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ORDERS

FORESTRY (VANUATU CODE OF LOGGING PRACTICE) ORDER NO. 26 OF 1998.

REPUBLIC OF VANUATU

FORESTRY ACT [CAP. 147]

FORESTRY (VANUATU CODE OF LOGGING PRACTICE) ORDER NO. 26 OF 1998

An Order to establish the Vanuatu Code of Logging Practice.

IN EXERCISE of the powers conferred upon me by section 34 and section 21A(4) of the Forestry Act [CAP. 147] as amended, I John Morsen Willie, Minister of Agriculture, Livestock, Forestry and Fisheries, hereby make the following Order : -

INTERPRETATION

1. In these regulations, unless the context otherwise requires -

"Act" means the Forestry Act [CAP. 147];

"Competence" means having sufficient skills and knowledge to be able to perform the relevant utilisation operation activities to the required minimum standard set out in the Code of Logging Practice or to the satisfaction of the Director;

"Coupe" means a discrete area of forest harvested and regenerated in one operation usually in less than one year;

"Coupe harvesting plan" means an operational plan which provides precise details of logging proposals, including the location of boundaries, excluded areas, roads, landings and skid tracks as well as details about timber resources, environmental and cultural values and post harvesting land use;

"Department" means the Department of Forests of the Government of the Republic of Vanuatu;

"Director" means the Director of the Department of Forests or such other person as the Public Service Commission may appoint as Director;

"Excluded area" means areas where utilisation operations are not allowed except with the specific approval of a Forest Officer prior to any operations. Excluded areas must be clearly marked on Coupe Harvesting Plans and marked in the field;

"Forest Officer" means the Director, the Principal Forest Utilisation Officer, any forest officer or any other officer carrying out the duties of a forest officer whose duties are approved by the Director under the Act;

"Forest operator" means any person who undertakes any of the defined activities associated with utilisation operations under a Timber Licence and who is required to hold a forest operator's licence in accordance with regulation 5(1);

"Harvesting agreement" means an agreement prescribed under section 11(1) of the Act which is in the form of schedule 2 of the Act;

"Penalty points" means points allocated to a forest operator for major breaches of the Code of Logging Practice in accordance with regulation 13(1);

"Timber licensee" means a person or company who has been issued with a Timber Licence in accordance with Section 12 of the Act;

"Utilisation operations" means any of the following kinds of activities carried out for the purpose of or in association with the sale or processing of timber: tree felling and log preparation, construction of skid tracks and log landings, skidding, log scaling, loading and hauling of logs, mobile sawmilling, planning or surveying, construction and grading of any road or track, construction of any stabilisation works, construction of any watercourse crossing and extraction and spreading of any gravel, coral or rock onto any road or track;

"Watercourse crossing" means any bridge, culvert, pipe, earth embankment, ford or any other means of enabling a road or track to cross any watercourse.

APPLICATION OF ORDER

2. The provisions of this Order shall apply to any person who holds a Timber Licence under the Act or who undertakes any of the defined activities associated with utilisation operations in Vanuatu.

VANUATU CODE OF LOGGING PRACTICE

3. (1) A code of logging practice for the Republic of Vanuatu is hereby established and shall be known as the Vanuatu Code of Logging Practice.

(2) The Vanuatu Code of Logging Practice shall specify the minimum standards and practical procedures which shall apply to utilisation

operations, to ensure that environmental and cultural values are protected and that forests are managed on a sustainable basis.

(3) The Vanuatu Code of Logging Practice Version March 1998 in the form of Schedule 1 of this Order shall apply throughout the Republic of Vanuatu as amended from time to time.

AMENDMENT TO THE VANUATU CODE OF LOGGING PRACTICE

4. (1) The Director may after consultation with Timber Licensees recommend amendments to the Vanuatu Code of Logging Practice to the Minister.

(2) The Minister may approve amendments to the Vanuatu Code of Logging Practice by publication in the Gazette.

(3) The Director shall advise all timber licensees of any approved amendments to the Vanuatu Code of Logging Practice.

LICENSING OF FOREST OPERATORS

5. (1) No person shall supervise utilisation operations or carry out any of the defined activities associated with utilisation operations, unless he or she holds a valid and unsuspended forest operator's licence.

(2) A person may apply in the form of Schedule 2 of this Order to the Director for a forest operator's licence.

(3) The Director may require an applicant for a forest operator's licence to demonstrate competence or attend relevant training courses about the Vanuatu Code of Logging Practice, log scaling and operation of the machinery used in utilisation operations.

(4) Having considered the application and evidence of competence, the Director may grant or refuse to grant a forest operator's licence in the form of Schedule 3 of this Order.

(5) The Director shall maintain a register of all forest operator's licences issued and shall record the details of any penalty points issued to any licensee in the register.

LICENCE FEE

6. The holder of a forest operator's licence shall upon being granted a licence pay a fee of VT5000.

OBLIGATIONS OF TIMBER LICENSEE

7. (1) A timber licensee shall notify the Department on a quarterly basis in the form of Schedule 4 of the names and forest operator licence

numbers of each person employed by them to work in utilisation operations.

(2) A timber licensee shall not allow any person to carry out utilisation operations, for which a forest operator's licence is required, without a valid and unsuspended forest operator's licence.

UTILISATION OPERATIONS SUPERVISOR

8. (1) A timber licensee shall nominate a person to be the Company Utilisation Operations Supervisor for each area in which they are carrying out utilisation operations.

(2) The Company Utilisation Operations Supervisor shall be responsible for ensuring that all persons involved in utilisation operations comply with the provisions of the Code of Logging Practice and the approved Coupe Harvesting Plan.

COUPE HARVESTING PLAN

9. (1) The Director shall determine the appropriate format for a coupe harvesting plan taking into account the requirements of the Vanuatu Code of Logging Practice, size of operations, the available mapping systems and natural resources databases.

(2) A timber licensee shall prepare a coupe harvesting plan for each area in which utilisation operations are to be carried out, unless granted an exemption by the Director.

(3) The Director or delegated Forest Officer shall consider each coupe harvesting plan and if satisfied it meets the minimum standards of the Vanuatu Code of Logging Practice approve the plan.

(4) Utilisation operations must not commence until the Coupe Harvesting Plan has been approved.

MONITORING OF UTILISATION OPERATIONS

10. (1) A Forest Officer will be responsible for monitoring compliance with the Vanuatu Code of Logging Practice in each area where approval has been given for utilisation operations to be carried out.

(2) A Forest Officer shall inspect a coupe in the field for compliance with the provisions of the Vanuatu Code of Logging Practice prior to, during or after utilisation operations.

(3) A Forest Officer shall, after inspection of utilisation operations, complete the relevant sections of a checklist in the form of Schedule 5.

COMPLETION OF TIMBER HARVESTING

11. (1) At the completion of utilisation operations in an area, the Company Utilisation Operations Supervisor shall request an inspection of the area by a Forest Officer to certify that the utilisation operations have been conducted in accordance with the Vanuatu Code of Logging Practice and the harvesting agreement.

(2) A Forest Officer shall, after inspection of an area, complete the post-harvest section of the checklist in the form of Schedule 5 and fill in the authorisation to move section provided all the necessary stabilisation and cleaning works have been completed.

(3) When logging machinery needs to be moved before all the utilisation operations in an area have been completed, a Company Utilisation Operations Supervisor may request a Forest Officer to approve machinery leaving the coupe using the relevant section of the checklist in the form of Schedule 5.

(4) A Forest Officer shall approve machinery leaving the coupe if they are satisfied that there is a valid reason to move the logging machinery and provided stabilisation works have been completed on those areas where utilisation operations have been completed.

(5) Logging machinery required for constructing stabilisation works shall not be moved from a coupe until the Forest Officer has approved the move.

BREACHES OF THE VANUATU CODE OF LOGGING PRACTICE

12. (1) A Forest Officer may determine a breach of the Vanuatu Code of Logging Practice to be either a major or minor breach depending on the seriousness of the matter.

(2) Major breaches of the Code of Logging Practice will be related to any items set out in Schedule 6 of this Order.

(3) Minor breaches of the Code of Logging Practice will be related to any other requirements set out in the Code of Logging Practice.

PENALTIES FOR BREACHES OF THE VANUATU CODE OF LOGGING PRACTICE

13. (1) A Forest Officer shall issue the appropriate number of penalty points, as set out in Schedule 6 of this Order, to any Forest Operator that he considers has committed a major breach of the Vanuatu Code of Logging Practice.

(2) A Forest Officer may issue a fine, as set out in Schedule 6, to any Timber Licensee for major breaches committed by any Forest Operator under that Timber Licence.

(3) A Forest Officer must notify any forest operator, the Company Utilisation Operations Supervisor and the relevant timber licensee of the allocation of penalty points and fines in the form of Schedule 7 of this Order.

(4) All penalty points issued to any forest operator shall remain on the register for a period of 12 months.

(5) A Forest Officer shall notify the timber licensee and the Company Utilisation Operations Supervisor of any minor breaches of the Vanuatu Code of Logging Practice and of any remedial works that are required.

(6) A Company Utilisation Operations Supervisor shall ensure that any instructions given by a Forest Officer about remedial works associated with breaches of the Vanuatu Code of Logging Practice are complied with within the time specified by the Forest Officer.

APPEAL REVIEW PROCEDURE

14. If a Timber Licensee or licensed forest operator disputes a decision by a forest officer to issue penalty points or fines under regulations 13 he may, within fourteen days of the date upon which the penalty points were issued, request a review of the decision by the Director whose decision shall be final.

SUSPENSION OR CANCELLATION OF FOREST OPERATOR'S LICENCE

15. (1) The Director may suspend the Forest Operator's Licence of any person who in any twelve month period accumulates 20 or more penalty points.

(2) The period of suspension shall be in accordance with the number of penalty points that have been accumulated as set out in Schedule 8 of this Order.

(3) The Director or delegated Forest Officer shall issue a Suspension or Cancellation of Forest Operator's Licence Notice in the form of Schedule 9 of this Order to the Timber Licensee for whom the suspended forest operator works.

(4) When the Forest Operator's Licence of a person who has been nominated as a Company Utilisation Operations Supervisor is suspended all utilisation operations in that area shall be suspended for the duration of the nominated period of suspension or until the Director

notifies the Timber Licensee that utilisation operations can recommence.

(5) The Director may cancel the Forest Operator's Licence of any person who in any twelve month period accumulates 150 or more penalty points.

OFFENCE

16. Any person who in undertaking any utilisation operations contravenes any provisions of this Order commits an offence and upon conviction, the Court may in addition to awarding a fine of not more than VT50,000, order the cancellation of the offender's forest operator's licence.

COMMENCEMENT

17. This Order shall come into force on the date of its publication in the Gazette.

MADE at Port Vila this 10th **day of** **1998**

REPUBLIC OF VANUATU
MINISTER OF AGRICULTURE, FORESTRY, FISHERIES & LIVESTOCK
REPUBLIQUE DE VANUATU

JOHN MORSEN WILLIE
Minister of Agriculture, Livestock, Forestry and Fisheries

SCHEDULE 1

(Regulation 3(3))

REPUBLIC OF VANUATU
DEPARTMENT OF FORESTS

VANUATU CODE OF LOGGING PRACTICE

(Code document itself to be attached)

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ACKNOWLEDGMENTS

This Code of Logging Practice has been produced by the Department of Forests with assistance from the Vanuatu Sustainable Forest Utilisation Project. The Code has been developed from the "Code of Conduct for Logging of Indigenous Forests in Selected South Pacific Countries" which was ratified by Vanuatu Government representatives at a Technical Forestry Meeting held in Suva in December 1994.

Through a series of meetings with representatives of the Vanuatu forest industry and other interested parties, agreement has been reached on the content of the Code of Logging Practice, which is relevant to Vanuatu conditions. The assistance of all persons who contributed to these meetings is acknowledged.

Particular recognition should be given to the members of the Code of Logging Practice Consultative Committee who gave freely of their time and provided frank and open discussion. A Code of Logging Practice for Vanuatu would not be a reality without the assistance of Neil Croucher, Anthony Kong, Joshua Ling, Dick Narai, and Harold Tavner, who provided the benefit of their knowledge and experience.

To ensure maximum coverage and comprehension of the Code of Logging Practice, elements of this document have been translated into French and Bislama. The work of Vanuatu Translation and Secretarial Services and Nokoruae Ltd in completing these translations is gratefully acknowledged.

Some of the illustrations in this document have been copied from publications produced elsewhere in the Pacific Region. Particular publications which were of assistance were:

Logging Operations Guidelines, Editor L Vaughan, Illustrator G Leitch
New Zealand Logging Industry Research Association 1986

Forest Practices Code, Forestry Commission Tasmania 1987

Key Standards for Selection Logging in Papua New Guinea Papua New Guinea Forest Authority 1995.

Forest Soils and Water Protection A manual for machine operators. State Forests of New South Wales 1996

Illustrations were also modified for publication by Hamphrey Lewis of Connie's Art Blong Yumi to reflect Vanuatu conditions.

The challenge now lies in implementation of the Code through training and awareness programs for forest industry operators and forest owners. The Code of Logging Practice is not just this document, it is a dynamic process involving all people concerned with the future sustainable management of Vanuatu's forest resources.

Feke P Nimoho
Acting Director of Forests

1. INTRODUCTION

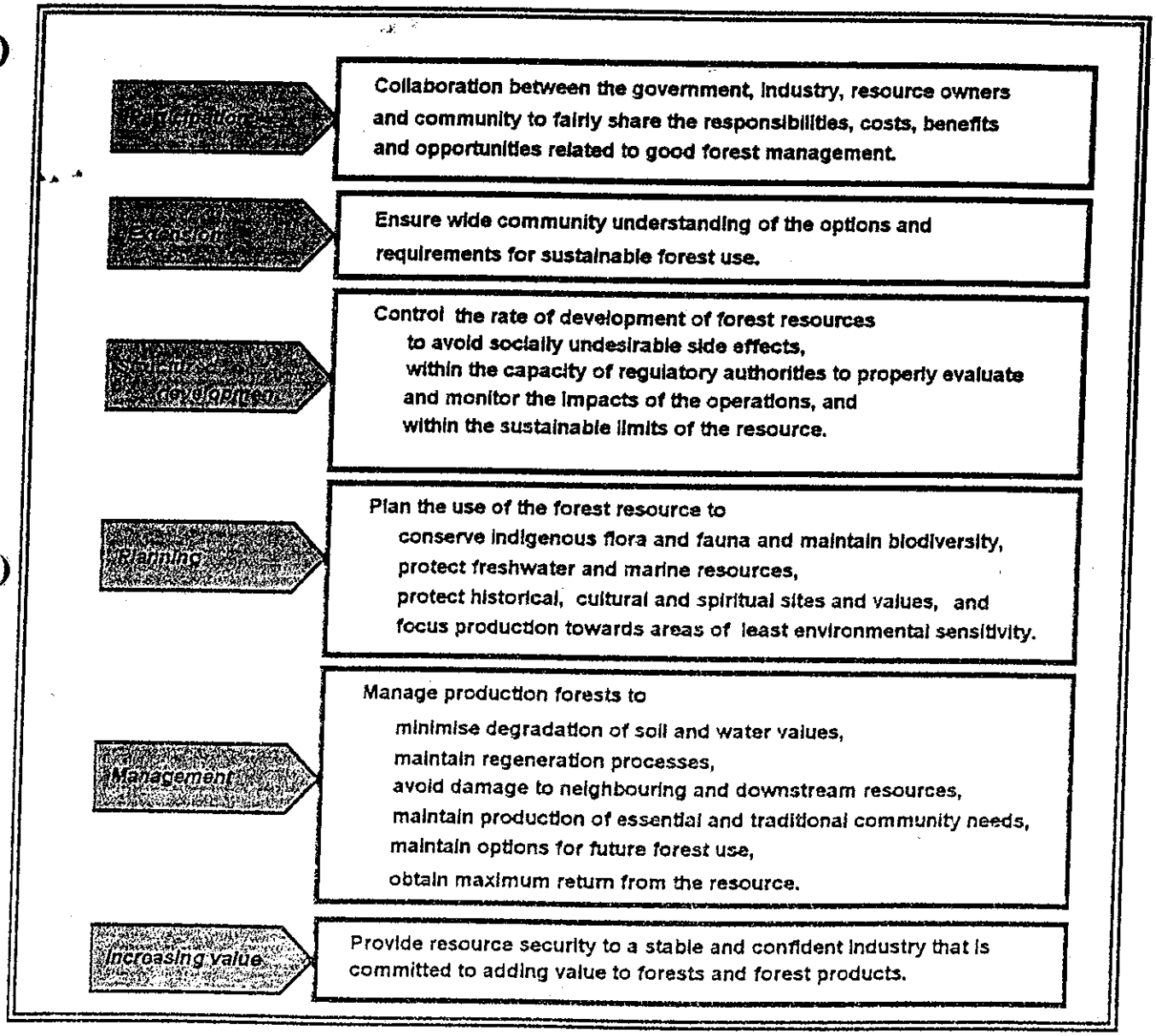
Logging can bring benefits to our people. It can also cause a great many changes in forested catchments. Poor practices can harm our natural and cultural resources, and the future welfare of our people and the Nation.

Logging must occur within the context of clearly thought out policies on land use planning and forest development.

A code of logging practice is a dynamic document requiring regular review and amendment in light of research and operational findings, to meet changing circumstance and experience.

Implementation of the code will not in itself deliver ecologically sustainable forest management although it is an important step towards this goal. To ensure its effective implementation, the code should be integrated with wider forest and sustainable development policy initiatives and be firmly based on a participatory approach involving all interested parties, particularly local communities. Some key challenges in developing and implementing sound forest management practices which meet the needs of ecologically sustainable development are outlined in the figure below.

1.1 KEY CHALLENGES



1.2 SCOPE OF THE CODE

This Code sets minimum standards which will allow selected forest areas in Vanuatu to be harvested with minimum adverse impact. It balances the needs for protection of environmental values with safety and commercial considerations. Implementation of the standards will ensure that important resources and values are recognised and protected during harvesting operations, and that the benefits of logging to communities, to industry and to the nation are optimised.

The Code of Logging Practice does not outline the mechanisms at field level, but defines practices and sets standards that:

- Protect the environment and promote forest development consistent with the principles of sustainable development
- Recognise and respect the rights of resource owners
- Protect sites of cultural, historical, archaeological, geomorphic, biological or spiritual significance
- Promote conservation measures for flora and fauna
- Maintain forest regenerative capacity and species diversity
- Promote the growth of merchantable timber
- Ensure that all harvested merchantable timber is accurately scaled and removed
- Ensure the health and safety of forest workers
- Maximise the economic return from the forest

The Code shall be considered to be:

- A statement of the Department of Forests requirements for the preparation and implementation of work programmes by licensees
- A statement of what the Department of Forests considers to be satisfactory logging practice in carrying out all operations in an efficient and workman-like manner.
- A direction to the Licensee given by the Department of Forests in the interests of good forest management.

1.3 APPLICATION OF THE CODE OF LOGGING PRACTICE

This Code of Logging Practice will be legally binding on all parties operating under authority of a Timber Licence in Vanuatu. Mobile Sawmill Licence holders will also be subject to provisions of the Code unless specifically exempted by the Director of Forests. Selected elements of the Code will also apply to operations which are exempt from Licences and will be applied by means of special conditions imposed on those operations by the Director of Forests.

1.4 ROLES OF PARTICIPANTS IN SUSTAINABLE FOREST MANAGEMENT

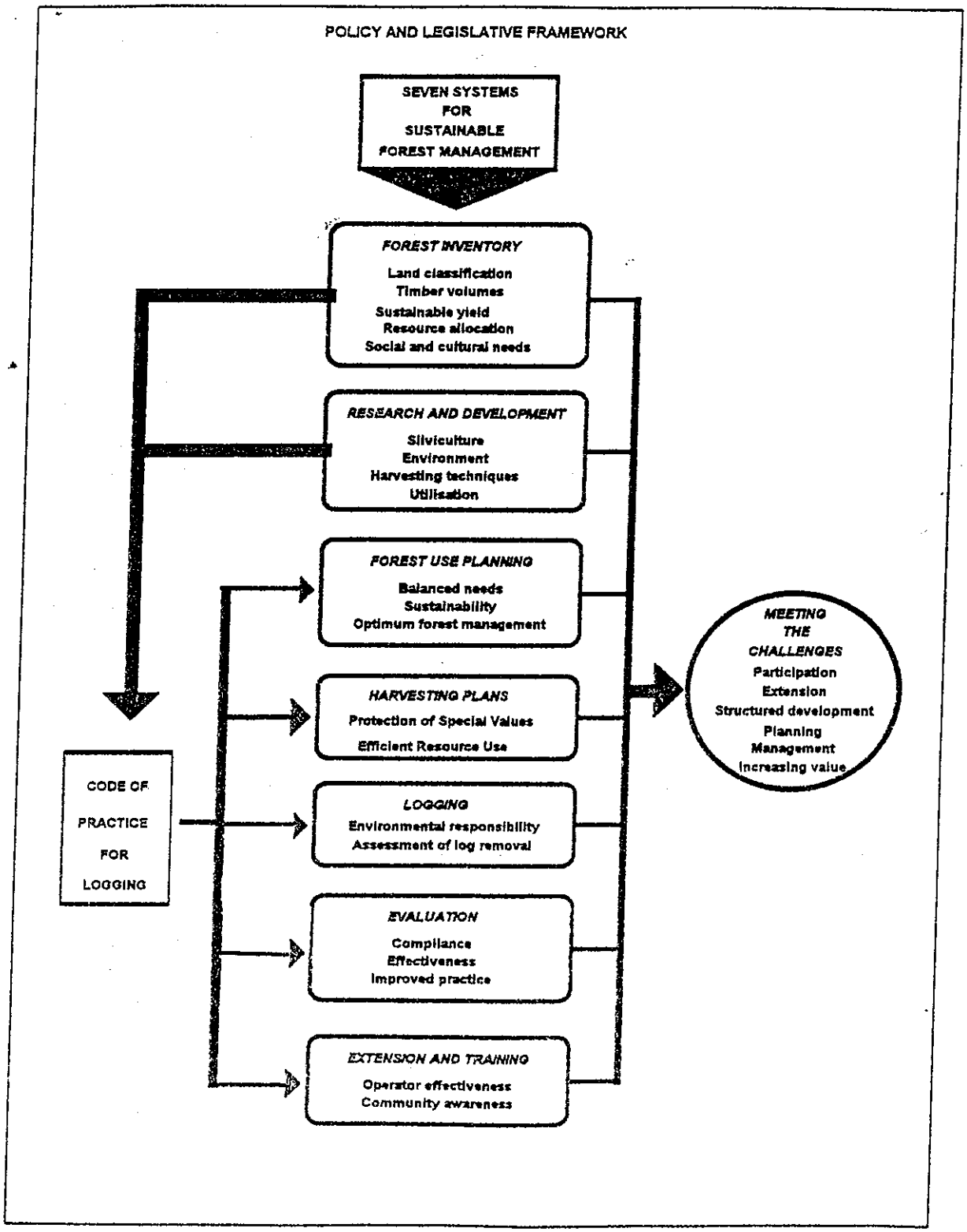
Government	• Provide policies, mechanisms, staff, resources and encouragement for the ecologically sustainable use and management of forest, land and water resources, on all classes of land ownership, for the benefit of the whole community.
Resource owners	• Use their resources wisely in a way that will maintain options for future development and so provide for their long term benefit • Maintain the capacity of the forest resource to supply essential lifestyle needs • Protect neighbouring and down-stream resources • Monitor operations for compliance with good practice.
Industry	• Prepare harvesting plans in consultation with land holders and regulatory authorities • Supervise and implement operations consistent with sustainable forest management • Optimise the benefits to both the community and the company • Train and employ local community members to increase their level of skill.
Department of Forests	• Assist land owners and the timber industry to implement sound harvesting practices consistent with sustainable forest management • Evaluate harvesting plans • Monitor and evaluate harvesting operations for compliance with the logging contract and the Code of Logging Practice • Enforce compliance with legislation.
Community	• Assist to educate and train resource owners and users in the sustainable management of forest resources

1.5 RESPONSIBILITY FOR IMPLEMENTATION OF THE CODE

The licensee shall be held responsible for compliance with the provisions of the Code and shall be responsible for meeting penalties which may be imposed as a result of breaches of the Code. All people working in any logging operation will be required to hold a current forest operator licence.

1.6 THE CODE OF LOGGING PRACTICE AND SUSTAINABLE FOREST MANAGEMENT

The sustainable management of forests requires the integration of seven basic systems within a framework of forest policy, legislation, information management and resource provision. Sustainable forest management draws on forest inventory information and on research and development programmes to define standards for good management of logging. The adoption of sound practices addresses important aspects of the key challenges



2 FOREST USE PLANNING

Best management will	**Use land and forest resources within the limits of their ecologically sustainable capacity.** **Identify areas which should be protected.** **Identify production areas.** **Provide additional management conditions for special values identified within the production area.** **Seek to identify and manage the above zones through negotiation and agreement with resource owners**

2.1 A HIERARCHY OF PLANNING

Ecologically sustainable forest management is one of a range of land uses. Ideally forest use should be determined within an integrated approach to land use planning. An integrated approach to land use planning will recognise and provide for the multiple values of forests, the sensitivity of land to degradation, the desired outputs from the forest and land, and the management requirements which are necessary to achieve sustainable use.

As the focus of planning narrows, from a country to a regional to a site specific level, the emphasis will shift from broad planning and allocation for desired uses, to a level which requires specific management decisions and actions.

- Broad planning will identify the requirements for balancing the conservation and development needs of forests and communities;

- Site specific planning will identify the most desirable management practices which ensure that areas are managed sustainably. At the site specific level, particular account needs to be taken of community needs and their welfare. Where decisions regarding land use rest with local resource owners, these decisions should be made after full consideration of the options available and the consequences of particular actions.

2.2 FOREST USE PLANNING AND COMMUNITY PARTICIPATION IN LOGGING MANAGEMENT

Forest use planning, at a site specific level, should:

- Provide an avenue for informed community participation in resource use and management decisions
- Encourage sustainable use and management of land and forest resources
- Account for the impact of management on the continued productivity of the area
- Promote conservation of flora and fauna

Initial planning for forest use can identify specific issues for a discrete area which is relevant to local communities. Options for future use of the area should be developed based on sound land use planning principles.

Extension programmes, in conjunction with the initial planning exercise provide an important opportunity to explain the benefits of sustainable land management and the consequences of poor land management to land owners and communities. These should:

- present resource owners with a range of options for sustainable management of particular areas, including the conservation of particular forest areas,
- clearly present the consequences of using land beyond its capacity for sustained production.

Examples of some options for future forest and land use

Protection forest, areas of forest that have identified social, environmental or nature conservation values. These areas are not to be logged, nor damaged by works associated with logging. Disturbance is to be limited to that necessary for traditional lifestyle needs, or access through to other areas where development is approved.

Sustained native forest management. These are areas identified as suitable for sustainable forest production. They generally have the following characteristics:

- Not on steep or unstable slopes
- Carry significant volumes of commercial timber species

These areas require harvesting under a system which will preserve essential regeneration processes of the forest.

Management for grazing,

Establishment of plantations of agricultural or forest tree crops . The rotation length of these crops is generally more than 5 years.

Agriculture - where crops are cultivated on a 5 year or less cropping cycle.

Selecting and implementing the future land use option

Forest use decisions must be documented in the logging contract and in the logging plan.

The nomination of an option for intensive development, for example agricultural, pastoral or plantation development, is to be accompanied by clear and detailed plans about the type and time-scale of future management.

Failure to negotiate and adequately document agreements and plans for the agricultural or plantation development of suitable areas, will result in the limitation of harvesting conditions to those which apply to selective forest harvesting. If these plans are not implemented within 6 months of logging, then future logging proposals, by that company or in that area, will be limited to selective logging.

2.3 DATA USED FOR SITE SPECIFIC FOREST USE PLANNING

The base data

Planners should investigate the availability of **Site Susceptibility** maps and/or **Environmental Sensitivity** maps. These are available from the Vanuatu Natural Resources Information System (VANRIS) data bases of the Vanuatu Land Use Planning Office. Maps are reproducible at any scale. **NOTE that altering the scale will not change the basic accuracy of these maps.** This accuracy should be made clear in the logging plan proposals.

Slope information may also be available from VANRIS or can be obtained from contour maps with air photo interpretation and field checking.

Suitable uses for particular areas of forest may be identified by

- reference to regional land use planning information
- reference to an environmental sensitivity map
- reference to a land capability classification
- by negotiation and agreement with land owners.

Excluded Areas within all areas of forest to be logged (sites such as tambu sites, villages, gardens, designated watercourses and landslip areas) are identified by aerial and ground inspection and by discussion with the land owners.

This base data must be included at the appropriate plan level and any conclusions or agreements reached with landowners indicated on a base map.

Opportunities for refining this data

The point accuracy of land resource information data is often limited by the scale on which it is based.

The scale generally available from VANRIS is 1:50,000.

Logging companies may wish to explore opportunities for logging which may be identified at a higher level of resolution. They may refine the land classification data by undertaking intensive site investigations. These investigations must collect and interpret data using the methodology of the Vanuatu Land Use Planning Office. The presentation of this work would form part of the annual logging plan and would include good documentation of the methodology and the refined resource data.

The refined data and forest use proposals will be evaluated by the Department of Forests and by other authorities with a responsibility for evaluation of the logging proposals. Their approval is required before logging commences.

2.4 CONSERVATION OF ANIMALS AND PLANTS

Flora and fauna conservation is an integral part of sustainable forest management. Conservation measures may include

- Setting aside reserves large enough to maintain viable populations of plants and animals
- Retaining strips of unlogged forest to maintain habitat diversity. These strips should connect any large patches of forest which will not be logged.
- Retaining habitat trees in harvested areas
- Protecting rare and endangered species and communities in harvested areas by modifying harvesting regimes or leaving patches of uncut forest.

Data bases on the distribution of plants and animal species within forest areas should be compiled from field observation or information available from the Environment Unit and Department of Forests Conservation Unit.

2.5 SILVICULTURAL PRESCRIPTIONS

The selection of silvicultural systems depends on the condition of the forest before logging and the proposed land use following logging. During the planning of logging a mutual decision must be made between the licensee and landowners on the silvicultural regime to be followed. In Vanuatu, Silvicultural Forest Harvesting Types (SFHTs) have been categorised for the major areas where harvesting is being undertaken or planned. For each of the SFHTs, silvicultural regimes have been developed which specify such criteria and minimum cutting limits for different species in the SFHT. The agreed regime will be decided in consultation with a Forest Officer during the preparation of the logging agreement. The prescriptions and mechanisms for retention of trees will be detailed in relevant Timber Harvesting Plans, according to the Reduced Impact Logging Guidelines for Vanuatu (RIL). More details of SFHT and RIL can be found in separate documents available from the Department of Forests.

Best management will	**Define the optimum silvicultural practice for particular forest harvesting types. This practice is to be consistent with maintaining a vigorous healthy forest.** **Maintain essential regeneration processes of the forest.** **Improve the productivity of the remaining forest.** **Retain growing stock of desirable, high value species.** **Avoid large canopy openings where this will allow the development of undesirable or lower value pioneer species or vines such as *Merremia* spp.**

Amount of canopy disturbance

- To promote the growth of the residual stand, the size of canopy opening in any one position should always be minimised to prevent invasion of weed species like *Merremia* vine.

Selecting trees for extraction

- In good quality forest which is to be managed as forest in the future the prescriptions below will be applied.
- The selection of trees for harvesting will be carried out according to the prescriptions for Vanuatu Silvicultural Forest Harvesting Types (SFHT's).
- Before felling operations commence, logging company operations staff including supervisors, tree marking staff and chainsaw operators must:
  - have copies of this code, or SFHT or RIL, AND
  - understand how they are to be applied.

Minimum standards for retention

- Where desirable species are present in the sub-merchantable category,
  - apply silvicultural prescriptions approved by the Department of Forests.
  - Potential crop trees (>20cm) must be marked
  - Tree falling and extraction must be carried out to protect potential crop trees from harvesting damage.
- Where desirable species do not exist in sufficient numbers, they should all be retained to ensure that sufficient quality seed trees are preserved for sustained regeneration.
- **Quality seed trees** are
  - the highest value species present
  - well formed and straight
  - free of defect and disease
  - undamaged
- Retain additional trees to make up the minimum post-logging stocking required by the tree marking rules. These trees must be
  - healthy and vigorous
  - well formed and free of defect, disease and damage
- It is desirable that retained trees be evenly spaced over the area.
- Retain trees which lean to an extent that their felling direction cannot be sufficiently controlled, and which would fall into areas excluded from logging.

Minimum standards for cutting

- Select only those trees which will provide logs suitable for processing. These must be a commercial species greater than the minimum specified log length.
- Logging agreements or Coupe Harvesting Plans will specify the minimum diameter at breast height (in cm) of trees which may be felled, following agreement between the licensees and landowners. This specification will be influenced by decisions made about post logging land use.
- Where land is to be managed as production forest appropriate prescriptions as for the Vanuatu Silvicultural Forest Harvesting Types will apply.
- To minimise wastage the licensee must salvage useable wood from the limbs of felled trees, and defective trees, in line with the Department of Forests minimum quality specifications.

2.6 AREAS EXCLUDED FROM LOGGING

Best management will	**Identify and protect selected areas where special values are identified, to be excluded from logging.** **Identify and implement modified operational prescriptions for sensitive areas within the area to be harvested.** **Avoid impacts to neighbouring and down-stream people and resources.**

Areas where logging is not permitted

Protected Areas

Areas will be excluded from logging when:

- they have been declared as Protected Areas under any National or Provincial legislation;
- they have cultural importance. These sites would generally be identified in surveys before logging under the supervision of the Vanuatu National Cultural Council. The surveys would be carried out by qualified personnel with assistance from affected landowners.
- they have ecological or scientific importance. This includes, but is not limited to, all outer reef and lagoon islands, swamps, wetlands, mangroves and forest catchments which are vital to the protection of important marine resources;
- they exceed upper slope limits for suitability classes or sensitivity classes (generally 30° or 60%);
- customary land owners decide that they are required for traditional lifestyle needs which would be damaged by any level of logging. This includes protection of village water supply catchments.
- land owners do not wish to log an area.

Excluded Areas within forest to be logged

Buffer zones around these areas provide protection for important resources. They include

- Cultural areas including village areas, gardens and tambu sites
- Shore lines, lagoons, lakes and water storage areas
- Landslip areas
- Designated watercourses

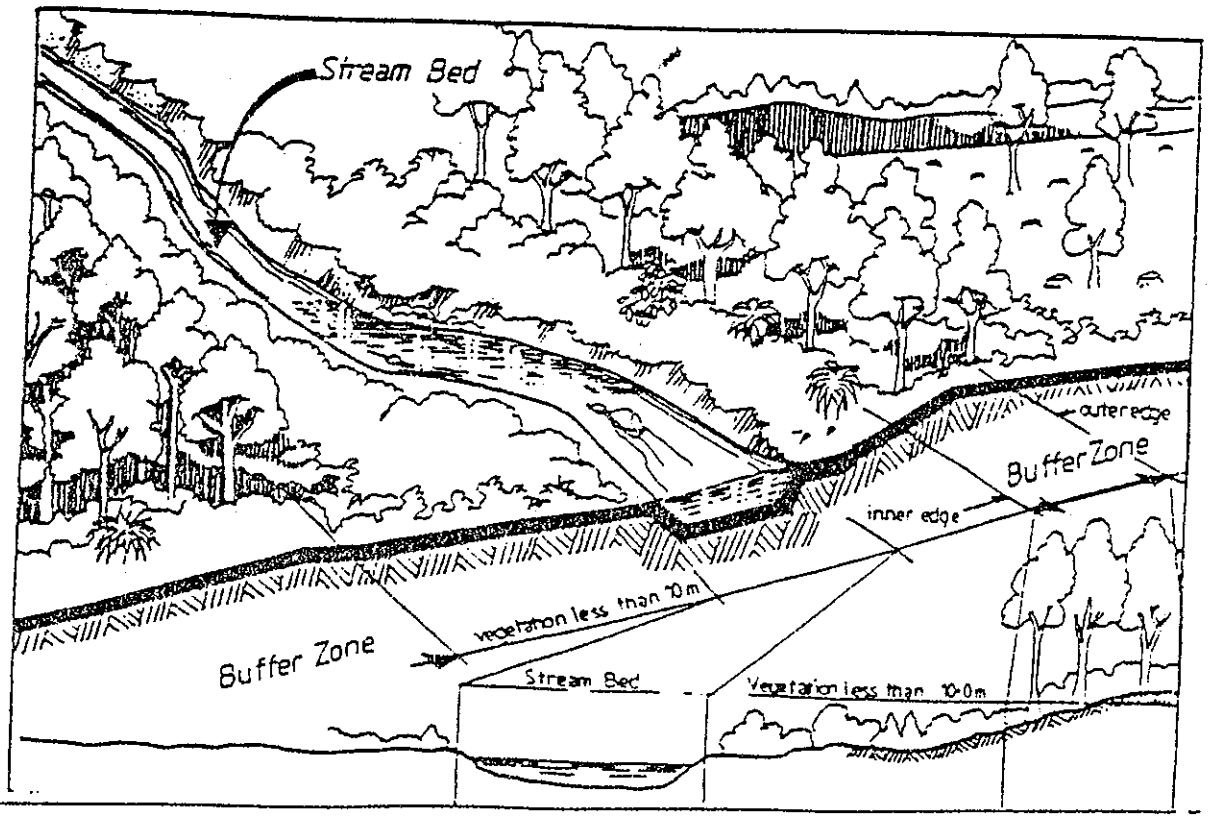
Protected Areas and Buffer Zones will be identified in Harvesting Plans and logging agreements.

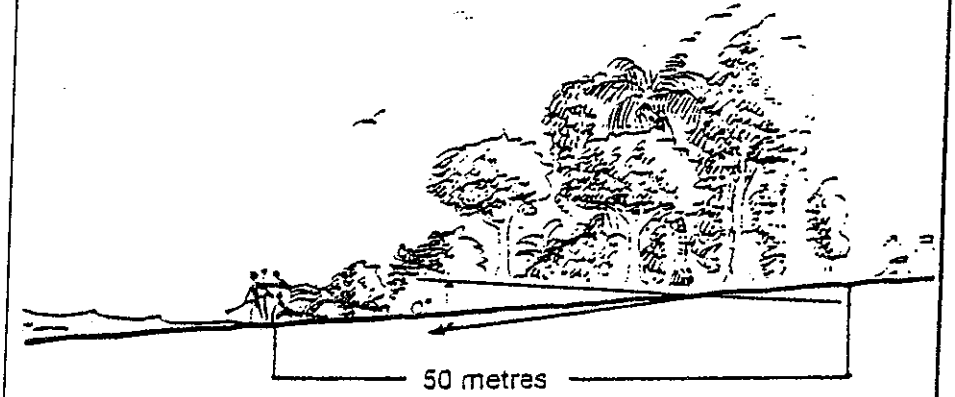
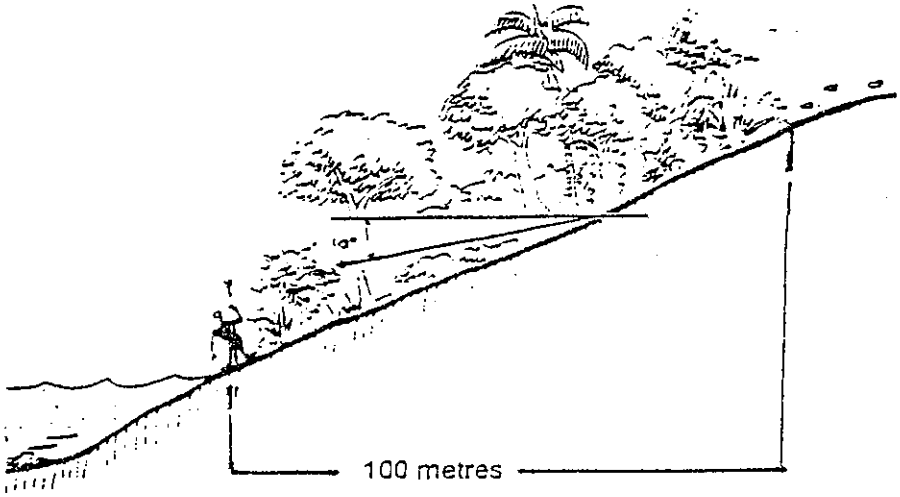
Management of Areas Excluded from Logging

- No trees to be felled within protected or excluded areas or their buffer zones.
- Machine access is prohibited within the areas and their buffer zones except where watercourse crossings are permitted. Where permitted, access must cross by the lowest impact or shortest possible distance.
- Where a tree is fallen into a watercourse, all debris is to be removed. Removal of this debris must not cause disturbance to the watercourse bank.
- No earthworks, or spoil from earthworks, is to fall within the area or its buffer zone.
- No logging debris is to be pushed into areas excluded from logging.
- Camping in excluded areas by logging company employees is not permitted.

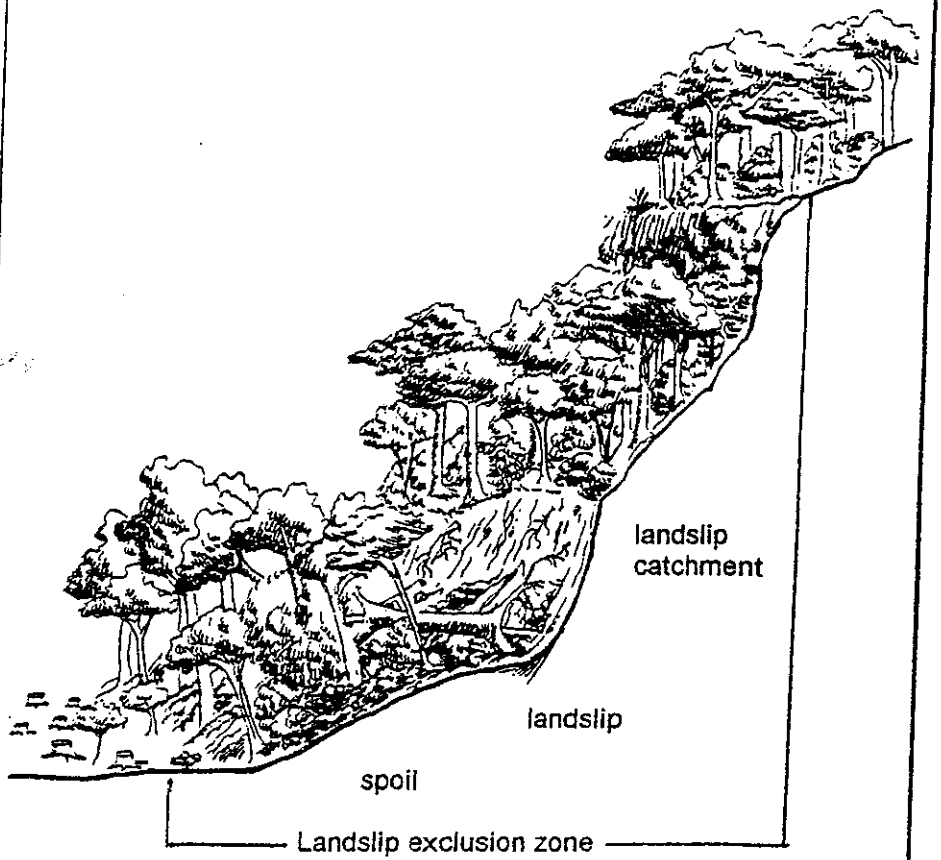
2.7 BUFFER ZONE PROTECTION FOR CONSERVATION AND PROTECTED AREAS

Buffer zones are required, irrespective of whether or not the feature is identified on available maps of any scale. Field inspection is an important and necessary part of harvesting operations.



Buffer Zone Protection	
Feature	**Minimum Required Buffer Zone Protection**
Cultural areas **Tambu** **Garden** **Village**	**Tambu and Garden areas** - Buffer width greater than the dominant tree height to be retained between the boundary of the area and the edge of logging[1], minimum20 metres **Village areas** - Minimum buffer width of 100 metres between the village and the edge of logging.
Buffers around • **Lakes** • **Lagoons** • **Shore line** • **Water storage areas**	The buffer width is measured from the high water mark or edge of the mangrove vegetation if this occurs above the high water mark. The minimum width depends on slope - • where slope is < 10° (17.6%), buffer width = 50 metres  • where slope is 10° (17.6%) +, buffer width = 100 metres 
The only exceptions are	• for a log pond, where the buffer may be reduced to 50 metres • for a wharf, associated log pond and ship loading area projection to the seaway where vegetation may be cleared to the waters edge for the width of the wharf, to a maximum of 100 metres.

[1] This will not apply where the logging operation is to specifically remove trees from garden and plantation areas. These situations will be specified in Harvesting Plans and Logging Agreements.

Buffer Zone Protection	
Feature	**Minimum Required Buffer Zone Protection**
Landslip areas	The area of the land slip, the landslip spoil and the catchment of the slip and spoil. 
Watercourse reserves	Retain vegetation on **both** sides of the watercourse. Delineation of the buffer zone will start where the vegetation is 10 metres high or greater Class 1 Streams - **30** metres each side Class 2 Streams - **20** metres each side Class 3 Streams - **10** metres each side Gullies and - merchantable trees may be felled; extraction equipment is not permitted within **10** metres of either side Waterways (catchment area >2 ha) merchantable trees may be felled; extraction equipment is not permitted within **5** metres of either side Swamps - **10** metres from swamp boundary

2.8 WATERCOURSE DEFINITIONS

Watercourses are zones which receive and conduct concentrated overland flow for some period in most years. Flows may be permanent or periodic.

Watercourses include streams, gullies and waterways and classes are defined in terms of permanency of flow, bed material and width and bank slope.

The **high bank** of water courses is the level which water reaches during normal season peak flows, and may include a **flood plain** area. This adjacent flood plain area may be a swamp, stream meander or anabranch.

Designated watercourses are all classes of streams where vegetation buffers are to be marked in the field before logging commences.

Streams are those watercourses where water may flow for more than 2 months in most years. The beds are generally characterised by the presence of clean, water-washed stone, gravel, or exposed bed rock materials.

Class 1 streams - Width of the stream base = more than **20** metres
Class 2 streams - Width of the stream base = 10 to **20** metres
Class 3 streams - Width of the stream base = less than **10** metres
Conditions
No felling permitted in buffer zones, Classes 1-3
Crossing only at approved points.

Gullies are steep sided channels. The slope of at least one bank exceeds 15 degrees. Depth of the bank adjacent to the bed may be 30 cm or more. The beds of gullies are soil or covered with bark, branch and leaf litter. Vegetation may be growing.

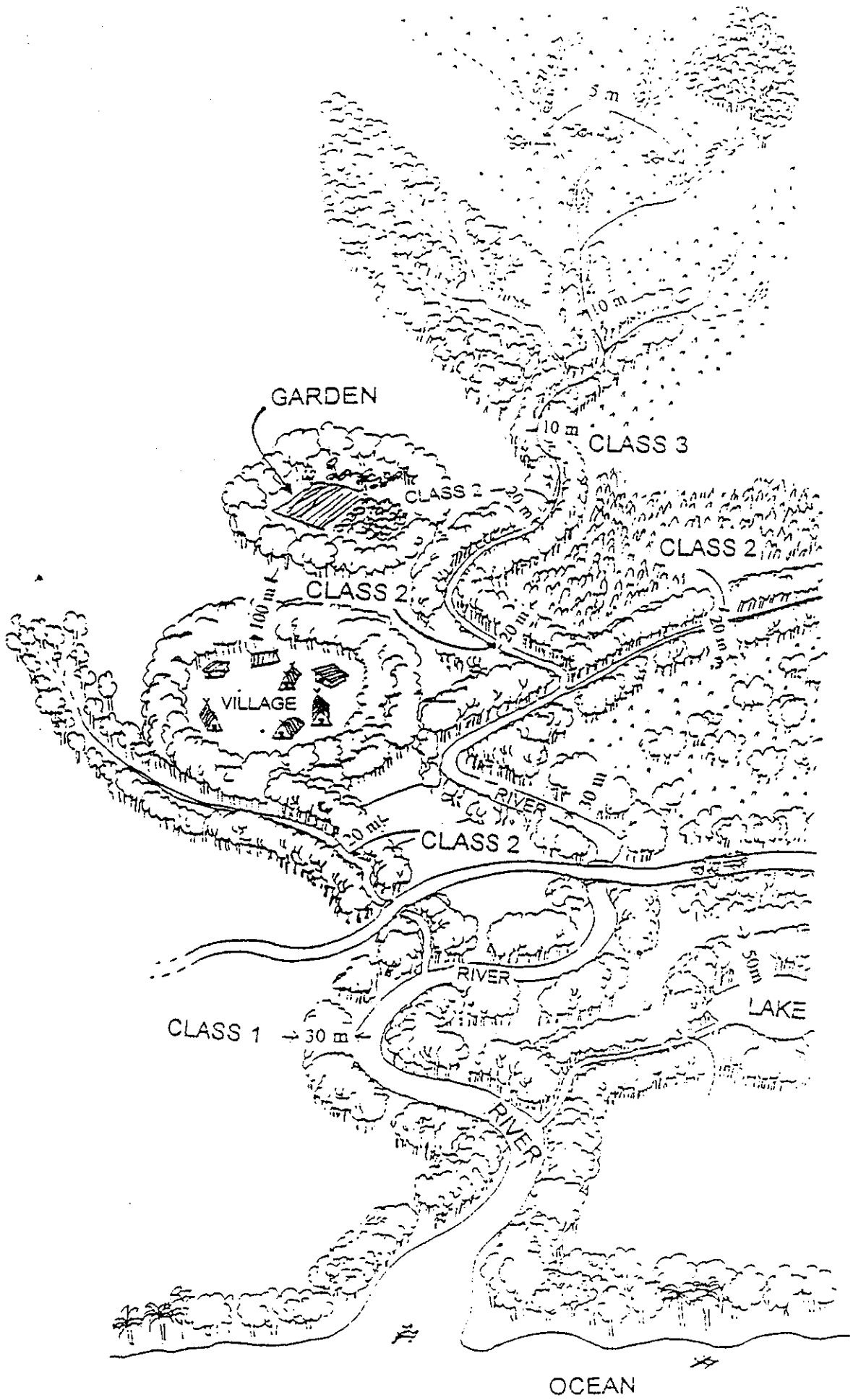
Water will flow for less than 2 months in most years.
Conditions
Felling is permitted in buffer zones
Crossing only at approved points

Waterways are stable, non-incised depressions. The side slope of both banks is less than 15 degrees. Beds are of soil and will usually be covered with leaf litter and vegetation.
Conditions
Felling is permitted in buffer zones
Crossing only at approved points

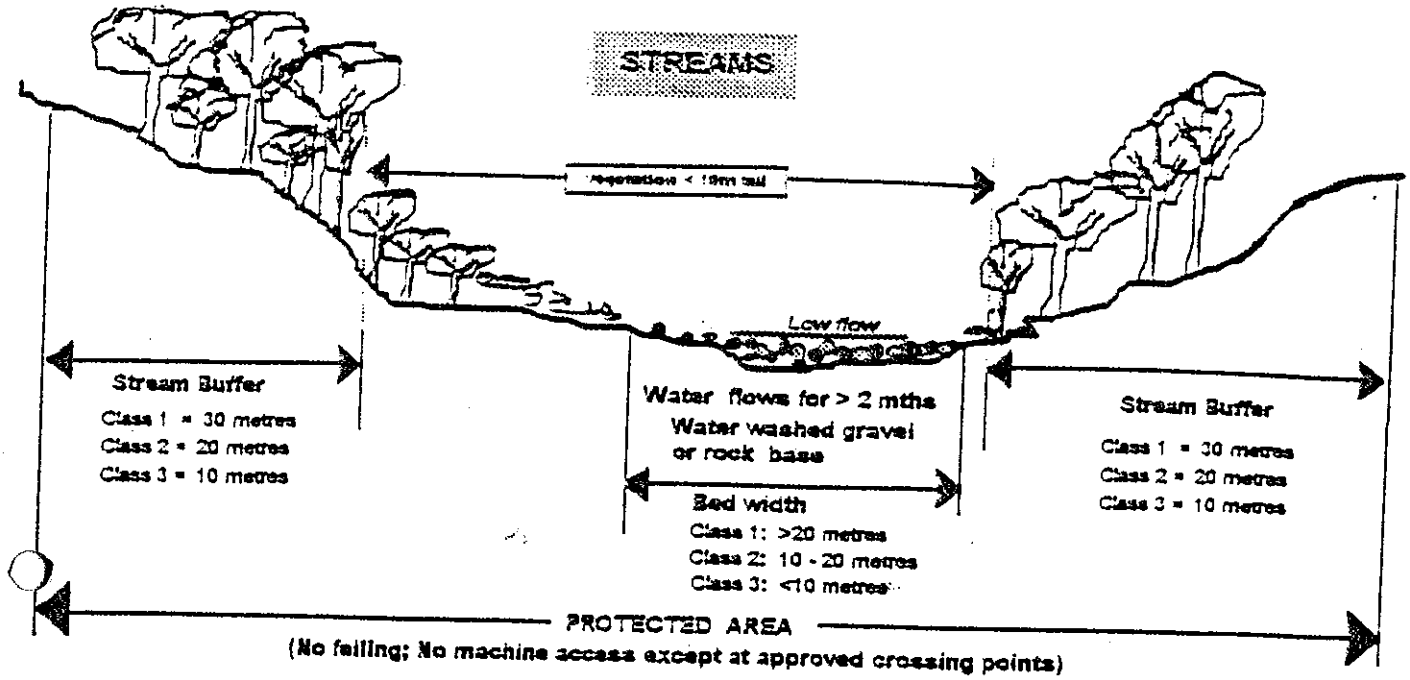
Swamps have surface water present for 6 months of the year.

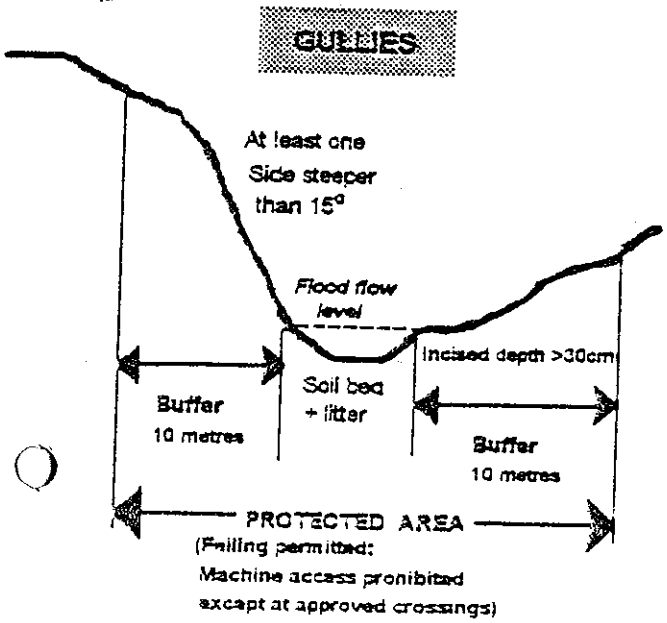
Buffer zones and crossing points for designated watercourses must be

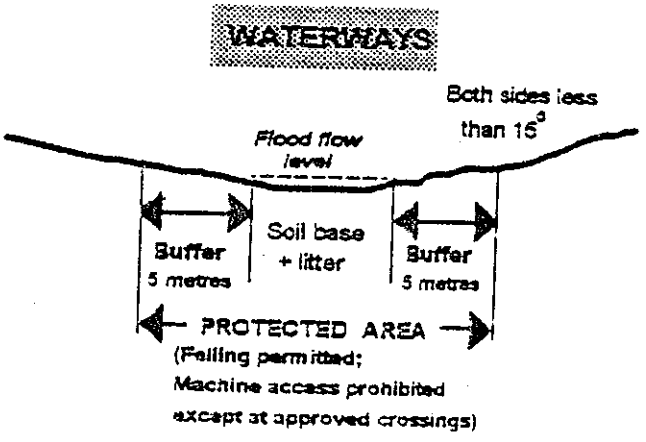
- shown on logging plans, AND
- approved in the field by a Forest Officer before operations commence.

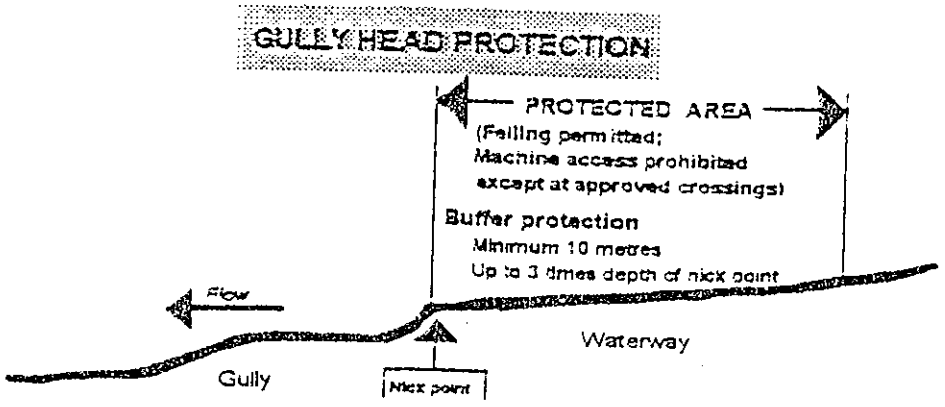

5 m
10 m
GARDEN
10 m
CLASS 3
CLASS 2
20 m
CLASS 2
CLASS 2
100 m
20 m
20 m
VILLAGE
RIVER
20 m
20 m
CLASS 2
RIVER
50m
LAKE
CLASS 1
30 m
RIVER
OCEAN

2.9 WATERCOURSES AND BUFFER STRIPS









3 HARVESTING PLANNING

Best management will

Put in place comprehensive strategic and operational planning mechanisms which ensure that forest values will be protected during harvesting.

Use land and forest resources within the limits of their capability.

Identify the most efficient and environmentally responsible means of harvesting timber.

Recognise problem areas and avoid the cost of remedial action.

Plan on the basis of information obtained from thorough ground inspection.

Plan road and snig track location to minimise earthworks.

Carefully locate landings to minimise disturbance to forest, soil and water resources.

Carefully select a minimum number of watercourse crossings.

Identify and protect areas to be excluded from logging.

Assess the plans in terms of their social and environmental consequences for the area and for down-stream resources.

Consider planning as an on-going day-to-day activity, involving staff at all levels.

Use the plan to direct and monitor field operations.

3.1 PLANNING STAFF

Minimum requirements	An ability to develop detailed logging plans for each area in which logging is to carried out by the logging company. It is suggested that a minimum planning team consist of a professional Forest Planner and 2 assistants, employed by the logging company.
Skills	• Experienced in Planning large forest harvesting operations Survey skills for boundary and road location Map reading Plan preparation and reporting • Able to communicate with management and operations staff
Duties and Responsibilities	• Prepare and review long-term, strategic plans • Prepare and review short-term, operational plans • Present the plans and a briefing to staff of the Department of Forests, other relevant agencies and to landowners. • Oversee the correct field implementation of plans • Discuss problems which arise from the field implementation of the plan with field staff, land owners and representatives of the Department of Forests and other relevant agencies • Conduct regular training sessions to instruct field operatives in the needs of environmentally sound harvesting practice.

3.2 LEVELS OF PLANNING

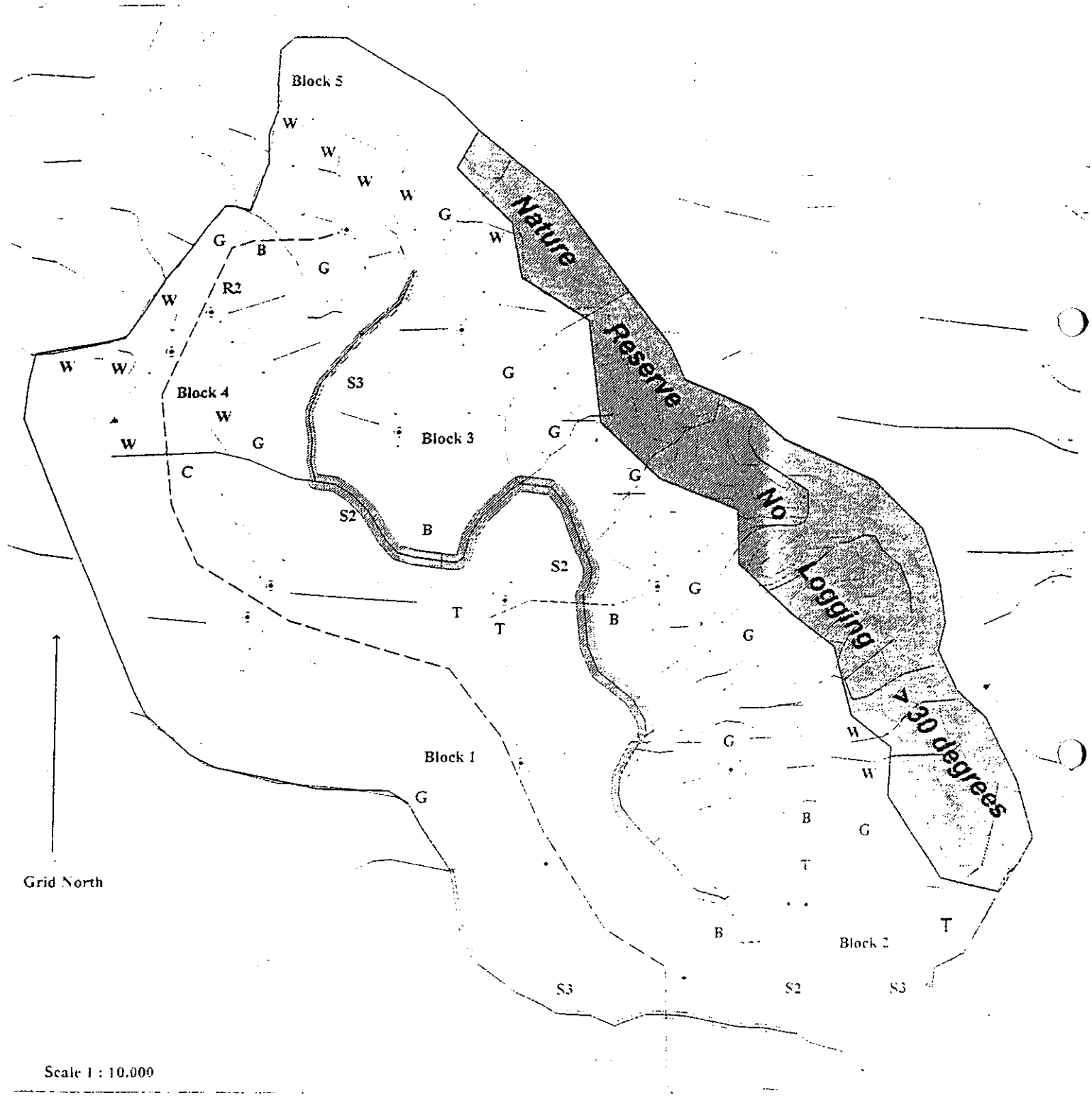
	Strategic Plans (Annual Plans)	Operational Plans (Detailed coupe harvesting plans)	Job planning by the Company (Particular tasks)
Needs	1:25 000 scale base map Aerial photographs Land ownership boundaries Contour information Watercourses Future development plans	The operational plan is an updated and more detailed version of a section of the Annual Plan. Annual plan 1:10 000 scale base map (enlarge if necessary to 1:10,000) Aerial photographs Land ownership boundaries Contour information (best available) Watercourses	Short term plan for a particular job, eg road construction. Job marked in the field. Briefing of operators by their supervisor.
Inspection requirements	Low intensity eg aerial inspection, ground inspection of key points	Ground inspection of important aspects eg Excluded Area boundaries, watercourses, roads, major snig tracks and log landing locations	Intensive ground inspection. Operators must walk the area before starting the job.

	Strategic Plans (Annual Plans)	Operational Plans (Detailed coupe harvesting plans)	Job planning by the Company (Particular tasks)
Detail shown on the map	Boundary of licence Key points (eg log ponds) Broad roading plan Areas previously cut. Current operations. Future operations.	Boundary of operation Excluded Areas Designated watercourses Land ownership boundaries Key points (eg log ponds) Detailed roading plan Major skid tracks and skid direction Minor skid track pattern and direction Watercourse crossings (permanent and temporary) Log landings Sites where operations do not adhere to the Code. (For special inspection by Forest Officer) Order in which coupes will be logged.	Plan shows the whole job Critical aspects are highlighted and discussed thoroughly.
Details of written plan submitted with the map	As per current planning guidelines. Proposed system for selection logging. Location and design details for Log Pond construction. Design for any new camps.	Period for which the plan applies. Species mix. Anticipated volumes and net area yields.	Specifications for the job must be explained to operators. • construction standard • felling direction • rehabilitation work
When is the plan submitted?	Annually	At least 2 months before operations in a particular area.	Immediately before the job commences
Who sees the plans?	Land owners representatives Department of Forests (head office and local supervisory staff) Provincial Government Camp Manager Production Manager Surveyors	Land owners/representatives Camp manager Production manager Surveyors The Forest Officer immediately responsible for the operation, will inspect the Operational Plan in the field with the Company representative.	Operators for specific tasks eg road construction, felling, skidding
Who approves the Plan?	Department of Forests	The responsible Forest Officer may approve Operational Plans provided that they are in line with the intent of the approved Annual Plan. **Decision is given following field inspection.** Major departures from the intent of the Annual plan require the approval of the Department of Forests	The Forest Planning Team of the Logging Company. Decision given following field inspection.

3.3 LEGEND FOR THE COUPE HARVESTING PLAN MAP

Interpretation	Map Symbol	Map Colour	Field Colour	Field symbol
Harvesting Boundary		Red	Red	2 Rings
Watercourses		Blue		
Class 1 stream (30 m buffer)	S1	Green	Red	⊥
Class 2 stream (20 m buffer)	S2	Green	Red	⊥
Class 3 stream (10 m buffer)	S3	Green	Red	⊥
Gully (10 m buffer)	G	No buffer shown	Buffer in	marked field only
Waterway (5 m buffer)	W	No buffer shown	Buffer in	marked field only
Steep Sites (>30 degrees)		Red	Red	⊥
Exclusion Zones				
Tabu / Cultural Sites	T T	Red Letter/ Green buffer	Red	3 rings plus T
Village	V V	Red Letter/ Green buffer	Red	2 rings plus T
Gardens	G G	Red Letter/ Green buffer	Red	2 rings plus T
Roading and Skid tracks	**Existing** **New**			
Major Road	R1	Black	Blue	4 Vertical Stripes
Minor Road	R2	Black	Blue	3 Vertical Stripes
Haul Track	T	Black	Blue	2 Vertical Stripes
Culvert	C	Black	Blue	C
Bridge	B	Black	Blue	B
Skid Track Location	→	Black	Blue	1 Vertical Stripe
Temporary Crossing	X	Black	Blue	"S"
Log Landings (numbered)	L1	Black	Blue	L + No.
Landing Boundary (max. size 1000m² 30m x 30m)			Blue	1 Ring

3.4 MAP FORMAT TO ACCOMPANY COUPE HARVESTING PLANS



3.5 AMENDMENT TO THE PLANS

Annual plan (or rolling plans) (Strategic)

The plan is to be re-submitted to the Department of Forests if it is proposed to change:

- broad intent of the plan
- broad schedule of operations
- the broad roading plan

Land owners and other responsible management authorities are to be advised of approved departures from the plan.

Short-term plans (or coupe harvesting plans) (Operational)

The approval of the Forest Officer must be obtained when it is desired to amend the operational plan and

- a change to road alignment involves increased side cutting or an increase in the number of watercourse crossings
- a change to skid track alignment or pattern involves increased side cutting or an increase in the number of watercourse crossings
- additional log landings are to be constructed
- the area of a log pond is to be increased

The Forest Officer may approve these changes provided that they conform to the Code of Logging Practice.

Job plans

- The Planning Officer of the Company should ensure that job plans and instructions are issued for each segment of the work.
- Major amendments to the Job Plans must be referred to the Forest Planner of the Company.
- The Forest Planner may approve these changes provided that they conform to the Code of Logging Practice.

When can operations commence?

Operations can only commence after approval is received from the Department of Forests.

Field operators must know exactly what is required before work commences. This includes a knowledge and understanding of:

- safety requirements
- construction standards
- operation standards
- tree marking rules
- post logging requirements including stabilisation of disturbed areas.

Road and skid track lines must be marked and direction of felling explained.

3.6 PAINT COLOURS AND SYMBOLS TO BE USED IN MARKING LOGGING AREAS

Harvesting Boundary

Harvesting Boundaries will be marked in the forest by the Licensee and the landowners according to the Harvesting Plan with RED paint as follows:

Category	Field Marking
Harvesting Boundary	Two (2) rings on trees at a maximum spacing of 10 metres.

Buffer Zone Marking

Buffer Zones will be marked in the forest by the Licensee or DoF representative in association with the landowners according to the Harvesting Plan with RED paint as follows:

Category	Field Marking
Buffer Zones (steep slopes, watercourses)	Perimeter with a " ⊥ " as high as possible on one side facing the logging area.

Exclusion Zone Marking

Exclusion Zones will be marked in the forest by the Licensee or DoF representative in association with the landowners according to the Harvesting Plan with RED paint as follows:

Category	Field Marking
Tabu/Cultural Sites	Perimeter with three (3) rings plus "T" as high as possible on one side facing the logging area.
Village and garden boundaries	Perimeter with two (2) rings plus "T" as high as possible on one side facing the logging area

Road Marking

Major Roads, Minor Roads, Haul Tracks and landings will be marked by the Company representative according to the Harvesting Plan in the forests according to the legends with BLUE paint as follows:

Category	Field Marking
Major Roads	Centre line with 4 vertical stripes as high as possible on two sides aligned with the road direction.
Minor Roads	Centre line with 3 vertical stripes as high as possible on two sides aligned with the road direction.

Category	Field Marking
Haul Tracks	Centre line with 2 vertical stripes as high as possible on two sides aligned with the road direction
Log Landings	Marked with L and number as per Harvesting Plan on tree at location.
Stream Crossings (bridges)	Marked on trees with **B**
Stream Crossings (culverts)	Marked on trees with **C**

Skid Track Marking

Major skid tracks shall be marked by Forest Officer at the time of tree marking. The tracks must be clearly visible to the tractor operator and marked on trees using **BLUE** paint as follows:

Category	Field Marking
Major Skid Track	Centre line with **1 vertical stripe** as high as possible front and back of trees, spaced at approx. 10 m intervals.
Major Skid Track Ends	Marked with "O" **and stripe** as high as possible facing the track.
Minor Skid Track	Marked by tree feller if required to guide machine operator to the log.
Temporary Stream Crossings	Marked with S on trees on either side of stream. (Note: Shown on Harvesting Map as "X")

Alterations approved by the Forest Officer to the location of the skid tracks may be carried out to take account of field conditions relating to tree distribution, topography and drainage.

Tree marking requirements for felling

Interpretation	Field Colour	Field Symbol
Trees to be felled.	BLUE	3 "X" 's on tree trunk plus Preferred direction of fall: 30cm vertical stripe near ground level.
Trees to be retained: • Potential Crop Trees (PCT's) • Fruit trees • Others as required	BLUE	One ring at dbh Where retained as fruit trees "F" One blue ring

4 CONSTRUCTION WORKS FOR LOGGING

4.1 LOG POND AND WHARF (where applicable)

Best management will	Work according to the Logging Plan. Keep the log storage area as small as possible, allowing for efficient processing and shipping of logs Avoid adverse impact on the marine environment Store logs to minimise degrade.

Location

- A **log pond and wharf plan**, showing the location and construction specifications is to be submitted to the Director of Forests prior to construction.
- Gently sloping areas (up to 6%) are preferred.
- Construction of log ponds by fill reclamation of areas below low-water mark will only be considered where
  - there is no other alternative, AND
  - construction and operation will not damage the adjacent marine environment, AND
  - drainage water is directed away from the sea.
- Locate to provide the best and most direct access for log ships. Deep water ports are preferred to reduce the cost and disturbance associated with barging operations.
- Retain a 50 metre buffer area between the log pond and the shore line (or mangrove vegetation) or a watercourse.
- Clearing of shoreline vegetation (including mangroves) is limited to that necessary to construct the wharf and associated log storage area. A maximum frontage of 100 metres is allowed.

Timing of construction

- Construct the log ponds and wharf in dry weather.

Maintenance

- Drains are to be kept open at all times. Log storage areas and the surface of the wharf are to be kept elevated by top gravelling as required.

Design

Log Pond

- Log pond areas are to be well drained. Spoon drains (3 - 4 metres wide and 30 cm deep), constructed at a maximum interval of 40 metres will channel runoff to vegetated outlets. The maximum slope of spoon drains will be 2%. A fine contour survey of the log pond may be necessary to plan the drainage system.
- The major crossing points of drains are to be gravelled to a depth of 30 cm. The gravel is not to restrict the flow of water along drains. Where gravel is not available, crossing points are to be corded so that the top of the cording is level with the base of the drain.
- Drains are not to directly enter water bodies. Water must be filtered by a designated filter strip.
- Log and waste storage areas between the drains are to be elevated with a cross fall of 4 - 6%.

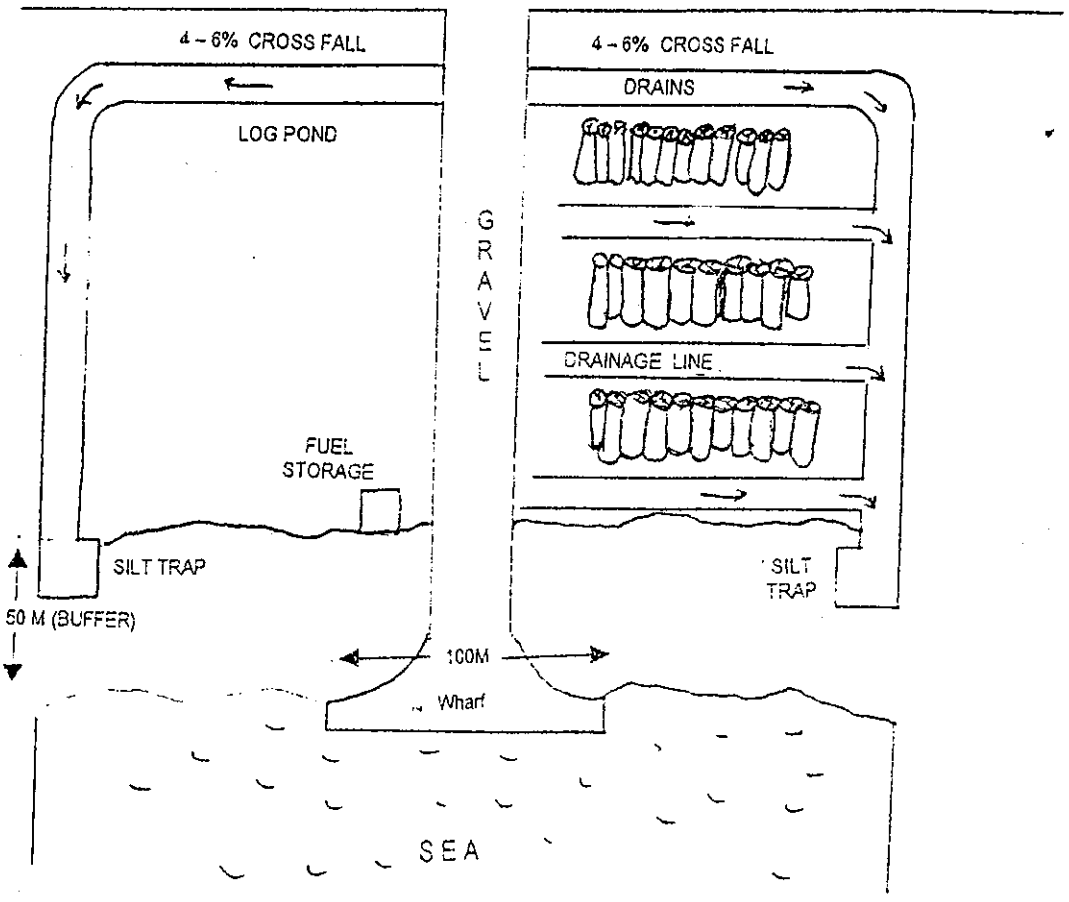
Design

Wharf

- Construct using clean gravel fill only. Soil material is not to be used.
- Maximum frontage to the sea is 100 metres.
- The loading face of the wharf is to be a wall construction with a top log. Walls may be constructed of round timbers, rock or other material able to prevent slumping of wharf fill into the sea. All timbers are to be secured to prevent their falling into the sea. Only durable timber species will be used.

Existing Log ponds and Wharfs

- Earthworks and other rehabilitation is required to bring existing facilities to these standards.



4.2 ROADS

Best management will	**Work according to the Logging Plan.**
	Use construction methods which enhance safe use
	Keep the area and disturbance as small as possible to minimise the loss of productive area.
	Prevent sedimentation of water courses.
	Avoid disturbance to Excluded Areas.
	Provide and maintain good surface and side drainage during and after construction.
	Use excavators in side cut areas and for watercourse construction.
	Decommission those roads which will no longer be used, and in doing so, recreate the natural drainage patterns as far as possible.

Classes of Roads

As a general principle the following classification will apply in the description and classification of forest roads.

Major Roads will be used for logging for three or more years and/or be required by local communities on an ongoing basis for all weather access (or will carry log volumes of 2,500 m^3 or more per week averaged over the logging operation).

Minor Roads will be used for logging for one or two years and/or be required for local communities for access under dry weather conditions (or will carry log volumes of between 1,000 and 2,500 m^3 per week averaged over the time that they are in operation).

Haul Tracks will be used for logging for a few months of the year and will not be required by local communities for ongoing access (or will carry log volumes of less than 1,000 m^3 per week averaged over the time that they are in operation).

Road design

The design and construction standards to be applied will be decided before construction in consultation with the Department of Forests and affected landowners .

Location

- Land owners and government agencies responsible for the co-ordinated development of infrastructure, are to be consulted about the location of roads
- Locate roads in areas of low side slopes
- Locate roads so that no earthworks or soil spill falls into watercourse buffer areas
- Minimise the number of watercourse crossings
- Balance cuts and fills.

Areas to avoid

- Avoid all areas excluded from logging. Where construction is unavoidable and has been approved by the Forest Officer, use end hauling ie. full bench cutting with no side cast of spoil.
- Locations which require box cuts
- Areas subject to flood flows

Maximum side slopes

- 25 degrees (approximately50%)

Link villages

- Villages are to be linked to the main road network where this has been negotiated with land owners. The location of these links is subject to the general Road Design guidelines.

NOTE: **All occasions where proposed roads will breach these design criteria are to be shown and discussed in the Logging Plan. They must be inspected by the Forest Officer prior to approval.**

Road and haul track construction

Timing of construction

- Inspection and approval of the location, by the Forest Officer, is required before construction commences.

- It is desirable that major and minor roads are to be completed before logging. Construction 3 months in advance of logging is required unless adequate compaction has been achieved during formation and surfacing. The staging of road construction to provide logging access will be decided in consultation with the Department of Forests and affected landowners.

- Preliminary road line clearing should be no more than 1 month ahead of final construction in any one site. This will reduce sedimentation from undrained sections.

Survey requirements

- Inspect, survey and mark the centre-line. The standard of survey to be adopted will be dependent on road standards and will be decided in consultation with the Department of Forests.

Road-line felling

- All merchantable stems are to be felled and extracted along the road alignment
- All clearing debris is to be stacked in compact heaps on the edge of the road line clearing (or road side log landing if this is included in the logging plan). Organic material is not to be placed in fill areas, nor in watercourses

Specifications

Road Grades

Road Class	Preferred maximum allowable grade (%)	degrees
Major Road	10	5°
Minor Road	15	8°
Haul tracks	18	10°

Steeper grades (up to 20% or approx 11°') for short sections will be acceptable if this reduces the disturbance from road construction

Road Width

Road Class	Width (m)
Major Road	15
Minor Road	12
Haul tracks	7

Curves

- Fit curves to the topography. The minimum radius of the curve is related to visibility

Minimum horizontal and vertical visibility

- 30 metres

Earthworks

Temporary tracks

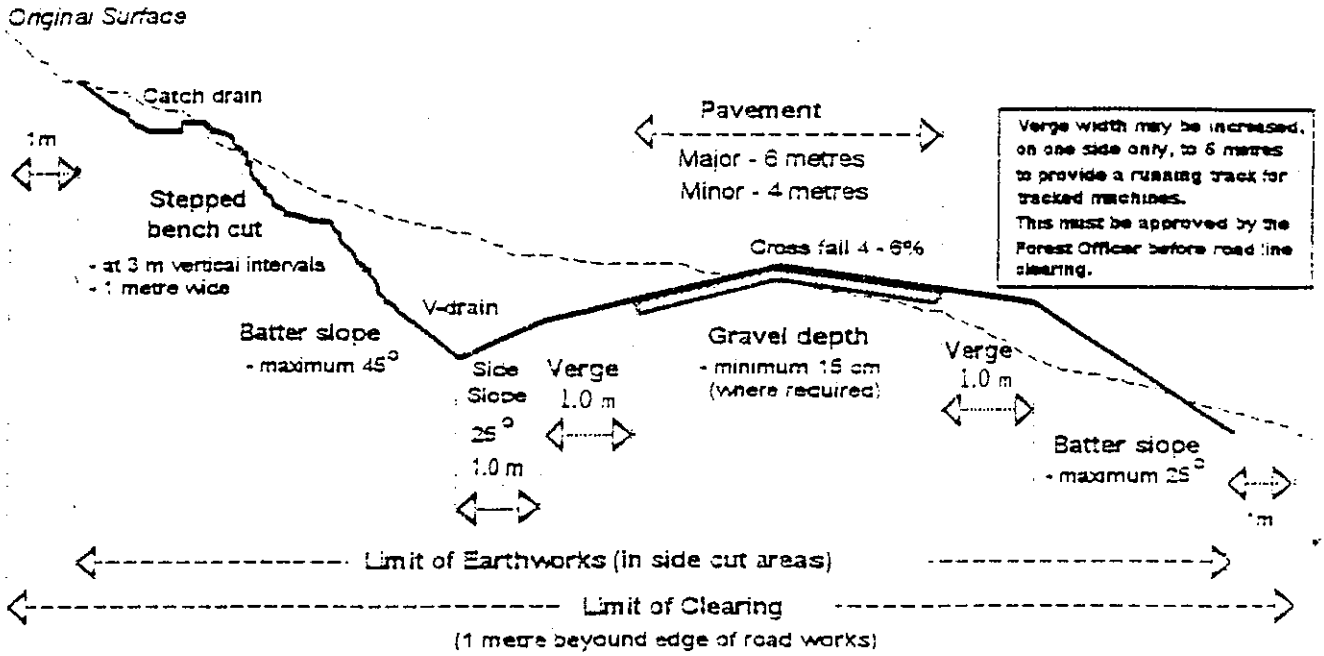
- These are tracks constructed to allow machinery to gain access to an area ahead of the main construction activity.
- They are not generally permitted. Their location and justification is to be discussed in the logging plan. A field inspection by the Forest Officer is required before approval will be considered.
- Where a temporary track is approved, it is
  - to be sited so as to avoid felling commercial trees greater than 30 cm DABOB
  - to be less than 4 metres wide
  - to be stabilised and drained immediately after use.

Road construction

- Preliminary clearing is to follow the centre line of the road.
- Road construction and formation within watercourse buffer areas (for watercourse crossings) must use end-haul.
- Soil heaps and berms and debris stockpiling along road sides are prohibited.
- All road fill and paving material is to be compacted.

Cross-section construction (Major and Minor Roads)

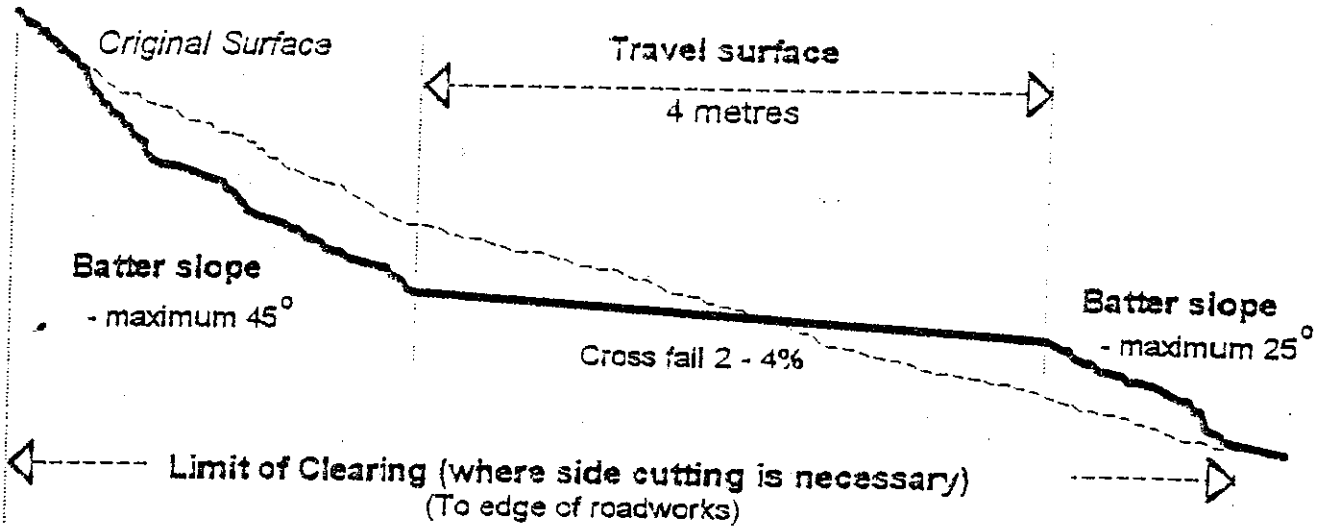
- Roads are to be located on ridge lines wherever possible to minimise side cutting and width of clearing.
- Where side cutting is not necessary, earthworks are limited to the width allowed for pavement plus verge and table drains on either side. An additional width to allow for travel by track machines may be approved following inspection by the Forest Officer. Approval must be received before felling and clearing commences.
- Where side cutting is necessary, construction should be as shown below:



MAXIMUM ROAD WIDTH CLEARING	
Major	=15 metres
Minor	=12 metres
Haul tracks	=7 metres

Cross-section construction (Haul tracks)

- Haul tracks are to be located on ridge lines wherever possible to minimise side cutting.
- Where side cutting is not necessary, width must not exceed that specified for the travel surface.
- Where side cutting is necessary, they are to be formed as shown below:

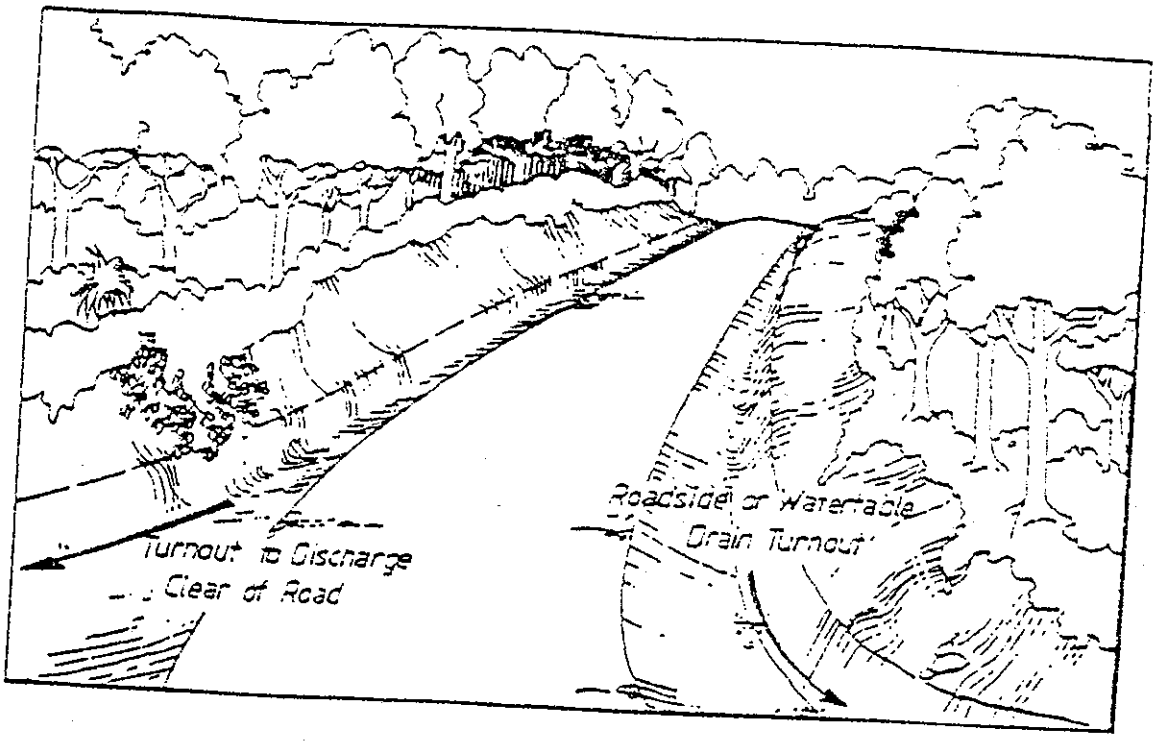


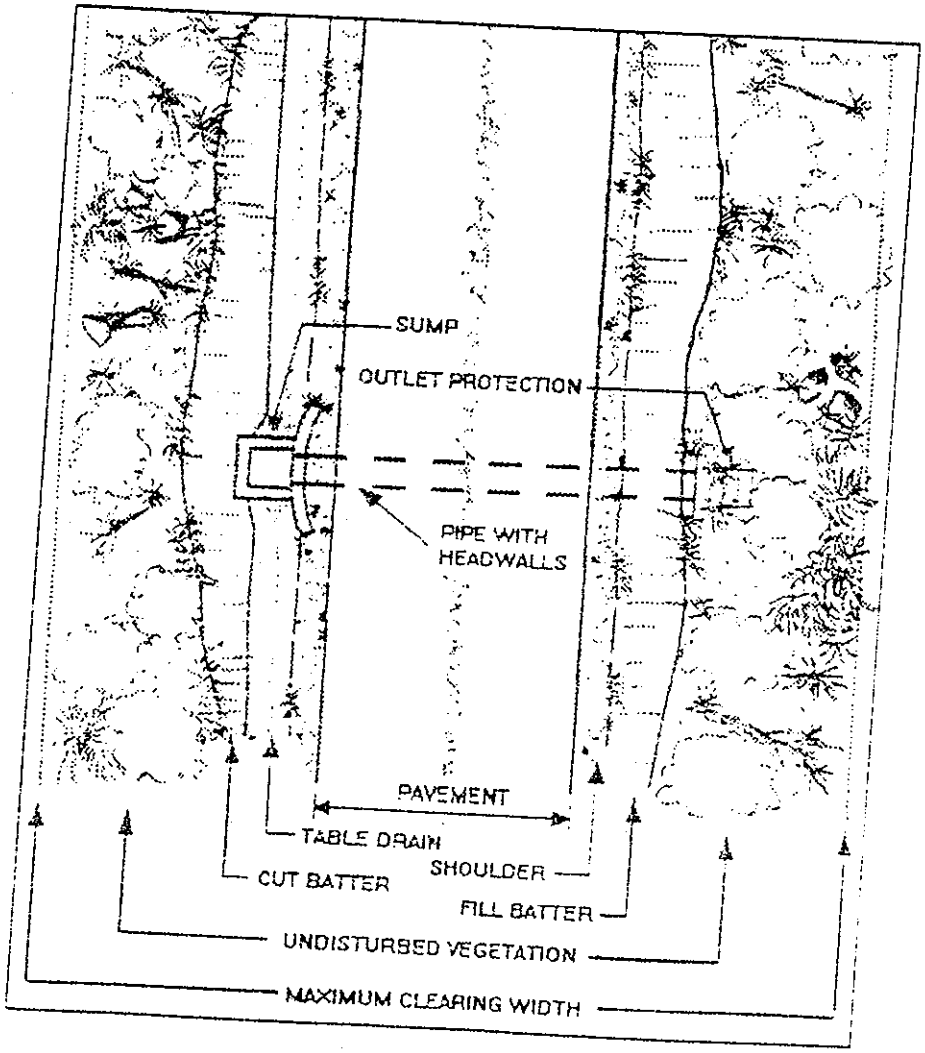
PROVIDE PASSING AREAS AT 100 METRE SPACING
PASSING AREAS TO BE 6 METRES WIDE AND 20 METRES LONG

Re-vegetating cut and fill areas

- Revegetation of cut and fill areas may be required in areas of high erodibility or landscape sensitivity.
- The techniques for revegetation of cut and fill areas will be determined in consultation with the Department of Forests with field officers of the Department of Agriculture.

Road Location and Drainage





Road gravelling (or coralling)

- Gravelling (or coralling) is required
  - where land owners or Government Agencies have negotiated road gravelling as part of the logging contract
  - 15 metres of the approaches on either side of all bridges.
- Minimum compacted gravel thickness is 10 cm (equivalent to 15 cm uncompacted).
- All road drainage works should be completed before gravelling work commences.
- The requirements for road gravelling may be waived where good gravel supplies are not available within 15 km of the section to be gravelled. Where gravel is not available, roads should be well compacted during formation using compactors.

Road and haul track drainage

Spacing

- Drain all roads to minimise sediment production. Road drains are to be constructed
  - at changes of slope, and
  - within 50 metres of watercourse crossings, and
  - additional drains to meet the maximum spacing requirement.

Centre Line Gradient (%)	Maximum Drain Spacing (metres)
0 - 5	60
6 - 10	30
11 - 15	20
>16	15

- Side drains adjacent to box cut roads are to be provided with rock bars at **half** the maximum drain spacing.

Method of drainage

- Provide as
  - reverse grades (ie. dips in the road surface).
  - side drainage for table drains. Side drain grade = 1 - 3%.
  - cross road drainage (pipes or culverts) where side drainage is not possible. Pipes to be laid at a grade of 1 - 3% to prevent blocking.

Drain out-flow

- Drains are not to directly enter watercourses.
- All drains are to have stable outlets, protected by vegetation or by rock or log barriers, particularly in fill areas.

Road maintenance

- All drains, pipes, culverts and bridges are to be kept open at all times. In particular, they are to be inspected thoroughly and repaired before the onset of the wet season.
- Removal of soil from the surface of roads, except during initial construction, is not permitted.

Limits to road construction

- Restrictions apply to road construction and use in wet weather as detailed in section 7 "Weather Limitations on Logging" (page 63)

4.3 WATERCOURSE CROSSINGS FOR ROADS AND HAUL TRACKS

Best management will	Work according to the Logging Plan. Provide permanent bridge or culvert crossings, constructed with durable materials, over all watercourses crossed by roads which will be retained after logging. Provide temporary bridge or culvert watercourse crossings where roads will be decommissioned after logging. Prevent sedimentation of water courses Restrict disturbance to watercourses and the buffer areas to that necessary for crossings. Vegetation will not be cleared to a width greater than the crossing.

Types of crossings and their use

The design and location of watercourse crossings will be determined in consultation with the Department of Forests and affected landowners before construction.

Bridges
- must be used for road crossings of all class 1,2 and 3 streams (except where fords are acceptable). They may also be used to cross other watercourses.

Culverts or pipes
- must be used for crossing gullies or waterways (if bridges are not used).

Fords or open crossings
- are acceptable when
  - bank height of the watercourse is less than 1 metre
  - depth of the normal water flow across the ford is less than 0.5 metres
  - approaches to the stream are less than 5° or 10% grade
  - the bed is solid (gravel or stone), with rock accumulation downstream

Temporary bridges
- may be used for roads which will not be maintained after logging.

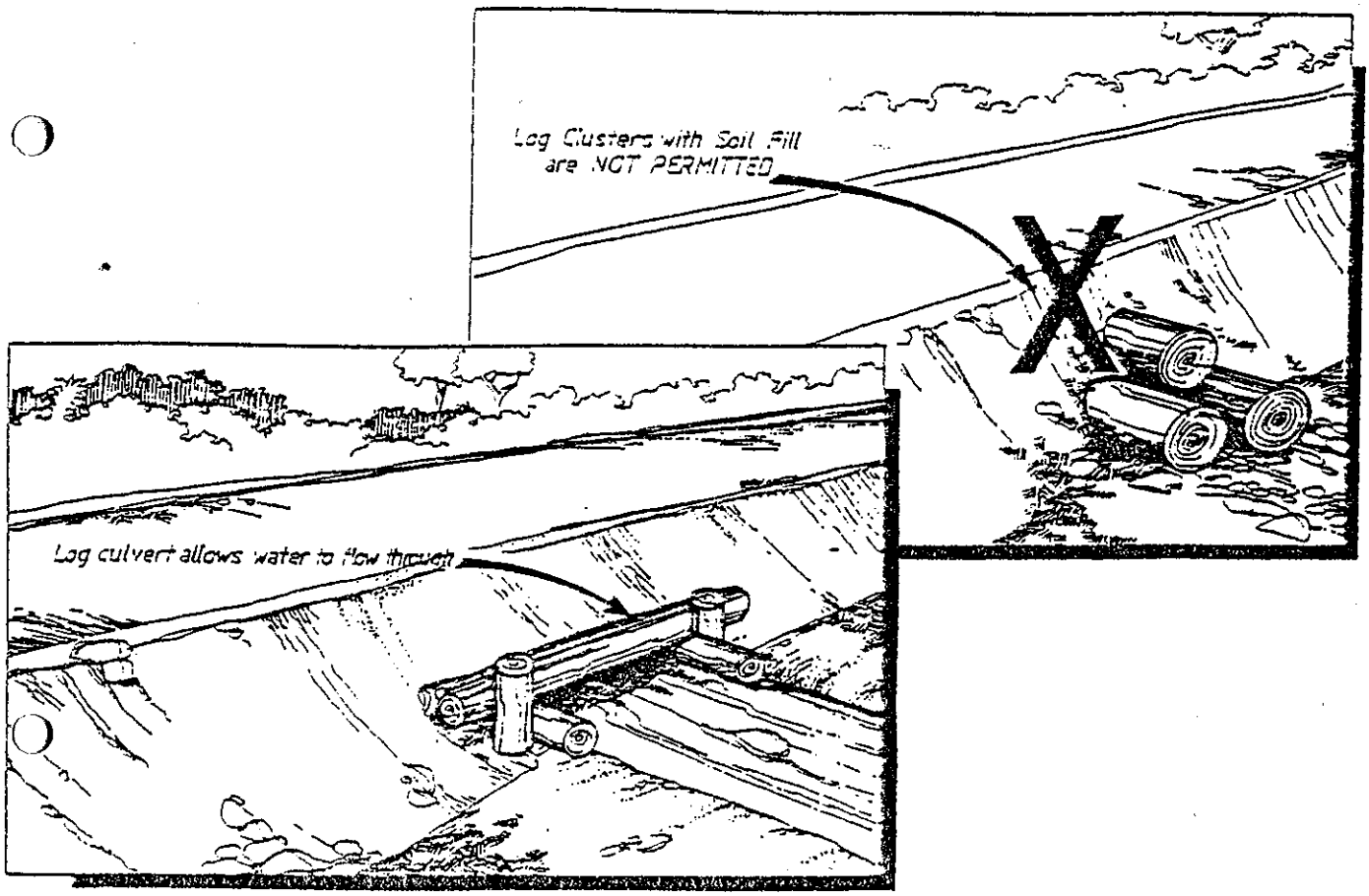
Log clusters with earth fill
- are not permitted for any watercourse in any situation.

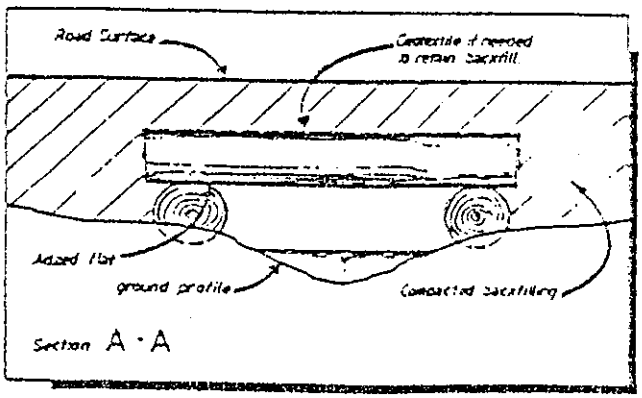
Earth fill embankments
- may be used in absorptive soils where there is no evidence of regular overland water flow. They must be well consolidated and properly drained.

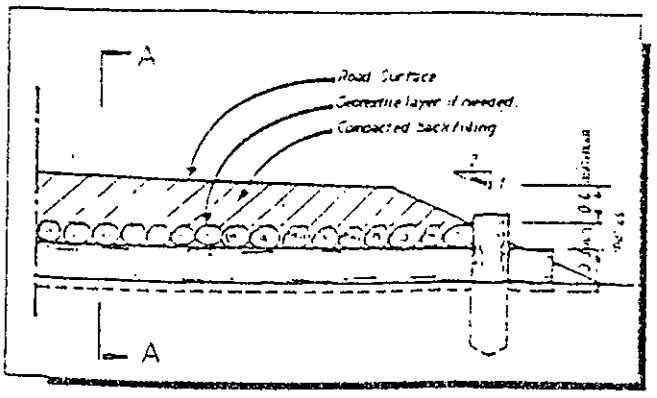
Design of watercourse crossings

- cross watercourses at right angles
- select crossing points which:
  - are immediately downstream of straight and stable watercourse sections
  - have easy high bank access
  - do not require deep box cuts
  - require minimum alteration or disturbance to the high bank
  - have stable beds

Watercourse Crossings







Construction of watercourse crossings

Location

- The location of all watercourse crossings is to be inspected and approved by the Forest Officer before construction.

Temporary crossings

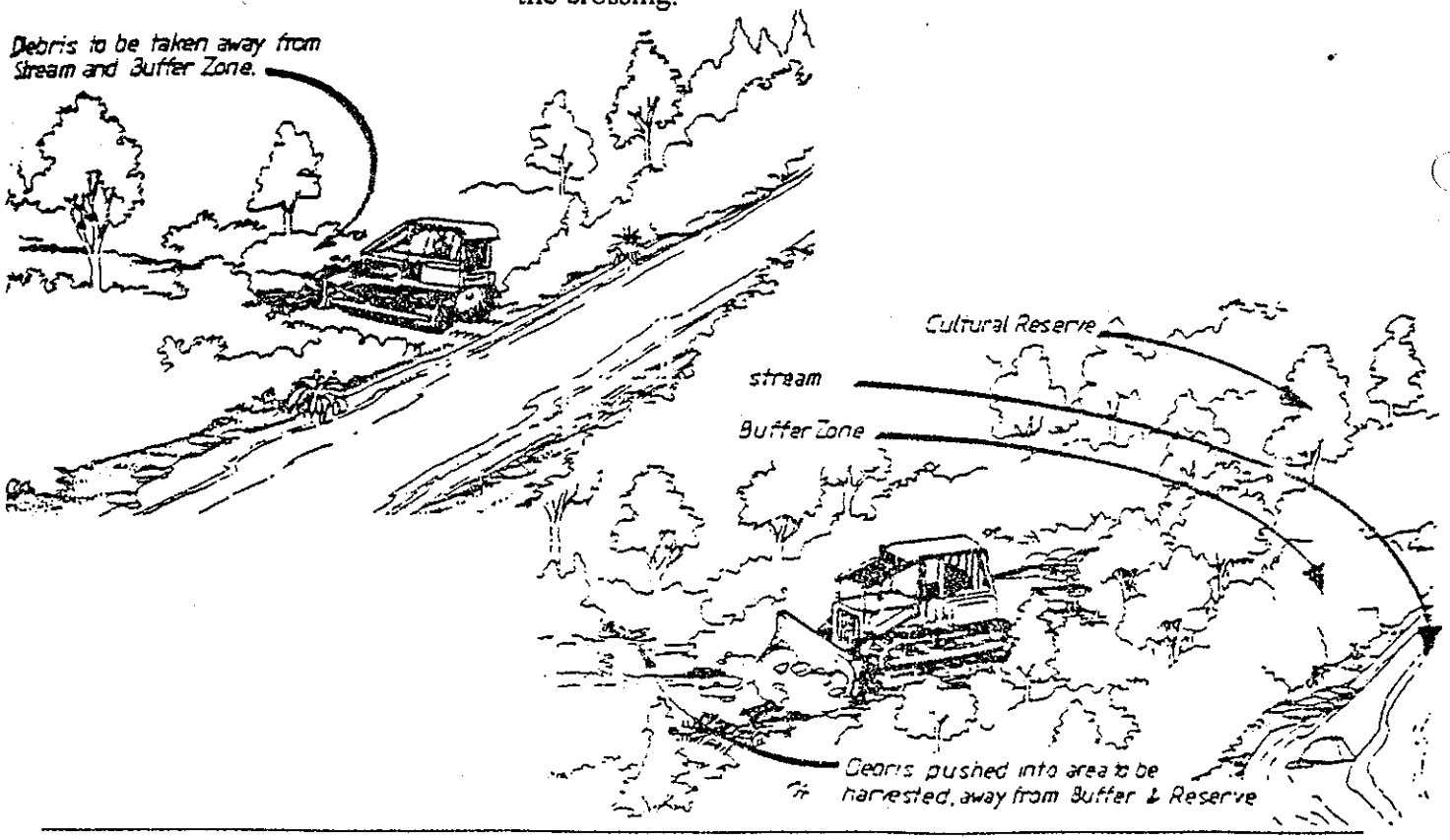
- are permitted to allow equipment involved with the construction of the watercourse crossing to cross to the other side. The width of temporary crossings is limited to 4 metres. The temporary crossing is to be made on the final crossing alignment, so as to reduce disturbance to watercourse banks and buffer vegetation.

Size of permanent crossings

- Permanent crossings must be of a size to allow flood flows to pass without damage to the crossing or its foundations.
- The height from the stream bed to the bottom of the deck must be at least equal to the height of the high bank.
- The width of the crossing must be at least equal to 80% of the width of the watercourse measured from high bank to high bank.

Earthworks

- Excavators should be used for the construction of all watercourse crossings.
- All earthworks are to be done so as to prevent soil entering the watercourse. No soil is to be pushed or placed past the high bank without first having erected and secured a suitable abutment.
- Road construction within the buffer area will be by end-haul
- All spoil is to be removed to outside the buffer areas.
- Watercourse buffer vegetation is to be retained to the edge of the crossing.



Foundations

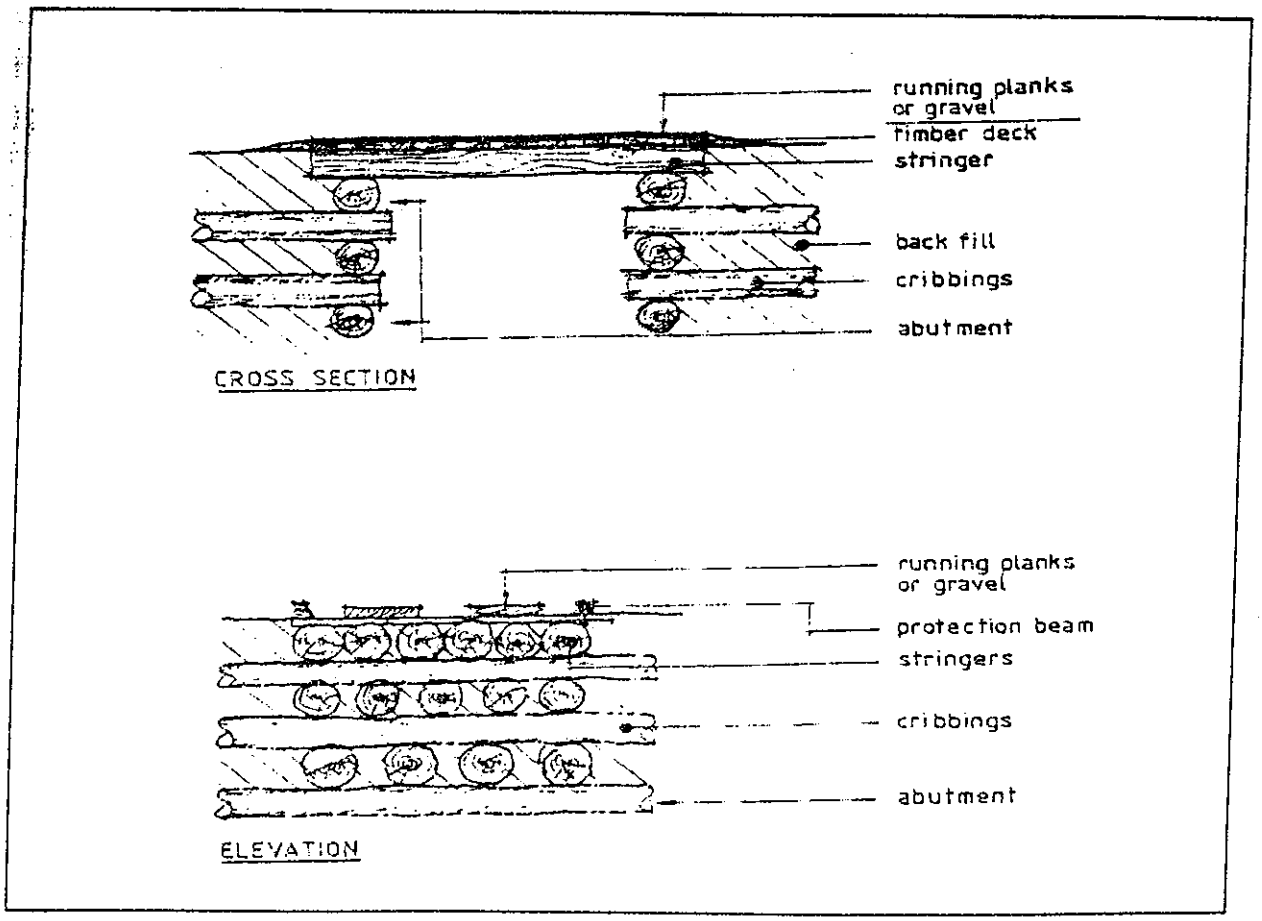
- Bridge and culvert foundations are to be seated on stable materials
- The foundations are to be excavated and not formed by pushed material.

Construction

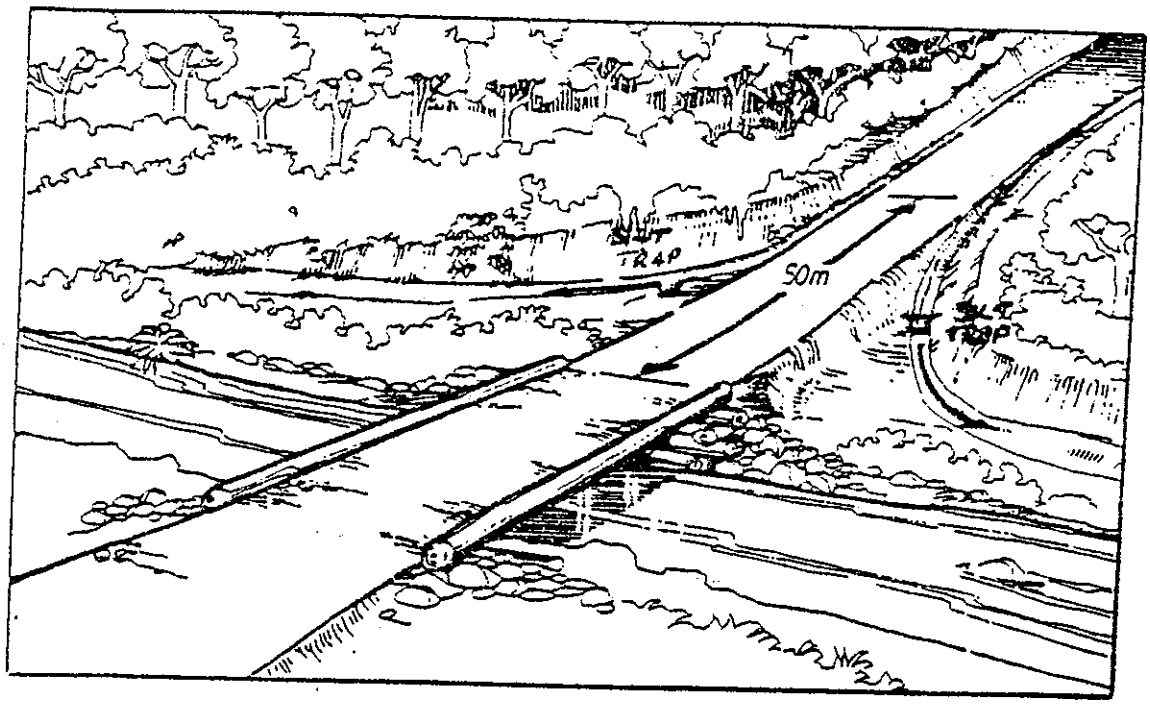
- No machinery will operate in the watercourse during construction

Bridges

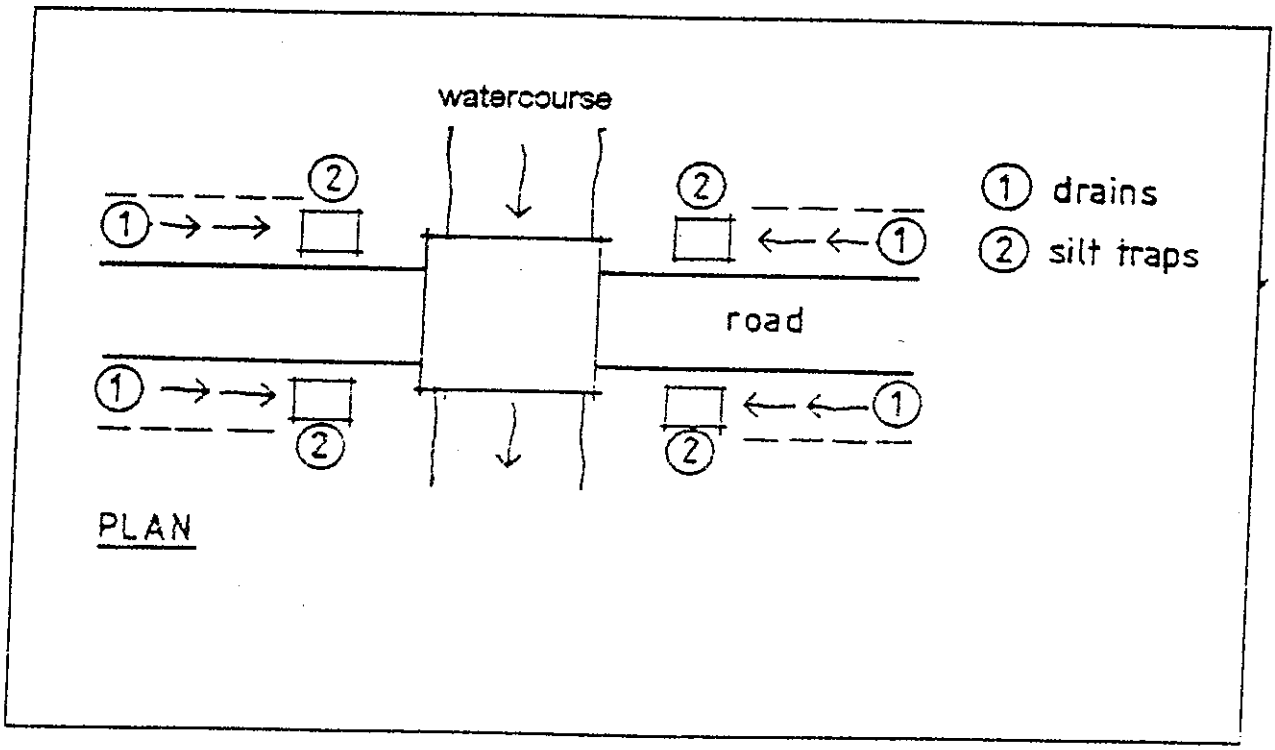
- Approaches must have a straight and level alignment for a minimum of 10 metres either side.
- Decks must be of durable sawn timber, or other non-erosive material (eg clean rock fill). Soil fill or soil covering is not permitted unless the timber deck is completely covered with material such as geotextile.
- All parts must be well anchored to prevent their washing away.
- The stream banks adjacent to the bridge, on both the top and bottom sides must be stabilised using wings of durable log or stone pitch or other equivalent construction.



Diversion drains and silt traps must be constructed on approaches to bridges and culverts



Silt traps
- are to be provided at the four corners of bridges and culverts



Culverts and pipes
- may have earth fill but must have stable abutments constructed to the level of the running surface to prevent spoil entering watercourse.
- Minimum fill height is 60 cm; maximum fill height is 1.5 metres
- The head and outlet walls are to be stabilised with log or stone pitched walls.

4.4 QUARRIES

Best management will	**Work according to the logging plan.**
	Minimise disturbance to forest and water resources

Where to obtain gravel or rock material

Bed rock or gravel from dry-land deposits

- Extraction of gravel and rock materials from road cutting areas during the formation of the road is preferred to the development of large quarries.
- Proposed quarries within areas excluded from logging require the inspection and approval of the responsible Forest Officer.

River Gravel

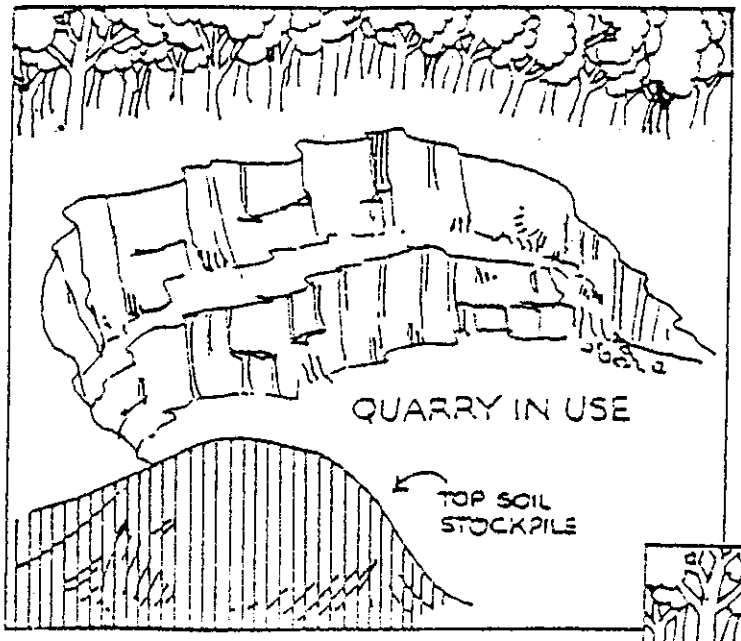
- Obtain the approval of authorities other than the Department of Forests if this is a legal requirement.
- River gravel will only be used where quarry rock material is not available.
- River gravel or rock will only be taken from deposited fans in wide rivers. Gravel or rock is not to be excavated from incised streams.
- Gravel or rock is to be extracted from areas above the level of current water flow, unless the written agreement of customary land owners has been obtained. Neighbouring land owners who would be affected by any muddying of the water should be consulted.

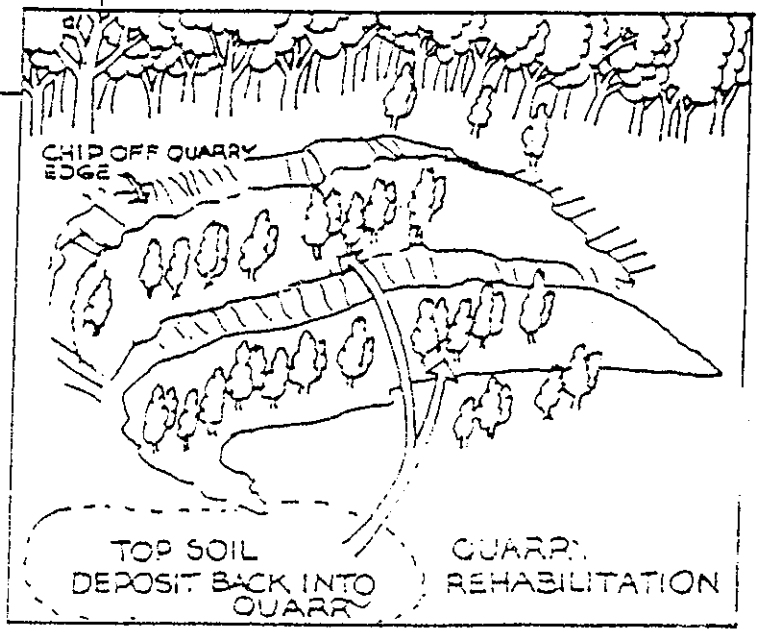
Reef material from marine areas

- Limited extraction of dead reef material will be considered only if
  - the impacts of dead reef coral mining are less than those involved in winning other sources,
  - dead coral is taken only from areas dedicated to wharf construction
  - no other gravel material is available
- If the reef area is within a declared fish breeding ground or habitat area, the approval of other authorities should be obtained where this is a legal requirement.

Quarry management

- Log all merchantable trees on the proposed quarry area.
- Drains are to be constructed around the up-hill side of the quarry to prevent runoff entering the area. The drains are to direct all runoff away from the quarry and are to shed water to stable disposal areas
- The base of the quarry is to be drained at all times. Drains must not directly enter watercourses.
- Overburden is to be stockpiled for spreading in the quarry surface when operations are completed. Runoff is not to pond in the stockpiled area.
- The face of the quarry is to be stable at all times.
- Blasting operations are to be carried out by certified personnel. Strict public safety measures are to be followed at all times with signs and guards posted at safe distances to prevent entry to the danger zone during blasting operations.





4.5 LOG LANDINGS

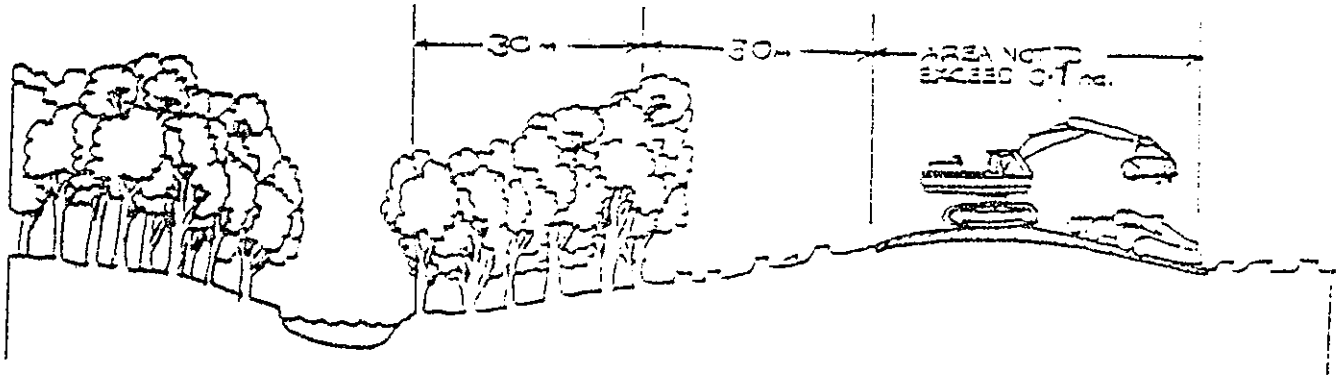
Best management will	Work according to the Logging Plan Use small landing areas to reduce the loss of productive forest area. Manage landing areas to prevent sedimentation of watercourses. Stabilise landings after use

Location

- Landing locations are to be marked in the forest before operations commence
- Landings are to be located
  - outside areas excluded from logging,
  - at least 30 metres from the edge of all buffer zones,
  - at sites which suit skidding pattern and direction,
  - to balance site disturbance with snig distance,
  - in dry areas on ridges or benches,
  - in areas which are easy to drain,
  - in areas of low slope to reduce the amount of side cutting.
- The minimum distance between landings will normally be 200 metres.
- Roadsides may be used if
  - this reduces earthworks, AND
  - landing areas and roads can be drained adequately.
- The location of all landings is to be shown on the logging plan, and inspected by the Forest Officer before construction..
- The Forest Officer may approve additional landings after field inspection.

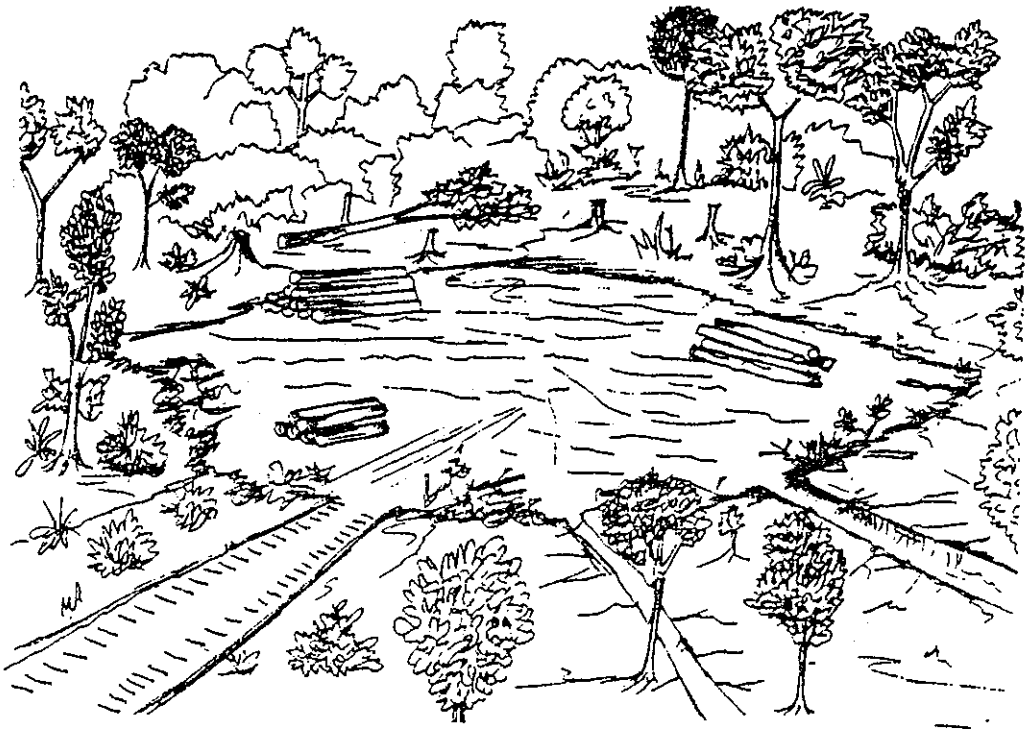
Size of landings

- The size of landings includes
  - the total area of disturbance, including cut and fill batters
  - half the road width if the landing is constructed at the roadside
- Maximum landing size is 1,000m^2 (30mx30m approx.).



Construction	• Mark the boundaries of the landing including cut and fill areas.
	• Remove all merchantable trees.
	• Debris and waste heaps are to be
	  • placed so as not to restrict drainage of the landing,
	  • stored away from standing trees,
	  • more than 10 metres from drainage areas.
	• Soil and vegetation debris are to be kept separate.
	• Heap debris within the landing area.
	• Split level landings may be used to reduce excavation.
	• Batter cuts and fills to stabilise and encourage revegetation.
	• Construct and maintain landings to prevent the ponding of water
	• Provide ring drainage to prevent surface ponding. Drains must empty on to stable vegetated buffer strips

Skidding to landings	• Skid tracks should approach landings from below to avoid directing runoff to the landing.
Limits on operation	• Wet weather restrictions apply.



Skid tracks approach from below

4.6 SKID TRACKS

Best management will	**Work according to the Logging Plan.**
	Reduce the area covered by skid tracks to maintain productive forest area. The percentage of logging units covered by skid tracks should be less than 15%.
	Reduce soil damage along skid tracks
	Avoid damage to watercourses
	Use low skid track grades
	Locate skid tracks to • **minimise the number of watercourse crossings** • **improve the economics of harvesting**

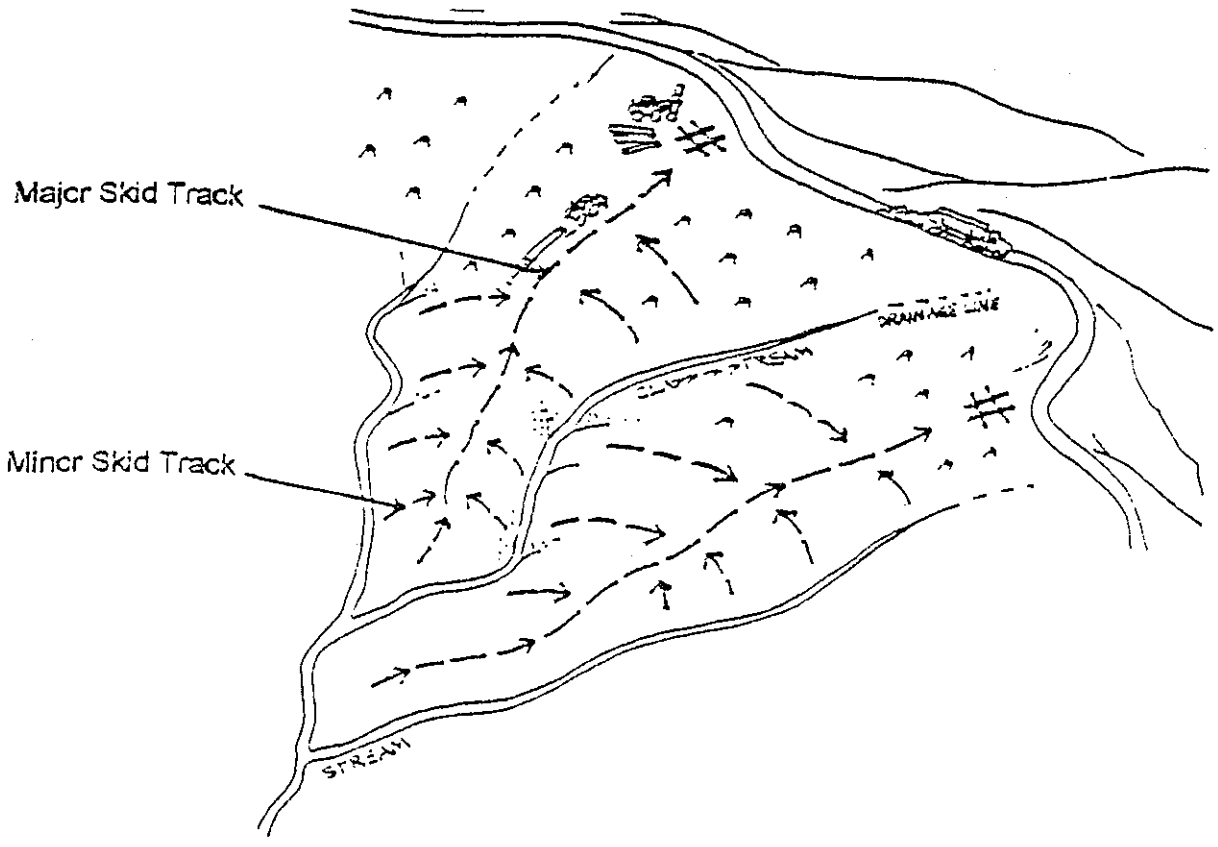
Classes of Skid Tracks

Major Skid Tracks

- will have more than 10 passes made along each track. Their construction may require minor earthworks. They will usually be located along spur lines.

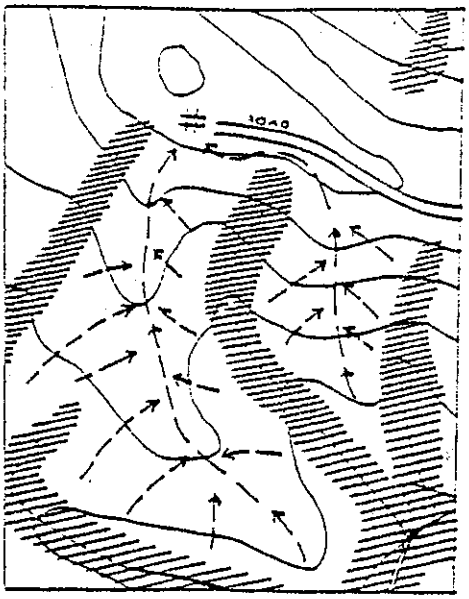
Minor Skid Tracks

- will have less than 10 passes made along each track. Their construction does not require earthworks. Leaf litter is to be maintained on the surface of the track to minimise erosion.



Up-hill or down-hill skid

- Up-hill skidding is generally preferred because
  - runoff is spread to vegetated areas
  - the number of watercourse crossings is usually less
  - roads are located further away from watercourses.
  - Gives more control over skidded logs, especially in wet conditions.

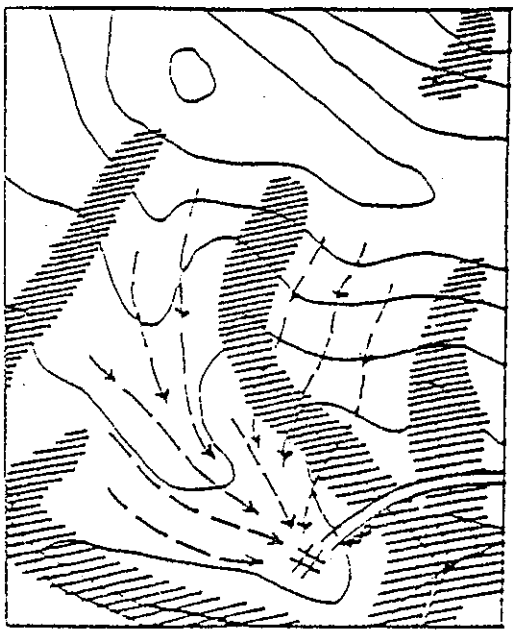


Uphill Skidding

- Down-hill skidding may be approved by the Forest Officer where
  - road densities can be shown to be less
  - areas required for log landings are less
  - large size logs will cause extreme soil damage when pulled up-hill
  - soil conditions prevent good traction by logging machinery



Optimum Downhill Pattern



Poor Downhill Pattern

Winching

Logs are to be winched for the maximum distance possible, to reduce the level of soil disturbance associated with skid tracks.

Design

- **Maximum slopes for side cutting are 30 degrees (57.7%)**
- **Maximum allowable grades for skid tracks are**
  - **Major skid tracks = 15 degrees (26.8%)**
  - **Minor skid track = machine limits apply**
- **Skidding machines are not to leave marked skid tracks**

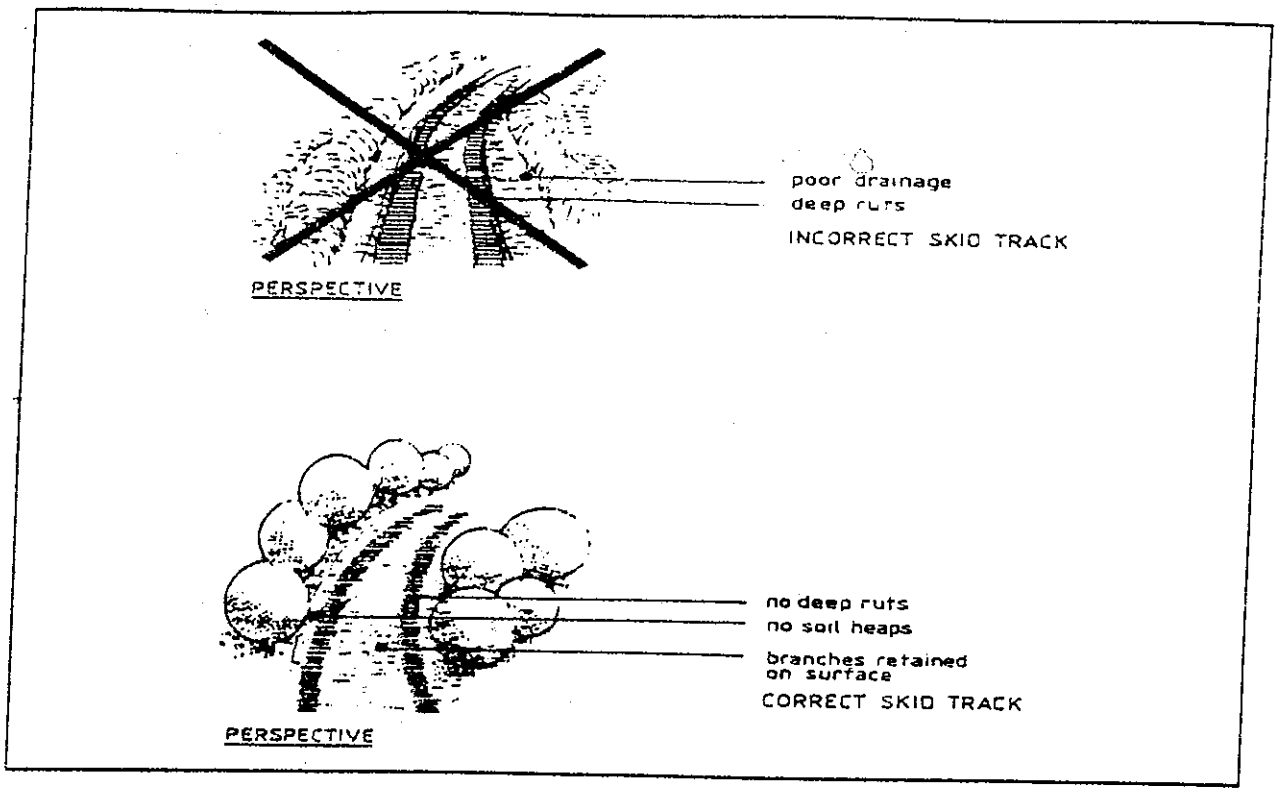
- Skidding in areas excluded from logging (other than at defined watercourse crossing points) is not permitted.
- Locate the position of landings before deciding the location of skid tracks.
- Locate skid tracks
  - away from waterways and unstable areas
  - on spur lines where possible, to allow good drainage.
  - to avoid damage to retained trees.
- Watercourse crossing points for major skid tracks must be shown on the logging plan, and approved by the Forest Officer. An increase in the number of watercourse crossings will require the approval of the Forest Officer following a field inspection.
- Where major skid tracks must cross slopes, the angle of the skid track to the contour must not exceed 45 degrees.

Skid Track Marking

- Major skid track locations are to be inspected and marked in the field prior to their construction.
- Departures from the planned alignment which involve increased side cutting or increased watercourse crossings, are to be referred to the Company Planning Officers. They may authorise the new alignment if it conforms to the Code of Practice. Other cases are to be inspected by the Forest Officer, before construction.
- Skidders and chainsaw operators are to identify and walk the proposed skid track locations before beginning work.

Construction

- Construct skid tracks in dry weather.
- Maximum width is 4 metres for all skid tracks.
- Avoid side cutting of major skid tracks.
- Side cutting is not permitted for minor skid tracks
- Side cut skid tracks should have an out-slope of 2 - 6%.
- Box cuts are not permitted.
- Berms (spoil material) on the outside edges are not permitted
- The radii of curves are to be large enough to prevent damage to retained trees and regeneration.
- Where track slopes are less than 15°, disturbance of topsoil by blading is not permitted.



Timing of construction Coordination and planning of operations should ensure that falling and track construction are concurrent within logging areas, with track marking and construction to be carried out ahead of felling.

Major skid tracks are to be constructed before the start of falling.

Minor skid tracks must be marked prior to logging to assist the cutter to determine the direction of felling. They may be constructed after felling.

Temporary Watercourse crossings

Location

- Major skid track crossings are to be shown on the logging plan, and approved in the field by the Forest Officer.
- Skid tracks are not to cross Class 1, 2 or 3 streams or major gullies
- Temporary crossing points should be marked in the field with "S" in BLUE paint
- Select crossing points over watercourses in places where
  - bank slope is less than 10 degrees (preferably less than 5°)
  - the bed is firm
- Approach and cross permitted watercourses at right angles
- Temporary crossings are to be provided for gullies or waterways if water is flowing at the time of operation.

Construction

- Construct crossings in dry weather
- Width of the crossing is to be less than 4 metres. Buffer vegetation is not to be otherwise disturbed.
- Use small logs cut from the tops of fallen trees for the crossing
- Abutments and approaches are to be higher than the stream banks.
- Cord approaches within 2 metres of the high bank.
- Soil is not to be pushed past the high bank. Soil must not be pushed into watercourses nor onto the top of the crossing..

Removal

- Remove crossings in dry weather. Crossing material is to be placed more than 10 metres from the high bank.
- Removal must not disturb the watercourse banks.

Limits to construction

Wet weather restrictions apply.

5 LOGGING OPERATIONS

Best management will	**Work according to the Logging Plan.** **Prevent the entry of soil or turbid water to watercourses.** **For ground based logging systems, harvest areas on a coupe by coupe basis, using natural landscape units - not on a grid by grid basis.** **Minimise ground disturbance and traffic in the area to maintain the productive and regenerative capacity of the forest.** **Log steep areas and soils sensitive to compaction only in dry weather.** **Cease operations in wet weather.**

5.1 FELLING

Best management will	**Fell trees to maximise recovered log volume** **Directionally fell trees to** • **minimise damage to the retained trees and regeneration** • **assist snigging and minimise ground disturbance** • **avoid disturbance to areas excluded from logging.** **Adopt safe practices.**

Felling can commence when	• The logging plan has been approved and exclusion areas have been marked. • Road construction as detailed on plans is complete • Major skid track construction is complete***[2] • Minor skid track location is known • Tree marking completed, according to the Vanuatu Silvicultural Prescriptions.
Testing soundness	• Trees, suspected of being unsound, should be tested before felling eg by sounding with an axe or by drilling the tree vertically with a chainsaw

[2] The location of skid tracks will depend on the density of the stand to be logged and will be decided in consultation with the supervising Forest Officer in accordance with the requirements of RIL.

Removal of Logs

- Trees susceptible to blue stain or insect attack are to be removed as soon as possible after falling

Directional felling

- Directional felling is required to
  - minimise damage to standing trees,
  - assist snigging and avoid ground disturbance,
  - avoid disturbance to buffer areas and conservation zones.
- Organise cutting to fall trees towards an open space.
- Use felling jacks and wedges to assist with directional felling.
- Ensure a maximum of 3 tree crowns felled in one area.

Preparation

- Plan the direction in which to fall the tree
- Make sure that there are no dead limbs or "hung-up" branches.
- Cut vines attached to the stem or trailing from the canopy. Vines should be cut at an earlier stage, for example, during tree marking operations
- Clear an escape route at 45° to the direction of fall.
- Clear an alternative escape route in case something goes wrong.
- Clear shrubs and saplings away from the base of the tree to provide an adequate working space.

Felling

- Chainsaw operators must not work on their own. Assistants must stay at least 2 tree lengths from the operations, during felling.
- Scarf and back-cut properly.
- Once cutting of a tree is started, that tree must be fallen.
- A winch path needs to be prepared

Stump height

- Keep low to increase the log volume. Cutting must not be higher than 30 cm above ground level on the high side, provided that
  - where butt defect is obvious, the tree can be cut immediately above this defect
  - where a buttress exists, the tree may be cut immediately above the buttress

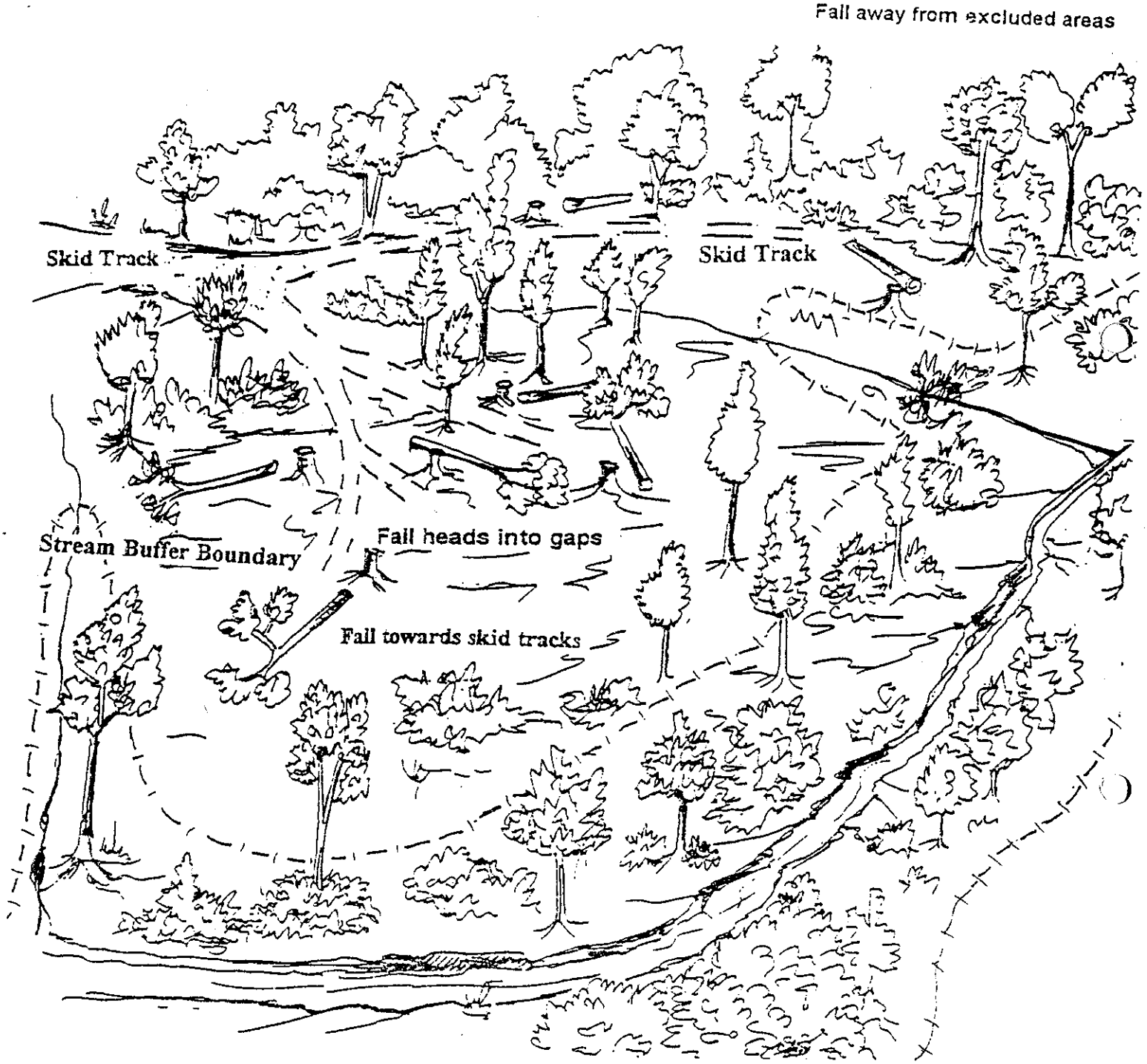
Using machines to assist falling

- The use of machines to pull trees while they are being cut is prohibited.
- Machines, fitted with international standard roll-bar protection, are to be used to dislodge hung-up trees. Hung-up trees are to be removed before any more trees are cut. If they cannot be removed immediately, they area is to be well marked to signal the danger to other people using tape.

Limitations

- Adverse weather restrictions apply.

Felling

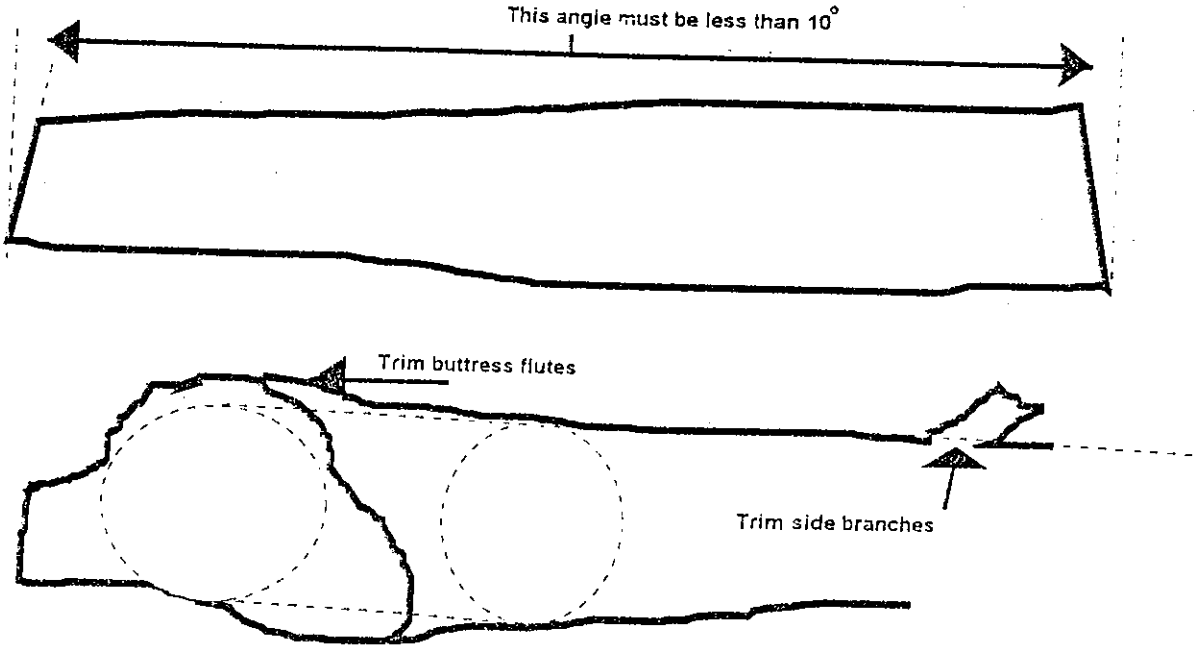

Fall away from excluded areas
Skid Track
Skid Track
Stream Buffer Boundary
Fall heads into gaps
Fall towards skid tracks
No logging in stream buffer and excluded areas

5.2 LOG PRESENTATION

Best management will	Obtain the maximum log value possible from felled trees. Present logs well at stump, to reduce the amount of cross-cutting needed at landings

Operations

- Completely cross-cut logs so that splitting does not occur when the log is moved during skidding.
- Crosscut boles and tops to obtain the maximum volume, consistent with highest value, of saleable logs.
- Trim all buttress flutes and side branches flush with the main stem to
  - gain maximum log quality and volume
  - reduce soil disturbance and assist skidding
- Removal of bark in the bush (rather than at the landing) is preferred.
- Beware of tension while cutting logs and if necessary make a cut on the compression side to reduce the tension before making the final cut
- Avoid using the tip of the bar as this can cause kickback
- Switch off the saw if it jams
- Be ready to step back quickly if the log being cut starts to roll
- Avoid making the final cut while standing on the lower side of a tree if it is lying on a slope
- Do not stand on the trunk of the tree being crosscut
- When making the final cut always stand on the compression side of the log.



5.3 SKIDDING

Best management will	**Use low ground pressure equipment.** **Minimise the area of disturbed and compacted soil.** **Avoid damage to remaining trees and regeneration.** **Preserve watercourse banks and buffer zones.**

Preferred skidding equipment to minimise soil exposure and compaction

Use low ground pressure equipment to minimise compaction of the soil.
As a guide to machine selection, approximate static ground pressures, and upper slope limits for safe working, are given below.

Examples of Type of Machine	Static Ground Pressure (kPa)	Upper Slope Limit for Safe Working (Degrees)
Skidders Wheeled loaders (with standard tyres)	50 - 80	20
Forwarders (with standard tyres)	70 - 140	20
Tracked tractors Tracked loaders (Grouser plates up to 60cm wide on rigid track frame rollers.)	40 - 70	25
Wide tyred skidders (tyre width up to about 100cm.)	< 30	20
Flexible track machines e.g. FMC	15 - 30	25
Helicopter	Not applicable	Subject to special approval

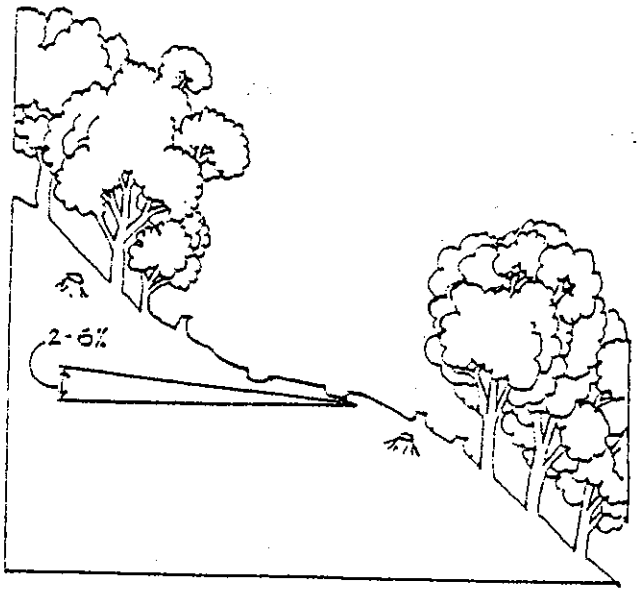
Some skidding machine characteristics to reduce impact to the forest.

Equipment which can reduce damage to the forest during logging is preferred. This includes

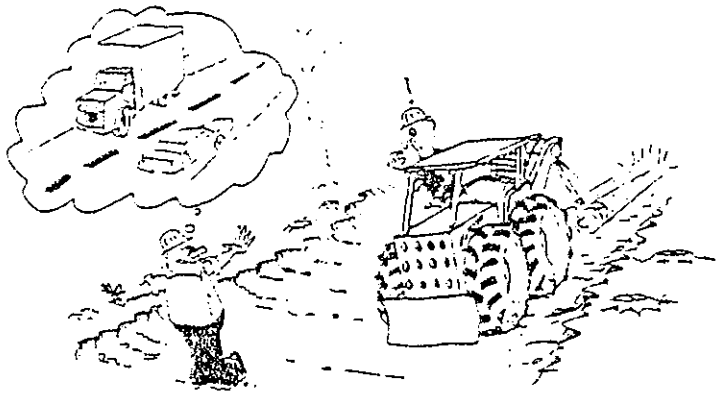
- **Dozers fitted with bull blades of a width no greater than outside track width** will reduce soil exposure and damage to retained trees
- **Track machines fitted with wide tracks** (or wheeled machines fitted with wide tyres)will reduce compaction
- **Logging arches** will assist lifting of the end of the log and improve the efficiency of skidding

Skidding

- Keep the blade up when travelling and skidding. Pushing soil on skid tracks, other than that permitted for construction, is prohibited.
- Retain vegetation litter along tracks.
- Reverse along skid tracks towards the log, wherever this can be done safely.
- Use winches to minimise the need to drive right up to the tree.
- Head or butt haul to minimise the tractor travel distance.
- Lift the end of the log off the ground, to avoid soil damage due to log drag. Logging arches will help this action.
- Avoid damage to standing trees and regeneration along skid tracks.



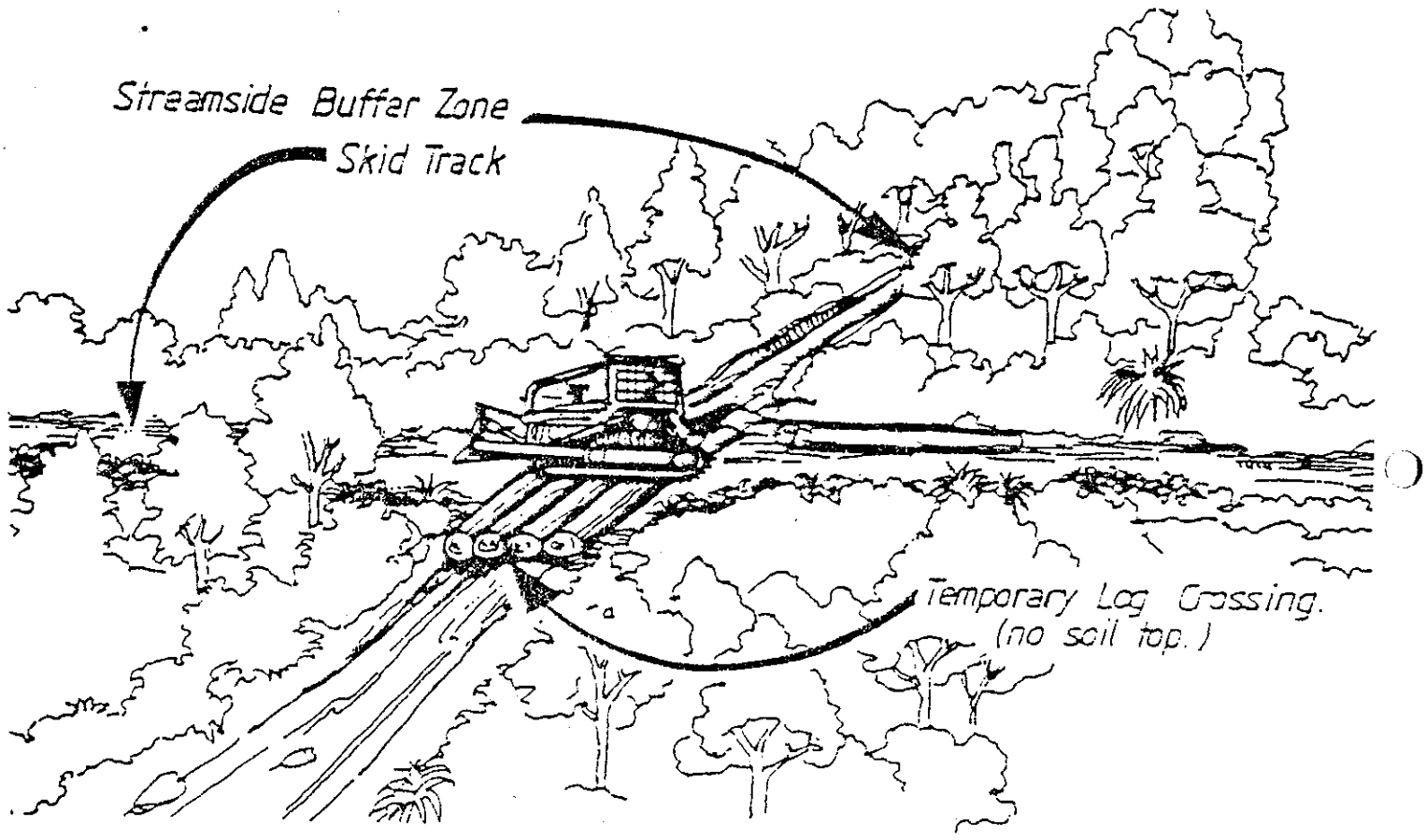
Outsloping of snig tracks should be considered to reduce scouring. The outslope should be about 2 per cent (approx 1°) and not more than 6 per cent (approx 3°) as logs slide off slopes greater than 6 per cent.



Don't make tracks wider than necessary

Tractor access is prohibited	• Within 10 metres from road cuttings or other banks which are more than 2 metres high. • In areas excluded from logging • In watercourses, except at approved and properly constructed crossing points. • Within the limits of swamps or wet areas, except at approved crossing points.
Limitations	• Wet weather restrictions apply

Skid track crossings for gullies and waterways



5.4 TRUCK LOADING AND HAULING

Best management will	Reduce the need to stock pile logs in the bush by planning work so that logs can be removed soon after they are cut. Avoid stockpiling logs which are susceptible to blue stain or insect attack. Load and haul logs safely.

Bush stock piling of Logs

Where to stockpile

- Stockpile logs at well drained road-side landings, accessible in wet weather.

Regular inspection

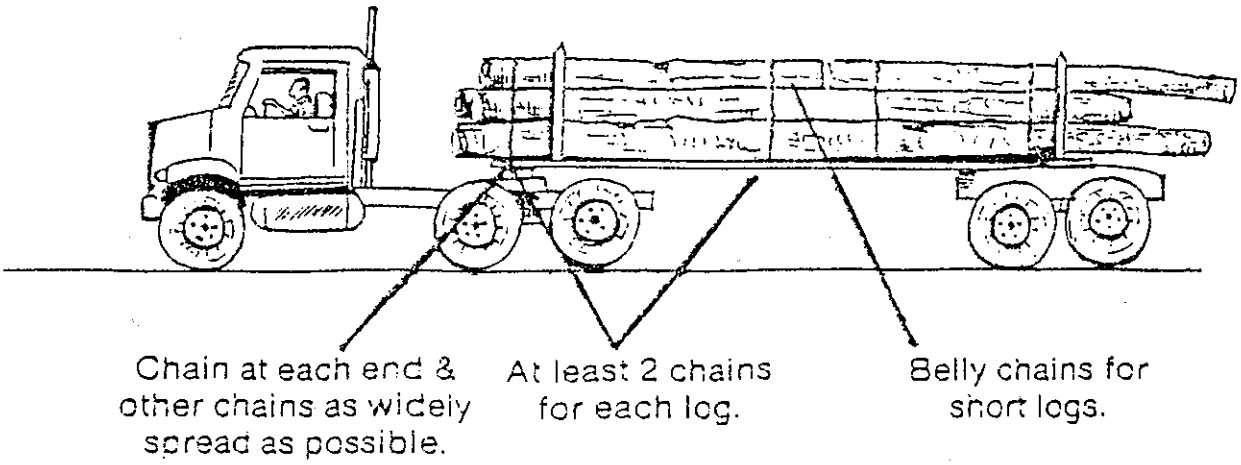
- Inspect logs and apply appropriate control measures if insect or fungal attack occurs

Limitations

- Avoid stockpiling logs for more than 2 months.
- Avoid stockpiling logs in cyclone prone sites prior to the onset of the cyclone season.
- Wet weather restrictions on the operation of landings apply.

Truck loading

- Trucks must not be loaded in excess of their design capacity
- Side stanchions must be vertical after loading.
- All loads are to be secured with at least 2 approved load binders. Each log must be secured by at least 2 approved log binders.
- Protruding limbs or trailing material must be removed before the truck leaves the loading point



When can trucks be assisted in travelling along roads?

- Logging equipment can assist loaded trucks to:
  - move from the landing to the road
  - climb steep sections of road constructed according to an approved logging plan.

Road speeds

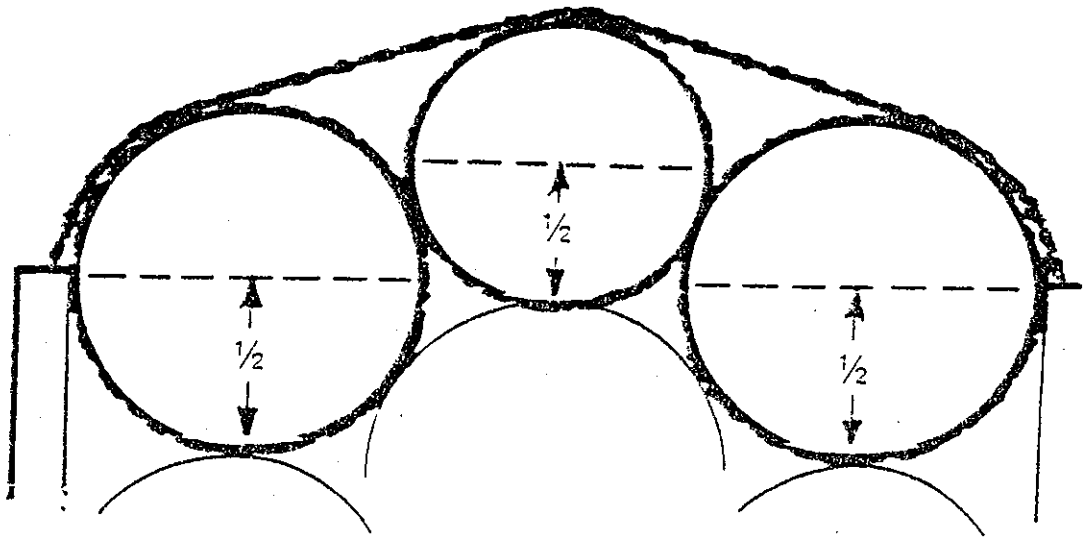
- Observe posted speed limits
- Legal speed limits must be observed when travelling on public roads

Checking the load

- The load must be checked regularly en route.
- The driver is to select a safe stopping area with
  - a minimum sight distance of 40 metres in both directions
  - adequate area for another truck or other vehicles to pass safely.

Unloading

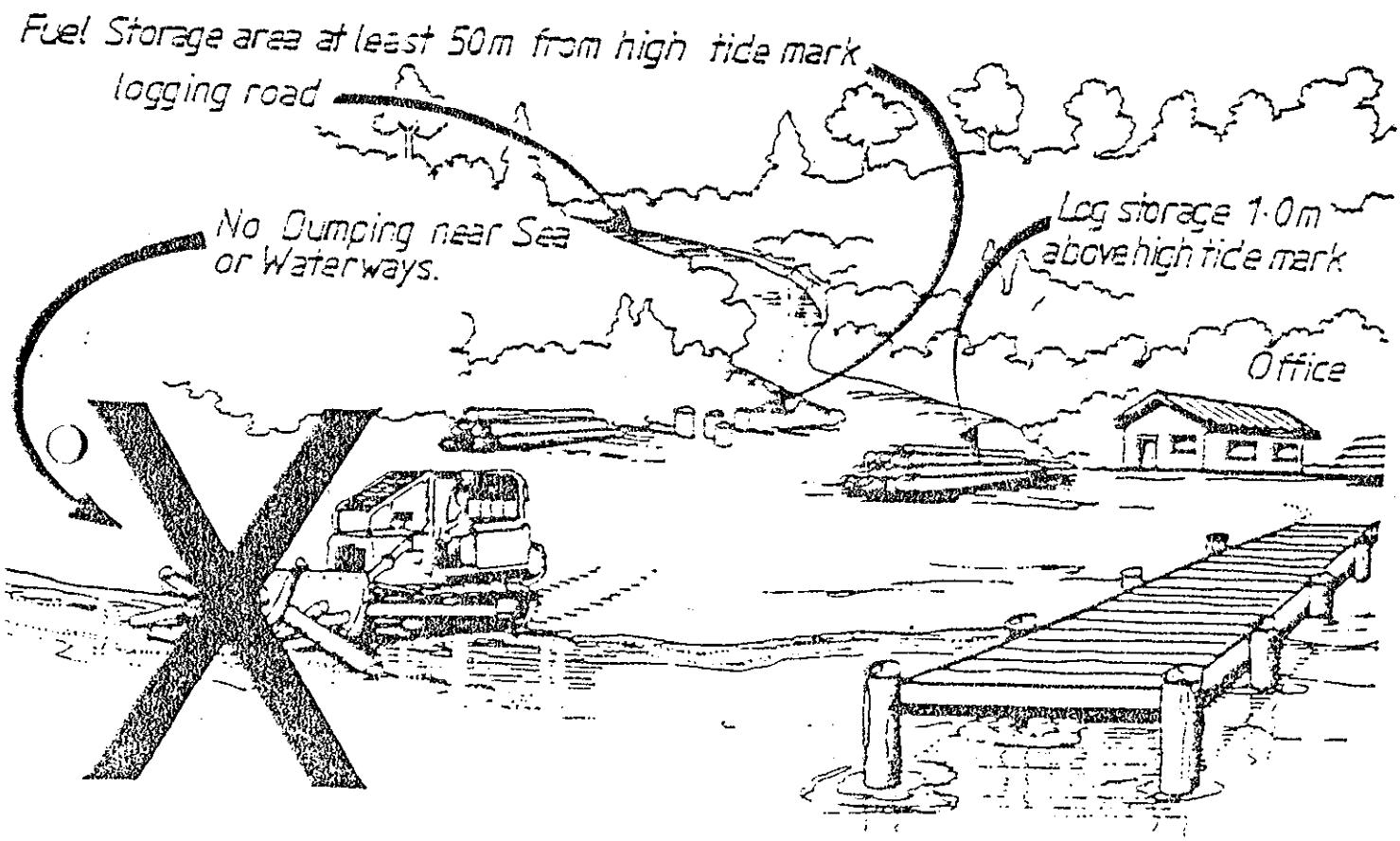
- Check that the side stanchions are secure before removing log binders.
- All logs are to be removed by loaders or grapple excavators.
- All people other than the loader operator are to stay at least 20 metres from the truck during unloading.



Chains must be securely fastened before leaving the vicinity of the landing.
Logs must be loaded so that half their diameter is below the stanchion or adjacent log.

5.3 BARGING AND LOADING OF LOG SHIPS

Best management will	Use properly constructed and stable wharves. Avoid damage to the shore and inter-tidal zone. Prevent sediment entering the sea. Prevent logs, offcuts or trimmings entering the sea. Not discharge waste water ballast within National waters



Management of loading and barging areas

6 LOG SCALING

6.1 MEASURING LOGS

Best management will	**Ensure that all logs are measured accurately.** **Ensure all logs are numbered clearly with a unique identifier that enables checking with the felling register.** **Ensure that log measurements are recorded in a manner which allows easy checking of measurements and forms a basis for correct payment of owners** **Ensure good record keeping**

Responsibility for measurement

- Prime responsibility for accurate measurement rests with the purchaser.
- The land owner or his representative should accompany the purchasers representative for the purpose of log measurements. Independent recording of log measurement by owners is encouraged.
- The Forest Officer may attend and/or evaluate log measuring procedure during his inspections

Where are logs measured? (Other than where logs are sold on a weight basis)

- Where logs are properly measured at the stump there is little scope for dispute. Logging agreements will specify whether logs are measured at the stump, at the landing or at the mill. Measurements recorded on felling record sheets are the official records for the purpose of log volume and pricing calculations.
- All logs must be branded with a unique number after felling. The same number must also be branded on the stump.
- Logs meeting the minimum specifications, but left in the bush will also be measured and charged.
- Re-measurement of all or a sample of logs at the landing or at the log pond will be done as part of Department of Forests monitoring procedure.

Log tally sheets

- Log tally sheets, approved by the Department of Forests must be used to record log measurements.

Markings on logs

- Minimum requirements for recording of log measurements are
  - an individual number for each log
  - log length
  - log diameter(s)
- Other records may, for the purposes of payment, include
  - owner identification
  - identification of cutter/skidder/ hauler
  - Log grade
  - Lines showing position of diameter measurements

- Log markings must be sufficiently durable to last at least until logs are loaded for export or processed.
- Use sequential numbering
- Avoid duplication of numbers

Size of saleable logs

- Log dimensions are generally the subject of individual logging contracts. These reflect both market and silvicultural regimes for a particular Silvicultural Forest Harvesting Type.

6.2 LOG OWNERSHIP

Ownership of logs

- Legal arrangements between the parties to logging must precisely specify when log ownership is transferred, For example specify the time of payment, or specify that log ownership is transferred when the licence agreement is signed.

- Following this transfer, the logs are owned by the purchaser. Land owners have no further claim.

Payment for logs

- Legal agreement between the parties to logging must specify precisely the point and time of payment for logs and other forest products.

- Payment must be made for all commercial logs felled, irrespective of whether or not they are removed from the bush unless specific exemption is given for particular uses, for example:
  - logs are used in road construction.
  - logs are provided to land owners for their own use.
  - logs are used for logging camp construction and maintenance.

- The supervising Forest Officer shall determine whether a log is commercial should any dispute arise over payment.

7 WEATHER LIMITATIONS ON LOGGING

Best management will	Avoid operations in hazardous conditions. Not operate in areas where ground conditions are so wet as to cause severe and long-lasting damage to the soil or water values. Avoid practices which risk loss of property.

Operating when conditions are excessively wet causes extreme damage to soil and water. It is also inefficient. Areas most likely to be workable in wet weather are those less than 15° slope on stable soil types.

Felling operations will cease when

- wind strength prevents accurate and safe directional felling.
- ground conditions are too slippery to allow the chainsaw operator to move safely and quickly away from the falling tree.

Tractor operations for
- **skidding** OR
- **road construction**

will cease in an area when

- soils are saturated and muddy water or mud is flowing down a skid track for more than 10 metres, OR
- blading of mud or soil is necessary to continue skidding, OR
- soils are rutted to a depth of more than 30 cm below the original ground level over a section of 10 metres or longer.

The affected section of the skid track must not be by-passed by opening up a new skid track or road.

Construction or operation of **log landings** will cease when

- water is ponded on the surface of the landing in any area which is being worked.

Hauling of logs along roads will cease when

- trucks cannot move unassisted along the roads because of slippery conditions, OR
- muddy water or mud runs in wheel ruts, which are more than 10 cm below the road surface, for a length greater than 50 metres.

Operations may shift	• to a dry section of the coupe, or to another approved block, if all preliminary work (survey or construction) has been done in the new area. • Operations must cease if no suitable alternative areas are available.
Operations may re-commence	• only when ground conditions permit operation without causing damage described above.
Extending operations on log landings and snig tracks	• Use track-based swivel loaders • Cording of log landings or major snig tracks may be done to extend operations in wet weather. • If the cording sinks to the original rutted depth, operations must stop. Additional cording is not permitted.
Responsibility for stopping operations	• The logging company Operations Supervisor is responsible for halting operations in windy or wet conditions. Operations may also be suspended by a Forest Officer.

Wet Weather

Harvesting machinery working in wet weather is more likely to cause problems that lead to damage to the soil by :

- Increasing compaction, in which soil is pressed down tightly leading to more water run-off and poorer forest regeneration;
- Rutting, in which furrows are made in a track , causing run-off water to collect, leading to drainage problems;
- Damaging the road or track surface.

8 FOREST AND CAMP HYGIENE

8.1 EQUIPMENT MAINTENANCE, SERVICING AND HYGIENE

Best management will	Prevent pollution of water resources Prevent introduction of non-endemic species and pathogens to new operating areas. Maintain a tidy operation.

Moving equipment

- All equipment is to washed thoroughly before it is moved to a new operation area to prevent the spread of weeds and disease.
- Fuel or oil spillage is to be avoided during transport.

Workshop facilities

- Site at least 50 metres from any water body or watercourse.
- Drainage from workshop areas is not permitted to directly enter watercourses.
- Provide sullage pits for fuel and oil waste. Sullage pits must be constructed so that
  - they are above the watertable,
  - runoff water does not enter the pit,
  - they are stable and safe,
  - they are at least 50 metres from a watercourse or water body
- Provide safe disposal areas for solid workshop wastes.

Main fuel and oil storage

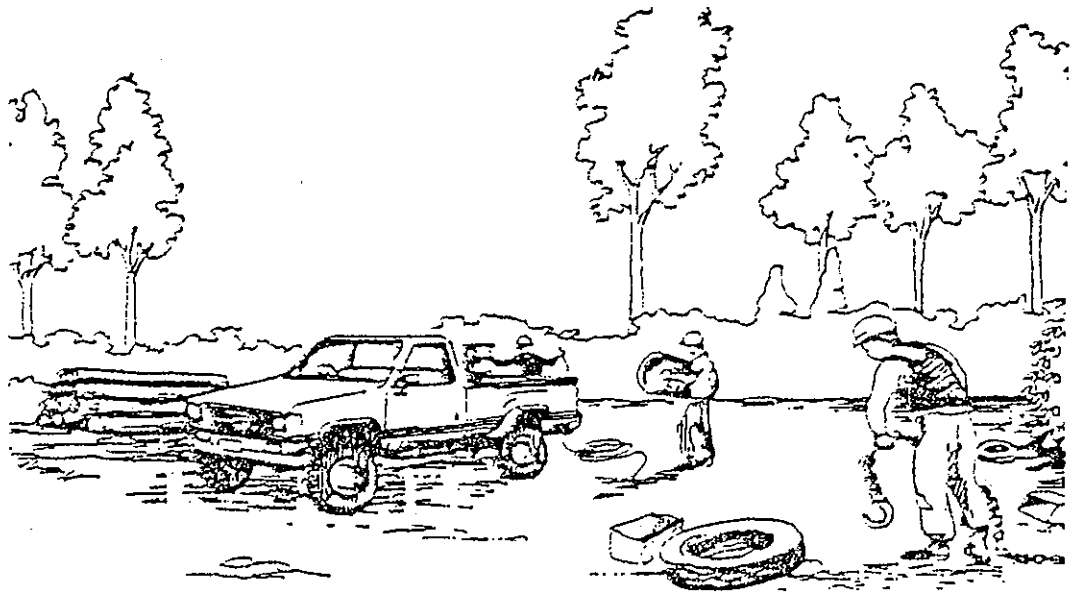
- Locate
  - in a well drained area.
  - no closer than 100 metres to village areas
- Bunds (preferably concrete) with a capacity of twice (X 2) the storage capacity must be provided around the storage.
- Drains are to be directed to a closed, stable and flood free sullage pit, at least 50 metres from a watercourse or water body.
- Spillage of fuels during refilling or fuel transfer is to be avoided.
- Storage at least 50 metres from a water body or watercourse is preferred. Where main fuel storage must be located on the wharf, they are
  - to be located as far away from the sea as the fuel pumping lines permit,
  - to be fitted with a proper, leak-proof bund, which in the event of a spill is able to be pumped to a sullage pit at least 50 metres from a water body.

Field servicing and maintenance

- Prevent leakage of the fuel and oil reserves
- Field fuel tanks, re-fuelling points and maintenance areas are to be located
  - in well drained areas such as landings or road junctions
  - outside areas excluded from logging
  - more than 50 metres from a watercourse
- Prevent spillage during refuelling
- Sump oil is not to be dumped in the logging area. It is to be collected and removed to the main sullage disposal facility

Rubbish disposal

- Discarded machinery is to be removed from the logging operation area to the base camp.
- All rubbish is to be placed in a rubbish pit and buried as soon as logging in the coupe is finished.



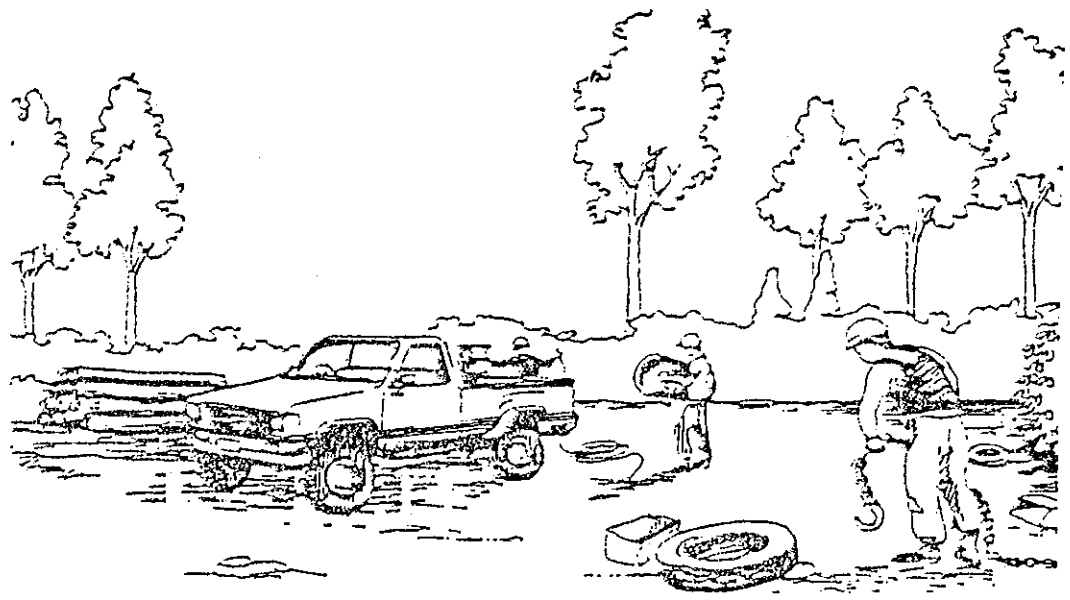
Remove all rubbish and debris to an approved disposal site on completion of a logging area.

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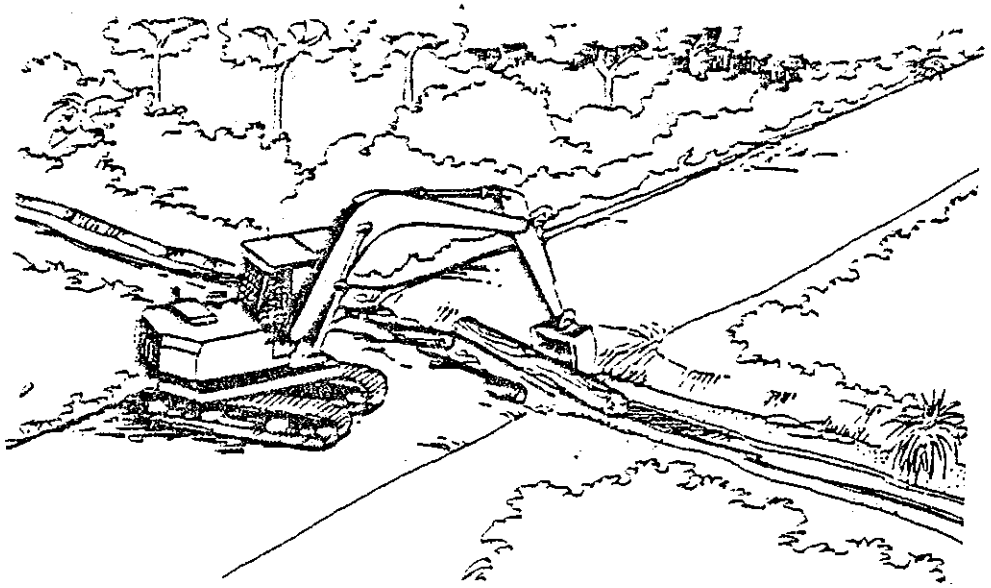
9 STABILISATION OF LOGGED AREAS

Best management will	Prevent further deterioration of the logged area and downstream soil and water values. Leave all areas in a clean and tidy condition.

Skid tracks and Haul tracks

Temporary crossings

- Remove all temporary crossings using an excavator
  - avoid disturbance to the watercourse banks and buffer zones.
  - place material at least 10 metres from the watercourse.

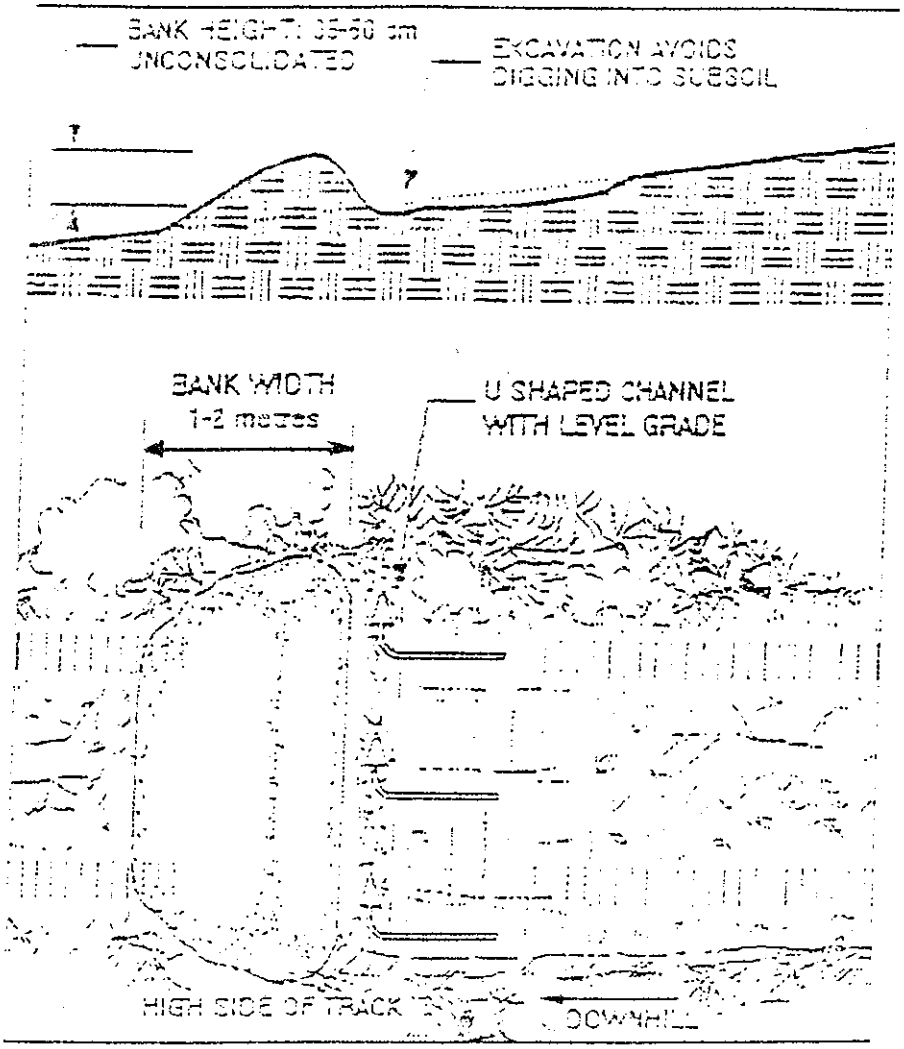


Tracks

- Cross drains are to be constructed only when topsoil has been disturbed. If the surface vegetation is still intact cross drains are not necessary.
- Do not increase the width of tracks by blading material from the side, in order to cover the track surface.
- Place cross drains
  - at changes in slope, and
  - within 10 metres of a watercourse, and
  - at other locations so that the spacing between drains is equal to or less than the maximum allowed.
- Cross drains are to have
  - a bank height approximately 50 cm
  - the bank is to be accompanied by a cut into the surface of the track, on the up-hill side
  - a cross fall of 2 - 4%
  - a stable disposal area of vegetation or log barriers.
- Box cuts are to have earth dams constructed at a spacing equal to or less than the maximum allowed. The bank height is to be equal to the depth of the cut.

MAXIMUM DRAIN SPACINGS

Centre Line Gradient(%)	Maximum Drain Spacing (metres)
0 - 5	60
6 - 10	50
11 - 15	40
> 16	15



Landings

- Remove or bury rubbish.
- Stabilise the batters of cuts (less than 45°) and fills (less than 25°). Drain all areas where water may pond. The drains should be directed to stable disposal points and not directly into watercourses. The grade of drains is to be 2% to 4%.

Roads

Permanent crossings

- Check all bridges and culverts, including decking foundations and sidewalls. They must be secure and safe.
- All debris which has been pushed into the watercourse must be removed by excavator or by hand.
- Water must be able to flow freely beneath the bridge.
- Re-open all the silt traps.

Formation

- Road formations are to be left in good condition. There are to be no ruts in the surface. Cross-fall is to be 4 - 6%. It is likely that light surface grading and compaction will be required to leave the road in a stable and well drained condition.

Side drainage

- All table drains, side drainage and cross-road drainage are to be left in a good working condition. It is likely that light surface grading will be required.
- Soil, vegetation or other material which would obstruct water flow is not to be left in the road drains.

Quarries and borrow pits

- Remove or bury all rubbish
- Stabilise steep cuts -
  - batters are to be less that 45°
  - cuts more than 3 metres high are to be stepped at 3 metre vertical intervals
- Regrade the drain on the up-hill side and make sure that
  - runoff cannot enter the quarry or borrow area
  - the runoff is diverted to a stable disposal point
- Drain the surface of the quarry if water is likely to pond. These drains must empty to stable disposal areas.

Log Ponds and wharves

- All material able to be used by the local community is to be stockpiled free of soil.
- Drainage within the log pond and on the wharf is to be put in good working order such that water will not pond for more than 2 days after rain ceases.
- The road to the wharf is to be drained to prevent runoff reaching the sea.

Rubbish dumps

- Fill in level with the surrounding areas, to prevent water ponding.
- Compact the fill to prevent settling.

Camp areas (Base and field)

- Remove all rubbish
- Drain all areas where water is likely to pond. Drains must not empty directly to water bodies.
- Leave the area in a tidy condition.

10 TRAINING

Best management will	Ensure that all staff who are engaged in logging operations are properly trained and are competent in the use and maintenance of equipment to which they are assigned. Ensure that staff responsible for particular tasks understand the requirements of those tasks.

Areas of Training

Training programmes and regular refresher courses (at least 2 per year) for company and Department of Forests staff are to be conducted.

Task	Required training

Planning and survey	• Code of Logging Practice, particularly requirements for
	  • watercourse class recognition and protection
	  • road location, alignment and construction
	  • snig track location, alignment and construction.
	• Road design and survey.
	• Watercourse crossing location and construction.
	• Correct marking and recording of survey information.

Equipment operation and maintenance	It is desirable that equipment operators possess certification of their skills from a recognised training institution. The Department of Forests, companies and training institutions should negotiate on a target date for certification of all logging operators. Training is required for the operation of equipment including: • Chainsaws • Earthmoving and shaping equipment including bulldozers, excavators, graders, compactors • Skidding equipment • Truck and barge loading equipment • Haulage trucks Staff engaged in particular tasks must understand the requirements of the Code of Logging Practice for their particular task.
Log scaling	All staff engaged in log scaling must have a working knowledge of the requirements of log scaling, including • species recognition • accurate log length and diameter measurement requirements • defect allowance calculation • log marking requirements.

11 SUPERVISION OF OPERATIONS

Best management will	**Ensure that competent and experienced supervisory staff direct all logging operations.** **Provide on-the-job guidance and training so that staff responsible for particular tasks understand the requirements of those tasks.** **Inspect logging operations regularly to ensure that operations are being carried out safely and in accordance with the logging agreement, Code of Practice and company requirements.**

Supervisory staff of logging companies

Number of supervisory staff

The minimum number of supervisory staff will depend on the size of the operation and company structure and is related to inspection requirements.

Frequency of inspections

The supervisor must inspect each operation at least once per week and check compliance with the Code.

Skills of supervisory staff

- Experienced in the planning and supervision of large harvesting operations.
- Working knowledge of logging agreements and Code of Practice.
- Ability to communicate clearly with all logging crews, other company staff, Department of Forests personnel and resource owners.
- Working knowledge of all logging operations including machine operation, maintenance schedules and requirements and basic repairs.
- Possession of a current first aid certificate.

Duties and responsibilities

- Direct involvement in pre-logging planning
- Train and familiarise staff with
  - the operational and safety requirements of good logging practice
  - company requirements in relation to the logging operation
- Co-ordinate logging operations
- Direct supervision of logging operations to ensure compliance with
  - Code of Practice
  - logging agreement
  - company requirements
- Maintain and submit accurate records as required by the company. The company is required to submit accurate records as required by the Department of Forests and other relevant agencies.
- Render first aid if required
- Arrange rapid evacuation to hospital of any injured worker if required

Responsible to Licensee

Liaise with

- Planning officer of the company
- Resource owners
- Department of Forests staff
- Other forest and land management agencies with responsibilities for the proper conduct of aspects of logging operations.

12 EQUIPMENT SAFETY

Best management will	**Provide and maintain all equipment in accordance with international safety standards.** **Train staff in the safe operation of equipment.**

Equipment	Minimum safety standard	Operator safety equipment
Chainsaw operation	• Clearly marked positive on-off switch • Safety throttle catch • Front hand guard incorporating a chain brake • Chain catcher and chain breakage guard • Exhaust system to direct fumes away from the operator • Tool kit for corrective and preventative maintenance **Modifications to chainsaws which reduce their operational safety are not permitted.**	• Safety helmet less than 2 years old conforming to international standards • Eye protection such as goggles or mesh screen • Ear defenders which reduce noise by a minimum of 27dB • Leg protection such as chainsaw chaps • Safety boots with steel toe caps and protective guarding at front vamp and instep • Non-snag outer clothing • First aid kit including a large wound dressing

Equipment for skidding and roading	• Roll Over Protection Structure (ROPS) and Falling Object Protection Structure (FOPS) cab or frame conforming to international standards securely mounted with high tensile nuts and bolts specified in fitting instructions.
	Modifications to ROPS/FOPS are prohibited.
	Damaged ROPS/FOPS must be replaced.
	
	• Securely mounted seat and seat belt conforming to international standards
	• Rear of cab or frame fitted with protective wire mesh
	• Reverse alarms
	• Securely guarded pulleys, shafts, belts and fan blades
	• Positive, non-returning engine stopping device which is
	  • accessible from normal operating position
	  • clearly marked with operating instructions
	• Suitable fire extinguisher firmly fixed and easily retrievable
	• Exhaust system fitted with a spark arrester
	• First aid kit
		• Safety helmet less than 2 years old conforming to international standards
		• Ear defenders which reduce noise by a minimum of 27dB
		• Gloves when handling wire rope
		• Safety boots with steel toe caps

13 EVALUATION OF LOGGING OPERATIONS

Best management will	**Check compliance with the priority areas identified in the Code of Practice.** **Check that the procedures and practices are effective.** **Improve the quality of future planning and implementation of harvesting operations.**

Who evaluates the operations?

- Formal evaluation of operations will be done by staff of the Department of Forests.
- Logging companies may do their own evaluations at any time to check their compliance with requirements and monitor their performance.

When are official evaluations done?

- Forest Officers will evaluate operations at each inspection.
- Maximum time between evaluations is to be 3 months, or on a per logging unit basis. Inspection at 1 month intervals is preferable
- If the evaluation results in a suspension of operations, a further field evaluation will be done to confirm that all the required work is completed to the required standard, before the suspension will be lifted.

How are evaluations done?

- All evaluations will require ground inspection. The Forest Officer is to be accompanied by a representative of the Logging Company and other authorities as appropriate.
- Areas inspected and evaluated will include a representative sample of
  - current logging operations
  - areas completed since the last inspection
  - areas where the company was directed, at the previous inspection, to do further work
- During the inspection all areas of non-compliance with the Code or the logging contract are to be explained to the Company representative.
- The Company representative is requested to sign the evaluation form as a true record of the inspection.

Who sees the evaluation?

- Copies of the evaluation are to be forwarded to
  - Head office of the Department of Forests (via regional offices)
  - Other relevant Government agencies
  - Landowners
  - Company.

13.1 EVALUATION OF HARVESTING OPERATIONS IN NATURAL FOREST IN VANUATU

Evaluation is a process that ensures that harvesting complies with the Logging Contract, the Harvesting Plan and the Vanuatu Code of Logging Practice. Following are examples of forms which may be used in the process.

Periodic Evaluation of Harvesting Operation

Procedure: Assess and score operations as indicated on the evaluation form. If only part of the operation is to be inspected, choose areas randomly. Make sure that the assessment represents all areas of operation.
Attach additional pages of comments if required.

Company.....Area.....Contract No.....

RESULTS OF PREVIOUS INSPECTIONS

DATE	RESULT

MARK FOR THIS INSPECTION

COMMENTS BY THE INSPECTING FOREST OFFICER

Operations HAVE/HAVE NOT improved since the last inspection. The major problems are:

Is major breach action necessary? YES/NO

Signed.....Dated.....

COMMENTS BY LOGGING COMPANY REPRESENTATIVE

Signed.....Dated.....

COMMENTS BY SENIOR FOREST OFFICER

I SUPPORT/DO NOT SUPPORT the action recommended by the inspecting officer because

Signed.....Dated.....

ACTION TAKEN

13.2 FOREST HARVESTING CHECKLIST

Location of logging operation:

Place:.....Landowner's name.....

Island.....Name of Land.....

Company name.....Contract Number.....

Harvesting Plan Prepared by.....Date:...../...../.....

Things to check	Observations and questions to ask	Pre harvest (Yes /No)	During harvest (Yes/No)	Post-harvest (Yes/No)
BOUNDARIES	1.1 Boundaries located according to plan?			
	1.2 Have boundaries been marked in field?			
ROADS	2.1 Are roads located as per plan?			
Check a length of 3 separate sections of roads, of 100 metres each.	2.2 Have they been marked in field?			
	2.3 Are they constructed according to plan?			
	2.4 Is clearing width as per code?			
	2.5 Maximum formation width as per code?			
	2.6 Maximum pavement width as per code?			
	2.7 Roads located at correct/max grade?			
	2.8 Gravel pits constructed as per code?			
	2.9 Do roads have proper drainage?			
LANDINGS	3.1 Are landings located as per plan?			
Select 3 landings And check if they are constructed According to plan, And standards Required by COLP.	3.2 Are they located on an elevated area?			
	3.3 Is it less than 0.1 ha (30m x 30m)?			
	3.4 Located outside exclusion zones?			
	3.5 Located 40m away from buffer zone?			
	3.6 Located in well drained areas?			
	3.7 Occupy less than 1% of logged area?			
	3.8 Constructed according to COLP?			
	3.9 Is debris stored away from drainage?			
	3.10 Has debris been removed or burned?			
	3.11 Have landings been rehabilitated?			
SKID TRACKS	4.1 Are they located as per plan?			
Check and assess 1 major skid track at each of the 3 selected landings.	4.2 Have they been marked in field?			
	4.3 Has soil disturbance been minimised?			
	4.4 Has skidding been uphill where possible			
	4.5 If downhill, is it approved by DoF?			
WATERCOURSE CROSSINGS	5.1 Are crossings located as per plan?			
	5.2 Are crossings at right angles to streams?			
Assess 3 Watercourses. Check others also.	5.3 Watercourse crossings as per COLP?			
	5.4 All temporary crossings been removed?			
	5.5 Has debris been removed from streams?			
TABU SITES	6.1 Are they located as per plan?			
Assess known Sites. Check for other signs.	6.2 If present, are they marked in field?			
	6.3 If present, are they free from damage?			
BUFFER ZONES	7.1 Have they been marked in field?			
	7.2 Are buffer zones still intact?			
FELLING	8.1 Have all trees to be felled been marked?			
Check felling At stump. Check and assess 6 trees.	8.2 Have all felling directions been marked?			
	8.3 Have all trees for retention been marked?			
	8.4 Is felling out & away from buffer zone?			
	8.5 Does felling agree with marked direction?			

Things to check	Observations and questions to ask	Pre harvest (Yes / No)	During harvest (Yes / No)	Post harvest (Yes / No)
STUMPS	9.1 Have all stumps been numbered correctly?			
Check 6 stumps at each of the selected landings.	9.2 Stumps cut immediately above buttress?			
	9.3 If no buttress, is cut 30cm above ground level?			
DAMAGE TO RESIDUAL TREES	10.1 Bulldozer blade damage to: (i) stem?			
Assess damage along selected skid tracks and felling sites.	(ii) buttress?			
	10.2 Felling damage:			
	(i) top off?			
	(ii) branches?			
	10.3 Winching damage to:			
	(i) stem?			
	(ii) buttress?			
SPECIAL CONDITIONS	11.1 Other exclusion zones located as per plan and marked in field?			
Check these things if listed on plan.	11.2 Are gardens located correctly on plan?			
	11.3 All water supply sources located in field?			
	11.4 All fruit/nut trees marked as per agreement?			
	11.5 Have all seed trees been marked?			
LOG REMOVAL	12. Have all logs been removed from:			
Record logs not Removed on 'Tally Sheet'.	(i) permanent road clearing?			
	(ii) forest?			
	(iii) landings?			
FOREIGN MATERIAL	13. Has all rubbish been removed from;			
E.g. tyres, empty Drums wire ropes and other rubbish	(i) landings?			
	(ii) temporary camping sites?			
	(iii) road sides?			
	(iv) forests?			
LANDOWNER REQUIREMENTS	14. Have all landowner requirements in Contract or Harvesting Plan been met?			
BREACHES	15. Have any breach notices been issued?			
REMEDIAL WORKS	16. Have all stabilisation works been completed before machinery leaves coupe?			
COMPLETION	17.1 Do you approve machinery leaving coupe?			
	17.2 Is all harvesting completed?			
	Checklist completed by (name)			
	Position			
	Dates			

If any answer is "NO", write comment on separate sheet:
(Use number from above to assist you, e.g. "*9.1 Bulldozer damage to 20% of trees - needs improvement. Operator warned*").

GLOSSARY

Abutment	End support for bridge or culvert.
Adverse grade	Grade up which a loaded log truck must travel.
Annual plan	Plan of logging for one years operation. It is often a strategic plan.
Back-cut	The final cut involved in felling a tree. The back-cut should be higher than the scarf.
Ballast water	Water loaded into a ship to provide weight when sailing without a cargo.
Batter	Side slope of walls, banks, cuttings.
Berm	Heap of soil associated with the side of a road or skid track.
Biodiversity	The range of species of plants and animals in an ecosystem
Blading off	Use of a grader or bulldozer to sweep loose mud, slush or soil from the road or skid track surface.
Block	A defined sub-unit of the logging area. (see coupe)
Borrow pit	An excavation outside the limits of road construction for obtaining fill used for roadway construction.
Buffer zones	Area of vegetation retained around a sensitive area or site. Logging and disturbance is excluded from these areas.
Butt	The stump end of a log.
Camber	The amount of cross fall on a road.
Canopy gap	A break in the leaf canopy of a forest. Gaps permit light to reach the forest floor. The amount of light is an important factor in forest regeneration, particularly in rainforests. Usually recorded on a percentage scale (0-100% light reaching the ground)
Catchment	The area which yields run-off water to a given point.
Clearfelling	Felling and removal, of all or nearly all commercial trees and the trees in the size classes immediately below the merchantable category which provide the next harvest, from a specific area in one operation.
Conservation Area	Areas protected from harvesting by National or Provincial legislation.
Coralling	Paving of roads using coral material.
Cording	Laying of suitable logs, bark or vegetation on the soil to separate machine tyres or tracks from direct soil contact.
Coupe	A defined sub-unit of the logging area.
Cross cut	Cutting through a felled log.
Cross drain	Drain constructed across a track to divert water to a stable disposal area.

Crown	(i) Leaves and branches which make up the top of the tree. (ii) To shape a landing, road or track so that it is higher in the centre than the outside, allowing water to drain to the sides.
Cultural Area	Area of social, cultural, historical or anthropological importance to indigenous populations. Includes villages, gardens and tambu sites.
Culvert	A channel or conduit carrying water across a road
DABOR	Diameter above buttress over bark.
Directional felling	Felling a tree in a particular direction
DBH	Diameter at breast height.
Designated watercourses	Those required to be marked on logging plans. They include all classes of streams and gullies where vegetation buffers are to be marked and retained.
Drainage lines	Small pathways of water movement located upstream of stream channels, typically carrying no water except during or immediately after periods of rain. They generally have catchments of at least one hectare and exhibit signs of the action of flowing water.
Drilling	Inserting a vertical cut into the stem with a chainsaw to determine the presence of internal defect. Defect is indicated by discoloured sawdust or soft wood.
Endangered	Flora and fauna species in danger of extinction.
End haul	Excavation and removal of spoil to another site along the road. End haul is used where side casting of material is not appropriate.
Enrichment planting	Planting trees within a partial forest canopy to increase the representation of the selected species in the forest.
Environmental sensitivity	Classification of the importance of a particular area of land or forest to degradation. (ie level of sensitivity to disturbance)
Excluded Area	Area which is excluded from logging.
Favourable grade	A downhill road grade which a loaded truck must travel.
Feeder road	A road connecting landings to a main road.
Felling jack	Tool inserted into the back-cut to lever logs in a particular direction during felling.
Forest Authority	Government agency with legal responsibility for the management of timber harvesting.
Forest Officer	Employee of the Forest Authority or other agency authorised, under the relevant legislation, to administer one or more of the forest regulations.
Flume	An open channel or conduit of timber, concrete, metal or flexible material such as plastic to carry water across unstable areas. Located at culvert outlets to prevent erosion.
Flute; fluting	Supporting buttresses at the base of some species.
Formation width	the width of a road, excluding batters.

Guard log	Log along the outside of bridge, above the main stringer logs to prevent gravel from falling from the bridge into a watercourses.
Haul tracks	Tracks linking roads and landings and used for haulage of logs on trucks. May also be called a **Spur Track.**
Head	The top end of a log nearest the branches.
Head wall	A retaining wall at the inlet end of a culvert.
Hung-up tree	A tree which has not completely reached the ground following cutting.
Integral arch	An extension to the winch of a logging tractor which gives lift to one end of the log.
Job plan	Plan provided to operators describing particular jobs such as construction of a particular section of road.
Landing	Area where logs are stored prior to transport to the log pond.
Line planting	Planting of trees in lines through forest or regrowth.
Log cluster	Group of 3 or more logs placed in a triangular fashion to act as a culvert.
Logging arch	See integral arch.
Logging Contract	Legal agreement in a form prescribed under Schedule 2 of the Forestry Orders negotiated between land owners and logging companies for the logging of forests.
Logging debris	Broken logs, branches, vines or other tree material created as a result of felling and skidding.
Logging Supervisor	Company officer responsible for the management of harvesting operations in the field.
Logging unit	See coupe.
Log pond	Main storage area for logs awaiting shipment or processing.
Log scaling	Measurement of logs for purpose of determining volume.
Main road	A permanent or semi-permanent road carrying large volumes of timber.
Operational plan (harvesting)	Plan providing precise details of logging proposals, including location of roads, landings and skid tracks. Operational plans usually cover relatively small areas.
Out-slope	Sloping the surface of a track to shed water to the down hill side.
Outlet wall	Retaining wall placed at the outlet end of a culvert.
Permanent road	A road which will be maintained after logging is finished.
Planning Officer	Company officer responsible for the planning of harvesting operations.
Potential crop trees	Trees which will provide merchantable timber in the future.
Protection Zone	Area of forest excluded from logging.

Ramp	See landing.
Reforest	To establish a tree crop on forest land.
R.I.L	Reduced Impact Logging
Regeneration	Seedlings of tree species.
Run - off (drain)	A short graded channel angled away from the road or skid track to divert water onto undisturbed vegetation
Saddle	A low point on a ridge or spur.
Scarf	The first cut in a tree. Two cuts to remove a wedge are usually made to assist directional felling.
Sediment trap	See silt trap.
Selective harvesting	Felling and removing part of a forest crop.
Set-up	See coupe.
Shoreline	Limit of high tide; limit of mangrove growth
Shoulder	See verge.
Side cast	Pushing material to the side, usually during road or track construction.
Side drain (run - off)	Drain which diverts water from a table drain.
Sight distance	The distance along a road or track that a driver can see other objects (usually other vehicles).
Silt trap	Hole dug to catch sediment in runoff water flowing in drains. Log or rock bars may also be used.
Skid track	Track along which a log is pulled by a tractor.
Skidding	The pulling of logs from the felling point to a landing.
Snig track	See skid track.
Snigging	See skidding.
Spur tracks	See Haul Tracks.
Strategic plan	Plan which provides broad description and broad details of future logging and forest management plans. May be an annual plan or for a longer period.
Stream	Any part of a watercourse which at any time contains running water more than half of one metre in width. (*Forestry Act* definition)
Sullage pit	Hole dug for collection of liquid waste
Susceptibility Class	Land classification of susceptibility to degradation.

Sustainable forest management	The process of managing permanent forest land to achieve one or more clearly specified objectives of management with regard to the production of a continuous flow of desired forest products and services without undue reduction in its inherent values and future productivity and without undue undesirable effects on the physical and social environment. (Definition of the International Tropical Timber Organisation).
Swamps	Surface water present for 6 months of the year.
Table drain	The drain parallel to and at the side of a road.
Tambu	Site of social, cultural, historical, spiritual or archaeological significance.
Temporary crossing	A watercourse crossing which will be removed after logging.
Turn out	See side drain.
Understorey	That part of the forest vegetation growing below the forest canopy.
V-drain	'V' shaped table drain.
Verge	The part of the road construction continuous and flush with the pavement on either side. It is generally only used by passing vehicles but may be used for travel by track machines.
Village	A cluster of five (5) or more dwellings.
Water bar	Drain constructed across a track to divert water to a stable disposal area.
Water body	Surface water area such as a lake, lagoon or ocean.
Watercourses	Defined lines that receive and conduct concentrated overland flow for some period in most years. Flows may be permanent or periodic. Watercourses include streams, gullies and waterways and classes are defined in terms of permanency of flow, bed material, bed width and side slope.
Wedge	A high impact plastic or aluminium wedge driven into the back cut to assist directional felling.
Winch rope	Flexible wire rope used to winch logs towards the skidding tractor.
Wing wall	Side walls provided at a culvert or bridge to retain road fill material.

SLOPE CORRECTION TABLE

Degree °	Percent %	Distance (m)									
		2	4	6	8	10	20	30	40	50	100
1	1.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02
2	3.5	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.03	0.06
3	5.2	0.00	0.01	0.01	0.01	0.01	0.03	0.04	0.05	0.07	0.14
4	7.0	0.00	0.01	0.01	0.02	0.02	0.05	0.07	0.10	0.12	0.24
5	8.7	0.01	0.02	0.02	0.03	0.04	0.08	0.11	0.15	0.19	0.38
6	10.5	0.01	0.02	0.03	0.04	0.05	0.11	0.16	0.22	0.27	0.55
7	12.3	0.01	0.03	0.04	0.06	0.07	0.15	0.22	0.30	0.37	0.75
8	14.1	0.02	0.04	0.06	0.08	0.10	0.19	0.29	0.39	0.49	0.97
9	15.8	0.02	0.05	0.07	0.10	0.12	0.25	0.37	0.49	0.62	1.23
10	17.6	0.03	0.06	0.09	0.12	0.15	0.30	0.46	0.61	0.76	1.52
11	19.4	0.04	0.07	0.11	0.15	0.18	0.37	0.55	0.73	0.92	1.84
12	21.3	0.04	0.09	0.13	0.17	0.22	0.44	0.66	0.87	1.09	2.19
13	23.1	0.05	0.10	0.15	0.21	0.26	0.51	0.77	1.03	1.28	2.56
14	24.9	0.06	0.12	0.18	0.24	0.30	0.59	0.89	1.19	1.49	2.97
15	26.8	0.07	0.14	0.20	0.27	0.34	0.68	1.02	1.36	1.70	3.41
16	28.7	0.08	0.15	0.23	0.31	0.39	0.77	1.16	1.55	1.94	3.87
17	30.6	0.09	0.17	0.26	0.35	0.44	0.87	1.31	1.75	2.18	4.37
18	32.5	0.10	0.20	0.29	0.39	0.49	0.98	1.47	1.96	2.45	4.89
19	34.4	0.11	0.22	0.33	0.44	0.54	1.09	1.63	2.18	2.72	5.45
20	36.4	0.12	0.24	0.36	0.48	0.60	1.21	1.81	2.41	3.02	6.03
21	38.4	0.13	0.27	0.40	0.53	0.66	1.33	1.99	2.66	3.32	6.64
22	40.4	0.15	0.29	0.44	0.58	0.73	1.46	2.18	2.91	3.64	7.28
23	42.4	0.16	0.32	0.48	0.64	0.79	1.59	2.38	3.18	3.97	7.95
24	44.5	0.17	0.35	0.52	0.69	0.86	1.73	2.59	3.46	4.32	8.65
25	46.6	0.19	0.37	0.56	0.75	0.94	1.87	2.81	3.75	4.68	9.37
26	48.8	0.20	0.40	0.61	0.81	1.01	2.02	3.04	4.05	5.06	10.12
27	51.0	0.22	0.44	0.65	0.87	1.09	2.18	3.27	4.36	5.45	10.90
28	53.2	0.23	0.47	0.70	0.94	1.17	2.34	3.51	4.68	5.85	11.71
29	55.4	0.25	0.50	0.75	1.00	1.25	2.51	3.76	5.02	6.27	12.54
30	57.7	0.27	0.54	0.80	1.07	1.34	2.68	4.02	5.36	6.70	13.40
31	60.1	0.29	0.57	0.86	1.14	1.43	2.86	4.28	5.71	7.14	14.28
32	62.5	0.30	0.61	0.91	1.22	1.52	3.04	4.56	6.08	7.60	15.20
33	64.9	0.32	0.65	0.97	1.29	1.61	3.23	4.84	6.45	8.07	16.13
34	67.5	0.34	0.68	1.03	1.37	1.71	3.42	5.13	6.84	8.55	17.10
35	70.0	0.36	0.72	1.09	1.45	1.81	3.62	5.43	7.23	9.04	18.08
36	72.7	0.38	0.76	1.15	1.53	1.91	3.82	5.73	7.64	9.55	19.10
37	75.4	0.40	0.81	1.21	1.61	2.01	4.03	6.04	8.05	10.07	20.14
38	78.1	0.42	0.85	1.27	1.70	2.12	4.24	6.36	8.48	10.60	21.20
39	81.0	0.45	0.89	1.34	1.78	2.23	4.46	6.69	8.91	11.14	22.29
40	83.9	0.47	0.94	1.40	1.87	2.34	4.68	7.02	9.36	11.70	23.40
41	86.9	0.49	0.98	1.47	1.96	2.45	4.91	7.36	9.81	12.26	24.53
42	90.0	0.51	1.03	1.54	2.05	2.57	5.14	7.71	10.27	12.84	25.69
43	93.3	0.54	1.07	1.61	2.15	2.69	5.37	8.06	10.75	13.43	26.86
44	96.6	0.56	1.12	1.68	2.25	2.81	5.61	8.42	11.23	14.03	28.07
45	100.0	0.59	1.17	1.76	2.34	2.93	5.86	8.79	11.72	14.64	29.29

To use this table

If the horizontal distance shown on a map is 20 metres and the slope is 15° or 26.8%, the actual distance to be measured on tne ground is 20m + 0.68m, or 20.68m.

If the horizontal distance shown on the map is 100 metres and the slope is 10° or 17.6%, the actual distance to measured on the ground is 100m + 1.52m, or 101.52m

SCHEDULE 2

(Regulation 5(2))

REPUBLIC OF VANUATU
DEPARTMENT OF FORESTS

APPLICATION FOR A FOREST OPERATOR'S LICENCE

I ..... (name), who was born on ..../...../.....

(day/month/year), of .....

.....(address)

Postal address: (e.g. company address)

.....

.....

wish to apply for a Forest Operator's Licence.

I wish to carry out utilisation operations on .....(island) working for .....(name of company or person with Timber Licence).

I wish to carry out the following operations:

Type of Utilisation **Operation**	**(show with ✓)**
chainsaw operator	
tree felling	
log scaling	
machine operation (skidding and loading)	
road construction and maintenance	
log hauling	
utilisation operations supervision	
mobile sawmilling	

I agree to abide by the Vanuatu Code of Logging Practice and understand that this License may be suspended or cancelled if I do not comply.

Date: ..... Signature of Applicant:

I have received the Vt 5000 fee.

Date: ...../...../..... Signature of Forest Officer: .....

Name of Forest Officer in CAPITAL LETTERS:
.....

SCHEDULE 3

(Regulation 5(4))

REPUBLIC OF VANUATU
DEPARTMENT OF FORESTS

FOREST OPERATOR'S LICENCE

Licence No......

This LICENCE authorises

..... (name), who was born on ..../...../.....

(day/month/year), of .....

..... (address)

to carry out the following types of utilisation operations on

.....

.....island(s) in the Republic of Vanuatu, subject to the conditions indicated.

Type of Utilisation Operation	**Authorised (cross-out option not required)**
chainsaw operator	Yes / No
tree felling	Yes / No
log scaling	Yes / No
machine operation (skidding and loading)	Yes / No
road construction and maintenance	Yes / No
log hauling	Yes / No
utilisation operations supervision	Yes / No
mobile sawmilling	Yes / No

Conditions:

1. Failure to comply with any of the requirements of the Code of Logging Practice may result in the issuing of penalty points, fines and the suspension or cancellation of the licence.
2. The forest operator shall comply with the regulations contained in the Forestry (Code of Logging Practice) Order No. 1998.
3. The forest operator shall notify the Department of Forests if they change either the island on which they are working or the company they are working for.
4. The forest operator shall attend any training programs required by the Director of Forests.
5. The forest operator may be required to demonstrate competence in carrying out his normal operations to the satisfaction of the Director of Forests or his delegated officer.
6. The forest operator shall pay an application fee of Vt 5000 otherwise the licence will not be valid.
7. The issuing Forest Officer may add extra conditions as attachments. Any additional conditions? Yes/No

....

Director of Forests **Departmental Stamp** **Date**

SCHEDULE 4

(Regulation 7(1))

REPUBLIC OF VANUATU
DEPARTMENT OF FORESTS

QUARTERLY RETURN OF FOREST OPERATORS

COMPANY NAME: .....

Names of Forest Operators with current Operator Licence	Forest Operator Licence No.	Working on Island	Type of Forest Operator (show with ✓)							
			Chainsaw no tree felling	Chainsaw tree felling	Log scaling	Machine operator	Road construction or maintenance	Log truck driver	Supervision	Mobile sawmill

Quarterly report for ____ (enter year) (show with ✓)

1	Information as at 31 March	Due 30 April	
2	30 June	Due 31 July	
3	30 Sept.	Due 31 Oct	
4	31 Dec.	Due 31 Jan	

Signature: ..... **Date:** .....
Name of Company Representative in CAPITAL LETTERS: .....

SCHEDULE 5

(Regulations 10(3) 11(2) and 11(3))

REPUBLIC OF VANUATU,
DEPARTMENT OF FORESTS,
FOREST HARVESTING CHECKLIST

Location of logging operation:

Place: ..... Landowner's name: .....

Island: ..... Name of Land: .....

Company name: ..... Contract Number: .....

Harvesting Plan No. ..... Date: (day / month / year) ...../...../.... Prepared by: .....

Things to check	Observations and questions to ask	Pre -harvest	During harvest	Post-harvest
		(Yes /No)	(Yes/No)	(Yes/No)
BOUNDARIES	1.1 Boundaries located according to plan?			
	1.2 Have boundaries been marked in field?			
ROADS	2.1 Are roads located as per plan?			
Check a length of 3 separate sections of roads, of 100 metres each.	2.2 Have they been marked in field?			
	2.3 Are they constructed according to plan?	Not applicable		
	2.4 Is clearing width as per code?	Not applicable		
	2.5 Maximum formation width as per code?	Not applicable		
	2.6 Maximum pavement width as per code?	Not applicable		
	2.7 Roads located at correct/max. grade?			
	2.8 Gravel pits constructed as per code?	Not applicable		
	2.9 Do roads have proper drainage?	Not applicable		
LANDINGS	3.1 Are landings located as per plan?			
Select 3 landings Aand check if they are constructed Aaccording to plan, aAnd standards required by COLP.	3.2 Are they located on an elevated area?			
	3.3 Is it less than 0.1 ha (approx. 30m x 30m)?			
	3.4 Located outside exclusion zones?			
	3.5 Located 30m away from buffer zone?			
	3.6 Located in well drained areas?			
	3.7 Is debris stored away from drainage?	Not applicable		
	3.8 Have landings been rehabilitated?	Not applicable	Not applicable	
SKID TRACKS	4.1 Located and marked in field as per plan?			
Check and assess 1 major skid track at each of the 3 selected landings	4.2 Maximum skid track width is 4 meters?			
	4.3 Has soil disturbance been minimised?	Not applicable		
	4.4 Has skidding been uphill where possible	Not applicable		
	4.5 If downhill, is it approved by DoF?	Not applicable		
	4.6 Are skid tracks properly drained?	Not applicable		
WATERCOURSE CROSSINGS	5.1 Are crossings located as per plan?			
	5.2 Are crossings at right angles to streams?			
Assess 3 watercourses. Check others also.	5.3 Watercourse crossings as per COLP?	Not applicable		
	5.4 All temporary crossings been removed?	Not applicable		
	5.5 Has debris been removed from streams?	Not applicable		
TABU SITES	6.1 Are they located as per plan?			
Assess known sites. Check for other sites.	6.2 If present, are they marked in field?			
	6.3 If present, are they free from damage?	Not applicable		
BUFFER ZONES	7.1 Have they been marked in field?			
	7.2 Are buffer zones still intact?	Not applicable		

Things to check	Observations and questions to ask	Pre harvest (Yes / No)	During harvest (Yes / No)	Post harvest (Yes / No)
FELLING Check felling At stump. Check and assess 6 trees.	8.1 Have all trees to be felled been marked?			
	8.2 Have all felling directions been marked?			
	8.3 Have all trees for retention been marked?			
	8.4 Is felling out & away from buffer zone?	Not applicable		
	8.5 Does felling agree with marked direction?	Not applicable		
STUMPS Check 6 stumps at each of the selected landings.	9.1 Have all stumps been numbered correctly?	Not applicable		
	9.2 Stumps cut immediately above buttress?	Not applicable		
	9.3 If no buttress, is cut 30cm above ground level?	Not applicable		
DAMAGE TO RESIDUAL TREES Assess damage along selected skid tracks and felling sites.	10.1 Bulldozer blade damage to: (i) stem?	Not applicable		
	(ii) buttress?	Not applicable		
	10.2 Felling damage:	Not applicable		
	(i) top off?	Not applicable		
	(ii) branches?	Not applicable		
	10.3 Winching damage to:	Not applicable		
	(i) stem?	Not applicable		
	(ii) buttress?	Not applicable		
SPECIAL CONDITIONS Check these Things if listed on plan. plan.	11.1 Other exclusion zones located as per plan and marked in field?			
	11.2 Are gardens located correctly on plan?			
	11.3 11.3 All water supply sources located and marked in field?			
	11.4 All fruit/nut trees marked as per agreement?			
	11.5 Have all seed trees been marked?			
LOG REMOVAL Record logs not removed on 'Tally Sheet'.	12. Have all logs been removed from:	Not applicable		
	(i) permanent road clearing?	Not applicable		
	(ii) forest?	Not applicable		
	(iii) landings?	Not applicable		
FOREIGN MATERIAL E.g. tyres, empty drums wire ropes and other rubbish	13. Has all rubbish been removed from; (i) landings?	Not applicable		
	(ii) temporary camping sites?	Not applicable		
	(iii) road sides?	Not applicable		
	(iv) forests?	Not applicable		
LANDOWNER REQUIREMENTS	14. Have all landowner requirements in Contract or Harvesting Plan been met?			
BREACHES	15. Have any breach notices been issued?	Not applicable		
REMEDIAL WORKS	16. Have all stabilisation works been completed before machinery leaves coupe?	Not applicable		
COMPLETION	17.1 Do you approve machinery leaving coupe?	Not applicable		
	17.2 Is all harvesting completed?	Not applicable		
	Checklist completed by (signature)			
	Name of Forest Officer in CAPITAL LETTERS			
	Position			
	Dates			

If any answer is "NO", write comments below or on a separate sheet:
(Use number from above to assist you, e.g. "*9.1 Bulldozer damage to 20% of trees - needs improvement. Operator warned*").

SCHEDULE 6

(Regulations 12(2), 13(1) and 13(2))

REPUBLIC OF VANUATU
DEPARTMENT OF FORESTS

MAJOR BREACHES OF THE CODE OF LOGGING PRACTICE

BREACH NUMBER	TYPE OF BREACH	PENALTY POINTS	TIMBER LICENSEE FINE
1	A person or company holding a Timber Licence or a Company Utilisation Operations Supervisor shall not carry out utilisation operations in any area without an approved coupe harvesting plan unless granted an exemption by the Director or delegated Forest Officer.	50	50,000
2	A person shall not carry out any kind of utilisation operations unless he or she holds a valid and unsuspended Forest Operator's Licence.	30	30,000
3	A forest operator shall not construct any road except in accordance with an approved plan and the requirements of the Code of Logging Practice unless granted a specific exemption by the Director or delegated Forest Officer.	20	20,000
4	A forest operator shall not construct a watercourse crossing without prior inspection and approval by a Forest Officer.	5	5,000
5	A forest operator shall not construct a watercourse crossing except in accordance with the requirements of the Code of Logging Practice.	15	15,000
6	A forest operator shall not fell a tree that has been marked for retention or which stands within an area excluded from logging without the prior approval of a Forest Officer.	5	5,000
7	A forest operator shall not operate a machine within excluded areas and their buffer zones except at approved watercourse crossings.	10	10,000
8	A forest operator shall not construct a log landing at any location which has not been approved by a Forest Officer.	5	5,000
9	A forest operator shall not construct a major skid track unless its location has been inspected and marked in the field.	5	5,000
10	A forest operator shall not carry out any kind of utilisation operations in an area where operations have been halted or suspended due to wet weather until the ground conditions permit operation without causing significant damage to soil and water.	10	10,000
11	A forest operator shall not transport any logs on a public road unless the loads are secured by at least two load binding chains.	5	5,000
12	A person or company holding a Timber Licence, or a Company Utilisation Operations Supervisor shall not permit the removal of logging machinery to another logging area unless a Logging Completion Certificate or a Provisional Logging Completion Certificate has been issued by a Forest Officer.	15	15,000
13	A Company Utilisation Operations Supervisor shall not fail to carry out any instruction or remedial works requested by a Forest Officer to remedy any breaches of the Code of Logging Practice.	15	15,000

SCHEDULE 7

(Regulation 13(3))

REPUBLIC OF VANUATU
DEPARTMENT OF FORESTS

NOTICE OF PENALTY POINTS ALLOCATED

To ..... (name) of ..... (address) holder of Forest Operator's Licence numbered: ..... It is alleged that you have committed the following major breaches of the Code of Logging Practice while carrying out utilisation operations at .....(place).

NO.	TYPE OF BREACH	BREACH COMMITTED (show with ✓)	PENALTY POINTS	TIMBER LICENSEE FINE
1	A person or company holding a Timber Licence or a Logging Operations Supervisor shall not carry out utilisation operations in any area without an approved coupe harvesting plan unless granted an exemption by the Director or delegated Forest Officer.		50	50,000
2	A person shall not carry out any kind of utilisation operations unless he or she holds a valid and unsuspended Forest Operator's Licence.		30	30,000
3	A forest operator shall not construct any road except in accordance with an approved plan and the requirements of the Code of Logging Practice unless granted a specific exemption by the Director or delegated Forest Officer.		20	20,000
4	A forest operator shall not construct a watercourse crossing without prior inspection and approval by a Forest Officer.		5	5,000
5	A forest operator shall not construct a watercourse crossing except in accordance with the requirements of the Code of Logging Practice.		15	15,000
6	A forest operator shall not fell a tree that has been marked for retention or which stands within an area excluded from logging without the prior approval of a Forest Officer.		5	5,000
7	A forest operator shall not operate a machine within excluded areas and their buffer zones except at approved watercourse crossings.		10	10,000
8	A forest operator shall not construct a log landing at any location which has not been approved by a Forest Officer.		5	5,000
9	A forest operator shall not construct a major skid track unless its location has been inspected and marked in the field.		5	5,000
10	A forest operator shall not carry out any kind of utilisation operations in an area where operations have been halted or suspended due to wet weather until the ground conditions permit operation without causing damage to soil and water.		10	10,000
11	A forest operator shall not transport any logs on a public road unless the loads are secured by at least two load binding chains.		5	5,000
12	A person or company holding a Timber Licence, or a Company Utilisation Operations Supervisor shall not permit the removal of logging machinery to another logging area unless a Logging Completion Certificate or a Provisional Logging Completion Certificate has been issued by a Forest Officer.		15	15,000
13	A Company Utilisation Operations Supervisor shall not fail to carry out any instruction or remedial works requested by a Forest Officer to remedy any breaches of the Code of Logging Practice.		15	15,000

A total of ..... penalty points have been allocated to the above Forest Operator for these breaches. These penalty points will remain in the register for one year. You currently have a total of ..... penalty points registered against your name. The Timber Licensee must pay the fine within 30 days.

If the Forest Operator or Timber Licensee want to dispute the issuing of these penalty points or fine you must request a review by the Director within 14 days from the date of this notice.

Name of Forest Officer ..... *Date* .....

SCHEDULE 8

(Regulation 15(2))

REPUBLIC OF VANUATU
DEPARTMENT OF FORESTS

SUSPENSION PERIODS OR CANCELLATION FOR FOREST OPERATOR LICENCES

ACCUMULATED PENALTY POINTS	PERIOD OF SUSPENSION
20	One Working Week
30	Two Working Weeks
40	One Month
50	Two Months
60	Six Months
100	One Year
150	Cancellation

SCHEDULE 9

(Regulation 15(3))

REPUBLIC OF VANUATU
DEPARTMENT OF FORESTS

NOTICE OF
SUSPENSION OR CANCELLATION OF FOREST OPERATOR'S LICENCE

To: .....(manager or person holding Timber Licence)
of.....
.....(company name and address)
I have suspended / cancelled the forest operator's licence number.....
which is registered in the name of .....
The period of suspension is from ...../...../..... to ...../...../..... (including both dates).
The licence is suspended / cancelled because over the past 12 months the following penalty points have been allocated for major breaches of the Code of Logging Practice.

Date	Breach Number / type	Penalty Points Allocated
	TOTAL PENALTY POINTS	

You must not allow this person to carry out any utilisation operations under your Timber Licence during this suspension period. If you do the person will be liable to have their licence suspended for a further period or cancelled and you will be guilty of an offence under regulation 15 of the Forestry (Code of Logging Practice) Order.

Suspension of Utilisation Operations (Applicable / Not Applicable)
Because ..... (name) is your nominated Company Utilisation Operations Supervisor for the utilisation operations being conducted by your company at
..... (location) under coupe harvesting plan no. .....
I hereby suspend all utilisation operations in that area
until further notice / until .....(date). *(delete the one not applicable)*

.....
Director of Forests (or delegated Forest Officer)

.....
Date