WORKING ARRANGEMENTS AND ENVIRONMENTAL CONTROL SPECIFICATIONS FOR BUNNINGS' LOGGING OPERATIONS IN THE NORTHERN JARRAH FOREST

REVIEWED ISSUE OCTOBER 1, 1985

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DEPARTMENT OF CONSERVATION & LAND MANAGEMENT

Form F O 808

NORTHERN FOREST REGION Office,

To.....

OCTOBER 3, 19 85

Western Australia

Reference-H.O.

Local

SUBJECT: **BUNNINGS / C.A.L.M. LIAISON GROUP.**

WORKING ARRANGEMENTS FOR BUNNINGS LOGGING OPERATION IN NORTHERN JARRAH FOREST.

The initial issue of this document approved by both parties was made on January 23, 1985. That issue is now superceded and should be destroyed.

Since that time the document has been tested by operations and the passage of time has resulted in some necessary alterations.

A further revision will be due October 1, 1986.

D. R. LEJEUNE
for REGIONAL MANAGER

DRL:PRK

DISTRIBUTION:

Bunnings 6 Copies

Central Forest Region 6 Copies

D/M Jarrahdale, Mundaring, Dwellingup, Harvey, Collie.

Production Branch

IM&C Kelmscott

Manager Silviculture

Manager Environmental Protection.

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PART ONE

1.0 INTRODUCTION

It is the policy of Bunnings and the C.A.L.M. Department to carry out logging to standards that will minimize environment damage to the Northern Jarrah Forest.

To meet these objectives, mutually agreed Working Arrangements between Bunnings and CALM are contained in this booklet.

2.0 OBJECTIVES FOR LOGGING IN THE NORTHERN JARRAH FOREST

- Enable cutting to take place with minimum environmental damage.
- Ensure logging outside and inside DRA conforms with the 7-Way Test.
- Logging within DRA to conform with the most current dieback policies.
- Water purity following logging must be maintained at standards acceptable to the water authority.

3.0 STRATEGIES FOR LOGGING IN THE NORTHERN JARRAH FOREST

- Rolling 4 year logging plan to be developed to cover all aspects of logging and its impact.
- Firm proposals for logging to be prepared two years ahead. Two year plans to be prepared by Bunnings and C.A.L.M.
- Logging proposals are to include 7-Way Tests and other specifications to ensure environmental controls are achieved.
- The Department will liaise with Bunnings to provide a reasonable balance between environmental controls, economics of logging and product requirements with the available resource.
- The Department and Bunnings will liaise to provide agreed specifications and works programmes for implementing environmental controls.

PART TWO

1.0 SPECIFICATIONS FOR ENVIRONMENTAL CONTROL

- A number of specifications are attached which provide environmental control standards. Working groups have been nominated to up-date these as necessary.

- Working Groups

  The Working Groups represent senior staff of Bunnings and CALM. They are not making recommendations - their presentations in this document are assumed to be responsible and agreed to by both parties.

  Convenors are requested to ensure specifications are reviewed and rewritten annually and are presented to the Northern Region by the 1st October each year. Convenors will call the group together when conflicts about standards occur. The group will recommend a solution to the Regional Manager concerned.

1.1 Coupe Control Working Group

Convenor: R/L Operations North (alternate with Central).

Members: R/L Ops. Central, D/F Logging Central,
D/F Harvey or Collie
D/F Jarrahdale, For. Protection North,
Bunnings representatives,
Environmental Protection Branch representative.

1.2 Roading Working Group

Convenor: Bunnings Representative

Members: D/F Logging Central
S/F Protection North, D/F Dwellingup,
D/F Harvey or Collie,
Bunnings representatives,
Environmental Protection Branch representative.

1.3 Fire Management Working Group

Convenor: S/F Protection North,

Members: S/F Protection Central - or nominee
Forester Protection North.

1.4 Water Quality Working Group

Convenor: D/M Dwellingup
Members: O.I.C. Research Dwellingup,
Environmental Protection Branch
Representative
Forester Protection North
D/F Logging Central,
M.W.S. Representatives
Bunnings representatives.

2.0 IMPLEMENTATION OF ENVIRONMENTAL CONTROLS

- Regional Planning Officer to provide a base 2-year logging plan which provides the basis for environmental assessment. These will be drawn up in consultation with Bunnings and D/M's and will be a development of the rolling 4-year plan.

- Bunnings will provide advice on preferred logging method for coupes covered by the 2-year plan.

- Regional staff (Planning Officer and IM&C) to provide volume assessments for coupes and assistance with dieback and site susceptibility demarcation.

- D/M's in liaison with Bunnings staff will inspect coupes and delineate those suitable for both dry and wet soil logging, necessary roadwork and assess stockpile requirements.

- Once agreement has been reached with Bunnings on proposed logging program, Region to arrange necessary approvals for implementation.

- Nature Conservation Forests:-

  Without the approval of the Executive Director no logging is permitted in buffers of MPA's designated under the Department's G.W.P. as landscape and conservation of flora and fauna.

- Logging Activity in Special M.P.A.'s

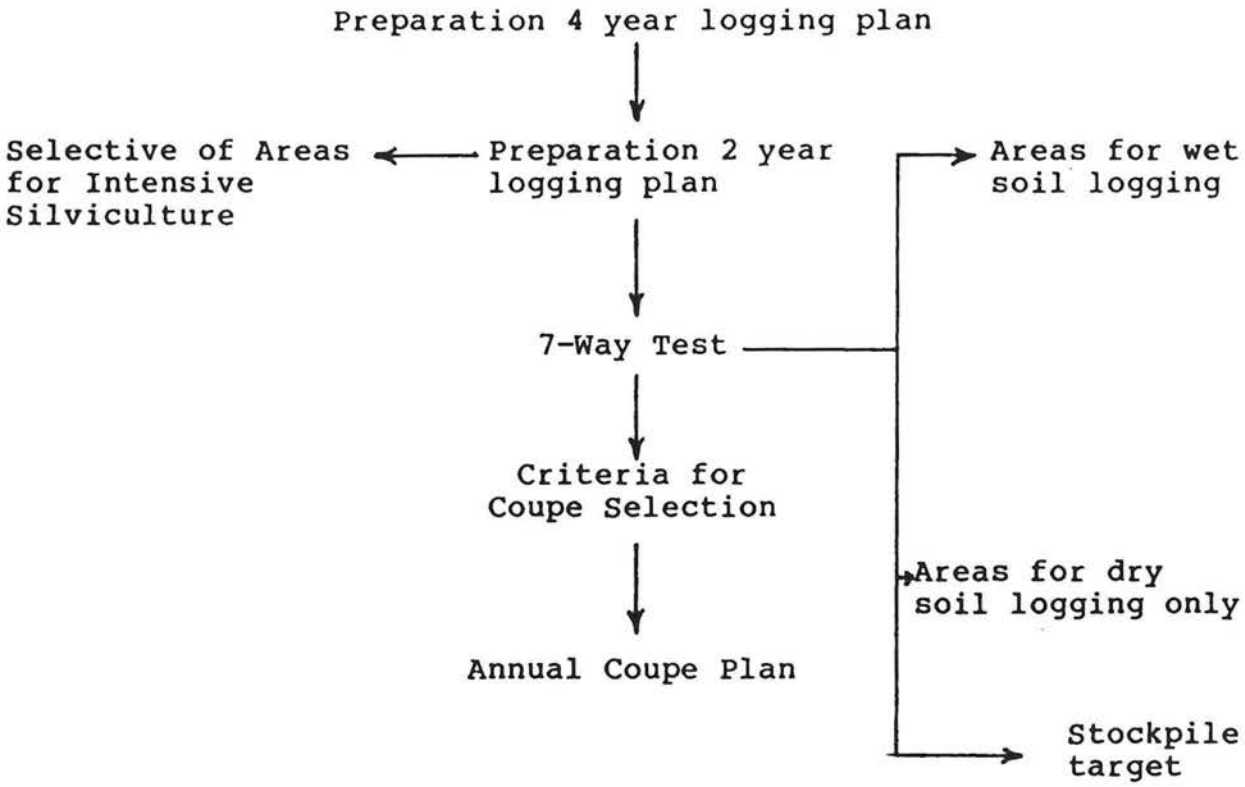
  The following list of logging activities require authorization at various levels as tabled according to the Priority Land Use Classification for the area.

ACTIVITY	M.P.A.			
	FLORA, FAUNA & LANDSCAPE (PRESERVATION)	FLORA, FAUNA LANDSCAPE (SCIENTIFIC & MANAGEMENT)	RECREATION	ROAD, RIVER & STREAM RESERVES
1. Normal Logging	-	Ex. Dir.	Ex. Dir.	-
2. Thinning	-	Ex. Dir.	Ex. Dir.	Ex. Dir.
3. Dead Tree Removal	-	Ex. Dir.	R/Man.	R/Man.
4. Ground Salvage	-	Ex. Dir.	R/Man.	R/Man.
5. Gravel Pits	Ex. Dir.	Ex. Dir.	Ex. Dir.	R/Man.
6. Road Construction	Ex. Dir.	Ex. Dir.	Ex. Dir.	R/Man.
7. Felling Trees Dangerous to The Public	Ex. Dir.	Ex. Dir.	D/Man.	D/Man.

PART THREE - THE LOGGING OPERATION PLANNING AND SPECIFICATIONS

1.0 CALM is responsible for planning logging operations in Northern Jarrah Forest. This planning will be carried out in liaison with Bunnings to ensure the Company's commercial requirements are met.

Operations planning for logging in the Northern Jarrah Forest is based on:-



2.0 Guidelines for planning logging operations in the Northern Jarrah Forest are:-

2.1 Development of 4 year logging plans. Responsibility R/L Planning.

2.2 Development of immediate 2 year logging proposals based on 4 year plan which requires:-

- Preparation of dieback hygiene maps.
- Identification of dieback, dieback-free areas and areas at risk. Assess reliability of maps and photography e.g. age.
- Vegetation and/or landform mapping for site susceptibility to dieback.
- A plan for logging which:-
  - Avoids crossing dieback boundaries during felling, snigging and loading.
  - Containment of drainage within micro catchments as a precaution against hygiene breakdown i.e. micro catchments = logging sub-coupes.

- Hygiene measures between sub-coupes to prevent spread of disease by machines.

- Upgrading of haul roads to specifications for access in wet or dry soil conditions.

  These conditions will provide the basis for 7-Way Test evaluation which must be completed for all forest to be logged.

2.3 Resource Data

The most up-to-date inventory data to determine the volume on each coupe. (Responsibility R/L Planning).

2.4 Integration of Harvest for all Produce

It is desirable to arrange one harvest for all products so as to avoid repeated returns to the area.

Therefore, try to arrange integrated logging for sawlogs, poles, residues, peelers etc. This requires all products within a coupe to be snigged by the same machine to landing. Where this is not achievable a second 7-Way Test should be prepared to examine impact of the later operation.

2.5 Allocation of coupes and Stockpile Targets

- The order of logging in Dieback, Suspect or Secure Dieback-free forest will be flexible depending on specific hygiene requirements of the logging plan.

- All logging will be carried out to 7-Way Test requirements.

- The stockpile target will be mutually agreed upon between Bunnings and the Department.

  - It will be the sole responsibility of Bunnings to accumulate sufficient stockpile to cover requirements for logging under this working arrangement.

- The stockpile will amount to the volume difference between mill intake requirements during wet soil condition and the volume which satisfies the 7-Way Test for wet soil conditions.

  - Soil damage specification will also be taken into account for stockpiling.

2.6 Presentation of Plans

- Tabulate volumes by coupes, by season and by year to ensure that allocations balance permissible intakes.

- Prepare coupe sheets for tree-marking and industry representatives - standard base coupe sheets will be produced by IM&C on request.

- Specific requirements for environmental controls must be attached to the 49B.

2.7 Road System

Bunnings will be responsible for all road construction, maintenance, rehabilitation and road closure associated with the Company's logging operation.

Bunnings to identify roads required for log hauling and mark on plan.

Guidelines are:-

- Use as few roads as possible consistent with economic snig distances. Liaison between Bunnings and the Department is required.

- Roads to be as low in the profile as possible where there is a risk of spreading disease, erosion or effect on water quality (downslope) during hauling operations;

- Avoid new roading, unless required to relocate parts of existing roads for access to secure dieback-free forest, without crossing dieback categories. All roading proposals or up-grading to pass the 7-Way Test.

- Avoid crossing dieback categories unless roads are upgraded to specifications which avoid spreading disease;

- Define unwanted roads in consultation with the Department, for closure.

- Work through the Dieback Hygiene Guide to cross-check decisions taken.

Road specifications applicable are defined in the Industry Roading Specifications attached.

2.8 Coupe Control (Reviewed by Working Group 6-8-85)

2.8.1 CALM is responsible for dieback demarcation, coupe boundaries and tree marking (for retention or removal). Sub coupe boundaries, snig track pattern and landings will be located jointly by Bunnings foreman and a CALM Officer.

2.8.2 CALM and Bunnings representatives (where required) demarcate and prepare in the field:

- Coupe boundaries including:
  - "Special care" zones -
    - Stream Reserves
    - Buffer Strips
    - Road Reserves
  - Dieback risk categories
- Sub-coupe boundaries including:
  - Landings, snig tracks and shunts.
  - Areas to remain unlogged i.e. too steep.
  - Non-harnessed stream crossings.
  - Drainage channels.
  - Cleandown points.

2.8.3 LOGGING TECHNIQUE

- Split Phase Logging - Dieback-free secure forest (see sketch page 28).
- Snigging in a sub-coupe will be physically separated from the hauling. This can be achieved by:

  (a) Time

  Snigging in sub-coupes or fallers blocks to be completed before loading and hauling commence.

  OR

(b) Barrier at rear of landing

The skidding and loading phases are separated by a physical barrier; the skidder pushing logs over the barrier on to the landing.

OR

(c) Barrier at front of landing

The machine carrying out loading can also be used for skidding. Care should be taken if this method is used in moist soil conditions to avoid soil movement between truck and loader.

2.8.4 Conventional Logging - Dieback forest

2.8.5 The machine used for loading can also be used for skidding and haul roads can be used without cleandown.

2.8.6 Logging will cease when soils are wet and soil type is susceptible to deep ruts and bogging of logging machinery. This will generally apply to loam or clay based soils and low lying soils with a high water table. These areas should be logged in summer dry soil conditions to avoid excessive soil damage.

2.8.7 Erosion control in a sub-coupe must be completed by Bunnings immediately following snigging and before further snigging of sub-coupes commences.

2.8.8 Site rehabilitation by Bunnings is required upon completion of logging. Timing will be decided between CALM Officer and Bunnings.

Refer to Coupe Control Specifications. (6.1 - 6.6)

2.9 Fire Management

Fire Management is solely the responsibility of the CALM Department except for fire control provisions under Bunnings Forest Produce Licence(s).

- Will be planned and implemented by the Department in conjunction with the overall 4 year logging plan.

- Bunnings responsibility is as defined in other

specifications and to meet conditions as laid down in the Forest Produce (Sawmilling) Licence or permit.

- Refer to Fire Management Environmental Protection specification.

2.10 Water Quality Control *

Bunnings are responsible for all earth works for water quality control required for the Company's logging operations. The Company is not responsible for work incurred by other operations.

- Logging areas may have different siltation and salinity risks for water quality associated with logging. These are dependent on:
  - Rainfall zone
  - Proximity to reservoirs and major water courses
  - Soil susceptibility to erosion and damage
  - topography
  - location of haul roads
  - type of equipment and season.
- Each logging area must be considered individually (by CALM) for these risks.
- Specific requirements for turbidity control must be discussed (by CALM) with the Metropolitan Water Authority (M.W.A.) for sensitive areas prior to logging.
  - As a guideline water turbidity less than 50 N.T.U. will be acceptable where it enters the stream and stream salinity will be monitored on an ongoing basis. Logging proposals will be reviewed by Research Branch to ensure there is no long term increase in salinity.

* Footnote

Water quality may be adversely affected by silt or colloidal material (turbidity) entering streams.

- Basic to water quality control is the implementation and Protection of stream Reserves on all second order (and greater) streams (i.e. all W & C vegetation types) in logging areas.

- Refer to Water Quality Control Specification.

N.B. As soon as practical experience of achieving their specification are available Working Group to review the prescription.

2.11 Nature Conservation

- Within Timber production M.P.A.'s, timber production needs to receive first consideration, therefore, logging operations will not be orientated specifically towards conservation priorities. Logging in other M.P.A.'s available for timber production will conform with prescriptions which maintain land use priority e.g. recreation.

INDUSTRY ROADING SPECIFICATION (Reviewed by Working Group 6-8-85)

1. Objective

To prescribe uniform standards for roads to minimise environmental damage for all jarrah logging operations in the Northern Jarrah Forest.

2. Scope

The minimum road specification is any track or road which will be required to carry loaded or unloaded log trucks.

3. Planning

3.1 Bunnings to submit a conceptual plan for hauling 2 years in advance. From this a 7-Way Test will be developed in liaison with Bunnings.

3.2 Based on the approved 7-Way Test, Bunnings to submit an access plan and roading proposal 6 months in advance for Departmental approval.

3.3 Guidelines to be followed include:

- Use of optimum number of roads to provide economic snigging.
- Avoid new roading unless required to protect dieback-free forest.
- Use low profile roads, unless 7-Way Test requirements can be met for roads high in the profile.
- Roads are preferred in dieback forest. Where this is not feasible, minimise the crossing of dieback categories and minimise amount of forest placed at risk.
- Define unwanted roads, in consultation with the Department, for closure.

3.4 Plan to show:

- Proposed alignment or alternatives including in coupe roads and all obligatory points.
- New clearing and sections of existing road to be upgraded.
- Proposals for water course crossing indicating whether pipes or bridges are to be used, and

their size and number. No log fills will be approved.

In dry conditions, a water course may be crossed provided no earthworks are required e.g. wide flat, and that requirements of the `water quality' section can be met.

- Location of proposed gravel pits and their access.

3.5 District Manager of Division to review roading proposals using 7-Way Test, Jarrah 81, Dieback Hygiene Guide and `Water Quality Control Specifications' to cross check decisions.

3.6 Bunnings and CALM to field demarcate approved access at least 6 weeks prior to commencement of earth works confirming in a written report (CALM to do):

- Suitability of road alignment.
- Need for all clearing proposed.
- Need for all proposed construction works and their timing.
- Sections of road to be stabilised.
- Location of clean down points.
- Location of all proposed in-coupe roads.
- Roads to be closed, timing and responsibility for closure.
- Roads to be rehabilitated by Bunnings and timing.

3.7 Where required, District Manager, in consultation with Bunnings, to liaise with Shire or M.R.D. engineers where haul roads intersect Shire or M.R.D. roads.

4. Roading Standards

4.1 Roads for log hauling trucks will be 4-6m in width of clearing with 3-4m width of crowned road surface. Widths will be decided locally between Bunnings and CALM representatives based on type of equipment, traffic hazards, volume to be carted and topography.

4.2 New roads must not be inside any Stream Reserve except for crossings. Refer to specifications on Water Quality for Reserve widths.

4.3 Roads for dry soil use only

- Major Haul Roads
  - Shallow side drains.
  - Culverts only on defined water courses.
  - Gravel where required to protect dieback-free sections from infection (moist areas).
  - At the completion of logging industry will restore road to original condition with appropriate erosion control.
- Other Roads - minimum specification.
  - The standard of road will be determined by the resource volume to be carted.
  - For harnessed catchment crossings over 2nd and 3rd order streams (see glossary) will be a pipe with earth or gravel fill which could be removed at a mutually agreed time.

4.4 Roads for Wet Soil Use:

- Drained both sides of road with deep side drains.
- 5-15cm thick layer of gravel.
- Culverts will be installed to comply with road design, dieback hygiene and water quality requirements. Particular attention must be given to adequate drainage or steep grades.
- Stabilise, where necessary by compaction, water binding steep slopes, tight corners, gullies and can involve water tanks and compaction rollers or rainfall and gravel/log trucks. Construction one year ahead is desirable.
- Water to be sterile by addition of fungicide (CALM specification).
- Form up roads as required in all low lying areas. Pushing up from the side, ensuring adequate drainage of borrow areas.

4.5 Crossings, 3rd Order Stream, Wet Soil Conditions

- Pipe or bridge crossing - no full earth/log fills.
- Approach as close to but not at right angles to

contours, keeping in mind road alignment and safety factors.

- Borrow areas for fill to be approved and will not be closer than 20m from watercourse. Water draining from borrow areas to be directed into a silt trap or vegetation filter strip.

- Off shoots to turn water off at regular intervals into silt traps or natural vetetation.

- Fill to be consolidated to minimise erosion of loose soil and risk of slumping.

- Embankments should be left rough surfaced or corrugated.

- Machine activity in the watercourse and disturbance of stream vegetation to be minimised. No heaps of debris within 40m of the watercourse.

- Gravel and compact a pavement either side of major crossings.

4.6 Table drains:

- Must be correctly formed to ensure water does not channel onto road.

- Rock fill or bitumise table drains where required or at erodable sites.

4.7 Off-shoots:

- Off-shoots must be sufficient in number to prevent table drain erosion.

- Off-shoots from dieback forest drainage must not discharge into dieback free forest. If necessary, the water must be carried in the road side drains until it can be discharged into sump or vegetation filters clost to the water course.

- Off-shoots into dieback free forest to be kept to a minimum. Wherever possible these off-shoots should be at the lowest point in the topography.

- Off-shoots must have a flared outlet into a vegetation filter strip or silt sump.

- Care to be taken when locating off shoots near stream zones, to ensure adequate vegetation filter to prevent siltation.

4.8 Safety:

- Sign posts and roadside scrub clearing will be to T.I.R. requirements.

- Where consistent with Hygiene practices, an economic system of one way roads should be adopted.

5. Hygiene Requirements For Roadworks

5.1 Construct roads only in dry soil conditions:

- When travelling from Dieback forest into Dieback-free forest, all vehicles and roadworking machinery are to be inspected and cleaned down if required, at designated clean down points.

  - This is the responsibility of Bunnings.

- Clean down point to be on boundary of dieback downslope of roadside, draining from road to diseased forest.

- Clean down point to be signposted and to have hard surface for machine to stand on e.g. reject sleepers or belting, surface to be kept clean.

Contractor to supply own cleaning equipment and CALM specified fungicide. Spray clean down points with fungicide as directed by CALM Officer.

5.2 Road Works

- Clear and form. Construction dry soil: Minimise width of clearing on roads used for short periods. Roads planned for heavy use to have allowances for corners to be straightened.

  Construction Moist Soil: This can only be considered for extensive roading inside dieback and should be discussed by Road Working Group at the planning stage.

- Trees will be pushed to meet dieback hygiene requirements. Sawlogs will be removed from pushed trees at a previously agreed time which does not compromise hygiene.

- At the time of road construction suitable arrangements should be made for clean down points. These should include:

  - elevation of washdown area to ensure water drains away into dieback category.

- construction of small drains may be required.

- construction of a bypass loop to the upslope side of the wash down point for exiting traffic.

- Gravelling to be carried out during dry soil conditions. Use gravel from dieback-free pits whenever possible. Infected gravel only for roads passing through dieback forest. Use pits within the coupe whenever possible (in situ gravel), to avoid carting gravel across dieback boundaries.

  Small stockpiles of suitable road surfacing material should be established at the time of construction in areas likely to cause problems.

- The main objective of grading is to shape the road profile and to clean table drains to improve drainage off and away from road surface.

- Culverts - If moist soil accumulates on machinery during culvert installation, machine must be washed down before leaving culvert.

- CALM Officer should cross check all prescriptions in the Dieback Hygiene Manual.

5.3 Road Maintenance - Winter

Road maintenance by hand e.g. cleaning culverts and filling pot holes should be undertaken regularly where necessary and not confined to winter. Maintenance requiring machinery in winter, only with District Manager's approval provided specifications for wet soil operation are used.

6. General

6.1 C.A.L.M. reserves the right under the CALM Act to close any road at any time.

6.2 Where wet soil roads deteriorate or break up to the stage where road maintenance is outside the above guidelines, the road will be closed until it can be repaired under suitable conditions.

6.3 No by-passes to be built around bogs.

6.4 Any failure in a wet weather road resulting in road closure should be investigated by CALM and industry to ascertain the cause and prevent repetition if possible.

6.5 Gravel pits developed specifically for logging operations are to be closed when the logging is complete. All pits and their associated access roads are then to be rehabilitated by industry.

PART FOUR

COUPE CONTROL SPECIFICATIONS (Reviewed by Working Group 15/7/85)

1. Objective

To prescribe uniform standards to minimise environmental damage within coupes and sub-coupes for all jarrah logging operations in the Northern Jarrah Forest.

2. Scope

Coupe control specifications apply to coupe planning and demarcation, pre-logging operations, logging operations and post-logging operations to a sub-coupe level.

3. Planning - Logging Coupes

3.1 To provide for the application of a uniform standard in the selection of coupes for logging within the annual cutting plan, the following will be considered:

3.1.1 Within DRA must conform with the most recent Dieback Policy e.g. Dieback Policy 1982.

3.1.2 Within DRA will have recent 70mm photography Dieback-free and vegetation maps unless evidence can be produced that a map of equal accuracy can be produced from ground stripping. Outside DRA ground assessment and interpretation for dieback presence may be used if 70mm maps are not available.

3.2 1:25,000, 70mm photography, hygiene maps are to be prepared (by District) indicating:

3.2.1 External boundary of proposed two year cutting area.

3.2.2 Nominated "special care" influence zones e.g. stream reserve, protective vegetation filter strips. These are indicated by white painted cross as for coupe boundaries.

3.2.3 Site susceptibility classification based on vegetation and geomorphological types.

3.2.4 Existing and proposed access roads (refer to Roading specifications).

3.2.5 Coupe boundaries are to be positioned so that:

- Coupes are situated within one macro catchment area, with the strategic placement of the boundary high in the profile following the catchment boundary

  OR

- Boundaries should use roads, waterways, reserve boundaries or dieback boundaries low in the profile where possible.

3.2.6 Those dieback-free sub-coupes likely to be moist soil logged, must be restricted to "Havel" vegetation types with acceptable dieback impact.

3.2.7 Each sub-coupe area and its boundary will be determined using the following standards:

3.2.8 Each sub-coupe will be nominated as either `dry' or `moist' soil, but not both and should be confined to a single dieback risk category.

3.2.9 Sub-coupes will be totally situated within a self contained draining micro catchment, ensuring that water does not flow from one sub-coupe to another.

3.3 Utilizing the above information, 7-Way Tests for each coupe are required to define:

- Whether risk of spreading dieback, impact and consequences are acceptable.
- Soil moisture conditions for logging.
- Dieback hygiene conditions for logging.

N.B. 7-Way Test requirements must also be met for roading (see Roading Specifications).

3.4 Logging operations - Moist Soil Conditions

- Any decision on moist soil conditions should be determined in the field.

3.4.1 Summer stoppages - dieback free.

- Areas logged during this period are of the higher risk type, however, level of inoculum should be at its lowest.

- Machinery should stop, following rain, when large pieces of soil (see glossary) adhere to the tyres and mud-guards.

3.4.2. Summer stoppages - dieback.

- If heavy rain occurs and soil type is susceptible to bogging, logging will be transferred to a suitable area.

3.4.3 Winter stoppages - dieback free.

- These areas will be of the lower risk type vegetation. Detail could change as research develops. The latest guide is Flow Chart No. 3 17/6/85.

- Machinery should stop operating, following rain, when large pieces of soil (see glossary) adhere to the tyres and mud-guards.

4. Pre-Logging Operations

A CALM Officer is responsible for establishment and supervision of coupes.

4.1 Coupe boundaries to be identified by white painted crosses around total cutting area - crosses facing into coupe.

4.2 . Dieback risk boundaries must correspond to hygiene plan boundaries. These are demarcated by CALM Officer. These should be checked by experienced interpreters (or experienced District personnel) for accuracy before operations commence.

. These boundaries are to be taped yellow and blazed on 3 sides - 2 blazes will face along the line and the third will face into dieback bush. All blazes to be painted yellow.

4.3 . CALM Officer and Bunnings Foreman demarcate sub-coupe boundaries with red flagging tape increasing to three red tapes on corners and defined junction points.

. "Special care zones" are demarcated by CALM tree marker with white painted crosses on one side facing sub-coupe area.

- Amenity screens (on road reserves) 100/200 metres in depth, depending on locality, and bordering roads or tourist attractions, to be created at the discretion of the District Manager. Line of sight reserve may be necessary on steep slopes. These screens will be reserved from general cutting, although a light improvement cut accompanied by cull felling may be permitted in mature pole stands, and thinning by felling may be permitted in pole stands.

4.4 Landings and Snig Tracks

4.4.1 Landing and snig track herring bone pattern must be planned and demarcated for each sub-coupe by the CALM Officer and Bunnings Foreman, after considering economic snig distance.

4.4.2 Landings must be situated low in the profile and operated under split phase logging techniques within dieback free forest. Conventional logging methods may be used in dieback forest. Landings and snig tracks are marked by red and white tape with flagging or are blazed or both.

4.4.3 Frequency of landings is to be minimised to avoid unnecessary soil compaction over the coupe.

4.4.4 Clearing debris to be placed clear of retained stems and preferably in openings.

4.4.5 Landing to use existing gaps and be of sufficient size to store all logs to be removed from the block if operating under conditions of 2.8.3(a).

4.4.6 Area prepared for long butting etc.

4.4.7 Area provided for stacking reject logs suitable for salvage or M.F.P.

4.4.8 Entry for snig track to prevent drainage onto winter landings.

4.4.9 Safety for personnel and machines on landing.

4.4.10 `Clean down' point for machines entering fallers block or sub-coupe.

4.4.11 Turbid water must be released into a table drain or vegetation and not directly into

streams and particularly not those used for domestic water supply.

4.4.12 Snig tracks must be located outside Stream Reserves, (see Water Quality Specification) and must not be located in or adjacent to water courses. CALM Officer to approve crossing non-reserved streams.

4.4.13 Parking Bays

- Where necessary a 6m wide undisturbed strip left between the haul road and the edge of the landing to act as an erosion control buffer.

4.5 Coupe prescriptions to be presented to Bunnings before cutting commences.

5. Logging Operations

Within logging plan areas the order of logging in dieback, uninterpretable and dieback-free forests will be flexible, depending on specific hygiene requirements of the logging plan.

Areas with snig distance exceeding 400m should be highlighted on coupe plans and jointly field inspected prior to silvicultural marking.

5.1 Logging method varies between Dieback categories.

5.1.1 Conventional logging methods may be used in the cutting of dieback forest. Separation of the snigging and loading, and hauling phase is not required.

- However, no plant or equipment may cross dieback boundaries from `dieback' to `disease free' unless it is cleaned.

5.1.2 Logging operations in:

- Dieback-free and uninterpretable will be based on the split-phase logging system.

- Snigging for each landing must be separated from hauling i.e. Under agreed modified split-phase methods.

  - Skidders construct major snig tracks.

  - Within coupes, machinery must work systematically through the coupe, from sub-coupe to sub-coupe as each

is completed. See pt 6.4.

- Machine operators and fallers must not damage crop trees marked by orange or blue band of tape or paint.

- Trees marked specially for removal regardless of damage are painted with a cross on 2 sides plus a paint dot on base for direction of fall. Use the same colour paint as for retention. When marking for general removal use axe for blazing and toe marking.

- Crop tree protection will be carried out according to Bunnings license requirements.

5.2 No machine to enter a Stream Reserve in the course of logging operations without CALM Officer approval.

- Trees leaning into Stream Reserves and trees within Stream Reserves leaning into a sub-coupe to be inspected by CALM Officer with a view to removal based on specifications for water quality control.

5.3 During logging and environmental control operations it is essential crop trees and groups of quality poles and saplings are protected from damage where designated by the CALM Officer, conditions in the Sawmilling License apply. Groups marked by orange or blue tape band with knots facing outwards. Trees to be felled out from or into protected groups will be blazed and toe marked or paint crosses and dot for directions as in para 5.1.2.

5.4 CALM Officer uses yellow tape for trees missed and needed to be felled: Yellow band with long flag for logs left.

5.5 Where dieback hygiene prescribes hygiene cleandown on entry to, or exit from a coupe, or sub-coupe, it applies to <u>all</u> plant and vehicles.

- Cleandown must be at a point nominated by the CALM Officer where disease spread will not occur.

5.6 Logging will cease when soil is wet and soil type is <u>susceptible</u> to deep ruts and bogging of machinery. These areas should be logged in summer dry soil conditions or when conditions become favourable.

6. Post Logging Operations

6.1 All landings, nominated temporary haul roads, and any other areas as the CALM Officer and Bunnings Foreman specify, must be rehabilitated.

6.2 Site rehabilitation by Bunnings may involve:

6.2.1 Any action where logs were stacked - generally there has been little disturbance of soil.

6.2.2 Ripping the working section of landing. Ripping along contour preferred.

6.2.3 Heaping long butts etc. in gap as directed by CALM Officer, access by public to be considered.

6.2.4 Stacking and access to salvage on M.F.P.

6.2.5 Possible restacking of clearing debris to best advantage for regeneration and protection of forest.

6.3 Timing of rehabilitation to be decided in liaison between District Manager (CALM) and Bunnings.

6.4 Erosion control works must be completed by Bunnings, immediately after logging a sub-coupe prior to last machine moving to next sub-coupe.

6.4.1 All snig tracks and those roads not listed for fire control purposes must be cross drained and blocked if required.

6.4.2 At any stage during operations in a sub-coupe the CALM Officer may inspect and draw to the attention of the Bush Boss unsatisfactory aspects. These are indicated on the Coupe Control Sheet. Bush Boss and CALM Officer both sign the sheet.

6.4.3 Sub-coupes are <u>not</u> to be certified completed until erosion control has been carried out to the prescribed standards. Once certified, Bunnings responsibility for the area ends.

6.5 <u>Erosion Control Standards</u>

Interceptor Cross drain specifications -

6.5.1 Spacing of the cross drains will be in accordance with slope and soil type as shown below:

Erosion Control Cross-Drain Spacing

Slope	Lateritic Gravels	All Other Soils
0 - 2°	Nil	Nil
3 - 5°	200m	200m
6 - 10°	100m	50m
11 - 15°	60m	30m
16 +	30m	15m

6.5.2 Banks to be 40cm high and 40cm thick, (but not excessively engineered i.e. must control peak run-off) or debris can be used as an alternative.

6.5.3 Angled at 100° to flow of water.

6.5.4 Outlet flared directing water into vegetation silt traps without ponding. Must not divert water into another drainage line.

6.6 The CALM Logging Officer has "frontline" responsibility for ensuring all of the aforementioned environmental standards are maintained in liaison with Bunnings. For this, soil conditions and topography need to be taken into account.

7. SUMMARY OF SIGNS AND MARKINGS

7.1 Single red tape - ridge line if marked.

White blaze on 4 sides - if ridge line to be permanent.

7.2 Red single tape - sub coupe boundaries (para 4.3)

7.3 White painted cross - Coupe boundary & Amenity & Portection areas (para 4.1 & 3.2.2)

7.4 White single tape - Fallers block where applicable.

7.5 Yellow tape with flagging - Trees missed and felling required and utilisable logs left in bush. (para 5.4)

7.6 Three yellow painted blazed on three sides with yellow tape band - dieback boundary (para 4.2.2)

7.7 Orange or Blue painted band or tape - retention and protection (para 5.1.2)

7.8 Orange or Blue tape band with knot facing outwards - protection of groups (para 5.3)

7.9 Red and White tape bands with flagging or blaze o both - Location of landings and snig tracks (para 4.4.2)

7.10 Blazed and toe marked trees - Where general marking for removal (para 5.1) trees to be felled into protected groups, (para 5.3)

7.11 Orange or blue paint cross on 2 sides with paint dot at base - trees marked for special removal regardless of damage. Paint dot gives falling direction (para 5.1.2).

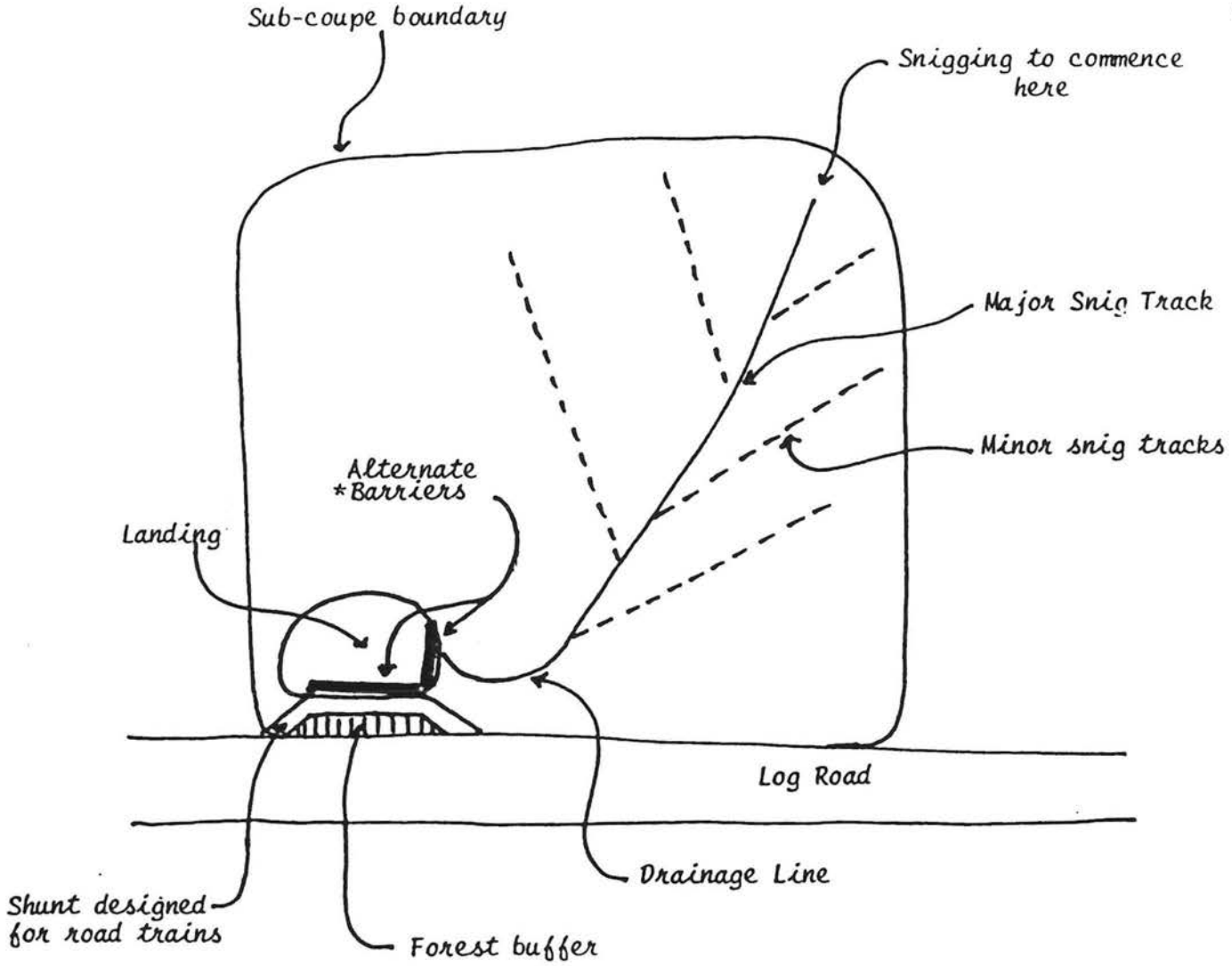


PLATE NO. 1 (not to scale)

* See Logging Techniques p. 7 for various systems and location of barriers.

FIRE MANAGEMENT - ENVIRONMENTAL PROTECTION SPECIFICATION

(No changes at 1985 review)

1. Objective

To provide guidelines for use of fire in association with logging that will minimise environmental impact and provide silvicultural advantages.

2. Scope

All prescribed burns in Northern Jarrah Forest in particular those over recent, or proposed logging areas. Burning is a flexible treatment tool.

3. Strategies

Provide prescriptions for prescribed burning operations which may cover:

Advance burning - fuel reduction (where applicable)
Top disposal burning
Stream zone reserves
Dieback
Silviculture - Protection and vegetation
Aesthetics - Major tourist routes and recreation facilities.
Amend master burning plans to suit objectives.
Control - review master burning plans in conjunction with 4-year logging plan.
Prescribed burning to be coordinated with 70mm photography.

4. Operations

1. Areas within 3km of dams and reservoirs are not to be burnt within 2 years of logging operations..

2. Stream zones and filter strips must have a minimum fuel tonnage of 5 tonnes/ha and must be maintained in an unburnt condition for 2 years following burning in the logging area.

3. Dieback - No burning of logging area within 3 years of demarcation - Burning removes indicator species.

Burning to promote acacia and regeneration to be carried out during Autumn.

4. Silviculture - Burning regimes to provide for:-

Protection of established regeneration

according to age, height, etc.

This includes the use of strategic buffer burning.

Burning for removal of tops and creating ash beds to promote regeneration in the logged areas. Select seed year if necessary.

5. Aesthetics - Prescribed burns associated with major tourist routes and recreation facilities should be carried out initially in Autumn with burning rotation changing periodically.

6. Suppression Action

Any fire occuring in the licence area shall be dealt with under conditions specified in Forest Produce (Sawmilling) Licence.

WATER QUALITY CONTROL SPECIFICATIONS

(Reviewed by Working Group 30/7/85)

1. Objectives

1.1 To prescribe treatments on harnessed catchments for logging operations that will limit stream siltation (turbidity) to a maximum fo 50 N.T.U.'s on harnessed streams. Stream salinity will be monitored on an ongoing basis. Logging proposals will be reviewed by Research Branch to ensure there is no long term increase in salinity.

1.2 To prescribe treatments on non harnessed catchments.

1.3 To ensure adequate environmental protection for all Stream Reserves in the Northern Jarrah Forest.

2. Scope

2.1 All logging coupes and sub-coupes in Northern Jarrah Forest Catchments.

2.2 Stream Reserves on all second order (and greater) streams within catchments in the Northern Jarrah Forest adjacent to logging operations.

2.3 Where appropriate, additional streams zones may be protected as the need is indicated by field checks of vegetation and topographical characteristics.

3. Strategies - logging operation treatments

3.1 Siltation

- Each area for logging must be considered individually for turbidity risk. This will depend on proximity to reservoirs and major water courses, soil susceptibility to erosion and damage, and location of haul roads. Specific requirements for turbidity control must be discussed with the Metropolitan Water Authority (M.W.A.) for sensitive areas prior to logging.

    - Stream reserves must be provided at the standards specified (see 4 below) to achieve necessary filtering to maintain this standard.

- Harnessed Catchment controls include:

    - Special attention to buffers and filters is required for winter logging in a pipe head domestic supply catchment (e.g. North Dandalup).

- Special attention to buffers and filters is required within 500m of top level of a terminal reservoir, e.g. South Dandalup or terminal domestic reservoir/dam e.g. Wellington

- In summer, logging within 500m limit of top water level of a terminal reservoir or terminal domestic reservoir must have prior approval of the water authority. All limitations should take into account soil type, slope and vegetation.

- Non Harnessed Catchments

  - Winter and summer logging is acceptable in all other catchments provided:

    - no logging or new roadworks are within 100m of top water level of any water body or as specified by the District Manager.

    - burning and roading conform to Fire Management and Industry Roading Specifications respectively.

Footnote

Point of measurement of turbidity levels to be the closest practicable point of a stream to the logging operation.

3.2 Salinity:

3.2.1 Water quality may be adversely affected where salt is leached into streams.

3.2.2 Of great significance in relation to logging operations are the low (900mm p.a.) and intermediate (900-1,000mm p.a.) rainfall zones. Storage of salt in the subsoil is generally high in low rainfall areas, and is variable in amount in intermediate rainfall areas.

3.2.3 Increased runoff and increased movement of water through the soil with logging operations may increase stream salinity particularly in the zones mentioned.

3.2.4 Controls:

- In jarrah thinning operation should retain:

  (a) $10m^2$/ha basal area in high rainfall zones (1100mm p.a.).

  (b) $15m^2$/ha basal area in intermediate and low rainfall zones.

  N.B. Above are average B.A.'s over total area tested.

3.2.5 Logging for jarrah and wandoo regeneration in low rainfall zones is acceptable provided regeneration is guaranteed to a predetermined success criterion.

Footnote

4 year logging plan should ensure that logging for regeneration does not significantly reduce evaporation - transpiration within any catchment at any time.

3.3 Soil damage level, rehabilitation requirements and techniques, and erosion control to ensure both soil conservation and water quality control are defined in Coupe Control Specifications.

4. Stream Reserve Specifications

4.1.1 All second order (and greater) watercourses within a 3km radius of a catchment reservoir must have a protective vegetative filter buffer.

4.1.2 Width of buffers is dependent on vegetation type, slope and soil susceptibility to erosion and will be provided at a width specified by the District Manager. Buffer width shall be measured from the point of change in stream zone vegetation. In general the following guidelines apply.

4.1.3 Rivers and large permanent streams minimum of 100m width buffer each side of watercourse.

4.1.4 Other streams minimum of 50m width buffer each side of stream.

4.1.5 All second order (and greater) watercourses outside of 3km zone.

Rivers and large permanent streams minimum of 50m width buffer each side of watercourse.

Other streams minimum of 25m width buffer each side of stream.

4.2 Where logging operations are undertaken in non-harnessed catchments stream reserve positioning and width will be at the discretion of District Manager who will take account of vegetation type, slope and soil susceptibility to erosion.

Logging operations must however meet all management specifications.

4.3 Management

These specifications apply equally to harnessed stream reserves and non-harnessed catchments.

Fire Management - Environmental Protection Specification

4.3.1 Program burning to exclude fire from stream reserves for the period 2 years before and 4 years after logging of adjacent coupes. Where burning is necessary within stream reserves outside this period, only ignite under low F.D.I. No scorch is to occur.

4.3.2 Where consistent with objectives laid down under "Item 4 - Fire Management - Environmental Protection" program burning of stream reserves for Spring to allow the vegetation to recover and stabilise the soil before the winter rains.

5. Logging

5.1 No machine to enter a stream reserve in the course of snigging operations.

5.2 Falling of trees leaning into a stream reserve is dependant upon:

(a) the silviculture need to remove individual trees.

(b) likely damage to soil and vegetation.

(c) predicted location of tops i.e. not to enter the water course.

(d) ability to recover logs without entering the reserve.

5.3 Falling of trees within a stream reserve is prohibited unless:

(a) the tree is dead or dying.

(b) the tree is unsafe.

(c) the tree poses a future fire hazard.

6. Roading

6.1 No new roads to be located within a stream reserve. Minimise use of existing roads within a stream reserve.

6.2 Cross stream reserves as close to but not at 90^{o} i.e. to enable control of drainage.

6.3 Minimise disturbance when constructing crossings.

6.4 Use pipe or bridge crossings only where required. All temporary crossings approved by District Manager.

6.5 No snig tracks are to enter a stream reserve.

7. Siltation

Minimise amount of silt entering stream reserve by use of silt traps, sumps, vegetation screens etc.

8. Dieback

Dieback free stream reserves are to be protected from infection by:

(a) Channelling run off as low as possible before entry.

(b) Practising maximum hygiene on adjacent roads and logging coupes.

GLOSSARY OF TERMS

- **Basal area:** The area of the cross section of a stem, usually of a tree at breast height (1.3m above the ground on the high side of the tree). When applied to a crop, the sum of the basal areas of all stems or the total basal area per unit of area.

- **Base flow:** That part of runoff that is not storm flow. Sustained by outflow from groundwater acquifers, perched water tables and the slow drainage of unsaturated soils.

- **Blaze:** A shallow excision removing a portion of the bark, with or without wood, from a tree, so as to leave a visable mark for purposes of identification.

- **Buffer:** An area of land managed in such a way as to protect another area from outside influences.

- **Catchment area:** The total area draining into a given waterway or reservoir.

- **Cleandown:** The process by which soil and other material is removed from vehicles and machinery. Water, air or brushing may be used as an agent for cleaning down, depending upon whether mud or dust is to be removed.

- **Conventional logging:** Not split-phase, ie. no barrier between loading and hauling.

- **Coupe:** The only area in a locality to be cut by a licensee during a particular year.

- Cut over: An area that has been logged, by whatever method.

- Deep Side Drains: Of a size to handle estimated volume of water, but not too large as to be a safety hazard.

- Dieback Disease: In Western Australia, the effects of the root rotting fungus P.cinnamomi.

- Dieback-free forest: Forest apparently free of dieback infection.

- Dieback disease risk: The liklihood of introduction of P. cinnamomi to a locality by either natural or artificial spread.

- Dieback tolerant forest: Forest in which site factors or species combine so that tree deaths will not occur if P. cinnamomi is introduced.

- Dieback Risk Areas (D.R.A.): Amendments to the Forest Act in 1974 allowed for the proclamation of State Forest disease risk areas to "control and eradicate" such forest diseases as are detected in such quarantined areas.

- Disease Impact: Likely effect of introduction of dieback to a particular site.

- Disease Risk Categories: As from Hygiene Maps.

  Secure Dieback-Free: Forest apparently free of dieback and upslope from dieback, uninterpretable, and NEQ roads.

  Low Potential Risk: Forest apparently free of dieback but downslope from dieback, uninterpretable or NEQ. Considered to have a low potential for infection by P. cinnamomi by natural spread.

Uninterpretable: Forest in which susceptible plants are absent or too few to enable the interpretation of P. cinnamomi presence or absence.
N.E.Q.: Forest adjacent to roads in which there is a potential for incipient disease.

High Potential Risk: Forest apparently free of dieback or uninterpretable, but downslope from or in the same swamp as dieback or suspect. Considered to have a high potential for infection by P. cinnamomi by natural spread, in free water.

Suspect: Forest in which the evidence for P. cinnamomi presence or absence is inconclusive.

Dieback: Forest areas which show current dieback symptoms and are supported by laboratory recoveries of P. cinnamomi from soil and tissue samples.

NB: NEQ -Not effectively Quarantined: Roads, track within the disease risk area that have had considerable use throughout all seasons with an unknown degree of hygiene.

Incipient Disease: Forest in which P. cinnamomi may be present but symptoms are yet to appear.

- First Order Stream: Drainage pattern Grading to a second order stream - rarely has surface flow.

- Harnessed Streams: Any stream that flows into a Water Authority Dam in use.

- Infect: To establish a pathogenic relationship with a host plant.

- Intercepter cross drains: Prevent the accumulation and concentration of water and reduces its velocity.

- Large pieces of soil: Large pieces of soil are defined as the condition where soil moisture is sufficient to cause soil plasticity where soil and/or root material adhere in small or large lumps to machinery.

- Management Priority Area: An area of forest managed according to its dominant use under a Land Use Management Plan.

- Pipe Head Dam: A holding area for water on route to a terminal reservoir.

- Salinity: Where salt is leached into a stream or area of water.

- Second Order: All streams shown on CALM 1:50,000 sheets or indicated by W & C vegetation type.

- Sedimentation: Refers to the deposition of all material across the full range of particule size downstream from a source of disturbance.

- Shunt: A spur road off a haul road which is used to service a landing some distance from the main haul road.

- Siltation: Refers to the deposition of particles larger than clay but smaller than sand i.e. silt.

- Soil Drought Index (S.D.I.): Reflects changes in soil moisture and flammability of heavy fuels. It indicates suppression difficulty and further reflects influence of long term past weather.

- Stockpiling: Accumulation of logs during dry soil conditions on the sawmill landing or on landings in the bush; to enable restriction of snigging activity during period when soil is predisposed to damage and when risk of dieback spread is greatest.

- "Special Care Zones": Whithin coupes are slopes and gullies steeper than 20^{o}, Stream Reserves, filter strips or Road Reserves.

- Split-Phase Logging: All logs to be snigged and stacked on the landing before loading out can commence, or the snigging and loading operation is separated by a physical barrier.

- Stream Reserve: A strip of vegetation of a specified width located along particular watercourses from which logging is excluded.

- Sub-Coupe: A nominated area servicing a bush landing. Situated within a self draining micro-catchment. A sub-coupe may contain several fallers blocks.

- Turbidity: Discolouration of water due to suspended silt or organic matter.

  Turbidity measurement is based on comparative light scattering, the units being Nephdometric Turbidity Units (N.T.U.).

. Watercourse:	A river, stream or creek in which water flows in a natural channel whether permanently or intermittently.
. Wet Soil:	See Large Pieces of Soil.