterinary Medicines Authority (APVMA) for forestry use or have an approved off-label permit for forestry use.
- The chemical application plan will include:
  - prescriptions for chemical formulation
  - method of chemical application
  - identification of risks, both safety-related and environmental
  - the management approach for mitigating identified risks
  - a description of boundaries
  - a map of the area to which chemical is to be applied.
- When chemical application close to watercourses and drainage depressions is required, chemicals specifically approved for direct application to waterbodies or techniques such as wick-wiping and spot or shrouded strip application should be considered.
- Boundaries of the area to which chemicals are to be applied should be clearly visible or marked on the ground where GPS positioning technology is not being used by the operator.
- Special care will be required around karst features (e.g. caves and sinkholes) and specialist advice should be sought.
- The *Environmental Management and Pollution Control Act 1994* (EMPCA) contains requirements for the reporting of spills that are applicable to forest practices.
- Fertiliser application will be planned and carried out in a way that minimises the chance of fertiliser dropping or drifting onto any surface waters (streams, lakes, storages, swamps or wetlands).

Outcome

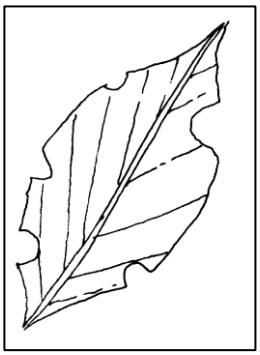
Management of chemicals used during forest practices, particularly the potential for their off-target movement, in accordance with legislative requirements.

E3. Forest health

General principles

- Forest practices will be conducted in a manner that meets legislative requirements and minimises the risk of spread of weeds, pests and diseases through effective control measures that have the least risk of adverse environmental impact.
- Pests, diseases and declared weeds can pose economic and environmental threats and should be managed to minimise these threats. Landowners are responsible for providing reasonable protection to their forests from pests and diseases.
- All newly established forests need monitoring and protection. Monitoring for forest health should be done to identify damage agents.
- Forest practices should not spread weeds, pests or diseases, and measures should be taken to contain outbreaks which arise as a result of the forest practices.
- Washing down of machinery that might carry soil or biological material can reduce the risk of spreading weeds, pests and diseases between areas where forest practices are carried out.

E3.1 Insect pests



Operational approach

- Monitoring for insect pests should be carried out where forest damage is anticipated or has been identified and is expected to exceed a reasonable threshold.
- Control measures may be required, appropriate to the risk and scale of the issue.
- The advice of a forest entomologist may need to be sought in such situations.

E3.2 Diseases

Operational approach

- Where extensive unexplained death or decline of trees occurs, advice should be sought from a forest pathologist.
- Healthy, disease-free seedlings should be used for planting.
- The root-rot fungus *Phytophthora cinnamomi* is of concern in swamps, heaths, sedgelands, dry lowland forest on sandy or poorly drained sites, and low altitude rainforest on infertile sites. Hygiene measures for machinery use in *Phytophthora cinnamomi*-susceptible vegetation should be reduced by implementing hygiene measures during relevant activities (e.g. road construction). Further information can be found in the FPA's *Flora Technical Note 8: Management of* Phytophthora cinnamomi *in production forest* (8) (see B1, B5, C1, and D4.1).
- Myrtle wilt is a major disease of myrtle (*Nothofagus cunninghamii*). Consult an FPO whenever road or track construction, harvesting, or recreational facilities are planned in areas containing mature myrtle.
- Other threats to forest health arise from time to time, e.g. myrtle rust and chytrid fungus. Where these are associated with forest practices and may impact the environment, specialist advice should be sought, and management prescriptions developed if required.

E3.3 Weeds

Operational approach

- A list of declared weeds is available from DPIPWE.
- The *Weed Management Act 1999* and Weed Management Regulations 2017 contain requirements for the control of declared weeds that are applicable to forest practices.
- Hygiene to control the spread of weeds is very important, especially when moving machinery between operational areas. This applies to both moving between sites on a given property and moving between properties.
- Forest managers and planners should make machinery operators aware of any known weed locations and risk management strategies to minimise their spread.
- Before moving machinery between operational areas, consideration should be given to risk management strategies to control the spread of weeds.
- Before moving machinery from an area with declared weeds, machinery will be thoroughly washed in accordance with the *Tasmanian washdown guidelines for weed and disease control 2004* (13) either at the point of departure from the previous area of forest practices, or at a designated washdown facility with a well-drained hard surface.
- Measures to contain the spread of declared weeds will be specified in the FPP where relevant.

E4 Stand maintenance

General principles

- Forest stand maintenance involves the manipulation of a stand of trees, usually by pruning or removing selected trees and understorey vegetation. It is used as a part of forest management in both plantations and native forests.
- The objectives of stand maintenance may include wood production, visual amenity, fire, or protection from pests and diseases.
- In plantations, competing vegetation and wildlings may need to be removed to maintain stand productivity and to provide reasonable protection from fire, pests and diseases. Techniques used include pruning and thinning of trees and slashing of understorey vegetation.
- Native forest stands may be maintained for production, environmental or stand protection objectives. The methods to be used should be selected to meet the objective, for example:
  - production objectives might require thinning of small trees using tree-felling or stem injection to promote growth of remaining stems
  - environmental objectives might include encouraging development of stand attributes that favour habitat for some species (e.g. hollow-dependent species; creation of refuges for ground-dwelling species) or maintenance of understorey vegetation
  - stand protection objectives might include the use of prescribed fire for fuel management, vegetation composition and habitat development, or pest and disease control.

Operational approach

- Stand maintenance is usually accomplished by conducting low-impact activities periodically throughout the life of the stand. These may include prescribed burning or mechanical, chemical, or biological techniques.
- Control of vegetation on roadsides, tracks and in drainage depressions and close to streamside reserves should consider if such vegetation provides habitat for important fauna, and measures should be taken to limit any adverse impact on that habitat (e.g. Marrawah skipper, Ptunarra brown butterfly).

Operations not requiring an FPP

- Stand maintenance operations considered to be ‘low impact’ must not involve the use of heavy machinery or have the potential to cause environmental harm.
- To be considered a low-impact operation, spraying or other weed control will be done in a targeted manner designed to avoid damage to natural and cultural values that would normally be given reasonable protection under the forest practices system.
- Chemical application in low-impact operations will follow the approach in E2, with special care to be taken near streams and drainage depressions, and any vegetation intended for retention.
- Chemical thinning in low-impact operations must be carried out in compliance with regulatory controls for the use of chemicals.
- Low-impact operations will minimise soil disturbance, especially on steep slopes, on high and very high erodibility soils, and where invasive species are likely to establish.
- Low-impact operations will be planned and implemented in a manner consistent with the intent of this Code.

Outcome

Effective stand management measures that minimise the risk of spreading weeds, pests or diseases or other adverse environmental impacts.

F. MANAGEMENT OF FUEL, OILS, RUBBISH AND EMISSIONS

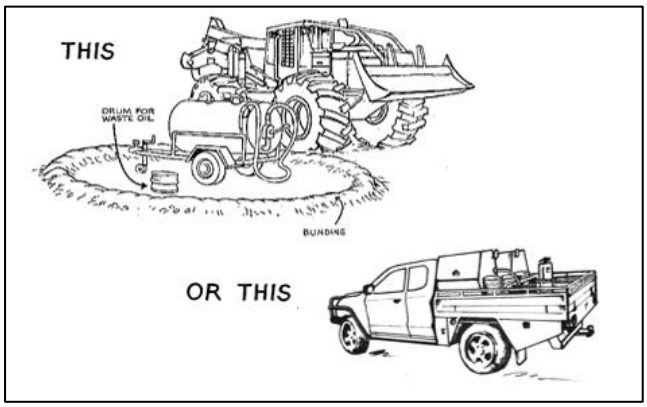
General principles

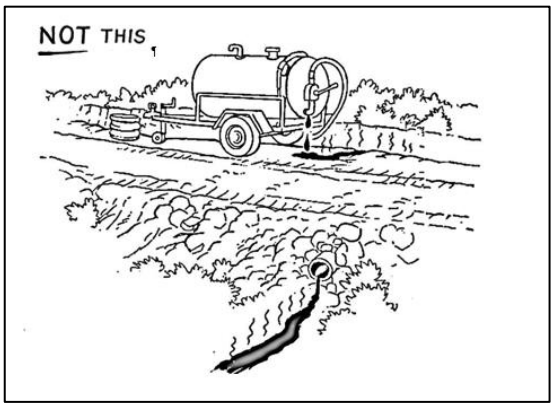
- A risk management approach should be adopted for those forest practices which use, produce, convey or store quantities of hazardous materials sufficient to cause serious or material environmental harm to soils or waters if released.
- The *Environmental Management and Pollution Control Act 1994* (EMPCA) contains requirements that are applicable to forest practices, relating to matters such as smoke, noise, pollution, dust, chemicals or hydrocarbons in the soil, water or air.
- Any matters of suspected non-compliance with EMPCA that relate to forest practices may first be investigated by FPA and may be referred to the EPA for further action.

F1. Use of fuel, grease and oils

Operational approach

- Equipment will be maintained in such a manner as to prevent or avoid fuel leaks.
- Fuel, grease and oils will be stored in a location where any inadvertent leaks will not enter watercourses, swamps or other still waters, or karst systems either directly or indirectly.
- Any spills will be contained as soon as possible, and any necessary clean-up done promptly.





Outcome

Effective management of leakages and spills of fuels, grease and oils emissions during forest practices, based on a risk-management approach.

F2. Disposal of rubbish

Operational approach

- Oily rubbish, such as fuel or oil drums, filters and oily rags, will be removed regularly from the forest and taken to a collection depot suitable for receiving hazardous wastes.
- All other rubbish (e.g. wire ropes, plastic containers and wrappings) will be removed regularly to a collection depot or transfer station, or recycled if appropriate.

Outcome

Removal of rubbish, including rubbish associated with fuels and oils, from sites during forest practices.

F3. Minimisation of smoke, noise and dust

Operational approach

- Measures should be taken to ensure that emissions of smoke, dust or noise from forest practices do not cause serious or material environmental harm.
- Planned burns under the forest practices system will be managed to minimise the risk of smoke concentration within populated areas.
- Where forest practices are to take place near residences:
  - smoke from the burning of forest debris should be minimised by burning under appropriate conditions
  - alternatives to burning should be used where practicable
  - occupants should be notified, and consideration given to appropriate hours of machinery operation.
- Forest quarries that are likely to generate noise of concern to nearby residents should be operated consistent with the *Quarry Code of Practice 2017* (12).
- Approaches that reduce the amount of dust emanating from road surfaces or quarries should be used where necessary to minimise adverse impacts.

Outcome

Levels of smoke, dust and noise from forest practices that do not cause serious or material environmental harm as defined under EMPCA.

G. GLOSSARY

- **Access track** – a generally unsurfaced track, for short term or occasional use, designed for log truck and other vehicular access. Cartage is permitted in dry soil conditions only. If intended for long-term periodic access (e.g. as a firebreak), permanent watercourse structures will be installed as for Class 4 roads.
- **Agroforestry** – the integration of trees on farms and in the agricultural landscape, for the purpose of diversifying farm production for increased social, economic and environmental benefits.
- **AHT** – Aboriginal Heritage Tasmania (within DPIPWE).
- **APVMA** – Australian Pesticides and Veterinary Medicines Authority.
- **Basal area** – the cross-sectional area of a tree stem taken at 1.3 m above ground. Stand basal area is the sum of the basal areas of the trees in the stand and is expressed in square meters per hectare (m^2/ha).
- **Batter** – the side slopes that connect the road surface to the contour of the surrounding land. The cut batter is above the road and the fill batter is below the road.
- **Biodiversity** – a concept encompassing the diversity of indigenous species, their genes and the ecosystems occurring in a given region. It includes 'genetic diversity', which reflects the diversity within each species; 'species diversity', which is the variety of species; and 'ecosystem diversity', which is the diversity of different communities formed by living organisms and the relations between them. Biodiversity is the variety of all life forms – the plants, animals and microorganisms – their constituent genes, and the ecosystems they inhabit.
- **Borrow pit** – a small area along a road construction alignment where earth/gravel may be taken for use in a specific project, such as road construction or maintenance. No rock crushing is permitted. See **Quarry**.
- **Bridge** – a structure that provides for vehicular access over a watercourse while generally causing minimal interference to natural watercourse flow; usually has abutments and a road surface supported by beams.
- **Cable harvesting** – an extraction system employing winches, blocks and cables and aerial suspension or partial suspension of logs.
- **Catchment** – a natural area or basin of land from which water drains and flows to a watercourse, lake, wetland, estuary or sea.
- **Chemicals** – includes the range of insecticides, fungicides and herbicides which may be used in forest practices.
- **cm** – centimetres.
- **Coarse woody debris** – dead trees and the dead remains of large branches, in various stages of decomposition.
- **Coppice** – growth of a new stem or stems from the stump or base of a tree to replace a previous stem that is damaged, killed or felled.
- **Cording and matting** – cording and matting 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, 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.
- **Coupe** – an area of forest of variable size, shape and orientation, on which harvesting takes place.
- Cross drain – see **Grip**.
- **Culvert** – a conduit, typically of manufactured piping or logs, that provides for passage of water under a road or track.

- **Damaged soil** – soil from which the topsoil (A horizon) has been removed; or in which the A horizon has been mixed with the subsoil, or with bark, litter or woody debris; or which has been severely compacted; or has been contaminated with chemicals, fuel, grease or oil; or is affected by a combination of these impacts.
- **DBHOB** – Diameter at Breast Height Over Bark. The diameter of the tree measured over the bark at 1.3 m above ground level on the uphill side of the tree.
- **Declared weed** – a plant declared to be a weed under section 9 or 10 of the *Weed Management Act 1999*.
- **Domestic water supply** – a water supply used for household purposes but not including farming, livestock or irrigation.
- **DPIPWE** – Department of Primary Industries, Parks, Water and Environment.
- **Drainage depression** – a depression in the landscape which only carries water during or shortly after rainfall, is generally characterised by mottled, waterlogged soils, has a continuous topsoil cover and in its natural state may support moisture-dependent vegetation such as pin rushes. See **Watercourse** and Table 7.
- **Drainage structures** – techniques employed on roads, tracks, extraction tracks and landings to minimise erosion by slowing down, diverting, and dispersing water from the running surface. Examples include grips, water bars, outsloping, spoon drains etc.
- **Ecological burning** – a form of prescribed burning. Treatment with fire of vegetation in nominated areas to achieve specified ecological objectives.
- **EMPCA** – *Environmental Management and Pollution Control Act 1994* (Tas).
- **End hauling** – cartage of excess spoil from a sensitive area (e.g. a streamside reserve) to an area where it has less potential to cause environmental harm.
- **Environmental harm** – serious environmental harm and material environmental harm have the same meaning as defined in EMPCA.
- **EPA** – Environmental Protection Authority.
- **Epiphytic species** – species that grow on the surface of another plant, and derive their nutrients from the air, rain, and accumulating organic debris. Epiphytic environments include relict or old-growth rainforest, dense patches of musk or tree ferns.
- Erodibility – see **Soil erodibility**.
- **Evaluation sheet(s)** – specific documents of an administrative nature released by the FPA from time to time that must be used for the evaluation and development of management prescriptions for natural and cultural values under the forest practices system. The evaluation sheets address biodiversity, earth sciences, cultural heritage, and visual landscape and are included in the FPA planning tools, defined below.
- **Even-aged forest** – a forest composed of trees of mainly the same age resulting from a single disturbance.
- **Extraction** - the pulling (snigging) or carrying (forwarding) of logs from the felling point to a landing by machinery.
- **Extraction track** – a track along which logs are pulled (snigged) or carried (forwarded) from the felling point to a nearby landing. See **Major extraction track** and **Feeder extraction track**.
- **Feeder extraction track** – an extraction track with less equipment traffic than a major extraction track. See **Major extraction track**.
- **FIFMC** – Forest Industry Fire Management Council.
- **Fire break** – a strip of land, preferably at least 5 m wide, where vegetation has been removed to reduce the risk of fire starting or spreading. Fire breaks may incorporate a trafficable access track.
- **Ford** – a road crossing of a watercourse involving minimal alteration to the natural watercourse bed (e.g. installation of flexmat at the invert).

- **Forest practices** – as defined in Section 3 of the *Forest Practices Act 1985*: (a) the processes involved in establishing forests, growing or harvesting timber, clearing trees or clearing and converting threatened native vegetation communities; and (b) works (including the construction of roads and the development and operation of quarries.
- **Forest type** – a group of forest ecosystems of generally similar composition that can be readily differentiated from other such groups by their tree and understorey species composition, productivity and/or crown closure.
- Forwarding – see **Extraction**.
- **FPA** – Forest Practices Authority.
- **FPA planning tools** – decision support systems, software and documents of an administrative nature released by the FPA from time to time that must be used for the evaluation and development of management prescriptions for natural and cultural values under the forest practices system.
- **FPO** – Forest Practices Officer, a person appointed under Sections 38 and 39 of the *Forest Practices Act 1985.*
- **FPP** – Forest Practices Plan, a plan for forest practices as specified in Section 18 of the *Forest Practices Act 1985.*
- **Fuel reduction burning** – the planned application of fire to reduce hazardous fuel quantities undertaken in prescribed environmental conditions within defined boundaries.
- **Georeferencing** – a system where the internal coordinate system of a map or aerial photo image can be related to a ground system of geographic coordinates. The relevant coordinate transforms are typically stored within an image file, though there are many possible mechanisms for implementing georeferencing.
- **GPS** – Global Positioning System
- **Grip** – a ditch and earth bank constructed at approximately right angles to a track, preventing water from building up speed along the track and allowing redirection of running water into surrounding areas. Also known as a cross drain or water bar.
- **ha** – hectares
- **Habitat tree** – a habitat tree is a mature living tree selected to be retained in a coupe because it has features of special value for wildlife (e.g. hollows). Habitat trees should be selected based on their size and the presence of hollows.
- **Harvesting machine(ry**) – wheeled or tracked equipment used for harvesting.
- **Harvesting section** – a sub-section within a harvesting coupe.
- **Hazardous trees** – as defined in the *Forest Safety Code* (Tasmania).
- **Headwall** – solid surround provided at either end of a culvert to minimise erosion. May be constructed from rock, cement, sandbag or wood.
- **Karst** – a landscape that forms from the dissolution of soluble bedrock by fresh water, producing characteristic surface landforms such as caves, fissures and sinkholes. Rock types that may host karst include Ordovician limestone, Precambrian dolomite and magnesite, Permian limestone and Tertiary limestone/calcarenite.
- **Karst depression** – a depression in a karst landscape caused by dissolution of soluble bedrock by water that has drained underground; variable in shape and size and may be formed in rock or sediments overlying karstic rocks. Includes:
  - various types of sinkholes, sinkhole complexes and slots or shafts that can be defined by a closed depression contour, and,
  - linear depressions with no closed contour such as apparently dry valleys or channels that occur in areas where subsurface soil water seeps underground, or where an underground watercourse may resume a surface course when the capacity of the underground conduits is exceeded under wet conditions.

- **km** – kilometres
- **Lake** – a body of open water that occurs in a natural depression. The term includes a body of fresh or brackish open water created by artificially blocking or restricting the flow of a watercourse, stream, or tidal area, but does not include farm dams, or impoundments solely for irrigation purposes. A lake does not have a permanent cover of terrestrial vegetation (cf. swamps) and may be seasonally dry.
- **Landing** – an area to which logs are pulled and processed, i.e. de-barked, cut to length and sorted, and loaded onto trucks. This does not include areas used solely for stockpiling processed logs.
- **Landowner** – see **Owner of land**
- **Landscape scale** – One of the following spatial scales of planning, appropriate to the management context of an operation:
    1. state-wide
    2. bioregional (IBRA)
    3. Planning Context Unit (PCU) – a notional contextual area around the planning node which depends on the scale of the operations – e.g. forest block, multiple private property boundaries, CVEV major drainage catchments
    4. Coupe Context Unit (CCU), which on Permanent Timber Production Zone land may be a notional 400 ha unit around the coupe, or may be a private property boundary and surrounding land-use context.
- **Lignotuber** – a swelling on a tree at or just below the ground which is made up of a mass of dormant buds and food reserves.
- **Low-impact stand maintenance operations** – silvicultural activities conducted periodically throughout the life of a stand of trees, which do not involve the use of heavy machinery or have the potential to cause environmental harm, and which are done in a targeted manner designed to avoid damage to natural and cultural values that would normally be given reasonable protection under the forest practices system.
- **m** – metres.
- **mm** – millimetres.
- **m^2** – square metres.
- **m^3** – cubic metres.
- **Major extraction track** – extraction track used for five or more passes of ground-based extraction equipment on wet soils, or for ten or more passes on dry/rocky soils.
- **Majority slope** – the maximum steepness of 90% of a coupe area or discrete landscape unit (e.g. hillside, alluvial fan). For a majority slope of 20°, 90% or more of a coupe area should be on slopes of 20° or less, 10% of the coupe area may be steeper than 20°.
- **Matting** – see **Cording**.
- **Mature forest** – forests that are at least 100 years old and have begun to develop structural features typically found in older forests (e.g. hollows).
- **May** – ‘may’ statements in this Code are considered equivalent to ‘should’ statements. See **Should.**
- **MRT** – Mineral Resources Tasmania.
- **Must** – ‘must’ statements in this Code are considered equivalent to ‘will’ statements. See **Will.**
- **Native forest** – a naturally occurring forest community containing indigenous species and habitats normally associated with that community or having the potential to develop these characteristics. Native forest includes mature, regrowth and regenerating forests.
- **Natural and cultural values** – biodiversity, genetic resources, landscape, cultural heritage, geodiversity, soils, water quality and flow, and landforms (see **Significant natural and cultural values**).

- **Old-growth forest** – as defined in the *Tasmanian Regional Forest Agreement* (ecologically mature forest where the effects of disturbance are now negligible).
- **Outslope** – fall of a track over its width so that the surface is sloped to shed surface water to the downhill side.
- **Owner of land** – as defined in the *Forest Practices Act 1985* part 1:

  (aa) in the case of Crown land that is Permanent Timber Production Zone land within the meaning of the Forest Management Act 2013 – the Forestry corporation;
  (a) in the case of land held in fee simple – the person in whom the estate of fee simple is vested, or, if the land is general law land subject to mortgage, the person having the equity of redemption in that land;
  (b) in the case of land held under a tenancy for life – the person who is the life tenant;
  (c) in the case of land held under a lease for a term of not less than 99 years – the person who is the lessee of the land; or
  (d) in the case of land held under any other interest declared by the Regulations to be an interest for the purposes of this definition – the person who is the holder of land under that interest;

  Additionally, Section 17(2) of the Act provides that in relation to FPPs, 'An owner of land may enter into an agreement in writing under seal with any person under which that person is assigned the owner's responsibilities under this section.'
- **PACH** – Procedures for Aboriginal Cultural Heritage as specified in *Procedures for managing Aboriginal cultural heritage when preparing forest practices plans* (27).
- **Permit** – a licence or authority issued for specified purposes.
- **PHCH** – Procedures for Historic Cultural Heritage as specified in *Procedures for managing historic cultural heritage when preparing forest practices plans* (28).
- **PID** – Property Identifier Descriptor.
- **Pinch points** – small areas (typically 0.04 ha or less of plantation planted before 1 January 2021) where trees cannot be machine harvested in accordance with this Code because machines are not allowed within 5 m of the streambank.
- **Planning scheme** – a planning scheme has the same meaning as defined in the *Land Use Planning and Approvals Act 1993* but includes for the purpose of this Code the term special planning order as defined under that Act.
- **Plantation** – a forest stand established by the planting of seedlings or cuttings of trees selected for their wood producing properties and managed intensively for the purpose of future timber harvesting.
- **Previously cleared and converted land** – as defined in section 3 of the Regulations, means land:

  (a) whose owner can demonstrate a history of agricultural or other non-forest land use over a consecutive period of at least 5 years, since 1985, during which the land did not contain trees or threatened native vegetation communities; or
  (b) that has been cleared and converted in the immediately preceding 5-year period in accordance with a certified FPP.
- **Private timber reserve (PTR)** – an area of land so designated in the *Forest Practices Act 1985.*
- **Property** – in the case of private land means the area defined by a unique Property Identification Number (PID). For Permanent Timber Production Zone land 'property' means a management unit with a radius of approximately one kilometre as defined by the Landscape Context Planning System, or a larger forest management unit where this would deliver better management outcomes for socio-economic and environmental factors.
- **Provenance** – a geographic area in which a species has developed particular characteristics recognisably different from the characteristics of the species from other areas.
- **PTPZ land** – Permanent Timber Production Zone land – public forests managed by the Forestry corporation.

- **Quarry** – an area of land where earth/gravel is extracted for use on roads on an ongoing basis. Extraction, crushing, and screening of material is permitted in quarries (see **Borrow pit**).
- **Reforest** – to re-establish a tree crop on forest land.
- **Regeneration** – the renewal of a tree crop arising from planting or from seed or the young plants on a site.
- **Regeneration burn** – a planned burn lit under prescribed conditions for the purpose of achieving regeneration of a particular vegetation type.
- **Regeneration unit** – an area of forest planned to be regenerated as a single unit.
- **Rehabilitation forestry** – a silvicultural approach used for the purpose of restoring elements of structure or function to an ecological system, which may include but is not limited to burning, direct seeding, weeding (including the removal of plantation species from native vegetation), sowing and assisted natural regeneration.
- **Remnant** – the native vegetation remaining from the 'original' forest or non-forest vegetation in a landscape after land clearance/alteration. A remnant can be of any size or condition, including individual trees, both live and dead.
- **Reserve/reservation** – an area of land formally or informally set aside for specified purposes. Formal reserves have been declared by the Governor. Informal reserves have been created through administrative instruments by public authorities, but the term may also include wildlife habitat strips, and other areas where harvesting activities are specifically excluded by management prescriptions.
- **RFA** – Regional Forest Agreement between State of Tasmania and Commonwealth of Australia.
- **Rilling** – a form of erosion where soil is removed from narrow channels by water flow in the channels (e.g. on a batter slope or floodplain).
- **Rip rap** – stone material used to protect exposed soils to minimise erosion.
- **Riparian zones** – land within a streamside reserve as defined in this Code, or within 10 m of a class 4 streambank.
- **Salvage operation** – forest practices which are not technically permitted by this Code but are desirable in order to achieve good long-term environmental outcomes, e.g. minimising potential or existing adverse environmental impacts, and/or ensuring long-term forest cover on the site. Retrieval of merchantable timber may also be an objective of a salvage operation. Examples of salvage operations include removal of timber from streams following flooding or harvesting of stands damaged by severe windthrow.
- **Sediment trap** – a structure or pond to collect sediment.
- **Should** – 'should' statements in this Code show the desirable practice for most situations and must be interpreted by an FPO taking account of local conditions. 'Should' statements will be applied unless there are good reasons for an alternative approach that achieves an equivalent environmental outcome.
- **Significant natural and cultural values** – natural and cultural values (see definition above) identified by the evaluation processes, and for which management prescriptions are developed where required.
- **Sinkhole** – a closed depression draining underground in karst, of simple but variable form (e.g. cylindrical, conical bowl or dish-shaped) from few to many hundreds of metres in dimensions. Synonym: doline.
- **Slash** – material left on the ground after harvesting, including tree heads, shrubs and other non-merchantable woody material.
- **Smeared** – a form of soil compaction in which cultivation has resulted in a layer of clay lining the walls of the hole in which a tree is to be planted, restricting root penetration and growth.
- Snig track – see **Extraction track**.
- Snigging – see **Extraction.**

- **Soil erodibility** – the inherent susceptibility of a soil to erosion (detachment and movement of soil particles or aggregates) by processes such as rainfall, runoff, through flow, wind and frost.
- **Soil erodibility class** – this Code divides soils into five erodibility classes – low, moderate, moderate-to-high, high, and very high. Refer to D1 and Appendix 3.
- **Specialist** – a person highly skilled or qualified in a specific field (e.g. botany or soils).
- **Spoon drain** – a shallow semi-circular open drain, normally traversable by vehicles, designed to carry water to the side of a road, access track or fire break. Also known as a trafficable grip.
- **Spot cultivation** – the cultivation of up to 50% of a site using an implement attached to the arm of an excavator or similar machine.
- **Steep country** – an area with a majority slope of 20° or more.
- **Stockpile** – stacks of logs which have been de-limbed, de-barked and cut to length elsewhere, and are ready for loading onto trucks.
- Stream – see **Watercourse**.
- **Stream sink** – a sinkhole or cave into which a stream disappears underground.
- **Streamside reserve** – all land within a distance specified in this Code from the banks of a watercourse, lake, artificial storage or tidal waters (see Table 7).
- **Survey Directions Tasmania** – instructions issued by the Surveyor General (DPIPWE) from time to time to set the technical specifications and standards to be observed in the conduct of surveys of land made for a statutory purpose.
- **Sustainable forest management** – a dynamic and evolving concept that aims to maintain the economic, social and environmental values of all types of forests, for the benefit of present and future generations (FAO (3)).
- **Swamp** – an area of land more than 400 m^2 which has mainly waterlogged (poorly drained or very poorly drained) soils with peaty topsoils at least 20 cm thick, or peaty for more than half the soil depth to 1 m, that are usually saturated to the surface for long times every year and over most of its area supports terrestrial vegetation typically adapted to very wet environments including anaerobic soil conditions. Synonyms: marsh, wetland, bog.
- **Table drain** – the drain at the side of a road or track, and parallel to it.
- **TASVEG** – a Tasmania-wide vegetation map produced by the Tasmanian Vegetation Monitoring and Mapping Program (TVMMP), built upon and incorporating the original Regional Forest Agreement mapping of forest vegetation communities, as well as World Heritage Area mapping. TASVEG is continually revised and updated.
- **Temporary watercourse crossing** – a crossing of a watercourse by an access track designed for removal following short term use, having an opening (e.g. a log culvert) designed to take typical peak annual flows and a cover of slash for a running surface.
- **Threatened native vegetation community** – as defined in Schedule 3A of the *Nature Conservation Act 2002* and referenced in section 19(1AA) of the *Forest Practices Act 1985*. These include both forest and non-forest communities.
- **Threatened species** – a species listed on current schedules of the Tasmanian *Threatened Species Protection Act 1995* or the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999.
- **Town water supply catchments** – water catchments supplying the intakes identified by the water management authority.
- Trafficable grip – see **Spoon drain**.
- **Turbid water** – cloudy water containing significant amounts of clay or silt in suspension, typically testing at 50 NTU or more.
- **Understorey** – that part of forest vegetation growing below the forest canopy.

- **Uneven-aged forest** – a forest composed of trees in a mosaic of various ages.
- **Unstable areas** – sites susceptible to one of the forms of mass soil movement or accelerated soil erosion as a result of the interaction of such factors as steepness, soil properties, parent and surface geology and position in the landform profile.
- **Vulnerable karst soils** – soils in the following categories:
  - thin residual soils derived from in situ limestone or dolomite
  - thin or high or very high erodibility soils derived from other parent materials, on limestone or dolomite.
- **Water bar** – see **Grip**.
- **Watercourse** – a natural depression carrying perennial or intermittent flows of surface water for part of or all the year in most years. Consisting of a defined channel, with banks and a bed along which water may flow. See **Drainage depression** and Table 7.
- **Wetland** – see **Swamp**
- **Wildlife habitat clump** – patches of mature native forest excluded from forest practices.
- **Wildlife habitat strip** – Strips of uncut forest generally about 100 m in width, based on streamside reserves but including links up slopes and across ridges to connect with watercourses in adjoining catchments.
- **Will** – 'will' statements in this Code must be applied in a practical manner to forest practices. 'Must' statements are equivalent to 'will' statements.
- **Winch-assisted harvesting systems** – generally type B or C machinery stabilised by a winched cable. Winch-assisted machinery may be used as a stand-alone harvesting system or in conjunction with cable-based extraction.
- **Windrow** – an elongated heap of forest debris pushed up following harvest.

H. SUPPORTING DOCUMENTS

1. **Department of State Growth.** Tasmania's forest management system: an overview. [Online] 2017. https://www.stategrowth.tas.gov.au/__data/assets/pdf_file/0018/154620/5_Overview_Tasmania_Forest_Management_System_2017.pdf.

2. **Tasmanian Forest Industry Training Board.** *Forest Safety Code (Tasmania). Preserved as an approved code of practice under the Work Health and Safety Act 2012.* Launceston, Tasmania : Tasmanian Forest Industry Training Board, 2007.

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I. APPENDICES

Appendix 1. Legislation and policies referenced in this Code

Note: The dates applicable to regulations, principles and policies were correct at the time of publication but may change from time to time. The most recent version is to be applied.

(RL) denotes legislation relevant to the Duty of Care as described in section D of this Code.

Instrument	Agency	Purpose	Code Section
Forest Practices Act 1985 (RL)	Forest Practices Authority	Establishes the *Forest Practices Code* and forest practices system to provide for the sustainable management of forests on any land subject to forest operations. Provides for the establishment of private timber reserves on private land to provide security of long-term forestry use for land owners.	A1
Forest Practices Regulations 2017 (RL)	Forest Practices Authority	Identifies circumstances in which FPPs are not required, and prescribed fees.	A1.1, A3.2, C1, D4.3
Forest Management Act 2013 (RL)	Department of State Growth	Provides for the management of Permanent Timber Production Zone land by the Forestry corporation (Sustainable Timber Tasmania).	A1.1
National Forest Policy Statement 1992	Australian Department of Agriculture and Water Resources	Outlines objectives and policies for the future of Australia's public and private forests that have been agreed upon by all states and territories.	A1.1
Forest Practices Related to Wood Production in Plantations: National Principles 1996	Australian Department of Agriculture and Water Resources	Set the framework for a consistent and scientific basis for sound plantation management to which all states and territories subscribe.	A1.1
Export Control Act 1982	Australian Department of Agriculture and Water Resources	Provides for the control of the export of certain goods and for related purposes.	A1.1
Export Control (Unprocessed Wood) Regulations 1986	Australian Department of Agriculture and Water Resources	Prohibits the export of unlicensed unprocessed wood products from Australia.	A1.1
Policy for Maintaining a Permanent Native Forest Estate 2017	Department of State Growth	Regulates the extent to which native forest may be cleared and converted to other land uses.	A1.1 & D

Instrument	Agency	Purpose	Code Section
Tasmanian Regional Forest Agreement 1997 (2017 variation)	Agreement between the Australian and Tasmanian governments	Provides a framework for the sustainable management of Tasmania's public and privately owned forests. Varied in 2001, 2007 & 2017.	A1.1 & A3.1 D4.3
Nature Conservation Act 2002 (RL)	Department of Primary Industries, Parks, Water and Environment (DPIPWE)	Provides for the declaration of certain types of reserves and sets out the values and purposes of each reserve class.	A1.1 & D4.3
Fire Service Act 1979 (RL)	Police, Fire and Emergency Management	Amalgamates fire services in the state and consolidates the law relating to preventing and extinguishing fires and the protection of life and property from fire.	C2
Fire Service (Miscellaneous) Regulations 2017 (RL)	Police, Fire and Emergency Management	Provides specific requirements for fire safety practices.	C2
Water Management Act 1999 (RL)	DPIPWE	Provides for the management of groundwater and surface water.	C8
State Policy on Water Quality Management 1997	DPIPWE (EPA)	Provides the overarching framework for managing water quality in Tasmania.	D2
Threatened Species Protection Act 1995 (RL)	DPIPWE	Provides for the conservation management of scheduled threatened species of flora and fauna.	D4.3
Environment Protection and Biodiversity Conservation Act 1999	Australian Department of the Environment and Energy	Provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places.	D4.3
Aboriginal Heritage Act 1975 (RL)	DPIPWE (AHT)	Provides for the identification and protection of all Aboriginal heritage sites.	D6
Historic Cultural Heritage Act 1995 (RL)	DPIPWE	Identifies, assesses and protects historic (post European settlement) cultural heritage.	D6
Agricultural and Veterinary Chemicals (Control of Use) Act 1995 (RL)	DPIPWE	Provides for the use and application of agricultural chemical products and veterinary chemical products.	E2

Instrument	Agency	Purpose	Code Section
Weed Management Act 1999 (RL)	DPIPWE	Provides for the management of weed control.	B5 & E3.3
Weed Management Regulations 2017 (RL)	DPIPWE	Defines prescribed measures for importation of certain feed and livestock, and offences under the Weed Management Act.	E3.3
Environmental Management and Pollution Control Act 1994 (EMPCA) (RL)	DPIPWE (EPA)	Establishes duty of care on everyone to prevent or minimise environmental harm. Defines potentially harmful activities requiring assessment and approval. Identifies notification requirements for environmental incidents.	F3
Environmental Management and Pollution Control (Noise) Regulations 2016	DPIPWE (EPA)	Limits the amount of noise from equipment and machinery used on building construction and demolition sites (not road construction) which can be heard in any neighbouring residential premises.	F3
Land Use Planning and Approvals Act 1993 (RL)	Justice	Defines the Tasmanian planning scheme and policies, state and local planning provisions.	G
Crown Lands Act 1976 (RL)	DPIPWE	Makes provisions with respect to the management, sale, and disposal of the lands of the Crown.	D
Forestry (Rebuilding the Forest Industry) Act 2014 (RL)	Department of State Growth	Provides for the invigoration of the forest industry.	D
Forestry Rights Registration Act 1990 (RL)	DPIPWE	Provides for the registration on land title of certain forestry rights.	D
National Parks and Reserves Management Act 2002 (RL)	DPIPWE	Provides for the management of reserves declared under the *Nature Conservation Act 2002.*	D
Public Land (Administration and Forests) Act 1991 and *Resource Planning and Development Commission Act 1997* (RL)	Department of Justice	Provides authority to conduct public land use inquiries, approve planning schemes and report on state policies.	D

Appendix 2. Protocol for forestry field marking colours

The table overleaf shows the standard marking colours recommended for field use in the forest industry in Tasmania.

1. A single clear, distinctive colour is allocated to each primary use as below:

Primary use	**Colour**
Harvest/site preparation boundary	blue
Roadlines	red
Property boundary	pink
Research/silviculture/inventory plots	yellow
Survey lines/general purpose	orange
Assessment	white

   Under ***no*** circumstances should blue tape be used for purposes other than for harvesting or site preparation boundaries.

2. High visibility colour versions of flagging tapes should be used where available. Biodegradable tape should only be used where high visibility and longevity is not critical. Striped tape is prone to fading and therefore is recommended only for relatively short term uses.
3. In low light conditions or heavy undergrowth situations, the distance between individual pieces of tape placed in the field should be reduced to minimise the risk of boundaries being accidentally crossed. Night-time operations should be scheduled away from boundaries where possible.
4. In some situations, it may be appropriate to use two tape colours together (e.g. for a harvesting boundary which is also a wildlife habitat strip, the blue tape may be supplemented with yellow and white striped tape).
5. FPPs should state the tape colours being used on a coupe. Ideally the colour of tape/paint used in the field should also be reflected in the colours used on the FPP map.

Protocol for forestry field marking colours

Use	Colour	Comments
Harvesting boundary	Blue tape	Including coupe, streamside reserves and wildlife habitat strips/clumps. Indicates a boundary that cannot be crossed by fallers (except individual trees as below*) or harvesting machinery.
Site preparation boundary	Blue tape	Indicates a boundary that cannot be crossed by plantation site preparation machinery.
Road location	Red tape or paint	Indicates the location of the proposed road centreline.
Property boundary	Pink tape or paint	
Silviculture, research, inventory	Yellow tape	Generally long-term use. Inventory **–** permanent plots only.
Survey	Orange tape	Profiles for cable harvesting, general purpose survey**,** outrow tracks in plantations etc.
Sales	Orange paint (preferred)	Log marking, tagged logs to be retrieved in harvesting operation, landing location. *Individual trees marked for harvesting from a native forest streamside reserve by an FPO.
Assessment	White tape	Generally short-term use. Assessment strip take-off points, assessment traverses and temporary plots.
Sub-coupe harvesting boundary	Blue and white striped tape	Indicates a section boundary in a coupe (e.g. between cable and conventional harvesting sections).
Machinery exclusion zone	Blue and white striped tape	Generally marking will be 10 m from the watercourse, indicating the point beyond which only excavator-type felling machines are permitted.
Natural and cultural values	Yellow and white striped tape	Used by FPA specialists to flag areas identified during survey (e.g. location of aboriginal artefacts).
Works	Red and white striped tape (preferred)	Windrow locations, culvert locations etc.
Extraction track watercourse crossings	Red and white striped tape	Indicates a crossing point on a Class 3 or 4 watercourse.
Hazard	Yellow tape (75 mm) with black lettering ‘CAUTION ‘	Used to mark dangerous trees for falling etc.
	Yellow and black striped tape (75 mm)	Used by Work Safe Tasmania inspectors when a prohibition notice is issued stopping access to a section of forest.

Appendix 3. An outline of soil erodibility classes in relation to soil properties

Definition of soil erodibility

Erodibility is the inherent susceptibility of a soil to the detachment and transportation of soil particles or aggregates by rainfall, runoff, subsurface flow, wind or frost. Erosion by wind is important process to consider for sandy soils. Erodibility is a soil property and should not be confused with erosion hazard which takes into account other factors like slope and vegetation cover.

Soil erodibility classes

In the Forest Practices Code, measures to prevent erosion are applied to soils according to their classification into one of five soil erodibility classes (low, moderate, moderate-to-high, high or very high). A semi-quantitative methodology has been developed[1] for assessing the erodibility class of Tasmanian forest soils based on both field and laboratory determinations of soil properties. They include the proportion of water-stable soil aggregates using wet-sieving and/or dispersion tests, soil strength, stone content, thickness of soil layers, and permeability and drainage classes. Soil erodibility can also be estimated from soil field characteristics and a brief guide for determining soil erodibility classes in the field is given below.

Low erodibility

Low-erodibility soils are freely drained and friable with no mottles, have moderate or high permeability, often have silty clay, clay loam or clay textures, and have high aggregate stability (strongly developed peds), or are extremely stony with sandy or loamy textures. They are formed on a wide variety of substrates. They do not have pale A2 horizons.

Moderate erodibility

These soils are both freely-drained and friable with loamy or clay textures and moderate aggregate stability (moderately developed peds) or have impeded drainage (imperfectly drained, with mottles) with clayey textures and high aggregate stability. They are formed on a wide range of substrates. They do not have pale A2 horizons.

Moderate-to-high erodibility

Moderate-to-high erodibility soils are imperfectly drained with grey and brown mottles and clayey textures or they are moderately well drained and have a bleached sandy or silty layer (A2 horizon) with low aggregate stability (poorly developed peds) overlying moderately permeable clays or they have a pale loamy layer (A2 horizon) with moderate aggregate stability (moderately developed peds) overlying slowly permeable clays. They occur on a range of substrates. If present, the A2 horizon is generally up to 25 cm thick.

High erodibility

By water (rainfall and runoff)

Most high erodibility soils have texture-contrast profiles. They generally have dark-coloured topsoils (often containing abundant charcoal) and moderate or high aggregate stability (moderately or well-developed peds) overlying a bleached sandy or silty layer (A2 horizon) generally 25–50 cm thick with low aggregate stability (weakly developed peds, or single grain structure, or massive) which in turn overlies slowly permeable clay or a hardpan. If the organic-rich topsoil is breached or removed, the underlying sandy or silty layers are highly susceptible to erosion by rainfall and runoff, and rill and gully erosion or tunnel-gully erosion can result. They are formed mainly under dry forests on sandy substrates including sandstones, conglomerate, and granite. However, also included in this class are some loamy soils on dolomite under wet forest, clayey soils with dispersible subsoils on mudstone under dry forest, and sandy or silty soils on Quaternary glacial deposits, and soils with high contents

[1] Laffan, M, Grant, J and Hill, R 1996, 'A method for assessing the erodibility of Tasmanian Forest soils', *Australian Journal of Soil and Water Conservation* 9 (4), 16–22.

of exchangeable sodium or magnesium in subsoils including soils developed in deeply weathered ‘mealy’ dolerite.

By wind

Soils that are highly erodible by wind include deep, loose sandy soils with dark-coloured well-developed topsoils (usually 20 cm or more thick) overlying yellowish brown subsoils or bleached sands overlying humus and iron pans. They occur on relatively stable coastal dune systems. Elsewhere, for example in dry inland areas, they occur as dunes, sand sheets and lunettes on floodplains, at the margins of lagoons and on river terraces.

High erodibility soils are highly susceptible to rill and gully erosion if surface layers are unduly disturbed.

Very high erodibility

By water (rainfall and runoff)

Soils with very high erodibility are mainly formed under dry forest on Quaternary alluvial deposits derived from granite. They occur mainly along drainage depressions and adjacent to small watercourses in north-east Tasmania. Soil profiles have weakly developed topsoils with low aggregate stability (poorly developed peds) overlying unconsolidated deep sands with low aggregate stability. The total thickness of surface and subsurface layers with low aggregate stability is 50 cm or more in these soils.

Also included in this soil erodibility class are texture-contrast soils under dry forest on granite hill slopes and on Tertiary granite outwash and deep sandy soils derived from siltstones and sandstones, often in sites of accumulation such as drainage depressions. Profiles have weakly developed topsoils overlying thick (>50 cm), bleached coarse sandy layers which in turn overlie slowly permeable clays or rock. Both these soil types are highly susceptible to gully erosion if surface layers are unduly disturbed.

By wind

These soils occur on recent active sand dunes in coastal areas where soil profiles are formed in deep, loose, sands with only very weak, if any, topsoil development.

Erodibility in relation to soil colour and texture

Soil colour and texture are useful characteristics that help classify soil erodibility. Loamy or clayey soils with dark-coloured topsoils overlying uniformly coloured yellow, brown or red subsoils generally have low or moderate erodibility. In contrast, loamy or clayey soils with distinct grey mottling or dominantly grey colours in subsoils and/or thin A2 horizons usually have moderate-to-high erodibility. Soils with bleached, loose, sandy layers >50 cm thick are generally have high or very high erodibility depending on their thickness and the degree of development of topsoils.

Appendix 4. A field test for assessing soil water status

Sample collection

Samples from soil surface to a depth of 20 cm (0–20 cm) should be taken and tested individually from at least six sites considered to be representative of the coupe. Samples may be collected using a hand auger, spade or trowel. Sufficient soil should be collected to fill the palm of the hand.

Sample testing

The tests involve observing the behaviour of the soils when squeezed in the hand.

Soil water status	Behaviour of soils tested
Dry	Soils will not form a ball when squeezed. Sands or sandy loams will flow through fingers or fragments will powder.
Moist	Soils form a ball when squeezed. Sands and sandy loams form a weak ball which breaks easily.
Wet	The soil ball leaves a wet outline when squeezed, or is wetter (saturated). Loams and clays are sticky.

Appendix 5. Management of Class 4 streams

Principle

The inherent erosion risk in the riparian zone is chiefly dependent on slope and soil erodibility (McIntosh and Laffan 2005[2]). These two factors determine an 'erosion hazard' class. Each erosion hazard class requires an appropriate level of management, which may be upgraded if 'erosion features' are noted.

Basic observations required

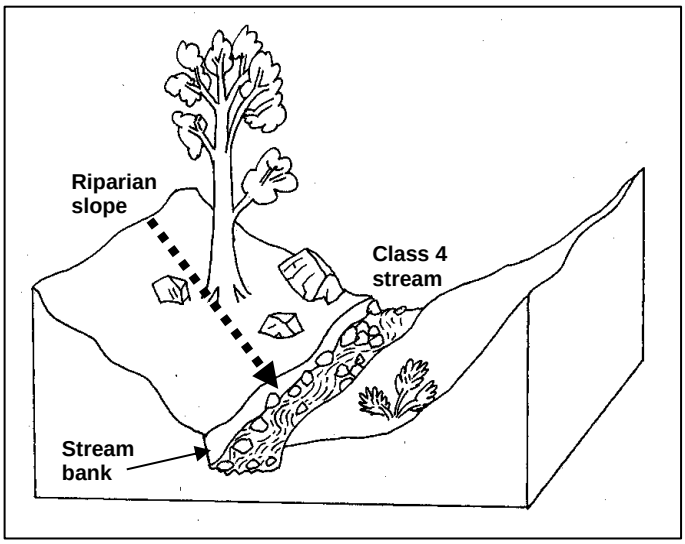
To assess actual and potential risk to a Class 4 stream the following information about the stream and its riparian zone[3] is required:

- What is the maximum riparian slope?
- What is the soil erodibility in the riparian zone?
- Are 'erosion features' present?

A field inspection will normally be needed to answer these questions. Streams showing erosion features, or at risk of developing erosion (e.g. those on steeper slopes, in areas showing instability, or in entrenched gullies) should be inspected.

Riparian slope

The maximum slope in the riparian zone should be estimated or measured with a clinometer. The measured slope should cover a significant area in the riparian zone. As a general rule, the measured maximum slope should cover at least 5–10% of the riparian zone, but FPOs should use their judgement to decide which slopes are significant. Stream banks (periodically in contact with stream water) are not considered part of the riparian slope.



[2] McIntosh, P and Laffan, M 2005, 'Soil erodibility and erosion hazard: Extending these cornerstone soil conservation concepts to headwater streams in the forestry estate in Tasmania', *Forest Ecology and Management* 220:128–139.

[3] For the purpose of these guidelines, the riparian zone is defined as the 0–10 m zone adjacent to the stream.

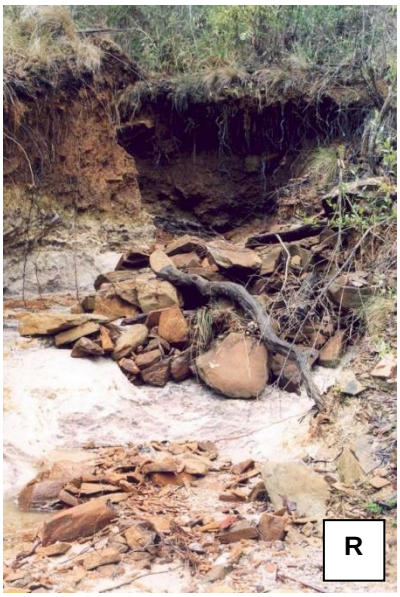
Soil erodibility

Soil erodibility in the riparian zone should be determined by matching observed soils with those described in publications, including *Forest soils of Tasmania* (16)*, Soils bulletins 1, 2 and 3* (Laffan et al. 1995[4], Grant et al. 1995[5], Hill et al. 1995[6]), and the FPA *Forest soil fact sheets* (17). See also Appendix 3 in this Code. Alternatively, soil erodibility may be estimated by the methods described by Laffan (2000[7]) or by checking with a soils specialist.

Erosion features

For streams there are four categories:

- a channel >4 m wide (W)[8]
- evidence of recent boulder movement (R)
- near-vertical stream banks >1 m high (V)
- significant sediment accumulation (A).



[4] Laffan M, Grant J and Hill R, 1995, 'Soils of Tasmanian State Forests 1. Pipers Sheet', *Soils Bulletin 1*, Forestry Tasmania, Hobart.

[5] Grant J, Laffan M and Hill R, 1995, 'Soils of Tasmanian State Forests 2, Forester Sheet', *Soils Bulletin 2*, Forestry Tasmania, Hobart.

[6] Hill R, Laffan M and Grant J, 1995, 'Soils of Tasmanian State Forests 3, Forth Sheet', *Soils Bulletin 3*, Forestry Tasmania, Hobart.

[7] Laffan M, 2000, 'A rough field guide for assessing soil erodibility', *Forest Practices News*, 3 (2), pp. 13–16. Forest Practices Board, Hobart, Tasmania.

[8] Meandering slow-moving streams flowing in organic-matter rich sediments in almost flat-bottomed gullies 4 m or more wide are exempt from the 4 m rule.

In the riparian zone there are three categories:

- landslides or slumps (L)
- sheet erosion (S)
- tunnel gully erosion (G).

The presence of erosion features, alone or in combination, indicates that a Class 4 stream and its riparian zone are at greater risk of erosion than a stream and riparian zone without these features.

Step 1 Recording features

Record these features on a record sheet.

Coupe No.	
Class 4 stream I.D	
Steepest riparian slopes (must cover at least 5–10% of riparian zone)	deg
Soil erodibility	Low Mod. Mod-high High Very High
EROSION HAZARD CLASS (from Step 2)	A B C D E
EROSION FEATURES	
Channel >4 m wide	W
Recent boulder movement	R
Near-vertical stream banks >1m high	V
Sediment accumulation	A
Landslides or slumps	L
Sheet erosion	S
Tunnel-gully erosion	G
No erosion features	NIL
PRESCRIPTION (from Step 3)	

Step 2 Determine erosion hazard

Determine **erosion hazard** from the chart of riparian slope versus soil erodibility in the riparian zone. Add this information to the record sheet (Step 1).

Erosion hazard in relation to soil erodibility class and riparian slope angle

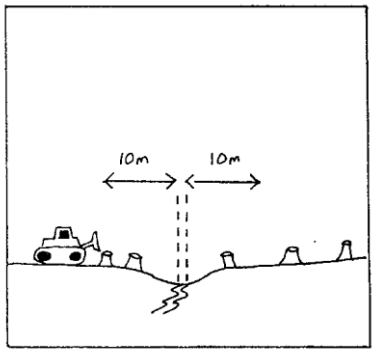
	Soil erodibility class				
Maximum slope in riparian zone	**Low**	**Moderate**	**Moderate-to-high**	**High**	**Very high**
<3º	A	A	A	C	C
3–8º	B	B	B	C	D
9–11º	B	B	C	C	D
12–14º	B	C	C	D	E
15–19º	C	C	D	E	E
20–26º	D	D	E	E	E
>26º	D	E	E	E	E

Notes:

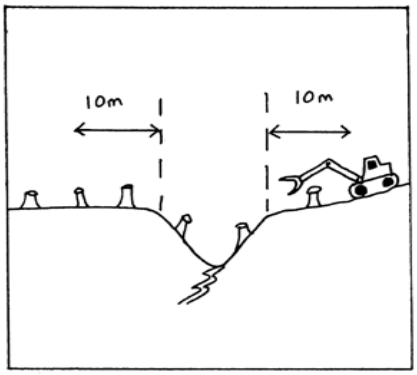
A: low
B: moderate
C: moderate-to-high
D: high
E: very high

Step 3. Prescriptions

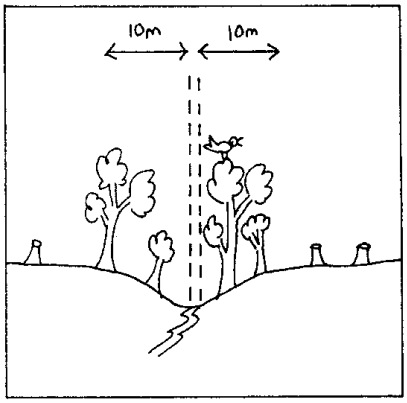
From the record of erosion features (Step 1) and determination of erosion hazard (Step 2) work out the prescriptions from the decision trees (see below). There are five prescriptions to choose from. Note that streams may be divided into reaches having different prescriptions.



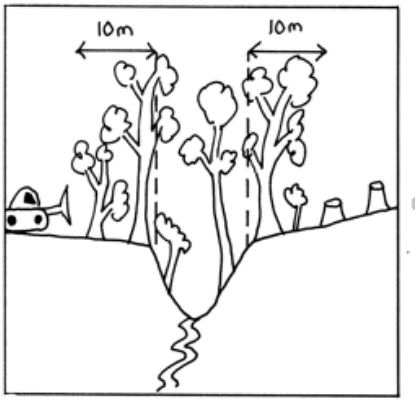
Standard Class 4 machinery exclusion zone (MEZ)



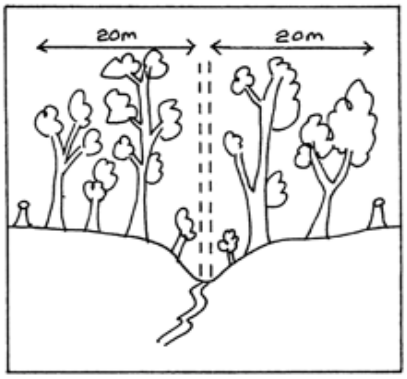
Extended Class 4 machinery exclusion zone (MEZ). The 10 m wide zone is measured from where the steep (>19°) gully sides begin. The maximum width is 20 m.



Class 4 streamside reserve (SSR). A 10 m wide no-harvest and no-machinery zone is applied.

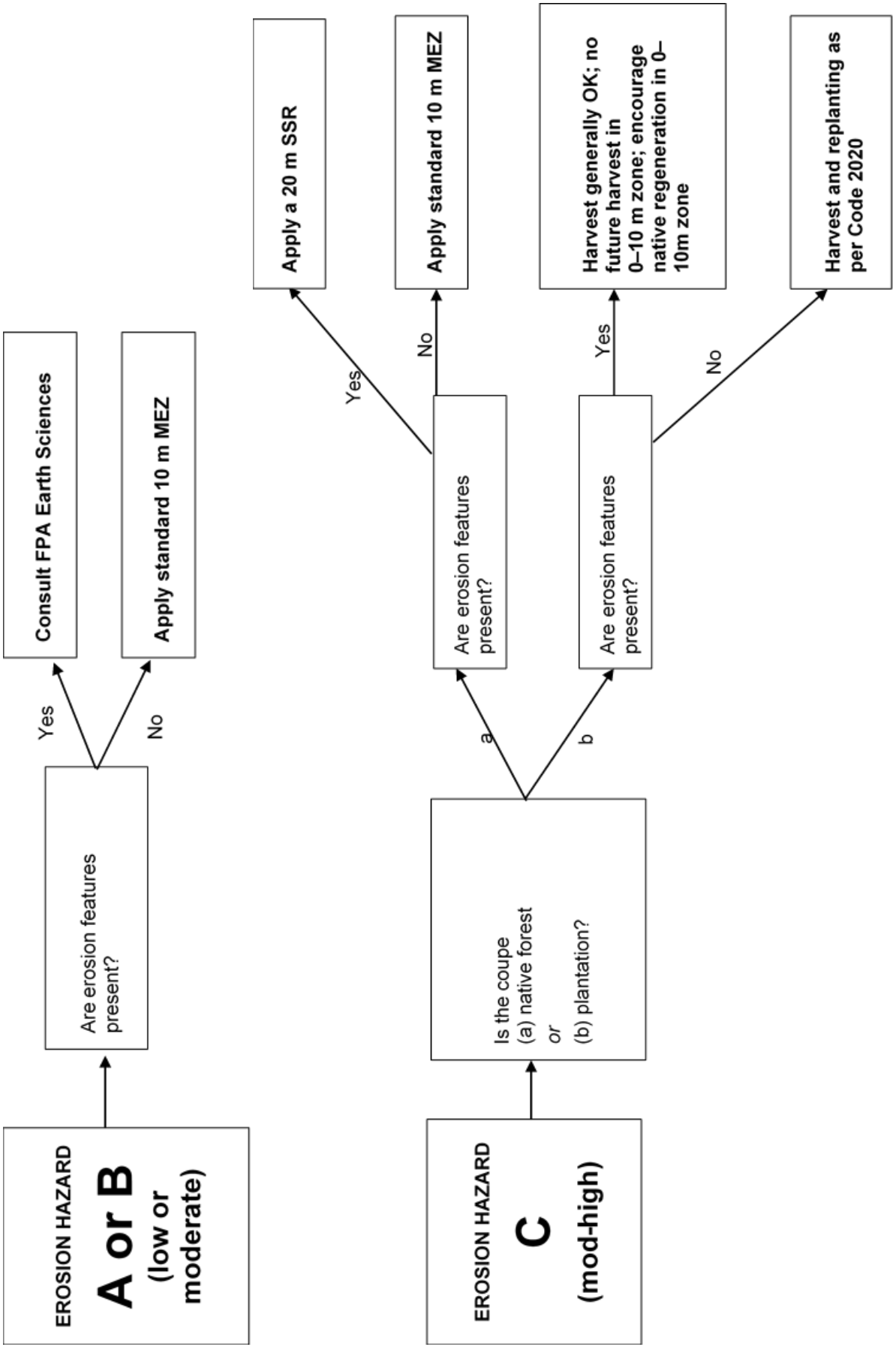


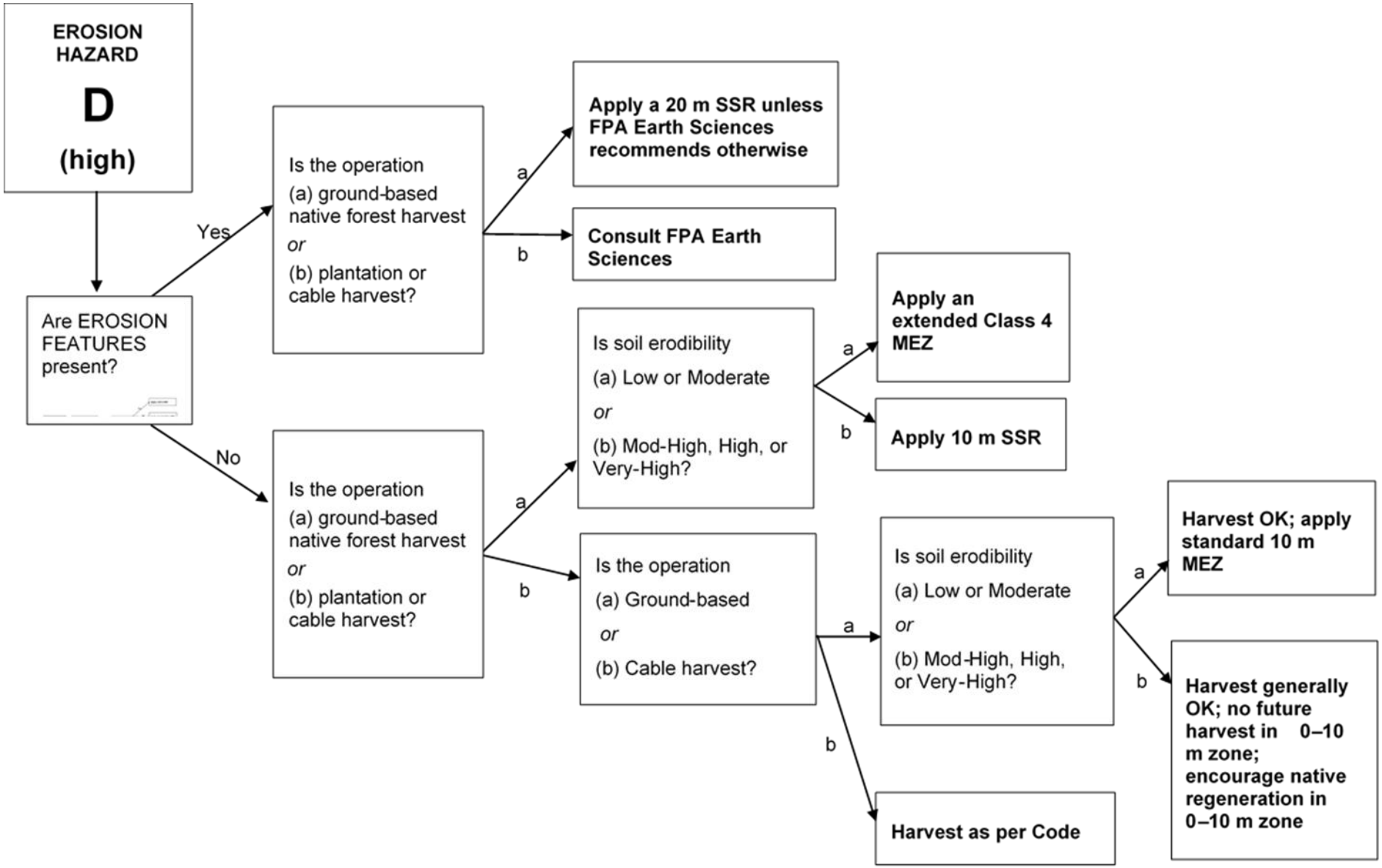
Extended Class 4 streamside reserve (SSR). The 10 m wide SSR is measured from where the steep (>19°) gully sides begin (commonly referred to as 'the break in slope'). The maximum SSR width measured from the stream bank is 20 m.



20 m streamside reserve (SSR).

Use these decision trees to key out a prescription





MEZ = Machinery exclusion zone; SSR = Streamside reserve

EROSION HAZARD
E
(very high)
Are erosion features present?
Yes
No
Is the operation (a) ground-based native forest harvest or (b) plantation or cable harvest?
a
b
Apply a 20 m SSR
Consult FPA Earth Sciences
Is the operation (a) ground-based native forest harvest or (b) plantation or cable harvest?
a
b
Is the stream in a steep-sided gully?
Yes
No
Apply an extended Class 4 SSR
Apply 10 m SSR
Is the operation (a) Ground-based, or (b) Cable harvest?
a
b
Harvest generally OK; no future harvest in 0–10 m zone; encourage native regeneration in 0–10 m zone
Is soil erodibility (a) Low or Moderate or (b) Mod-High, High, or Very-High?
a
b
Harvest as per Code
Consult FPA Earth Sciences
MEZ = Machinery exclusion zone; SSR = Streamside reserve

Appendix 6. Slope angles in degrees and percent

Degrees °	Percent %
1	1.7
2	3.5
3	5.2
4	7
5	8.7
6	10.5
7	12.3
8	14.1
9	15.8
10	17.6
11	19.4
12	21.3
13	23.1
14	24.9
15	26.8
16	28.7
17	30.6
18	32.5
19	34.4
20	36.4
21	38.4
22	40.4
23	42.4
24	44.5
25	46.6
26	48.8
27	51
28	53.2
29	55.4
30	57.1
31	60.1
32	62.5
33	64.9
34	67.5
35	70
36	72.7
37	75.4
38	78.1
39	81
40	83.9
41	86.9
42	90
43	93.3
44	96.6
45	100

Appendix 7. Requirements for FPP maps

1. FPPs will include a map at an appropriate scale that effectively portrays the details of the planned forest practices to contractors, supervisors, planners, auditors, neighbours, or other parties. The FPP map should clearly portray all the necessary details that a person conducting the forest practices needs to know to comply with the FPP and with this Code.

2. FPP maps should reflect the text in the body of the FPP and vice versa.

3. Generally, a 50 ha coupe can be shown on an A4 page at 1:10,000 scale with reasonable clarity. Where useful, enlargements should be used to show particular areas in greater detail (e.g. unusual cadastral boundary alignment; special values feature, identification of important infrastructure).

4. The map and the legend must be clear and legible. Lines, polygons and point features with the accompanying shading, fills and label fonts must be clear and legible. If the map is to be reproduced in black and white or grey scale ensure that the key features are easily identified and labels are legible. Consider using multiple maps to avoid a single map being too complicated.

5. The more features and colours on a map, the more complicated it becomes. Maps should be fit for purpose, readable and relatively simple to interpret. Legends should reflect what is on the map. If a feature is not on the map do not show it in the legend.

6. Where the FPP is for a linear operation such as clearing for a road or pipeline over a long distance, multiple maps may be required to ensure the features and boundaries are clear for operators who need to implement the planned works.

7. The datum of the FPP map should be shown in terms of the Datum specified in the version of the Survey Directions Tasmania currently in operation, as issued by the Surveyor General.

8. The boundaries of the FPP should be clearly described in the FPP text and shown on the FPP map. Any roads or other features named in the text should be also identified on the FPP map.

9. The width of streamside reserves or machinery exclusion zones should be mentioned in the FPP text and in the map legend and drawn to scale on the FPP map.

10. The FPP map should include the following features (if present):
    - FPP boundary
    - operational boundary
    - property boundaries
    - operational area in hectares
    - harvest methods (if multiple)
    - roads and access tracks (existing and planned for construction in the FPP)
    - watercourses and their classification
    - watercourse crossings
    - contour lines
    - approximate routes of extraction
    - landings, stockpiles and/or continuous landings (numbered)
    - fire dams
    - natural and cultural values identified in the FPP such as habitat protection strips or clumps and any areas to be excluded from operations (FPO discretion should be applied to sensitive information)
    - town water intake (if close enough to be on the same map).

11. Hazards such as dangerous trees or overhead or underground powerlines may be shown on the FPP map but would more commonly be shown on the coupe safety plan.

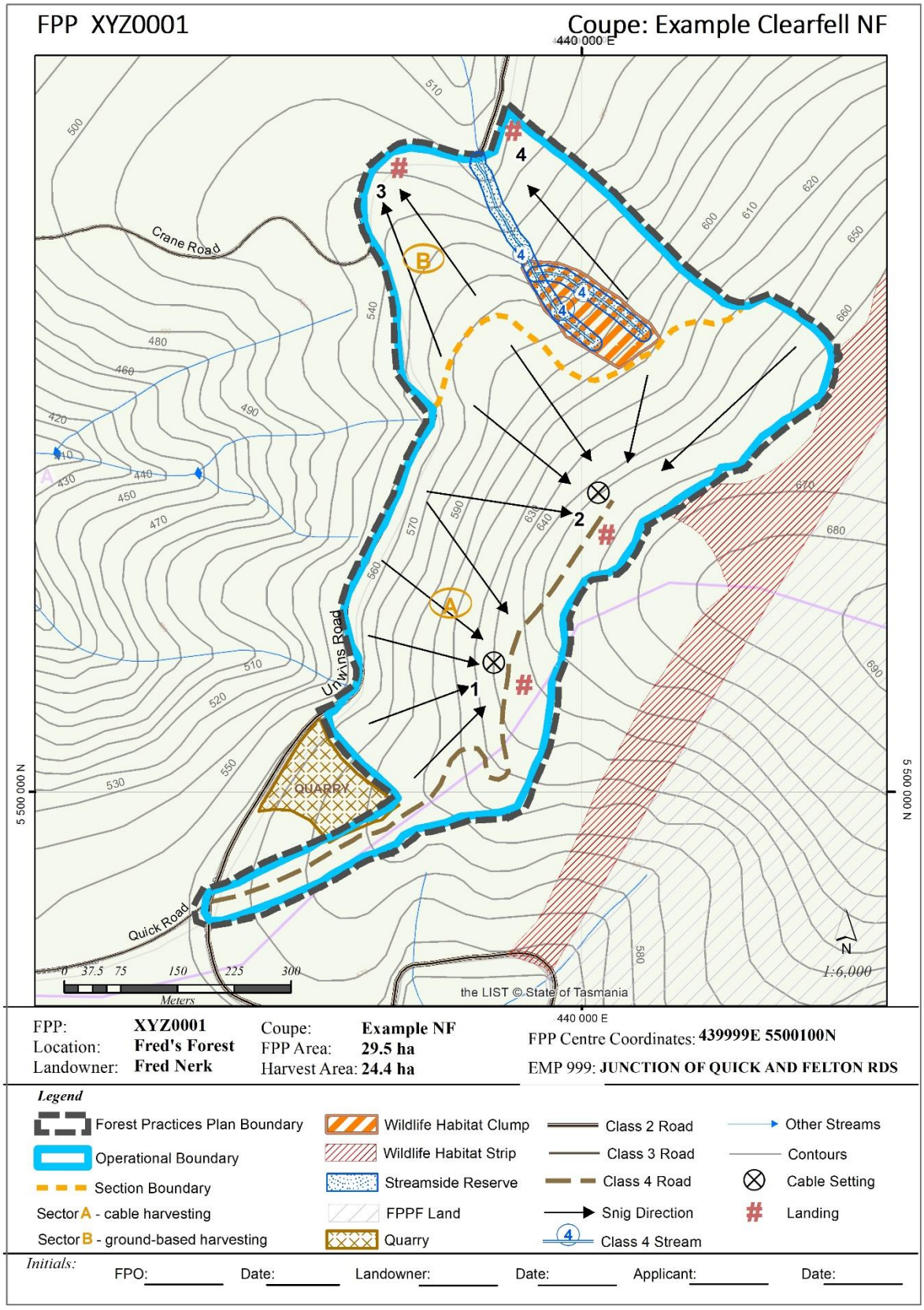
12. The FPP map should clearly indicate the FPP number and coupe number(s) and be signed and dated by all signatories to the FPP.

13. Aerial imagery may be used as a background if useful and the map remains legible.

14. Where maps are to be used by machinery operators with digital spatial software tools the boundaries marked on the map should be sufficiently clear and accurate to allow the operator to make a decision as to the precise location of the boundary, where the boundary has not been physically marked. Note the legal requirements for property boundary marking in section A3.2.

15. An example of an acceptable FPP map is shown on the following page

Example native forest clearfell FPP map



Example plantation FPP map