

REPUBLIC OF FIJI



FIJI FOREST HARVESTING CODE OF PRACTICE

Republic of Fiji

Fiji Forest Harvesting Code of Practice
Second Edition 2013

Ministry of Fisheries & Forests

ACKNOWLEDGEMENTS

This Code was produced by the Ministry of Fisheries & Forests in consultation with stakeholders within the forest sector and with financial and technical assistance from the German Technical Cooperation (formerly GTZ now GIZ) and the Secretariat of the Pacific Community (SPC). The modification of illustrations from the following documents is gratefully acknowledged: Forest Practices Code of Tasmania (2000); Revised Solomon Islands Code of Logging Practice (2002); Code of Practice for Forest Harvesting in Asia-Pacific (1999), Reduced Impact Logging Guidelines for Indonesia (2001), North Carolina Forestry BMP Manual (2006) and the Guidelines for Roads and Watercourse Crossings, Natural Resources, New Brunswick, Canada (2004).

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Fiji Forest Harvesting Code of Practice



Fiji is endowed with extensive forest resources that provide important environmental, social and economic benefits to its people. The wise use of these resources is essential if their multiple values are to be maintained for the benefit of future generations.

Forest harvesting can generate many economic and social benefits. However, poor practices can lead to serious environmental degradation and adverse impacts on regional communities. Fiji has signaled its commitment to conserve and sustainably manage its forests through a number of international and regional conventions. Our National Forest Policy Statement seeks to achieve a thriving forest industry that operates in cooperation with landowners to achieve the sustainable management and utilisation of their forests.

This Code is an important part of our national approach to sustainable forest management. It provides practical guidance to forestry officers, landowners, contractors and the forest industry on how forest harvesting should be conducted so as to achieve best practice and minimise any adverse impacts. It highlights that our harvesting operations must be well planned and supervised and that our forest workers and land owners must have the right skills and knowledge to achieve good practice.

The Code applies to all forest harvesting operations within Fiji. However, the Code by itself will not bring about changes in forest management. It will be the people who are using the Code that will shape the forests for future generations. This is a responsibility that extends to every person in Fiji who has an involvement or an interest in the sustainable management of our forests.

A handwritten signature in black ink, appearing to read 'Inia Seruiratu'.

INIA SERUIRATU
Minister for Agriculture, Fisheries and Forests;
Minister for Rural and Maritime Development
and National Disaster Management

THIS DOCUMENT IS THE PROPERTY OF THE CABINET

CP(2010): 19th Meeting

Date: 26/10/10

CABINET DECISION

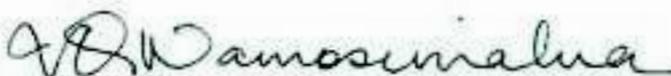
Extract from Minutes of Meeting Held on Tuesday, 26th October, 2010 at 9.00am

374. Fiji Forest Harvesting Code of Practice 2010
- F.641

CP(10)305

Cabinet:

- (i) noted the completion of the review of the Fiji National Code of Logging Practice (FNCOLP) and the extensive consultation undertaken;
- (ii) endorsed the Fiji Forest Harvesting Code of Practice (FFHCOP) 2010 attached as **Appendix I** to the Memorandum;
- (iii) noted the setting up of a Code Implementation Steering Committee;
- (iv) noted the initiative that will be taken to improve the implementation of the FFHCOP; and
- (v) agreed that the FFHCOP be implemented from 1st January 2011.


[V. Namosimalua (Mrs)]
Acting Secretary to the Cabinet

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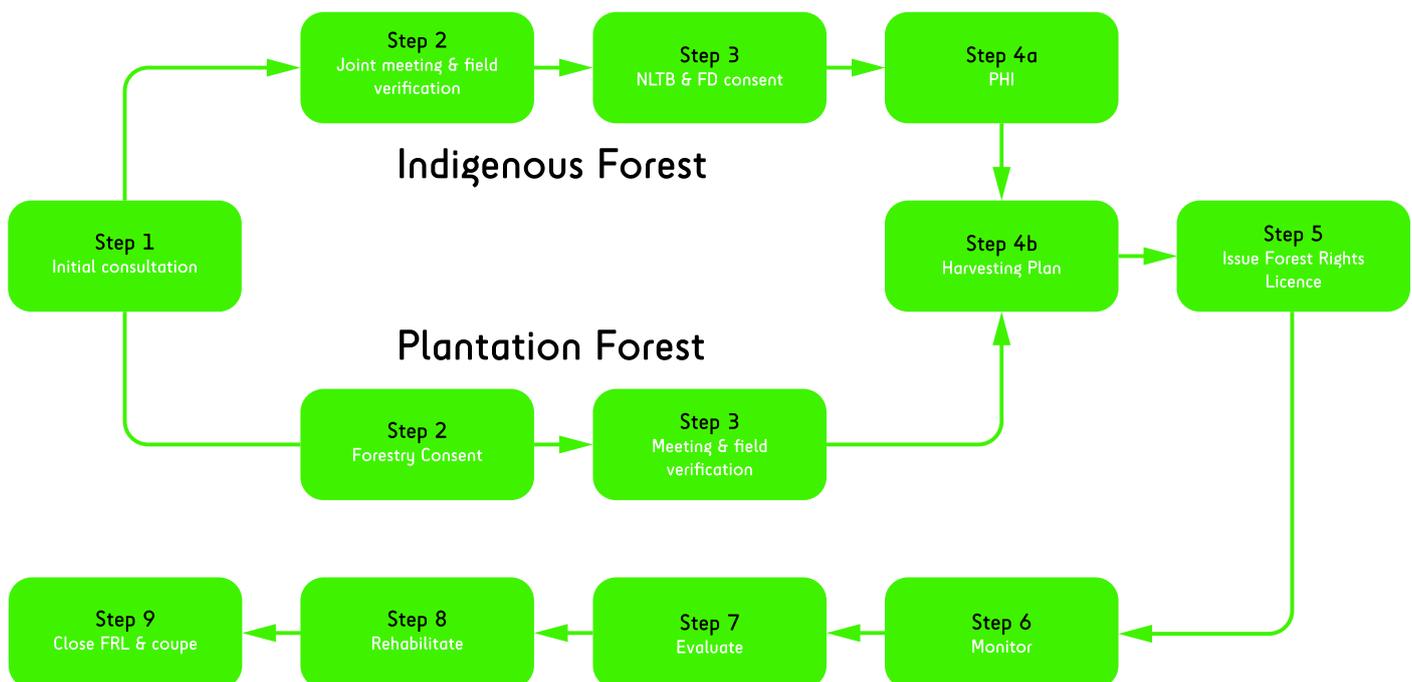
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1 SCOPE

- The Fiji Forest Harvesting Code of Practice (the ‘Code’) shall apply to all harvesting operations in the Republic of Fiji in conjunction with any wood-sales agreement between the owner(s) of wood resources, the buyer(s) and the licensing authority (Forestry Department).
- The Code prescribes desirable practices aimed at protecting the forest environment, its assets and it’s users, while allowing the execution of economically viable operations within acceptable safety standards.
- The provisions of the Code are legally binding on all parties and individuals involved in marking, felling, extracting, loading and hauling wood and wood products from all forests in the Republic of Fiji.
- The Code must be used in conjunction with the Harvesting Licence Procedures issued by the Forestry Department, which lists the processes involved in acquiring a Forest Harvesting Licence (see Figure 1).

Figure 1 – Summary of Harvest Licence procedures



- The Code governs the operational phase of the Harvesting Licence Procedures for both plantations and indigenous forests. All harvesting operations must be licensed and therefore must comply with the relevant provisions of the Code. This includes any harvesting by portable sawmills, fuel wood collectors etc within the area covered by the Harvesting Plan.
- The Code aims to optimise the utilisation of forest resources in an ecologically sustainable manner. All harvesting operations must comply with the utilisation standards prescribed in the Harvesting Licence.

- This Code remains in force until such time that it is replaced by a revised Code. The Forestry Department in consultation with stakeholders will at least every five years undertake a review into the effectiveness of this Code and will recommend any revisions that are necessary to promote the continuing improvement of forest management in Fiji.

2 LEGAL COMPLIANCE

- All forest harvesting operations shall be conducted in accordance with the requirements of (or its successor):
 1. Forest Decree 1992
 2. Fiji Pine Decree 1990
 3. Fiji Mahogany Industry Development Decree 2010
 4. Fiji Mahogany Act 2003
 5. Environment Management Act 2005
 6. Endangered and Protected Species Act 2002
 7. Biosecurity Promulgation 2008
 8. Coconut Industry Development Authority Act 1998
 9. Fijian Affairs Act Cap 120
 10. Land Conservation and Improvement Act Cap 141
 11. Native Land Trust Act. Cap 134
 12. Land Development Act Cap 142
 13. Land Sales Act Cap 137
 14. State Lands Act Cap 132 and
 15. Surveyors Act Cap 260
 16. Property Law Act Cap 130
 17. Land Transport Authority Act 1998
 18. Health and Safety at Work Act 1996
 19. Factories Act Cap 99
 20. National Fire Service Authority Act 1994

3 PRE-OPERATIONAL INSPECTION

3.1 Meeting of Stakeholders

- A meeting of stakeholders must be held to decide the Licence conditions to be adopted. Stakeholders include representatives of the landowner, applicant, iTaukei Land Trust Board, Lands Department (if applicable), nominated harvesting contractor, Provincial Office and the responsible Forest Practices Officer.
- Proposals from the Applicant will be considered with regards to the prospective harvesting contractor, with a view to ensuring that the contractor has the capacity in terms of harvesting equipment and skills to fully comply with the requirements of the Harvesting Plan and the Code.

3.2 Field Inspection

- All relevant stakeholders should inspect the subject area to ensure that environmental, social and commercial factors are fully considered in determining whether harvesting is a viable option.
- Important points to be considered during the field inspection include:
 - > the identification of common boundaries;
 - > the visual assessment of the species composition and volume distribution over the proposed harvesting area;
 - > existing and proposed forest roads, including access points to public roads; terrain conditions, including areas too steep or wet for harvesting; streams and potential crossing points; gravel deposits/quarries; landslides; and protected forests.
- Special attention must be given to areas of biological and archaeological significance. The ultimate aim is to design a mutually acceptable and practical Harvesting Plan.



*Figure 3.2
A pre- operational field inspection must be undertaken to assess any sensitive or culturally significant sites*

3.3 Liaison with Other Organizations

- In situations where major haulage roads serve other possible end uses, the relevant parties should clarify their respective roles and responsibilities for the use, maintenance and repair of the roads. The Forestry Department and the iTaukei Land Trust Board should consider the interests of landowners and the forest industry as well as other road users.
- Relevant authorities such as the Fiji Museum, National Heritage and the Department of Environment should be consulted in relation to areas containing significant natural or cultural values.

4 PRE-HARVEST INVENTORY

- Pre-harvest inventory (PHI) is the responsibility of the licence applicant and should be carried out after the determination of harvest boundaries, buffer strips and other protected areas. Landowners should be involved in PHI where possible.
- PHI for indigenous forests must be carried out in accordance with the guidelines and statistical standards issued by the Forestry Department so as to provide reliable stand information (species composition, basal area, standing volume, log quality) for calculating the allowable harvest volume and information on the regeneration potential of the forest.
- Prior to any harvesting operations, the contractor/ licence applicant shall submit a report containing PHI results and proposals for management requirements to the Forest Practices Officer for approval. The Forest Practices Officer may require other management prescriptions to be included in the Harvesting Plan.

5 SILVICULTURE PRESCRIPTIONS

- In indigenous forests the allowable cut and silvicultural prescriptions shall be determined in advance, using PHI data and the Diameter Limit Table (DLT), in accordance with the guidelines issued by the Forestry Department.
- The basic silviculture prescription is the strict application of the DLT. Rare species, fruit trees, seed trees and other tree species with value for non timber forest products (NTFP) are not eligible for felling.
- Forest owners should be involved in tree selection where possible to incorporate their local knowledge of tree locations and non-timber forest use.
- Selected trees must be marked in advance in the field. The felling direction should be clearly indicated on the marked tree.

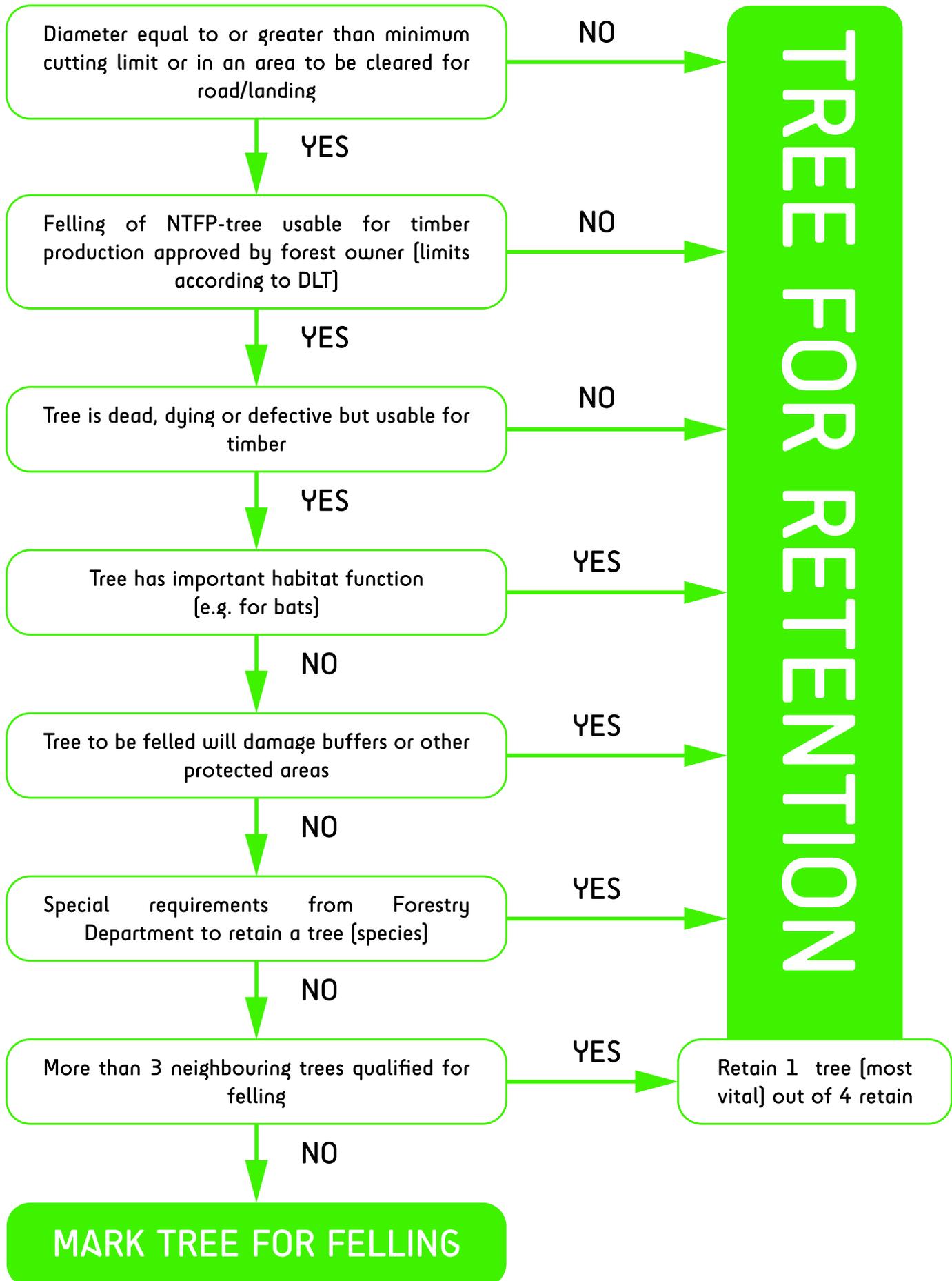
Exceptions from the strict application of the DLT:

1. Where approved by the forest owners, some tree species that have non timber use may be selected for felling according to the limits of the DLT.
2. To avoid excessive canopy openings, where 3 or more adjoining trees are eligible for felling under the DLT, the most vital tree (1 out of 4; regardless of species or diameter) should not be felled but retained for shelter and seed production.
3. Trees eligible for felling according to the DLT but with severe defects resulting in limited timber value should not be felled. Such trees should be retained as seed and habitat trees (e.g. for bats) and for other ecological functions.
4. Trees which lean to an extent that their felling direction cannot be sufficiently controlled, and which would fall into areas excluded from logging should be retained.
5. Where the PHI indicates insufficient or very dense regeneration the cutting limits

of the respective species may be varied within the range of +/- 10 %.

- Further silvicultural prescriptions proposed by the licence applicant or the Forestry Department must be contained within the Harvesting Plan.

Figure 5 – Tree Marking Decision Chart .



6 THE HARVESTING PLAN

6.1 Preparation and Submission of the Harvesting Plan

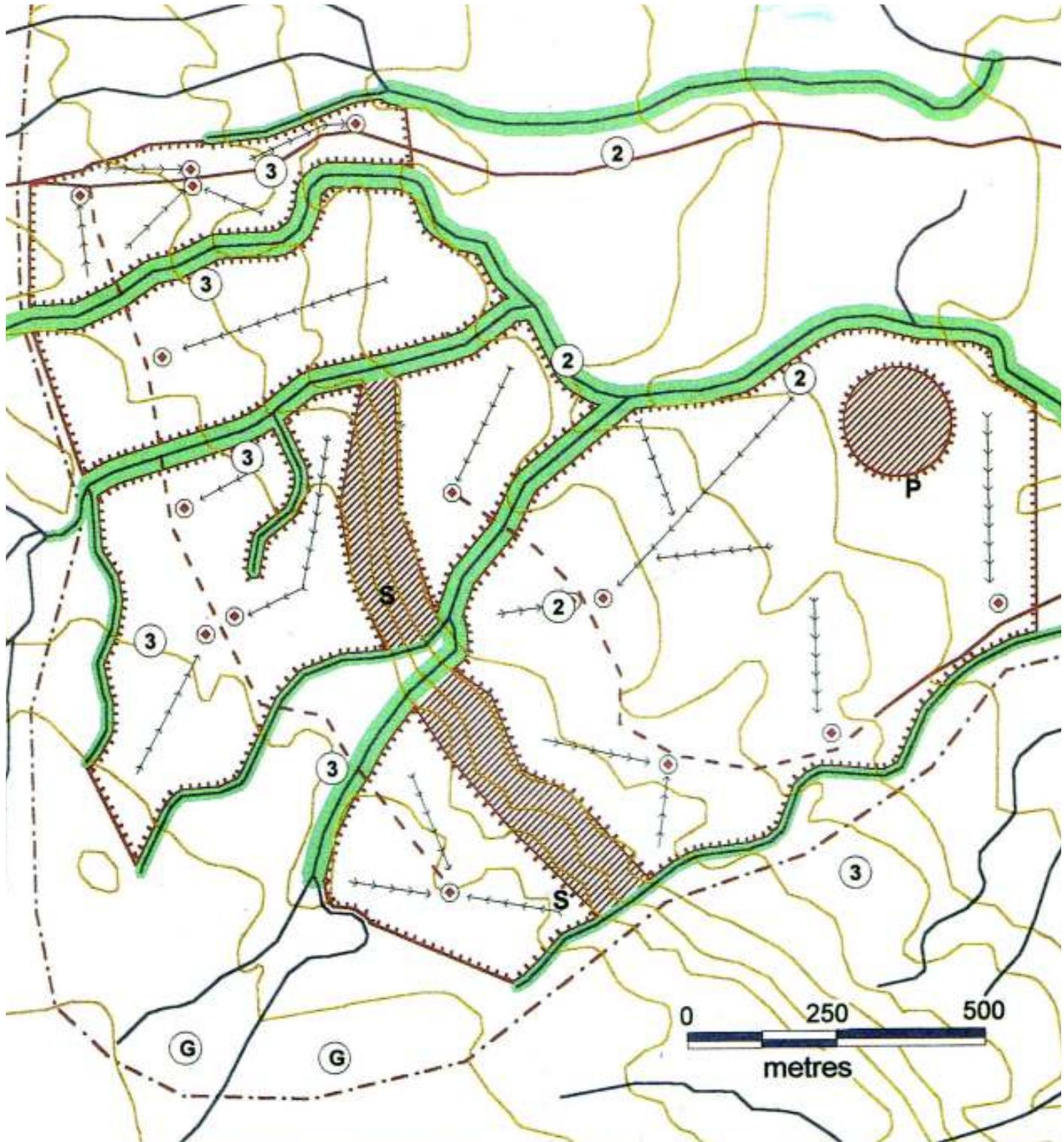
- It is the responsibility of the licence applicant to prepare and submit the Harvesting Plan with relevant documents for the subject area to a Forest Practices Officer for certification.
- A respective Forestry Officer will be available for advice on the preparation of the Harvesting Plan.

6.2 Requirements of the Harvesting Plan

- Coupe planning must be undertaken and the Harvesting Plan submitted to the certifying Forest Practices Officer for approval prior to the commencement of any harvesting operations, including road construction.
- Coupe planning involves gaining good ground knowledge of the coupe/ compartment to be logged to identify the location of the boundary, special management zones, stream crossings, roads and skid tracks and the starting point of the felling operations.
- Coupe size should generally be in the range of 30 to 50 ha and should not exceed 100 ha unless approved by the Forest Practices Officer and good environmental and safety outcomes can be achieved.
- The Harvesting Plan must contain details of the harvest area and the proposed operations, as shown in Table 6.2.1.
- The features identified in the Harvesting Plan must be clearly demarcated and verified by the Forest Practices Officer in the field before harvesting and road construction machinery enter the forest area. Standard colours should be used for maps and field marking, in accordance with Table 6.2.2.
- The Harvesting Plan must be certified by the Forest Practices Officer before the issuance of a Right Licence.
- Where it becomes necessary to make a variation to a Harvesting Plan due to unforeseen circumstances, such variation must be endorsed by all relevant parties and submitted to a Forest Practices Officer for certification. The variation will only be certified where reasonable environmental outcomes can be achieved. Any certified variation must be attached to all copies of the Harvesting Plan.
- All parties must at all times comply with the provisions of a certified Harvesting Plan and all certified variations.

- The Harvesting Plan must be kept bound and up to date, including any certified variations. All relevant documentation must be held in a secure filing system.

Figure 6.2 Example of a Harvesting Plan map



Key N ↑		Forest Owner		20 metre contours
		Harvesting boundary, log landing		Streams and class 1,2,3,G,W
		Watercourse		Major Road
		Steep, Prohibited Area, Farm Plot		Minor Road
				Skid Track and Direction

Map Scale 1: 10,000

Table 6.2.1 Details that must be contained in a Harvesting Plan

1. A contour map of scale 1:10,000 or 5,000 showing the following features:
 - The licence area boundary
 - The boundary of the harvesting coupe[s]/compartment
 - Buffer zones along designated streams, special management zones such as protection forests, catchments areas, reserves, historic and archaeological sites, etc.; any underground and overhead lines such as water, sewerage, electricity, and telecommunications
 - Locations of stream crossings
 - Haulage roads
 - Major arterial skid tracks
 - Loading locations or landings
 - Any other features required to be shown in accordance with an agreement between the resource owners and the harvesting contractor or conditions of the proposed licence
2. The method of harvesting extraction, loading and haulage in coupes/units/ compartments.
3. The location of communities or indigenous populations that could be affected by harvesting or the transportation system associated with the harvesting operation. The Harvest Plan should identify the consultation that has occurred and the measures that will be taken to mitigate any adverse impacts.
4. Location and prescriptions relating to the camp [living] sites for loggers
5. An inventory of the following:
 - a. Indigenous forest – volume and species to be removed from each coupe
 - b. Plantation forest – volume to be removed from each compartment.

Note: Separate maps showing trees marked for removal and felling direction should be prepared at a scale of 1:2,000 or 1:5,000.

Table 6.2.2 – Standard colours for the marking of features in a Harvesting Plan

Feature	Map colour	Field colour
Licence area boundary	Red line 	Red 
Harvesting coupe/compartment boundary	Red broken line 	Red X 
Mataqali	Orange line 	Orange 
Buffers zones	Blue line 	Blue 
Location of stream crossings	Blue 	Blue X 
Haulage roads [metalled]	Double Brown lines 	Double Yellow 
Haulage roads [non-metalled]	Brown line 	Yellow 
Major arterial skid tracks	Brown broken line with arrows 	Yellow X 
Loading locations or landings	Brown box 	Yellow Rectangle 
Trees marked for removal	Numbered circle 	Slash 

7 TRAINING AND ACCREDITATION

- All landowners and contractors who undertake harvesting activities under the Harvesting Plan must successfully have completed a training course approved by the Department of Forests.
- Powered harvesting equipment shall be operated only by personnel trained and certified for that specific equipment.
- All untrained harvesting workers shall attend a relevant training course (listed in Annex 3) and undertake to sit a skills test conducted by the Department of Forests to attain a Certificate of Competency.
- All harvesting supervisors shall attend the approved training courses (listed in Annex 3) conducted by the Department of Forests and attain a Harvesting Supervisor Certificate.
- Qualification requirements for chainsaw and harvesting machine operators are given in Table 7.

Table 7- Qualification requirements for chainsaw and harvesting machine operators

<p>Chainsaw operators</p>	<ul style="list-style-type: none"> • A valid Competency Identity Card provided by the Forestry Training Centre. The Competency Identity Card must be produced on demand. • All chainsaw operators who have not been involved in the forest industry for a period of two (2) consecutive years will be required to undergo the required skills test offered by the Forestry Training Centre.
<p>Harvesting machine operators</p>	<ul style="list-style-type: none"> • A valid Competency Identity Card provided by the Forestry Training Centre. The Competency Identity Card must be produced on demand. • All harvesting machine operators who have not been involved in the forest industry for a period of two (2) consecutive years will be required to undergo the required skills test offered by the Forestry Training Centre. • All harvesting machine operators must work in compliance with current Lands Transport Authority (LTA) regulations. • A valid LTA Operator’s Licence for the relevant machine must be produced on demand.

8 WEATHER RESTRICTIONS

- It is the responsibility of all operators to cease work when adverse weather conditions are likely to cause an increased risk of personal injury or damage to the environment.
- Guidelines for stopping and starting work according to weather are provided in Table 8.
- Additional restrictions may be placed on harvesting operations at the discretion of a Forest Practices Officer in consultation with the licensee.

Table 8 - Guidelines for stopping and starting operations according to weather

Operation	Stop when	Start when
Felling	<p>Wind prevents accurate directional felling</p> <p>Ground conditions are too slippery to allow the chainsaw operator to move safely</p>	<p>Wind drops and accurate directional felling is possible</p> <p>The ground dries to allow the operator to move without slipping</p>
Skidding or road construction	Water is seen flowing on any length of skid track or road	<p>Water has stopped flowing and the soil is no longer saturated. This can be seen as the soil surface becomes solid enough to operate on without causing rutting.</p> <p>Note:</p> <ul style="list-style-type: none"> • skid tracks must not be bladed off • New skid tracks must not be opened up to by-pass an old skid track • Rutting must not exceed 30cm below the original ground surface.
Landings	Water starts to pond on the surface of the landing	The soil is no longer saturated. This can be seen as the soil surface becomes solid enough to operate on without causing rutting.
Haulage of logs	<p>Trucks cannot move unassisted along the road because of slippery conditions; or</p> <p>Muddy water is running in wheel ruts which are more than 10cm below the road surface for a distance greater than 50 m.</p>	<p>The surface dries and trucks can move without assistance along the road and water is no longer running in wheel ruts.</p> <p>Note: Other machines must not be used to move trucks.</p>

9 BUFFER STRIPS

- Buffer strips are required for the protection of designated streams and may also be applied to protect special management zones such as protection forests, catchment areas, reserves, historic and archaeological sites and infrastructure for water, sewage, electricity, and telecommunications.
- Buffer strips should be marked in the field and on the Harvesting Plan.

- Buffer strips must remain undisturbed except at approved crossing points where clearing widths should be minimised.
- The minimum widths of buffers are given in Table 9. The widths specified are horizontal distances and must be applied to both sides of the streams. A Forest Practices Officer may prescribe wider buffer widths in a Harvesting Plan where necessary to protect sensitive streams or catchments.
- The following protection applies to buffers-
 - > Trees must not be felled in buffers (except in plantations where planted trees may be harvested providing that debris does not enter streams and disturbance to indigenous trees and understorey is minimised).
 - > Trees in forest adjacent to buffers must be directionally felled or retained where necessary to avoid damage to buffers.
 - > Machines must not enter any buffer or stream (except at approved crossing points). Skid tracks should be kept at least 40 m away from streams except at approved crossing points.
 - > Tree crowns are not to be felled into streams. Debris increases water turbulence resulting in erosion and increased turbidity, which adversely affects water quality and stream biodiversity. Any debris in streams is therefore to be removed immediately, whilst ensuring that machines do not enter the buffer.
 - > Floating of logs along rivers/large streams can be carried out only with the written consent of a Forest Practices Officer.

Table 9: Minimum buffer widths for streams (metres)

Width and type of stream ¹		Buffer strip width ²	Restrictions
20 m		30 m	• No felling or machine entry
10-20 m		20 m	• No felling or machine entry
0 to 10 m	1. perennial streams	10 m	• No felling or machine entry
	2. intermittent streams (no flow during the dry season)	10m	• Selective felling permitted • No machine entry • Avoid disturbance to understorey • Remove any debris from stream
Streams in plantations		10 m	• Felling of planted trees only is permitted • No machine entry • Avoid disturbance to understorey • Remove any debris from stream

¹The width of stream from bank to bank during normal flush seasonal flow

²Horizontal distance measured from the stream bank to the edge of the buffer

10 ROAD ACCESS

10.1 Road Location, Clearing and Construction

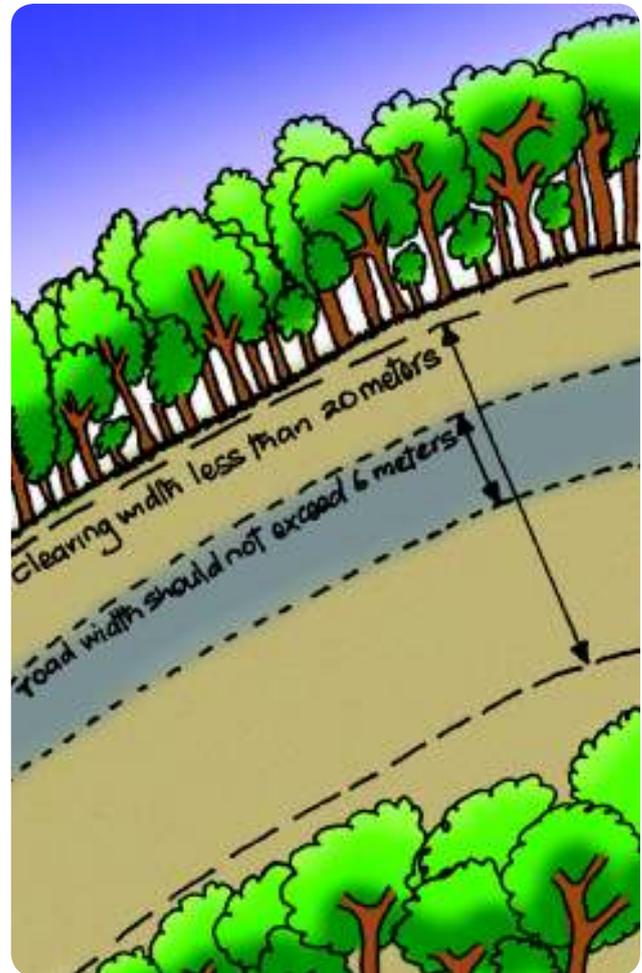
- Construction of haulage roads must be confined to the road alignment shown in the Harvesting Plan.
- Any deviations/alterations to the road alignment must be covered by a certified variation to the Harvesting Plan (see section 6.2) prior to construction.
- The width of major haulage roads should not exceed 5.5 to 6m and minor roads 3.7 to 4.5m. The road clearing width should be minimised and should not exceed 20 metres (including width of road) for major haulage roads or 15 metres for minor haulage roads unless approved by a Forest Practices Officer where necessary for safety reasons and to enhance the drying of constructed road surfaces.
- All road construction, maintenance and drainage works must be conducted during dry weather.
- During construction, all trees within the road line must be directionally felled in a manner that minimizes damage to the residual stand and promotes full utilisation of the felled trees and proper disposal of the slash.
- Roads should be located on or along ridge tops or on moderate side slopes wherever possible. The alignment should be designed to-
 - > minimise the earthworks
 - > ensure good drainage
 - > minimise the proximity of roads to streams and minimise the number of stream crossings.
- Roads should be at least 20 metres from the edge of the closest stream buffer zone and care must be taken to prevent any side-cast material from entering the stream buffer.
- Roads should be constructed and compacted well in advance of proposed haulage operations to allow the road to dry out and 'bed-in' before heavy use.
- All surface formation and maintenance for Category A roads must be undertaken with a grader.

10.2 Road Grades and Cambers

- Road grades should generally be 8° (14%) or less, although sections steeper than 8° may be approved by a Forest Practices Officer in order to reduce overall construction lengths or reduce earthworks, provided that adequate drainage can be installed (see section 10.6 - Road Drainage).

- Camber and super-elevation of the road surface should be properly formed to allow for water runoff.

Figure 10.1 :
Clearing beyond the width of the road formation should be minimised and should be done by manual felling and by avoiding the blading of soil where possible.



10.3 Box and Side Cuts

- Box cuts must be avoided wherever possible and may only be constructed in short sections where adequate road drainage can be achieved. Box and side cuts deeper than 2 metres must be shown on the Harvesting Plan.
- Side cut roads should generally not be located on slopes greater than 30° (58%) on stable soil types or 25° (46%) on unstable soils. Any side cuts on slopes above these limits should be very carefully considered and shown on the Harvesting Plan.
- Wherever side cutting is necessary, the roadway width must be kept on solid ground (i.e. on the cut section and not on any part of the fill section).
- Grass or reeds must be planted on cuts and fills soon after construction to minimise erosion and to stabilise the road formation.

10.4 Batters and Benches

- Benches must be constructed to avoid erosion or batter slumping where batters (either cut or fill) are in excess of 3 metres.
- All benches when formed should be graded back against the cut edge.
- To minimise erosion, vegetation should be retained at the top of cut batters

- and at the toe of fill batters and shrubs/grass/reeds planted on benches.
- The edges of all cut batters should be levelled back wherever possible.

Figure 10.4: Construction of benches to improve sight distance and the stability of road batters.



10.5 Road Visibility

- Visibility is the minimum distance ahead, which a driver should be able to see in his/her own traffic lane. All vehicles using the forest roads should have their headlights on if visibility is poor.
- At road intersections, a minimum visibility of 30 metres along all roads shall be maintained where practicable.
- Road intersections, wherever possible, should always be at right angles or as near as feasible, even though it may be necessary to introduce a curve prior to the intersection to achieve it.
- All curves should be kept at the maximum possible radius achievable, circular in shape and with minimum super-elevation.
- Wherever feasible and particularly where successive tight curves are in opposite directions, intermediate stretches should be reasonably straight and for a distance of at least 20 metres.
- On tight curves, where visibility standards cannot be adhered to, extra widening of the curves should be applied wherever possible.

10.6 Road Drainage

- Proper drainage is essential for the maintenance of all harvesting roads and tracks.
- All roads and tracks must be adequately drained to minimise erosion and to avoid the movement of sediment into streams.
- Cross drains and turnout drains should be constructed at regular intervals as required to reduce surface flow, particularly in steep country where frequent diversions are necessary to reduce the volume and velocity of run-off.
- Roads should have adequate camber and side drains (V drains) to direct water off the road surface towards dispersal points.
- Drainage on roads approaching a watercourse should be prevented from entering the watercourse by diverting it through cross drains or turnouts into the adjacent vegetation as close as possible to the watercourse while maintaining an effective filter strip (one which ideally allows a minimum of 30 m of drainage over vegetated ground before entering the watercourse).
- Silt traps should be used where necessary to prevent sediment entering streams.
- Except for the initial stage of road construction and drainage, machine blades must not be used to remove road surface material. This does not include minor repair work or that which will not further excavate the road. Any fill must be deposited in locations that avoid the entry of sediment into streams.
- The use of hydraulic excavators is encouraged on steep or erodible slopes.

Figure 10.6.1:

Use turnout drains or culverts to divert runoff into vegetation and away from streams.

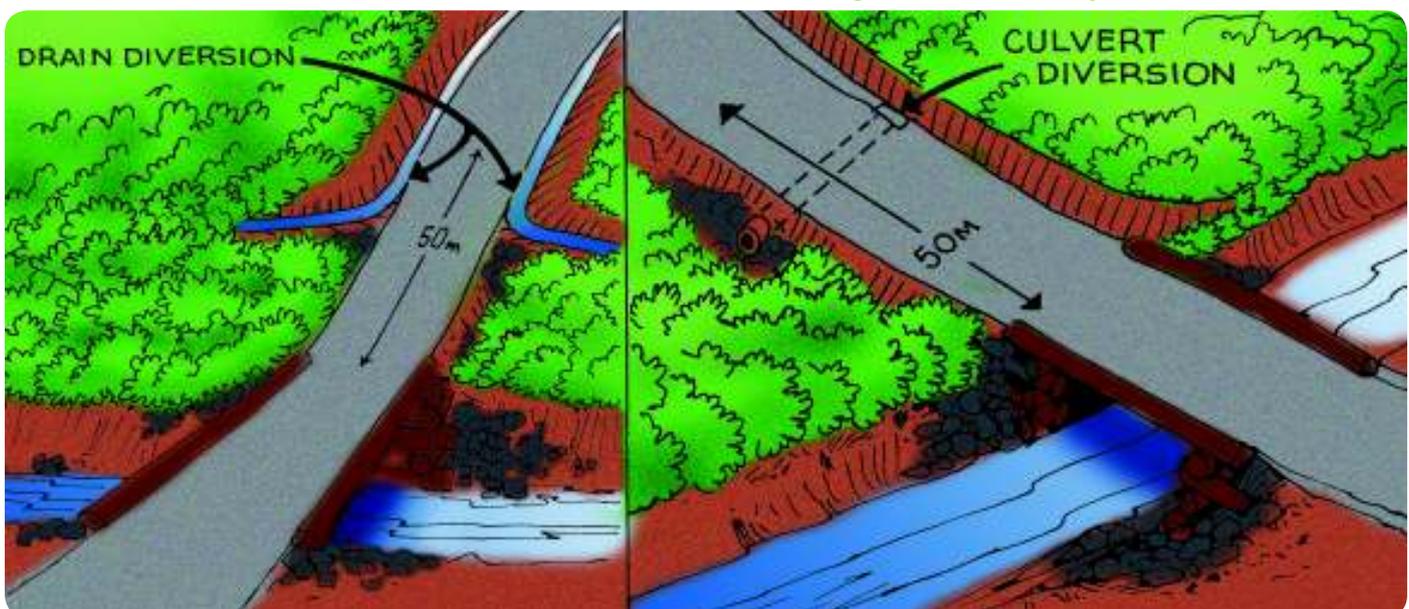
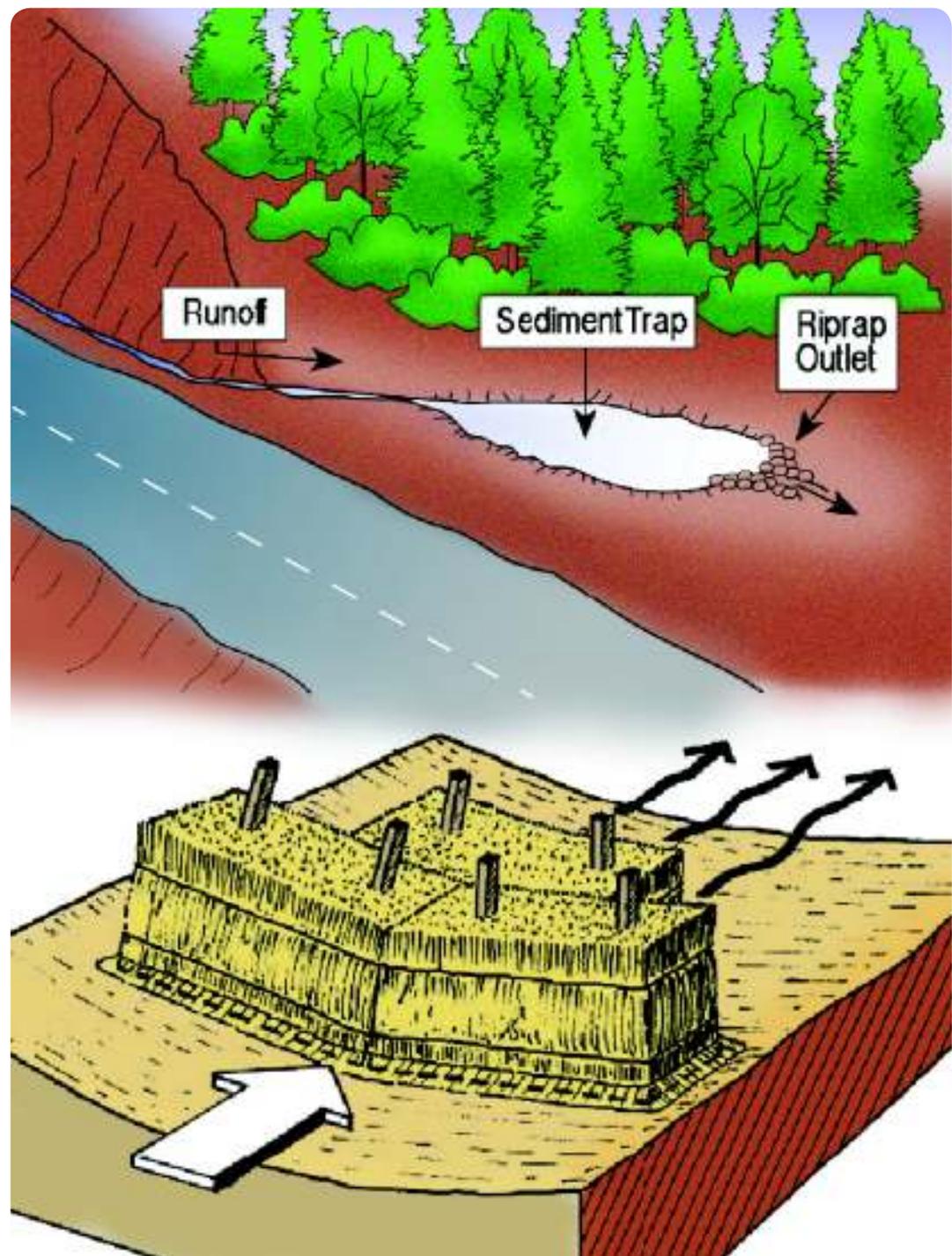


Table 10.6: Maximum spacing between cross-drains for roads

Gradient of road	Maximum distance between drains [metres]	
	Low erodibility soils	High erodibility soils
0 – 9° [0 – 16%]	150	40
>9° [>20%]	50	30

Note: drains should also be installed at major changes of slope and within 50 metres of watercourse crossings.

Figure 10.6.2: Silt traps can be constructed as sediment ditches (above) or barriers made of straw or other vegetation (below) to filter runoff from roads.



10.7 Stream Crossings

- Stream crossings are potentially the most hazardous sources of stream sediment.
- The number of crossings should be minimized.
- Crossings should be carefully located to minimise disturbance to stream banks.



- All crossing locations and types should be shown on the Harvesting Plan.

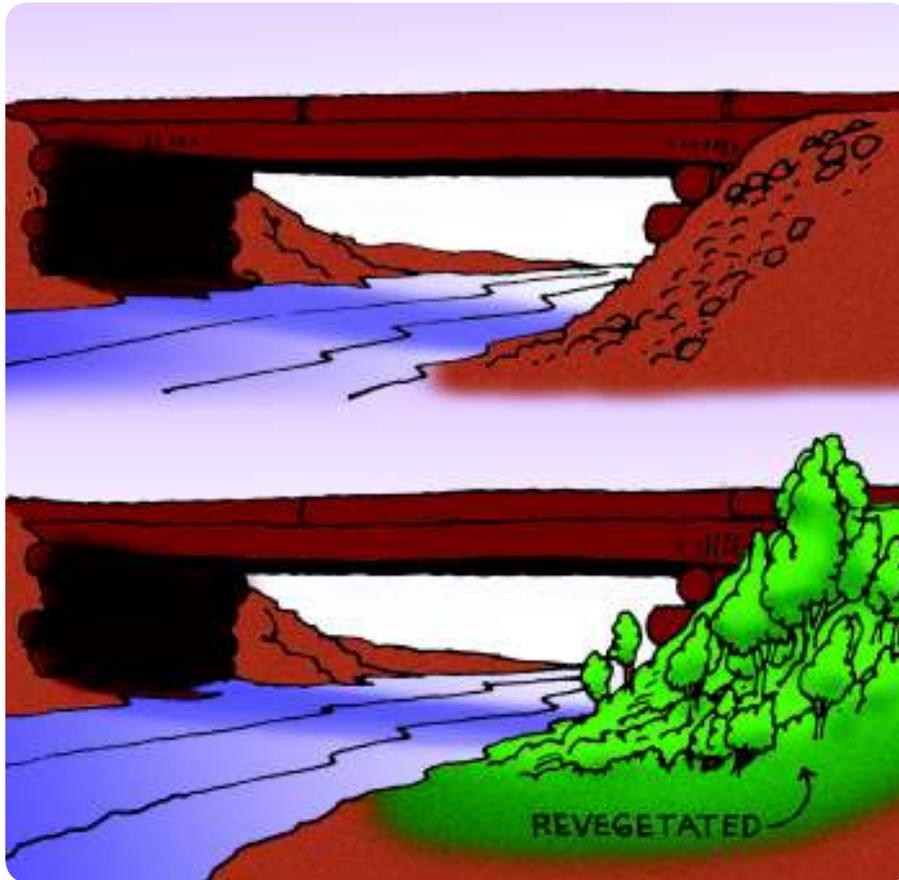
Figure 10.7.1:
Roads should be located to avoid steep side cuts and approach stream crossings at right angles where possible.

10.7.1 Permanent Crossings

- Bridges must be constructed to allow for free flow of water underneath during normal (1 in 20 year) flood events.
- Construction and maintenance activities must be planned and conducted so as to minimise the risk of sediment entering streams.
- Where possible, crossings of designated streams should be located at right angles where stream channels are straight and have well defined stream banks
- Approaches to a bridge should be of straight alignment with level gradient for a minimum distance of 15 metres either side wherever possible.
- Large rocks, sandbags or logs must be placed on the upstream side of the foundation to reduce erosion. All fill must be similarly stabilised or re-vegetated to minimise slumping and erosion.
- Where earth and gravel is used for paving bridges, kerbs should be installed to contain such material.
- Culverts with adequate fill may be used on small streams where peak flows are not extreme. The culvert size must be designed to cope with catchment

flow and should be no less than 300mm diameter.

- Where the road is constructed using the 'cut and fill' method, culverts should not discharge over fill material unless flumes or non-erosive materials are used below the outlet to prevent erosion.
- The use of hydraulic excavators is encouraged during the construction of bridges, permanent crossings and culverts to avoid soil erosion and the collapse of the stream banks.



*Figure 10.7.2:
Bridge embankments
should be protected
and stabilised with
vegetation or heavy
duty materials such as
rock or logs*

10.7.2 Temporary Crossings

- Approaches to temporary crossings should be adequately drained to prevent runoff flowing directly into the stream (see Figure 14.2).
- Crossings should be located on sites with stable streambed material and where bank restoration will be possible.
- Construction activities should be timed to coincide with dry weather and low stream flows.
- Ford crossings should only be constructed over stable gravel material.
- Log crossings must be constructed as a temporary log bridge allowing free flow of water.
- Log clusters with soil fill are not permitted as crossings.

- Temporary crossings must be removed to allow unimpeded stream flow as soon as operations over the crossing are completed or before the wet season if operations are not completed. The streambed and banks must be restored as near as possible to its natural condition.

10.8 Road Metalling

- The ultimate aim of metalling is to provide a durable, all weather surface which will provide an acceptable level of travelling comfort and safety and have sufficient inherent strength to withstand expected loads and weather conditions.
- Before any metalling is carried out adequate grading of the road must be undertaken to ensure that:
 - > the prescribed construction widths and drainage systems are maintained;
 - > a suitable and even surface is formed to accommodate the metal;
 - > the camber and super-elevation (if required) are formed correctly.
- Metalling is generally not warranted for Category B roads. However, consideration should be given to the metalling of sections where necessary because of steep gradients, erodible soils or other values.

10.9 Public Access – Government Roads

- Any construction from or on to a public road must be approved by the Divisional Engineer, Fiji Roads Authority.
- Harvesting activities from within the Road Reserve should have prior approval of the Divisional Engineer, and any condition set by the Divisional Engineer must be incorporated into the Harvesting Plan and adhered to.
- Road haulage vehicles used to transport forest produce; heavy plant, and road construction material shall comply with all regulations prescribed under the Land Transport Authority. All loads must be safely secured with approved load binders to avoid any movement in transit. Load and vehicle limits must not be exceeded unless the necessary approvals have been obtained from the Land Transport Authority.
- The logger and/or cartage contractor shall erect approved temporary signs where log haulage vehicles enter onto public roads and provide warnings of any potential safety hazards. The logger/cartage contractor shall provide additional traffic control in high hazard situations.

10.10 Road Closure

- Roads may be closed to haulage vehicles when in the opinion of the Forest Practices Officer damage to the road formation or its structures may occur.

- The Forest Practices Officer should consult the licensee and harvesting contractor prior to giving notice of road closures.
- The logger and cartage contractor must take reasonable precautions to avoid causing damage to the road infrastructure and must cease haulage before major damage occurs (see Section 8 – weather restrictions).
- Roads shall be kept open to essential traffic during the course of harvesting operations.

10.11 Road Maintenance & Repair

- During harvesting and haulage operations, the licensee and harvesting contractor(s) will be responsible for the maintenance and repair of roads and associated infrastructure, including bridges and signs.
- Road edges, drains and silt traps must be cleared of harvesting debris and maintained in good working order at all times during operations.
- Road metal should be routinely maintained during the course of heavy traffic usage and log loading to prevent road deterioration.



Figure 10.11:
Control roadside vegetation only to the extent necessary to keep the road surface dry, to permit good visibility and for weed and fire control purposes. Soil disturbance on batters should be avoided.

11 FELLING OPERATION

- Felling should not occur where average slopes exceed 25° over a distance of 100 metres or more unless approved by a Forest Practices Officer and measures are taken to avoid erosion and environmental harm.
- The Harvesting Contractor(s) will provide all persons in the field with Personal Protective Equipment (PPE) as listed in Annex 2. All persons must wear the relevant PPE at all times whilst undertaking harvesting activities.
- Chainsaw operators must work in pairs not closer than 2 tree lengths apart but close enough to call for assistance or notice in case of an accident. All other persons must remain at a safe distance of at least two tree lengths. Greater distances should be allowed on slopes where felled trees may slide downhill.
- Tree driving is not permitted under any circumstances.

11.1 Job Organisation – Preparing to Fell

- ‘Morning briefings’ between supervisors, machine operators and fellers must be held to review safety issues and the day’s operations.
- ‘Weekly briefings’ should be held between supervisors, the Forest Practices Officer and the licensee to review safety and operational issues.
- Trees should always be directionally felled in a manner that minimises any potential safety hazards or damage to the remaining stand. Factors to be considered include:
 - > Suitable gaps in the canopy and intended skidding direction
 - > the lean of the tree and the direction and strength of the wind
 - > any obstacles in the way of the tree’s fall and escapes routes.
- Back-pulling is strictly prohibited

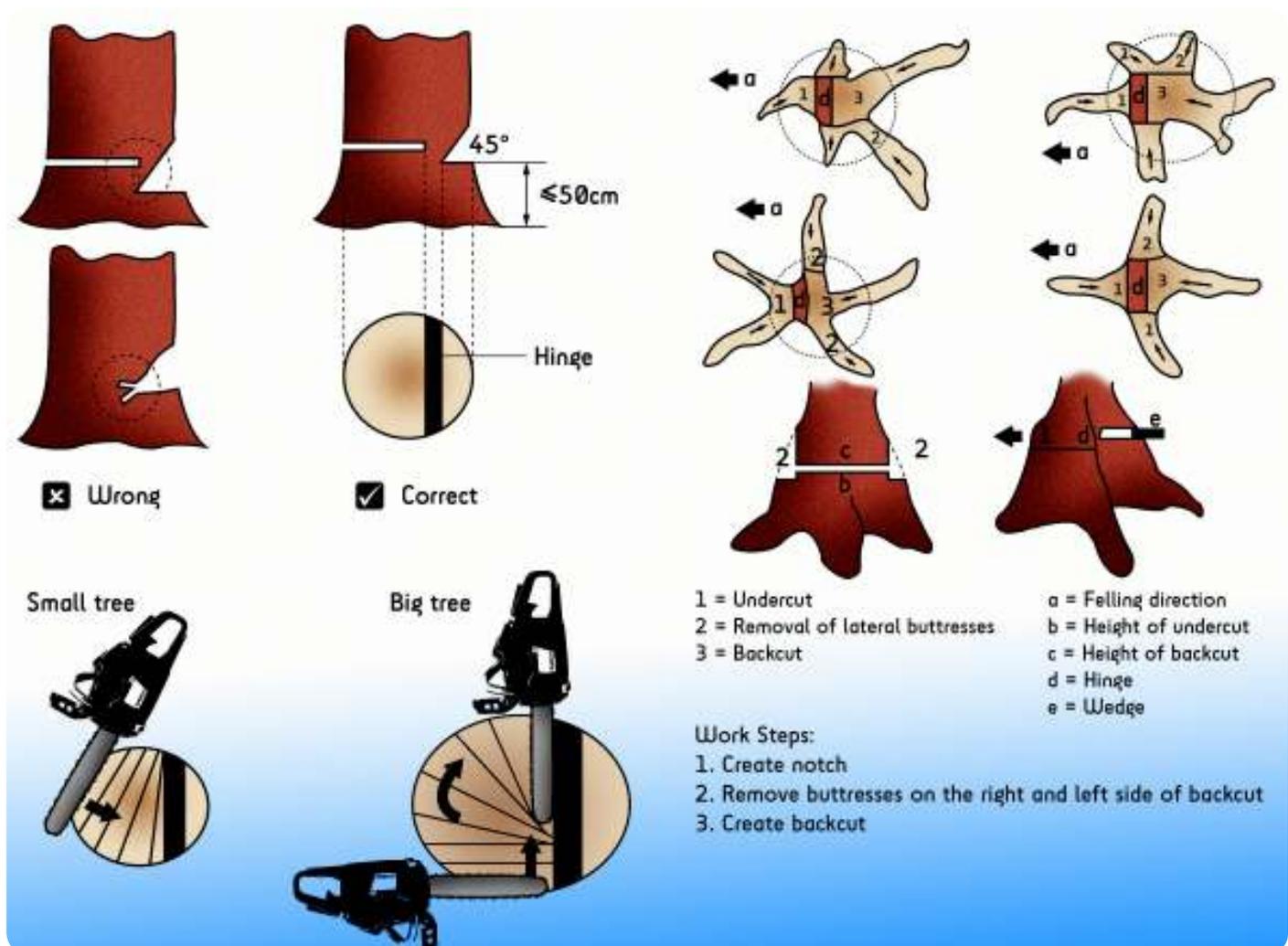
Figure 11.1: Directional felling away from buffers and retained trees



11.2 Preparing to fell at Roadside

- Suitable signboards and precautions must be taken to warn oncoming traffic when trees are being felled within 2 tree lengths from a road or greater on sloping land where felled trees may slide downhill.
- Any underground and overhead lines such as water, sewage, electricity, and telephone must be accurately identified, the relevant authority notified and the required buffers marked on the ground before felling commences. Appropriate care must be taken to avoid any damage to the utility lines.
- Where an overhead electricity line passes through a harvesting area, it must be suitably marked and felling must not take place within this area without prior consultation with Fiji Electricity Authority (FEA).

Figure 11.2: Directional felling techniques



11.3 Stump Height

- Stump height should be as low as practicable (less than 30 cm on the uphill side) to maximize merchantable volume.
- Stump height greater than 30cm is acceptable where butt defect is obvious or if a buttress exists. Trees may be cut immediately above the buttress but below shoulder height.
- For pine plantations, the stump height should be as low as practicable (less than 15 cm) to maximize merchantable volume providing that appropriate health and safety requirements are met.

11.4 Partially Cut Trees and Hung Up Trees

- Trees must not be partially cut and left standing.
- Where a tree is 'hung up' it must be brought to the ground as soon as possible.
- Trees not marked for felling that have been damaged and become dangerous as a result of felling or skidding operations must be felled as soon as possible and the Forest Practices Officer must be notified.
- Where trees cannot be safely taken down manually, a machine with winch must be used. When winching, the distance from the tree to the machine must be at least one and a half times the height of the tree.
- The chainsaw operator and all other persons must remain as far away as possible until the tree is safely on the ground and winching has ceased.



*Figure 11.4:
Machines should maintain a distance of at least 1.5 x the tree length when removing hung up trees*

11.5 Salvaging of Windblown Trees

- Windblown trees may be harvested where approved by a Forest Practices Officer in accordance with the Guidelines on the Management of Cyclone Damage to Forests and Trees in South Pacific Island Countries. Major salvage operations should be covered by a Harvesting Plan or by a certified variation to an existing Harvesting Plan.

12 SKID TRACKS

12.1 Planning of Skid Tracks

- Skid tracks must be planned to:
 - > Minimize the area covered by skid tracks, reduce skid track grades and avoid box cuts and excessive side cuts.
 - > Maximise the volume of logs that can be skidded safely and efficiently.
 - > Eliminate unnecessary stand damage by the skidding machine.
 - > Provide winch-line paths to logs. This will eliminate the necessity for the machine to approach every log and thereby reduce stand damage.
- Major skid tracks must be shown on the Harvesting Plan and marked in the forest prior to the commencement of harvesting.

12.2 Skid Track Location & Clearing

- Skid track location will be influenced by factors such as topography, required drainage, volume available, log size and harvesting equipment available.
- Locations requiring side cuts should be minimised. On steep land the tracks should be contoured and tracks must not be less than 60 metres apart.
- Skid tracks should be planned to provide uphill skidding to landings wherever possible. Where downhill skidding is necessary, skid tracks and haulage roads should be carefully located and drained to ensure that run-off is diverted before it enters the landing.
- Major access tracks should be located and constructed prior to the commencement of the felling operation. This will allow better directional felling and sequencing of the harvesting area.
- The clearing width for tracks should be minimised and must not exceed 4 metres.
- Skid tracks shall generally not exceed 25° (46%) except for short distances where effective drainage and prevention of erosion can be achieved.

12.3 Track Construction

- The harvesting machine operator must follow the route marked on the ground and verified by a Forest Practices Officer.
- During construction, all trees located on the skid track must be directionally felled in a manner that minimizes damage to the residual stand and promotes full utilisation of the felled trees and proper disposal of the slash.
- Soil displacement (e.g. side cutting) should be avoided as much as possible during skid track construction and use since this tends to expose the often highly erodible subsoil.
- Box cuts should be avoided, as they are difficult or impossible to drain.
- Except for the initial stage of skid construction and track drainage, machine blades must not be used to remove soil. This does not include minor repair work or work which will not further excavate the track.

12.4 Skidding Operation

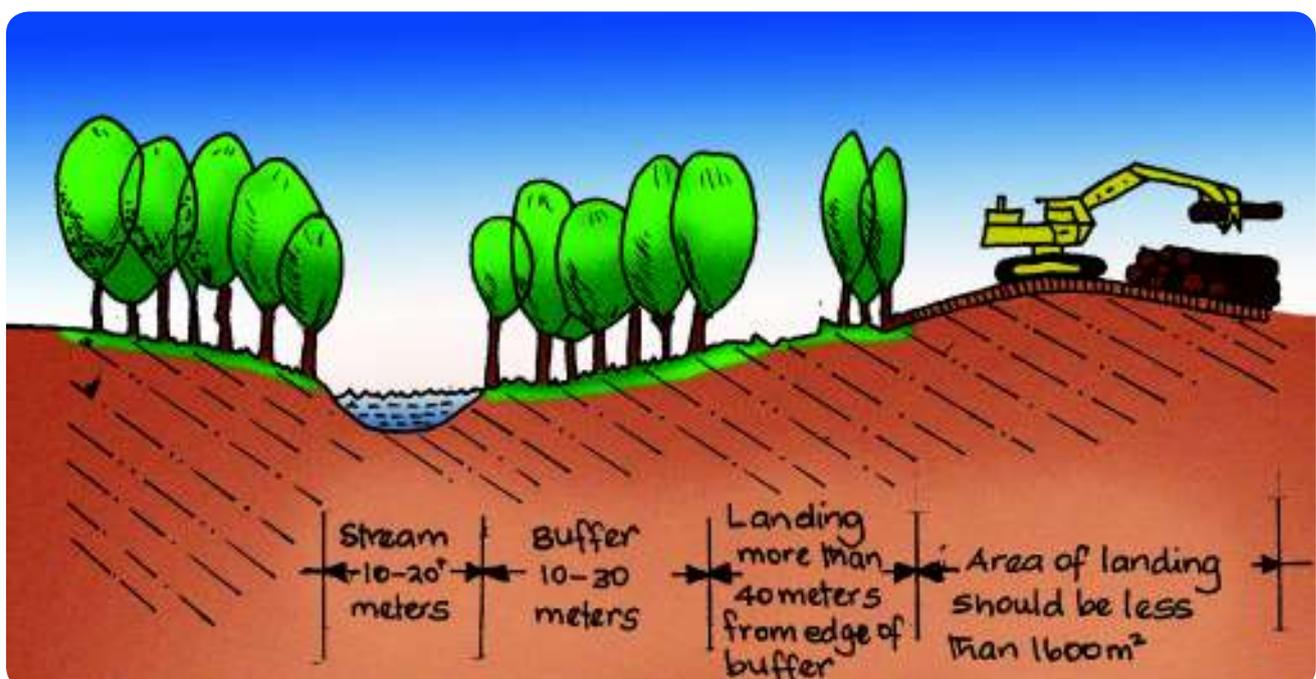
- Log Skidders and crawler tractors (D6 size or equivalent) are the preferred skidding machines.
- Blading after initial construction is not permitted. Machines must walk along the constructed tracks with blades lifted unless the lowering of the blade is essential for safety on steep slopes.
- On steep slopes machines must remain on the designated skid tracks at all times and use winching techniques to extract logs.
- Machines shall be driven at a safe speed appropriate to the conditions of the forest roads and tracks.
- All logs must be raised at the front during skidding to minimise soil disturbance and skid track damage caused by the ploughing effect of logs during extractions.
- Skidding of logs is not permitted along or across haulage roads and streambeds.
- Logs must be removed as soon as possible after felling to avoid insect and fungal infections.

13 LANDINGS

13.1 Construction of Landings

- The following factors should be considered when determining the size and location of a proposed landing site:
 - > The planned operational duration of the site and the expected stockpiling requirements as determined by the loading and haulage logistics
 - > Topography and drainage, including gradients to connecting skid tracks and roads
 - > Average skid distances and the extraction method to be used
 - > Disposal of accumulated logging residues.
- Landings should be located as far as practical on a slight slope (up to 6° or 10.5%) on a ridge, and they should be at least 40 metres from the closest buffer, or further if on steep terrain.
- The number and size of landings should be minimised, consistent with providing safety and efficiency for the movement of machines and workers. As a general guideline, landings should not exceed 1,600m² (e.g. 40m x 40m).
- All landings must be shown on the Harvesting Plan and marked in the forest prior to the commencement of harvesting.
- Landings should be constructed in a manner that minimises soil damage and allows for rapid rehabilitation after the completion of harvesting operations. Consideration should be given to techniques such as cording and the stockpiling of topsoil for use in rehabilitation (see also Section 14 – Rehabilitation of Landings).

Figure 13.1: Landings should be located well away from streams and buffers



13.2 Log Piling/Stacking on Landing

- Stacks of logs shall be built on firm level ground or other secure base.
- Adequate measures shall be taken to prevent stacks from collapsing or logs from falling off.
- Clearances shall be created in between stacks to allow safety of movement and work.
- Push-loading is not permitted.

14 REHABILITATION OF HARVEST AREA

Rehabilitation measures should be undertaken after harvesting to ensure that infrastructure such as roads, tracks, stream crossings and landings are properly drained and revegetated so as to minimise the risk of erosion or other environmental harm. Wherever possible, rehabilitation measures should be undertaken in a manner that permits the infrastructure to be re-used during the next harvesting cycle.

14.1 Skid Tracks

- Skid tracks must be adequately drained after harvesting to minimise the risk of erosion.
- Cross-drains with turnouts must be constructed on skid tracks at locations where the surface water can be diverted into undisturbed vegetation or silt traps.
- Cross-drains must be constructed at an angle (50° – 70°) across the track, depending on the gradient of the slope.
- Place cross-drains at a change in slope or at other locations so that the spacing between drains is equal to or less than the maximum allowed in Table 14.1.
- Where skid tracks approach stream crossings, cross-drains should be placed within 10 metres of the crossing in a location that maximises the filtration of run-off before it enters the stream.
- Cross-drains may not be necessary where the topsoil and surface vegetation are intact and the risk of erosion is low.
- Tracks must not be widened by blading material from the side in order to cover the track surface.

Figure 14.1: Cross drains must divert run-off into adjacent vegetation

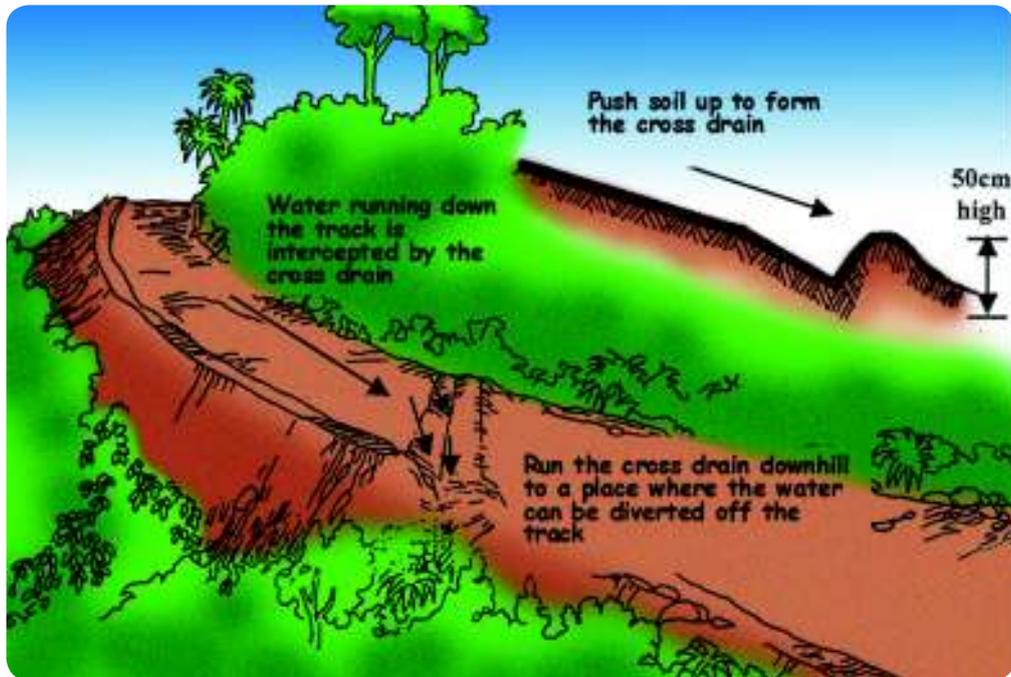


Table 14.1 – Maximum distance apart for cross-drains on skid tracks (metres)

Gradient	Soil erodibility	
	Low	High
0 to 4° (0 to 7%)	nil	40 m
5 to 9° (8 to 16%)	50 m	30 m
10 to 19° (17 to 34%)	30 m	20 m
>19° (>34%)	20 m	Avoid skid tracks

14.2 Temporary Crossings

- Temporary crossings must be removed to allow unimpeded stream flow as soon as the use of the crossing is no longer required or prior to the commencement of the wet season if operations are not completed. The streambed and banks must be restored as near as possible to their natural condition.
- Excavator type machines should be used to remove temporary crossings.
- Avoid disturbance to the watercourse banks and buffer zones, placing materials at least 10m from the watercourse.

Figure 14.2: Rehabilitation of skid tracks



14.3 Landings

- Remove, bury or burn rubbish at the landing. Petrochemicals and containers (including oil drums, grease cartridges, hydraulic hoses etc) must be removed to an approved disposal site. Wood residues must be removed from the landing by placement in the forest or be neatly stacked to facilitate burning or collection for fuel wood.
- Landings must be properly rehabilitated and drained to minimise erosion and encourage rapid revegetation. Deep ripping may be required where surface soils are compacted. Stockpiled topsoil should be re-spread and contoured to encourage rapid re-vegetation (see also Section 13 – Landings).
- All batters must be stabilised and left no steeper than 45° for cuts and 25° for fills.
- Drain all areas where water may pond. The drain should be directed to stable disposal points and not directly into watercourses. The grade of drains is to be 2% - 4%.

14.4 Haulage Roads

- Road formations must be left in a good condition with adequate drainage. There should be no ruts in the surface. It is likely that surface grading and compaction will be required to leave the road in a stable and well-drained condition.
- All bridges and culverts, including decking foundations and sidewalls, must be left in a secure and safe condition.
- All harvesting debris in watercourses must be removed by excavators, winches or by hand, avoiding any entry of machinery into the stream or buffer.
- Bridge and culvert openings must allow free water flow, including flood events (at least equivalent to the 1 in 20 year flood).
- All drains and silt traps must be maintained in working order. Soil, vegetation or other material, which would obstruct water flow, must not be left in the road drains.

14.5 Quarries & Borrow Pits

- All rubbish must be removed or buried. Petrochemicals and containers (including oil drums, grease cartridges, hydraulic hoses etc) must be removed to an approved disposal site.
- Steep cuts should be stabilized where practicable by constructing batters that are less than 45° and by constructing vertical steps in cuts that are higher than 3m. Drains on the up-hill side should be clear and functioning so that runoff cannot enter the quarry or borrow area.
- The surface of the quarry should be drained if water is likely to pond.
- Run-off from quarries must be diverted and filtered through stable disposal areas such as gently sloping, undisturbed vegetation to minimise the risk of sediment entering streams.

15 FOREST HYGIENE

15.1 Fuel & Rubbish

- Spillage during refuelling or machine maintenance must be avoided by locating maintenance areas on level ground well away from streams and drains. All storage and use of fuels must be contained within bunded areas.
- Spills arising from the operation of any machinery must not be allowed to enter any streams. Contaminated soil must be immediately excavated and removed to a disposal area approved by a Forest Practices Officer.

- Used oil filters, empty grease gun cartridges, drums, spray paint cans, etc. should be removed to a disposal area approved by a Forest Practices Officer.

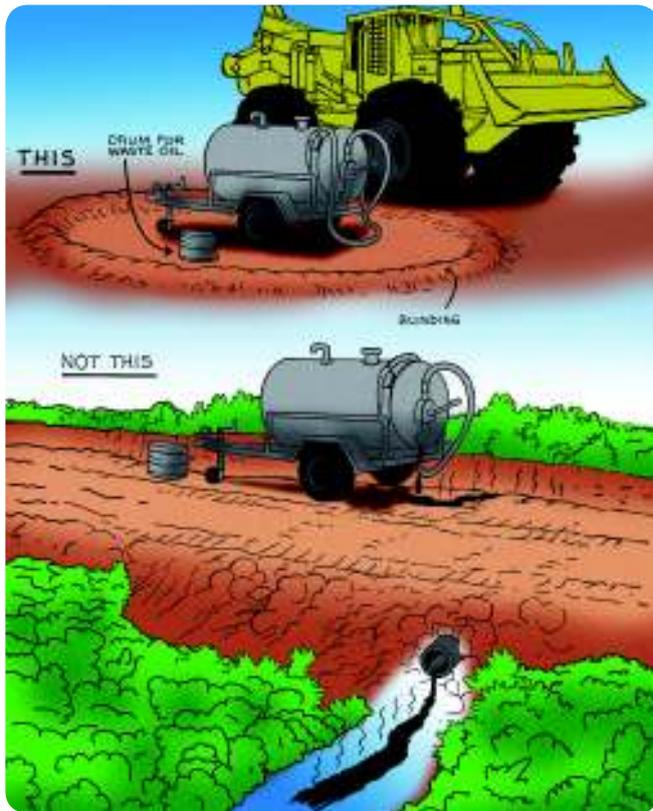


Figure 15.1:
Re-fuelling and storage sites must be located away from drains and streams and surrounded by a bund of soil

15.2 Camp Site Standards

- Harvesting crew camps must consist of a separate sleeping shed, a kitchen, eating area, storeroom and toilet in compliance with Occupational Health & Safety (OHS) requirements.
- The campsite must be located in a safe and a healthy surrounding.
- Campsites must have access to clean water supplies.
- To prevent the breeding of mosquito, water collection tanks at the campsite must be properly screened and the campsite must be well drained so that water does not accumulate in ponds for more than one day.
- Domestic waste-water must be disposed at least 20 metres from the building.
- Toilet facilities must be provided at all campsites and should be located at least 100 metres away from sources of drinking water and a safe distance from sleeping quarters.
- A rubbish disposal site must be provided at all campsites and placed at least 50 metres away from any watercourse or water source and located above the water table.
- All non-organic waste products such as discarded equipment and parts, waste

oil and related containers, must be removed from the forest and disposed of at designated off-site collection centres.

- It is the responsibility of the harvesting crews to clean and clear the site to its previous conditions before they shift to a new site.

*Figure 15.2:
All rubbish should be placed within containers
and removed to approved disposal sites*



15.3 Fire Precautions

- No smoking is permitted within a forest during high fire danger periods, except on a roadway cleared of inflammable material.
- All cigarette butts and matchsticks are to be properly extinguished before being discarded.
- Fires for preparing meals, boiling water or for any other purposes must not be less than 5m from any log, stump or tree and the ground must be cleared of all flammable materials within 2m of the fire. Any such fire should be completely extinguished when being left, either temporarily or otherwise.
- No fire shall be lit or maintained in the open during a fire period equal to or in excess of High Fire Rating.
- Fires in buildings and camps shall be lit in properly constructed fireplaces and must be completely extinguished before leaving the site.
- No fire should be left unattended in the forest.
- It is the responsibility of the harvesting crews to clean and clear the site to its previous conditions once they shift to a new site.

16 HARVESTING MACHINE STANDARDS

- All harvesting operators must comply with relevant OH & S requirements, including the following:
 - > All chainsaws must have required safety features (e.g. chain-breaks) in working order.
 - > All machines are to be fitted with seat belts, which must be worn during the operation of the machine.
 - > All machines must be fitted with a fully charged fire extinguisher and a First Aid Kit.
 - > All machines must be fitted with a safety cabin, which conforms to the standard of the Roll Over Protection Structure (R.O.P.S). The cabin of the machine must have a safe and securely mounted seat.
 - > The machine cabin must not be modified, drilled, welded or altered in any way nor should any attempt be made to straighten any part of the frame or attached brackets which have suffered damage.
 - > The Land Transport Authority must examine all damaged cab frames prior to further use.
 - > No part of the main frame or safety cabin should be secured by fittings other than the specified high tensile nuts and bolts.
 - > The machine must have an engine stopping device which is non-self returning. It must be securely attached with clear instructions for use (e.g. Pull/Stop) and purpose. It should be readily accessible to the driver from the normal operating position.
 - > If the machine is driven on public roads or forest roads it should be equipped with lights conforming to the statutory regulations.
 - > The machine must be fitted with an efficient spark arrestor and this must be maintained in working order.
 - > All pulleys, shafts, belts and fan blades must be securely guarded.
 - > Machine operation should not commence before workers not engaged in the operation vacate the work area.
 - > All machines must be registered with the Land Transport Authority.
 - > Machines must not have any fuel or oil leaks.
 - > For loaders and excavators, an appropriate grapple must be in place.
 - > All skidding machines shall be fitted with a winch carrying not less than 40 metres of good wire rope. The winch must be operational at all times.
 - > Any new machines apart from those mentioned in the code should be approved by Forestry Department e.g. Forwarder.
 - > All lifting machines, including helicopter trials, must be first cleared by the appropriate authorities (such as CAAF and Department of Labour).

17 HARVESTING SUPERVISION

- Responsibility for the supervision of the harvesting operation should be clearly stated in the Harvesting Plan. The Harvesting Supervisor should inspect operations on a regular basis, preferably at least weekly, to ensure that any problems are

identified and that corrective action is taken in a timely manner.

17.1 Work Skills and Ethics of a Harvesting Supervisor

- A Harvesting Supervisor should have a good working knowledge and skills in:
 - > industrial labour issues and contractor work agreements
 - > company/concession/harvesting agreements
 - > harvesting operations, including machine operations, maintenance schedules and basic repairs.
 - > consultation and communication with harvesting operators, licensees, Forestry Department staff and landowners.
 - > First aid, including a current First Aid Certificate.
 - > the planning and organization of all facets of harvesting operations as required by the Management Team and the Code.

17.2 Main Duties of a Harvesting Supervisor

- Direct involvement in pre-harvesting planning whenever appropriate.
- Direct supervision of field operations to ensure compliance with the Code.
- Liaison between company management and field crew regarding transport, support services and any other relevant matters and ensure that all persons have access to communication systems and transport at all times.
- Liaison between company management and the licensee on any matter of mutual concern.
- Direct responsibility to company management for:
 - > All activities of plant and machine operators, loggers, drivers, trainees and any other field hands employed.
 - > Coordination of all operations to ensure company production targets are satisfied in respect of quality and quantity of output.
 - > Maintenance and submission of accurate records, as required by law and as required by the company.
 - > Ensuring harvesting operations conform to acceptable standards of safety as detailed in this Code.
 - > Rendering first aid if required to do so.
 - > Arranging rapid evacuation to hospital of any injured worker if required.
 - > Reporting all work-related accidents to the Forestry Department as soon as possible.

18

MONITORING AND EVALUATION OF OPERATIONS



- Monitoring and evaluation programs provide forest managers with information about the standards that are being achieved in the forest and how those standards can be improved.
- Monitoring should be carried out by a Forest Practices Officer in accordance with the standard Monitoring Checklist issued by the Forestry Department, as follows-
 - > Regular (monthly) inspections to assess compliance with the Harvesting Plan and Code.
 - > Final monitoring inspection upon the completion of harvesting areas and prior to the closure of the coupe or licence area. Final monitoring reports must be submitted to the Forestry Department and must include the following information-
 1. Results of the monitoring inspection
 2. Corrective actions that have been taken in relation to major non-compliances
 3. Other recommended actions to improve the standards of compliance with the Harvesting Code of Practice.
- The Forestry Department will prepare an annual report on the results and outcomes of the monitoring and evaluation programs.

ANNEX 1

Glossary

The following definitions shall apply for the interpretation of the terms used in this Code.

Adequate tool kit (chainsaw) – an adequate tool kit for a chainsaw comprises- :

- a. Combination spanner / screwdriver
- b. Grease gun
- c. Correct diameter round file and file holder
- d. Flat file and depth gauge regulator
- e. Combination allen key / box spanner
- f. Small screwdriver

Allowable cut - trees specified for removal, selected using the PHI data and the DLT

Annual Cut - Volume removed per annum on a given area

Basal Area - Cross-sectional area of tree calculated from the diameter at breast height (DBH)

Batter slope – the slope of the bank of cut earth or soil fill on either side of a constructed road or track

Benches - horizontal area constructed along the side slope of batters to provide a break in the slope and reduce erosion

Borrow pit - Source of land-fill for roads or landings

Box and Side Cuts - portion of ridge or hillside cut away during road making. Side cuts occur when one side is cut and box cuts are made when both sides of the road are cut into the hill.

Buffer strip - (also known as a filter strip or streamside reserve) - within a harvesting coupe, a specified horizontal width of ground retained either a side of a designated stream and any associated saturated flat in which indigenous trees must not be felled and machinery may not enter, except at crossings, which must be kept to a minimum and only where designated in a Harvesting Plan. Minimum buffer widths are prescribed in section 9 of this Code.

Buttress - a ridge of wood that develops in the angle between a lateral root and the base of a tree stem to provide lateral stability to the stem

Bund - a circular mound of soil that is constructed in the forest to surround fuel storage, re-fuelling and machine maintenance areas so that any spillage is contained and prevented from entering drains or streams

Camber - curvature of road carriageway; the amount of cross-fall on a road.

Chain breakage guard (chainsaw) – the part of the rear handle of a chainsaw designed to prevent injury to the operator’s right hand in the event of a chain breaking

Chain catcher (chainsaw) – a device located on the underside of the chain saw close to the front and designed to arrest the chain if it comes off the bar

Chainsaw – a petroleum-driven portable saw for felling and cross-cutting timber

Contour map – a map showing all points at the same height above sea level at fixed interval

Cording – placement of small logs, branches or bark material on a landing or skid track to spread the weight of the harvesting or loading machine and to protect the soil from direct contact with the tyres or tracks during operations, thus reducing ground pressure and rutting.

Coupe / compartment / stand / cutting permit area – an area of forest from which logs for sawmilling or other industrial processing are harvested.

Cross-drain – a drain constructed across a road or skid track to divert water towards a disposal point. Cross-drains may be either culverts under the surface of the road or open surface drains (see also Water bars).

Designated streams – all watercourses that have a defined stream channel, including all permanent streams and any intermittent streams which for reasons of water quality, erosion risk, wildlife habitat, or recreational value should be buffered from any impacts associated with forest harvesting

Diameter Limit Table - Table used to determine if the diameter a species is qualified for harvesting

Erosion hazard (soil) - the susceptibility (erodibility) of soil to movement by water or wind (erosion) when disturbed or exposed

Exotic – introduced, not native (indigenous)

Forest Practices Officer - a Forest Officer employed by the Forestry Department or other person with skills in the preparation and supervision of Harvesting Plans who has been accredited and authorised in writing by the Conservator to certify Harvesting Plans and submit reports on compliance monitoring.

Forest Officer – employees of the Forestry Department, Fiji Pine Limited, or Fiji Hardwood Corporation Limited who have been designated by the respective

head of these organisations to control harvesting operations

Harvesting – includes tree felling, extraction and the marking, sorting, loading and carting of forest produce within a forest

Harvesting Plan – A plan of harvesting operations for a given area showing roads, skid tracks, protection areas, landings, etc

Haulage roads – the road network within areas of forest for the primary purpose of extracting or carting timber from the forest

Landing – place where sawlogs and residual roundwood are transported for sorting and loading for transport from the forest; or where roundwood is processed into sleepers, posts or miscellaneous products

Merchantable Volume - Log volume suitable for commercial timber

Perennial stream – a watercourse that flows for all or most of the year

Permanent crossing – a bridge or culvert structure that is constructed to provide access across a permanent or intermittent stream for harvesting traffic. The crossing must have an opening designed to permit natural flows, including floods to at least the 1 in 20 year frequency. Such a crossing may be subsequently used for other purposes after the completion of harvesting operations

Permanent road – a generally high standard road constructed initially for timber extraction, but permanently required for the continuing management of the forest

Pre-Harvest Inventory (PHI) - stock-take of trees carried out before harvesting. Data include tree species, diameter, height, log class, etc.

Push-loading - the loading of loads by machines pushing logs up a ramp or off a bench on to the truck

Road Alignment – The location of the road on the map/ground. It includes the road's horizontal and vertical positions across the landscape.

Road Categories -

Category A: Main haulage roads – the main haulage routes within a forest serving large areas, having a relatively high volume of use that warrants two-way traffic.

Category B: Minor haulage roads – feeder roads that provide the major common route to a landing from a major haulage road.

Category C: Skid tracks – tracks that run from the harvested trees to the landing.

Road grades - gradient (incline) of road measured as a percentage or degree of angle from the horizontal and expressed as adverse (uphill) or favourable (downhill)

Road Reserve – areas reserved for road making and development of rural zones

Reforestation – the establishment of tree stands by planting or seeding with tree species on previous logged or poorly forested land for the purposes of establishing a tree cover, usually for timber production

Residual stand - trees still standing after a harvesting operation

R.O.P.S. – Roll Over Protection Structure

Turn-out (or diversion drain) – a short graded channel angled away from the edge of roads and tracks to divert run-off into undisturbed vegetation so that any sediment can be filtered and trapped before the water reaches a stream

Safety / dead hand throttle catch (chainsaw) – a device to prevent the accidental operation of the throttle trigger

Safety helmet – helmet manufactured from polycarbonate and complying with international safety standards, it should have eye protection and ear/hearing protection fitted as an integral part of the helmet

Scarf, sink cut, or notch – the first 2 cuts made in a tree to remove a wedge to assist directional felling

Seed Trees - Trees retained as seed source for regeneration purposes

Side drain - (v drain or table-drain) – a drain constructed along the side of a road to carry run-off towards culverts or turn-outs where the water can be discharged into vegetation for dispersal and filtration.

Silt Traps - Holes dug to catch sediment in run-off water flowing in drains. Other silt traps include hay bales or barriers made of hessian or other materials to trap sediment at the outlet of drains

Skidder – all purpose built frame-steered wheeled machines used for the extraction of timber with load lifted at one end only

Skidding – the towing or winching of a log on the ground by a tractor or dozer from the stump to the landing site

Skid track – track along which a log is skidded

Special management zones – designated areas of scientific, recreational or landscape significance (e.g. water supply areas, fishing areas, village teitei, old village or burial sites etc), erosion prone sites or particular steep sites which may require them to be excluded or harvested under special conditions or restrictions

Spoon drain – A shallow semi-circular open drain, normally traversable by vehicles, designed to carry water to the side of a road, access track or fire break.

Standard Error - a measure of the variation of the sample means

Super Elevation - the cross-sectional gradient of a road, designed to improve road safety and drainage.

Temporary crossing – a road or skid track crossing constructed across an intermittent stream using corded logs, a culvert or ford for use for a limited period of less than three (3) months during the dry season only

Intermittent (temporary) stream – a watercourse that flows for part of the year and normally carries no flow during the dry season

Timber – standing trees or felled logs before their processing into forest produce

Tractor – harvesting machinery i.e. bulldozers. A variety of types and sizes are used depending on the type of forest being harvested.

Tree driving – when a tree or a number of trees have been partly sawn across at the butt and left standing until the last tree is felled towards the partly sawn trees(s), so that all the trees are brought down to the ground by trees falling over one another.

Water bar – a cross-drain that is constructed by excavating a shallow depression and forming a mound of soil to divert water from a track or road into adjoining vegetation.

Water catchment area – an area of land that provides natural drainage for rainfall run-off and seepage into streams for water supply purposes

ANNEX 2

Personal protective equipment (PPE) appropriate for forestry operations
(Sourced from the ILO Code of Practice: Safety and Health in Forestry Work)

Parts of the body to be protected	Feet	Legs	Trunk, arms, legs	Hands	Head	Eyes	Eyes/face	Hearing
PPE normally appropriate	Safety boots or shoes ¹	Safety trousers ²	Close-fitting clothing	Gloves	Safety helmet	Goggles	Visor [mesh]	Eaf muffs ³
Felling								
Hand tools	✓		✓	✓	✓			
Chainsaw	✓	✓	✓	✓	✓		✓	✓
Extraction								
Manual	✓			✓	✓ ⁴			
Animal	✓			✓	✓ ⁴			
Mechanical extraction								
Skidder	✓		✓	✓ ⁵	✓			✓
Forwarder	✓		✓		✓			✓
Cable crane	✓		✓	✓ ⁵	✓			✓
Helicopter	✓		✓ ⁶	✓ ⁵	✓ ⁷	✓		✓

Notes-

1. Safety boots or shoes with integrated steel toe for medium or heavy loads
2. In hot climates/weather chain saw leggings or chaps may be used. Safety trousers and chaps contain fibres that are inflammable and will melt and should not be worn during fire fighting
3. Ear plugs and ear valves are not generally suitable for forestry because of the risk of infection
4. When extracting near unstable trees or branchwood
5. Only if manipulating logs. Gloves with heavy-duty palm required if handling wire chocker rope or tether line
6. Highly visible colours
7. With chin strap

ANNEX 3

List of Courses offered at the Forestry Training Center

1. Bridging Courses:
 - > Sustainable Forest management Awareness Training
 - > OHS Awareness Training
 - > First Aid Course

2. Harvesting Trees Manually – Basic Level

3. Harvesting Trees Manually – Intermediate Level

4. Harvesting Trees Manually – Advanced Level

5. Harvesting Planning

6. Supervision Course for Harvesting Supervisors

7. Supervision Course for Plantation Supervisors

8. Harvesting Manager’s Training

9. Chainsaw Mechanics Training

10. Forestry Business Creation Course

11. Harvesting Machines Training
 - > Skidder
 - > Bulldozer
 - > Loader

12. Log Making and Cross Cutting