PREFACE

This edition of the "Manual of Management Guidelines for Timber Harvesting in Western Australia" (the Manual) replaces the January 1996 edition of "Timber Harvesting in WA ".

The Manual complements the current edition of the Code of Practice for Timber Harvesting in Western Australia (the Code).

As well as providing management guidelines, the Manual includes some quantifiable measures required to implement the Code, together with specifications for all log products, and some important administrative procedures associated with log harvesting. For plantation harvesting operations, reference should also be made to the "Code of Practice for Timber Plantations in Western Australia", published in 1997.

The Manual may be amended from time to time, as improvements to procedures are identified. Amendments will apply as dated and their effect on harvesting contracts will be taken into account by CALM.

The Manual is distributed to all CALM Regional and District offices in the south west, to all Forest Officers involved in timber harvesting, and to all CALM harvesting contractors. Members of the public may purchase the Manual at $15.00 per copy.

The amendments to the Manual published in this document now apply.

Syd Shea
EXECUTIVE DIRECTOR

March 1999

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1.1 HARVESTING AND REGENERATION PLANS

PART A - NATIVE FORESTS

1. **Responsibilities**

Short and medium term native forest harvesting and regeneration plans are prepared for the State Forest Resources Business Unit (SFRBU) by the Regional Forest Management Branch offices in the Swan Region and Central Forest Region (CFR) and by the Forest Resources Planner in the Southern Forest Region (SFR).

Responsibilities for preparation of the long term integrated plan for native forest harvesting is as stated above but the Regional Manager is the authority responsible for recommending the plan for approval by the Director of Forests.

In all cases, planners must produce integrated plans and consult with Regional staff, District staff, Specialist Branch staff and, where relevant, timber industry representatives during plan preparation.

2. **Plan Types**

2.1 Long Term Integrated Plan

This is a strategic level (primary level) plan which, at the time of preparation, shows the most likely direction harvesting will take for the period of the plan.

Due to the long term nature of the plan (a minimum of 30 years) it is highly likely that circumstances will change during the plan period. Thus the plan should be considered indicative only.

One plan per supply area is produced at least once every 5 years.

Primary users of the plan are the Director of Forests, Forest Management Branch, the SFRBU, Regional Managers and planners.

2.2 Medium Term Integrated Plan

This is the secondary level integrated harvesting plan which shows in more detail the direction of harvesting over the next 7 years (Swan, CFR) and 7 to 12 years (SFR).

(Note: shorter term medium term integrated harvesting plans may continue to be produced until sufficient staff time is available to produce the 7 & 12 year plans.)

One plan per supply area is produced each year

Primary users of medium term integrated harvesting plans are SFRBU cell managers, Districts, Regions, Forest Management Branch and planners. These plans shall contain the following information, as a minimum:

(1) Regional summary of available resource.

(2) Estimate of product yield in detail.

Maps:

(1) a 1:500,000 (approx) plan showing approximate locations of proposed cutting areas for each year of the plan.

(2) 1:50,000 block plans showing:

- name of block
- boundary of each harvesting year
- compartment number

Additional information should be shown as it becomes available eg., Visual Landscape Management (VLM) zones, silvicultural status.

2.3 Short Term Integrated Harvesting and Regeneration Plan.

This is the tertiary level integrated harvesting plan which shows in detail proposed harvesting areas over a one or two year period. The short term plan takes into account the principles contained in "Guidelines for Integrated Forest Harvest Planning and Design".

One plan per supply area is produced and issued no later than the first week of July each year.

Primary users of the plan are SFRBU staff, District staff, Regional staff, and Contractors.

These plans shall contain the following information as a minimum:

(1) Contract of Sale details (ie. commitments).

(2) Predicted yield summary (where possible in "soil movement" or "no soil movement" categories).

(3) Predicted yield details (where possible in "soil movement" or "no soil movement" categories).

The plans shall include:

(1) A 1:250,000 overview plan showing the approximate location of all proposed harvesting areas for each year of the plan.

(2) 1:50,000 block plans showing proposed harvesting boundaries and major access - also shows CALM grid.

(3) 1:25,000 plans showing, when available :

- boundary of proposed harvesting area.
- "with soil movement" harvesting areas.
- "no soil movement" harvesting areas.
- CALM mapping grid.
- at least one major cross road.
- river and stream zones, if known; if not, rivers and streams to be highlighted and FOIC to determine order in field.
- VLM buffers as they become available.
- special care zones (eg., areas close to domestic dams - refer Section 4.1 of this Manual).
- research and inventory plots.
- strategic burning buffers.
- contours.
- travel route zones (road reserves).
- lignotuber status.
- areas previously cut over.
- no entry areas.

In addition to the above, hygiene maps are issued to SFRBU cell managers, enabling *Phytophthora cinnamomi* hygiene plans to be prepared for each cutting area as necessary.

3. **Plan Amendment**

Short term harvesting and regeneration plans can only be amended by the planning officer. Amendments must be approved in writing by the appropriate SFRBU cell manager.

4. **Units of Cutting**

The units of cutting in harvesting and regeneration plans must conform to the following hierarchy :

(i) Supply Area - specific name allocated by SOHQ
(ii) District (if required) - specific name allocated by SOHQ
(iii) Forest Block - specific name allocated by SOHQ
(iv) Compartment - specific number allocated by local Forest Management Branch office
(v) Coupe - specific number allocated by local Forest Management Branch office, or FOIC if not already allocated
(vi) Sub-coupe and/or feller's block - specific names or numbers allocated by FOIC.

5. **Public Inspection**

Short term plans are available for public inspection at relevant Regional and District offices. Plans may only be inspected in the presence of the FOIC, the SFRBU cell manager, the planner or the District Manager.

Medium term and long term harvesting plans are available for public inspection at the relevant Regional office in the presence of either the Regional Manager, the SFRBU cell manager or the planner.

In all cases inspections are by appointment only.

6. **Pre Harvesting Checklist**

The Pre Harvesting Checklist (CLM 109) is designed to ensure nothing is overlooked by planners or the FOIC. A minimum of one CLM 109 must be prepared for each forest compartment in which harvesting is planned, and for each discrete road construction operation.

Preparations for harvesting or road construction cannot commence until the relevant CLM 109 has been signed by the Planning officer and the Regional Manager (or his delegate).

7. **Field Plans**

In most cases it is necessary for the Forest Officer in Charge of a harvesting operation to be in possession of a relatively large scale field plan. The field plan is used to record the progress of cutting and extraction, and the progress of any silvicultural treatments. The certification of completed harvesting areas (refer Spec. 4.5) should relate directly to the field plan.

8. **Records**

SFRBU or District staff must maintain up-to-date field records of areas cut over and silviculturally treated. Forms for input into the computer system “SILREC” will be collated every six months with assistance from Forest Management Branch.

PART B - PLANTATIONS

1. **Responsibilities**

Plantation harvesting plans are prepared by the relevent business unit in consultation with other branches, and Districts.

2. **Plan Types**

For softwood plantations, three levels of harvesting plans are produced:

2.1 20 year resource plan - a long term rolling plan, issued in January each year.

2.2 5 year plan - a medium term rolling plan issued in October each year. This plan includes landscape (VLM) considerations.

2.3 One year harvesting plan - issued in June each year. This plan details the following information

- areas to be cut
- cutting prescriptions (CLM 709 forms)
- reserve areas (including research areas, VRM, water and other environmental considerations)
- method of harvesting
- terrain information (flat, steep, winter, summer)
- contractor and customer information
- mill distances
- yield prediction

3. All cutting must be approved by the relevent business unit manager.

4. The business unit cell or area manager, or FOIC, must discuss all proposed cutting areas with the relevant contractor's representative, and carry out joint site inspections prior to commencement of cutting.

5. Prior to any establishment work, a management plan for second rotation establishment must be prepared. Also see Code of Practice for Timber Plantations in Western Australia.

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

PRE HARVESTING CHECKLIST (NATIVE FORESTS)

A CLM 109 must be completed prior to any integrated harvesting operation on State forest and prior to any clearing or felling of trees on State forest associated with road construction. The maximum area to be covered by one CLM 109 is, in normal circumstances, a compartment.. For road construction, one CLM 109 must be completed for every discrete operation, as decided by the relevant SFRBU Cell Manager. Approval of a CLM 109 signifies formal approval for an area to be harvested, or for clearing or felling of trees for road construction. In answering each question on this checklist, write "Yes", "No", or "N/A" where required.

PART A : THE AREA

Compartment and coupe number(s) : ..... LOIS operation code(s) : .....

Brief operation description :.....

Nominated harvesting year : .....

PART B : THE CHECKLIST	**CHECKED**		**ACTION REQUIRED**		**COMPLETED**	
B1 : To be completed by the planner(s)	**Initials**	**Date**	**Details**	**By (name)**	**Initials**	**Date**
What is the land tenure? ..... (NOTE : Timber harvesting is permitted on State forest, Timber Reserves and Executive Director land only).						
Are there any proposals to change the tenure of any part of the area? (Refer to CALM Management plans, DPUD Regional plans, etc) If "Yes", provide details :						
Is any part of the area subject to a Forest Lease or land exchange? If "Yes", provide details :						
Does any part of the area adjoin current or proposed National Park or any other conservation Reserve? If "Yes", have such boundaries been accurately surveyed?						
Have prescribed minimum road, river and stream zone widths been indicated on the coupe harvesting or concept plans for the area?						
In What rainfall zone does the area lie?						
If the area is in the intermediate or low rainfall zone of the multiple use jarrah forest, does the harvesting prescription ensure that at least 30% of each second order catchment have a retained basal area of at least 15 m^2/ha? (Refer "Ministerial Condition" 12.1, 24 December 1992).						
Have road alignments and landing areas been inspected for Declared Rare Flora? If "Yes", provide details :						
Has the area been mapped for P.cinnamomi? If "Yes", what is the use-by-date for the P.cinnamomi map?						
Does the area contain an area identified as part of the "old growth" karri with a high aesthetic, social or environmental value (refer "Ministerial Condition" 7.1, 24 December 1992) such that it must be excluded from harvesting?						

	CHECKED		ACTION REQUIRED		COMPLETED	
	Initials	**Date**	**Details**	**By (name)**	**Initials**	**Date**
Has the area been checked for "diverse ecotype zones" (refer "Ministerial Condition" No. 6, 24 December 1992) which must be excluded from harvesting? If "Yes" provide details :						
Have prescribed coupe size limits been followed?						
Has the Aboriginal Sites Register Data Set been checked? Does the area involve a Registered Aboriginal Site? If 'Yes', provide details.						
Are there any known non-indigenous cultural (archaeological, historical) sites on the area that need to be excluded from harvesting? If "Yes" provide details :						
Are there any Inventory or Research plots on the area that need to be excluded from harvesting?						
Is the area subject to any current water catchment studies? If "Yes", provide details :						
What is the Visual Landscape Management Zone for the area? Zone : ..... Has the harvesting plan been modified accordingly?						
Do the coupe harvesting plans for the area take into account current and future planned recreation sites, the Bibbulmun track, other recreation trails, or any other sites or areas of significance?						
Have apiary site owners been notified? List :						
Has the local government authority been notified?						
Has the local Tourist Bureau been notified?						
Have adjacent neighbours been notified, including Water Corp. if applicable? List :						
Is there likely to be any conflict between log trucks and other road users such as school buses? If "Yes", provide details :						
Is an approved roading plan available of the area?						

CLM 109 (1999)

B2 : To be completed by the Forest Officer in charge	Initial	Date	Details	By (name)	Initial	Date
Is (are) the CIMCIS plan(s) completed and approved?						
Has a *P.cinnamomi* Hygiene Plan been completed? If "Yes", date approved?						
Has a Seed Forecast been conducted over the area? If "Yes", date completed? survey details held where?						
Has a Lignotuber Survey been conducted over the area? If "Yes", date completed? survey details held where?						
What is (are) the silvicultural prescription(s) to apply to the area?						
Has field demarcation for the following been completed? • Ridge lines : • Coupe boundaries : • *P.cinnamomi* boundaries : • Nominated washdown points : • Declared Rare Flora sites : • Road, river and stream zones : • Fragile areas : • Cultural sites :						
Have necessary roads been constructed/maintained to the required standards?						
Are road signs in place?						
Is (are) CLM 709 form(s) completed?						
Other checks :						

PART C : ASSOCIATED DOCUMENTS

Document Name	Original Held At	Date Approved or completed
Concept Plan		
P.c Hygiene Plan		
Declared Rare Flora Inspection		
Lignotuber Survey		
Seed Forecast Survey		

PART D : AUTHORITIES

Name	Signature	Date	
Planning Officer			All management values considered and action completed. Approval recommended.
Regional Manager			**Area approved for harvesting in the _____ harvesting year, subject to check by the Forest Officer in charge during the five working days prior to commencement of felling, and 'handover' of site via CLM 104.**
Forest Officer in charge of operation			Felling is approved to commence on _____ (date).

CLM 109 (1999)

SECTION 1 – PLANNING

1.2 *PHYTOPHTHORA CINNAMOMI* HYGIENE PLANS

1. All 'protectable' areas of native forest (that is protectable from *Phytophthora cinnamomi*) subject to timber harvesting, regeneration or forest tending activities must be covered by a *Phytophthora cinnamomi* Hygiene Plan. These plans are documents, including maps, which provide details about how human access to these areas is to be controlled and managed.

2. *P cinnamomi* Hygiene Plans:

   - are based on use of qualified interpreters to prepare maps showing occurrence of *P.cinnamomi* and protectable areas,
   - apply to whole landscape units,
   - identify all current and future activities for protectable areas,
   - reinforce the principle of machines and equipment being clean on entry into protectable areas,
   - consider the consequences of a hygiene failure,
   - list required actions and accountabilities,
   - include procedures for reviews and audits

3. Hygiene tactics available to land managers preparing *Phytophthora cinnamomi* Hygiene Plans fall into two groups:

(i)

Control of humans entering uninfested areas.

Uncontrolled and potentially unhygienic human access into protectable areas is managed by:

(a) The temporary seasonal closure of roads and walk trails with barriers, gates and signs.
(b) The permanent closure by removal and rehabilitation of roads and walk trails.

(ii) **Control of cross contamination from infested to uninfested areas.**

Cross contamination from infested to uninfested areas is minimised by:

(a) Ensuring all potential human vectors enter protectable areas via effectively designed, located and managed cleandown points. Being clean on entry into a protectable area means the removal of all potentially infested soil and plant tissue from boots, light vehicles, trucks and machines.Objects can be cleaned using a high pressure water jet, compressed air or hand tools such as spades, crowbars and brushes.

(b) The use, during specific activities, of split phase systems of work that physically separate infested and uninfested areas.

4. For more details on *Phytophthora cinnamomi* Hygiene Plans, refer to CALM's "Root Rot caused by *Phytophthora cinnamomi*" manual.

SECTION 1 - PLANNING

1.3 DRA (QUARANTINE AREA) ENTRY PERMITS

1. No vehicle, truck or harvesting machine may enter a Disease Risk Area (quarantine area) without a permit signed by a Forest Officer. This includes vehicles and trucks driven by CALM personnel.

2. All vehicles/machines operating inside a DRA must carry a DRA entry permit at all times, and be prepared to show the permit to a Forest Officer on demand.

3. In situations where a number of vehicles/machines belonging to or associated with a single harvesting contractor need to enter a specific DRA, the local CALM District may issue a single DRA entry permit to that harvesting contractor. A copy of this permit must be kept in every vehicle/machine belonging to or associated with that harvesting contractor that enters the DRA.

4. The driver or operator of every vehicle/machine entering DRA under permit must be familiar with the conditions printed on the permit document.

SECTION 2 - ROADING

2.1 ROAD PLANNING

PART A - NATIVE FOREST ROADING

1. The responsibilities for planning of native forest harvesting roads are included in the listing of "Responsibilities for Harvesting Roads" below :

RESPONSIBILITIES FOR HARVESTING ROADS			
TASK	**RESPONSIBILITY OF**	**ACTUAL WORK DONE BY**	**IDEAL TIMING**
1. Planning.			
1.1 Nomination of major road alignments, after considering other roading requirements (e.g. recreation, fire control, disease).	SFRBU cell manager	Planning officer in conjunction with SFRBU roading officer.	Harvesting year minus 2.
1.2 Nomination of "in-coupe" road alignments.	SFRBU cell manager	SFRBU roading officer after discussion with harvesting contractor.	Harvesting year minus 1.
1.3 Nomination of class of roads (i.e. major or minor) and whether roads are for (i) dry soil haulage only or (ii) all weather haulage, during consideration of overall harvesting plans.	SFRBU cell manager	Planning officer in conjunction with SFRBU roading officer.	Harvesting year minus 1.
2. Writing of standard roading specifications, i.e. clearing widths, gradients, cambers, super-elevations drainage, hygiene etc.	SFRBU cell manager	SFRBU roading officer.	Harvesting year minus 2.
3. Selection of final road alignments in field.	SFRBU roading officer	SFRBU roading officer and/or District staff.	Harvesting year minus 1.
4. Nomination of gravel sources.	SFRBU roading officer.	SFRBU roading officer and/or District staff.	Harvesting year minus 1.
5. Preparation of annual timetable for roadworks, including timetable for calling of tenders. Works to be combined or split as required in interests of efficiency.	SFRBU cell manager, after consultation with SFRBU manager and Manager, Forest Resources Services.	SFRBU cell manager or roading officer.	Harvesting year minus 1.5.
6. Preparation of documents for calling of tenders.	SFRBU cell manager.	SFRBU cell manager or roading officer and Manager, Forest Resources Services.	Harvesting year minus 1.5.
7. Approval of tender documents and advertising.	As per CALM tender and contract guidelines.	Manager, Forest Resources Services.	Harvesting year minus 1.5
8. Awarding of tenders.	As above.	As above.	Harvesting year minus 1.5.
9. Progress checking of work to ensure conformity with environmental aspects and Engineering standards.	SFRBU cell manager.	SFRBU roading officer and/or District staff.	Harvesting year minus 1.
10. Measure completed works, sign dockets authorising progress payments.	SFRBU cell manager	SFRBU roading officer.	Harvesting year minus 0.5.
11. Checks on road work quality.	SFRBU cell manager.	SFRBU roading officer.	Harvesting year minus 0.5.
12. Road maintenance.	SFRBU cell manager	Either Maintenance Contractor or CALM operations.	Harvesting year.

2. In addition to the above, the Native Title Amendment Act 1998 requires that representative Aboriginal bodies, registered native title bodies corporate and registered native title claimants, be notified of any “public works”, including roads, planned to be constructed on lands managed by CALM.

3. The relevant Planning officers are responsible for the preparation of rolling Short term (two year), Medium term (five year) and Long term (15 year) roading plans for each supply area :

   3.1 Short Term Plan - on 1:25,000 scale, showing in-coupe roading requirements.

   3.2 Medium Term Plan - on 1:50,000 scale, showing major haul road requirements.

   3.3 Long Term Plan - on 1:100,000 scale, showing likely requirements for major haul roads.

PART B - PLANTATION ROADING

1. Roading for plantation harvesting must be integrated with roading for native forest harvesting whenever possible. Thus the principles in Part A of this specification will apply where applicable.

2. Business Units must prepare annually updated five year programmes of proposed road construction together with estimated costs. For softwood plantations these plans will generally be based on the expectation that harvesting roads will be required for the first thinning of plantations when they reach approximately 10 to 12 years of age.

3. Approved road works will normally be carried out by contractors. The Business unit cell or area managers must ensure that contractors are given adequate time and that specifications for the work comply with standard instructions for road contracts. A higher standard is required for roads required for winter use. For details on plantation road standards refer to Section 5 of the Pine Management Guide and the Code of Practice for Timber Plantations in Western Australia.

4. Whenever possible, roadworks should be completed one winter prior to proposed harvesting activities. If it is necessary for roads to be used for winter operations immediately after completion, harvesting operations must then be planned so the road is "run in" by log trucks. Any weak spots exposed, prior to the onset of winter rains, will then need to be strengthened.

SECTION 2 - ROADING

2.2 ROAD SELECTION

PART A - NATIVE FORESTS

1. The responsibilities for planning of log haul routes is covered under Section 2.1. Using this information, and subject to *Phytophthora cinnamomi* (P.c.) hygiene plans, the precise alignment of proposed log haul routes is determined.

2. Guidelines to be followed in selecting log haul routes include:

   - avoid stream zones, except for stream crossings

   - avoid new roading unless required to protect P.c.-free forest

   - use roads in P.c.-affected forest in preference to roads in protectable forest. Where roads in protectable forest must be used, minimise the crossing of P.c. boundaries and minimise the areas of forest placed at risk.

   - where consistent with P.c. hygiene practices, and economics, use systems of one-way roads.

3. The responsibility for the exact alignment of proposed new roads is covered under Section 2.1.

4. In instances where proposed new roads intersect Shire or MRWA roads, Shire or MRWA engineers must be consulted.

PART B - PLANTATIONS

Refer to Section 5, Pine Management Guide ("Engineering") and the Code of Practice for Timber Plantations in Western Australia.

SECTION 2 - ROADING

2.3 ROAD CONSTRUCTION

PART A - NATIVE FORESTS

1. The responsibility for road construction lies with CALM. The actual work of road construction is done by companies contracted by CALM.

2. Road construction must be carried out in accordance with an approved *Phytophthora cinnamomi* Hygiene Plan.

3. Standard specifications for new roads and upgrading of existing roads are listed in the table below.

   (Note: these specifications may be subject to amendment or alteration in particular roading tenders or particular areas of the South West.)

	Major Haul Roads		**Other Roads Including InCoupe Roads**	
	For dry soil use	For moist soil use	For dry soil use	For moist soil use
Minimum Clearing width	14m	14m	7m	7m
Road Formation width	8m	8m	4m	4m
Gravel thickness	Nil or as required	min 15cm	Nil or as required	min 15cm
Culvert spacing	see (a) next page	see (a) next page	see (a) next page	see (a) next page
Culvert size	see (b) next page	see (b) next page	see (b) next page	see (b) next page
Table drain depth	20cm	20cm	10cm	20cm
Major stream crossings	See (c) next page	See (c) next page	See (c) next page	See (c) next page
Off-shoots	See (d) next page	See (d) next page	See (d) next page	See (d) next page
Maximum grade	7^o	5^o	10^o	8^o
Curves - recommended radii should be > (m)	350	200	350	200
Design speed km/hr	80	60	80	60

	Major Haul Roads		Other Roads Including InCoupe Roads	
	For dry soil use	For moist soil use	For dry soil use	For moist soil use
Stopping Sight Distance to object (from 1.15m eye level to 0.2m object) (m)	115	75	75	115
Stopping Sight Distance to another oncoming vehicle (from 1.15m eye level to 1.15m object) (m)	160	150	160	150
Sight Distance to intersection (from 1.15m eye level to 1.15m object) (m)	175	115	175	115

(a) Culvert Spacing:

Culvert spacing depends on:

- grade
- erodibility of soil type
- catchment size
- time of concentration
- return period used in design.

The programme "PROCALC" is available (refer Environmental Protection Branch) and can be used to calculate culvert spacing and size for various situations. The table below is a "rule of thumb" approximation that can be used. It should be applied cautiously particularly on highly erodible soils.

Slope	On lateritic gravels	On all other soils
0 - 2^{o}	As Required	As Required
3 - 5^{o}	100m	100m
6 - 10^{o}	50m	50m
11 - 15^{o}	30m	30m
16^{o} +	15m	15m

(b) Culvert size:

- The size of culvert required depends on the anticipated peak flow which is dependent on design return period, rainfall intensity and duration, and time of concentration. Time of concentration is dependant on catchment size and cover conditions and the amount of water already stored in the soil (field capacity). It must also be remembered that under full flow conditions culverts will only run at 1/3 of full capacity due to vacuation at the outlet end.

The programme "PROCALC " can calculate the culvert size required in various circumstances. The table below is a "rule of thumb" developed for fully forested catchments and should be applied with caution.

Pipe Diameter (mm)	**Maximum Catchment Size (ha)**
300	36
375	56
450	80
600	144
750	244
900	324

(c) Major Stream Crossings:

- Must be constructed with pipes or a bridge with a minimum design period of 50 years. Full earth/log fills are not permitted.
- Stream reserves must be marked prior to the commencement of earthworks.
- A vegetation filter zone of minimum width 75m on both sides of the stream must be maintained for 100m upstream and downstream of the crossing.
- Borrow areas and log landings must not be located within river or stream reserves.
- Water from borrow areas and log landings must be directed into silt traps or vegetation filters.
- Fill must be consolidated to minimise erosion of loose soil and risk of slumping.
- Embankments must be left rough surfaced or corrugated and at an angle at least equal to the natural angle of repose for the soil type (see also (e) below).
- Machine activity in the watercourse and disturbance of stream vegetation must be minimised.
- No heaps of debris to be created within 40m of watercourse.
- A compacted, gravel pavement must be created on both sides of a stream crossing (In some specific instances this may have to be sealed.)

(d) Off-Shoots:

- Off-shoots must be $< 1.5^{o}$ fall.
- Off-shoots must be sufficient in number to prevent table drain erosion. Spacing is the same as for culverts [see (a)].
- Off-shoots into *Phytophthora cinnamomi*-free forest must be approved by the SFRBU cell manager. These off-shoots should be at the lowest point in the topography, and into a vegetation filter strip.
- Off-shoots must have a level sill outlet into a vegetation filter strip or silt sump, so that water is not directed immediately into a stream.

- Care must be taken when locating off-shoots near stream zones. Off-shoots to be located to minimise the risk of overtopping and causing table drain discharge to the stream from above the stream reserve. Adequate vegetation is required to filter any outflow from the ends of the off-shoots within the reserve to minimise the risk of siltation.

  At least two off-shoots should be designed within the 75m vegetation filter zone above stream crossing points. The second off-shoot should catch any outfall from the upper off-shoot by extending that off-shoot further from the road if necessary. The second off-shoot should have a minimum of 40m of undisturbed vegetation downslope from its discharge point.

  Additional off-shoots may be necessary within the vegetation filter zone depending on slope, table drain, soil type and the construction road surface.

  Discharge from the table drain below the lowest off-shoot at the stream crossing may require local diversion into vegetation filter strip or some form of stabilisation of the table drain.

(e) Cut and Fill Slopes:

The gradient of cut and fill slopes will depend upon the soil type and the amount of established plant growth beside the area to be regraded. The reasons for sloping these banks are:

- control erosion by minimising soil movement on the slope;
- assist the establishment of new plant cover;
- make the grade alteration appear as natural as possible.

The following tables are offered as a guide to **maximum** cut and fill slopes. More gentle slopes are desirable.

CUT SLOPE

Material	**Maximum Slope (°)**
Sand	$22^1/_2$
Wet clay, loose gravel	30
Loam, ordinary clay	45
Firm tough soil, compact gravelly soil, towards road, tight cemented gravel	60
Solid well-bedded rock	Vertical

FILL SLOPE

Material	**Maximum Slope (°)**
Loose sand and soft clay	12-$22^1/_2$
Ordinary earth	30
Loose rock	40
Hand placed rock filling	45

Where there is doubt about the stability of a proposed cut or fill, engineering advice should be sought.

The shoulders of cut and fill slopes should be rounded off so that the profile appears as natural as possible.

4. Unless specified otherwise, all road clearing debris must be neatly heaped in natural gaps alongside the road, with due consideration given to the protection of crop trees, and burnt in suitable weather conditions.

5. The location and use of gravel pits must be approved by the District Manager. Gravel for use on roads in *Phytophthora cinnamomi*-free forest must be obtained from *Phytophthora cinnamomi*.-free gravel pits, or as per an approved *Phytophthora cinnamomi* Hygiene Plan. Small stockpiles of suitable road surfacing materials should be established at the time of construction for later use in areas likely to cause problems and for gravel road maintenance.

6. If, during road construction in *Phytophthora cinnamomi* .-free forest, water is required to settle dust or bind the road surface, such water must be treated with sodium hypochlorite at the rate of 1:1500.

7. New gravel should be compacted with a vibrating roller prior to use by log trucks.

8. Road signposting should conform to MRWA and CALM sign manual standards.

9. Road names must be approved by the Department's Geographic names Committee.

PART B - PLANTATIONS

1. As with native forest operations, the responsibility for road construction lies with CALM. The actual work of road construction is generally carried out by companies contracted to CALM.

   Guidelines for road construction are included in the Code of Practice for Timber Plantations in WA. In addition road specifications are included in the Engineering Section of the Pine Management Guide.

SECTION 2 - ROADING

2.4 ROAD MAINTENANCE

PART A - NATIVE FORESTS

1. The responsibility for road maintenance resulting from normal wear and tear lies with CALM. The actual road maintenance work is generally carried out by companies contracted by CALM.

2. The cost of any necessary road maintenance resulting from unwarranted damage to roads will be borne by the road user, and may be recouped from the user, as decided and directed by the Forest Officer in Charge.

3. Road maintenance using earth moving machinery must conform with an approved *Phytophthora cinnamomi* Hygiene Plan.

4. A road that deteriorates suddenly should not be used until repairs are affected. By-passes must not be constructed to avoid boggy sections of road.

5. A failure in a wet weather road resulting in road closure should be investigated by CALM and relevant contractor personnel to ascertain the cause and prevent repetition if possible.

6. Roadside scrub clearing must be carried out in accordance with the logging Safety Code.

7. The edge windrow of gravel resulting from maintenance grading operations must be broken frequently to allow water entry to table drains, off-shoots, culverts or intact vegetation.

8. All roads not in use should be signposted as being closed - particularly dry soil access roads.

PART B - PLANTATIONS

1. As with native forest operations, each business unit cell or area manager is responsible for the maintenance of roads used by harvesting contractors. This maintenance will generally consist of the removal of harvesting debris from the road and drains, grading the road, repair of culverts damaged during harvesting and limited patch gravelling where required.

2. Plantation harvesting roads must not remain impassable for any extended period. Logs on roads must be removed immediately, and debris or road damage of a major nature should be removed or repaired so the road is trafficable. This is of particular significance during the fire season.

3. Major through roads must be kept open at all times during the fire season. Harvesting along these access roads during winter will help to achieve this. It is the responsibility of the FOIC to inform the fire duty officer of any roads which are impassable and to ensure alternative through access exists and is known.

4. Because many plantations are adjacent to dams and reservoirs, or follow major watercourses, the timing and extent of road maintenance is very important. Free water tends to accumulate on and near roads and may increase after harvesting. One aim of planning harvesting operations in general, and road maintenance in particular, is to slow the movement of water and dissipate it through vegetation to reduce turbidity.

   Harvesting debris is an ideal filter. Debris can be left in drains for a period immediately after harvesting, but culverts must be clear and exit into silt traps, vegetation or harvesting debris whenever possible.

5. Traffic control signs must be displayed along log hauling routes as required by the FOIC. All signs should conform with MRWA standards.

6. The contractor will, as a matter of course, heap up a considerable amount of harvesting debris on adjacent firebreaks. Close liaison and discussion with the contractor will ensure this is done in a manner which assists future protection requirements.

7. Refer also to the Code of Practice for Timber Plantations in WA.

SECTION 2 - ROADING

2.5 GRAVEL PIT MANAGEMENT

1. For the purposes of this specification, the term "gravel" also applies to other road-making materials such as sand, quartz, limestone, marl and rock. These materials are sometimes referred to as "basic raw materials" or "BRMs".

2. Contractors involved in gravel extraction, including CALM harvesting contractors, are required to work to the guidelines set out in the CALM booklet: "Guidelines for Management and Rehabilitation of Gravel Pits - South West Forest Areas". This booklet is undated but was released in 1992.

   If specific requirements for a given contractor vary from these standard guidelines, such requirements should be included in the particular contract.

3. CALM's policies regarding requirements for leases, compensation, royalties, and approvals, with respect to basic raw materials ex State forest, are contained in Policy Statement No. 2 and in Briefing Paper No. 1/93.

4. For basic raw materials extracted from State forest for use on harvesting roads, there is no requirement for any mining tenement, CALM lease, compensation to CALM, or royalty. Approval for opening of new pits on State forest for gravel for harvesting roads rests with the relevant Business Unit cell manager.

SECTION 3 - SILVICULTURE

3.1 CURRENT SPECIFICATIONS

1. Listed below are the current native forest silvicultural specifications.

No	TITLE	ISSUED
JARRAH		
3/89	TREEMARKING IN JARRAH FOREST AFFECTED BY *Phytophthora cinnamomi* IN THE CENTRAL AND NORTHERN FOREST REGIONS	AUGUST 89
4/89	REGENERATION IN FOREST AFFECTED BY Phytophthora cinnamomi	AUGUST 89
1/95	SILVICULTURAL PRACTICE IN THE JARRAH FOREST	JANUARY 96
1/97	FIRE AS A SILVICULTURAL TOOL IN THE JARRAH FOREST	AUGUST 97
4/97	JARRAH REGENERATION SURVEYS	AUGUST 97
	KARRI	
1/90	KARRI REGENERATION SURVEYS	JANUARY 90
1/92	KARRI THINNING	JANUARY 92
2/95	SILVICULTURAL PRACTICE IN KARRI FOREST	DECEMBER 95
2/97	KARRI SEED CROP ASSESSMENT AND MONITORING	AUGUST 97
3/97	ESTABLISHMENT GUIDELINES FOR KARRI FOREST REGENERATION FOLLOWING HARVESTING	AUGUST 97
	OTHER	
1/88	REGENERATION OF TUART FOR CONSERVATION	FEB 88
2/89	TREEMARKING AND REGENERATION IN WANDOO WOODLANDS	AUGUST 89

2. For details of all current softwood silvicultural specifications, refer to the latest edition of CALM's "Pine Management Guide" or to the Softwood Plantations Business Unit manager.

3. The decision as to which silvicultural specification to use must be given careful consideration prior to the commencement of treemarking and harvesting. The decision made should be noted by the Forest Officer in Charge of the particular cutting area on any harvesting checklists or coupe plans.

   All silvicultural work carried out during or immediately after harvesting must be accurately and promptly recorded on CIMCIS sheets.

SECTION 3 - SILVICULTURE

3.2 ADVANCED BURNING

1. "Advanced burning" is the practice of carrying out controlled burning in advance of a native forest harvesting operation. Such burning is ideally conducted one season prior to the harvesting operation.

2. Advanced burning is beneficial to a harvesting operation if the density of scrub is effectively reduced by the burning, allowing easier and safer access for treemarkers and fellers. Advanced burning can also assist Forest Officers in the task of assessing the amount of lignotuberous advance growth present in jarrah forests.

3. Advanced burning must not be carried out in areas of jarrah forest about to be cut, if interpretation for *Phytophthora cinnamomi* has not been completed. However, if current reliable *Phytophthora cinnamomi* hygiene maps are available, advanced burning may be undertaken for reasons of access, safety and silviculture.

4. CALM is not obliged to carry out advanced burning according to a contractor's wishes. If CALM cannot carry out advanced burning on areas of forest due to be cut, then any required scrub control ("scrub rolling") is the responsibility of the harvesting contractor.

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SECTION 4 - COUPE MANAGEMENT

4.1 COUPE DEMARCATION

PART A – NATIVE FORESTS

1. Coupe boundaries must be identified prior to commencement of cutting using white painted crosses facing into the coupe. Sufficient trees must be marked with crosses to ensure sharp changes in direction, causing a loss of continuity, are avoided. Unless already nominated on the approved harvesting plan a coupe boundary should correspond to: (i) the boundary of a single "macro catchment" and/or (ii) roads, watercourses, reserve boundaries or *Phytophthora cinnamomi* boundaries low in the profile. Accurate location of coupe boundaries is vital, particularly when clear felling is involved. A known point (theodolite reference tree, surveyed road junction, private property boundary, etc.) should be used to locate a precise geographical location. Aerial photos will assist. Roads and other features plotted on Departmental maps cannot be assumed to be accurate.

2. The responsibility for accurately determining the location of boundaries in the field between different land tenures (e.g. State Forest/National Park, State Forest/Private Property) lies with the relevant Regional Manager. No harvesting or roading can take place adjacent to land tenure boundaries until such boundaries have been made identifiable and demarcated.

3. Sub-coupes when applicable must be identified prior to cutting using red flagging tape, increasing to three red tapes on corners and defined junction points. Sub-coupe boundaries must correspond to boundaries of individual, self-draining "Micro catchments" within a coupe, and/or *P. cinnamomi* hygiene plan boundaries.

4. Sensitive boundaries including river, stream and fixed travel route (road) zone boundaries must be identified prior to cutting in the same way as coupe boundaries, that is with white painted crosses facing the cutting area. Again, sufficient trees must be marked with crosses to ensure sharp changes in direction, causing a loss of continuity, are avoided. Diverse ecotype zones will be similarly marked where appropriate. The exact location of boundaries of river, stream and fixed travel route zones is decided by the Forest Officer in Charge, using the following guidelines:-

4.1 **River and Stream (Riparian) Zones**

STREAM ORDER	WIDTH EITHER SIDE (APPROX.) (M)	TOTAL WIDTH (APPROX.) (M)	MINIMUM WIDTH EITHER SIDE (M)
First	30	60	20
Second	30	60	20
Third	30	60	20
Fourth	75	150	50

Fifth upwards	200	400	100

4.2 **Travel Route Zones** (formerly road zones)

Fixed travel route zone widths are applicable in the Southern Forest Region on what are known as "Level 1" and "Level 2" travel routes.

For Level 1 travel routes the width must be 200m on both sides. For Level 2 travel routes the width must be 100m on both sides.

For all other roads in State forest, any adjacent harvesting is to be carried out in accordance with appropriate VLM principles.

4.3 **Diverse Ecotype Zones**

The mosaic of heath, sedge and herb vegetation, rock outcrops, swamps, lakes, wetlands and woodland formations which occur throughout the forest are important sites for wildlife conservation and are often significant landscape features.

To protect these sites :

(i) Diverse vegetation communities must be excluded from timber harvesting. Associated activities such as roading must be minimised. Rock outcrops (>0.2 hectares in size), lakes, swamps and other wetlands, heath, sedge, herb and woodland communities must be kept free of disturbance apart from necessary roading.

(ii) Transitional vegetation (ecotones) must be kept undisturbed for a distance of up to 50m from the edge of the feature and ecological characteristics must be used to determine the boundary of these zones.

5. Coupe demarcation is the responsibility of the Forest Officer in Charge. However, as much of this task as possible must be delegated to the contractor provided the contractor has suitably qualified staff.

6. **Demarcation of Karri Regrowth Permanent Increment Plots.**

Over 230 permanent increment plots are located throughout the karri forest. These plots range in size from 30m by 30m to 70m by 70m and are identified in the field by five star pickets, one at the plot centre and one at each corner. All trees within the plot are tagged. Forest Officers and harvesting contractors must take care not to disturb these plots. Forest Officers are required to exclude these plots, and a suitable buffer zone of at least 25m width, from any cutting, using painted white crosses. Further information may be obtained from the Manjimup office of Forest Management Branch.

PART B –PLANTATIONS

1. Coupe boundaries must be identified prior to commencement of cutting. Unless already nominated on the approved harvesting plan a coupe boundary should correspond to a compartment boundary which is usually defined in the field by firebreaks, roads, watercourses or reserved areas. Accurate location of coupe boundaries is vital, particularly when harvesting near private property. When cutting in or adjacent to private plantations a known point (theodolite reference tree, surveyed road junction, private property boundary, GPS reference, etc) should be used to locate a precise geographical location. Aerial photos will assist.

2. Sensitive boundaries including river, stream and other reserved areas must be identified prior to cutting with white painted crosses facing the cutting area. The exact location of these boundaries is decided by the Forest Officer in Charge.

3. In plantations due for clearfelling and subsequent establishment of a second rotation, the original plantation area must be maintained, unless Visual Landscape Management (VLM), water quality or other environmental considerations deem otherwise. For plantations within 3km of a reservoir, design of second rotation plantations should involve consultation with management of the local Water Corporation office. (Refer also to the Code of practice for Timber Plantations in Western Australia).

SECTION 4 - COUPE MANAGEMENT

4.2 FELLING (INCLUDING TREE MARKING TECHNIQUES)

PART A - NATIVE FORESTS

1. **Fellers' Blocks**

- Control of felling is by the system of fellers' blocks i.e. the allocation of areas of forest in approved coupes or sub-coupes to individual fellers or individual tree harvesting machines. The areas must be demarcated by orange tape prior to commencement of cutting.

- Fellers' blocks must be demarcated by the contractor's foreman or supervisor.

- The size and shape of a feller's block can vary, depending on the quality of forest, terrain, access or other factors, but must not be greater than about two weeks of cutting for the individual feller or tree harvesting machine.

- Normally, all products in a feller's block will be extracted to a single landing, on the edge of that block.

  A feller should not be allocated more than two blocks at any one time. Unless approved by the Forest Officer, a third block should not be allocated until cutting in one of the first two blocks is completed.

2. **Tree Marking**

Trees to be removed from an area may be indicated to fellers by marking either those trees to be removed or those trees to be retained as crop trees. The Forest Officer in Charge will decide which method is to be used depending on the type of bush being cut and other practicalities. Once this decision is made, the tree marking method must not be changed within an individual coupe.

Tree marking must be carried out by Forest Officers. Other personnel required to carry out tree marking must be appropriately trained and authorised by CALM's Executive Director. During treemarking, the treemarker must look for and mark any unusual or particularly threatening safety hazards, in accordance with the "Guidelines for Managing In-Forest Hazards" (see Section 4.9).

Occasionally the Forest Officer in Charge may allow felling to take place without tree marking. This may occur in "first thinning" of young, even-aged regrowth stands, and in "clear felling" areas. In these cases the FOIC must ensure that:

(i) silvicultural objectives are achieved and

(ii) protection of retained crop trees meets standards as per Section 5.4.

2.1 **Tree marking individual trees for removal**: Individual trees may be marked for removal using an axe only. Paint or tape is not acceptable.

Trees marked for removal with an axe must be blazed on two sides at a comfortable height and toemarked to indicate the desired direction of fall.

In areas where trees are marked for removal, no other trees may be felled. This may apply , for example, to leaning or dangerous trees in stream zones.

2.2 **Tree marking individual trees for retention**: Individual trees may be marked for retention using white paint only.

Trees marked for retention with paint must be painted at least 1.5m above the ground, with a band about 4cm wide completely around the tree. In areas where trees are individually marked for retention, fellers must cut any other tree containing usable produce under the terms of the relevant contract.

2.3 **Tree marking groups of trees for retention:**

A group of trees may be marked for retention by using double white painted brands around trees along the perimeter of the group. At least one tree in every 10m of perimeter must be marked. The harvesting supervisor must be advised by a Forest Officer of areas containing groups marked for retention.

2.4 Tree markers must make regular sample counts to determine crop tree stocking during tree marking.

2.5 Trees leaning into road, stream or amenity reserves must not be felled unless specifically marked for removal by a Forest Officer using a tree marking axe.

2.6 Trees outside coupes (eg inside a stream reserve) which need to be felled (eg a hazardous leaning tree) must be treemarked with an axe (ie blazed and toe-marked with an FD branding axe) as required under Forest Management Regulation 20.

3. **Scrub Rolling**

Scrub rolling prior to felling, if necessary, must be carried out by the harvesting contractor. Soil disturbance during scrub rolling must be minimised. Scrub should be rolled flat rather than bladed out. Limited blading out is acceptable close to trees to be felled. *Phytophthora cinnamomi* hygiene requirements must be observed during scrub rolling.

4. **Stump Height**

Stumps must be as low to the ground as possible, provided safety is not compromised. For a solid mature tree, the stump should not be higher than approximately 45cm above the ground at the base of the tree on the uphill side. (45cm is approximately "knee height"). For solid regrowth trees, including trees cut for poles or mining timbers, the stump should not be higher than approximately 7cm above the ground at the base of the tree on the uphill side.

5. **Safety**

All fellers must comply with safety requirements as detailed in the "Safety & Health Code for Native Forest/ Hardwood Logging & Plantation Logging" (as published from time to time by the Forest Industries Federation (WA) Inc or other nominated body) and the "Guidelines for Managing In-Forest Hazards".

PART B - PLANTATIONS

1. Whenever possible, the same treemarking rules applicable to native forests should be used in plantation harvesting operations. In particular, only white coloured treemarking paint should be used.

2. Tree markers must make regular sample counts to determine stocking, both before and during treemarking.

3. Note when marking individual trees for removal a cross with white treemarking paint is required however this should not be done where it may be confused with reserve boundaries.

4. All treemarking should be performed by qualified treemarkers.

SECTION 4 - COUPE MANAGEMENT

4.3 EXTRACTION

PART A - NATIVE FORESTS

1. Extraction (skidding, snigging or forwarding) of logs may be controlled by the system of fellers' blocks (or sub coupes) in the same way as felling. That is, an individual harvesting unit may be allocated two blocks (or sub coupes) and should not be allocated a third until extraction in one of the first two is completed.

2. Snig track patterns in individual feller's blocks or sub coupes must be planned, and may be physically demarcated, if necessary, by the contractor's foreman or supervisor. Snig tracks should adopt a herringbone pattern leading downhill whenever possible. Snig tracks may be indicated using: (i) red and white flagging tape together on individual trees or bushes, or (ii) axe blazes on trees or bushes.

3. When applicable the location of landings must be planned and marked at the time of road construction. This allows road drainage to be diverted and the avoidance of large table drains and batters which make loading away from landing sites difficult. It allows the landing to be located away from any disturbance caused by roading activity and so avoids cross contamination from road to landing by dieback.

4. Landings must, whenever possible, be created in existing gaps within the forest. Cleared debris must be neatly heaped to the side or rear of landings, at least 5 m away from retained crop trees. For landings on deep loam soils or duplex soils, which are to be operated on in wet conditions, any topsoil present, to a maximum of 100 mm depth, must be neatly stockpiled to one side to avoid mixing with subsoil horizons. This topsoil must be protected and not mixed or covered with clearing or harvesting debris.

5. Whenever possible landings should be located on old landings from past harvesting activities or in natural openings. Slopes greater than 8 degrees should be avoided.

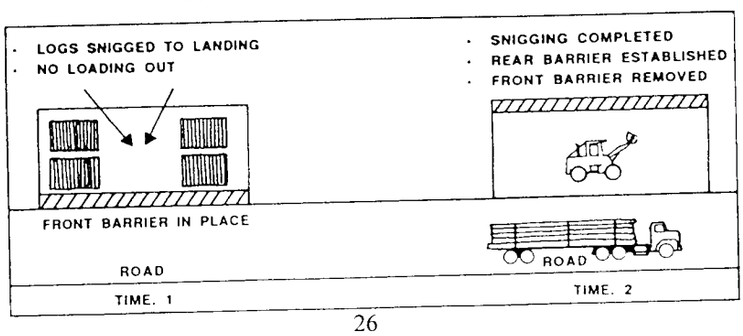
6. Landings should be kept as small as possible and only one landing allocated to each feller's block or sub-coupe.

7. Landings must be planned and marked (using the same techniques for snig tracks) by the contractor's foreman or supervisor, subject to approval by the Forest Officer in Charge.

8. **Split phase harvesting:**
In forest not known to be infested with *Phytophthora cinnamomi*, extraction of logs may need to conform to the techniques of "split-phase harvesting". This separates the snigging phase of harvesting in a protectable area from the loading and hauling phase. This is done to minimise the risk of introducing *Phytophthora cinnamomi* fungus into a protectable area from material that may be dropped near a landing by log trucks or other vehicles. There are four different techniques in "split-phase harvesting". These are, in recommended order of preference:

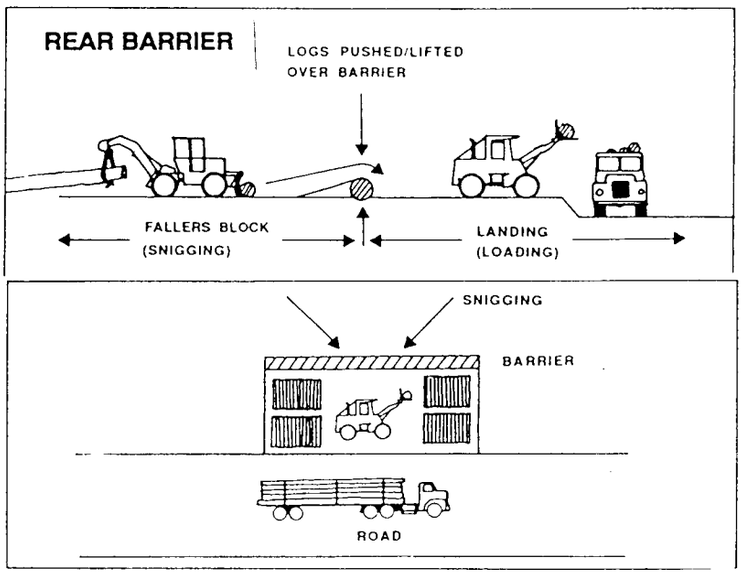
   8.1 **Separation of extraction and loading in time**: In this technique, extraction in a sub-coupe or feller's block must be completed before loading and hauling commences. That is, once loading and hauling commences, a skidder must not return to the sub coupe or feller's block and all snig tracks must be blocked at the landing. If a skidder is required to return, it must be cleaned down before each entry into that sub-coupe or feller's block. Prior to each entry a Forest Officer may require a machine to be inspected by an appropriately qualified person. In this technique, a log barrier must be positioned at the front of the landing during skidding. When skidding is completed, this front barrier must be removed and a rear barrier established.

SPLIT PHASE IN TIME

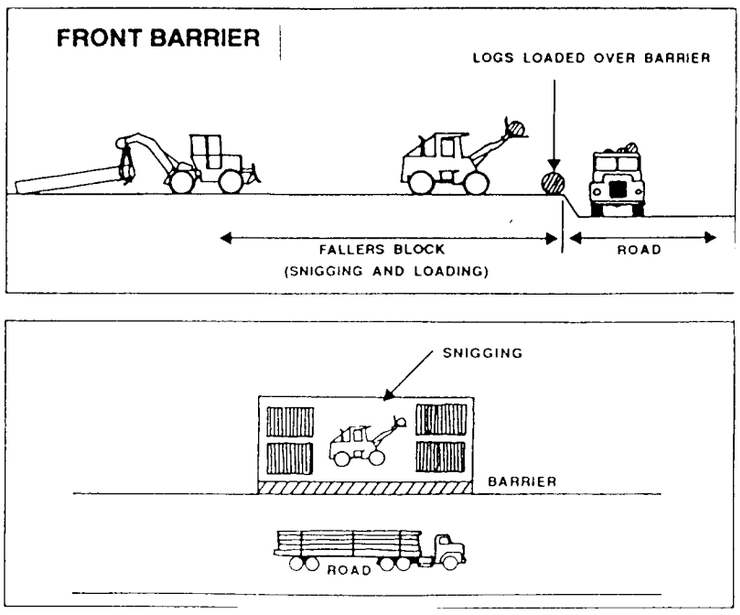


8.2 **Use of a stationary loading machine:** In this technique, a stationary machine such as a "heel-boom loader" is used to load trucks. Such machines are set up on the roadside below a landing, thus avoiding the transfer of soil and plant tissue onto the landing. Skidding and loading can take place concurrently. A barrier to separate the area on which trucks can travel from the area on which the skidder works is required.

8.3 **Separation of extraction and loading by a physical barrier at the rear of a landing**: In this technique, the landing must be located in an uninfested area, a physical barrier such as a log not less than 400mm in diameter must be situated at the rear of the landing, and logs skidded to this landing must be pushed or preferably lifted over the barrier onto the landing proper. The skidder and loader are thus physically separated, reducing the risk of transfer of soil and plant material brought in by log trucks, into the protectable area. The barrier must be substantial and secure so that it does not move forward during use. Skidding and loading can take place concurrently.



8.4 **Separation of extraction and loading by a physical barrier at the front of a landing**: In this technique, a physical barrier such as a log not less than 400mm diameter is placed at the front of a landing, adjacent to where log trucks are parked for loading. This barrier separates the loader and skidder from the path of the log trucks, thus reducing the risk of transfer of soil and plant material brought in by the log trucks, into the protectable area. Skidding and loading can take place concurrently. The front barrier technique is the least preferred of all split phase harvesting techniques. When it is used, the barrier must not be allowed to shift from the landing onto the road or road batters and soil must not move over or around the barrier.



9. In all infested areas, extraction operations are subject to the guidelines detailed in Section 5.2 (Protection of Soil).

10. At the completion of extraction, all major snig tracks in uninfested areas must be blocked by a physical barrier such as a log of at least 400mm in diameter.

11. No extraction machine may enter a road, stream or amenity reserve without the specific approval of a Forest Officer. Where approval is given, for example to remove a dangerous or leaning tree which has been felled, the extraction machine must make maximum use of winches, and take every effort to minimize disturbance to ground covering vegetation.

PART B - PLANTATIONS

Conventional Extraction

1. The shortwood system of harvesting using conventional flat terrain equipment is used in most CALM controlled plantation harvesting operations. Under this system trees are delimbed and cut to length at the stump, and extracted to plantation roadside using 6 or 8 wheel forwarders. The main advantages with the shortwood system over the alternative long length or whole tree system using skidders for extraction are:

   - minimal or no landings, important for steep country and forest adjacent to reservoirs.
   - minimal damage to remaining crop, important in thinning operations.
   - maximum loading efficiency of trucks, and
   - less sand and stones imbedded in the bark, which reduces saw damage.

2. To facilitate extraction and minimise damage to the remaining stems during thinning operations, a fifth row outrow is used whereby each fifth row is removed and the bays in between are thinned.

3. Felling, delimbing and cutting to length is either done manually or mechanically.

Skyline (Cable) Extraction

1. On terrain with slopes which exceed approximately 14^{o} to 16^{o} , conventional equipment cannot be used and skylines are used instead. Trees are felled manually and extracted in multiples of log lengths by skyline. The skylines used in WA are in fact high lead systems with the logs dragging on the ground.

2. Logs are extracted to roadside, stacked in log lengths using a mounted knuckleboom loader and shifted by forwarder to the nearest road accessible by truck.

3. This type of operation requires rather different forward planning to conventional methods of extraction, even though a 5th row outrow arrangement still applies.

4. The ideal situation is to extract approximately half the trees in each direction (ie. uphill and downhill). The ideal extraction distance for this type of machine is between 150-250 metres. An inspection of the area to be logged and the measurement of distances through the longest axis must be part of the planning.

5. The contractor's representative or the Skyline operator should take part in the inspection. The aims should be to complete the area without constructing internal tracks.

6. If the construction of internal roads becomes necessary, these should be planned well in advance. Internal roads will be constructed for summer operations only, and will be at the minimum standard to allow access for the Skyline unit and forwarder.

7. Internal roads or tracks should nearly follow the contour to maintain as flat a footing as possible. It may be necessary to construct short shunts and pull the material on a fan layout.

SECTION 4 - COUPE MANAGEMENT

4.4 LOADING AND DELIVERY

1. In native forest not known to be infested with *Phytophthora cinnamomi* fungus, loading operations may be required to conform with the techniques described as "split-phase harvesting" (see Section 4.3).

2. The log hauling route or routes used on State forest must be approved by the Forest Officer in Charge. Traffic control signs must be supplied and erected along these routes by the contractor as required by the Forest Officer in Charge. All signs displayed should conform with MRWA standards. A list of recommended signs, and their use, follows:-

   (a) **"TRUCKS ENTERING"** - 15cm letters, black on yellow background. These signs must be erected on major roads on either side of the junction of the major road and a lesser road used by log trucks. The signs must be removed immediately after the operation is complete, or if there is a break in carting exceeding five days.

   (b) **"LOG TRUCKS ON ROAD"** - 15cm letters, black on yellow background. These signs must be erected at both ends of major roads used by log trucks. The signs must be removed immediately after the operation, or if there is a break in carting exceeding five days.

   (c) **"FELLER AHEAD"** - 15cm letters, black on yellow background. These signs must be erected whenever felling is occurring near a roadway.

   Alternatively :

   "TREE FELLING IN OPERATION" - 5cm black letters on fluorescent orange triangle; available from Forest Industries Training Services (ph 97256322).

   (d) **"GRADER AHEAD"** - 15cm letters, black on yellow background. These signs must be erected on both ends of the section of road being graded.

   (e) **"ROAD PLANT AHEAD" -** 15cm letters, black on yellow background. These signs must be erected on both ends of the section of road being repaired.

   (f) **"HARVESTING OPERATIONS AHEAD" -** 15cm letters, black on yellow background. To be erected on roads whilst harvesting operations are occurring. Must be removed immediately after the operation is completed, or if there is a break in harvesting exceeding 5 days.

   All signs mounted on posts must be diamond-shaped. Signs placed temporarily on the ground must be rectangular.

3. The Forest Officer in Charge may stop haulage on any road in State forest, if in his opinion continued haulage is likely to result in damage to the road, excessive turbidity in adjacent streams or the spread of *Phytophthora cinnamomi* fungus.

4. The Forest Officer in Charge must ensure all truck drivers know exactly the name of the coupe or "operation" from which their load of logs has been extracted. The recommended method to eliminate confusion is to erect professionally made signs at the entrance to the coupe or "operation", or on the log landing. These signs should be yellow painted, triangular with 400mm side, with 50mm black letters, erected on a steel star picket.

SECTION 4 - COUPE MANAGEMENT

4.5 HARVESTING OPERATION INSPECTIONS AND CERTIFICATION

PART A - NATIVE FOREST OPERATIONS

1. The contractor's foreman or supervisor must check harvesting standards periodically on a feller's block by feller's block (or sub-coupe by sub-coupe) basis to ensure felling and extraction standards are maintained. CALM's Forest Representative will periodically accompany the contractor's foreman or supervisor on these inspections to monitor standards.

   Aspects of harvesting to be inspected include:

   - safety hazard management
   - stump height
   - in-forest treatment of logs
   - trees indicated for removal but not felled
   - trees felled but not removed
   - damage to retained (crop) trees by felling and/or skidding
   - extraction pattern
   - soil damage
   - *Phytophthora cinnamomi* hygiene
   - tops disposal
   - protection of stream zones and other reserves
   - erosion control structures.

2. **Formal Inspections**

   There are two types of formal inspection of a harvesting operation:-

   (i) General inspection of all aspects of a harvesting operation by senior staff, and

(ii) Inspection of a harvesting operation with the specific intention of certifying as complete one or more feller's blocks or sub-coupes in that operation.

   2.1 **General Inspection**: This inspection should be carried out as often as considered necessary by SFRBU staff. As a general guide, if the quality of the harvesting work is “excellent” (ie less than three log products per fellers’ block found in the first inspection of four fellers’ blocks) then only one in ten blocks need be inspected for the remainder of the operation. If the initial inspection is “good” (ie three to five log products found per block) then one in five blocks should be inspected. If “poor” (ie six or more products found, and/or problems found involving crop tree damage, tops disposal, soil damage or erosion control) then one in three blocks should be inspected for the remainder of the operation. For smaller operations not involving a large number of fellers’ blocks, inspections should be carried out twice per month by a Forest Officer, and once per month by the Forest Representative. Inspections should be carried out with the contractor's foreman or supervisor in attendance. At the completion of such an inspection a report must be completed on CLM 105 (see attachment 4.5.1).

   This form should provide a permanent record of the standards achieved at that particular harvesting operation for CALM and the harvesting contractor.

   2.2 **Feller's block certification**: This inspection must be regularly carried out on a systematic basis by the contractor's foreman or supervisor, in order to formally certify to CALM that specific areas in an operation have been completed to CALM's standards. The unit area in these inspections is the feller's block. Inspections must be carried out with sufficient regularity to ensure a large backlog of non-certified feller's blocks does not eventuate. As a general guide, fellers’ blocks must be inspected and certified as complete within four working days of completion and no more than three completed fellers’ blocks should be uncertified at any point in time for a given operation. Any abnormal safety hazards remaining following completion of harvesting must be noted and recorded. The progress of these inspections must be recorded on form CLM 104.

One of these forms must be kept by the contractor's foreman or supervisor in charge of each harvesting operation. This form is the official permanent record of the progress of completed cutting. CALM staff will also carry out inspections of fellers' blocks. A Forest Officer will spot check and sign the CLM 104 at an appropriate frequency, depending on the quality of the work. These frequencies should be similar to the guidelines applicable to general inspections (see above).

The CLM 104 is also to be used as the formal mechanism for the "handing over" of a site (operation) from CALM to a contractor, and the "handing back" of the site from the contractor to CALM after the completion of the operation. This process helps ensure both CALM and the contractor fulfill their responsibilities under the Occupational Safety and Health Act. When handing over a site to a contractor, the Forest Officer (coupe manager) must discuss with the contractor's bush supervisor the hazards on the site, and the steps CALM has taken or will take to identify or control those hazards (see guidelines in section 4.9). A summary of this discussion is to be recorded in the comments space at the top of the CLM 104. The site will be considered complete and accepted back by CALM when all felling, extraction, loading out, erosion control work and post harvesting coupe preparation work is completed. CALM will accept the handing back of a site before landings are rehabilitated and before certain log products are loaded out (eg green firewood logs, third grade sawlogs) provided these items are noted in the comments column.

3. During any inspection the Forest Officer must use only yellow lumber crayon to initial and date stumps, and cross out unmerchantable timber. The contractor's foreman or supervisor must use only white lumber crayon for the same purposes. These markings will indicate that the area has been inspected.

4. Yellow flagging tape must be used to indicate trees to be felled and logs to be cut and/or snigged.

PART B - PLANTATION OPERATIONS

1. Inspection of plantation harvesting operations should be carried out on a regular basis. This is especially important where sawlogs are being produced.

2. The Forest Representative should try to arrange inspections accompanied by the contractor's representative. When this is not possible, a suitable time to suit both parties, at least at weekly intervals, should be arranged.

3. All instructions to contractors should be done through the nominated contractor's representative.

4. Instructions regarding utilisation of forest produce and which log lengths to cut for orders must be issued to the contractors representative and the feller or processor operator.

5. The FOIC must ensure that all fellers and machine operators and the contractors representative have been instructed and trained in log specifications and cutting requirements.

6. Aspects of the operation to be inspected include:

- condition of the harvesting roads being used. (Bring to the contractor's attention any likely problems.)
- safety management,including safety equipment and clothing.
- stump height, log lengths and crown diameters (measure a sample).
- length of time logs are being left in the bush. (Watch for *Ips* attack and blue stain developing.)
- correct loading of bin measured materials. (No cross logs, gaps etc.)
- crop tree stem damage.
- trees left "hung-up".

- signs of excessive soil damage or erosion.

- adherence to requirements listed under the Code of Practice relating to fire control (eg. fire attack pumper units and pack sprays available and working).

- warning signs to ensure a safe working environment.

7. Results of formal inspections should be recorded on the Harvesting Inspection and Action Sheet –Plantations (CLM 106).

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

HARVESTING INSPECTION AND ACTION SHEET (NATIVE FORESTS)

Supply Area: _____ **Operation Code:** _____ **Contractor:** _____

CALM Representative: _____ **Contractor Representative:** _____ **Date:** _____

Aspect of Operation	Comments	Complies	Action Required	Not Applicable
1. COUPE PREPARATION				
1.1 Coupe Boundaries Demarcated				
1.2 TEAZ, PEAZ, Reserves Demarcated				
1.3 Coupe Signs				
2. ENVIRONMENT				
2.1 Hygiene Practices				
2.2 Soil Damage				
2.3 Erosion Control Drains				
2.4 Top soil landings saved				
2.5 Landing ripped/rehabilitated				
2.6 Pollutants/Rubbish				
2.7 Road drainage free of debris				
2.8 Reserved areas undisturbed				
2.9 Habitat trees undisturbed				
3. SILVICULTURE				
3.1 Crop trees not damaged				
3.2 Top disposal around crop trees				
4. UTILISATION				
4.1 Trees missed by felling				
4.2 Stump heights/Long Butts				
4.3 In forest Treatment				
4.4 Logs identified & segregated				
4.5 Docking - rejects				
4.6 Rejects stacked at front for future sale				
5. SAFETY				
5.1 Hazards identified/removed				
5.2 Personal Protective Equipment Worn				
5.3 Felling Techniques				
5.4 Landing Management				
5.5 Road warning signs (felling/trucks)				
5.6 Travelling vehicles have headlights on				
5.7 Road conditions – Visibility				
5.8 Loads chained down				
6 ADMINISTRATION				
6.1 DRA Permits				
6.2 TWR				
6.3 Fire equipment/Units				
6.4 Coupes identified for D/Note completion				
6.5 Log measurements				
7. OTHER				
8. GENERAL COMMENTS				

SIGNATURES: CALM: _____ CONTRACTOR: _____

Distribution:

White	Contractor
Green	SFRBU Monitoring Officer & Manager
Yellow	Remains in Book at all times

Department of Conservation and Land Management

Harvesting Operation Handover & Progress Certification Sheet (Native Forests)

Operation Code: _____ **Contractor:** _____

Date of handover of site (operation) by CALM to Contractor: _____

Comments: _____

_____

_____

Forest Officer Name: _____ **Signature:** _____

Record of Progress
(to be completed for every feller's block and landing by contractor)

BLOCK			LANDING(S)			CALM CHECK	
Block No.	Date Completed	Contractor's Signature	Date Completed	Contractor's Signature	Comments	Date	Signature

Site (operation) completed and handed back to CALM on ***(date)*** _____

Contractor's Representative Name _____

Operation accepted by CALM as complete: **Forest Officer Name** _____

Signature: _____

Distribution: Original: CALM (FOIC)
Copy: Contractor

CLM106(1999)

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

HARVESTING INSPECTION AND ACTION SHEET (PLANTATIONS)

Supply Cell: _____ **Operation Code:** _____ **Contractor:** _____

CALM Representative: _____ **Contractor Representative:** _____ **Date:** _____

Aspect of Operation	Comments	Complies	Action Required	Not Assessed/ Applicable
1. COUPE PREPARATION				
1.1 Boundaries Demarcated				
1.2 Reserves Demarcated				
1.3 Coupe Signs				
2. ENVIRONMENT				
2.1 Soil Damage				
2.2 Erosion Control Drains				
2.3 Pollutants/Rubbish				
2.4 Road drainage free of debris				
2.5 Reserved areas undisturbed				
2.6 Firebreaks trafficable				
3. SILVICULTURE				
3.1 Crop trees not damaged				
3.2 Top disposal around crop trees				
4. UTILISATION				
4.1 Trees missed by felling				
4.2 Stump heights/Long Butts				
4.3 Logs to be extracted				
4.4 Logs graded & segregated				
4.5 Products cut to specification				
5. SAFETY				
5.1 Hazards identified/removed				
5.2 Personal Protective Equipment Worn				
5.3 Felling Techniques				
5.4 Landing Management				
5.5 Road warning signs (felling/trucks)				
5.6 Travelling vehicles have headlights on				
5.7 Road conditions – Visibility, trafficability				
5.8 Loads chained down				
6. ADMINISTRATION				
6.1 DRA Permits				
6.2 TWR				
6.3 Operations identified for D/N completion				
7. OTHER				
7.1 Fire equipment/Units				
7.2 Water point signage & access				
7.3 Lease fences				
8. GENERAL COMMENTS				

Target date for completion of action items: _____ Date for field check of action items: _____

SIGNATURES: CALM: _____ CONTRACTOR: _____

Distribution: White Contractor
Green Monitoring Officer & Manager
Yellow Remains in Book at all times

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

PRE HARVESTING OPERATION HAZARD IDENTIFICATION AND SITE HANDOVER SHEET (PLANTATIONS)

CALM OFFICER: ..... CONTRACTOR REP: .....
DATE:.....
PLANTATION:.....
OPERATION CODE: .....

1. ROADING (Attach map if required). Indicate road names

Approved Haul Routes: .....
.....
.....

Scrub Rolling Needed ? .....
.....

Road surface, grading, machine work gravel ? .....
.....
Culverts, Maintenance required ? .....
.....
Harvesting/truck signage required ? .....
.....
.....
Other Hazards ? .....
.....
.....

2. TYPE OF HARVESTING

(a) Hand falling (b) Mechanical Harvesting
(c) Cable Log (d) Mechanical Forwarding

3. TREEMARKING

(a) Required (b) In progress (c) Completed
(d) Not required

DID TREEMARKERS IDENTIFY HAZARDS ? YES / NO

4. FIELD INSPECTION: Notes & action: .....
.....
.....
.....
.....
.....
.....

Date site (operation) handed by CALM to Contractor: .....

Name of Forest Officer: ..... Signature: .....

Date site (operation) handed back by Contractor to CALM: .....

Name of Contractor's Rep: ..... Signature: .....

Name of Forest Officer: ..... Signature: .....

Distribution: White Contractor
Green Monitoring Officer & Manager
Yellow Remains in Book at all times

4.6 BUSH STOCKPILING

1. Bush stockpiling is the practice of stockpiling unprepared logs in the forest to supplement mill stockpiles and is important in native forest harvesting operations. Bush stockpiles are not designed to replace mill stockpiles, but are to enable the harvesting contractor to continue log haulage during periods of the year when extraction is not permitted. Mill stockpiles will always be preferred to bush stockpiles.

2. The contractor must obtain permission for bush stockpiling from the Forest Officer in Charge. Bush stockpiling of native forest sawlogs should not start before the onset of cooler weather in early autumn, which coincides with a reduction in activity of the bardi grub (*Phorocantha semipunctata*).

3. The location of bush stockpiles must be approved by the Forest Officer in Charge. Bush stockpiles must be located in areas accessible in all weather conditions.

4. All native forest sawlogs in bush stockpiles should be removed to a mill by 15 October in any year.

5. A firebreak of 4m width must be constructed around every bush stockpile.

SECTION 4 - COUPE MANAGEMENT

4.7 IN-FOREST LOG TREATMENT AND LOG SEGREGATION ON BUSH LANDINGS IN NATIVE FORESTS

1. **IN FOREST TREATMENT**

1.1 "In-forest treatment" refers to the process of applying sawcuts to a felled tree in order to prepare logs ready for measurement, prior to transport.

Terms used in this process include "crown cutting", "long butting", "queen cutting", "docking" and "trimming". Definitions of these and other terms may be found in the "Log Faults" booklet by Clarke and Ellis (1989).

1.2. Efficient utilisation of the timber resource requires efficient in-forest treatment. This in turn requires knowledge of product specifications, the relative value or priority of different products, and the In-Forest Treatment guidelines. Harvesting contractors and supervising CALM officers alike must be well versed in these matters. Product specifications and the relative value of different products are detailed in Section 6. To assist harvesting contractors and CALM staff involved in timber production, "In-Forest Log Treatment" guidelines have been written. These guidelines, reproduced below, are particularly relevant to operations required to produce both first and second grade native forest sawlogs.

GUIDELINES FOR IN-FOREST LOG TREATMENT (NATIVE FORESTS)

BACKGROUND

In integrated harvesting operations it is theoretically possible for over 20 different log product types to be produced by the one harvesting contractor from the one area at the one time.

It is therefore essential for harvesting contractors and CALM staff supervising harvesting operations to have a sound understanding of:

(i) The specifications of the various log products.

(ii) The relative priorities for production of the different log products.

(iii) The basic rules to be observed in producing logs from trees that have the potential to produce more than one log product.

These guidelines address point (iii).

GUIDELINES

(i) At the stump, after felling a tree, the feller must attempt to crown cut the tree at a point either:

(a) where the crown end of the log displays 30% millable wood (this corresponds to the minimum standard for a second grade sawlog), or

(b) if the wood quality is better than the 30% millable limit, where the diameter under bark reaches the minimum crown end diameter specified in the applicable contract of sale, or

(c) where an unacceptable bend occurs, beyond which there is insufficient log length to make a saleable product.

(ii) At the stump, the butt end of a felled tree must not be docked if it displays a minimum of 30% millable wood or more. If the butt end does not display a minimum of 30% millable wood, the faller must attempt to dock the butt end of the log at a point corresponding to 30% millable wood.

(iii) No further docking of logs in the bush is permitted without the approval of the Forest Officer in Charge (FOIC).

All logs meeting the above standard must be snigged to a landing before further treatment.

(iv) On the bush landing, all docking will be the responsibility of the FOIC. This does not mean that he must be present every time the harvesting contractor wishes to dock a log. Rather, the FOIC must ensure the harvesting contractor's employees fully understand the difference between the various log products, and the value and importance of sensible docking to maximise length and minimise waste.

(v) On the bush landing docking will be minimised, in an attempt to:

(a) maintain a greater average sawlog length, and

(b) reduce the volume of docked waste at log landings.

(vi) If docking is thought to be necessary, the following rules shall apply with respect to the production of first grade and second grade jarrah sawlogs.

(a) For logs less than or equal to 5.0 metres in length:

Attempt to sell the log unaltered as a first grade sawlog. (i.e. a log with a minimum of 50% millable wood as assessed on the worst end face).

If the log cannot be sold as a first grade sawlog, consider docking up to 0.6m from one end only to produce a first grade sawlog.

If it is considered that more than 0.6m needs to be docked to produce a first grade sawlog, sell the whole log as a second grade sawlog.

(b) For logs greater than 5.0 metres in length:

Attempt to sell the log unaltered as a first grade sawlog.

If the log cannot be sold as a first grade sawlog, consider docking up to 0.6m from one end only to produce a first grade sawlog.

If it is considered that more than 0.6m needs to be docked to produce a first grade sawlog, consider docking to produce a short second grade sawlog and a longer first grade sawlog, or vice versa.

(vii) If docking is thought necessary for karri and marri logs, the following rules apply:

(a) Karri first grade sawlogs - no docking is to be undertaken if the resulting second grade sawlog is less than 3.0m in length. The log length considered for the production of both first and second grade sawlogs should not be less than 6.0m prior to docking.

(b) Karri second grade sawlogs - where potential second grade sawlog is evident in otherwise chip or third grade logs, docking should be done to produce second grade sawlogs down to the minimum 2.4m length.

(c) Marri sawlogs - the docking of marri logs to produce sawlogs should be attempted if the lower grade product remaining is no less than 3.4m in length. The minimum log length considered for docking to produce a sawlog should be no less than 6.0m.

(viii) Where log products of lower quality can be sold, the rules listed above should be adjusted to accommodate the minimum specification for those log products. For example, both the butt end and crown end of logs prepared at the stump will need to correspond to the minimum standard for the lowest quality log product, thereby replacing the 30% millable specification listed above.

(ix) SFRBU staff must ensure standards between different Timber Supply Areas are consistently maintained.

(x) If any treatment of logs on a bush landing results in the removal of the feller's brand, the brand should be replaced on the treated log with white lumber crayon.

2. LOG SEGREGATION ON BUSH LANDINGS

2.1 "Log Segregation" is the practice of sorting or separating logs on a bush landing into different products prior to loading out.

Log segregation is an integral part of in-forest treatment, hence requires the same knowledge of product specifications and relative product values or priorities.

2.2 Log segregation is the responsibility of qualified harvesting contractor personnel, however Forest Officers may be required to mark or brand doubtful logs prior to loading out.

2.3 If different grades of native forest logs need to be marked for identification purposes, either on a bush landing or on a truck, lumber crayon should be used as follows:

- Forest Officers - yellow lumber crayon or yellow paint
- Contractor personnel - white lumber crayon or white paint
- Premium grade sawlogs - letter "P"
- First grade sawlogs - Number "1"
- Second grade sawlogs - Number "2"
- Third grade sawlogs - Number "3"
- Chiplogs - "CHIP"
- Charcoal logs - "CHAR"

SECTION 4 - COUPE MANAGEMENT

4.8 SUMMARY OF BUSH SIGNS AND MARKINGS

1. **White painted crosses on the side of a tree (permanent)**

   - coupe boundary
   - road reserve
   - stream reserve
   - amenity reserve
   - gravel pit boundary
   - special care zone
   - TEA strip boundary

2. **Yellow painted blazes on three sides of a tree (permanent)**

   - boundary between *Phytophthora cinnamomi*-infested forest and uninfested forest, with the third painted blaze facing the infested forest. (Note: If considered necessary, the fourth side of the tree may be blazed and painted with a yellow cross. This may be necessary in situations where the uninfested forest is logged prior to the infested forest.)

3.* **Red Flagging Tape (i.e. tape with ends able to move in breeze)**

   - sub-coupe boundary
   - ridge line

4.* **White Flagging Tape (or other colour acceptable to FOIC)**

   - feller's block boundary

5. **White painted band around tree**

   - tree marked for retention (crop tree or seed tree)
     (Note: in plantation operations, the white painted band may be reduced to a slash or a dot.)

6.* **White painted double bands around a number of trees in a rough circle**

   - a group of trees marked for retention (crop trees).

7. **Axe blaze on two sides of a tree with a "toemark" cut into the base of the tree**

   - tree marked for removal, the toemark indicating the desired direction of fall.

8.* **Red flagging tape and white flagging tape tied, one above the other, around a tree or bush**

   - landing extremity
   - major snig track

9.* **Yellow flagging tape tied around a tree**

   - tree, missed by feller, which must be felled (if considered by faller to be safe.)

10.* **Yellow flagging tape tied around a log, or stick or bush adjacent to a log**

- log, missed by feller or skidder, which must be cut and/or extracted.

11. **Yellow lumber crayon on a stump or log**

- used by a Forest Officer to instruct contractor and/or record inspection of a harvesting operation. (Note: Blue or black crayon may be used on light coloured species of wood such as pine.)

12. **White lumber crayon on a stump, log or tree**

- used by contractor supervisor or bush foreman to mark logs, instruct bush crew and/or record inspection of a harvesting operation. (Note: Blue or black crayon may be used on light coloured species of wood such as pine.)

13.* **White and red striped tape tied around a tree or bush**

- hazard sign, used to indicate presence of a hazardous situation such as a tree hung-up, "widow-maker", etc.

14. **White painted "S" on three sides of a tree**

- tree marked for retention as a seed tree.

15.* **Dayglo orange flagging tape tied around a tree or bush, with knot facing P.c.-infested forest**

- initial P.c. line marked in field by interpreters.

16.* **Blue flagging tape**

- used to indicate tree around which tops disposal is required.

17. **Double blue painted bands around pine trees**

- indication of boundaries of research plots; the bands are 150mm in width, 150mm apart, 2m above ground.

18. **Large White painted "H" on two sides of a tree or on a log**

- tree or log marked for retention for fauna habitat.

19. **Orange flagging tape**

- TEA strip boundary

* Whenever possible, biodegradable tape should be used.

SECTION 4 - COUPE MANAGEMENT

4.9 SAFETY

1. All timber harvesting operations are subject to the Occupational Safety and Health Act (1984) and Regulations under that Act.

2. CALM and its contractors must comply with the "Safety and Health Code for Native Forest/ Hardwood Logging and Plantation Logging", first published in October 1997 as an interim version by FIFWA.

3. CALM will conduct audits of its contractors to monitor compliance with the Safety and Health Code.

4. Specific guidelines for identifying and managing in-forest hazards prior to and during timber harvesting operations have been written to help overcome the natural hazards found in native forests and plantations. These guidelines, which include mechanisms for the "handing over" of a site from CALM to contractor, and the "handing back" of the site from contractor to CALM, have been reproduced below.

GUIDELINES FOR MANAGING IN FOREST HAZARDS
These guidelines define and describe in-forest hazards and systems for overcoming these hazards prior to and during timber harvesting operations. The responsibilities of CALM, CALM's contractors and other organisations with respect to in-forest hazards are clarified.

What are in-forest hazards?
Native hardwood forests, and to a lesser extent softwood or hardwood plantations, contain many natural safety hazards, most of which cannot practicably be removed prior to or during harvesting activity.

These naturally occurring in-forest hazards include:

- biting, stinging and poisonous creatures,
- steep, uneven, rough and slippery terrain,
- sharp, prickly or spiky scrub vegetation,
- restricted visibility, and
- trees or branches which can fall unexpectedly or in an unexpected manner, particularly during tree felling operations.

In addition to these naturally occurring hazards, harvesting and clearing operations create additional unavoidable hazards such as dust, mud, tree 'hangups' and additional debris on the forest floor.

The type of in-forest hazard which has caused most accidents to people in the forest is the overhead hazard. Overhead hazards include:

- dangerously leaning trees,
- 'hangups' (ie trees leaning or resting on other trees),
- 'window makers' (ie loose, dead branches hanging or balanced in the limbs of trees), and
- other trees considered unusually dangerous and likely to pose a hazard to timber workers.

How do CALM and forest harvesting companies manage in-forest hazards?

Because it is not practicable to remove naturally occurring hazards from forests and plantations, the strategy adopted by CALM and harvesting contractors for many years has been to educate and train the people most at risk, particularly tree fellers, to recognize and deal with these hazards during the course of their work, and to provide appropriate personal protective clothing and equipment.

As well as providing training and equipment for the persons at risk, contractors (and CALM) also make a conscious effort, as far as is practicable, to identify and highlight hazards prior to tree felling. This involves the use of paint marks (arrows) on trees pointing out overhead hazards. During the course of timber harvesting red and white striped hazard tape is used by contractors, again where practicable, to highlight hazards created by the harvesting operation. If possible, hazards such as tree hangups are removed during the log extraction phase.

One of the problems or issues involved in the marking of potential hazards is the difficulty in discovering or recognising them, particularly in native forests. Almost every tree can represent a potential hazard, and it is impossible to assess with certainty a tree's stability, the extent of decayed wood in a tree's roots, trunk or branches, its lean, or predict its behaviour when it is felled.

The tactic in identifying and marking for overhead hazards is therefore to mark only those trees discovered or recognised which have unusual or particularly threatening hazards, (eg 'bridging limbs', bad hollows, unstable dead trees, particularly those around log landings where harvesting activity is concentrated. To do otherwise would result in a situation where almost every tree is highlighted with paint or tape – an 'impracticable scenario'!

The hazard management system in detail

These guidelines include a table or matrix which sets out the specific steps or actions which must be taken to identify in-forest hazards, and the persons or organisations responsible for implementing these steps, for a range of different sites or operation types.

The table lists six actions, commencing with an assessment and identification of hazards by either the CALM tree marker or the contractor supervisor. (An exception is on minesites where the mining company carries out demarcation, drilling and other activities prior to timber harvesting, in which case the mining company is responsible for carrying out an initial assessment of hazards.)

These actions are:

1. *Assessment and identification of hazards by CALM's tree markers*

Tree marking is carried out on certain sites to indicate to the harvesting contractor which trees may be felled or which trees may not be felled. Tree marking is not carried out on clearfelling sites. Tree marking generally involves marking trees for retention, thus indicating to the contractor that all other trees are available for harvesting. During tree marking, the treemarker looks for unusual or particularly threatening hazards on trees to be harvested, and marks such trees with white paint (the same paint used for treemarking). The mark made is usually an upward pointing arrow indicating the presence of an overhead hazard.

2. *'Handing over' of site by CALM to CALM's contractor*

For every harvesting operation there is a Forest Officer responsible for starting the contractor on the particular site. The written mechanism for doing this in native forests is the 'Harvesting Operation Progress Certification Sheet' (CLM 104) and the 'Pre-Harvesting Operation Hazard Identification and Site Handover Sheet - Plantations' (CLM 377) for plantation operations.

On the CLM 104 (native forests) or CLM 377 (Plantations) the Forest Officer in Charge, or Forest Representative, will, after liaising with the treemarkers or the relevant silvicultural officer, write down the steps that CALM has or will take on the site regarding in-forest hazards before giving the contractor clearance to start work. This information will include a statement saying that assessment and identification of hazards, as far as is practicable, has/will or has not/will not be taken. Any unusual hazards found on the site will also be indicated (for example, sink holes in the ground).

3. *Assessment and identification of hazards by the contractor's supervisor or by a mining company*

Other than on minesites, the contractor's supervisor will, after the site is 'handed over' to the contractor, assess the site and identify hazards considered to be particularly threatening, whether or not the site has been treemarked by CALM.

Emphasis will be on trees around log landings sites where activity is most concentrated. On minesites where the mining company carries out activity prior to harvesting, a company representative will similarly assess the site and identify any particularly threatening hazards prior to 'handing' the site to CALM to arrange for timber harvesting to be carried out by a harvesting company. In these cases hazards identified are marked or indicated using orange paint.

4. *Assessment and identification of hazards by the tree feller following felling*

Immediately after trees are felled, new overhead hazards are sometimes created. Tree 'hangups' are typical. If such hazards cannot immediately be removed, by a nearby skidder for example, then the feller will mark the hazard with red and white striped hazard tape, to alert the skidder driver in particular.

5. *Assessment and identification of hazards by machine operators following log extraction*

In a similar fashion to steps taken by the tree fellers, machine operators involved in log extraction will use red and white striped hazard tape to highlight hazards remaining after log extraction. The contractor's supervisor will also make a final assessment of the site before handing the site back to CALM for subsequent regeneration, and ongoing forest management activities.

6. *'Handing over' of site to CALM*

This refers to the 'handing back' of a completed site by the harvesting contractor's supervisor to the CALM coupe manager. Again the Harvesting Operation Handover and Progress Certification Sheet – Native Forests (CLM 104) or Pre-Harvesting Operation Hazard Identification and Site Handover Sheet - Plantations (CLM 377) is the formal mechanism for doing this.

RESPONSIBILITIES FOR MANAGING IN-FOREST HAZARDS

ORGANISATION/ PERSON	SITE								
	(1) Jarrah	(2) Karri (C/Fell)	(3) Karri (Thinning)	(4) Karri (S/Tree)	(5) Ground Salvage Only	(6) Minesite (C/F)	(7) Plantation (Thinning)	(8) Plantation (C/Fell)	(9) Road Construction (involving clearing or felling of trees)
(A) CALM TREE MARKER	1	-	1	1	-	-	1	-	-
(B) CALM COUPE MANAGER	2	2	2	2	2	2	2	2	2
(C) MINING COMPANY	-	-	-	-	-	3,6	-	-	-
(D) CONTRACTOR SUPERVISOR	3,5,6	3,6	3,5,6	3,5,6	3,5,6	3,6	3,5,6	3,6	3,6
(E) CALM ROADING OFFICER	-	-	-	-	-	-	-	-	1,5
(F) FELLER	4	4	4	4	-	4	4	4	4
(G) MACHINE OPERATOR	5	5	5	5	5	5	5	5	5

Action

1. As far as is practicable, assess trees and identify hazards using white paint (eg. by upward facing arrows on tree trunks).
2 "Hand" site to contractor.

3. As far as is practicable, assess trees and identify hazards using orange paint (eg. by upward facing arrows on tree trunks).

4. As far as is practicable, assess and identify hazards resulting from felling operation using red and white striped hazard tape (ie. for hazards which cannot be immediately and safely removed).

5. As far as is practicable, assess and identify hazards remaining after log extraction operation using red and white striped hazard tape (ie. for hazards which cannot be immediately and safely removed).

6. "Hand" site to CALM.

5 BLASTING

Specific guidelines for notifying/warning people within the vicinity of in-forest blasting operations have been written to ensure workers and neighbours are aware of the hazards associated with the use of explosives. These guidelines are reproduced below;

Directions for Shotfirers

(Includes extracts from 'Notes for the Shotfirer' prepared by Explosives and Dangerous Goods Branch Department of Mines.)

Blasting of trees, stumps and/or rock is commonly carried out during forest activities, especially road construction, by a qualified shotfirer. It is usually in forest areas remote from other activities or dwellings but sometimes in the vicinity of neighbouring farms. For this reason, the following procedure is to be followed.

1. **Notification**

1.1 CALM contractors shall notify the supervising CALM Officer of all likely blasting within five working days prior to commencing each job.

1.2 CALM officer shall notify all persons in the vicinity, especially neighbours, that blasting is to be expected, and shall inform them of the signals that will be used.

2. **Warning Procedures**

2.1 All persons in the vicinity shall be advised that blasting is to be expected and they shall be informed of the signals to be given prior to a shot being fired.

2.2 The shotfirer shall ensure that all surplus explosives or equipment are removed from the site and that all personnel are cleared from the danger area.

2.3 To give adequate warning prior to firing, a recognised code of signals must be followed and in order to provide greater uniformity of signalling throughout Western Australia it is recommended the following procedure be adopted. *It is essential that warning signals can be heard by all persons likely to be affected by the blast. This includes neighbours.*

2.3.1 When satisfied the charge is ready to be fired and that all precautions have been taken, the shotfirer, immediately before lighting the fuse or connecting to the exploder, shall give the caution 'ready to fire' or sound three short blows on a siren.

2.3.2 When satisfied that the area is vacated and safe the shotfirer shall prepare the fuse or connect the leads to the exploder and immediately before lighting the fuse or operating the exploder shall give the warning 'fire' or sound one short blow.

2.3.3 When the fumes have dispersed and it is considered all charges have fired then the shotfirer alone shall examine the site to ensure the charges have in fact completely exploded. If satisfied this is so he shall give the call 'all clear' or sound one long blow.

2.4 In summary, the audible signals used for the above warning system are;

Ready to Fire	-	Three short blows
Fire	-	One short blow
All clear	-	One long blow

Note: One short blow - 1 second
One long blow - 5 seconds

Only when the 'all clear' has been signalled by the shotfirer may work commence around the blast area.

In all situations where other activities are taking place in the more immediate vicinity, or where traffic or people could chance upon the blasting site, full warning procedures are to be followed – as specified by the Explosives and Dangerous Goods Branch of the Department of Mines. This may entail additional assistants or flagmen, warning signs and/or red flags.

SECTION 5 - ENVIRONMENTAL PROTECTION

5.1 PROTECTION FROM ROOT ROT DISEASE CAUSED BY *PHYTOPHTHORA CINNAMOMI*

PART A - NATIVE FORESTS

1. Introduction

Phytophthora cinnamomi is a microscopic fungus. *P.cinnamomi* kills a wide range of native plants including jarrah. The disease caused by *P.cinnamomi* has been known as 'dieback' or 'jarrah dieback'. However, it is a root and collar rot disease, which causes rapid decline and death in susceptible native plants. *P.cinnamomi* can be artificially spread in soil and plant tissue transported on the wheels or tracks of vehicles or machinery. Restricting human vectoring or spread of *P.cinnamomi* into uninfected areas is of fundamental importance in timber harvesting and roading operations within native forests.

2. **Knowledge**

All personnel involved in native forest harvesting must have a working knowledge of the biology and hygiene management of *Phytophthora cinnamomi* and be certified competent by successfully completing an accredited training course supplied by CALM. Apart from this section, guidelines regarding root rot disease caused by *P.cinnamomi* are included in the following sections of this Code.

- Section 7 of the Code proper (Environmental Protection)
- Sections 1.1, 1.2 & 1.3 (Planning)
- Sections 2.1, 2.2, 2.3, 2.4 & 2.5 (Roading), and
- Sections 4.1, 4.3 and 4.4 (Coupe Management)

In addition, Forest Officers involved in timber harvesting and road construction must be familiar with CALM's Policy Statement No 3 "*Phytophthora cinnamomi* and disease caused by it" (1998) and its accompanying background paper, and CALM's manual '*Phytophthora cinnamomi* and disease caused by it, Vol I – Management Guidelines" and "..... Vol II – Detection, Diagnosis and Mapping Guidelines." .

The most important definitions of terms are listed below:

Cleandown: The removal of all potentially infested material from an object. This can be achieved by using a high pressure water jet (washdown), compressed air (blowdown) or a brush (brushdown).

Cross contamination: Human or animal vectoring of the plant pathogen *Phytophthora cinnamomi* from infested areas into uninfested areas through the movement of infested soil and/or plant tissue.

Forest disease risk area: Any area of public land which in the opinion of the Executive Director may become infected with a forest disease and has been gazetted by the Governor as such on the recommendation of the Minister. Also known colloquially as "Quarantine Area".

SECTION 5 - ENVIRONMENTAL PROTECTION

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Forest disease risk area: Any area of public land which in the opinion of the Executive Director may become infected with a forest disease and has been gazetted by the Governor as such on the recommendation of the Minister. Also known colloquially as "Quarantine Area".

Front Barrier: A physical barrier to the movement of machinery placed at the front of a log landing, directly behind the soil disturbance caused by roading. Its purpose is to minimise the risk of infested soil being moved from the road onto the landing. A log of 400 mm minimum diameter is required.

Ground Stripping: The systematic interpretation (inspection, sampling, decision, mapping) on foot of an area of forest for the presence of disease symptoms.

Hygiene categories: Categories applied to forest that describe its disease status. These categories are:

- *Phytophthora cinnamomi*-free: Forest apparently free of *P.cinnamomi.*
- Uninterpretable: Forest in which susceptible plants are absent or too few to enable the interpretation of *P. cinnamomi* presence or absence.
  P.cinnamomi-infested: Forest areas which show current symptoms of infestation and are supported by laboratory recoveries of *P. cinnamomi* from root and soil samples.

Hygiene (in relation to disease caused by *P. cinnamomi*): The cleaning of objects such as boots, vehicles, trucks and machines to remove all soil and plant tissue which may contain the plant pathogen *Phytophthora cinnamomi*.

***Phytophthora cinnamomi* Hygiene Plan:** A document, including appended maps, that describes how human access to an uninfested, protectable area is to be managed so that the role of humans as vectors in establishing new centres of infestation is reduced to the lowest possible level.

Protectable area: An area that has been determined as free of the pathogen *Phytophthora cinnamomi* by a qualified Interpreter (ie all susceptible indicator plant species are healthy and no plant disease symptoms normally attributed to *P.cinnamomi* are evident) over which the hygiene rule of "clean on entry" will apply. Can also apply to areas of uninterpretable forest.

Rear barrier: A physical barrier to the movement of machinery placed at the rear of a log landing. All logs from the feller's block are delivered to the landing by being lifted or pushed over this barrier. A log of 400 mm minimum diameter is required. Its purpose is to minimise the risk of infected material being moved from the landing onto the feller's block.

Soil Movement: The movement of moist soil sticking to the wheels or tracks of vehicles.

Split phasing: The separation of component tasks of an operation in time and/or space, so as to minimise opportunities for spread of *P. cinnamomi*.

Uninterpretable: Forest in which susceptible plants are absent or too few to enable the interpretation of *P.cinnamomi* presence or absence.

3. Demarcation of hygiene categories

Refer to "*Phytophthora cinnamomi* and disease caused by it, Vol II – Detection, Diagnosis and Mapping Guidelines".

4. Hygiene tactics

Hygiene minimises the risk of *Phytophthora cinnamomi* being spread or introduced:

Highest Risk	Lowest Risk
Contaminated equipment	Clean equipment
Tracked machines	Rubber-tyred machines
'Hot' landing	Split phase in time
Untrained staff	Trained staff
Unsupervised operators	Supervised operators
Multiple entries	Single entries
Large sub-catchments	Small fellers' blocks
Disease distribution unknown	Disease distribution known
Uncontrolled access	Area secured
No stockpiling	Stockpiling
With soil movement	No soil movement

4.1 Machinery/vehicle cleandown

4.1.1 A key part of forest management with respect to *P.cinnamomi* is the cleaning down of vehicles and machinery prior to entering uninfested or uninterpretable forest, and when leaving infested or uninterpretable forest. Forest Officers must regularly check the standard of vehicle/machinery cleanliness.

4.1.2 The aim is to clean the vehicle or machine of all soil, mud, dust and vegetable matter, especially from wheels or tracks, and from underneath the chassis.

4.1.3 Cleaning down may be carried out using a variety of equipment involving water, compressed air or brushes. When conditions are dry, compressed air is the preferred

cleaning down technique, provided a machine or vehicle can be cleaned by such technique. The Forest Officer will specify the location and method of cleandown.

4.1.4 Clean down sites in the field must be approved by a Forest Officer.

All cleandown points used during harvesting and regeneration will be inspected and approved by a Forest Officer. An approved cleandown point will meet the following minimum standards.

Construction standards

- ❖ Provides physical separation between the object being cleaned and the effluent being produced.
- ❖ Provides physical separation from the object being cleaned and infested soil and plants.
- ❖ Provides easy and safe access for both the placement of the object to be cleaned and for the person conducting the cleandown.

Field location standards

- ❖ Sited for safe entry and departure of vehicles and plant.
- ❖ Sited either to allow effluent to fall directly onto infested soil or is constructed to capture effluent for later transport and correct disposal.
- ❖ Sited to enable cleaned objects to enter uninfested areas without becoming reinfested.

Note:
(a) Avoid turbidity in nearby streams by leaving at least 50m of vegetation buffer, or by constructing a silt trap or sump.
(b) To minimise field washdown, trucks and vehicles to use high pressure cleandown at central depots once daily.

4.2 Preventing the transport of infested soil and plant material

P. cinnamomi may be present in soil or plant tissue adhering to vehicles and machinery. This soil and/or plant material, if transported into a Protectable area, may initiate a new infection. It is essential that the transport of infested soil and/or plant material into Protectable areas is minimised.

The following test is to be applied before harvesting machinery moves from infested to Protectable areas :
(a) Inspect the machinery to see if soil and/or plant tissue is carried.
(b) If the soil and/or plant tissue is being carried, the hygiene conditions in the relevant *P.cinnamomi* Hygiene Plan will apply.

Within those areas which are free of *P. cinnamomi*, the movement of soil does not carry a risk of spread of *P.cinnamomi*. However, the requirements for protection of soil properties (see Section 5.2) must be observed.

4.3 General hygiene conditions

4.3.1 A written authority is required before a potential disease carrier (includes vehicles, plant and equipment) may be taken into a Disease Risk Area (DRA) or a Disease Area.

4.3.2 Harvesting operations will comply with the relevant *Phytophthora cinnamomi* Hygiene Plan prepared using "*Phytophthora cinnamomi* and disease caused by it. Vol I - Management Guidelines".

4.3.3 The same hygiene guidelines are applied to Protectable areas inside and outside Disease Risk Areas (DRA).

4.3.4 Access to harvesting coupes will be made secure by closing roads adjacent to the coupes outside DRA in accordance with CALM Act Section 134. The FOIC will implement road

closure in accordance with strategic roading plans and the relevant *Phytophthora cinnamomi* Hygiene Plan.

4.4 Stockpiling

An essential hygiene tactic is to stockpile logs during periods of lowest risk, to enable operations to periodically cease as necessary for the maintenance of hygiene and to prevent soil damage. Stockpiles or mill intakes are monitored regularly.

PART B - PLANTATIONS

1. Introduction

See Part A above (Native Forests) Section 1 – this is applicable to operations in plantations.

2. Knowledge

See Part A above (Native Forests) Section 2 – this is applicable to operations in plantations.

3. Demarcation

See Part A above (Native Forests) Section 3 – where required this is applicable to operations in plantations.

4. Hygiene

4.1 The use of roads through CALM managed land to access plantations will be managed in accordance with the relevant *Phytophthora cinnamomi* Hygiene Plan.

4.2 Plantations established on ex-pasture sites are assumed to be infested with *Phytophthora cinnamomi* and will therefore not require any specific *Phytophthora cinnamomi* hygiene measures.

4.3 (a) Plantations established on ex bush sites where the under story indicator plants have been removed, will be treated as for 4.2 above.

(b) Plantations established on ex bush sites, where the under story indicator plants are present so that mapping and demarcation of diseases caused by *Phytophthora cinnamomi* is possible as described in "*Phytophthora cinnamomi* and disease caused by it. Vol II – Detection, Diagnosis and Mapping Guidelines", will be treated as per Part A-Native Forests, Section 4, above.

SECTION 5 - ENVIRONMENTAL PROTECTION

5.2 PROTECTION OF SOIL (INCLUDING REHABILITATION MEASURES)

1. Soil Damage

1.1 Damaged soil is soil that has either:

(a) had the A horizon (topsoil) removed,
(b) had the A horizon (topsoil) mixed with the B horizon (subsoil usually containing clay)
(c) suffered severe compaction (meaning compaction which will affect germination or growth of plants). This often applies to landings, and
(d) been affected by all three of the above.

1.2 **Native forest Operations**

1.2.1 In selectively cut forest (i.e. jarrah forest, karri thinning) and karri seed tree operations, soil damage must not exceed 10% in area of any single feller's block or sub-coupe, including the landing. If a Forest Officer considers that damage is approaching 10% then he/she must :

(a) Survey the feller's block (compass and pace method), plot on graph paper and calculate total area.
(b) Measure the perimeter of the landing and calculate area.
(c) Plot four parallel lines at right angles to the general snigging direction, the four lines positioned to divide the feller's block into five approximately equal sections.
(d) Pace along each sample line, classifying each pace as damaged or undamaged soil.
(e) Record all the above data on a "Field Assessment of Soil Damage" sheet (form CLM 108), and calculate percentage of damaged soil.

If the total area of soil damage, including the landing, is greater than 10% then skidding in that feller's block must cease immediately. The harvesting contractor will then be asked to select the best area in the coupe to continue harvesting. If the damage levels are exceeded in the best area then the whole coupe will be closed.

1.2.2 In clearfelling situations (ie, karri forest) the acceptable limit of soil damage is 20%. Where a "partial cut" or "pre-harvesting" is allowed as part of the clearfell operations a limit of 5% is set for a "partial cut", thus allowing for additional damage up to 15% for the combination of final cut and landings.

1.2.3 If skidding is stopped in a feller's block because of excessive soil damage then it cannot recommence in that block until the Forest Officer in Charge decides that the soil is dry enough. This decision cannot be made until the local Soil Dryness Index exceeds 500 in the Northern Jarrah Forest and 250 in the Southern Jarrah and Karri Forest.

1.3 **Plantation Operations**

1.3.1 In plantation operations soil damage must not exceed 15%. Soil damage will be measured using a one hectare assessment plot placed in the most affected portion of the compartment being harvested. Firebreaks, access tracks and roads are excluded from the assessment plot.

If a Forest Officer considers the soil damage is approaching 15% he/she must :

(a) Survey a 100 m x 100 m plot over the most effected area within the compartment. In most cases this will occur adjacent to firebreaks.
(b) Plot four parallel lines at right angles to the general direction of extraction, each line being 25 metres apart.
(c) Pace along each sample line classifying each pace as damaged or undamaged soil.
(d) Record the above data on a "Field Assessment of Soil Damage" sheet (Form CLM 108) and calculate the percentage of damaged soil.

1.3.2 Should the one hectare sample indicate that soil damage has exceeded 15% then harvesting must cease, in which case the FOIC/Forest Representative will provide an alternative area suitable to continue operations, if such an area is available.

1.3.3 During the period 1 May to 30 September felling operations may be limited so that they precede extraction operations by no more than three days. Should extraction be stopped due to soil damage, this requirement will limit the area of further soil damage while recovering harvested timber.

1.3.4 Following the cessation of felling due to soil damage, extraction may continue until harvested timber is recovered.

1.3.5 If harvesting operations are stopped within a compartment due to soil damage, harvesting may not recommence in that compartment until the FOIC/Forest Representative decides that the soil is dry enough.

1.3.6 Because of the relative areas planted on hills and in coastal plantations, it will be necessary to operate in some hills plantations in winter. Good planning of the timing and the siting of operations will minimise soil and environmental damage to plantations and firebreaks.

2. Erosion Control

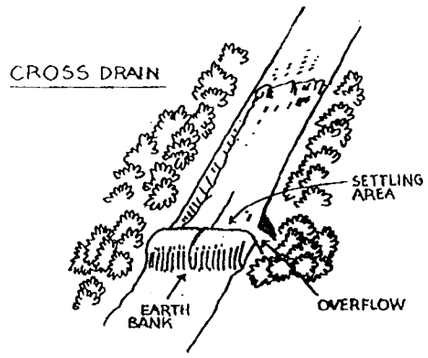
2.1 CALM staff and harvesting contractors must be aware of the potential for soil erosion along firebreaks, extraction tracks and roads during wet weather.

2.2 When extraction is completed in any feller's block or clearfelled plantation compartment, and prior to machinery leaving, interceptor banks and drains must be constructed across all extraction tracks and disturbed firebreaks with exposed soil, to the following standards :

(a) Interceptor bank/drain spacing :

SLOPE	ON LATERITIC GRAVELLY SOILS (m)	ON ALL OTHER SOILS (m)
0-2°	Nil	Nil
3-5°	200	100
6-10°	100	50
11-15°	60	30
16°+	30	15

(b) Size of interceptor banks :
minimum of 40 cm high and 40 cm thick, using compacted soil.
(c) Angle of interceptor banks :
0.3-0.5% from horizontal (1.5-3°),
(d) Dispersal of water from interceptor drains :
The interceptor banks/drains must be constructed so that water is directed from the extraction track into nearby vegetation (see illustration).



2.3 Erosion control work should be carried out at any time during the course of harvesting, if rainfall is imminent. Such work shall be to the standards listed in 2.2. above.

3. Rehabilitation of Damaged Soil

3.1 *Landings and Snig Tracks (Native Forests)*

Soils on landings and major snig tracks will be categorised by the FOIC into one of the following types prior to the feller's block being opened :

(a) Concreted or dissected laterite close to the surface with a skeletal gravelly or sandy soil.
(b) Duplex soil with a gravelly or sandy soil over a clay that is operated on under dry conditions.
(c) Duplex soil with a gravelly or sandy soil over a clay operated on in wet conditions OR deep loam, including gravelly or sandy loam, with no impeding layer, that is operated on in any season.

Each of these soil types will be rehabilitated using the appropriate prescription detailed below. Rehabilitation must be carried out by the harvesting contractor to the specifications in the appropriate prescription. The contractor will make available suitable machinery to undertake this work.

All rehabilitation must be carried out in strict accordance with standard *Phytophthora cinnamomi* hygiene practices.

Any burning of debris considered necessary will be carried out by the relevant CALM District.

Any seeding or fertilising will be carried out by the contractor(s). Seeds and fertiliser will be supplied by CALM.

In situations where remaining log material can or is likely to be sold, for example as firewood, charcoal logs or third grade sawlogs, such material should be neatly stacked in the front of the landing in preparation for loading out at a later date.

3.1.1 *Landings with Concreted or Dissected Laterite Close to Surface*

- At the completion of loading out, ensure all landing debris, and all unmerchantable log material and bark generated during the harvesting operation, is neatly stacked at the sides and/or rear of the landing, no closer than 5 metres from any retained crop trees. Some of this material must be used to block access from the landing to snig tracks.

- At any time following the completion of debris stacking, but before application of seed and fertilizer in April, lightly scarify the surface of the landing to disturb any surface crusting that may have occurred, using any suitable machine or implement. The scarifying depth will be governed by the amount of rock or laterite present on the landing, but is not expected to be greater than 100 mm. The aim of the scarifying is to facilitate germination of seed.

- In April, apply CALM-supplied indigenous tree and scrub seed mix to the landing at 1.5 kg/ha, and CALM-supplied superphosphate at 250 kg/ha.

3.1.2 *Landings and Major Snig Tracks with Duplex Soils Operated on Under Dry Conditions*

- At the completion of loading out, ensure all landing debris, and all unmerchantable log material and bark generated during the harvesting operation, is neatly stacked at the sides and/or rear of the landing, no closer than 5 metres from any retained crop trees. Some of this material must be used to block access from the landing to the snig tracks.

- At any time following the completion of debris stacking, but before application of seed and fertilizer in April, scarify the landing, and major snig tracks, to a depth of 200 mm, using any suitable machine or implement, in a manner which will facilitate germination of seed.

- In April, apply CALM-supplied indigenous tree and scrub seed mix to the landings and major snig tracks at 1.5 kg/ha, and CALM-supplied superphosphate at 250 kg/ha.

3.1.3 *Landings and Major Snig Tracks with Duplex Soils Operated on in Wet Conditions, and Deep Loams*

(Note requirement for winning and stockpiling of topsoil - Specification 4.3.)

- At the completion of loading out, ensure all landing debris, and all unmerchantable log material and bark generated during the harvesting operation, is neatly stacked at the sides and/or rear of the landing, no closer than 5 metres from any retained crop trees. Some of this material must be used to block access from the landing to the snig tracks.

- When soils are sufficiently dry - generally between November and April - respread any overburden (not topsoil) back onto the landing and blade flat any irregularities. At the same time blade level all major snig tracks.

- Return and spread topsoil evenly over surface of landing.

- At any time following the completion of topsoil return, but before application of seed and fertilizer in April, rip the landing and the major snig tracks to a depth of 500 mm at one metre spacing, using a winged ripper. Ripping will be considered adequate when an 8 mm rod can be pushed by hand to a depth of 500 mm in the rip lines and to a depth of 200 mm over 60% of the remainder of the landing.

- In April, apply CALM-supplied indigenous tree and scrub seed mix to the landings and major snig tracks at 1.5 kg/ha, and CALM-supplied superphosphate at 250 kg/ha.

3.2 *Rehabilitation of Outrows and Firebreaks (Plantations)*

3.2.1 Soil damage exceeding limits in 1.3.1 must be repaired during the ensuing summer period, as part of the overall firebreak maintenance programme. Particular attention needs to be paid to landing points.

3.2.2 Where firebreaks are disturbed through harvesting operations, interceptor banks will be installed as per Section 2 - Erosion Control.

3.2.3 Any erosion control interceptor banks damaged during the course of a harvesting operation will be re-installed to the standard listed in Section 2 - Erosion Control.

4. Protection of Soil Adjacent to Water Reservoirs

4.1 Harvesting operations adjacent to reservoirs (usually softwood harvesting operations) require special treatment to prevent turbidity, and care must be taken during all stages of harvesting. The following

checklist of rules and guidelines must be observed by the Forest Officer in Charge and/or contract supervisors. The relevant CALM planning officer must consult with the appropriate Water Corporation engineer in the planning process.

4.2 Visible turbidity results from soil disturbance and surface erosion on either roads or outrows. Excessive soil disturbance can occur when the soil is saturated or when powdering of the soil occurs during summer.

4.3 A favourable time for harvesting can be late spring, when the ground is moist but not saturated. This prevents powdering of soil and subsequent turbid runoff.

4.4 The opportunity for surface erosion to occur is greatest immediately after the disturbance, and decreases with time. Any control measures prescribed to minimise erosion must be well planned and implemented as soon as possible following the disturbance.

4.5 Winter harvesting adjacent to reservoirs should be minimised or excluded where possible.

4.6 Undisturbed filter strips adjacent to reservoirs and major creeks are required to filter water runoff. Depending on topography, the filter strips may have to be a full compartment wide or just a strip between the lowest road and the reservoir.

4.7 Harvesting should cease within 40 m of reservoirs at the first sign of excessive soil disturbance or erosion likely to cause turbidity.

4.8 Mechanical harvesters or processors leave greater amounts of debris on outrows, reducing potential disturbance by forwarders.

4.9 Cross drains may be required on outrows adjacent to a haul road.

4.10 Roads adjacent to reservoirs should not be used for hauling if they are likely to become heavily powdered during summer operations.

FIELD ASSESSMENT OF SOIL DAMAGE
(FOR NATIVE FOREST AND PLANTATION OPERATIONS)

DISTRICT..... FELLER'S BLOCK .....

PLANTATION.....

BLOCK/CPT + "P" YEAR.....

CONTRACTOR DETAILS.....

COUPE.....

CUTTING PRESCRIPTION.....

.....
PLOT OF FELLER'S BLOCK (ATTACHED)

SURVEY SUMMARY

1. Total area of feller's block (if applicable) _____ m^2

2. Area of landing (if applicable) _____ m^2

3. Extraction damage:

Sample line	Topsoil removed (m)	Mixing (m)	Compacted (m)	Undamaged (m)	TOTAL
1					
2					
3					
4					
TOTAL	(a)	(b)	(c)	(d)	(e)

Extraction damage = {[(a) + (b) + (c)] ÷ (e)} x 100 = ...%

4. Total damage = 2) + 3) = ...%

RECOMMENDATION

1. Operation can continue; survey to be repeated ..... (date)

OR

2. Fellers' block/compartment closed.

Date of assessment - .....

Officer compiling - .....

Distribution : 1. Contractor
2. Business Unit cell manager

SECTION 5 - ENVIRONMENTAL PROTECTION

5.3 PROTECTION OF WATER

1. Many catchments in State forest are harnessed, that is the water from such catchments is collected in man-made reservoirs for industrial and/or domestic use. It is therefore essential that effective water protection measures are undertaken during all phases of harvesting.

2. During harvesting operations, measures must be taken to protect water from unnatural increases in:

   (i) salinity (the salt content of water)
   (ii) sedimentation (the deposition downstream from a source of disturbance, of material across the full range of particle size)
   (iii) siltation (the deposition of particles larger than clay but smaller than sand)
   (iv) turbidity (discolouration of water due to suspended silt, clay or organic matter)

3. Water protection measures are necessary during:

   (a) planning (Section 1.1)
   (b) road construction and maintenance (Section 2.3 and 2.4)
   (c) gravel pit working and rehabilitation (Section 2.5)
   (d) coupe demarcation (Section 4.1)
   (e) extraction (Section 4.3)
   (f) haulage (Section 4.4)
   (g) harvesting operation inspection and certification (Section 4.5)
   (h) protection from root rot disease (Section 5.1)
   (i) protection of soil (Section 5.2).

   CALM staff and harvesting contractors must be familiar with the requirements for protection of water as detailed in the above specifications.

   Details of native forest river and stream buffer widths are contained in Section 4.1.

4. No roading or harvesting may take place within 500m of the high water mark of any reservoir without prior notification to the relevant Water Corporation office.

SECTION 5 - ENVIRONMENTAL PROTECTION

5.4 PROTECTION OF CROP TREES

1. Harvesting contractors must make every effort during all phases of harvesting to protect marked crop trees from physical damage. Physical damage is any damage resulting in one or more of the following:

   (a) Exposure of more than 100cm^2 of cambium on the bole of a crop tree.
   (b) Felling, breaking, or uprooting of a crop tree, or
   (c) removal of more than 30% of the crown of a crop tree.

2. Periodical assessments of crop tree damage must be carried out by a Forest Officer using the "Assessment of Crop Tree Damage" form. In carrying out these assessments, a Forest Officer must assess a sample of at least 100 crop trees in a given feller's block or sub-coupe or softwood plantation operation. The sample should consist of at least three 10m wide assessment lines **across** the fellers block or sub-coupe in native forest harvesting operations. In softwood plantation operations the sample must include trees from at least eight rows of trees. The results should be written on the CLM Form107.

3. If more than 5% of trees assessed are damaged, then the harvesting contractor may be charged for all damaged trees in that feller's block at rates determined from time to time by the Executive Director.

4. Copies of all crop tree damage assessments must be handed immediately to the relevant FOIC. Copies must be forwarded to the Manager of the relevant harvesting contractor, and the relevant Bush Supervisor.

5. **Tops Disposal**

   As well as avoiding physical damage, harvesting contractors must ensure that all harvesting debris created by a harvesting operation is removed from the base of crop trees. This task is commonly known as "tops disposal" and is designed to protect crop trees from fire damage. The debris to be removed includes all woody material greater than 75mm diameter. This material must be moved at least 1m away from the bole of a crop tree. Tops disposal must be completed before a feller's block or sub-coupe is certified complete. Bush Supervisors should encourage fellers and skidder drivers to carry out tops disposal during the course of a harvesting operation.

6. Trees that require tops disposal are to be highlighted by use of blue flagging tape.

FIELD ASSESSMENT OF CROP TREE DAMAGE

DISTRICT ..... CONTRACTOR .....

BLOCK/PLANTATION ..... HARVESTING DETAILS .....

OPERATION .....

FELLERS BLOCK ..... DATE OF ASSESSMENT .....

A. DAMAGE ASSESSMENT

Number of trees assessed ..... (minimum sample of 100 trees)

Number of trees damaged .....

Percentage of trees damaged .....%

B. COMMENTS

.....

.....

C. RECOMMENDATIONS

.....

.....

OFFICER COMPILING .....

Information re completing this form:

1. Damaged trees are those crop trees that:

   (a) have more than 100cm^2 of cambium exposed,
   (b) have been felled, broken in two or uprooted, or
   (c) have more than 30% of crown removed.

2. In "Harvesting Details" specify type of machinery involved and names of feller and skidder driver.

3. In "Comments" write down:

   (a) any environmental or other factors, that may have affected the result of the assessment, and
   (b) whether this assessment has indicated an improvement or worsening of performance by the contractor.

4. If in "Recommendations" it is recommended that the contractor be charged for crop tree damage, the total number of crop trees in the feller's block must be assessed and the total number of damaged crop trees determined.

5. Forward this form immediately to Business Unit cell manager; copies to Bush Supervisor and Contract manager.

SECTION 5 - ENVIRONMENTAL PROTECTION

5.5 PROTECTION OF DECLARED RARE FLORA AND SPECIALLY PROTECTED FAUNA

In these matters personnel involved in timber harvesting and road construction should refer to and implement where appropriate the relevant sections of :

- Policy Statement No. 9 - Conservation of Threatened Flora.

- Policy Statement No. 33 - Conservation of Threatened and Specially Protected Fauna.

- Policy Statement No. 44 - Wildlife Management Programs.

SECTION 5 - ENVIRONMENTAL PROTECTION

5.6 PROTECTION FROM FIRE

1. All harvesting contractors have certain fire control requirements as specified in the Code of Practice for Timber Harvesting in Western Australia.

2. Each relevant FOIC or Business Unit Area Co-ordinator and CALMfire Area Co-ordinator must ensure that the fire control provisions of the Code are strictly adhered to. This includes training of contractors' personnel.

3. In softwood plantation harvesting operations the relevant Fire Duty Officer in consultation with the relevant Business Unit Area Manager or Co-ordinator may prohibit any or all types of activity at such times and for such periods as is necessary, when in the officer's opinion such action is warranted by the CALM Fire Danger ratings.

   The decision to cease operations must be balanced against the benefits of maintaining trained fire crews and fire units in the field on high hazard days. Key factors to take into consideration include: local FDI rating for jarrah (fire hazard), whether or not the area has been burnt, slope, type of operations or equipment, access and presence of additional fire units.

   The following guidelines should be followed when making a decision to restrict softwood harvesting operations:

   CHAINSAW OPERATIONS

   (a) **Prescribed Burnt Areas**
   0 - 140m/hr: no restriction.
   Above 140m/hr: cease operations.

   (b) **Areas not Prescribed Burnt**
   0 - 60m/hr: no restrictions.
   Above 60m/hr: cease operations.

   (c) **Steep Terrain**
   0 - 60m/hr: no restriction.
   Above 60m/hr: cease operations.

   PROCESSING EQUIPMENT (e.g. feller bunchers, delimbing machines)

   (a) **Prescribed Burnt Areas**
   0 - 140m/hr: no restrictions.
   Above 140m/hr: cease operations.
   Unless:
   - Continuous radio contact between CALM and contractor, and
   - A minimum of one manned heavy duty fire unit, or a minimum of three light units, is stationed on site and remains and inspects the site for one hour after machine stops work.

   (b) **Areas not Prescribed Burnt**
   0 - 60m/hr: no restrictions.
   61 - 140m/hr: cease operations.

   Unless:
   - Continuous radio contact between CALM and Contractor.
   - Work area and entire site surrounded by a mineral earth break.
   - A minimum of one manned heavy duty fire unit is stationed on site and remains and inspects the site for one hour after machine stops work.

   Above 140m/hr: cease operations.

   FORWARDING (IN-COUPE)

(a) **Prescribed Burnt Areas**

0 - 140m/hr: no restrictions.

Above 140m/hr: cease operations.

Unless: - There is continuous radio contact between CALM and contractor.

- A heavy duty fire unit or two manned light units is on site and remains and inspects the site for one hour after machine stops work.
- Machines have hydrostatic driven equipment (wet brakes) and turbo charged engines.

(b) **Non Prescribed Burnt Areas**

0 - 60m/hr: no restrictions.

60 - 140m/hr: cease operations.

Unless: - Continuous radio contact with CALM.
- Site accessible to heavy duty.
- Site surrounded by mineral earth break.
- Two manned light units on site.

Above 140m/hr: cease operations.

Unless: - Machines have hydrostatic drive (wet brakes) and turbo charged engines.

- Continuous radio contact with CALM.
- Site accessible to heavy duty.
- Site surrounded by mineral earth break.
- One heavy duty fire unit on site.

LOADING FROM CLEARED BREAK

(a) **Prescribed Burnt Areas**

No restrictions.

(b) **Non Prescribed Burnt Areas**

0 - 140m/hr: no restrictions.

Above 140m/hr: cease operations.

Unless: - Continuous radio contact with CALM.

- Minimum of two manned light units on site.
- Area inspected 15 minutes after machine stops.

(c) **Steep**

0 - 140m/hr: no restrictions.

Above 140m/hr: cease operations.

All softwood plantation harvesting machines must be fitted with either (i) two x 9 kg fire extinguishers, or (ii) one x 9kg fire extinguisher **and** an integrated automatic fire extinguishing system.

SECTION 6 - LOG SPECIFICATIONS AND QUANTITY DETERMINATION

6.1 GENERAL DESCRIPTION OF LOG PRODUCT TYPES

1. **Sawlogs**

Sawlogs are logs prepared in the bush for cutting at a registered sawmill into sawn products such as sleepers, boards or scantling. Any log that is considered to be merchantable, that is, worth cutting into sawn products, may be classed as a sawlog. For commercial purposes several types of sawlogs are recognised, the most important being:

(a) **Native forest sawlogs**

- **Premium Grade Sawlogs** - the highest quality sawlogs that may be sold for specific end uses such as seasoned timber for furniture manufacture.

- **First Grade Sawlogs** - the most common type of sawlog cut. The minimum length and minimum crown diameter under bark of a First Grade Sawlog is generally 2.1m and 200mm for jarrah, and 2.4m and 300mm for karri, and the minimum amount of millable wood in such a log is generally set at 50% as assessed on the worst end.

- **Second Grade Sawlogs** - sawlogs below the standard of First Grade Sawlogs. Unless otherwise indicated, the minimum standard of a second grade sawlog is 2.1m in length and 250mm in crown diameter under bark, with at least 30% of millable wood as assessed on the worst end.

- **Third Grade Sawlogs** - sawlogs below normal Second Grade Sawlog quality, that may be sold by the Department. Third Grade Sawlogs have no minimum standard and selection of such logs from reject material on bush landings is the responsibility of the buyer.

- **Small Sawlogs** - sawlogs with diameters under bark of 150-200mm.

- **Short Sawlogs** - sawlogs of a specific quality and below a specific length, that may be sold for specific end uses.

- **Feature Sawlogs** - sawlogs with desirable features of grain, colour, shape or size, sold for specialty end uses. Two grades are recognized: "high" and "low".

(b) **Softwood sawlogs**

- **Premium Grade Sawlogs** - high quality pine sawlogs at least 300mm in diameter under bark and 4.8m in length. First Class Sawlogs are obtained from plantations at least 25 years of age.

- **Second Grade Sawlogs** - lower grade pine sawlogs of diameter down to 200mm and length down to 2.1m.

- **Third Grade Sawlogs** - sawlogs below Second Class Sawlogs in quality, selected by the buyer.

- **Small Sawlogs** - sawlogs of small end diameter under bark between 150 and 200mm.

- **Sawlogs** - sawlogs where stumpage is based on mid log diameter rather than class of log (e.g. at Wespine where an infra-red scanner is operational).

2. **Veneer Logs**

Veneer or "peeler" logs are logs intended for slicing or peeling into sheets for the production of veneer or plywood. Veneer logs must be of a consistently high quality, with much less allowable defect than sawlogs.

Softwood peeler logs that are prepared in good faith to the set specification but are below standard are sold as "Second Class Peeler" logs.

3. **Bridge and Jetty Timbers**

Bridge and Jetty Timbers are hardwood logs intended for use in the construction of bridges, wharves and jetties. Like Veneer Logs, Bridge and Jetty Timbers must be of a consistently higher quality than sawlogs. Most Bridge Timbers are produced for use by Main Roads WA. Most Jetty Timbers are produced for use by the Marine and Harbours Department. There are four types of Bridge and Jetty Timbers.

- **Piles** - high quality straight logs, driven into the ground in bridges, wharves and jetties.
- **Stringers** - high quality straight logs, placed lengthwise on piles.
- **Corbels** - short lengths of high quality log, placed lengthwise on top of piles to support stringers.
- **Bedlogs** - logs placed lengthwise on the ground, used to support stringers.

Note: bridge and jetty timbers are originally produced from the forest as "unprocessed round timbers".

4. **Poles**

Poles are long, straight logs used in an upright position to support loads above ground. Poles are usually of smaller diameter than Bridge Timbers, but must be of a similar high quality. Most poles are produced for use by Western Power in supporting transmission lines. The amount of defect allowable in poles can vary depending on whether or not the pole is to be treated with preservative. Species which have been accepted by Western Power are jarrah, marri, blackbutt, karri, yellow stringybark, radiata pine and pinaster pine.

Note: poles are originally produced from the forest as "unprocessed round timbers".

5. **Chip Logs**

Chiplogs are marri and karri logs destined for conversion into woodchips at the Diamond Mill at Manjimup.

6. **Mining Timbers**

Mining Timbers are generally short straight jarrah logs, of crown diameter under bark between 125mm and 250mm, used to support underground coal mines at Collie. Three terms commonly used are :

- **Props** - lengths of 2.4m or 2.7m used in an upright position in direct contact with the roof of a mine.
- **Legs** - similar to props, but are used to support Bars.
- **Bars** - longer lengths up to 5.1m, and placed horizontally on top of Legs. They support the roof of a mine.

7. **Charcoal Logs**

Charcoal logs are jarrah logs destined for conversion into charcoal at Simcoa's plant at Kemerton.

8. **Particle Board Logs**

Particle board logs are traditionally radiata pine and pinaster pine logs, produced mostly from thinning operations, for conversion into particle board. Recently, small diameter, low quality jarrah and marri logs have been trialled as particle board logs.

9. **Industrial Wood**

Industrial wood is the specific term used to describe pine logs used for medium density fibreboard. It is also a general term used to describe both particle board logs and logs for MDF, including logs which are chipped in-forest for MDF.

10. **Pine Rounds for Treatment**

Pine rounds for treatment are small diameter radiata or pinaster logs sold for preparation and preservative treatment for use in fencing and other applications.

11. **Domestic Firewood Logs**

Firewood for domestic use may be collected by the public from "Public Firewood Areas" (refer to Regulations Part 15). Significant quantities of firewood logs are harvested by CALM contractors and sold under Contracts of Sale as either "dry" or "green" logs. The predominant species used is jarrah.

12. **Minor Forest Produce**

"Minor Forest Produce" is a general term used to describe a range of products (including firewood) that may be harvested or collected from forests or plantations.

Minor forest products sold by CALM include :

- **Craftwood** - a term used to describe pieces of wood (except burls) remaining on the forest floor after the completion of an integrated harvesting operation. A piece of craftwood is generally small in size, but with certain features of grain, colour or shape that make it suitable for manufacture into craft items. Craftwood may be sold under a Forest Produce Licence (FPL) to members of the public. One condition of an FPL for craftwood is that no piece of wood greater than 1.5 m in length may be sold. If a longer piece of timber is required and found, it must be inspected and branded by a Forest Officer before it can be collected as craftwood.

- **Fencing material** - this includes a range of products used for fencing purposes or small domestic construction. It includes posts (split or round), struts, strainers, rails and small poles up to 6 m in length. A standard specification for fencing material when sold by contract is included in Specification 6.2.

- **Chopping logs and pegging logs** - logs used in the sport of log chopping.

- **Garden paving slabs or rings** - these are "biscuits" about 75 mm thick, cut from logs about 400 mm in diameter. Logs from which garden rings are cut are sold as third grade sawlogs.

- **Burls** - the dense outgrowths on the trunk of some trees. It is believed they result from a tree's reaction to attack from insects or viruses. Burls may be cut from felled trees only, and are sold by weight.

- **Forest debris** - leaves, needles, branches, tree loppings or small cull trees may be supplied free of charge to Shires or other Government organisations for purposes such as sand dune restoration, and to domestic users. Commercial users must pay prescribed royalties and other charges.

SECTION 6 - LOG SPECIFICATIONS AND QUANTITY DETERMINATION

6.2 NATIVE FOREST (HARDWOOD) LOG SPECIFICATIONS

Standard specifications for all native forest (hardwood) log products are reproduced below. These specifications may be used as a general reference by Forest Officers and contractors. However, because there may be small but significant variations to some log specifications in some Harvesting Contracts and Contracts of Sale, the specifications included in those Contracts must be checked and used as the official specification in every case.

The standard native forest (hardwood) log specifications reproduced below are:

(1) Premium grade sawlogs
(2) First grade sawlogs (jarrah, blackbutt and wandoo)
(3) First grade sawlogs (karri)
(4) Sawlogs (marri)
(5) Second grade sawlogs (jarrah, blackbutt and wandoo)
(6) Second grade sawlogs (karri)
(7) Third grade sawlogs (jarrah, karri, blackbutt and wandoo)
(8) Veneer logs
(9) Unprocessed round timbers suitable for preparation into bridge and jetty timbers
(10) Unprocessed round timbers suitable for preparation into transmission poles and building poles ("long poles" and "medium poles")
(11) Unprocessed round timbers suitable for preparation into mine support timbers
(12) Large chiplogs
(13) Small chiplogs
(14) Residue chiplogs
(15) Charcoal logs
(16) Fencing logs
(17) Domestic firewood logs
(18) High grade feature sawlogs (including sheoak)
(19) Low grade feature sawlogs
(20) Small sawlogs (karri)
(21) Small sawlogs (jarrah)
(22) Marri industrial wood (suitable for mobile chipper).

(1) **Premium Grade Sawlogs**

Species:	Any hardwood species as nominated in the relevant Contracts.
Dimensions :	
length	- minimum 2.4m.
diameter	- minimum 350mm underbark.
Shape :	Logs will be straight.
Quality :	a maximum of 15% by volume of defective wood is permissible, as assessed on the worst end face, provided the defective wood is confined to the centre or heart of the log. No other defect is permissible.
General :	logs must be delivered to mill landing for water spray storage within five days of felling.

(NOTE: Guidelines have been written to assist Forest Officers and contractors to distinguish between "defects" and "features" or "characteristics" with respect to quality of premium grade sawlogs.)

(2) **First Grade Sawlogs** (jarrah, blackbutt and wandoo)

Species:	Jarrah, blackbutt and wandoo.
Dimensions :	
length	- minimum 2.1m.
diameter	- minimum under bark 200mm.
Quality :	- minimum amount of millable wood - 50% as assessed by the FOIC.

(3) **First Grade Sawlogs** (karri)

(a) Normal Specification

Species :	Karri.
Dimensions :	
length	- minimum 2.4m.
diameter	- minimum under bark 300mm.
Quality :	- minimum amount of millable wood - 50% as assessed by the FOIC.

(b) Specification for Whittakers

Species :	Karri.
Dimensions :	
length	- minimum 2.4m.
diameter	- minimum under bark 200mm.
Quality :	For logs above 300mm sedub: minimum amount of millable wood - 50% as assessed by the FOIC. For logs between 200 and 300mm sedub: minimum amount of millable wood - 90% as assessed by the FOIC; sweep to not exceed 50mm in any 3.0m length from log surface to the chord treated by a straight edge or tight cord over the length of the log; logs shall otherwise be of uniform shape; gum rings to be maximum of one complete ring on end face.

(c) Specification for AustWest

Species :	Karri plus a small proportion of marri.
Dimensions :	
diameter	minimum sedub: 200mm.
length	- 3.6, 4.2 or 4.8 metres or multiples thereof. - tolerances will be negotiated from time to time.
Quality :	For logs above 300mm sedub: minimum amount of millable wood - 50% as assessed by the FOIC. For logs between 200 and 300mm sedub, sweep to be maximum of 50mm in any 2.4m length; rot to be maximum of 30% on worst end face, limbs, stubs and bumps to be maximum of one per lineal metre, dryside to be maximum of 50% of bole circumference; pinholes to be clean only,

unacceptable if associated with rot; large swellings unacceptable; gum rings to be maximum of one complete ring on end face; gum pockets to be maximum of one per lineal metre.

(d) Specification for Bunnings

Species :Karri plus a small proportion of marri.

Dimensions :

length	- minimum SED 200mm under bark.
diameter	- minimum length: 2.4 metres.

1. Quality for logs with minimum SED of 300mm	Logs will meet the quality standards set by the FOIC by which at least 50% millable wood as assessed on the worst end face will be available.
2. Quality of logs with SED between 200mm and 300mm	Sweep shall not exceed 30mm from log surface to the chord created by a straight edge or tight cord over the length of the log. Logs shall otherwise be of uniform shape. Fungal decay not acceptable. Double heart, limbs, overgrowths, drysides, shatters and saw cuts other than superficial not acceptable. Borer damage, shakes and gum veins should be present to a negligible extent only.

(4) **Sawlogs** (marri)

Species:	Marri.
Dimensions and Quality:	Marri sawlogs are those logs selected as such by the buyer, although generally the dimensions will be: length - minimum 2.4m. diameter - minimum under bark 300mm.

(5) **Second Grade Sawlogs** (jarrah, blackbutt and wandoo)

Species:	Jarrah, blackbutt, wandoo.
Dimensions :	
length	- minimum 2.1m.
diameter	- minimum under bark 250mm.
Quality :	- minimum amount of millable wood - 30% assessed by the FOIC.

(6) **Second Grade Sawlogs** (karri)

Species:	Karri.
Dimensions :	
length	- minimum 2.4m.
diameter	- minimum under bark 300mm.

Quality :	- minimum amount of millable wood - 30% assessed by the FOIC.

(7) **Third Grade Sawlogs** (Jarrah, karri, blackbutt and wandoo)

Species:	Jarrah, karri, blackbutt and wandoo.
Specification:	CALM does not set any specification. Third grade sawlogs are logs that do not meet the second grade sawlog specification. Selection of third grade sawlogs is the responsibility of the log buyer.

(8) **Veneer Logs**

Veneer, or peeler, logs are prepared from high quality jarrah or karri logs according to the specification below:

(a)

Diameter	Karri(large)	Karri (small)
Minimum:	500mm	350mm
Maximum:	1305	1305

(b) Length
As nominated by the customer, with tolerance of +100mm. Ends to be cut square.

(c) Rot - Not acceptable except at core. Specifications as for (e) below.

(d) Heart - may be up to 120mm out of centre provided that the heartwood will be covered by the lathe chuck. Chuck sizes are 120mm for small logs and 210mm diameter for large logs.

(e) Pipe - not permitted.

(f) Borers, Pinholes - not permissible.

(g) Shakes - Radial falling shakes, ring shakes and loose rings not acceptable. Star shakes acceptable so long as there is no associated rot and the shake diameter is not more than one half of the log diameter.

(h) Shape - all logs to be reasonably cylindrical.

(i) Limbs - sap limbs only are permitted.

(j) Dry Sides - recent dry sides acceptable where the dry wood and checks are not more than 50mm in depth.

(k) Gum - logs having large swellings indicating large pockets of gum not suitable. Gum rings are not acceptable but small gum pockets up to two per log face are acceptable.

(l) End Coating - All logs to be coated both ends with petroleum jelly or some other suitable end coating to prevent end checking. Gang nail plates supplied by WESFI are to be fitted by the contractor to both ends of peeler logs immediately after preparation to assist in controlling end splitting.

(9) **Unprocessed Round Timbers Suitable for Preparation into Bridge and Jetty Timbers**

Species:	Jarrah.
Dimensions:	
Length -	As required by the customer, but normally stringers are between 6.3m and 8.2m, piles are between 6m and 20m, and corbels are a standard 1.5m.

Diameter - As required by the customer, but normally stringers are between 520mm and 650mm underbark, piles are between 300mm and 700mm underbark, and corbels are between 480 and 530mm underbark.

Shape: Logs for preparation into bridge and jetty timbers must be essentially straight and of uniform but minimal taper.

Quality: Logs for preparation into bridge and jetty timbers must be essentially of sound wood, free of termite attack, internal rot pockets and heart rot.

Acceptable defects include tight gum rings, included sapwood at the butt end, minor end splits or shakes, and some sound knots.

General: Logs must be delivered to the preparation site as soon as possible after felling to avoid insect and fungal attack.

Note: This specification is based on MRWA specification No. 1261 of October 1986 for Supply of Untreated Round Timber and Department of Marine and Harbours specification for Supply of Timber Piles issued in March 1986.

(10) **<u>Unprocessed Round Timbers suitable for Preparation into Transmission Poles and Building Poles</u>**

Species: Jarrah, Marri, Blackbutt, Karri, Yellow Stringybark, radiata pine, or pinaster pine.

Dimensions:

Length - For transmission poles ("long" poles) minimum 12.1m to a maximum of 21.5m. For building poles ("medium" poles) minimum 6.0m to a maximum of 12.0m.

Diameter - For transmission poles, limits vary depending on the pole length, but range from a minimum of 150mm at the crown end for 9.5m poles to a maximum of approximately 700mm at the butt end for 21.5m poles. For building poles, limits will vary, but will generally be between 100mm and 300mm.

Shape: Logs must be sufficiently straight such that an imaginary line from the centre of the crown end to the centre of the butt end at the "groundline" remains within the confines of the log.

Quality: Logs must be essentially of sound wood, free of termite attack, internal rot pockets and heart rot. Radiata and pinaster pine must be entirely free of fungal and blue stain attack.

Acceptable defects include minor insect damage, minor mechanical damage, some surface checking, sound knots, spiral grain up to a maximum of 1 in 15, tight gum veins and minor end splits.

General: Logs must be delivered to the preparation site as soon as possible after felling to avoid insect and fungal attack. Radiata and pinaster pine must be delivered within eight days of felling; karri and yellow stringybark within five days of felling.

Note: The specification for transmission poles is based on Western Power pole specifications ES/39/86 (1987 revision), ES/37/86 (1987 revision), ES/8/99 and ES/11/89 (May 1989 revision).

Any pole from 6.0m to 12.0m in length is referred to for royalty purposes as a "medium" pole. A pole longer than 12.0m is referred to as a "long" pole

(11) **Unprocessed Round Timbers suitable for Preparation into Underground Mine Support Timbers**

Species: Jarrah.

Dimensions:

Length: As required by the customer, but normally between 1.8m and 6m.

Diameter: As required by the customer to match the nominated lengths, but normally between 125mm and 200mm.

Quality:

Acceptable Defects:

- Slight bends, provided the resulting mining timber does not deviate by more than half the crown diameter through the length of the individual mining timber.

- Double heart in the crown end, provided the heart centres are not separated by more than 33% of the diameter.

- Insect and mechanical damage, provided it is confined to the sapwood.

- Sound and tight knots, provided they do not exceed 20% of the log circumference measured immediately above the knot.

- Tight gum rings or veins.

- Included sapwood and gum pockets, provided they do not exceed 12mm in radius or 100mm in circumference.

- Minor surface checks.

Unacceptable Defects:

- Rot in any shape or form.

- Splits, shakes or popped wood.

General: Logs will generally be supplied in bole length and must be delivered to the preparation site freshly felled, that is within two weeks of felling.

Note: This specification is based on the specification for prepared mining timbers as written for mining timbers supplied to Western Collieries Ltd.

(12) **Large Chiplogs**

Species: Marri and karri.

Dimensions :

length	- minimum: 3.4m for marri, 2.1m for karri. - maximum: unlimited.
Diameter	- minimum: 300mm. - maximum: unlimited.

Quality :	Charcoal in any form or quantity is not acceptable. Kinks, bends and sweep must not exceed 150mm in any 3m length. Rotten wood must not exceed 50% of the log volume, as assessed on the worst end face. End face shatter must not exceed 50%. Test cuts are not permitted. Limbs, spurs and other protrusions must be trimmed to a maximum of 75mm beyond the log surface.

(13) **Small Chiplogs**

Species :	Marri and karri.
Dimensions :	
length	- minimum: 3.0m. - maximum: unlimited.
diameter	- minimum: 75mm. - maximum: 375 mm.
Quality :	Charcoal in any form or quantity is not acceptable. Kinks, bends and sweep are acceptable provided the log can efficiently pass through the mill debarker. Rotten wood must not exceed 50% of the log volume, as assessed on the worst end face. End face shatter must not exceed 50%. Test cuts are not permitted. Limbs, spurs and other protrusions must be trimmed to a maximum of 75mm beyond the log surface.

(14) **Residue Chiplogs**

Preamble :	Residue chiplogs are karri only chiplogs that do not meet the specification for a large chiplog or a small chiplog, but will fit through the "M50" line at the Diamond mill. Residue chiplogs will tend to be short butt logs, off cuts or crown logs.
Species :	Karri only.
Dimensions :	
length	- minimum: 2.1m. - maximum: unlimited.
diameter	- minimum: 150mm. - maximum: 900mm.

Quality : Charcoal in any form or quantity is not acceptable.

Rotten wood must not exceed 50% of the log volume, as assessed on the worst end face.

End face shatter must not exceed 50%.

Test cuts are not permitted.

(15) **Charcoal Logs**

Species: Jarrah.

Moisture content : Any moisture content, ie, "green" or "dry" (see note below).

Dimensions :

length: minimum 1.8m.
maximum as nominated by customer (currently 6.0m).

diameter : minimum underbark 150mm.
maximum underbark 1200mm

.

Preparation : Lateral projections (branches, limbs, bumps) must not exceed 150mm beyond the log surface.

Ends must be cut roughly square, and must consist of at least 50% by area of wood in one continuous piece.

Acceptable defects:
The following log defects are acceptable, provided the log can be safely handled and transported.

- double heart
- charcoal
- pin holes
- shakes and splits
- dead wood
- gum in any form
- bends: up to a maximum of 200mm in any 3m length
- rotten wood up to a maximum of 25% as assessed by area of rot visible on worst end
- pipe.

Unacceptable defects:
The following defects are not acceptable:

- visible evidence of termite activity
- shattered wood.

Note: Charcoal logs must be segregated into “green” or “dry” logs. “Green” logs are those from which the bark has been physically removed. “Dry” logs are those from which the bark has fallen off or become separated by natural means at the time of harvesting.

(16) **Fencing Logs**

Species: Jarrah, marri, blackbutt, wandoo or any other hardwood species made available by CALM and acceptable to the buyer.

Dimensions : Any dimension acceptable to the buyer but generally:

length:
- minimum 1.8m
- maximum 6.0m

diameter:
- minimum under bark 100mm
- maximum under bark 300mm for rounds
- maximum under bark unlimited for logs suitable for splitting or sawing into posts.

NOTE: Logs suitable for splitting will generally be supplied in standard post length, or multiples thereof. Logs for use in the round will generally be supplied in whole tree lengths.

Quality : For Rounds:
Any quality acceptable to the buyer, but generally:

- straightness - maximum deviation of 50mm in any 1.8m length
- double heart - acceptable
- deadwood - acceptable if not associated with decay
- pin holes - acceptable if not associated with decay
- decay - unacceptable
- shattered wood - unacceptable
- gum - acceptable.

For logs suitable for splitting into posts:

Any quality provided the log is below the standard of a first grade jarrah sawlog. (The specification for a first grade jarrah sawlog is minimum diameter 200mm, minimum length 2.1m and minimum quality of "at least 50% of millable wood as assessed by FOIC").

(17) **Domestic Firewood Logs**

Species: Jarrah, or any other species made available by CALM and acceptable to the buyer.

Moisture Content : Any moisture content; i.e. either “green” or “dry”, (see note below).

Dimensions :

length: minimum 1.8m.

diameter: minimum under bark 150mm.
maximum under bark 1200mm.

Unacceptable Defects :
- Decayed wood, if the proportion by volume is greater than 15%
- Shattered wood
- Double heart or spiral grain likely to hinder manual splitting of sawn blocks.

Note : Firewood logs must be segregated into “green” or “dry” logs. “Dry” logs are those cut from standing dead tress with most bark absent, or from logs that have been lying on the ground for at least three years. “Green” logs are all other logs.

(18) **High Grade Feature Sawlogs**

(18a) Species : Available native hardwood species, comprising jarrah, blackbutt and wandoo.

Dimensions and quality : There are not set dimensions or quality specifications for high grade feature sawlogs. In general however, these logs are considered to be **first or second grade sawlogs** suitable for specialty timber uses with particularly desirable features or characteristics of grain, colour or size. The logs are not to be used for general purpose sawmilling.

Selection: Selection of high grade feature sawlogs is the responsibility of the buyer, after all other log products of higher value have been segregated. (Higher value log products would normally include premium grade sawlogs.) Buyers will be expected to personally select logs at bush landings, or to give the appropriate CALM Forest Officer a clear indication of the species and characteristics of logs required so that logs can be efficiently segregated by CALM's contractors.

Note : There is no guarantee that the full contracted quantity of logs will be available in any one year to exactly meet the requirements of the buyer.

(18b)

Species: W.A. Sheoak (*Allocasuarina fraseriana*).

Dimensions :
length minimum 0.9m.
diameter minimum 200mm under bark.

Shape : Bends are acceptable provided a minimum length of 0.9m of straight log is available between bends, and provided no more than 5% of any log is wasted when cutting out the bends at the mill.

Quality : A maximum of 15% by volume of defective wood is permissible, as assessed on the worst end face.

General : Logs will generally be supplied in bole lengths and must be delivered to the mill landing within five days of felling.

(19) **Low Grade Feature Sawlogs**

Species : Available native hardwood species, comprising jarrah, karri, marri, blackbutt, wandoo and banksia.

Dimensions and quality : There are no set dimensions or quality specifications for low grade feature sawlogs. In general however, these logs are considered to be **low quality third grade sawlogs** suitable for specialty timber uses, with certain desirable features or characteristics of grain, colour, size or shape such as forks, flames, bends, unusual shapes, fire damaged and dry logs. The logs are not to be used for general purpose sawmilling.

Selection : Selection of log grade feature sawlogs is the responsibility of the buyer, after all other log products of higher value have been segregated. (Higher value log products would normally

include premium, first and second grade sawlogs.) Buyers will be expected to personally select logs at bush landings, or to give the appropriate CALM Forest Officer a clear indication of the species and characteristics of logs required so that logs can be efficiently segregated by CALM's contractors.

Note : There is no guarantee that the full contracted quantity of logs will be available in any one year to exactly meet the requirements of the buyer.

(20) **Small Sawlogs** (karri)

Species : Karri.

Dimensions : Minimum sedub 150 to 200mm.
Minimum length 2.4m.

Quality : Sweep shall not exceed 15mm in any 3.0m length from log surface to the chord created by a straight edge or tight cord over the length of the log.

Logs shall have a smooth, clean surface and be of uniform shape.

Fungal decay not acceptable.

Double heart, limbs, overgrowths, drysides, sawcuts other than superficial, borer damage, shakes, gum veins, shatter, epicormic growths and overgrowths are not acceptable.

(21) **Jarrah Small Sawlogs** (Provisional)

Species : Jarrah.

Dimensions : Minimum sedub 150mm.
Maximum led will generally be in the range 300-350mm.
Minimum length 1.8m.
Maximum length will be governed by the requirement to restrict the length of log above the point where the diameter is 0200mm under bark, to less than 2.1m. (i.e. any portion of the bole suitable for sale as first grade sawlog is to be produced as such.)

Quality :

- Tight gum veins are acceptable in one half of log as assessed on end face.
- Sapwood is included in the measurement of sedub.
- Borer damage is acceptable when confined to the heart only.
- Rot must be confined to a radius of 15mm from centre of heart on minimum size log, increasing to 19mm radius on log of sedub 190mm.
- Double heart is not acceptable.
- Sweep shall not exceed 25mm from log surface to the chord created by a straight edge along any 1.8m length of log.
- Logs shall have a smooth, clean surface and be of uniform shape.
- Tight limbs surrounded by tight wood acceptable if confined to one half of the log in any 18.m length, (as assessed on end face).

- Logs to be delivered fresh to minimise degrade through drying.

It is intended that this specification be applied to that part of the log less than 200mm dub. The first grade jarrah sawlog specification provides the minimum quality parameters for the remainder of log length.

(22) **Marri Industrial Wood Logs** (for Wesfi Chipper)

Species : Marri (*Eucalyptus calophylla*).

Dimensions :

length: minimum 2.1m.
maximum unlimited.

diameter: minimum 100mm underbark.
maximum 1,500mm.

Shape : Kinks, bends and sweep are acceptable provided the log can efficiently enter the chipper. As a guide, kinks, bends and sweep should not exceed 150mm in any 3m length.

Quality :

- Rotten wood must not exceed 25% of the log volume, as assessed on the worst end face.
- End face shatter must not exceed 25%.
- Test cuts are not permitted.
- Limbs, spurs and other protrusions must be trimmed to a maximum of 75mm beyond the log surface.
- Charcoal embedded in the log is not permitted; charcoal on bark, and superficial charcoal on surface of the log, is permitted.

SECTION 6 - LOG SPECIFICATIONS AND QUANTITY DETERMINATION

6.3 SOFTWOOD PLANTATION LOG SPECIFICATIONS

Standard specifications for all softwood plantation log products are reproduced below. These specifications may be used as a general reference by Forest Officers and contractors. However, because there may be small but significant variations to some specifications in some Harvesting Contracts and Contracts of Sale, the specifications in those Contracts must be checked and used as the official specification in every case.

The standard specifications reproduced below are:

(1) Peeler logs
(2) Industrial wood for particle board
(3) Industrial wood for medium density fibreboard
(4) Premium grade sawlogs
(5) Second grade sawlogs
(6) Third grade sawlogs
(7) Small sawlogs
(8) Sawlogs (measured by mid-diameter)
(9) Rounds for treatment
(10) Transmission poles
(11) Industrial Woodchips

(1) **Peeler Logs**

Species:	Radiata or pinaster pine.
Destination :	For supply to Wesfi Pty Ltd, Victoria Park.
Preparation:	Logs shall be freshly cut, square docked at both ends and have all branches flush trimmed.
Dimensions :	
length	Variable up to 2.56 metres and nominated by buyer. Tolerance will be nominal to +50mm.
diameter	Small end under bark not less than 350mm.
Defects :	The following log defects are not permitted:

- Blue stain
- Abrupt changes in diameter
- Massive knot whorls
- Individual dead knots exceeding 6cm in diameter.

The following log defects are permitted to the limits shown:

Dead or decayed knots or knot holes up to 3 per whorl, biggest not to exceed 40mm in diameter on greatest axis.

No more than one whorl of cone holes in any length.

Sweep shall not exceed 20mm in any peeler length, measured from log surface to the chord created by a straight edge or tight cord.

Pith shall not be off centre at the small end by more than 20% or at the butt end by more than 25% of the smallest axis diameter.

Burnt bark provided the timber has not been affected.

End coating: during the months January, February and March logs shall be end-coated within two days after preparation and extraction to the break.

Identification: logs shall be marked on one end with blue crayon to record the diameter class.

2nd Class Peelers : Logs prepared in good faith to the peeler specification but not to standard will be supplied as 2nd class peelers at a reduced stumpage, and will be identified by marking P2 on one end of the log.

(2) **Industrial Wood for Particle Board**

Species: Radiata or pinaster pine.

Preparation : Logs shall be freshly cut and have all branches flush trimmed. Logs shall be removed from the plantation within five days of cutting.

Dimensions : Diameter: minimum 75mm u.b.
maximum 350mm u.b.

Length: 5.4m only.

Defects : The following log defects are not permitted:

- Blue stain
- Abrupt changes in diameter
- Sharp kinks
- Massive knot whorls.

The following log defects are permitted to the limits shown:

Cone holes as they occur.

Bent or curved logs if they will pass through the barkers at Dardanup without interfering with production.

The moisture content of logs at the time of delivery shall not be less than 75%.

Burnt bark provided the timber has not been affected.

(3) **Industrial Wood for Medium Density Fibreboard**

Species: Pinaster or radiata pine.

Preparation : Logs shall be freshly cut and have all branches flush trimmed. Logs shall be removed from the plantation within five days of cutting.

Dimensions :

length — A minimum of 4m ranging to a maximum of 5.4m.

diameter — Small end under bark not less than 75mm. Large end under bark shall not exceed 350mm.

Defects : <u>The following log defects are not permitted</u>:

- Blue stain
- Abrupt changes in diameter
- Sharp kinks
- Massive knot whorls.

<u>The following log defects are permitted to the limits shown</u>:

Cone holes as they occur.

Bent or curved logs if they will pass through the debarker without interfering with production.

Burnt bark provided the timber has not been affected.

(4) **<u>Premium Grade Sawlog</u>**

Species: Radiata or pinaster pine.

Preparation : Logs shall be freshly cut flush trimmed and square docked. Butts will be supplied as cut with sloven and withdrawn slivers but generally free from falling splits and shakes. The sloven will not be tallied in the length.

Dimensions :

Length:
A minimum of 4.8m with increments of 0.3m plus overcut for board docking. Tolerance will be from +20mm to +50mm.

Diameter:
Small end under bark not less than 300mm. Logs with small end diameter under bark not less than 200mm and not greater than 290mm shall be graded as Second Class Pine Sawlogs.

Age:
A minimum age of 25 years.

Defects : <u>The following log defects are not permitted</u>:

- Blue stain
- Abrupt changes in diameter
- Massive knot whorls.

<u>The following log defects are permitted to the limits shown</u>:

Individual dead knots not to exceed 60mm in diameter on greatest axis.

Sweep shall not exceed 20% of the small end diameter under bark in any 3.0m length measured from log surface to the chord created by a straight edge or tight cord.

Burnt bark provided that the timber has not been affected.

(5) **Second Grade Sawlog**

Species: Radiata or pinaster pine.

Preparation : Logs shall be freshly cut trimmed and square docked. Butts will be supplied as cut with sloven and withdrawn slivers but generally free from falling splits and shakes. The sloven will not be tallied in the length.

Dimensions:

- ❖ For logs 2.1m to 3.3m in length, small end under bark not less than 250mm.
- ❖ For logs 3.6m and longer, small end under bark not less than 200mm.

Tolerance will be from +20mm to +50mm for board docking.

Age: Minimum 18 years

Defects : The following log defects are not permitted:

- Blue stain
- Abrupt changes in diameter
- Massive knot whorls.

The following log defects are permitted to the limits shown:

Individual dead knots not to exceed 60mm in diameter on greatest axis.

Sweep shall not exceed 20% of the small end diameter under bark in any 3.0m length measured from log surface to the chord created by a straight edge or tight cord.

Burnt bark provided that the timber has not been affected.

(6) **Third Grade Sawlogs**

Species: Radiata or pinaster pine.

Specification : CALM does not set any specification. Third Grade Sawlogs are logs that do not meet the Premium or Second Grade Sawlog specification. Selection of third grade sawlogs is the responsibility of the log buyer.

(7) **Small Sawlogs**

Species: Radiata or pinaster pine.

Preparation : Logs shall be freshly cut flush trimmed and square docked. Butts will be supplied as cut with sloven and withdrawn slivers but generally free from falling splits and shakes. The sloven will not be tallied in the length.

Dimensions :	Length: 2.1m, 2.4m, 2.7m, 3.0m and 3.3m. Tolerance from nominal to +50mm. Diameter: Small end under bark: 150mm to 250mm.
Defects :	The following log defects are not permitted: - Blue stain - Abrupt changes in diameter - Massive knot whorls. The following log defects are permitted to the limits shown: Dead knots less than 50mm diameter on greatest axis. Sweep shall not exceed 20% of Small End Diameter Under Bark along the total length measured from log surface to the chord created by a straight edge or tight cord. Burnt bark provided the timber has not been affected.

(8) **Sawlogs** (stumpage based on mid-diameter using scanner or other means)

Species :	Radiata or pinaster pine.
Preparation :	Logs shall be freshly cut flush trimmed and square docked. Butts will be supplied as cut with sloven and withdraw slivers but generally free from falling splits and shakes.
Dimensions :	Length: A minimum of 2.40 metres with increments of 0.3 metres with a minimum overtrim of 50mm. Diameter: Minimum of 200mm small end diameter under bark.
Age :	A minimum of 18 years.
Defects :	The following log defects are not permitted: - Blue stain. - Abrupt changes in diameter. - Massive knot whorls. The following log defects are permitted to the limits shown: - Individual dead knots not to exceed 60mm in diameter on greatest axis.

(9) **Rounds for Pressure Treatment**

Species: Radiata or pinaster pine.

Preparation : Logs shall be freshly cut square sawn at both ends, all branches flush trimmed and not display marked variations in diameter over the length.

Dimensions : Length:
From 1.8m upward in 0.3m increments to a maximum of 4.8m. Tolerance will be nominal to +50mm for 1.8m and -50mm to +50mm for all other lengths.

Diameter:
Small end under bark 70-200mm. Supply will be in any range of diameters of 40mm or greater.

Defects : The following log defects are not permitted:

- Fractures
- Dry sides
- Overgrowths
- Unsound knots
- Termite damage
- Clusters of cone holes
- Insect damage other than limited superficial bark borer
- Fungal decay (except blue stain)
- Axe or saw cuts other than superficial and bearing in mind end use.

The following log defects are permitted to the limits shown:

Blue stain: limited so as not to interfere with the treatment process.

Limbs & Spurs: shall protrude not more than 5mm above the bark.

Sound knots: except when in a whorl or located such as to impair seriously the strength of the pieces.

Cone Holes :		
Distance apart of whorls	Small end diameters	
	120mm or less	> 120 mm
Less than 1m	1 hole/whorl	1 hole/whorl
1m or more	2 holes/whorl	3 holes/whorl + 1 for every 40 mm of additional diameter
Sweep -	The maximum allowable sweep in length measured from log surface to a chord created by a straight edge or cord at the points of greatest deviation will be :	
SED	Sweep per metre of length	

Less than 120mm	8mm
120mm or more	10mm

Burnt bark provided the timber has not been affected.

Variation from Specification :

A tolerance up to 5% variation from the above specification in any one parcel is to be accepted.

6-15% departure from specification - faulty material will be replaced.

Over 15% departure from specification - whole parcel will be replaced.

(10) **Unprocessed Round Timbers suitable for Preparation into Transmission Poles**

See product type number 10 in Section 6.2.

(11) **Industrial Woodchips**

Species: Radiata or pinaster pine.

Chip Size: Nominal size:

Minimum : 16mm x 16 mm x 5 mm

Maximum: 25 mm x 25 mm x 8 mm

Quality Limits:

* Fines : (i.e. less than 4 mm) : maximum 2% by weight.
* Bark : maximum 1% by weight.
* Rot : maximum 0.5% by weight.
* Charcoal : (carbon) : 0.1% by weight.
* Dry (seasoned) wood : maximum 1% by weight.
* Blue Stain : maximum 2%.
* Free of Sand.

SECTION 6 - LOG SPECIFICATIONS AND QUANTITY DETERMINATION

6.4 DETERMINATION OF LOG TIMBER QUANTITY

1. Part 7 and Schedule 1 of the Forest Management Regulations 1993, detail the requirements for the determination of log timber quantity.

2. In summary, these Regulations require:

   (a) the person responsible for determining the quantity of any log timber to immediately record the quantity on the log delivery note, or if the quantity is printed on a weighbridge ticket, to immediately attach that ticket to the log delivery note, and

   (b) the owner or manager of a sawmill to ensure that no log timber ex State forest or Timber Reserve is stored or processed at his sawmill unless quantity has been determined and recorded.

3. Schedule 1 of the Forest Management Regulations 1993 details the five recognised methods for determining the quantity of log timber, viz:

   (a) volume of hardwood log timber by individual log measurement;

   (b) volume of softwood log timber by individual log measurement;

   (c) quantity of log timber by weighing;

   (d) volume of log timber by bin measure, and

   (e) volume of log timber by infra-red log scanner.

SECTION 7 - ADMINISTRATION

7.1 SALE OF LOG PRODUCTS

1. There are two ways in which log products may be sold:

   (i) Contract of Sale (either credit or pre-paid) - approved by the Executive Director.
   (ii) Forest Produce Licence (pre-paid) - approved by Authorised Forest Officers.

2. Contracts of Sale may extend for periods up to 15 years. In most cases, payment for logs is made after delivery by a CALM employed harvesting contractor. In these cases the customer must have lodged security in the form of a cash deposit or a bank guarantee.

3. The Forest Produce Licence (form CLM880) may be used locally to sell small one-off quantities of forest produce, particularly "Craftwood". All products sold under an F.P.L. must be paid for in advance.

4. **Mill Returns**

4.1 All buyers of log timber under Contract of Sale are required to submit, to the CALM District Office, a Log Timber Receival Record on form CLM183. The CLM183 is produced in book form; instructions for completion of the form are printed on the book cover. (Refer also to Part 8 of the Forest Management Regulations, 1993.)

4.2 All registered mills must, in January and July of each year, submit a return to CALM's State Headquarters on form CLM182, being a "Summary of Milling Operations" for statistical purposes.

5. **Simultaneous Operations on Crown Lands and Private Property**

If a buyer of log timber under Contract of Sale wishes to cut timber from private property and Crown Lands simultaneously, he must apply for permission to do so by writing to the relevant CALM District Manager or Business Unit cell manager. The letter must state the location numbers from which the timber is to be obtained, the names of the owners, private property owners' identification codes, estimated volumes, the names of harvesting operators to be engaged in the work, and the dates during which the work is to take place.

Assuming permission is given to operate simultaneously, the above information will enable Business Unit or District staff to monitor log haulage in their area, and efficiently carry out mill landing inspections.

All deliveries of private property timber to a crown land mill must be recorded on a Private Property Log Delivery Note issued by CALM.

6. **Royalty-Free Timber**

The CALM Act does not provide authority for either the Minister or the Executive Director of CALM to waive the payment of royalties on any timber harvested on Crown land.

SECTION 7 - ADMINISTRATION

7.2 T.I.R. ACT AND REGISTRATION OF MILLS

1. The Timber Industry Regulations Act (1926-1969) provides regulations to ensure the health and safety of personnel involved in the timber industry. The regulations cover all components of the timber industry from log harvesting and log transport to log milling and primary processing, and log preservative treatment. It is expected that the T.I.R. Act will be repealed and absorbed into timber industry regulations under the Occupational Safety and Health Act.

2. The T.I.R. Act and Regulations are enforced by District Inspectors who now work under a Controlling Officer from WorkSafe Western Australia (formerly Department of Occupational Health Safety and Welfare). These inspectors are based at Bunbury and may be contacted for advice or assistance by any Forest Officer or harvesting contractor on matters related to health and safety in the timber industry.

3. Forest Officers are required to have a reasonable knowledge of the T.I.R. Act and Regulations, and the Occupational Safety and Health Act. Forest Officers must also assist District Inspectors in obtaining prompt compliance with the provisions of the T.I.R. Act.

4. **Registration of Mills**

   Every mill used in the timber industry must be registered under and in accordance with the regulations made under the T.I.R. Act. Applications for registration must be made on the prescribed form, available from WorkSafe. Registration is effected upon issue of a certificate with effect for the year ending 31 December.

   Mills not requiring registration include sawmills or benches belonging to farmers or hobbyists not involved in cutting timber for sale or profit.

   Note: (i) CALM is no longer involved in registration of sawmills.
   (ii) When the TIR Act is repealed, it is likely that sawmills will no longer need to be registered.

SECTION 7 - ADMINISTRATION

7.3 LOGGING OPERATIONS INFORMATION SYSTEM (LOIS)

1. "L.O.I.S." is the Department's "Harvesting Operations Information System", a computer system designed to handle the data processing and recording requirements for all aspects of CALM's native forest and plantation harvesting activities.

2. The system is described in detail in the LOIS Reference Manual (a comprehensive loose leaf folder describing the system in detail for audit requirements).

3. **Initiation of a Contract of Sale in LOIS**

   Before a sale of log timber can occur, the computer system must be loaded with information about the sale. This is done at SOHQ via the "Initiation of Timber Sale Document" (form CLM216). This is a two page form summarizing essential information about a Contract of Sale. Information from the CLM 216 must be entered into LOIS by SOHQ before (i) the Harvesting Operation Prescription form (CLM709) can be completed and (ii) before production and/or deliveries can commence.

4. **Harvesting Operation Prescription**

   The Harvesting Operation Prescription form (CLM709) must be completed and input into LOIS before cutting can commence. The CLM709 provides the computer with base information about each harvesting operation in the field.

5. **Delivery Notes**

   The key to recording movement of log products is the Delivery Note. This is a one page document (in quadruplicate) which must be completed for each and every truck load of logs carted from State forest or any other land on which CALM manages the harvesting operation. If two different log products are carted at one time, two D/Notes must be completed, one for each product.

   All payments to contractors and invoices to customers are based on the original copies of the Delivery Notes, therefore great care must be taken, by truck drivers in particular, to neatly and correctly complete all relevant parts of the D/Note before leaving the bush landing or plantation roadside. Failure to do so is a serious offence.

   The Forest Management Regulations 1993, Parts 5, 6 and 7, cover the use of log delivery notes.

   Detailed instructions for completion of D/Notes are written on the inside front cover of every D/Note book. Damaged D/Notes must be kept in D/Note books, and completed books must be promptly returned to a CALM office, preferably the office from which the books were issued.

   Forest officers must regularly check D/Notes in the field to ensure correct procedures for their completion are being followed. Five per cent of all D/Notes originating in any one Timber Supply Area must be checked each month.

   For deliveries of logs from private property by harvesting contractors <u>not</u> employed by CALM, a "private log" delivery note must be used. This D/Note is also used to authorize transfer of logs from one mill to another and other situations not involving a monetary transaction with CALM.

   All original D/Notes, after processing by CALM, must be promptly forwarded to SOHQ on a monthly basis with the appropriate monthly "Log Timber Receival Record" sheets (CLM 183).

6. **Signing of Delivery Notes**

There are spaces on Delivery Notes for four signatures:

(i) Loader operator: there must always be a loader driver's signature.

(ii) Truck driver: there must always be a truck driver's signature.

(iii) Customer: there must always be a customer's signature, normally that of the loader driver at the customer's mill landing. Before signing the D/Note however, the customer's representative must agree with all details written on the D/Note by the contractor, in particular the product species and type, the date, and the number of logs (for individual log volume measure).

If there is any discrepancy requiring alteration, both parties (the contractor and the customer) must initial the alteration, without obliterating the original details.

If the delivery of the logs is the responsibility of the customer, then the truck driver, who is either directly or indirectly employed by the customer, must sign the D/note, at the bush landing, on behalf of the customer. Again, any discrepancy requiring alteration must be initialled by both parties.

(iv) Forest Officer: a Forest Officer can check and sign a D/Note at the bush landing, whilst the truck is en route, or at the customer's mill landing. The Forest Management Regulations require CALM to endeavour to check and sign at least 5% of all D/Notes each month. Forest Officers should target their efforts to ensure all contractors are regularly checked, and must ensure any errors or omissions on D/Notes are noted and appropriate action taken.

7. **Distribution of D/Notes**

In principle, the copies of a D/Note must not be separated until all details, including the quantity of logs on the load, have been written on the D/Note, to the agreement of both the contractor and the customer.

Then, the four copies are distributed as follows:

(i) Original (white) copy: CALM; This is the copy which is entered into CALM's computer system and upon which contractor payments and customer invoices are based.

(ii) Duplicate (green) copy: Contractor.

(iii) Triplicate (pink) copy: Customer.

(iv) Quadruplicate (yellow) copy: stays in book as backup copy only.

In most cases, the original (white) copy must be handed by the truck driver to the customer's representative, for later collection by CALM. In some cases CALM may require the contractor to retain the original copy and hand it in to the CALM office in the District from which the logs were harvested.

The duplicate (green) copy is normally retained by the truck driver who is normally directly or indirectly employed by the harvesting contractor. If however the delivery is the responsibility of the customer, then either:

(a) the contractor's representative may take the duplicate (green) copy before the truck leaves the bush landing, OR

(b) CALM must arrange for a photocopy of the original copy of the D/Note to be forwarded to the harvesting contractor (the duplicate in this case being retained by the trucking company).

Completed D/Note books must be promptly returned to a CALM office, preferably the office from which the books were originally issued. New books may not be issued unless used books are returned.

8. **LOIS Input Documents**

Delivery notes are just one of the several types of Input Documents that are used to "update" LOIS. A list of all current Input Documents follows:

- CLM 874 Hardwood log delivery note.
- CLM 875 Softwood log delivery note.
- CLM 876 Inspection Certificate.
- CLM 877 Private property log or mill transfer delivery note.
- CLM 878 Credit note.
- CLM 879 Adjustment note.
- CLM 880 Forest Produce Licence.
- CLM 881 Log product adjustment.

9. **Rates and Prices**

The Forest Resources Services Branch of the Department produces, maintains and indexes, through LOIS, official Contractors' rates, and prices to customers.

Authorised users can access these rates and prices through LOIS.

SECTION 7 – ADMINISTRATION

7.4 CONTRACTS FOR HARVESTING AND SALE OF LOG PRODUCTS

1. There are two main types of contracts initiated by CALM:

   (i) Harvesting Contracts
   (ii) Contracts of Sale.

1.1 **Harvesting Contracts**

This is where a harvesting company or organization is contracted to CALM, to supply one or more types of forest produce from State forest or other land managed by CALM, and including private property, as planned and directed by CALM. In this case "supply" may involve one or more of the following:

(i) "production" of the produce (i.e. felling, extracting, preparation and sorting).
(ii) individual log measurement on the bush landing.
(iii) loading and
(iv) hauling.

Contractors may be engaged by CALM by:

(i) acceptance of a tender after advertisement of a Harvesting Contract, or
(ii) acceptance of a quote requested by CALM for a specific task.

Harvesting Contracts are numbered according to:

(i) year the contract was signed,
(ii) species or category of species of timber involved, and
(iii) number of the contract in that particular year. For example, Contract 94/H3 was commenced in 1994, it involves hardwood timber species, and it was the third contract signed in 1994.

1.2 **Contract of Sale**

This is where a customer contracts to buy a specified quantity of forest produce from CALM. Produce sold under a Contract of Sale is usually supplied by a CALM contractor under a Harvesting Contract. Contracts of Sale are entered into:

(i) after an agreement is reached between a customer and CALM or
(ii) after a specified quantity of produce is sold by auction or tender.

Contracts of Sale are identified by a three or four digit number.

In all Contracts of Sale the Department recoups at least the following:

(i) the cost of production and delivery (as per the Harvesting Contract)
(ii) a sum of money to cover administration of the contract.
(iii) the Royalty or Stumpage for the produce
(iv) a sum of money for roading,
(v) a sum of money for "in-forest-costs" (i.e. the cost of managing the harvesting operations in the field).

SECTION 7 - ADMINISTRATION

7.5 REGISTRATION OF TIMBER WORKERS AND IDENTIFICATION CODES

1. Parts 2 and 4 of the Forest Management Regulations 1993 detail the requirements for (a) registration of timber workers, (b) registration of identification codes for persons who fell trees on State forests and timber reserves, and (c) identification of log timber removed from private land.

2. **Registration of Timber Workers**

2.1 In summary, the Regulations require that:

(a) all persons engaged in timber harvesting in a State forest or timber reserve be registered through CALM. The only exceptions to this requirement are persons who operate under a Forest Produce Licence, or persons who collect public firewood.

(b) applications for registration be made on the approved CALM form (CLM 014).

(c) applications for renewal of registration be made on the approved CALM form (CLM 014A).

(d) the Executive Director of CALM keep a record of all persons registered as timber workers.

(e) any worker carry his or her registration certificate (or a copy) at all times whilst working on State forests or timber reserves, and produce the certificate for inspection by a Forest Officer or CALM officer when required.

2.2 Timber workers may be registered in one or more of several categories, as listed on the application form (CLM 014). Registration in any category is subject to evidence of appropriate qualifications. At present, appropriate qualifications in most timber worker categories are obtained through the Forest Industries Training Services, an organisation based at Unit 1 Major Street, Bunbury, which is recognised by both CALM and WorkSafe Western Australia.

2.3 Registration in any particular category is classed as either (a) full, or (b) probationary. Full status means the applicant is able to produce documentary evidence acceptable to the Executive Director that a certain minimum skill level has been reached in the particular category. Full status can also be awarded in categories where no formal training or testing has been developed, to applicants of "some standing" in the particular category.

Probationary status applies to applicants who are new to the job and in the process of being trained, or who are waiting to be formally tested. Probationary status should not extend beyond approximately six months, by which time a timber worker should be able to satisfy the requirements of full status. If not, the person's registration should be cancelled.

2.4 Registered timber workers will be invited by CALM to renew their registration every three years. A notice will be sent by mail from CALM's SOHQ approximately two months before the annual expiry date for each individual timber worker.

2.5 Registration, or renewal of registration, can only be affected following receipt of the appropriate fee, currently $25, following which a "Certificate of Registration as a Timber Worker" is forwarded (CLM 430).

3. Identification Codes for Tree Fellers

In summary, the Regulations require that all persons who fell trees on State forest or timber reserve, including persons who operate harvesting machines which fell trees, be registered and given an "identification code".

These identification codes must then be recorded on Delivery Notes.

4. Identification of Log Timber Removed from Private Land

In summary, the Regulations require that:

(a) log timber felled on and removed from private land for processing at a sawmill be distinctly marked with an identification code unique to the owner or owners of that land.

(b) application for an "owner's identification code" be made by the owner or occupier of private land, or by any other person who intends to remove log timber from that land for processing at a sawmill, on the approved CALM form (CLM 083, 1993).

(c) the Executive Director of CALM register an approved "owner's identification code", upon receipt of the appropriate fee, currently $45.

SECTION 7 - ADMINISTRATION

7.6 MILL LANDING INSPECTIONS

1. Log landings at all mills receiving individually measured logs under Contract of Sale from CALM ("Crown Land" Mills) must be regularly inspected by a Forest Officer.

2. CALM's harvesting contractor, who is responsible for measuring individual logs must record the following information on the end of each log measured :

   (i) The complete D/Note number.
   (ii) Log Number (for that D/Note).
   (iii) Length.
   (iv) Diameter.

3. At each inspection, the Forest Officer must check the measurements on about six logs on the landing. The measurements taken must be checked against the measurements previously recorded by the contractor on the appropriate D/Note. The Forest Officer must initial and date the D/Note entries checked.

4. The Forest Officer must record his visit in the Log Timber Receival Record Book (CLM 183). This book is kept at each mill as a permanent record of all mill landing inspections. Any discrepancies or departure from the correct procedure, with regard to numbering or measuring logs or the recording of measurements on the D/Notes, must be:

   (i) recorded in the "Record Book" and
   (ii) reported promptly to the relevant Business Unit cell manager.

5. To check log measurements a Forest Officer must have a clear understanding of the method of measuring hardwood logs, as described in the CALM booklet: "Cubic Contents of Hardwood Logs" (1985).

6. Where a mill receives weight or bin measured logs under Contract of Sale from CALM, the above procedures do not apply. However, landing inspections must still be carried out and the mill log landing Inspection Record Book completed. During inspections at these mills the Forest Officer must check for :

   (i) identification of crown land and private property logs on the landing.
   (ii) correct use of weighbridge or bin measuring equipment.
   (iii) correct completion of D/Notes.

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7.7 USE OF LOGS FOR BUSH OR MILL LANDING CONSTRUCTION

1. A FOIC may approve the sale of logs to a sawmiller operating under a Contract of Sale for use in the construction of mill landings. The FOIC may also approve the removal of logs by a CALM harvesting contractor for use in the construction of bush landings.

2. Logs used in **bush** landing construction must be less than second grade sawlog in quality. The Department does not charge royalty for such logs. Whenever possible, logs used in bush landing construction should, upon completion of harvesting, be sold as firewood, charcoal logs, or other low grade industrial wood products.

3. Logs used in **mill** landing construction must be recorded on a Delivery Note in the normal fashion. The product type recorded must be the actual sawlog grade of the logs (i.e. first grade, second grade or third grade) and normal log prices will be charged.

   The same rules apply to logs destined for mill construction.

SECTION 7 - ADMINISTRATION

7.8 LOG QUALITY ADJUDICATION

1. Although CALM's harvesting contractors are required, under the terms of their contracts, to carry out all initial preparation, grading and segregation of logs into the various log products, the Forest Officers in Charge are ultimately responsible for all log quality standards. The relevant FOIC and all Forest Officers under his/her control must take all reasonable steps to ensure that all logs carted from harvesting operations meet the relevant specification, consistent with the need for full utilisation.

2. Log products that do not meet the relevant product specification may be rejected ("condemned" or "written off") by a Forest Officer before delivery, that is at the stump or at the bush landing. In these cases one end of the rejected logs should be marked with a cross in yellow lumber crayon or paint (for native forest products) or blue crayon or paint (for plantation products). This "crossing out" also implies that the log in question is unsuitable for preparation into any alternative log product being supplied from that particular harvesting operation. Logs downgraded to a lower grade specification should have the recommended grade marked on the log in the appropriate colour and be initialled by the Forest Officer.

3. Forest Officers must also be prepared to mark, again with the appropriately coloured crayon or paint, one end of any acceptable log that is at the low end of the relevant quality range. This practice is particularly important when a contractor is having difficulty in interpreting a log product specification, or when a new log product is introduced to an operation. A Forest Officer must also be prepared to mark any log at a bush landing when a contractor has doubts as to its acceptability.

   When marking logs, the Forest Officer should indicate the log product type, along with his/her initials and the date. When the log product type in question is obvious, the word "OK" may be substituted for the actual log product type.

4. Once logs have been carted by a CALM contractor to a customer's landing, and unloaded, the customer may request CALM to downgrade or reject any or all of the logs if the customer believes the logs are below specification. The conditions for acceptance by CALM of a request by a customer to downgrade or reject logs are:

   (i) CALM is responsible for setting and applying the log specification prior to delivery (i.e. the logs were not selected in the first place by the buyer, as applies to marri sawlogs and jarrah or karri third grade sawlogs for example).

   (ii) The source of the logs is clearly identifiable (i.e. the logs, including logs measured by weight, are clearly marked with the complete D/Note number and a coupe name and number) and the contractor involved is identifiable. The customer is responsible for identifying such logs.

   (iii) The request is made as soon after the date of delivery of the logs as possible, so that deterioration of the logs between the date of delivery and the date of adjudication is minimised. During the "summer" harvesting season (approximately November to May inclusive) the request must be made within two weeks of delivery; between approximately June and October inclusive the request must be made within four weeks of delivery, and

   (iv) The logs have been correctly measured and recorded on a CALM log delivery note.

5. A customer must not reject a whole or part truckload of logs **before** unloading.

6. Adjudication of all logs challenged by a customer under 4. above is carried out by the Executive Director of CALM, through specifically nominated CALM Forest Officers (“Authorised Forest Officers”).

7. Authorised Forest Officers, when carrying out routine inspection of logs at customers' landings, will not normally be accompanied by harvesting contractor representatives. However, if more than approximately ten cubic metres (or tonnes) of logs are likely to be officially downgraded or rejected, then the inspecting officer should arrange to have a representative of the relevant harvesting contractor in attendance. The reasons for the downgrading or rejection of the logs can then be immediately discussed with the contractor.

8. It is acceptable to have parts of logs downgraded or rejected at a customer's landing. It is also acceptable for a log to receive some treatment such as docking or delimbing in order to bring it up to specification.

   In each case the task of cutting a log should be carried out by a representative of the contractor who is accompanying the Authorised Forest Officer. For practical purposes, however, especially if only a small number of logs or a small amount of cutting is required, the work may be carried out by the customer or the Authorised Forest Officer.

   If a lot of log treatment work is necessary, the authorised Forest Officer may adjudicate that all logs in a parcel be returned to the bush landing for treatment by the contractor and redelivery.

9. All decisions on logs challenged by a customer must be indicated on the logs by the authorised Forest Officer using yellow crayon or paint (native forests) or blue (plantations). Rejected logs or part logs should be clearly marked with an "R". Logs inspected by the Authorised Forest Officer and found to be acceptable may be marked with an "OK".

10. It is CALM's responsibility, through the relevant contractor, to remove all rejected material from a customer's landing to either the operation from which the logs originated, or to another customer as directed by CALM. Contractors must act promptly to remove reject logs from customers' landings, as instructed by the Authorised Forest Officer.

11. (i) Credit Notes and Adjustment Notes issued for rejected logs are processed through CALM's Logging Operations Information System (LOIS) in the same way as Delivery Notes. It is the responsibility of the Authorised Forest Officer conducting the adjudication to ensure that Credit Notes and Adjustment Notes are distributed and processed accurately and promptly.
    (ii) Alternatively, logs rejected at a customer's landing by an Authorised Forest Officer may be branded with (a) an official brand signifying "not in accordance with the required specifications" and (b) a brand identifying the AFO. These logs can then be weighed out as part of the tare weight of the contractor's truck. A Credit Note in this situation is unnecessary. This method is only applicable to customers with a weighbridge.

12. Reject logs from a customer's landing may be dealt with in a number of ways:
    (a) downgraded and resold to that same customer—AFO completes a CLM 879 ("Adjustments to a Log Delivery Note")
    (b) downgraded and sold to another customer—AFO completes a CLM 878 ("Credit Note for Log Delivery Note") **or** brands and weighs out the rejected logs as per 11(ii) above and then ensures a new Delivery Note is completed to cover delivery and sale of logs to the alternative customer.
    (c) rejected logs returned to the bush—AFO completes a CLM 878 **or** brands and weighs out the rejected logs as per 11(ii) above.

13. Authorised Forest Officers must ensure that accurate log adjudication records are maintained. This may require the use of a "Log Adjudication Record Sheet".

14. Specific log rejection procedures for pine sawlogs delivered to Wespine Industries at Dardanup are detailed in the "Code of Procedure for Sawlog Sales by Log Scanner" dated 11 August 1995

SECTION 7 - ADMINISTRATION

7.9 SEIZURE OF FOREST PRODUCE

1. A Forest Officer who believes forest produce has illegally been removed may seize that forest produce whilst on any public road or within any State forest or Timber Reserve.

   Forest produce on private property but suspected of being the property of the Crown may be seized under warrant. A Forest Officer authorised by the Regional Manager may lodge a complaint to a Justice of the Peace who can in turn issue a warrant to enter and search for such produce. Only a Police Officer can seize forest produce on private property suspected of being the property of the Crown.

2. Sequence

2.1 When a person is found to be in possession of forest produce in State forest, Timber Reserve or on a public road (having been stopped by a Forest Officer) and is either unwilling or unable to satisfy the Forest or CALM Officer of the manner in which he came to possess the forest produce, he has committed an offence. If required to do so, the person must show the Forest Officer the forest produce cut or obtained.

2.2 Forest produce seized by a Forest Officer must be clearly stamped or marked with:

- A broad arrow
- The word "seized" and the Officers name and date
- A "Notice of Seizure" label (CLM 143)

The broad arrow and "seized" wording, name and date are to be marked on the seized forest produce with yellow timber crayon, but if crayon is not available then the seized produce may be marked with any available marking material. Where the forest produce seized is a whole or part of a stack then the produce seized needs to be clearly identified.

The offender should be asked to sign a receipt for the seized produce.

2.3 Conduct the interview using standard procedures (see below) and compile a breach report using the standard report format, CLM 259.

2.4 Once forest produce is seized it is necessary to allow the vehicle and driver to unload the seized produce and move off as soon as possible. In the case of logs this will best be done at the mill landing. With firewood and other easily removable produce, it is best to encourage the driver to unload at a secure location e.g. District headquarters. The driver does not have to deliver the produce to a nominated location but an attempt to get cooperation for them to do so should be made.

2.5 Once forest produce is seized it is an offence for any person without written authority of a Forest Officer to cut, injure, destroy, remove or interfere with seized produce. **NOTE:** The vehicle and cutting implements must **not** be seized, **only** the forest produce.

2.6 If a driver of a vehicle carrying forest produce will not stop when instructed to do so (by sign or action) the Forest Officer should note the:

- date
- time
- location
- type of load
- vehicle type and registration
- description of driver if possible.

A full report should be compiled as to the circumstances and reasons of why it was necessary to stop the vehicle. The name and address of the vehicle owner (and driver at the time) should be sought from local records, the Police or owner and included in the report.

2.7 Any person who aids, abets, counsels or procures or is directly or indirectly concerned in the commission of the illegal removal of forest produce is deemed to have committed the offence and should be interviewed independently of the others considered to have committed the offence.

3. **Procedure for recording interviews and taking Statements:**

3.1 All statements from persons likely to be charged should be taken in duplicate, and in triplicate if the offender wants a copy.

The statement must be in the actual words of the offender. Each copy must be signed in ink by the offender, and any corroborating witness, the original copy to be held by the officer taking the statement for court evidence, if required.

3.2 A person present as a corroborating witness should be present for the whole time that the statement is being taken.

3.3 When taking a statement, the obligation resting upon the Forest Officer is to put all questions fairly and to refrain from anything in the nature of a threat, or any attempt to extort a statement i.e. no threats, violence, bribes or promises are to be used to obtain a statement.

3.4 Points to be included in the statement are:

(i) Exact location (6 Fig ref.) and time of apprehension.
(ii) Registration, make, type and colour of vehicle.
(iii) Name and address of offender.
(iv) What section, or sections of Calm Act, Wildlife Conservation Act, Bush Fires Act infringed.
(v) Did offender know that he had infringed any of the above acts? Was there any evidence to tell offender that he had illegally entered Quarantine area - i.e. were there any "No Entry" signs on the roads upon which he travelled?
(vi) Particulars of how and why infringement occurred.

(vii) Names and addresses of all persons present (including Forest Officers).

3.5 The written statement should commence as follows:

"I have been warned by (Officer's name and rank) that I am not obliged to make a statement (or say anything) unless I wish to do so, and whatever I do say will be taken down in writing and may be given in evidence."

The statement should end as follows: (in the offender’s own handwriting if possible).

“I have read this statement through, and it is true and correct in detail and given at my own free will without any threat, promise or inducement, and I do not desire to make any corrections.”

3.6 The person making the statement should read it aloud prior to signing the statement.

3.7 Mistakes should be crossed out, and should be initialled by the person making the statement.

3.8 Form CLM 210 is a proforma for use when taking a statement.

4. Standard Action to be taken when Delivery Note Discrepancies are found:

4.1 Forest officers are required to check a minimum of 5% of all D/Notes in the field. Possible discrepancies, and recommended action to be taken, are listed in the table below:

Delivery Note Discrepancy V Recommended Action

	Discrepancy	Action Category (See codes below)
1.	No Delivery Note	A
2.	Suspicion of attempt to defraud	A
3.	Suspicion produce illegally obtained	A
4.	No date or incorrect date	A
5.	No customer name	B
6.	No customer address	B
7.	No coupe name or number	B
8.	No species name, or wrong species name	B
9.	No product type, or wrong product type	B
10.	No total number of logs, or incorrect numbers (if individual log measurement)	B or C
11.	No name(s) of harvesting contractor(s)	C
12.	No truck registration number	C
13.	No feller's identification code	C
14.	No work description, or incorrect work description	D
15.	No indication whether CALM contractor or not	D
16.	No carter's signature	D

Action Category	Description
A	Seizure with full detailed breach report.
B	Investigation by District with statement for Forest offence to Region/SOHQ. Notify employer. CLM 259 to be completed.
C	Investigation by Forest officer and caution to offender with recording at District and notification to employer. CLM 259 to be completed.
D	Caution by Forest officer only and file note.

4.2 When inspection of a D/Note on a truck results in a decision to seize the load of logs, the following steps should be taken by the Forest Officer:

- instruct the truck driver to move his truck to a safe place off the road edge,
- contact the driver's employer or the contractor representative,
- complete a CLM 259,
- organize the truck to be unloaded at an appropriate place,
- place logs under seizure and release the truck,
- notify Business Unit cell manager on same day.

4.3 Stopping of trucks on main roads and highways should be avoided unless the truck can be directed to an area off the road survey where other road users are not in any way put at risk.

4.4 If the Forest Officer believes an offence has been committed, he should communicate ahead to the expected truck destination, or follow the truck and carry out the investigation at the truck destination.

5. Recommended action to be taken when minor forest products are suspected to be illegally obtained:

- Domestic firewood slightly over the one tonne limit - CLM 259.
- Domestic firewood well over the one tonne limit - seizure and full report.
- Any other forest product - seizure and full report.

Form CLM 259 (1995)

REPORT CONCERNING ILLEGAL CUTTING OR REMOVAL OF TIMBER OR OTHER FOREST PRODUCE

FULL NAME OF OFFENDERS: _____

Address of Offender: _____

Nature of Offence _____

CALM Act breached (Section): _____

Forest Regulations breached (Section): _____

Date and Time of detection: _____

By whom Reported or Detected: _____

Names and addresses of any

other persons present:_____

_____

_____

Locality (Attach plan or sketch): _____

Period of Operations: _____

What indications are there of operations: _____

Vehicle used, Registration Number, Owner: _____

If timber industry employee, employed by whom: _____

Quantity of timber or forest produce removed: _____

To whom supplied: _____ Quantity seized: _____

Purpose for which obtained: _____

Was trespass deliberate or accidental _____

(State reasons for opinion):

_____

Was area fenced or blazed or signposted (give particulars): _____

Could direction of removal be seen

(Give particulars): _____

Has offender been previously reported or warned: _____

Is offender a registered timber worker: YES/NO

Further particulars: _____

_____

Recommendation: _____

Statements obtained and attached hereto: _____

Seized firewood is located at: _____

Date: _____

Forest Officer/CALM Officer: _____

District Manager's Endorsement: _____

District Manager's Signature: _____

Regional Manager's Recommendation: _____

Regional Manager's Signature:_____

RELEASE FROM SEIZURE:

Date produce released from seizure: _____

Action to be taken with the forest produce: _____

Business Unit Manager to sign: _____

STATEMENT BY PERSONS APPREHENDED BY AN AUTHORISED CALM OFFICER

Please to be advised that I: .....

Address: .....

.....

Occupation: .....

Was apprehended by .....

on..... day of .....19.....

at..... time .....

and was requested to make a statement.

I have been advised that I do not have to make a statement, but should I do, then anything I say will be taken down in writing and may be used as evidence.

I wish to make a statement signed:

_____
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_____
_____

I have read this statement through and it is true and correct in detail and given at my own free will, without any threat, promise or inducement, and I do not desire to make any corrections.

Signed .....

Witnessed by .....

In the company of .....

SECTION 7 - ADMINISTRATION

7.10 RESPONSIBILITIES OF FOREST OFFICERS

1. A Forest Officer is an officer of the Department of Conservation and Land Management, designated as such by the Executive Director. A Forest Officer, upon designation, will be issued with a Certificate of Authority, signed by the Executive Director. This certificate gives the Forest Officer all the responsibilities invested in a Forest Officer as specified in the CALM Act. The CALM Act also requires that the area of the State in which the Forest Officer is authorised to operate be listed on the Certificate.

2. To be designated as a Forest Officer, it is likely that a new graduate will be required to complete about two years of on-the-job training.

3. To be designated a Forest Officer in Charge (FOIC) or a Forest Representative, as defined in the Harvesting Contracts, Forest Officers must meet the requirements of formal Forest Resources training schools, **and** be formally nominated by the relevant Business Unit manager.