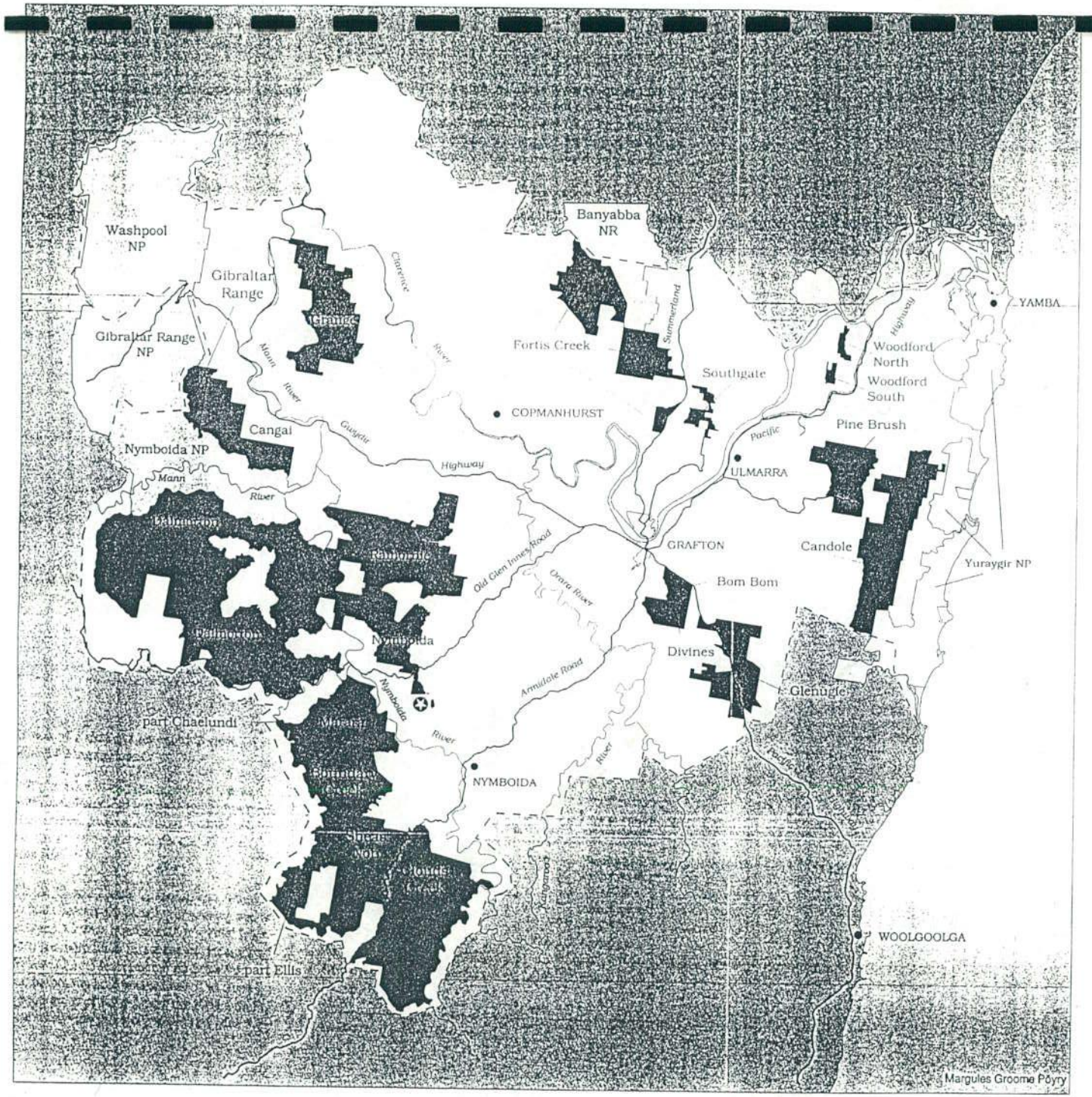
Nymboida
604 & 606

Grafton District
Northern Region



NSW

STATE FORESTS

NATIONAL PARKS

MANAGEMENT BOUNDARY

TOWNS

ROADS

RIVERS

0 20km N

LOCATION

✪ Compartments 604 and 606

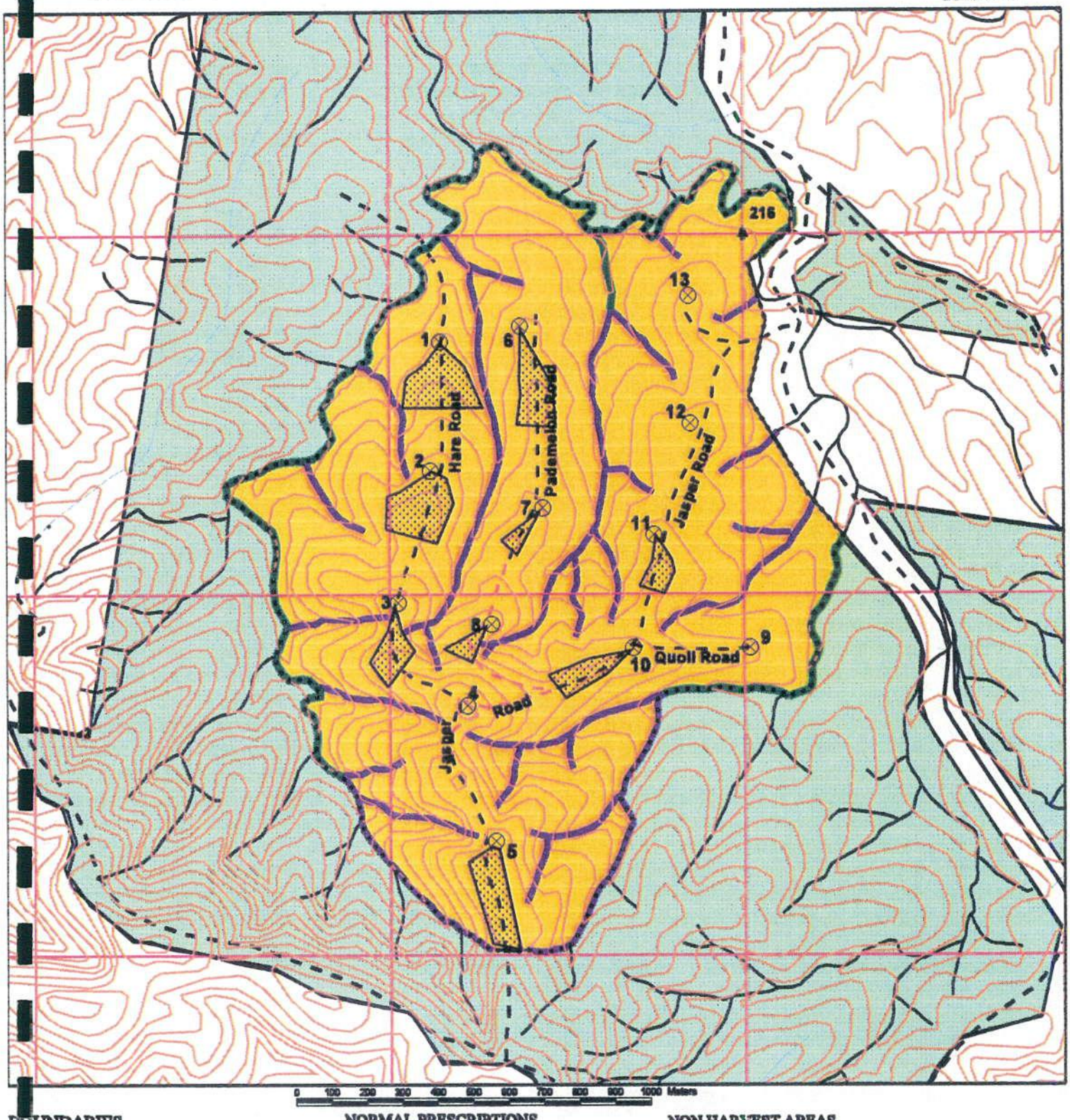
FIGURE 1.2

HARVEST PLAN OPERATIONAL MAP
NORTHERN REGION - GRAFTON DISTRICT
COMPARTMENT 604
NYMBOIDA STATE FOREST

STATE FORESTS

21/05/1996

BUCCARUMBI/NYMBOIDA MAP SHEET
SCALE 1:15000



BOUNDARIES
- Compartment Boundaries
- State Forest Boundary

ROADS (Proposed in Red)
- Road
- Minor Road

NORMAL PRESCRIPTIONS
- Harvestable Area
- Downhill Snigging

DUMP SITES OR LANDINGS
- Permanent Dry
- Permanent Wet

ASSESSMENT PLOT
- Assessment Plot 216

NON HARVEST AREAS
- Riparian Habitat Zone

WATERCOURSES & DRAINAGE
- Filter strip
- Drainage line
- Approved Crossings

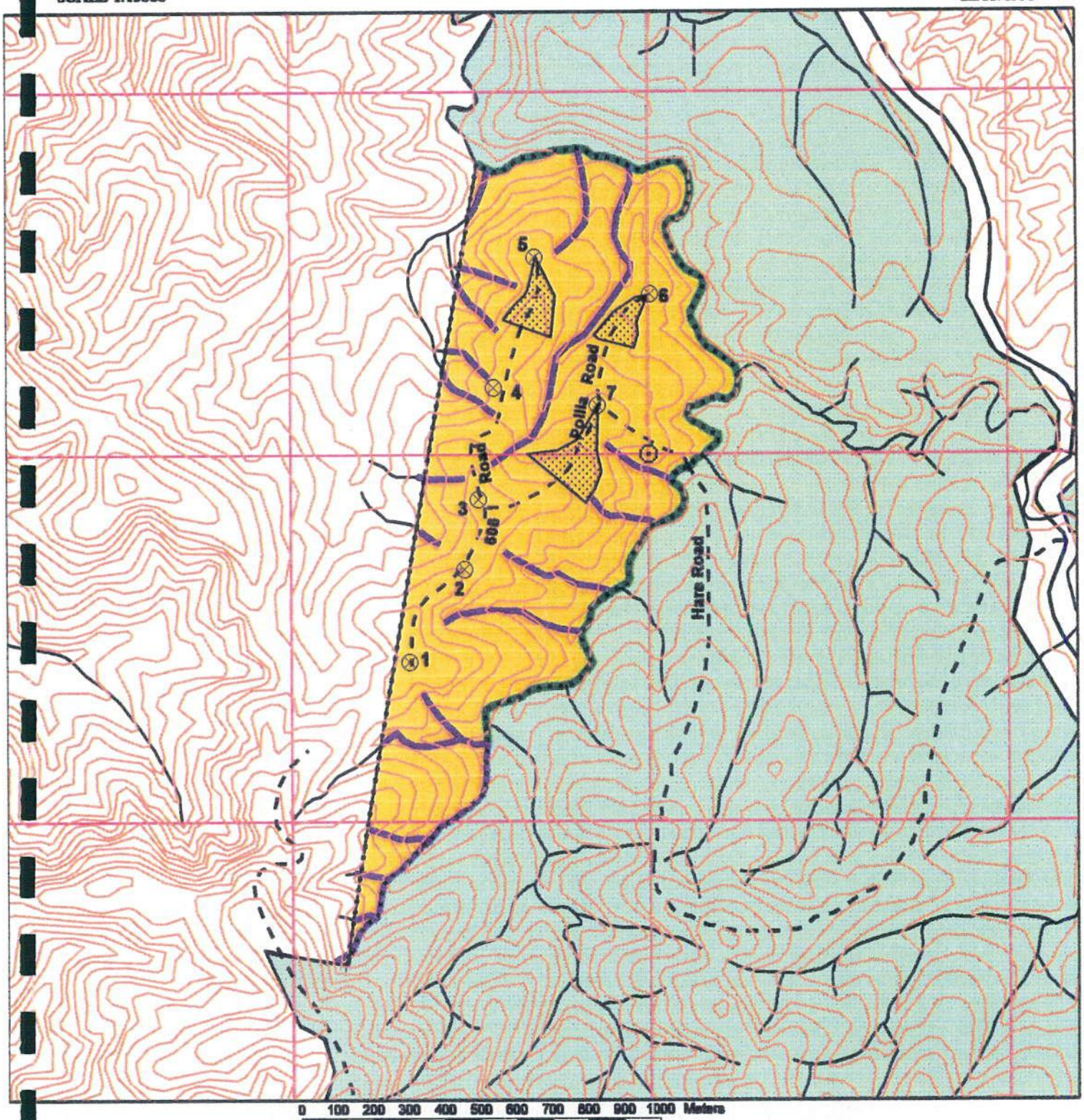
MN

HARVEST PLAN OPERATIONAL MAP
NORTHERN REGION - GRAFTON DISTRICT
COMPARTMENT 606
NYMBOIDA STATE FOREST

STATE FORESTS

22/05/1996

BUCCARUMBI MAP SHEET
SCALE 1:15000



0 100 200 300 400 500 600 700 800 900 1000 Metres

BOUNDARIES
- Compartment Boundaries
- State Forest Boundary

ROADS
- Minor Road
- Road

NORMAL PRESCRIPTIONS
- Harvestable Area
- Downhill Snigging

DUMP SITES OR LANDINGS
- Permanent Dry
- Permanent Wet

PERMANENT GROWTH PLOT
- PCG 334

NON HARVEST AREAS
- Riparian Habitat Zone

WATERCOURSES & DRAINAGE
- Filter strip
- Drainage line
- Approved Crossings

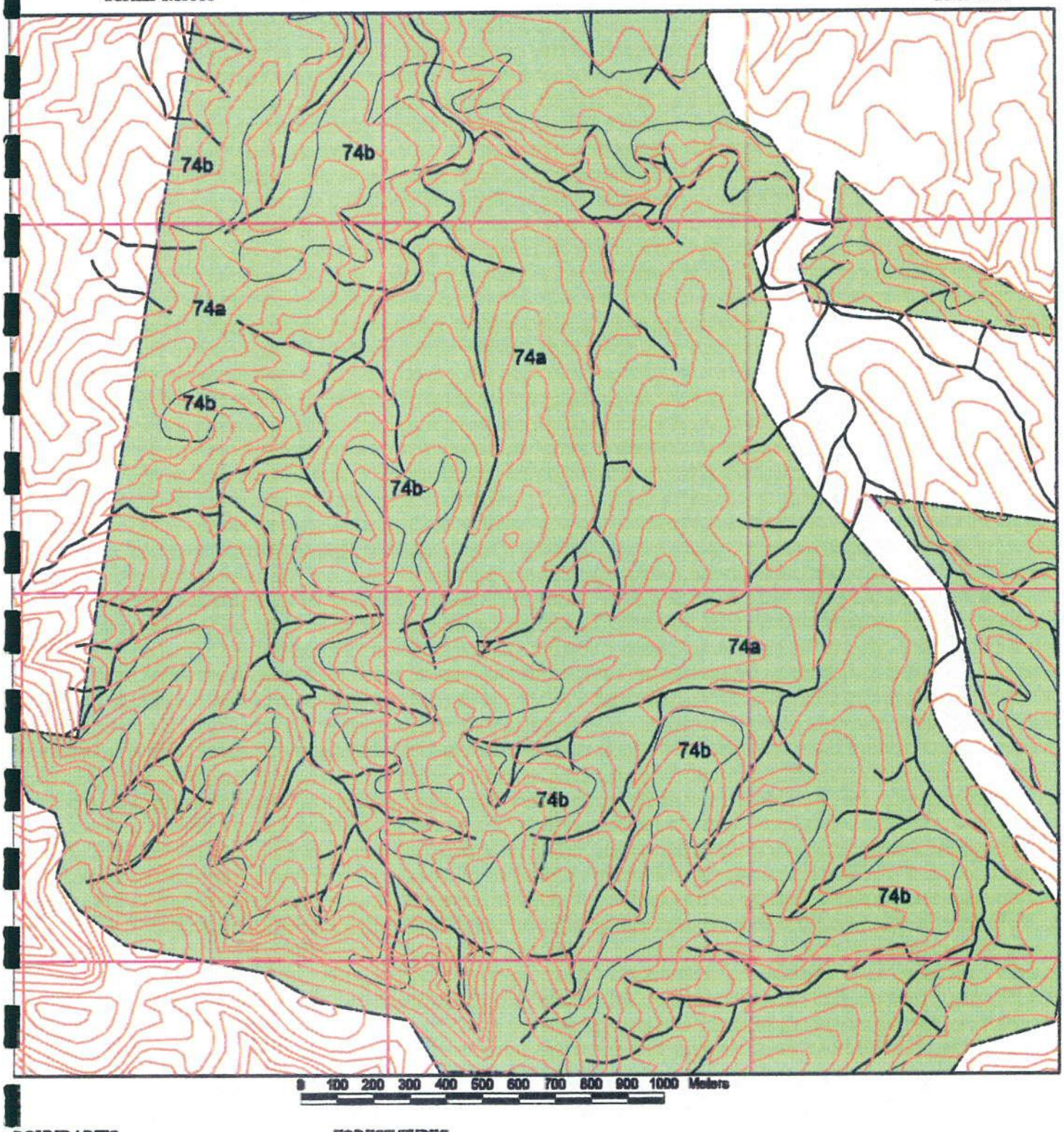
MN

HARVEST PLAN FOREST TYPES MAP
NORTHERN REGION - GRAFTON DISTRICT
COMPARTMENTS 604 AND 606
NYMBOIDA STATE FOREST

STATE FORESTS

21/05/1996

BUCCARUMBI/NYMBOIDA MAP SHEET
SCALE 1:15000



BOUNDARIES

State Forest Boundary

WATERCOURSES & DRAINAGE

Drainage line

FOREST TYPES

74a&b Spotted Gum - Ironbark/Grey Gum

MN

Harvesting Plan No GG 96/05/604

Contents

Part 2 FOREST MANAGEMENT & ENVIRONMENTAL CONSIDERATIONS

2.1 PHYSICAL FEATURES

Description 1 Physical Description of the Area

STATE FOREST	**Nymboida No 758**	DISTRICT	**Grafton**
REGION	**Northern**	COMPARTMENTS	**604 and 606**
MANAGEMENT AREA	**Grafton**		
NORTH-EASTERN CORNER		**469121 / 6696099**	
SOUTH-WESTERN CORNER		**467150 / 6694632**	

Natural Features

General: The compartments contain undulating to moderate slopes with a steeper area in the southern section of cpt 604. Together they form a series of side ridges running north off a main ridge system.

Catchment: Clarence River catchment. Glens Creek runs north-west out of the forest into Buccarumbi Creek, a tributary of the Nymboida River.

Altitude range: 240 - 410 m above sea level.

Aspect: Generally north

Topography: Most of the area varies from flat to undulating with slopes up to 15°. The southern section of compartment 604, which rises towards the main ridge, is steeper with slopes up to around 25°.

Artificial Features

Roads: Glens Creek Road, (a public road 100 links wide under the control of Nymboida Shire Council), the main access through the forest, runs near the compartments' north-east boundary.

Minor Roads: Jasper Road gives access off Glens Creek Road through cpt 604 up a side ridge. Three other minor roads - Hare Road, Pademelon Road and Quoll Road - give access to side ridges in compartment 604. There is another minor road running east-west along the northern edge of this compartment and into compartment 606, but this will not be used during this operation.

606 Road gives access through cpt 606 from Private Property to the south-west through to a side ridge. A minor road, Pollia Road, gives access to the other side ridge in the compartment.

Description 2 Special Warning of Critical Boundaries or Non-harvest Areas

Private property joins part of the north-eastern boundary of cpt 604, and the western boundary of cpt 606. This boundary is fenced.

Riparian Habitat Zones exist 20 metres either side of streams (watercourses, drainage lines and drainage depressions) with catchments greater than 40 hectares.

A Travelling Stock Route (TSR) runs along the north-eastern boundary of cpt 604. The State forest is dedicated over this TSR, and in regard to the proposed harvesting, the TSR is no different to the balance of the compartment. The TSR will not be referred to again in this plan.

An underground telephone cable runs through cpt 604, west of, and more or less parallel to, Glens Creek Road.

Reference Grafton Management Area Environmental Impact Statement

2.2 FOREST MANAGEMENT AND SILVICULTURE

Description 3 Compartment Subdivision, Forest Types

Areas:	cpt 604	cpt 606
Gross Area of Compartment	230 ha	109 ha
Wildlife Corridor	0 ha	0 ha
Riparian Habitat Zones	9 ha	6 ha
Filter Strips	18 ha	9 ha
Proposed for Logging	**203 ha**	**94 ha**

Logging History:

Compartments 604 and 606 appear to have been logged heavily from the 1930s up until the early 1960s for various timber products.

Forest Types:

		cpt 604	cpt 606
74	Spotted Gum - Ironbark/Grey Gum	230 ha	109 ha

Reference For Commission NSW (1989). Research Note 17. *Forest Types in New South Wales*

Description 4 Broad Description of Vegetation

(a) Forest Types

- Type 74 a dry type that occurs over the whole of compartments 604 and 606.

Overstorey species

The overstorey species are Spotted Gum, Grey/Red/Narrow-leaf Ironbarks, Small-fruited/Large-fruited Grey Gum, Blue-leaved/Broad-leaved White Mahogany, Grey Box, Red Mahogany, Tallowwood, Pink Bloodwood, Brush Box, Tindale's Stringybark and Forest Red Gum.

(b) Understorey

The understorey is typically dry, being eucalypt regeneration, Forest Oak, Native Cherry, Tick Bush, scattered Grass Trees, some Acacias and other xerophytic shrubs - Geebungs, Indigo, Hakeas.

(c) Ground-cover

The ground cover is mostly grass, bracken and litter.

(d) Rare or threatened species

No occurrences of rare or threatened flora are recorded on the compartments and none were encountered during field inspections.

(e) Rainforest

There are no rainforest areas in the compartments.

(f) Exotic weeds

Lantana is scattered through the lower sections of the compartments

(g) Regeneration and serial stages

The Nymboida State Forest area is low site quality for forest growth and this is reflected in the forest stand which is of poor quality.

The compartments carry a multi-age forest consisting of a few remnants of the original stand, maturing regrowth seemingly resulting from heavy logging during the 1930s and 1940s and younger regrowth of varying ages, the result of a number of subsequent selective logging operations.

Description 5 Forest and Crop Condition

Compartments 604 and 606 have had a long history of selective logging of varying intensities, but mostly light. These events have induced growth responses of varying extents on retained stems and allowed some regeneration to become established. Mostly the gaps created have been insufficient in size for widespread regeneration development. The current stand is mainly mature or maturing with groups of younger regrowth. Average growth rates would be low. There is a need to replace a proportion of the stands over the next few cutting cycles to maintain stand vigour and increase growth rates. The areas of younger regrowth shall be taken into consideration when carrying out this group selection activity. The compartment will now yield a range of log types.

The forest has been grazed more or less since European settlement in the 1840s, originally probably as part of *Chambigne (Ermington)* station and since State forest dedication by way of lease or permit. Grazing has seemingly been light in recent years and there is little evidence of it in Compartments 604 and 606.

Description 6 Forest Management Activities

(a) Silviculture

The main silvicultural objectives are to:

- Maintain the natural forest in a healthy condition, with some areas in a relatively undisturbed state. This will include the provision of habitat trees and provide for their future replacement.
- Obtain adequate post-harvesting regeneration that is similar in species composition to that of the original forest.
- Provide for growth and development of regeneration.
- Produce multi-aged stands on a broader area basis.

The Riparian Habitat Zones and filter strips on the compartment will remain in a relatively undisturbed state. Protection strips will be thinned under specific prescriptions with up to 50% canopy removal.

Habitat trees will be retained to meet wildlife habitat requirements.

On the balance of the area selective logging techniques, including the Australian Group Selection system, will be implemented.

(b) Harvesting Method

The harvesting method proposed for the area is based on current accepted operational practices. It comprises:

- Chainsaw felling using directional felling techniques where required.
- Snigging of logs using a crawler tractor and/or a rubber tyred skidder.
- Debarking and loading of logs at the dump using an excavator or forklift.
- Transport of logs from the site using a jinker and prime mover.

A number of different log types will be produced by the harvesting. These will be segregated at the dumps and usually transported to different purchasers.

(c) Fire Management

Fire management is required to;

- limit damage to stands caused by wildfires
- ensure the establishment and survival of regeneration
- maintain wildlife habitat
- maintain hydrological conditions
- meet State Forests' obligations under the Bush Fires Act.

Fire management entails the quick response to wild fire occurrence to limit fire spread, and the maintenance of fine fuels at low levels, usually by burning under mild conditions, to decrease wild fire intensities. Activities are coordinated with other fire control agencies through the Nymboida District Fire Plan.

In Compartments 604 and 606 bark and logging debris will be progressively spread through the logged area and/or accumulated in small heaps on the dump during the harvesting operation. Logging debris will be kept approximately 5 metres clear of identified habitat trees. Bark and logging debris will be burnt, and in the longer term fine fuels will be managed as detailed in the **Grafton District Fuel Management Plan 1993** and the **Nymboida District Fire Plan**.

2.3 FLORA PROTECTION

Description 7 Presence of Protected or Endangered Plant Species

No species listed Rare or Threatened have been detected in the compartments.

Reference Briggs, J.H. and Leigh J. H., 1988. Rare and Threatened Australian Plants, Aus NPWS
Grafton Management Area Environmental Impact Statement

Description 8 Presence of Rainforest

There are no areas of rainforest in the compartments.

Description 9 Protection of Plant Species

Not applicable to this plan.

2.4 FAUNA PROTECTION

Description 10 Endangered and Protected Fauna Occurrence

(a) General

No Threatened species have been detected in compartments 604 and 606. The Glossy Black Cockatoo has been recorded from compartment 607, just to the north of the boundary with cpt 606. Threatened species expected to occur in or in the vicinity of the compartment are;

Glossy Black Cockatoo	**Powerful Owl**	**Sooty Owl**
Masked Owl	**Stephen's Banded Snake**	**Pale-headed Snake**
Spotted-tailed Quoll	**Brush-tailed Phascogale**	**Yellow-bellied Glider**
Squirrel Glider	**Rufous Bettong**	**Long-nosed Potoroo**
Common Planigale	**Koala**	**Little Bent-wing Bat**
Great Pipistrelle	**Golden-tipped Bat**	
Common Bent-wing Bat		

References Grafton Management Area Environmental Impact Statement
SFNSW GIS Records

(b) Habitat Trees

Compartments 604 and 606 contain Dry Hardwood forest with xeromorphic understorey. Sufficient potential habitat and recruitment habitat trees exist in the net harvest area to allow for the retention of enough trees to meet prescription requirements.

(c) Riparian Habitat Zones

Riparian Habitat Zones exist 20 metres either side of streams (watercourses, drainage lines and drainage depressions) with catchments greater than 40 hectares.

(d) Refugia Areas

No areas of critical habitat for Threatened Species have been located in the net harvest area and no refugia areas have been set aside. Casuarina trees suitable for Glossy Black Cockatoos exist through the compartments and this species has been recorded from an adjacent compartment. Forest management will promote the growth of Casuarina.

Description 11 Species and Habitats Descriptions

Brief habitat descriptions for Threatened Species that might be adversely impacted by forest management activities on Compartments 604 and 606 are stated below:

(a) Critical Weight Range Species

Critical Weight Range species likely to occur in Compartments 604 and 606 are the Rufous Bettong, Long-nosed Potoroo and Spotted-tailed Quoll. Rufous Bettongs inhabit well grassed open forests and are commonly associated with Spotted Gum. Long-nosed Potoroos prefer dense understorey vegetation and will forage in open areas. Spotted-tailed Quolls occur in a variety of forest types favouring moister areas.

(b) Glossy Black Cockatoos

Glossy Black Cockatoos require stands containing species of Casuarina for food and large tree hollows for nesting, in a range of hardwood forest types. Suitable Casuarina occur in the compartments and there are large hollow trees in them and nearby.

(c) Powerful/Masked/Sooty Owls

These Owls require large tree hollows for nesting, roost sites in large trees and large home ranges. Suitable moist gully areas occur in nearby sites.

(d) Stephen's Banded Snake and Pale-headed Snake

These snakes require tree hollows and trunk scars. There is a scattering of suitable older trees through the compartments.

(e) Brush-tailed Phascogale

This species requires hollows for nesting and prefers open forest areas, foraging generally in large rough barked trees. The open drainage line areas of the compartments might be suitable habitat.

(f) Yellow-bellied Glider

Yellow-bellied Gliders require tree hollows for nesting and feed on eucalypt sap by cutting V-notches into the bark of certain eucalypts, eucalypt nectar and insects harvested beneath the loose bark of bark-shedding eucalypts.

(g) Squirrel Glider

This species requires trees hollows for nesting, feeds in upper canopies on flowers and insects, and on sap from Yellow-bellied Glider V-notches. The compartments are not really suitable.

(h) Koala

Koalas feed on eucalypt leaves from a range of species and prefer higher nutrient areas. Such country would be limited in these compartments.

(I) Long-nosed Potoroo

This species prefers dense understorey areas, will forage in open areas and builds a vegetation nest on the ground. There are broad flatter areas in the compartments but no dense riparian areas. The compartments are not really suitable.

(j) Golden-tipped Bat

This bat roosts in moist forests, seemingly preferring dense vegetation. The compartments do not really have a suitable habitat.

(k) Little Bent-wing Bat/Common Bent-wing Bat

These bats roost in caves and similar structures and occur in most forest and woodland types.

References
Grafton Management Area Environmental Impact Statement.
State Forests' Response to Submissions to the Grafton Environmental Impact Statement.

2.5 SOIL EROSION AND WATER POLLUTION CONTROL

Description 12 Site Soil and Water Data and Other Information

(a) Location

Compartments 604 and 606 are located in the southern section of Nymboida State Forest which in turn is located some 30 kilometres south-west of Grafton. See location map attached.

(b) Climate

Generally the climate in the Grafton area is sub-tropical with hot summers, mild winters and a distinct winter/spring dry season.

Rainfall

The average annual rainfall for the Nymboida area is about 1100 mm

The annual rainfall erosivity - **R = 2900**

January to March is the wettest period while June to August is the driest period. Heavy rainfall events are common during summer and autumn. There are no monthly rainfall figures available. The monthly erosivity details are:

	J	F	M	A	M	J	J	A	S	O	N	D
Erosivity	551	493	348	116	58	87	58	58	174	203	313	435

Reference
Rosewell C.J. & Turner J.B. (1992). *Rainfall Erosivity in New South Wales.* Technical Handbook No 11 (1st Edition), Soil Conservation Service of New South Wales.
Grafton Management Area Environmental Impact Statement.

Temperature

Mean maximum temperatures range from 30° in January/February down to about 20° in July/August. The mean minimum temperature range is from about 15° mid summer to around 0° July/August. These data give an indication that ground cover growth can be prolific during the warmer months but slows down considerably during the cooler drier winter periods and at times is basically nil.

(c) Geology

The compartments are on Metasediments (argillites) of Silurian age.

Bedding planes

There are no obvious bedding or fracture planes in the area and no indications of mass movement.

References Veness & Associates (1994). Soils Report Grafton Environmental Impact Statement.

(d) Soils

The compartments are included in the Grafton Management Area EIS Study Soils Report carried out by Veness and Associates (published 1994). This study identifies Metasediments ("C") Unit soils as occurring in Compartments 604 and 606. Field inspection of the compartments indicate that the metasediment unit soils do occur.

Soil sampling of the area and soil testing has been carried out by J Veness of Veness & Associates Pty Ltd. Soil sample sites are indicated on the map included with the attached Soils Report. The attached letter from Veness & Associates describes the landform elements occurring within these and adjacent compartments, and the sampling for each element. Data from all samples covering landform elements within the compartments are used below.

Soil types

The soils derived from the Metasediments (Soil Mapping unit "C") are typed as Structured plastic and subplastic clays, at times Krasnozems, Xanthozems, Chocolate Soils, Structures loams.

Description and profile

The soils on the metasediments are described as bioturbated, strongly structured, stony, silty clay loam topsoil, grading through brownish black to very dark brown, pedal, sandy to silty clay layers to a reddish to bright brown, pedal, stony, light clay subsoil layers.

The top soil layers are up to 50 cm and more in depth. The surface condition is described as friable, with up to 20% stones and a litter layer up to 1 cm thick.

References Veness & Associates (1994). Soils Report Grafton Environmental Impact Statement.

Erodibility

K values A horizon = 0.015 (site 604; crest) (Method B3)
K values B horizon = 0.059 (site 604; crest) (Method B3)

Texture

A horizon -.Fine Sandy Loam
B horizon - Sandy Clay Loam

Dispersibility (Method D1) (site 606; simple slope)

%clay A horizon	10%(inclusive of gravels)
%clay B horizon	12%(inclusive of gravels)
D% A horizon	23%
D% B horizon	49%
%dispersible soil A horizon	10/100x23/100x100 = **2.30**
%dispersible soil B horizon	12/100x49/100x100 = **5.88**

The A horizon is not significantly dispersible.
The B horizon is not significantly dispersible.

Reference Veness and Associates. Soils report Number VA16525B/01 of 25 July 1995, and letter of 26 April 1996.

A copy of the above reports and letter from J Veness are attached.

Inherent fertility

The soils are of low fertility when compared with those generally found in State forests in the Grafton area. The compartments carry a relatively low quality stand. Much of the original stand of the forest would have been very open.

Depth to subsoils and bedrock

Subsoils are from around 30 to 50 cm, bedrock is at about 100 cm to 150 cm. The harvesting should rarely disturb the subsoil.

Existing erosion

There are areas of rilling on some of the old logging tracks in the compartments. This will be rectified during the logging operation by improving the drainage on these tracks. There is limited deposition of sand and fine gravel in some drainage lines.

(e) Landform

Slope

Slopes are generally convex or straight from the ridge tops down to the creek lines. Almost 90% of the area has slopes under 15°. The southern section of cpt 604 is steeper with slopes up to about 25°. Absolute and percentage areas of slope classes are given in Tables 1a and 1b below.

Table 1a - Slope Class Areas - Cpt 604

Slope Class	0° - ≤5°	>5° - ≤10°	>10° - ≤15°	>15° - ≤20°	>20° - ≤25°	>25° - ≤30°	>30°
Area (ha)	46	98	59	20	5	1	nil
% Area	20	42	26	9	2	1	0

Table 1b - Slope Class Areas - Cpt 606

Slope Class	0° - ≤5°	>5° - ≤10°	>10° - ≤15°	>15° - ≤20°	>20° - ≤25°	>25° - ≤30°	>30°
Area (ha)	18	36	39	13	1	nil	nil
% Area	17	34	36	12	1	0	0

Terrain

The elevated southern section of compartment 604 is on the north side of the main ridge running through the area. This main ridge falls evenly to the north to long flat to undulating side ridges, with the balance of the compartment being on these side ridges. Compartment 606 is on a broad, long flat to undulating or rolling side ridge running in a northerly direction.

Drainage line condition

The drainage features in the compartments have been field inspected. They are in good condition. They are deeply incised in places on the steeper areas of the compartment but not often to bedrock. Glens Creek and its main tributaries are protected by Riparian Habitat Zones.

The flow in the streams is intermittent and the drainage lines were dry at the time of inspections, with the only water being in a few large water holes in the main creeks.

Aspect

The aspect is north, ranging from east to west.

Rockiness

There are no rock areas in the compartments. The surface condition is generally described as friable with variable amounts of stone up to 20% and plant litter.

(f) Hydrology

The compartments are in the Clarence River catchment. Glens Creek runs north-west out of the forest into Buccarumbi Creek which flows west for about 6 kilometres to the Nymboida River south of Buccarumbi. The Nymboida River is a main branch of the Clarence. There are no prescribed streams, swamps or wetlands within the net harvest area.

No major water storages occur adjacent to or down stream from the compartment.

Verification of drainage lines

All drainage features verified during harvesting plan preparation as watercourses or drainage lines are shown on the harvesting plan Operational Map with filter strip/protection strip protection. Other smaller drainage features which are not marked on the map must be inspected by the SFO during tree marking and given protection in accordance with the Pollution Control Licence.

Representative water monitoring sites

The representative water monitoring site is Chaelundi (Sandstone, Rainfall 800 mm +).

Reference Forest Planning Branch *Water quality monitoring program* **SFNSW** 1994

Previous harvesting

The general area was logged for Hoop Pine in the late 1800s. There was probably then only limited activity in the forest, except for poles, girders and posts for local use, until the 1930s. Regular logging for poles, girders and sleeper material (to then merchantable limits, with changing demands occurring almost annually) then commenced and continued until the early 1960s. It seems that the forest has been almost fully utilised by the cutting of such products and sawlog yields have been limited. Compartments 604 and 606 have been regularly accessible for many years and have been extensively utilised.

Upstream catchment water use

Production forestry - the upstream catchment is within Nymboida State Forest.

Downstream catchment water use

Glen/Buccarumbi Creek flows through grazing country before joining the Nymboida River. There would be limited stock watering along its length.

Domestic water use

The only domestic water supply drawn from the Nymboida/Clarence below the Buccarumbi Creek junction is the Copmanhurst town supply. Buccarumbi Creek would amount to only a

fraction of a percent of the Clarence flow and would have no influence at all on the town supply. Copmanhurst is to transfer to the lower Clarence scheme, which sources its water higher up the Nymboida catchment, during the next year or so.

(g) Vegetation and Ground-Cover

Effect on ground-cover during operations

The harvest operations are expected to remove less than 20% of the overall ground cover of the net harvest area.

Recovery time

Recovery will be relatively rapid with 70% live ground-cover being attained within 12 months. The tracks and minor roads previously utilised have revegetated.

(h) Proposed Operation System

Use of existing roads

Existing roads have been evaluated for their potential to cause water pollution.

Glens Creek Road, which runs near to the north-east and eastern boundaries of the compartments, is a fully designed road with concrete relief pipes in the side-cuts and drainage lines, and mitre drains on the ridge-tops. It crosses a number of drainage lines by way of concrete causeways. The road pavement is well consolidated and the road is maintained by periodic grading and manual cleaning of drainage structures. The batters and outlets of the drainage structures are stable and well vegetated. Glens Creek Road has been gravelled over all of its length.

4.5 km of existing minor roads in compartment 604 (Jasper Road, Hare Road, Pademelon Road, Quoll Road) and 2.3 km of minor roads in compartment 606 (606 Road and Pollia Road) will be used to access the compartments as shown on the Operational Map. These roads are old logging tracks that will be reopened for use during this harvesting operation. These roads are long established, stable, with litter and grass cover. Drainage is confined to cross-fall and roll-overs.

The reopening of these minor roads will require the removal of fallen timber and regrowth from the road pavements. This will be done with the logging machinery and will cause minimal disturbance to the road pavement. There is a sharp bend in Hare Road, just to the west of where it crosses the boundary between the two compartments, that will need to be widened to allow logging trucks to get around it. With the exception of Jasper Road, all minor roads in these compartments will be bedded down and closed on completion of the operation.

To avoid additional crossing of drainage lines, a further 800 m of existing minor roads in compartments 604 and 606 will not be used in this operation. These include a road running north-west from Dump 13 through the northern part of compartment 604 into compartment 606 and that part of Pademelon Road north of Dump 6.

None of the existing roads are likely to cause significant water pollution.

Use of existing drainage feature crossings

There are three existing drainage line crossings in the compartments, only one of which will be used during the operation.

The existing road running north-west from Dump 14 through the northern part of the compartment crosses two drainage lines on very old open natural surface causeways that have washed out. No work will be undertaken on these crossings, as any attempt at remedial action would create more disturbance and therefore increase potential for water pollution. A small amount of road construction will be undertaken (see below) to avoid the need to use this crossings.

The existing drainage line crossing on Hare Road north of Dump 1 (on the boundary between the two compartments) will be used. This is an old log crossing that is currently stable, but will be modified to ensure continued stability during and after the operation. The two outside logs will be removed, and a log placed across the bottom side to prevent pavement material washing into the drainage line. The work will be done with minimal disturbance and any adjacent areas that are disturbed will be seeded with rye grass at the rate of 20 kg/ha. The removed logs and any associated spoil will be deposited outside the Riparian Habitat Zone. The work will be done before the operation commences if weather conditions are suitable.

Road construction

1 km of minor road between log dumps 8 and 11 and 9 and 11 (along Pademelon and Jasper Roads) in compartment 604 will be constructed during the harvesting, as shown on the Operational Map. This construction is required to avoid additional crossing of drainage lines in the northern part of the compartment.

The centre lines for these roads have been surveyed and marked in the field. The maximum side slope is 17° and the roads will be constructed with a maximum grade of 10°. The maximum clearing width will be 6 m, except for the intersection of Jasper and Pademelon Roads, which will be no more than 10 m wide. The maximum length of cut batter will be 550m, and maximum batter depth will be 1.5 m. The roads will be drained by outfall drainage.

There will be no need to establish borrow pits or gravel pits (a gravel pit operated by the local Council is located beside Glens Creek Road, partly on State Forest, at the most easterly point of the forest - there was freshly won gravel in this pit at the time of recent inspection).

There is no road construction required for the operation in compartment 606.

Construction of drainage feature crossings

There is no drainage feature crossing construction required for this operation.

Harvesting

The harvesting method proposed for the area is based on current accepted operational practices. It comprises:

- Chainsaw felling, using directional felling techniques where required.
- Snigging of logs using an articulated rubber tyred skidder and/or a crawler tractor.
- Debarking and loading of logs at the dump using an excavator or forklift.
- Transport of logs from the site using a jinker and prime mover.

The crawler tractor is used for construction work and snigging from steeper slopes including winching of logs and snigging larger logs. The rubber-tyred skidder is used on the flatter terrain, for snigging smaller logs and logs from steeper areas that have been bunched by the tractor.

Cover factor

The harvesting operations described above result in a cover factor (in accordance with PCL Sch 4, Part A, Table 2) of **C = 0.108**.

Location of log dumps

There are 13 log dumps in compartment 604 and 7 dumps in compartment 606, as indicated on the Operational Map. Log dumps are located on ridge tops to facilitate uphill snigging. There will be limited downhill snigging to dumps 1, 2, 3, 5, 6, 7, 8, 9, and 11 in compartment 604, and dumps 2, 4, 5, 6 and 7 in compartment 606 to reduce snigging distances and take advantage of previously constructed log dumps, snig tracks and drainage line crossings. These snig tracks and drainage line crossings are stable. Less than 10% of the snigging activity will be downhill.

Log dumps will be located as indicated on the Operational Map.

Post-harvest burning

In Compartments 604 and 606 bark and logging debris will be progressively spread through the logged area during the harvesting operation and/or accumulated in small heaps on log dumps. Logging debris will be kept approximately 5 metres clear of identified habitat trees. Bark and logging debris will be burnt, and in the longer term fine fuels will be managed as detailed in the Grafton District Fuel Management Plan (1993) and the Nymboida District Fire Plan.

Post-harvest rehabilitation

Natural regeneration and natural re-seeding of overstorey, understorey and ground-cover plants will provide ground cover rehabilitation. Supervision by the SFO and fortnightly check sheets will assess that road surfaces, batters and drainage structures are stable at the completion of operations and prior to the shifting of the contractor.

Description 13 Evaluation of Soil and Water Data

(a) Soil Erosion and Water Pollution Hazard Categories

Soil Erosion and Water Pollution Ratings (SE/WPR) have been assessed using SOILOSS 5.1. The Ratings have then been used to assess Soil Erosion and Water Pollution Categories (SE/WPC) for the net harvest area. The subsoil data from site 604 give the lowest slope limits for the categories and have been used in the calculations. Details are in table 2 below.

SE/WPR = R x K x LS x C (5.1) where:

R = 2900

K = 0.015	**Topsoil (A horizon)**	Method B3
K = 0.059	**Subsoil (B horizon)**	Method B3

S = As factored in SOILOSS 5.1

L = 20 metres

C = 0.108 Native forest harvesting "B" Table 2

P = 1.0

Table 2: Water Pollution Hazard Categories

Slope Ranges (Degrees)	Water Pollution Category	Indicative % of Net Harvest Area	
		cpt 604	cpt 606
0 - ≤2	1	7	5
>2 - ≤11	2	60	49
>11 - ≤30	3	33	46
Roads	3	N/A	N/A

The following factors for rainfall erosivity and soil erodibility also apply to road construction:

R = 2900 **K = 0.059**

(b) Dispersibility (Site 606, simple slope)

%dispersible soil A horizon = 10/100x23/100 = **2.30** (Method D1)

%dispersible soil B horizon = 12/100x49/100 = **5.88** (Method D1)

The A horizon is not significantly dispersible.

The B horizon is not significantly dispersible.

(c) Other Factors

The spacing of road drainage structures derived for these compartments from Figure 1 of Schedule 4 of the Pollution Control Licence, would cause excessive soil disturbance and lead to an increased risk of water pollution. Under Condition 1 of Schedule 4 of the PCL, and in consultation with DLaWC (Northern Region Secondee), it has been determined that the prescribed spacing for snig track drainage structures in Water Pollution Hazard Category 3 would better achieve the licence objectives in this case. This will limit soil disturbance while still providing adequate road drainage.

Calculations to determine height of rollover crossbanks so that they convey the peak flow of a 1 in 5 year storm event are attached.

References

Standard Erosion Mitigation Guidelines for Logging in New South Wales Soil Conservation Service, CaLM, NSW 1993

Rosewall C.J. SOILOSS A program to assist in the selection of management practices to reduce erosion

Soil Conservation Service Technical handbook No. 11 First Edition 1990, 2nd Edition 1993.

2.6 FOREST ZONING AND SPECIAL ATTRIBUTES

Description 14 Forest Zoning and Special Attributes

(a) Research Plots

Assessment plot 216 is located in the north-east corner of Compartment 604 as indicated on the Operational Map. There are no research plots or long term inventory plots in Compartment 606.

(b) Permanent Growth Plots

Permanent Growth Plot PCG334 is located near the north-eastern boundary of compartment 606 as indicated on the Operational Map.

(c) Special Attributes of the Area.

An underground telephone cable runs near to and west of Glens Creek Road.

Part 3 AUTHORISATION CONDITIONS

3.1 COMPLIANCE

(a) Area Identification

GRAFTON DISTRICT

Nymboida State Forest No. 758

Compartments 604 and 606

Grafton Management Area

(b) Third Party/Lessee or Other Interest

The compartment is within the area of Occupation No. 4109 held by FX Zittmayer for the purpose of grazing.

(c) Environmental Compliance Requirements

This Harvesting Plan is prepared by State Forests of New South Wales (State Forests) under the authority of the Forestry Act 1916. This Harvesting Plan is a condition of all Timber, Forest Products, Contractors and Operators Licences issued in connection with the timber harvesting operations described in the Plan.

All operations conducted under the authority of the Timber Licence and other Licences and Agreements issued for the area covered by this Harvesting Plan must comply with:

- Licence conditions issued by State Forests under the Forestry Act 1916.
- the **"Forest Practices Code Part 2 - Timber Harvesting in Native Forests"** - State Forests (1993).
- the **"Standard Erosion Mitigation Guidelines for Logging in New South Wales" (SEMGL 1993)** issued by the Soil Conservation Service of Department of Land & Water Conservation (LaWC).
- the conditions of **Pollution Control Licence No 4017** issued by the Environment Protection Authority under the Pollution Control Act 1970. Those general conditions which affect licensees are set out in Schedule "A" attached to every Timber, Contractors and Operators Licence.
- conditions attached to licences issued by the National Parks and Wildlife Service under the Endangered Fauna (Interim Protection) Act 1992 and the National Parks and Wildlife Act 1974 (NPW Act).
- conditions resulting from the determination of the **Grafton Management Area Environmental Impact Statement**.
- the silvicultural specifications as stated in the **Grafton Management Area Environmental Impact Statement** (as amended by Operational Circular 95/14 of 30/10/95).
- the schedule of specifications for the harvesting and utilisation of timber applicable to this operation, in this case:

- **Grafton/Coffs Harbour Compulsory Sawlog Specification Hardwood Sawlog Flat Rate Royalty Utilisation Standards**
- **Specification for Eucalypt Veneer Logs for Rotary Peeling**
- **Australian Standard AS2209 - 1979 (poles)**

- the Code of Procedure for the measurement of timber and other products applicable to this operation, in this case:
  - **Code of Procedure for the Measurement of Hardwood Logs and other Timber Products - Northern Region.**

Variations, additions or amendments to the above documents may be made by the responsible authorities at any time, and must be implemented immediately by the State Forests Licensee.

(d) Environmental Planning & Assessment Act Requirements

In preparing this Harvesting Plan, the requirements of Part V of the EPA Act (as amended) and Section 92 of the NPW Act have been considered and Grafton Management Area Environmental Impact Statement (EIS) has been produced.

(e) Breaches and Infringements

Non-compliance with any condition or instruction set out in this Harvesting Plan will be dealt with in accordance with Section 4 of the **"Forest Practices Code Part 2 - Timber Harvesting in Native Forests"**. Serious breaches may lead to the issue of a penalty notice, licensee suspension or prosecution.

(f) Variations and Amendments to this Harvesting Plan

Conditions and requirements relating to the Pollution Control Licence cannot be varied in the field without the prior written approval of the EPA, other than those areas detailed in Condition 5.1 (c).

Variations and other specified approvals detailed Condition 5.1(c), may be made by the Supervising Forest Officer to this Harvesting Plan, subject to the District Forester's counter approval.

Other approvals may only be made by the Supervising Forester and are also subject to the District Forester's counter approval. Major variations that relate to the conditions of the Pollution Control Licence, minor variations that would result in an increased risk of water pollution, or any variation relating to drainage feature protection conditions can only be made with the prior written approval of the EPA.

All approvals must be recorded on a variation advice, attached as Part 6 to all operational copies of this Harvesting Plan.

This Plan must not be amended by a licensee or contractor.

(g) Harvesting Plan Availability

Copies of this Harvesting Plan must be held available by the contractor or bush supervisor at the site of timber-harvesting operations at all times that felling, snigging or environmental work is being undertaken within the area covered by this Harvesting Plan.

3.2 CERTIFICATION

(a) Plan Preparation

Prepared by: Leonie Walsh Signature: .....

Title: Marketing Forester Date: 3/6/96

(b) District Approval

I approve the issue of this Harvesting Plan subject to any amendments, endorsements or approvals that may be made following submission to the National Parks and Wildlife Service, the Environment Protection Authority and/or the Regulatory and Public Information Committee (constituted under the Timber Industry (Interim Protection) Act, 1993 as amended).

The date that operations will need to commence is: 1 July, 1997

Signature: ..... District Forester Date: 4 June, 1996

(c) Receipt of External Authority Approvals

(To be completed by the District Forester or a person nominated by the District Forester who must attach the relevant amendments to the Plan.)

Table 3: External Authority Approvals

Name of Authority	Date Received	Attached to Plan by
NPWS		
EPA		
RaPIC		
Other Authority		

I note approval of this Harvesting Plan from the above-mentioned authorities, together with the amendments they have required to be included in the Plan.

These amendments have been included in the final Plan. This Harvesting Plan comprises pages 1 - 41, attachments and the Operational, Forest Types and Locality maps marked and referenced to this Harvesting Plan. This is Harvesting Plan No. GG 96/05/604

Date for commencement of operations: .....

Signature: ..... Date: .....

District Forester

3.3 DISTRIBUTION

Recipient	Parts	Minimum Copies
Timber Licensee	1,3,4	1
Contractors	1,3,4	1
Operator(s) (where required)	1,3,4	
Supervising Forest Officer(s) [SFO(s)]	1 ,3-5, (2 optional)	1
Supervising Forester(s)	All	
District Forester	All	
District Office Register	All	
Compartment History File	All	1
Regional Office (optional)	All	
Community Groups		
Soil Conservationist (Forestry)	All	

Forest Planning Branch, Head Office, for distribution to:

Regulatory and Public Information Committee	All	3
National Parks And Wildlife Service	All	2
Environment Protection Authority	All	3
Department of Lands and Water Conservation (for harvesting in other Crown-timber lands)	All	1

3.4 INDUSTRY ENDORSEMENT

I endorse the harvesting plan on behalf of industry.

Signature: ..... Licence No.: ..... Date: .....

Position: ..... Company: .....

Signature: ..... Licence No.: ..... Date: .....

Position: ..... Company: .....

Signature: ..... Licence No.: ..... Date: .....

Position: ..... Company: .....

3.5 BUSH SUPERVISORS ACKNOWLEDGMENT

I acknowledge that I have received a copy of Harvesting Plan No GG 96/05/604 and that I understand the conditions of the Plan as explained to me by a State Forests officer.

Signature: ..... Licence No: ..... Date: .....

Position.....

Signature: ..... Licence No: ..... Date: .....

Position.....

Signature: ..... Licence No: ..... Date: .....

Position.....

Part 4 OPERATIONAL CONDITIONS

The Tree-marking Code shown in this Plan will be used to apply other Conditions of this Plan as required. All necessary tree-marking in the field must be carried out before and during the harvesting operation by the SFO. Product marking will generally be for extraction.

4.1 Harvesting Activity Description

The logging will be a selective harvesting operation in maturing and regrowth native hardwood forest. The products that will be harvested are sawlogs, poles and veneer logs.

4.2 Tree-marking Code and Harvest Regulation

Tree Marking Code

(a) Trees to be removed

Trees will be marked with a **dot**. Some trees may also be marked to produce a specific log type; **P** = Pole, **G** = girder, **V** = veneer log.

(b) Trees to be retained

Trees will be marked with a **horizontal line**. Some trees may be marked for a specific purpose; **H** = habitat tree, **R** = recruitment habitat tree.

(c) Trees marked for information

Two horizontal lines indicates that machinery is not permitted past the point but there may be trees to be felled. Two horizontal lines also indicates a **protection strip**. **Three horizontal lines** indicates that machinery and that felling is not permitted past the point. **F** = wildlife corridor, **Z** = riparian zone, "**5**", "**10**", "**15**", "**20**", or "**25**" = buffer, protection or filter strip width as appropriate. **D** = dump site, **O** = compartment boundary.

Forest boundaries are marked by yellow painted **blazes** and/or **sawn stakes**.

Vertical line indicates location of a minor road or snig track. **Vertical lines with arrowheads** indicates an approved crossing.

X = cancellation mark

Reference: Northern Region Tree Marking Code (1995)

4.3 Order of Working

(a) Wet Weather, Dry Weather and Intermediate Areas.

Fourteen dump sites have been located and marked in compartment 604 and five dump sites in compartment 606 , as indicated on the Operational Map. No dumps have been designated as suitable for working when conditions are wet. Harvesting must commence on dump 1 and work progressively through to dump 14 in compartment 604 and from 1 through to 5 in compartment 606.

(b) Wet Weather Controls - Roads

During wet weather, the wet-weather controls set out in Section 7 of the Forest Practices Code Part 2 (Timber Harvesting in Native Forests) must apply. In particular, when it is raining and/or where runoff occurs from a road surface, haulage must not occur unless the road is a gravel or sealed road.

[FPC Pt2 7.2, PCL Sch 4 C 82]

(c) Wet Weather Controls - Snigging

During wet weather, snig tracks must not be used where:

(i) there is runoff from the track surface, or;

(ii) there is a likelihood of significant rutting leading to turbid runoff from the track surface. [FPC Pt2 7.2, PCL Sch 4 C 93]

The SFO is responsible for determining the order of working in the field.

4.4 Silviculture

(a) General

The aim of the harvest is to promote growth on retained trees and to create conditions that will allow the establishment and growth of regeneration. Selective logging techniques, including the Australian Group Selection system where appropriate, shall be implemented.

(b) Tree Marking

Tree marking must aim at:

Retaining trees capable of net merchantable timber value increment for cutting in future cutting cycles, except where:

a) the removal would result in more valuable increment on preferred retained trees (redistribution).

b) the tree has been or is likely to be significantly damaged during the course of harvesting operations.

c) the removal of a small group of merchantable trees would create favourable conditions for the establishment and growth of regeneration.

In general tree marking and supervision must be directed towards:

1. Harvesting for the highest economic end use for which markets are available.

2. Ensuring maximum economic utilisation of all trees felled.

3. Minimising damage to the retained stand and minimising soil disturbance in excess of that required for successful regeneration establishment.

Tree marking for removal must be carried out by the SFO.

Reference Grafton Management Area Environmental Impact Statement
Jacobs (1955) Growth Habits of the Eucalypts. Forestry and Timber Bureau. Commonwealth Government Printer, Canberra.

(c) Harvesting Debris

Debris must be removed from within approximately 5 metres of the butts of retained habitat trees to minimise bark scorch during prescribed burning operations, or any wildfire.

Harvesting debris which is likely to impede the flow of water in road drainage structures must be removed from such structures every 2 days.

Bark and debris produced by the harvesting must be returned to the logging area and dispersed as far as practicable around the net harvest area and/or stacked in small heaps on log dumps.

(d) Directional Felling

Directional felling techniques must be employed to minimise damage to retained trees, to avoid hang ups and to maintain values of the Riparian Habitat Zones, filter strips, protection strips and buffer strips.

4.5 Flora Protection

(a) Rare or Endangered Species

No occurrences of rare or threatened flora are recorded on the compartments and none were encountered during field inspections.

(b) Rainforest Protection

There are no areas of rainforest in the compartments.

4.6 Fauna Protection

(a) Sightings of Fauna

No Threatened species have been recorded from the compartments. The Glossy Black Cockatoo has been recorded from compartment 607, just to the north of the boundary with cpt 606. Threatened species expected to occur in or in the vicinity of the compartments are;

Glossy Black Cockatoo	**Powerful Owl**	**Sooty Owl**
Masked Owl	**Stephen's Banded Snake**	**Pale-headed Snake**
Spotted-tailed Quoll	**Brush-tailed Phascogale**	**Yellow-bellied Glider**
Squirrel Glider	**Rufous Bettong**	**Long-nosed Potoroo**
Common Planigale	**Koala**	**Little Bent-wing Bat**
Great Pipistrelle	**Golden-tipped Bat**	
Common Bent-wing Bat		

Contractors and supervisory staff shall report any sightings of Threatened species to the District Marketing Forester. Such confirmed sightings or findings shall generate the application of the appropriate prescriptions to reduce the impact on the species.

(b) Habitat Trees

Compartments 604 and 606 include Dry Hardwood forest with xeromorphic understorey with mesic understorey. Sufficient potential habitat and recruitment habitat trees exist in the net harvest area to allow for the retention of enough trees to meet prescription requirements.

Prescription 1:

Habitat Tree Retention

Habitat tree retention in Dry Hardwood and Moist Hardwood forests with a xeromorphic understorey shall be four trees per hectare. For the purpose of this prescription a xeromorphic understorey is considered to be one composed predominantly of grasses, heath and/or shrubs with sclerophyllous leaves.

Habitat tree retention in Moist Hardwood forests with a mesic understorey shall be six trees per hectare. For the purpose of this prescription a mesic understorey is considered to be one composed predominantly of moist elements such as vines, shrubs with mesophyllous leaves and/or species often found in Rainforest areas.

Habitat trees will be live hollow bearing trees. They are to be well spaced throughout the compartment being harvested, consistent with requirements for adequate regeneration and growth for the species of the forest types. Where the specified density of habitat trees is not present the existing density is to be retained. Sufficient recruitment habitat trees to sustain the retained density of habitat trees into perpetuity are also to be retained. Stags shall not be counted as habitat trees.

Habitat trees shall be marked by the SFO.

All practical precautions must be taken to avoid tree heads landing adjacent to identified habitat trees. Tree heads shall be removed from within approximately 5 metres of identified habitat trees. Tree heads shall be removed with minimum disturbance to understorey vegetation and on-ground logs.

(c) Non Harvest and Modified Harvest Areas

Riparian Habitat Zones

Riparian Habitat Zones exist 20 metres either side of streams (watercourses, drainage lines and drainage depressions) with catchments greater than 40 hectares.

- except to use crossings harvesting machinery must not enter Riparian Habitat Zones.
- felling and snigging must be excluded from Riparian Habitat Zones.
- trees must not be felled into Riparian Habitat Zones.
- trees must not be damaged in Riparian Habitat Zones.

Refugia areas

No areas of critical habitat for Threatened species have been located in the net harvest area and no refugia areas have been set aside.

(d) Species and Mitigation Prescriptions

Mitigation prescriptions to be applied in Grafton Management Area have been determined for Threatened species that might be adversely impacted on by forest management activities. Those relevant to Compartments 604 and 606 are stated below. The appropriate mitigation

prescription shall be immediately applied when any of the listed species is sighted or critical habitat is located.

Prescription 2:

Preservation of Critical Weight Range species

In applying the following prescription it should be noted that the *Bush Fires Act* 1949 overrides Section 99 (1) of the *National Parks and Wildlife Act* 1974. That is, it is not an offence to undertake an activity which will take or kill any endangered fauna if that activity is authorised or required by a section 41A plan or authorised or required under the Bush Fires Act.

Given the above, the prescription should only be seen as a guide for managing the habitat of critical weight range (CWR) fauna.

Critical weight range species expected to occur in the compartments are the Rufous Bettong, Long-nosed Potoroo and Spotted-tailed Quoll

SFNSW are to ensure, to the fullest extent practicable, that any post-logging burning is to be carried out in such a manner that encroachment into critical habitat for those species listed above is prevented. This can be achieved by carrying out post-logging burning under weather and fuel conditions which minimises the chance of encroachment into critical habitat and minimises the destruction of large fallen logs (ie. those logs with a diameter greater than 40 cm).

For the purpose of this prescription critical habitat for the Spotted-tailed Quoll is defined as moist gullies, wet sclerophyll, rainforest and fallen logs with a diameter of greater than 40 cm. Critical habitat for the Rufous Bettong is defined as well grassed open forest and woodland, and large fallen logs of greater than 40 cm diameter.

Prescription 3:

Glossy Black Cockatoo

All practical attempts must be made to minimise disturbance to mature seeding forest oaks throughout the logging area. 100 metre radius buffer zone must be established around each identified nest site. This prescription is to be reviewed when more than 10 locations of the species have been recorded in the management area.

Prescription 4:

Powerful/Masked/Sooty Owls

200 metre radius buffer zone must be established around each identified nest site and 100 metre radius buffer zone must be established around each identified roost site. This prescription is to be reviewed when more than 10 locations of the species have been recorded in the management area.

Prescription 5:

Stephen's Banded Snake and Pale-headed Snake

100 metre radius buffer zone must be established around each location site. This prescription is to be reviewed when more than 10 locations of the species have been recorded in the management area.

Prescription 6:

Brush-tailed Phascogale

200 metre radius buffer zone must be established around each identified nest site. This prescription is to be reviewed when more than 10 locations of the species have been recorded in the management area.

Prescription 7:

Yellow-bellied Glider

All trees with V-notch markings shall be retained.

The tree with the most recent V-notch markings or other incisions shall be the centre tree of an area with a 100 metre radius. Within this area the following trees will be retained: a minimum of 30 trees (>10 cm dbh) of the sap feed tree species: and a minimum of 15 bark shedding trees.

Where there is more than one marked feed tree within the 100 metre radius, the additional feed trees may count as those feed trees to be retained.

Prescription 8:

Squirrel Glider

200 metre radius buffer zone must be established around each identified nest site. This prescription is to be reviewed when more than 10 locations of the species have been recorded in the management area.

Prescription 9:

Koala

If a koala is observed during logging, numerous dung pellets (more than twenty below a tree) are found, or less than twenty pellets of different sized are found, logging will be excluded from within a 100 m radius of the site and a survey undertaken.

The survey shall be undertaken according to the agreed coastal prescription for koala. Tree felling will be excluded from within fifty metres of a high use area or modified within intermediate use areas.

Prescription 10:

Long-nosed Potoroo

100 metre radius buffer zone must be established around each location site. This prescription is to be reviewed when more than 10 locations of the species have been recorded in the management area.

Prescription 11:

Golden-tipped Bat

100 metre radius buffer zone must be established around each identified roost site. This prescription is to be reviewed when more than 10 locations of the species have been recorded in the management area.

Prescription 12:

Little Bent-wing Bat/Common Bent-wing Bat

100 metre radius buffer zone must be established around each identified roost site. This prescription is to be reviewed when more than 10 locations of the species have been recorded in the management area.

References
Environmental Impact Statement Grafton Management Area.
State Forests' Response to Submissions to the Grafton Environmental Impact Statement.

4.7 Soil Erosion and Water Pollution Control Conditions

(a) Soil Erosion and Water Pollution Categories

The calculated Soil Erosion and Water Pollution Categories for Compartments 604 and 606, based on the subsoil data from site 604, are detailed in Table 4 below.

Table 4 - Water Pollution Hazard Categories

Slope Ranges (Degrees)	Water Pollution Category	Indicative % of Net Harvest Area	
		cpt 604	cpt 606
0 - ≤2	1	7	5
>2 - ≤11	2	60	49
>11 - ≤30	3	33	46
Roads	3	N/A	N/A

(b) Approved Timber Harvesting and Extraction Method

- Chainsaw felling, using directional felling techniques where required.
- Snigging of logs using a crawler tractor and/or a rubber tyred skidder.
- Debarking and loading of logs at the dump using an excavator or forklift.
- Transport of logs from the site using a jinker and prime mover.

(c) Marking and Location of Roads, Log Dumps and Crossings

The marking and location of roads, log dumps and crossings in the field must be in accordance with condition 4.2. The location of roads, drainage feature crossings and log dumps are indicated on the Operational Map.

(d) Wet Weather Controls

Harvesting operations may be conducted throughout the year subject to the application of normal wet weather closure procedures as per Section 7 of the Forest Practices Code Part 2 (Timber Harvesting in Native Forests). During wet weather, the wet weather controls for road usage and for snigging set out in section 7 of the Forest Practices Code Part 2 (Timber Harvesting in Native Forests) must apply. In particular, where:

i) runoff occurs from a road surface:

- haulage must cease on natural surface roads.

ii) there is runoff from a snig track surface:

- snig tracks must not be used.

(iii) there is a likelihood of significant rutting leading to turbid runoff from a snig track surface;

- snig tracks must not be used.

(iv) it is raining:

- operations must cease.

In any event, if:

rutting of a snig track is, or is likely to approach a maximum of 200 mm below the natural surface, measured over any 20 metre length of track, snig tracks must not be used.

There are no dumps suitable to be worked during wet weather periods.

(e) Existing Roads

Clearing of regrowth

The reopening of existing roads will involve the removal of fallen timber and small regrowth trees from the road pavement and edges. This work must be kept to the minimum required to allow use of existing roads.

Widening of corner

There is a bend in Hare Road just to the west of where it crosses the boundary between the two compartments. This will need to be widened slightly. This work must be kept to minimum required to allow logging trucks to get around the bend, and must not intrude on the 20 m Riparian Habitat Zone.

Road surface drainage

Rollover crossbanks may be required on some sections of the minor roads to log dumps where outfall drainage has not been established. Where required rollover crossbanks will be spaced as stated in Tables below. The banks must have a minimum design consolidated vertical height from spillway to bank top of 20 cm. Such banks will convey the peak flow of a 1 in 5 year storm event.

Spacing of Rollover Crossbank Drainage

Road Grade (degrees)	Max spacing
0 - ≤5	100m
>5 - ≤10	60m
>10 - ≤15	40m
>15 - ≤20	25m
>20 - ≤25	20m
>25	15m

Rollover crossbanks must drain onto undisturbed vegetation or logging slash. Where it is necessary to convey runoff water over a fill batter greater than 1 m high, that has been disturbed by the operation or on which the soil is exposed, drop down structures constructed of rock or prefabricated fluming must be installed. Dissipaters must be installed at the bottom of drop down structures.

Crossing of drainage features

The drainage lines in the compartments are intermittent, in fact rarely run water, and were dry at the time of recent inspections.

Glens Creek Road crosses a number of drainage lines. Concrete causeways have been constructed at these sites. The harvesting will not affect these causeways.

The two drainage feature crossings on the old road running north-west from Dump 13 must not be used.

The old log crossing on Hare Road north of Dump 1 will be used. This must be improved by the removal of the two outside logs, and placement of a log on the bottom side of the crossing. The removed logs and any associated spoil must be deposited outside the Riparian Habitat Zone. Any disturbed areas adjacent to the crossing must be seeded with rye grass by the SFO at the rate of 20 kg/ha. This work must be done before operations commence if weather conditions are suitable.

Revegetation and rehabilitation

Drainage on existing roads must be improved on those sections where minor rilling is occurring.

Revegetation of the minor roads following harvesting will be through natural regeneration. With the exception of Jasper Road, the minor roads in the compartments must be bedded down, all rollover drains converted to crossbanks, and crossfall (outfall) drainage reinstated. Where a minor road, or the first section of the road, is drained by outfall drainage only, a crossbank must be constructed at the entrance to prevent vehicular traffic using the road.

On Jasper Road, all crossbank rollover drains must be left in working condition and crossfall (outfall) drainage reinstated.

Road surfaces, batters and drainage features must be left in a stable condition.

Dispersible soils

The soils in compartments 604 and 606 are not significantly dispersible.

(f) Road Construction

Short sections of minor roads between log dumps 8 and 10 and 4 and 10 (along Pademelon and Jasper Roads) in compartment 604 will be constructed during the operation. No road construction is required for the harvesting in compartment 606.

Design

The minor roads to be constructed are approximately 1 km in length and the running surface must be no wider than 4 m. Drainage must be outfall drainage and must be constructed before the operations commence.

Grade

The roads must be constructed with a maximum grade of 10^0.

Survey

The centre lines of the roads have been surveyed to grade line standard and marked in the field. Clearing and earthworks must not deviate from the marked lines.

Clearing

The clearing widths for construction of the road must not exceed 6 metres

Batters

Batters must be laid back at a 1:1 ratio for this operation, and be no more than 1.5 m deep. The maximum length of cut batter must be 550 m.

Crossing of drainage features

No drainage features will be crossed.

(g) Slope limits for the area

Maximum slope for ground based harvesting	30 degrees
Maximum grade of snig tracks	25 degrees
Maximum side slope for snig track construction	27 degrees
Maximum road grade permitted	10 degrees
Maximum side slope for road construction	30 degrees without design.

There are no mappable areas in the compartments with slopes over 30°. The SFO is responsible for identifying slopes over 30° in the field.

(h) Drainage Feature Protection

Riparian Habitat Zones exist 20 metres either side of watercourses, drainage lines and drainage depressions with catchments greater than 40 hectares. These zones have the same harvesting exclusion specifications as wildlife corridors.

Filter strips and protection strips must be retained along all watercourses and drainage lines within the net harvest area of Compartments 604 and 606 at minimum widths (measured in the horizontal plane) as stated in Table 5 below. These minimum widths meet or exceed the requirements of the Pollution Control Licence.

Where a filter strip or protection strip extends beyond the boundary of the catchment of the drainage feature that is the subject of the protection, then the filter strip or protection strip may be terminated at the catchment boundary.

In addition buffer strips 5 metres wide must be maintained on either side of drainage depressions.

Table 5 - Filter Strip and Protection Strip Widths
(distance each side of stream)

Water Pollution Category	CATCHMENT /SLOPE	Riparian Zone	Filter Strip	Protection Strip
1	<40 ha		5m	
1	>40 ha	20m		
2	<40 ha <18° slope		10m	
2 N/A	<40 ha >18°slope		10m	10m
2	>40 ha	20m		
3	<40 ha <18° slope		10m	10m
3	<40 ha >18° slope		15m	10m
3	>40 ha <18° slope	20m		5m
3	>40 ha >18° slope	20m		10m

(i) Tree Marking Rules for Filter Strips, Protection Strips and Buffer Strips

The SFO must mark the protection strips (or filter strips or Riparian Habitat Zones if there are no protection strips) in the compartment progressively ahead of harvesting operations. The distance in metres to the filter strip or Riparian Habitat Zone must be indicated on marked protection strip trees.

The contractor or operator is responsible for measuring off-sets to a filter strip or Riparian Habitat Zone from a protection strip as indicated by the SFO to determine the boundary of the filter strip Riparian Habitat Zone adjacent to the protection strip. (See also 4.2, 5.2)

Contractors and operators are responsible for identifying drainage depression buffer strips encountered in the field and taking appropriate action whilst operating within the buffer strip or crossing the drainage depression. (See also 5.2)

(j) Felling and Extraction from Filter Strips and Protection Strips

OPERATIONS WITHIN NATIVE FOREST FILTER STRIPS

Trees located in a filter strip must not be felled, except for the purposes of constructing an approved road, extraction or snig track crossing.

Trees must not be felled into filter strips.

Crowns, logs and substantial debris accidentally felled into filter strips must be removed with minimal disturbance to the groundcover and soil in the filter strip. any disturbance caused must be remedied by reshaping and replacement of cover, so that concentrated water flow does not occur.

Machinery must not enter a filter strip except for the construction and use of road, extraction track or snig track crossings.

OPERATIONS WITHIN NATIVE FOREST PROTECTION STRIPS

Trees located in protection strips may be felled, but only if they can be directed out of the strip.

Where trees are felled out of protection strips in accordance with the previous condition above, State Forests must ensure that:

(a) a minimum of 50 per cent canopy cover is retained within the protection strip; and

(b) the retained canopy is evenly spread throughout the strip. Gaps and clusters of trees must not be created within the protection strip; and

(c) the tree is extracted from the strip in the direction of the line of the log;

(d) any furrows resulting from log removal are diverted at the edge of the protection strip, so that concentrated water flow is diverted onto undisturbed areas or onto surfaces capable of handling concentrated flow.

Crowns of trees may be felled into protection strips

Where crowns of trees are felled into protection strips in accordance with the previous condition above, State Forests must ensure that;

(a) logs are extracted from the protection strip in the direction of the line of the log; and

(b) any furrows resulting from tree removal are diverted at the edge of the protection strip, so that concentrated flow is diverted onto an undisturbed area or onto surfaces capable of handling concentrated flow.

Machinery must not enter a protection strip except for the construction and use of road, extraction track or snig track crossings.

(k) Extraction from Drainage Depression Buffer Strips

Machinery must not operate in buffer strips when the soil is saturated.

Soil exposure must be minimised and channelised flow must be prevented by use of the following techniques:

- no snigging along drainage depressions
- operating with the blade up at all times
- preventing skewing of machinery tracks (by approaching logs in reverse gear, and minimal changes in direction while snigging logs out of the buffer strip).

No earthworks can be undertaken within buffer strips except for the construction of road, extraction tracks or snig track crossings.

(l) Snig Tracks

Wherever practicable, walkover extraction techniques must be used in preference to snig track construction.

Wherever practicable, snig tracks must be located slightly off ridge-top to ensure free crossfall drainage. Side cut tracks must have crossfall drainage.

The grades of snig tracks must not exceed 25°.

Snig track construction is not permitted in areas with slopes above 27°.

Snigging along roads must only occur in order to avoid snig track construction and where approved by the SFO. Effective road drainage must be re-instated by the contractor/operator immediately at the completion of the snigging operation.

Snig tracks must be drained to minimise the flow of water along them and the flow of water directly into watercourses, drainage lines or onto roads and dumps. Drainage must be effected within 2 days of the completion of use, or where operations are to be temporarily suspended in accordance with Table 6.

Table 6 - Drainage of Snig Tracks at Temporary Cessation of Operations

Slope boundaries	WP Category	No. Days
0 - ≤2	1	10
>2 - ≤11	2	8
>11 - ≤30	3	5

Where earth banks are required they must be constructed to a minimum unconsolidated effective height of 35 cm, with spacing in accordance with Table 7.

Table 7 - Maximum Earth Bank Spacing

Track Grade (degrees)	WPH Category		
	1 (0° - ≤2°)	2 (>2° - ≤11°)	3 (>11° - ≤30°)
0 - ≤5	200 m	150m	
>5 - ≤10		100m	
>10 - ≤15		60m	40m
>15 - ≤20			25m
>20 - ≤25			20m
>25			15m

The above spacings are the maximums and should be varied to utilise the most suitable outlet point. Crossbanks must be discharged into undisturbed vegetation or logging debris.

(m) Downhill Snigging

Limited downhill snigging will be required to dumps 1, 2, 3, 5, 6, 7, 8, 9, and 11 in compartment 604, and dumps 2, 4, 5, 6 and 7 in compartment 606.

The following techniques must be used where downhill snigging is used:

- Crossfall drainage must be used where practicable.
- Where practicable the snigging pattern must be uphill from the stump with the logs being bunched for the downhill portion of the snig onto a centrally located extraction track(s).
- Where possible, tracks must enter the log dump from the side or below. Where this is not possible, a crossbank must be in place immediately before a snig track enters the log dump at the end of each day's operation.

(n) Snig Track Drainage Line Crossings

The drainage lines in the compartments only flow intermittently and were dry at the time of recent inspections.

All snig track watercourse and drainage line crossings must be approved by the SFO before construction and must be open causeways utilising the natural surface at the site. Crossings must be rehabilitated after use, and any harvesting debris inadvertently deposited during use must be removed from the channel. As far as practicable the crossing point must be reshaped to its original condition and seeded with rye grass by the SFO at the rate of 20 Kg/ha.

(o) Dispersible Soils

The soils in the compartments are not significantly dispersible.

(p) Log Dumps

Field location of log dumps must utilise the most level site available, consistent with the location marked in the field and indicated on the Operational Map.

Before use, only about 10cm topsoil must be stripped and stockpiled for subsequent respreading at the completion of operations.

Dumps must be constructed with outfall drainage and must be kept drained during use and at the completion of operations. Runoff must be dispersed onto stable surfaces, and not discharged directly onto watercourses or drainage lines or onto snig tracks.

At the completion of operations any debris at or near the edge of a dump must be moved away from standing vegetation into the dump area. The topsoil must be respread uniformly over at least 70% of the dump area to a depth of at least 5 cm. The dump must be left in a neat and stable condition.

(q) Prescribed Burning

Pre-logging burning

There is no pre-logging burning associated with the harvesting of Compartments 604 and 606.

Post-logging burning

Post-logging burning of Compartments 604 and 606 must be carried out in accordance with provisions and specifications of the Nymboida District Fire Plan and the Grafton District Fuel Management Plan.

Objectives

Post-logging burning objectives for the compartment are:

- to meet State Forests' obligations under the Bush Fires Act.
- to decrease fine fuel loads and logging debris under prescribed conditions to decrease the intensity of any wildfire that might occur in the compartment and hence, decrease associated damage to regeneration and retained stems.
- to reduce the possibility of wildfire burning through the compartment and entering and damaging adjacent forests and private property areas.
- to simplify and increase the efficiency and the safety of any wildfire control activity.
- to promote good seedbed conditions for regeneration.

Ignition

Post-logging burning must be undertaken under conditions that will prevent fire travelling onto slopes over 30^0.

The Grafton District Operations Foreman is responsible for ignition, subject to the requirements of the Grafton District Fuel Management Plan.

Preferred season to burn

February to August.

4.8 Research and Inventory Plots

Assessment plot 216 is located in the north-eastern corner of compartment 604 as indicated on the Operational Map.

Permanent Growth Plot CCG334 is located near the north-eastern boundary in compartment 606.

Neither of these plots need to be measured prior to harvesting. The contractor or operator must advise the SFO when the plots are to be harvested, and the SFO must be present during harvesting to record products removed and damage to retained stems.

4.9 Modified Harvest Conditions

(a) Riparian Habitat Zones

Riparian Habitat Zones, 20 metres either side of the stream, exist on all watercourses, drainage lines and drainage depressions with catchments greater than 40 hectares.

- except to use crossings harvesting machinery must not enter Riparian Habitat Zones.
- felling and snigging must be excluded from Riparian Habitat Zones.
- trees must not be felled into Riparian Habitat Zones.
- trees must not be damaged in Riparian Habitat Zones.

(b) Other (eg boundary fences)

Private Property joins part of the north-east boundary of compartment 604 and the western boundary of compartment 606. These boundaries are fenced. Damage to these fences must be avoided. Any damage caused must be immediately repaired.

(c) Underground Telephone Cable

An underground telephone cable runs near to and west of Glens Creek Road. This cable must not be disturbed.

4.10 Specification of Type of Products to be Removed.

Compulsory Sawlogs	See **Grafton/Coffs Harbour Compulsory Sawlog Specification Hardwood Sawlog Flat Rate Royalty Utilisation Standards.**
Salvage Sawlogs	See **Grafton/Coffs Harbour Compulsory Sawlog Specification Hardwood Sawlog Flat Rate Royalty Utilisation Standards.**

Poles See **Australian Standard AS2209 - 1979 (poles)**

Veneer Logs See **Specification for Eucalypt Veneer Logs for Rotary Peeling.**

Yield Information for Compartments 604 and 606

Estimated Yields are:

	Cpt 604	Cpt 606
Compulsory Sawlogs 40 cm +	500 m^3	250 m^3
Compulsory Sawlogs <40 cm	400 m^3	200 m^3
Salvage Sawlogs	200 m^3	100 m^3
Poles	100 m^3	50 m^3
Veneer Logs	100 m^3	50 m^3

Part 5 CONDITIONS FOR SUPERVISING FOREST OFFICERS (SFOs)

Condition 5.1 SFO Authority to Supervise Harvesting Operations

(a) General

The Supervising Forest Officer responsible for the direct field supervision of this harvesting operation, including tree-marking, log measuring and/or log check measurement, safety, implementation of wet weather controls, and monitoring and reporting generally is:

The appointed Hardwood Marketing Foreman, Grafton District.

(b) Relieving SFOs

Relieving SFOs , if required are:

The Forest Assistant, Marketing, Grafton District.

The Marketing Forester, Grafton District.

(c) SFOs Authority

The SFO has the authority to approve:

- the blading off of natural surface roads provided that damage will be minimal and the removed material is recoverable for respreading.
- downhill snigging routes where provided for in the Harvest Plan.
- use of natural surface roads for snig track crossings or as snig tracks to dumps provided restoration of the road for wheeled traffic is undertaken as necessary and use of the road significantly reduces soil disturbance.
- the exact location and type of drainage line crossing for snig tracks - for this plan area all crossings must be open causeways.

All approvals must be noted on the harvesting plan.

Condition 5.2 Tree Marking and Other Harvesting Control Requirements

(a) Tree Marking for Forest Management and Silviculture

The Northern Region Tree Marking Code will apply to the harvesting operation. All trees to be removed must be marked for extraction. (Also see Part 4.2)

Habitat trees and habitat recruitment trees for fauna protection

Habitat trees and habitat recruitment trees must be marked for retention by the SFO according to Prescription 1 in Part 4.6 (b).

Non-harvest areas and modified harvest areas

The boundaries of Riparian Habitat Zones and Filter Strip Protection/Protection Strip Zones must be marked ahead of harvesting operations.

(b) Soil Erosion and Water Pollution Control

Marking of filter strips and protection strips

Riparian Habitat Zone prescriptions are equivalent to or greater than filter/protection strips and drainage line buffer strip requirements. There is no need for filter/protection strips and drainage line buffer strips where they would be embedded in Riparian Habitat Zones. Hence filter/protection strips must only be marked in the field where they are not embedded in Riparian Habitat Zones.

All drainage features must be inspected by the SFO during the harvesting operation in conjunction with tree marking and protected in accordance with the Pollution Control Licence. Where practicable, any variation between the actual drainage feature found in the field and that shown on the harvest plan Operational Map should be marked on the SFO's copy of the map for future reference.

Filter strips, protection strips and drainage line buffer strips must be retained along all drainage features at the minimum widths as specified in Table 5 in Part 4.7 (i).

The SFO is responsible for marking protection strips (or filter strips or Riparian Habitat Zones if there are no protection strips) in the field progressively and prior to the commencement of operations in each section of the harvest area. Marked trees delineating edges of protection strips must have indicated on them the distance, in metres, to the edge of the filter strip or Riparian Habitat Zone.

The SFO is responsible for ensuring that the contractor or operator is correctly measuring off-sets to a filter strip (See also Part 4.7 (j)).

Drainage depression buffer strips

The SFO is responsible for ensuring that contractors and operators are detecting drainage depressions in the field and taking appropriate protective precautions within the buffer strip area whilst operating in the buffer strip or crossing the drainage depression. (See also Part 4.7 (k)).

Slopes over 30^0

There are no mappable areas with slopes over 30^0. The SFO is responsible for identifying slopes over 30^0 in the field.

Condition 5.3 Monitoring and Reporting

(a) Daily and Fortnightly Reporting

The standard District procedures for daily and fortnightly reporting on the conduct of operations must be followed.

(b) Fauna Reporting and Mitigation Prescriptions

Sightings of any Threatened fauna must be reported to the District Marketing Forester within 24 hours of the sighting being made, as required in Part 4.6 (a). For any of the animal species listed in Part 4.6 (d) the stated mitigation prescriptions shall be immediately applied.

(c) Soil Erosion and Water Pollution Control Conditions

The SFO must report the following matters and record their location if necessary on the SFO's copy of the Harvesting Plan Operational Map, or the recording map attached to the Plan for that purpose:

- any accidental felling into filter strips and remedial action taken.
- any approval to leave soil from road and track construction in drainage lines or watercourses where attempts at removal would have resulted in excessive damage.
- any approval to defer stabilisation works at a drainage feature crossing beyond five days.
- any approval to leave a snig track drainage feature crossing structure in place and the reason for it to be left in place.
- any instances where effective cross bank drainage of a snig track is not effected within two days of completion of snigging from the area served by the track.

(d) Sowing of Crossings

The SFO must ensure that crossing approaches are seeded in accordance with Part 4.7 (e).

(e) Dispersible Soils Exposed During Road/Snig Track Construction

Not applicable - the soils in the compartments are not significantly dispersible.

(f) Post Harvest Rehabilitation

Supervision by the SFO and fortnightly check sheets must assess that road surfaces, batters and drainage structures are stable at the completion of operations and prior to the shifting of the contractor.

Condition 5.4 Pre- and Post-logging Burning

(a) Pre-logging Burning

There will be no pre-logging burning associated with the harvesting of Compartments 604 and 606.

(b) Post-logging Burning

Post-logging burning of Compartments 604 and 606 will be carried out in accordance with provisions and specifications of the Nymboida District Fire Plan and the Grafton District Fuel Management Plan.

Ignition

Post-logging burning must be undertaken under conditions that will prevent fire travelling onto slopes over 30°.

The Grafton District Operations Foreman will be responsible for ignition, subject to the requirements of the Grafton District Fuel Management Plan.

Condition 5.5 Other Instructions

The required measuring of assessment plot 216 in compartment 604 and the permanent growth plot 334 in compartment 606 shall be carried out during the harvesting operation in accordance with Part 4.8.

The location of the underground telephone cable near to and west of Glens Creek Road, near compartment 604 must be made known to the contractor.

Condition 5.6 Supervising Forest Officer's Acknowledgment

I acknowledge that I have received a copy of Harvesting Plan No GG 96/05/604 and that I have been briefed on the conditions of the Plan and understand the supervision and operational control requirements as explained to me by the District Marketing Forester.

Signature: ..... Date: .....

Position: .....

Supervising Forest Officer

Signature: ..... Date: .....

Position: .....

Relieving Supervising Forest Officer

ATTACHMENTS
CLEARANCE CERTIFICATE

HARVESTING PLAN No. ..... Compartment:.....

.....STATE FOREST.....DISTRICT

To M.....Supervising Forest Officer

I request approval for me to move my logging crew and all associated machinery from the above mentioned area to the next Compartment in accordance with Section 3.5 of the Code of Logging Practice.

I certify that:

(a) all permanent roads, trails and mitre drains have been cleared of harvesting debris;
(b) butt damage to retained trees has been kept to acceptable limits;
(c) all trees marked for removal have been felled;
(d) utilisation limits have been satisfactorily met;
(e) stump heights conform to requirements;
(f) all hanging trees have been felled and brought down;
(g) all log dump sites have been satisfactorily restored as required;
(h) harvesting debris is not accumulated around retained trees;
(I) all accumulated litter has been disposed of properly;
(j) all filter, protection and buffer strip requirements have been complied with;
(k) all snig track, extraction track and temporary logging road drainage has been installed satisfactorily and other required rehabilitation work has been completed;
(l) all necessary repairs to damaged roads, signs, fences and other structures have been carried out.

I believe that I have met all my obligations under the conditions of the Timber Licence, the Pollution Control Licence, and/or any licence issued under Section 120 of the National Parks and Wildlife Act, which apply to the Compartment just completed, as stated in this Harvesting Plan.

Signature.....Licence No.....Date .....
Contractor/licensee

As a result of inspections of the logging operations made in accordance with this Harvesting Plan, I am satisfied that, to the best of my knowledge, the licensee/contractor responsible for this harvesting operation has satisfactorily completed all work and approval is given for her/him to remove her/his machinery and equipment and leave the area/commence operations in another Compartment. (Compartment .....).

This clearance does not release the licensee/contractor from any obligation to undertake any remedial work if subsequent deficiencies are shown to result from inadequate practices during the harvesting operation, which are found during any inspections of the area made within 12 months of the date of this post-harvesting inspection.

Last inspection was made on .....(Date)

Signed: .....(Date).....
Supervising Forest Officer

Notes

Appendix 1: Erosion Hazard Assessment - Soil Type "C" Metasediment Formation

(a) Soil Erosion Hazard Classes

Soil Erosion Hazard Ratings (SEHR) have been assessed using SOILOSS High. The rating has then been used to assess Soil Erosion Hazard (SEH) classes for the net harvest area.

SEHR = R x K x LS x C x P where

R = 2900 Derived from $R = 89.31 \times {}^{2}I_{12}{}^{1.74}$

K = 0.059 subsoil (B Horizon; site 604)

Derived from Laboratory Analysis of the B Horizon

B Horizon has been adopted as it gives lower slopes for the erosion classes.

S As factored in SOILOSS High

L = 10 metres

C = 0.45

Derived from 0.45 SEMGL standard

P = 1.0

Slope Ranges (Degrees)	Erosion Hazard Class	Where SEHR is	Indicative % of Net Harvest Area	
			604	606
<=4	Low	less than 40	15	10
4> to <=18	Moderate	40 - 400	80	85
18> to <=27	High	400 - 800	5	5
>27 to <=30	Extreme	greater than 800	<1	N/A

(b) Special Conditions

No special conditions, other than the following, are required as the conditions for use with Harvesting Plans, Schedule 4, of the EPA Pollution Control Licence (PCL) for 1995/96, are adequate to address the erosion and pollution risk.

(a) In areas of high erosion hazard, the grades of snig tracks and extraction tracks must not exceed 25°.

(b) In areas of extreme erosion hazard, snigging and extraction of timber is not permitted if snig track construction is required.

(Conditions derived above are to be inserted into the Harvest Plan at Condition 4.7 Soil Erosion and Water Pollution Control, (d) Wet Weather Controls - Seasonal Operations and Safeguards and (l) Extraction Tracks and Snig Tracks, when necessary.)

Preparation (by Forester, Forest Assistant)

Prepared by LEONIE WALSH Signature .....

Title MARKETING FORESTER Date 3/6/96

District Approval (by District Forester)

Signature .....

District Forester

Date 4th June 1996

POLLUTION CONTROL LICENCE CONDITIONS CHECKLIST

PLAN PREPARATION - PCL Sch 2, Div 3

Condition Number	Condition Title/Enquiry	Entry Needed?	Plan Ref.
C18	Representative water monitoring site	Yes	2.5 12 (f)
	Have Water Pollution Categories and proportion of Dispersible soil been calculated for the area?	Yes	2.5 13(a) 2.5 12(d)
	Method of soil sampling for K factor	Yes	2.5 12(d)
	Field sampling - sites? - lab analysis? - field analysis?	Yes Yes Yes	2.5 12(d)
1b)	Site specific conditions	No	
4	Are areas >30° within the net harvest area	No	2.5 12(e) Map
5	Are areas of WPC 4 within the net harvest area	No	2.5 13(a)
6	Drainage feature protection, prescribe stream	Yes	4.7 (h) Map
7	Any major water storage?	No	2.5 12(f)
8	Drainage depression buffer strips conditions	Yes	4.7 (h)
9.1 (c)	Filter strips on map?	Yes	Map
9.2	Protection strips on map?	Yes	Map
10	Prescriptions for marking/identifying in the field -filter strips -protection strips -buffer strips	 Yes Yes Yes	 5.2 (b) 5.2 (b) 5.2 (b)
13	Reporting accidental felling into filter strips	Yes	5.3 (c)
14, 20, 22	See 10		
24	Specify techniques in buffer strips	Yes	4.7 (k)
47	Stabilisation of roads within 12 months	Yes	2.5 12(h)
48	Are roads shown on map	Yes	Map
49	Road traverses area over 30°	No	2.5 12(h)
50 (a), (b)	Maximum road grade 10°	Yes	4.7 (f)
51	Marking of roads in field	Yes	4.7 (f)
52	Minimising road clearing widths	Yes	4.7 (f)

POLLUTION CONTROL LICENCE CONDITIONS CHECKLIST

PLAN PREPARATION - PCL Sch 2, Div 3

Condition Number	Condition Title/Enquiry	Entry Needed?	Plan Ref.
53	Road side clearing	No	2.5 12(h)
57	Borrow or gravel pits	No	2.5 12(h)
60	Batter stabilisation measures	Yes	4.7 (f)
63	Road drainage techniques	Yes	4.7 (e)
64	Road drainage spacing	Yes	4.7 (e)
65	Roadside windrows	No	
66	Removal of harvesting debris from structures	Yes	4.4 (c)
67	Blading-off of roads	Yes	5.1 (c)
71	Location of drainage feature crossings	Yes	4.7 (f)
74	Condition to cover non-removal of spoil from drainage features	Yes	5.3 (c)
76	Condition to cover non-completion of crossing stabilisation within 5 days - roads	Yes	5.3 (c)
77	Techniques to leave crossing sites stable	Yes	4.7 (f)
78	Techniques for stabilisation of roads that are no longer required	Yes	4.7 (e)
79	Evaluation of old roads	Yes	2.5 12(h)
80	Road construction in dispersible soils	Yes	4.7 (f)
81	Protection techniques for roads traversing dispersible soils	Yes	4.7 (f)
82	Wet weather restrictions for roads	Yes	4.3 (b)
83	Condition to cover non-completion of crossing stabilisation within 5 days - snig tracks	Yes	5.3 (c)
84	Techniques to leave crossing sites stable	Yes	4.7 (e)
85	Condition to cover non-removal of temporary crossing structures	Yes	5.3 (c)

POLLUTION CONTROL LICENCE CONDITIONS CHECKLIST

PLAN PREPARATION - PCL Sch 2, Div 3

Condition Number	Condition Title/Enquiry	Entry Needed?	Plan Ref.
86	Crossing of drainage features other than drainage depressions by snig tracks	Yes	4.7 (n) 5.1 (c)
	Specification of snig track crossing locations, types and capacity	Yes	4.7 (n)
	Condition for SFO approvals for crossings	Yes	5.1 (c)
	Conditions for non-removal of soil from drainage features	Yes	5.3 (c)
89	Location and effective drainage of snig tracks	Yes	4.7 (l)
92	Condition for snigging along roads	Yes	4.7 (l)
93	Conditions for wet weather restrictions for use of snig tracks	Yes	4.3 (c)
99	Specifications for drainage of snig tracks include:		
	-capacity for peak flow in a 1:2 year storm event	Yes	4.7 (l)
	-diversion into stable surfaces	Yes	4.7 (l)
	-minimise unchecked flow into drainage features	Yes	4.7 (l)
	-divert water at minimum damage to structure	Yes	4.7 (l)
103	Minimum specification for bank height	Yes	4.7 (l)
105	Condition for non-drainage of snig tracks 2 days after use has ceased	Yes	5.3 (c)
107	Condition for drainage at temporary cessation of use	Yes	4.7 (l)
109	Specifications for preventing concentrated water flow where downhill snigging is specified	Yes	4.7 (m)
112	Protection techniques for snig tracks on dispersible soils	Yes	4.7 (o)
119	Specifications for log dump location and drainage	Yes	4.7 (p)
120	Use of traxcavators and wheeled loaders in relation to wet weather	No	
125	Post-logging burning conditions	Yes	4.7 (q)
	Other conditions listed in Sch 2 Div 3 that need to be included as alert conditions in this plan	None	
	Are any appendices required	Yes	app

HARVESTING PROTOCOL

District: Grafton
State Forest: Grange

Management Area: Grafton
Compartments: 604 and 606

API

Interpreter: Peter Fisher

Date completed: 13/10/95

Results summary

Candidate OGF	Net Loggable Area
Polygons >25 ha	No
Contiguous areas >25 ha	No

Mapping required? No

Photo overlay signed and store with HP? No

Comments:
The net loggable area of cpts 604 and 606 contain no contiguous forest areas greater than 25 ha which contain <10% CCP of regrowth forest.

Prepared by

Leonie Walsh
Marketing Forester
Date: 3/6/96

District Approval

District Forester
Date: 4th June 1996.

LAND & WATER CONSERVATION

TO: Bob Williams

FROM: Kel Christiansen

DATE: 29/2/96

SUBJECT: Rollover Crossbank Design

Bob,

I have done some design calculations to determine whether it is valid to use 0.2m as a minimum height for rollover crossbanks at Grafton.

The calculations consist of two components. The first is determination of peak discharge. This has been done using the Kinematic Wave Equation (AR&R, Urban Stormwater Drainage, page 300). A Roughness Coefficient, n, of 0.0275 has been used in this equation. Catchment Areas, (A), are taken as being Road Length x Road Width (5m assumed) and catchment discharge calculated from Q=C.I.A/360 where a Runoff Coefficient, C, of 0.85 (ie 85% runoff) has been adopted. I have attached a printout of these calculations for a variety of bank spacings and road grades. A worst case scenario is assumed i.e. 180m bank spacing on a 15° grade road. The result is a peak discharge of 0.036 cubic metres/second (5 year recurrence interval).

The second component of the bank design is calculation of bank dimensions. This has been done using the Design Manual for Soil Conservation Works, Soil Conservation Service Technical Manual No. 5 (Section 2.5, Bank Design). The design was based on a trapezoidal channel shape. The following bank dimensions were used in the calculations.

Flow Rate (Peak Discharge) = 0.036 cubic metres/second
Bottom Width (B) = 0.5m
Batter Grade (Z) = 3:1
Roughness Coefficient (n) for the channel = 0.0275
Channel Slope = 1%
Velocity = 0.6m/second

The calculations result in a depth of flow of 0.08m. Accordingly, it is considered that a bank height of 0.2 metres is sufficient to convey a 1 in 5 year flow. The extra 0.12 m of bank height is required to provide freeboard and to allow for bank settlement. Note that 0.2m relates to

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compacted bank height. Flatter batters or increased bottom width will decrease depth of flow.

The above figures have been derived for Grafton. Other calculations may need to be done for higher rainfall areas, e.g. closer to Dorrigo, however the differences would not be expected to be significant.

I hope this information is of use to you. Don't hesitate to contact me if you have any further queries.

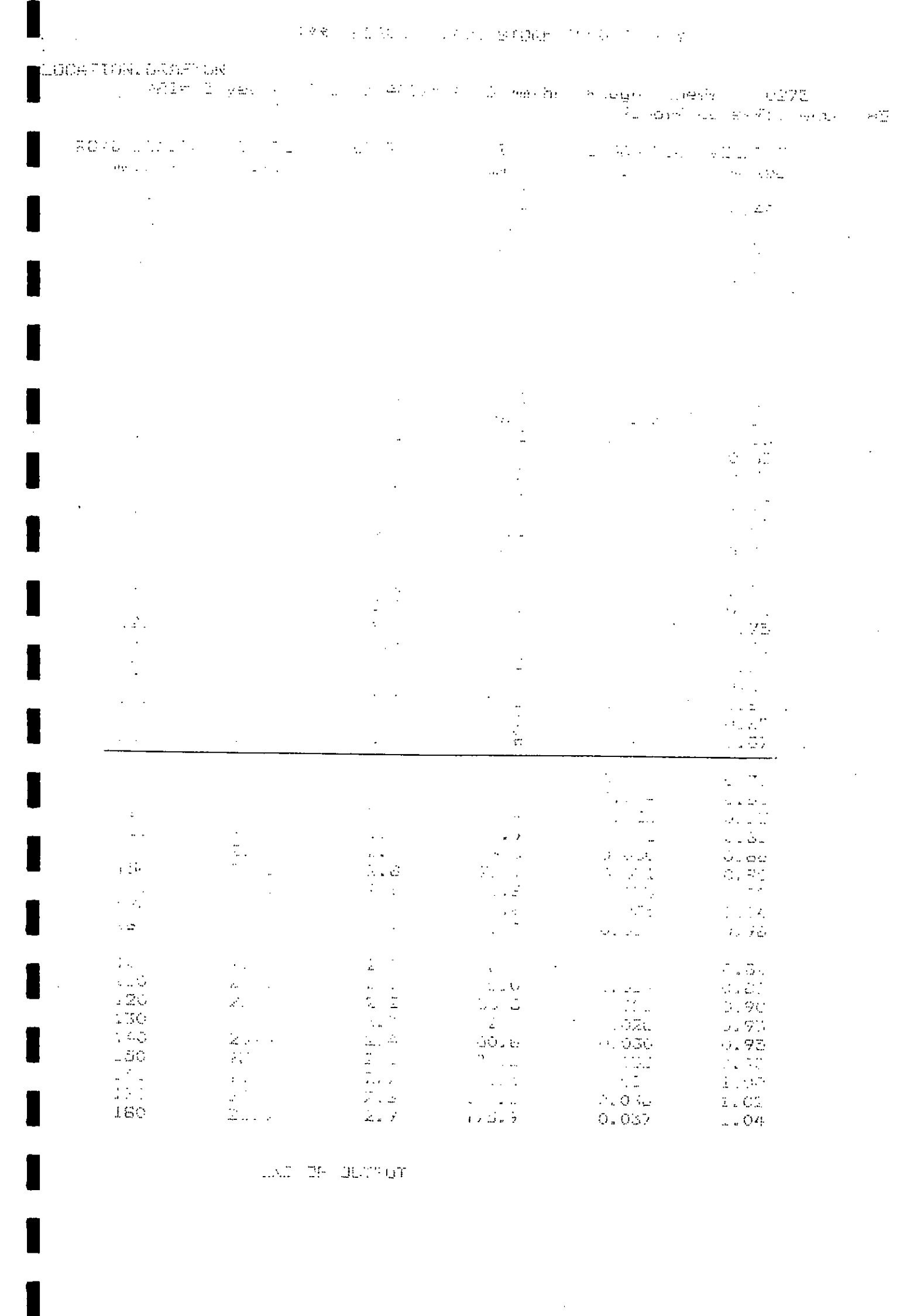
Regards,

K. P. Christiansen

Kel Christiansen

10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20	[illegible]	0.7	[illegible]	[illegible]	[illegible]
30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
40	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
50	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
60	[illegible]	[illegible]	193.6	[illegible]	0.71
70	[illegible]	[illegible]	[illegible]	[illegible]	0.75
80	25.0	1.7	190.1	0.018	0.79
90	25.0	1.8	188.4	0.020	0.82
100	[illegible]	2.0	186.8	0.022	0.85

END OF OUTPUT

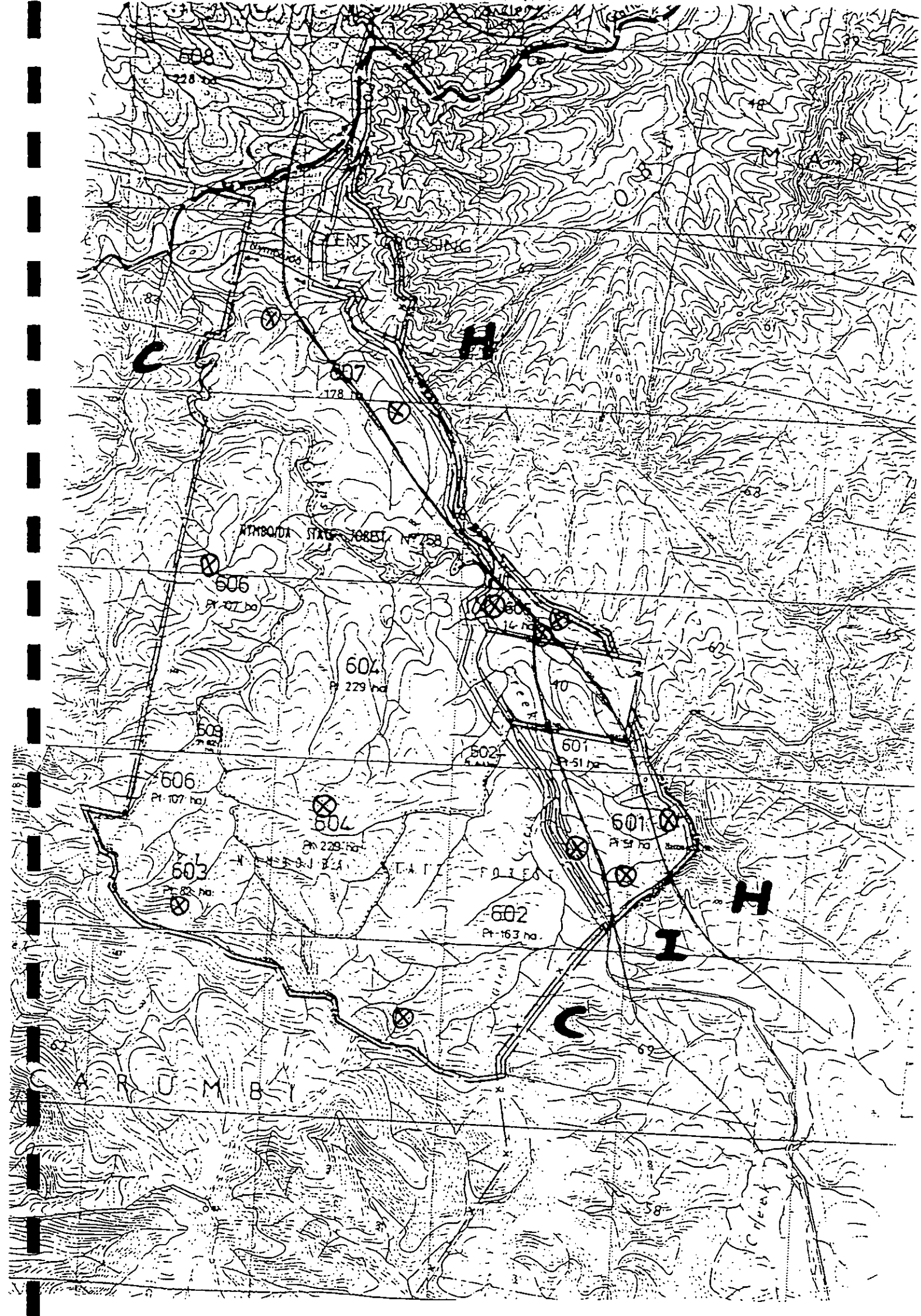


Sample	Sample Type	Depth (cm)	Particle Size Analysis (%) clay	silt	fine sand	coarse sand	gravel	D%	Texture+	Structure*	Permeability*	'K'#	% dispers- i. soil D% x clay%
601/H/A	Topsoil	0- 5	7 (8)	14(16)	40(44)	29(32)	10	29	SCL	2	3	0.026	2.03
601/H/B	Subsoil	25-35	10(13)	12(16)	26(35)	27(36)	25	65	SC	3	5	0.048	6.50
601/I/A	Topsoil	0- 5	4 (6)	12(18)	26(40)	23(36)	35	21	SCL	2	3	0.028	0.84
601/I/B	Subsoil	25-35	5(17)	5(17)	10(35)	9(31)	71	57	SCL	2	3	0.043	2.85
601/C/A	Topsoil	0- 5	(9)	(30)	(55)	(6)	-	30	FSCL	2	3	0.015	2.70
601/C/B	Subsoil	45-55	32(35)	18(20)	35(38)	6 (7)	9	58	LMC	3	5	0.036	18.56
602/A	Topsoil	0-10	5 (8)	10(15)	40(60)	11(17)	34	25	SCL	2	3	0.016	1.25
602/B	Subsoil	20-30	12(13)	18(20)	38(42)	22(25)	10	50	SCL	3	4	0.045	6.00
603/A	Topsoil	0-10	7 (8)	13(14)	58(62)	15(16)	7	25	L,fsy	2	2	0.009	1.75
603/B	Subsoil	25-35	10(14)	10(14)	39(53)	14(19)	27	29	SCL	3	3	0.046	2.90
604/A	Topsoil	0-10	5 (8)	14(21)	44(67)	3 (4)	34	29	L,fsy	2	2	0.015	1.45
604/B	Subsoil	20-25	8(11)	24(34)	34(49)	4 (6)	30	50	SCL	2	3	0.059	4.00
605/C/A	Topsoil	0- 5	11(16)	18(26)	26(39)	13(19)	32	30	CL	2	3	0.014	3.30
605/C/B	Subsoil	35-45	30(34)	30(34)	21(23)	8 (9)	11	48	LC	1	4	0.027	14.40
605/H/A	Topsoil	0-10	4 (8)	14(28)	15(30)	17(34)	50	32	SCL	1	2	0.027	1.28
605/H/B	Subsoil	15-30	8(13)	21(34)	12(20)	20(33)	39	46	SC	1	4	0.044	3.68
605/I/A	Topsoil	0- 5	3 (5)	9(15)	26(43)	22(37)	40	38	SCL	2	3	0.031	1.14
605/I/B	Subsoil	40-50	14(31)	7(15)	12(26)	13(28)	54	38	LC	1	4	0.026	5.32
606/A	Topsoil	0-10	10(12)	27(32)	26(31)	21(25)	16	23	L,fsy	1	1	0.001	2.30
606/B	Subsoil	30-40	12(16)	31(43)	19(26)	11(15)	27	49	FSCL	1	3	0.045	5.88
607/C/A	Topsoil	0-10	6 (8)	22(29)	35(47)	12(16)	25	14	L,fsy	1	2	0.009	0.84
607/C/B	Subsoil	15-30	8(13)	25(41)	19(31)	9(15)	39	35	CL	1	2	0.045	2.80
607/H/A	Topsoil	0- 5	6 (8)	19(25)	33(45)	16(22)	26	35	FSCL	1	2	0.028	2.10
607/H/B	Subsoil	15-25	42(47)	21(24)	19(21)	7 (8)	11	43	LMC	3	4	0.026	18.06

NOTES: PSA values are calculated inclusive of gravels. The values in brackets have been recalculated after excluding gravels; + textures determined after Northcote (1979); * structure and permeability classes are those to be used in SOILOSS; # 'K' value has been determined using SOILOSS version 5.1

These data have been determined on soil samples collected by Veness & Associates. The laboratory methods used are those required by EPA in its documentation relating to Harvesting Plans. The data presented on this page have been calculated and determined by me.

Jim Veness
(Managing Director)
VENESS & ASSOCIATES Pty Limited
25th July, 1995


608
228 ha
GLENS CROSSING
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603
Pt 82 ha
602
Pt 163 ha
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601
Pt 51 ha
601
Pt 51 ha
H
I
C
CARUMBY

VENESS & ASSOCIATES

ACN 003 419 958 Pty Limited

10 Dutton Crescent
COFFS HARBOUR NSW 2450
Telephone: (066) 52 7692
Facsimile: (066) 52 8232

26th April, 1996

Attn: Leonie Walsh
State Forests of NSW
P.O. Box 366
GRAFTON NSW 2460

Dear Leonie,

Re: Further information on compartments 604, 606 & 607, Nymboida SF

Following our recent telephone discussions and your requirement to have more information regarding the soil materials within compartments 604, 606 and 607, Nymboida SF, you are advised of the following.

Jim and Ruth Veness of Veness & Associates, examined these compartments and others in July, 1995 during which time soil samples were collected for laboratory testing. The results of these soil sample analyses were presented in report VA1625B.

Prior to the field visits, the landforms were examined from the 1:15,000 topographic maps and the boundaries between the Soil Mapping Units were mapped in from the EIS soils study (Veness, 1994). Because of the consistency of soil materials found to occur within individual soil mapping units from the EIS study, it was decided that one soil sampling site would be examined within each soil mapping unit within each compartment. This approach was consistent with the EPA soil sampling protocol existing at that time. In order to assess any variation that might be attributed to different landform elements, it was decided to locate the sampling sites within each of the compartments in a different landform element when one compartment was compared with another.

Within compartment 607, there are two different soil mapping units viz, Unit C (soils formed from metasediments) and Unit H (soils formed from Marburg sediments). Compartments 604 and 606 are located wholly within soil mapping unit C (soils formed from metasediments).

Soil Unit H (Marburg sediments)

Within Unit H (Marburg sediments) in compartment 607 there are two main landform elements. These are:

- crest
- open depression

The distinction between these two landform elements, given the uniform low slopes occurring in the very gently rolling topography of this compartment, is one of very fine definition. Indeed, sampling site 607/H is located on the boundary of these two units and is considered to be representative of all of this part of 607, even despite the variation in landform elements. It should be further noted that there are a few minute pockets of

simple slope but the overall extent of this element within unit H in compartment 607 is considered to be significantly less than the minimum mapping unit at a scale of 1:15,000 (see McDonald et al, 1990) to warrant sampling.

The soil materials from unit H in compartment 607 are represented by the following table.

Site	Landform Element	A Horizon Depth (cm)	Texture	'K'	B Horizon Depth (cm)	Texture	'K'
607/H	crest / open depression	0–11	FSCL	0.028	11–65+	LMC	0.026

The soils in unit H of compartment 607 are within the EIS Soil Mapping Unit H, with soils forming on conglomerate and sandstone of the Laytons Range Conglomerate Member of the Marburg Formation.

Soil Unit C (metasediments)

Within Unit C (metasediments) in compartment 607 there are two main landform elements. These are:

- crest
- simple slope

In compartments 604 and 606 (both of which are in unit C (metasediments)) there are three main landform elements. These are:

- crest
- simple slope
- open depression

The open depressions, occurring in the upper catchments along existing narrowly defined flowlines, are very narrow and often difficult to map out at 1:15,000. (Note that the topography in unit C is steeper than that occurring in unit H). In either case, because such flowlines are usually associated with protection / filter strips and are subject to specific conditions, they have not been sampled for this study.

These landform elements have been sampled within compartments 604, 606 and 607. Sampling site 607/C was situated on a simple slope as was site 606. Sampling site 604 was located on a crest.

Consequently, with the exception of the open depressions (as explained above) each of the landform elements in soil unit C in compartments 604, 606 and 607 has been sampled within these compartments.

Each of these sampling sites are within the EIS Soil Mapping Unit C, with soils forming predominantly on Silurian metasediments consisting of argillites with the northern sections of compartments 606 and 607 forming on Ordovician–Silurian metasediments consisting of argillites, phyllites, slates and intermediate volcanics, all with abundant quartz veins.

The soil materials from each of the three sites are compared in the following table.

Site	Landform Element	A Horizon Depth (cm)	Texture	'K'	B Horizon Depth (cm)	Texture	'K'
604	crest	0–14	L,fsy	0.015	14–58	SCL	0.059
606	simple slope	0–12	L,fsy	0.001	12–70+	FSCL	0.045
607/C	simple slope	0–12	L,fsy	0.009	12–65+	CL	0.045

As a result of these comparisons, it is evident that, despite the variation in landform, the soil materials from each of the various sampling sites within each of the two soil units are consistent with one another within each unit. Consequently, while the various landform elements within the two different soil units in compartments 604, 606 and 607 have been sampled within these compartments, the uniformity of these soils within each unit permits the conclusion that these landform elements have been adequately sampled.

Yours faithfully,

Jim Veness

CERTIFIED MAIL

FORESTRY COMMISSION OF NSW
LOCKED BAG 23 P.O.
PENNANT HILLS NSW 2120

Environment
Protection
Authority
New South Wales

Civic Tower
Cnr of Jacobs Street
and Rickard Road
Locked Bag 1502
Bankstown
NSW 2200

Telephone .02. 9795 5000
Facsimile .02. 9795 5002

Our Reference: 600000/D54/Not. Nos. 003311

Your Reference:
16 September, 1996

NOTICE UNDER SECTION 17D(3)
OF THE POLLUTION CONTROL ACT 1970

WHEREAS -

(a) FORESTRY COMMISSION OF NSW is the holder of licence number 004017 in respect of premises situated at LAND IN THE NORTHERN REGION, - which expires on 7 August, 1997.

TAKE NOTICE THAT -

In accordance with the powers vested in the Environment Protection Authority (EPA) under Section 17D(3) of the Pollution Control Act 1970, the EPA with respect to licence number 004017 from the date of this Notice hereby:-

1. Varies this licence by inserting the following compartment descriptions, corresponding water pollution hazard categories, special conditions, representative water quality monitoring site, and date of licence variation into Schedule 1:

   "Compartments Description

   Compartments 604 and 606
   Nymboida State Forest No. 758

Water Pollution Hazard Categories

Water Pollution Hazard Category	Slope Ranges (degrees)
1	Less than or equal to 2.
2	Greater than 2 and less than or equal to 11.
3	Greater than 11 and less than or equal to 30
4	Not applicable.

Proportion of dispersible soils: A horizon less than 10%
B horizon less than 10%

Special Conditions

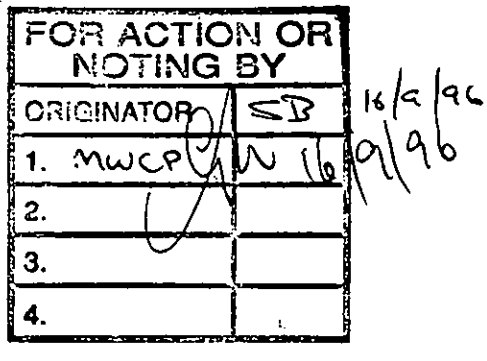
Special conditions are those conditions contained in the harvesting plan for Compartments 604 and 606, Nymboida State Forest No. 758, prepared by State Forests of NSW, received by the EPA on 2 August 1996, and as amended by addendum 1 received by the EPA on 30 August 1996;

Water Quality Monitoring Site

To Be Determined

Date of Licence Variation

16 September 1996."



NEIL SHEPHERD
Director-General

Per .....
Geoff Noonan
Manager - Waters & Catchments Policy
WATERS AND CATCHMENTS
(by Authorisation)

273napp-KG

FACSIMILE TRANSMISSION

To	Dr. Neil Shepherd, Environment Protection Authority P O Box 1135 CHATSWOOD NSW 2057		
Attention	Mr Geoff Noonan Catchments Branch	**Date**	16 September 1996
Your Fax		**Our Fax**	(02) 9980 7042
From	Kris Gounder Forest Planning Branch	**Phone**	(02) 9980 4217 (015) 271 625
No of Pages	1 (including this cover page)		

STATE FORESTS
MANAGING • CARING • SUSTAINING

State Forests of
New South Wales
Building 2
423 Pennant Hills Road
Pennant Hills NSW
2120
Phone (02) 980 4100

RE: NOTICE UNDER SECTION 17D(3) OF THE POLLUTION CONTROL ACT 1970

In terms of Clause 13(b) of the Pollution Control Regulations, State Forests of New South Wales hereby notifies you that no appeal will be made against EPA's decision to vary Licence No. 4017 on 16 September 1996 to include the following areas:

Compartment No.	**State Forest**	**Managenent Area**
604 & 606	Nymboida	Grafton

for **KRIS GOUNDER**
for Manager
Forest Planning and Fire Management Branch

For State Forests Use Only (Page 1 of 3)

District Forester: Grafton

As required under the above legislation we advised EPA about our intention not to appeal against this Licence amendment **on 16 September 1996**. Accordingly you may start logging these compartments **on 18 September 1996.**

Manager, Forest Planning and Fire Management Branch

HARVEST PLAN DESK AUDIT CHECKLIST

Register No: 879 Date Received: 2/8/1996

State Forest: NYMBOIDA Compartment/Age Class: 604/606

District: GRAFTON State Forest No: 758

Region: NORTHERN Harvest/Thinning:

Forest Type: Native Forest/~~Native Plantation~~/~~Softwood Plantation~~* (delete)

WATER POLLUTION HAZARD CATEGORY

Factor	Provided Yes	Provided No	Relevant Yes	Relevant No	Comment
R	✓		✓		R = 2900
K					K = .059
S					as factored by SOILOSS 5.1
L					L = 20 M
C					C = 0.108

Soil Sampling personnel named and approved: VENESS (Yes/~~No~~)

CALCULATION OF WATER POLLUTION HAZARD CATEGORIES

1.	Calculation provided	~~YES~~/NO
2.	Verified against SOILOSS	YES/~~NO~~
3.	Appropriate WPHC assigned	YES/NO
4.	Slopes associated with WPHC	YES/~~NO~~
5.	% Compartment per WPHC	YES/~~NO~~

Soil Unit 1:

	% Cpt	Slope (°)	Catchment Size
WPHC 1	6	0-2	
WPHC 2	49/60	>3-11	
WPHC 3	96/33	>11-30	
WPHC 4	N/A	N/A	

Soil Unit 2: _____(if applicable)

	% Cpt	Slope (°)	Catchment Size
WPHC 1			
WPHC 2			
WPHC 3			
WPHC 4			

Soil Unit 3: _____(if applicable)

	% Cpt	Slope (°)	Catchment Size
WPHC 1			
WPHC 2			
WPHC 3			
WPHC 4			

PROPORTION DISPERSIBLE SOIL

Soil Unit 1:

A Horizon % D: 23 x % C: 10 / 100 = 2.3
B Horizon % D: 49 x % C: 12 / 100 = 5.88

Soil Unit 2: (if applicable)

A Horizon % D: _____ x % C: _____ / 100 = _____
B Horizon % D: _____ x % C: _____ / 100 = _____

Soil Unit 3: (if applicable)

A Horizon % D: _____ x % C: _____ / 100 = _____
B Horizon % D: _____ x % C: _____ / 100 = _____

REPRESENTATIVE WATER MONITORING

Representative Water Monitoring Site: To Be Determined State Forest

Annual rainfall:_____ Geology:_____

Forest Type:_____

Condition	Condition	Comply	Comment
1 b	**Site Specific conditions** Attached site specific conditions to harvesting plan	N/A	
6	**Minimum protection widths for drainage line in native forests** Any prescribed streams, swamps and wetlands	N/A	
7	Any major water storages present	NIL	Pg 11
9 (1 c)	Minimum protection widths Show filter strips on harvesting plan map	YES	
9 (2)	Show protection strips on harvesting plan map	YES	
10	Prescriptions for marking F, P, and B strips in the field	Y	Pg 32
20	**Operations within Native Forest Protection strips** Person responsible for identifying P strips in the field	Y	"
22	**Operations within Native Forest Buffer strips** Person responsible for identifying P strips in the field	Y	"
24	Specifications of techniques for minimising soil exposure and that any disturbance will cause no channelised flow in buffer strip	Y	"
25	**Minimum protection widths for drainage feature in native plantations** (as per 6 and 7)	N/A	
32	**Operations within Native Plantation Protection strips** (as per 20)	N/A	
33	**Operations within Native Plantation Buffer strips** (as per 22 and 24)	N/A	

Condition	Condition	Comply	Comment
34	**Minimum protection widths for drainage feature in Softwoods Plantations** (as per 6 and 7)	N/A	
40	**Operations within Softwood Plantation Filter Strips** Person responsible for determining 5 metre machinery zone	N/A	
46	**Operations within Softwood Plantation Buffer Strips** (as per 22 and 24)	N/A	
47	**Road design, construction and maintenance** Specify techniques for the road design, construction and maintenance	Y	
48	Proposed road locations are shown on harvesting plan map	Y	
49	Maximum slopes for road construction Specify techniques for road stabilisation within 6 months of construction for roads built on slopes > 30 °	Y	
53	**Road Clearing** Specify techniques for clearing areas adjacent to roads with minimal disturbance to groundcover and topsoil and with 70% groundcover attained with 12 months	Y	Pg 31
57	**Borrow Pits and Gravel Pits** Specify techniques for 1. construction of stable batters 2. stabilisation at the completion of operations	N/A	Nil

Condition	Condition	Comply	Comment
60	**Road Batters** Specify road batter stabilisation techniques	N-	specify Leaf structures
63	**Road Drainage** Specify road drainage structures to be used and techniques for: 1. conveying peak flow in 1:5 year event 2. diverting water onto stable surfaces 3. minimising unchecked flow of water from table drains directly to watercourses and drainage lines, snig tracks and log dumps 4. discharging onto surface or structure which provide efficient sediment trapping	? ✓ X ✓	20 cm banks ? Specify
71	**Crossing of drainage features** Specify location and type of crossings at drainage features	✓	Pg 30
78	**Road no longer required** Specify techniques to be used to stabilise roads that are no longer used	✓	
81	**Dispersible Soil** Specify techniques used to protect roads and dispose of spoil that is dispersible	N/A	NIL
89	Snig Track Construction Specify criteria for ensuring that snig tracks are located and constructed where they can be drained effectively	✓	Pg 33

Condition	Condition	Comply	Comment
99	**Snig Track Drainage** Specify techniques to: 1. conveying peak flow in 1:2 year storm event 2. diverting water onto stable surfaces 3. minimising unchecked flow directly to watercourses and drainage lines, snig tracks and log dumps 4. divert water at a velocity which minimises damage to the structure	✓ ✓ X ✓	Pg 33, 34 Specify ✓
109	**Downhill snigging** Specify measures to prevent concentrated water flow where downhill snigging occurs	✓	Pg 34
112	**Snig Tracks and Dispersible Soil** Specify measures to protect dispersible soils	N/A	
115	**Log Dumps** Specify location of log dumps on harvesting plan map	✓	Pg 35
119	**Specify techniques for:** 1. drainage of log dumps during and at completion of operation 2. Log dumps being left in a stable condition at the completion of operations	✓	Pg 35

Condition	Condition	Comply	Comment
125	**Burning** Specify key and strategic and operational details of burning: 1. Objective of burn 2. Method of ignition 3. Preferred season of burn	✓ ✓ ✓	Pg 35 Pg 36 Pg 36

Additional Harvesting Plan Requirements

1. Appropriate Variation Conditions (Condition 3 of the Harvesting Plan) Yes/~~No~~
2. Appropriate SFO Authority Conditions (Condition 5 of the Harvesting Plan) Yes/~~No~~
3. Canopy Gapping Conditions ~~Yes~~/No

****
********** User's Name **********
****

SOIL LOSS ESTIMATION - Nymboida State Forest Cpt 604, 606

The computer program, SOILOSS, uses the procedures of the Universal Soil Loss Equation (USLE) to predict the average annual soil loss due to sheet and rill erosion. It is based on extensive research in the United States and by the Soil Conservation Service in New South Wales.

The following report was prepared by SOILOSS:

==========

Estimation prepared for : NYMBOIDA 604 606
Date : 22-08-1996 Time : 10:18 Report Number : 1

A = R x K x L x S x P x C

Rainfall Erosivity: Rainfall Zone: 2 R = 2900
Soil Erodibility : User supplied K = 0.059
Topography :Slope: 2.0° Slope Length: 20 m LxS = 0.393
Support Practice : No cultivation (P = 1) P = 1.000
Management :
Rotation :
Cultivations :
Stubble Mgmt : - User Supplied C = 0.1080

Long-term average annual soil loss: A = 7.3 t/ha

Soil Loss Targets :

There is very little information to indicate target levels of soil loss for Australian soils. The following are suggested as a guide:

Very deep and fertile soils <10 t/ha.a
Moderately deep and fertile soils <5 t/ha.a
Shallow or infertile soils <1 t/ha.a

Management Options :

To reduce soil loss from 7.3 to 5 t/ha.a the options are :
* Reduce C to 0.0743

****

****
********** User's Name **********
****

SOIL LOSS ESTIMATION

The computer program, SOILOSS, uses the procedures of the Universal Soil Loss Equation (USLE) to predict the average annual soil loss due to sheet and rill erosion. It is based on extensive research in the United States and by the Soil Conservation Service in New South Wales.

The following report was prepared by SOILOSS:

==========

Estimation prepared for : NYMBOIDA 604 606
Date : 22-08-1996 Time : 10:18 Report Number : 2

A = R x K x L x S x P x C

Rainfall Erosivity: Rainfall Zone: 2 R = 2900
Soil Erodibility : User supplied K = 0.059
Topography :Slope: 3.0° Slope Length: 20 m LxS = 0.571
Support Practice : No cultivation (P = 1) P = 1.000
Management :
Rotation :
Cultivations :
Stubble Mgmt : - User Supplied C = 0.1080

Long-term average annual soil loss: A = 11 t/ha

Soil Loss Targets :

There is very little information to indicate target levels of soil loss for Australian soils. The following are suggested as a guide:

Very deep and fertile soils <10 t/ha.a
Moderately deep and fertile soils <5 t/ha.a
Shallow or infertile soils <1 t/ha.a

Management Options :

To reduce soil loss from 11 to 10 t/ha.a the options are :
* Reduce C to 0.1024

****

****
********** User's Name **********
****

SOIL LOSS ESTIMATION

The computer program, SOILOSS, uses the procedures of the Universal Soil Loss Equation (USLE) to predict the average annual soil loss due to sheet and rill erosion. It is based on extensive research in the United States and by the Soil Conservation Service in New South Wales.

The following report was prepared by SOILOSS:

==========

Estimation prepared for : NYMBOIDA 604 606
Date : 22-08-1996 Time : 10:18 Report Number : 3

A = R x K x L x S x P x C

Rainfall Erosivity: Rainfall Zone: 2 R = 2900
Soil Erodibility : User supplied K = 0.059
Topography :Slope: 11.0° Slope Length: 20 m LxS = 2.515
Support Practice : No cultivation (P = 1) P = 1.000
Management :
Rotation :
Cultivations :
Stubble Mgmt : - User Supplied C = 0.1080

Long-term average annual soil loss: A = 46 t/ha

Soil Loss Targets :

There is very little information to indicate target levels of soil loss for Australian soils. The following are suggested as a guide:

Very deep and fertile soils	<10 t/ha.a
Moderately deep and fertile soils	<5 t/ha.a
Shallow or infertile soils	<1 t/ha.a

Management Options :

To reduce soil loss from 46 to 10 t/ha.a the options are :
* Reduce C to 0.0232

****

****
********** User's Name **********
****

SOIL LOSS ESTIMATION

The computer program, SOILOSS, uses the procedures of the Universal Soil Loss Equation (USLE) to predict the average annual soil loss due to sheet and rill erosion. It is based on extensive research in the United States and by the Soil Conservation Service in New South Wales.

The following report was prepared by SOILOSS:

==========

Estimation prepared for : NYMBOIDA 604 606
Date : 22-08-1996 Time : 10:18 Report Number : 4

A = R x K x L x S x P x C

Rainfall Erosivity: Rainfall Zone: 2 R = 2900
Soil Erodibility : User supplied K = 0.059
Topography :Slope: 30.0° Slope Length: 20 m LxS = 6.639
Support Practice : No cultivation (P = 1) P = 1.000
Management :
Rotation :
Cultivations :
Stubble Mgmt : - User Supplied C = 0.1080

Long-term average annual soil loss: A = 123 t/ha

Soil Loss Targets :

There is very little information to indicate target levels of soil loss for Australian soils. The following are suggested as a guide:

Very deep and fertile soils <10 t/ha.a
Moderately deep and fertile soils <5 t/ha.a
Shallow or infertile soils <1 t/ha.a

Management Options :

To reduce soil loss from 123 to 10 t/ha.a the options are :
* Reduce C to 0.0088

****

Forest Planning and Fire Management Branch

Phone No. (02) 97955386

STATE FORESTS
MANAGING · CARING · SUSTAINING

To	District Forester - Grafton / Marketing Forester (L.Walsh)
From	Forestry Liaison Officer - Environment Protection Authority
Date	27 August 1996
Subject	HARVESTING PLAN GG 96/05/604

The harvesting plan for Nymboida 604-606 has been examined by the Environment Protection Authority (EPA). The harvesting plan will fail to satisfy the EPA without some alteration to the text. Please implement any possible alterations requested so that an amended harvesting plan can be submitted to the EPA. Any amended pages must be forwarded to State Forests Forest Regulation Unit for consideration with the original harvesting plan.

Amendments requested are:-

1. *page 13. Part 2.5, description 11(h), use of existing drainage feature crossings.*

   In the second stanza, first sentence edit to 'dump 13'?

2. *page 15. Part 2.5, description 12(c), other factors*

   Please note for other harvesting plans that it is not necessary to justify use of table 2 WPHC3 of the PCL as condition 66(c) of schedule 4 allows for the use of cross banks at your desired spacing.

3. *page 18. Part 3.1(f), variations and amendments to this harvesting plan.*

   Include the following amendments to comply with the variation of 22 April.

   In the first stanza insert after Condition 5.1(c) 'or consistent with condition 24A of the Pollution Control Licence'.

   In the second stanza insert after Condition 5.1(c) 'or consistent with condition 24A of the Pollution Control Licence'.

4. *page 29. Part 4.7(e), existing roads, road surface drainage.*

To better comply with schedule 4, condition 63 (b) of the PCL we must prescribe for existing, re-opened and constructed roads on the technique to minimise the unchecked flow of water onto extraction tracks, snig tracks or log dumps. The usual practice is to place drainage structures that minimise the catchment area above the feature consistent with haulage practicalities.

5. *page 30. Part 4.7(e), existing roads crossing of drainage features.*

To better comply with schedule 4, condition 63 (c) of the PCL we must prescribe for existing, re-opened and constructed roads on the technique to stop water from table drains discharging into watercourses or drainage lines. The usual practice is to place drainage structures that minimise the catchment area of the approaches consistent with haulage practicalities, out-fall drainage on the immediate approach, and occasionally measures to increase ground cover or reduce velocity of the table drain outlet.

6. *page 31. Part 4.7(f), clearing.*

The EPA appreciate that very little area will be disturbed outside the road construction width, however they request that we state the techniques the contractor must use to aid 70% ground-cover to the road edge in 12 months. (Note that the road edge is the area beyond the table drain and batters.) Possible techniques would include minimising ground disturbance and scrapping top soil and logging slash over disturbed areas.

7. *page 31. Part 4.7(g), slope limits for the area.*

The EPA is pleased that we have identified 27 degrees as the maximum side slope for snig track construction consistent with the RaPIC calculations, however they request that we state that the SFO (or operator, or contractor) is responsible for identifying slopes over 27 degrees in the field where snig tracks must not be constructed.

8. *page 33. Part 4.7(l), snig tracks.*

Insert as an additional point on drainage structures probably under the point on cross bank height to comply with condition 101(d)
'Cross-banks must be constructed at right angles to the direction of the track.' or similar

Insert as an additional sentence on achieving affective drainage and compliance with 101(c), probably as the last point
'Snig tracks leading directly into watercourses and drainage lines or onto roads or log dumps must be drained to minimise the catchment area immediately above the feature.' or similar

In preparing the amendments the Marketing Forester should discuss issues with the Liaison Officer before final amendments are dispatched to EPA.

Compliance with this request does not constitute satisfaction by the EPA with harvesting plan GG96/05/604.

Although not required, the EPA also advise that they would appreciate the plan amended to account for the 8 August 1996 PCL. This would subsequently avoid any necessity for State Forests to produce a variation within 7 days of commencing the operation.

Russell Cowgill
for
Tony Howe
Branch Manager
Forest Planning and Fire Management

cc
Operations Manager
Northern Region

supply. Copmanhurst is to transfer to the lower Clarence scheme, which sources its water higher up the Nymboida catchment, during the next year or so.

(g) Vegetation and Ground-Cover

Effect on ground-cover during operations

The harvest operations are expected to remove less than 20% of the overall ground cover of the net harvest area.

Recovery time

Recovery will be relatively rapid with 70% live ground-cover being attained within 12 months. The tracks and minor roads previously utilised have revegetated.

(h) Proposed Operation System

Use of existing roads

Existing roads have been evaluated for their potential to cause water pollution.

Glens Creek Road, which runs near to the north-east and eastern boundaries of the compartments, is a fully designed road with concrete relief pipes in the side-cuts and drainage lines, and mitre drains on the ridge-tops. It crosses a number of drainage lines by way of concrete causeways. The road pavement is well consolidated and the road is maintained by periodic grading and manual cleaning of drainage structures. The batters and outlets of the drainage structures are stable and well vegetated. Glens Creek Road has been gravelled over all of its length.

4.5 km of existing minor roads in compartment 604 (Jasper Road, Hare Road, Pademelon Road, Quoll Road) and 2.3 km of minor roads in compartment 606 (606 Road and Pollia Road) will be used to access the compartments as shown on the Operational Map. These roads are old logging tracks that will be reopened for use during this harvesting operation. These roads are long established, stable, with litter and grass cover. Drainage is confined to cross-fall and roll-overs.

The reopening of these minor roads will require the removal of fallen timber and regrowth from the road pavements. This will be done with the logging machinery and will cause minimal disturbance to the road pavement. There is a sharp bend in Hare Road, just to the west of where it crosses the boundary between the two compartments, that will need to be widened to allow logging trucks to get around it. With the exception of Jasper Road, all minor roads in these compartments will be bedded down and closed on completion of the operation.

To avoid additional crossing of drainage lines, a further 800 m of existing minor roads in compartments 604 and 605 will not be used in this operation. These include a road running north-west from Dump 13 through the northern part of compartment 604 into compartment 606 and that part of Pademelon Road north of Dump 6.

None of the existing roads are likely to cause significant water pollution.

Use of existing drainage feature crossings

There are three existing drainage line crossings in the compartments, only one of which will be used during the operation.

The existing road running north-west from Dump 13 through the northern part of the compartment crosses two drainage lines on very old open natural surface causeways that

- **Grafton/Coffs Harbour Compulsory Sawlog Specification Hardwood Sawlog Flat Rate Royalty Utilisation Standards**
- **Specification for Eucalypt Veneer Logs for Rotary Peeling**
- **Australian Standard AS2209 - 1979 (poles)**

- the Code of Procedure for the measurement of timber and other products applicable to this operation, in this case:
  - **Code of Procedure for the Measurement of Hardwood Logs and other Timber Products - Northern Region.**

Variations, additions or amendments to the above documents may be made by the responsible authorities at any time, and must be implemented immediately by the State Forests Licensee.

(d) Environmental Planning & Assessment Act Requirements

In preparing this Harvesting Plan, the requirements of Part V of the EPA Act (as amended) and Section 92 of the NPW Act have been considered and Grafton Management Area Environmental Impact Statement (EIS) has been produced.

(e) Breaches and Infringements

Non-compliance with any condition or instruction set out in this Harvesting Plan will be dealt with in accordance with Section 4 of the **"Forest Practices Code Part 2 - Timber Harvesting in Native Forests"**. Serious breaches may lead to the issue of a penalty notice, licensee suspension or prosecution.

(f) Variations and Amendments to this Harvesting Plan

Conditions and requirements relating to the Pollution Control Licence cannot be varied in the field without the prior written approval of the EPA, other than those areas detailed in Condition 5.1 (c), or consistent with condition 24A of the Pollution Control Licence.

Variations and other specified approvals detailed Condition 5.1(c) or consistent with condition 24A of the Pollution Control Licence, may be made by the Supervising Forest Officer to this Harvesting Plan, subject to the District Forester's counter approval.

Other approvals may only be made by the Supervising Forester and are also subject to the District Forester's counter approval. Major variations that relate to the conditions of the Pollution Control Licence, minor variations that would result in an increased risk of water pollution, or any variation relating to drainage feature protection conditions can only be made with the prior written approval of the EPA.

All approvals must be recorded on a variation advice, attached as Part 6 to all operational copies of this Harvesting Plan.

This Plan must not be amended by a licensee or contractor.

(g) Harvesting Plan Availability

Copies of this Harvesting Plan must be held available by the contractor or bush supervisor at the site of timber-harvesting operations at all times that felling, snigging or environmental work is being undertaken within the area covered by this Harvesting Plan.

- snig tracks must not be used.

(iv) it is raining:

- operations must cease.

In any event, if:

rutting of a snig track is, or is likely to approach a maximum of 200 mm below the natural surface, measured over any 20 metre length of track, snig tracks must not be used.

There are no dumps suitable to be worked during wet weather periods.

(e) Existing Roads

Clearing of regrowth

The reopening of existing roads will involve the removal of fallen timber and small regrowth trees from the road pavement and edges. This work must be kept to the minimum required to allow use of existing roads.

Widening of corner

There is a bend in Hare Road just to the west of where it crosses the boundary between the two compartments. This will need to be widened slightly. This work must be kept to minimum required to allow logging trucks to get around the bend, and must not intrude on the 20 m Riparian Habitat Zone.

Road surface drainage

Rollover crossbanks may be required on some sections of the minor roads to log dumps where outfall drainage has not been established. Where required rollover crossbanks will be spaced as stated in Tables below. Rollover banks must have a minimum design consolidated vertical height from spillway to bank top of 20 cm. Such banks will convey the peak flow of a 1 in 5 year storm event.

Spacing of Rollover Crossbank Drainage

Road Grade (degrees)	Max spacing
0 - ≤5	100m
>5 - ≤10	60m
>10 - ≤15	40m
>15 - ≤20	25m
>20 - ≤25	20m
>25	15m

Rollover crossbanks must drain onto undisturbed vegetation or logging slash. Where it is necessary to convey runoff water over a fill batter greater than 1 m high, that has been disturbed by the operation or on which the soil is exposed, drop down structures constructed of rock or prefabricated fluming must be installed. Dissipaters must be installed at the bottom of drop down structures.

Road drainage must minimise the flow of unchecked water onto extraction tracks, snig tracks or log dumps. Where this cannot be acheived by outfall drainage, a rollover crossbank must be placed as close as possible to the track or dump, consistent with haulage practicalities, to minimise the catchment area above it.

During the conduct of the operation, spoon drains may be used in preference to rollover banks, but must be converted to rollover banks on completion of the operation.

Crossing of drainage features

The drainage lines in the compartments are intermittent, in fact rarely run water, and were dry at the time of recent inspections.

Glens Creek Road crosses a number of drainage lines. Concrete causeways have been constructed at these sites. The harvesting will not affect these causeways.

The two drainage feature crossings on the old road running north-west from Dump 13 must not be used.

The old log crossing on Hare Road north of Dump 1 will be used. This must be improved by the removal of the two outside logs, and placement of a log on the bottom side of the crossing. The removed logs must be deposited outside the Riparian Habitat Zone. Any associated spoil must be used to construct rollover crossbanks on the crossing approaches, as close as practicable to the crossing. There must be at least 5 m of undisturbed vegetation between the outlets of these crossbanks and the banks of the drainage line. Any disturbed areas adjacent to the crossing must be seeded with rye grass by the SFO at the rate of 20 kg/ha. This work must be done before operations commence if weather conditions are suitable.

Revegetation and rehabilitation

Drainage on existing roads must be improved on those sections where minor rilling is occurring.

Revegetation of the minor roads following harvesting will be through natural regeneration. With the exception of Jasper Road, the minor roads in the compartments are to be closed and must be bedded down, all spoon drains converted to rollover banks, and crossfall (outfall) drainage reinstated. A crossbank must be constructed at the entrance to each road to prevent vehicular traffic using the road.

On Jasper Road, all crossbank rollover drains must be left in working condition and crossfall (outfall) drainage reinstated.

Road surfaces, batters and drainage features must be left in a stable condition.

Dispersible soils

The soils in compartments 604 and 606 are not significantly dispersible.

(f) Road Construction

Short sections of minor roads between log dumps 8 and 10 and 4 and 10 (along Pademelon and Jasper Roads) in compartment 604 will be constructed during the operation. No road construction is required for the harvesting in compartment 606.

Design

The minor roads to be constructed are approximately 1 km in length and the running surface must be no wider than 4 m. Drainage must be outfall drainage and must be constructed before the operations commence.

Grade

The roads must be constructed with a maximum grade of 10°.

Survey

The centre lines of the roads have been surveyed to grade line standard and marked in the field. Clearing and earthworks must not deviate from the marked lines.

Clearing

The clearing widths for construction of the road must not exceed 6 metres. Ground disturbance to the road edge (ie the area outside the table drain and batters) must be minimised. Disturbed areas along the road edge must be seeded with rye grass (by the SFO) at the rate of 20 kg/ha, immediately following road construction.

Batters

Batters must be laid back at a 1:1 ratio for this operation, and be no more than 1.5 m deep. The maximum length of cut batter must be 550 m. Batters must be seeded with rye grass (by the SFO) at the rate of 20 kg/ha, immediately following construction.

Crossing of drainage features

No drainage features will be crossed.

(g) Slope limits for the area

Maximum slope for ground based harvesting	30 degrees
Maximum grade of snig tracks	25 degrees
Maximum side slope for snig track construction	27 degrees
Maximum road grade permitted	10 degrees
Maximum side slope for road construction	30 degrees without design.

There are no mappable areas in the compartments with slopes over 30°. The SFO is responsible for identifying slopes over 30° in the field. The SFO is also responsible for identifying slopes over 27° in the field, where snig tracks must not be constructed. The SFO must advise the operator where these slopes occur.

(h) Drainage Feature Protection

Riparian Habitat Zones exist 20 metres either side of watercourses, drainage lines and drainage depressions with catchments greater than 40 hectares. These zones have the same harvesting exclusion specifications as wildlife corridors.

Filter strips must be retained along all watercourses and drainage lines within the net harvest area of Compartments 604 and 606 at minimum widths (measured in the horizontal plane) as stated in Table 5 below. These minimum widths meet or exceed the requirements of the Pollution Control Licence.

Where a filter strip extends beyond the boundary of the catchment of the drainage feature that is the subject of the protection, then the filter strip may be terminated at the catchment boundary.

In addition buffer strips 5 metres wide must be maintained on either side of drainage depressions.

Table 5 - Filter Strip Widths
(distance each side of stream)

Water Pollution Category	CATCHMENT /SLOPE	Riparian Zone	Filter Strip
1	<40 ha		5m
1	>40 ha	20m	
2	<40 ha		10m
2	>40 ha	20m	
3	<40 ha <18° slope		15m
3	<40 ha >18° slope		20m
3	>40 ha <18° slope	20m	
3	>40 ha >18° slope		30m

(i) Tree Marking Rules for Filter Strips and Buffer Strips

The SFO must mark the filter strips in the compartment progressively ahead of harvesting operations. Riparian Habitat Zones and filter strips need not be marked where there is no tree marked for removal within a tree length of the Riparian Habitat Zone or filter strip.

Contractors and operators are responsible for identifying drainage depression buffer strips encountered in the field and taking appropriate action whilst operating within the buffer strip or crossing the drainage depression (See also 5.2)

(j) Felling and Extraction from Filter Strips

OPERATIONS WITHIN NATIVE FOREST FILTER STRIPS

Trees located in a filter strip must not be felled, except for the purposes of constructing an approved road, extraction or snig track crossing.

Trees must not be felled into filter strips.

Crowns, logs and substantial debris accidentally felled into filter strips must be removed with minimal disturbance to the groundcover and soil in the filter strip. any disturbance caused must be remedied by reshaping and replacement of cover, so that concentrated water flow does not occur.

Machinery must not enter a filter strip except for the construction and use of road, extraction track or snig track crossings.

(k) Extraction from Drainage Depression Buffer Strips

Machinery must not operate in buffer strips when the soil is saturated.

Soil exposure must be minimised and channelised flow must be prevented by use of the following techniques:

- no snigging along drainage depressions

- operating with the blade up at all times
- preventing skewing of machinery tracks (by approaching logs in reverse gear, and minimal changes in direction while snigging logs out of the buffer strip).

No earthworks can be undertaken within buffer strips except for the construction of road, extraction tracks or snig track crossings.

(I) Snig Tracks

Wherever practicable, walkover extraction techniques must be used in preference to snig track construction.

Wherever practicable, snig tracks must be located slightly off ridge-top to ensure free crossfall drainage. Side cut tracks must have crossfall drainage.

The grades of snig tracks must not exceed 25°.

Snig track construction is not permitted in areas with slopes above 27°.

Snigging along roads must only occur in order to avoid snig track construction and where approved by the SFO. Effective road drainage must be re-instated by the contractor/operator immediately at the completion of the snigging operation.

Snig tracks must be drained to minimise the flow of water along them and the flow of water directly into watercourses, drainage lines or onto roads and dumps. Drainage must be effected within 2 days of the completion of use, or where operations are to be temporarily suspended in accordance with Table 6.

Table 6 - Drainage of Snig Tracks at Temporary Cessation of Operations

Slope boundaries	WP Category	No. Days
0 - ≤2	1	10
>2 - ≤11	2	8
>11 - ≤30	3	5

Where earth banks are required they must be constructed to a minimum unconsolidated effective height of 35 cm, with spacing in accordance with Table 7. Cross-banks must be constructed at right angles to the direction of the snig track.

Table 7 - Maximum Earth Bank Spacing

Track Grade (degrees)	WPH Category		
	1 (0° - ≤2°)	2 (>2° - ≤11°)	3 (>11° - ≤30°)
0 - ≤5	200 m	150m	
>5 - ≤10		100m	
>10 - ≤15		60m	40m
>15 - ≤20			25m
>20 - ≤25			20m
>25			15m

The above spacings are the maximums and should be varied to utilise the most suitable outlet point. Crossbanks must be discharged into undisturbed vegetation or logging debris. Snig tracks leading directly into watercrouses and drainage lines, or onto roads and log dumps, must be drained to minimise the catchment area immediately above the drainage feature, road or dump.

Non-harvest areas and modified harvest areas

The boundaries of Riparian Habitat Zones and filter strips must be marked ahead of harvesting operations. Riparian Habitat Zones and filter strips need not be marked where there is no tree marked for removal within a tree length of the Riparian Habitat Zone or filter strip.

(b) Soil Erosion and Water Pollution Control

Marking of filter strips

In most cases Riparian Habitat Zone prescriptions are equivalent to or greater than filter and buffer strip requirements. Thereis no need for filter and buffer strips where they would be embedded in Riparian Habitat Zones. Hence filter strips shall only be marked in the field where they are not embedded in Riparian Habitat Zones.

Similarly, where filter strip requirements exceed Riparian Habitat Zones (ie in Wateer Pollution Hazard Category 3 above 18°), there is no need to mark Riparian Habitat Zones.

All drainage features must be inspected by the SFO during the harvesting operation in conjunction with tree marking and protected in accordance with the Pollution Control Licence. Where practicable, any variation between the actual drainage feature found in the field and that shown on the harvest plan Operational Map should be marked on the SFO's copy of the map for future reference.

Filter strips and drainage line buffer strips must be retained along all drainage features at the minimum widths as specified in Table 5 in Part 4.7 (i).

The SFO is responsible for marking filter strips in the field progressively and prior to the commencement of operations in each section of the harvest area. Riparian Habitat Zones and filter strips need not be marked where there is no tree marked for removal within a tree length of the Riparian Habitat Zone or filter strip.

The SFO is responsible for ensuring that the contractor or operator is correctly measuring off-sets to a filter strip (See also Part 4.7 (j)).

Drainage depression buffer strips

The SFO is responsible for ensuring that contractors and operators are detecting drainage depressions in the field and taking appropriate protective precautions within the buffer strip area whilst operating in the buffer strip or crossing the drainage depression. (See also Part 4.7 (k)).

Slope limits

There are no mappable areas with slopes over 30°. The SFO is responsible for identifying slopes over 30° where harvesting is not permitted, and slopes over 27° where snig track construction is not permitted, in the field.

Condition 5.3 Monitoring and Reporting

(a) Daily and Fortnightly Reporting

The standard District procedures for daily and fortnightly reporting on the conduct of operations must be followed.

(b) Fauna Reporting and Mitigation Prescriptions

Sightings of any Threatened fauna must be reported to the District Marketing Forester within 24 hours of the sighting being made, as required in Part 4.6 (a). For any of the animal species listed in Part 4.6 (d) the stated mitigation prescriptions shall be immediately applied.

(c) Soil Erosion and Water Pollution Control Conditions

The SFO must report the following matters and record their location if necessary on the SFO's copy of the Harvesting Plan Operational Map, or the recording map attached to the Plan for that purpose:

- any accidental felling into filter strips and remedial action taken.
- any approval to leave soil from road and track construction in drainage lines or watercourses where attempts at removal would have resulted in excessive damage.
- any approval to defer stabilisation works at a drainage feature crossing beyond five days.
- any approval to leave a snig track drainage feature crossing structure in place and the reason for it to be left in place.
- any instances where effective cross bank drainage of a snig track is not effected within two days of completion of snigging from the area served by the track.

(d) Sowing of Crossings and Road Batters/Edges

The SFO must ensure that crossing approaches are seeded in accordance with Part 4.7 (e). The SFO must also ensure that disturbed road edges, and batters on the new construction are seeded in accordance with Part 4.7 (f).

(e) Dispersible Soils Exposed During Road/Snig Track Construction

Not applicable - the soils in the compartments are not significantly dispersible.

(f) Post Harvest Rehabilitation

Supervision by the SFO and fortnightly check sheets must assess that road surfaces, batters and drainage structures are stable at the completion of operations and prior to the shifting of the contractor. The SFO must ensure that minor roads are bedded down and closed in accordance with Part 4.7 (e).

Condition 4: Pre- and Post-logging Burning

(a) Pre-logging Burning

There will be no pre-logging burning associated with the harvesting of Compartments 604 and 606.

(b) Post-logging Burning

Post-logging burning of Compartments 604 and 606 will be carried out in accordance with provisions and specifications of the Nymboida District Fire Plan and the Grafton District Fuel Management Plan.

HARVESTING PROTOCOL ATTACHMENT

Cpts 604 and 606, Nymboida State Forest

API

Photography: Grafton 1991 1:25000
Run 10 Print 41

Interpreter: Murray Webster Date completed: 26/7/96

Results summary (ocular estimate)

	Candidate OGF	Whole Cpt
	Polygons >25 ha	Yes
	Contiguous areas >25ha	Yes

Mapping required? Yes

Photo overlay signed and stored with harvesting plan? Yes

Comments:
Within cpts 604 and 606, API identifies a polygon >25 ha which contains <10% CCP of regrowth forest.

MAPPING

Mapper: Leonie Walsh Date completed: 5/8/96

	Candidate OGF	Net loggable area	
		No	Area
	Polygons >25 ha	1	174.5

Number of plots to be sampled: Minimum of 10 plots within cpt 604, and 8 within cpt 606

STUMP COUNT

- Plots were located in the office on a random 200 m grid. 17 plots were sampled in cpt 604 and 11 in cpt 606 (see attached map).
- *Disturbance history*: No records of logging are available. A large part of cpt 604 was burnt by wildfire during 1993/94.
- *Field inspection*: Field inspection revealed widespread evidence of repeated logging, including old dumps and snig tracks. In addition to the stumps recorded below, there were significant numbers of smaller stumps in the plots, plus a large number of burnt stumps that could not categorically be identified as the result of logging.

HARVESTING PLAN - GRAFTON DISTRICT (Grafton Management Area - Northern Region)

Assessors: Wayne Davis
Les Casson

Date completed: 9/8/96

Forest Type: Dry Hardwood

Cpt 604 (97 ha of Candidate Old Growth)

Plot No	Av largest tree diam (cm)	Number of stumps per half hectare plot		
		Post 1960	Pre 19630	Total
1		0	0	0
2		0	0	0
3	50.8	8	0	8
4	59.0	5	0	5
5	57.0	3	0	3
6	72.6	1	0	1
7		0	0	0
8	49.2	5	0	5
9	55.9	6	0	6
10	64.0	4	0	4
11	59.4	2	0	2
12	77.9	4	0	4
13	61.4	1	0	1
14	60.8	4	0	4
15	54.5	8	0	8
16	61.2	8	0	8
17	56.8	5	0	5
TOTAL:		64	0	64

NB: The figures presented above relate to number of stumps per half hectare plot. The figures below refer to average number of stumps per hectare.

Average number of pre-1960 stumps per hectare: Nil

Average number of post-1960 stumps per hectare: 7.5 (Disturbance threshold >5)

Cpt 606 (77.5 ha of Candidate Old Growth)

Plot No	Av largest tree diam (cm)	Number of stumps per half hectare plot		
		Post 1960	Pre 19630	Total
1	57.0	11	0	11
2	63.1	5	0	5
3	62.1	3	0	3
4	69.4	4	0	4
5	100.3	2	0	2
6	64.7	2	0	2
7	59.4	8	0	8
8	66.1	4	0	4
9	42.4	5	0	5
10	77.9	1	0	1
11		0	0	0
TOTAL:		45	0	45

NB: The figures presented above relate to number of stumps per half hectare plot. The figures below refer to average number of stumps per hectare.

HARVESTING PLAN - GRAFTON DISTRICT (Grafton Management Area - Northern Region)

Average number of pre-1960 stumps per hectare: Nil

Average number of post-1960 stumps per hectare: 8.2 (Disturbance threshold >5)

Candidate QGF polygons >25 ha	Net loggable area
	No

UNLOGGED AREA

Assessor: Leonie Walsh
Sources: Field observation

Date completed: 23 August 1996

Unlogged areas ≥25 ha NLA present? No

No Unlogged Forest Exclusion Areas

Prepared by: Leonie Walsh
Marketing Forester

Signature:
Date: 30 August 1996

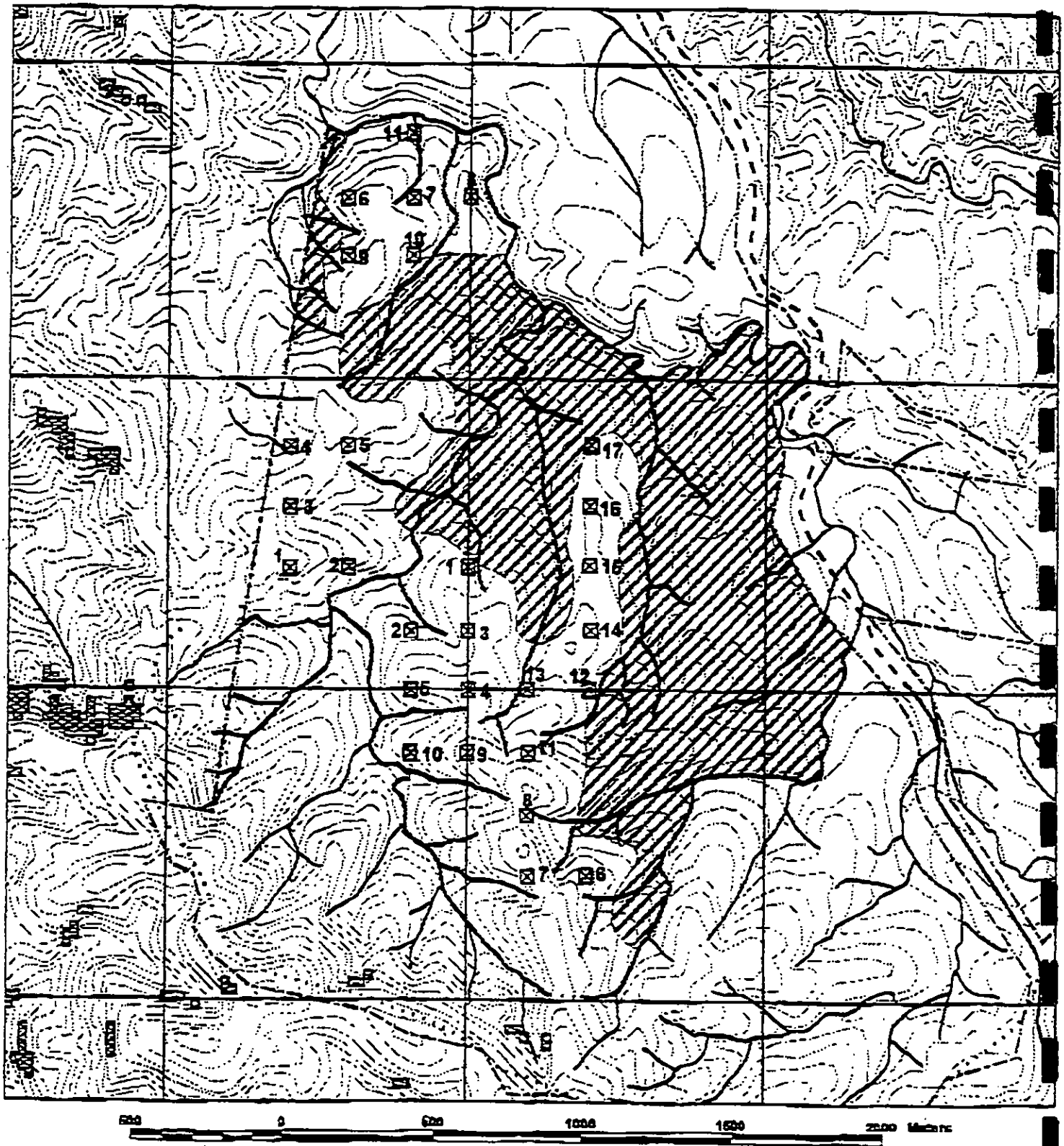
District Approval

District Forester
GRAFTON DISTRICT
Date..... 30 August 1996

NORTHERN REGION - GRAFTON DISTRICT
STUMP COUNT PLOT LOCATION
COMPARTMENTS 604 AND 606
NYMBOIDA STATE FOREST
BUCCARUMBI/NYMBOIDA MAP SHEET

STATE FORESTS

SCALE 1:18000



BOUNDARIES
- State Forest Boundary
- Compartment Boundaries

ROADS (Proposed in Red)
- Natural Surface
- Sealed or Gravelled
- Four wheel drive

Not candidate old growth

Stump count plot