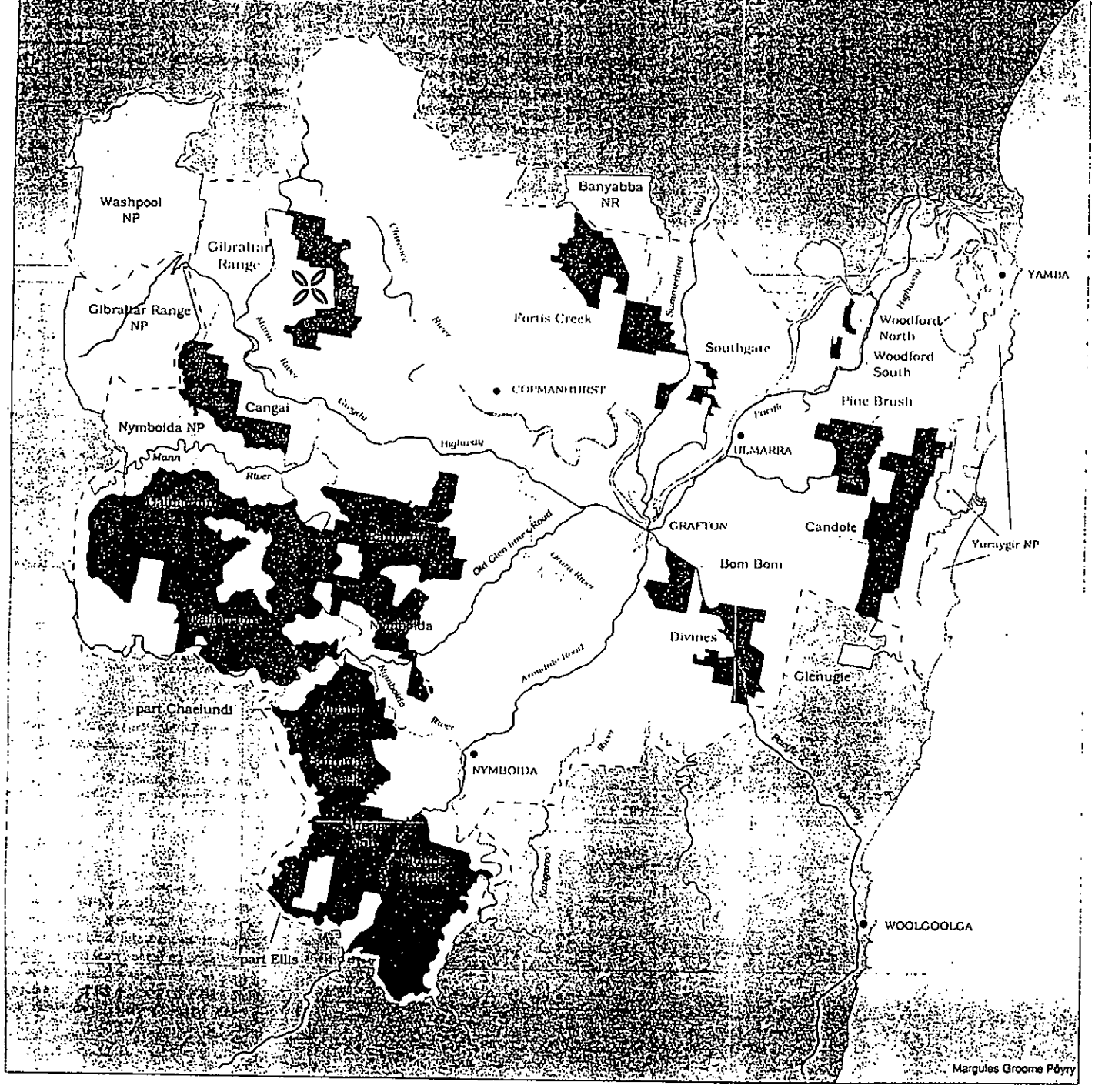
Grange

372

Grafton District
Northern Region



NSW

STATE FORESTS

NATIONAL PARKS

MANAGEMENT BOUNDARY

TOWNS

ROADS

RIVERS

0 20km N

LOCATION

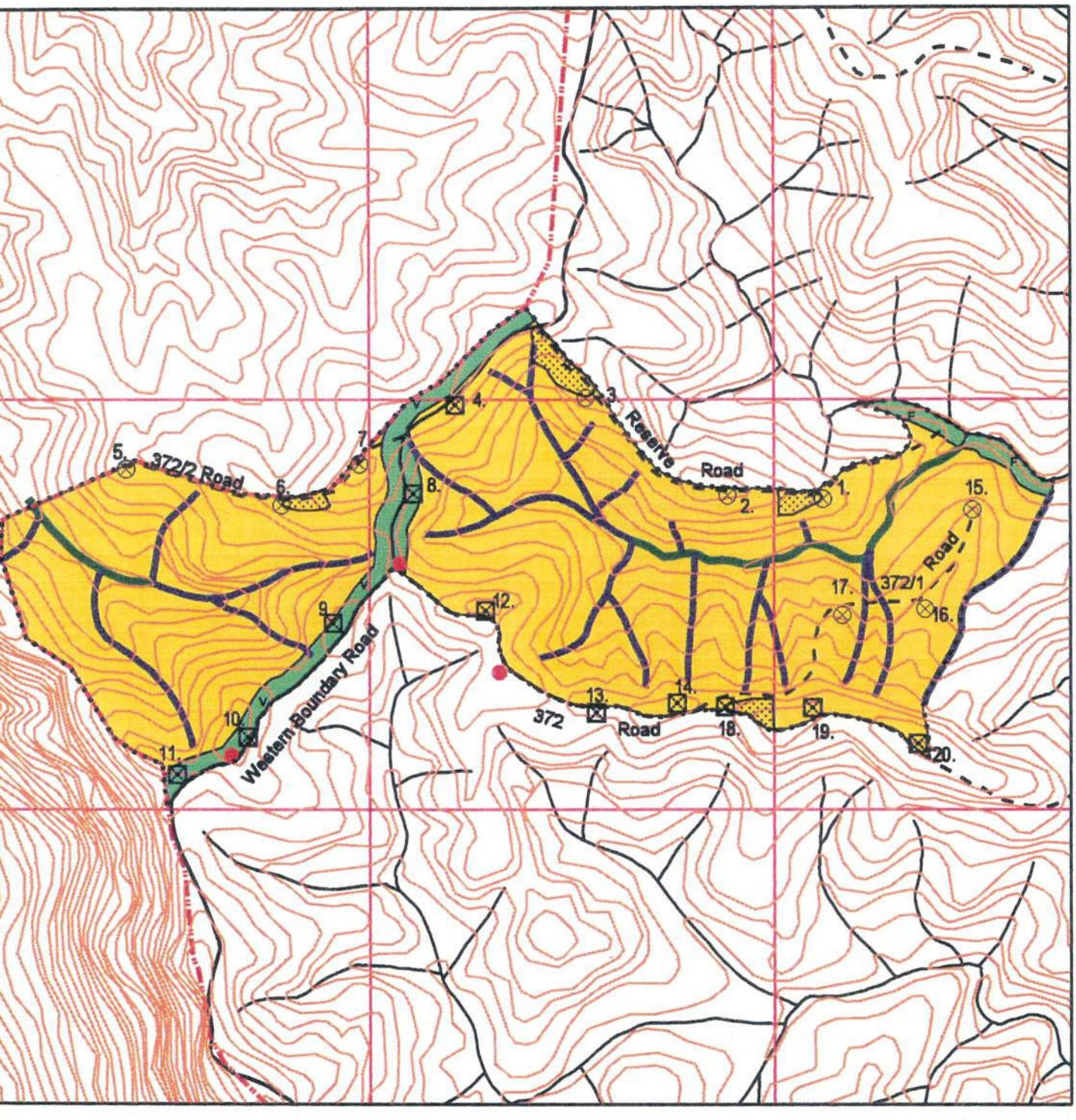
Compartment 372

FIGURE 1.2

HARVESTING PLAN OPERATIONAL MAP
NORTHERN REGION - GRAFTON DISTRICT
COMPARTMENT 372
GRANGE STATE FOREST

STATE FORESTS

CAMELBACK MAP SHEET
SCALE 1:15000



OUNDARIES
Compartment Boundaries
State Forest Boundary

OADS
Road
Minor Road

ORMAL PRESCRIPTIONS
Harvestable Area
Downhill Snigging

MODIFIED PRESCRIPTIONS
V Visual Resource Protection

NON HARVEST AREAS
Riparian Habitat Zone
F Flora and Fauna Protection
Aboriginal Archaeological Site

DUMP SITES OR LANDINGS
Permanent Dry
Permanent Wet

WATERCOURSES & DRAINAGE
Filter strip
Approved Crossings
Drainage line

MN

FOREST TYPE MAP
NORTHERN REGION - GRAFTON DISTRICT
COMPARTMENT 372
GRANGE STATE FOREST

STATE FORESTS

AMELBACK MAP SHEET
SCALE 1:15000

BOUNDARIES

- Compartment Boundaries
- State Forest Boundary

FOREST TYPES

- 60 - Narrow-leaved White Mahogany - Red Mahogany - Grey Ironbark - Grey Gum
- 62b - Grey Gum - Grey Ironbark - White Mahogany
- 70a - Spotted Gum
- 74a - Spotted Gum - Grey Ironbark/Grey Gum

KEY TO ADJOINING MAPS

WASHPOOL 9339-II-N	CARNHAM 9439-III-N
IMBADJHA CREEK 9339-II-S	CAMELBACK 9439-III-S
CANGI 9338-I-N	JACKADGERY 9438-IV-N

Harvesting Plan No GG 96/03/372

Contents

Part 2 FOREST MANAGEMENT & ENVIRONMENTAL CONSIDERATIONS

2.1 PHYSICAL FEATURES

Description 1 Physical Description of the Area

STATE FOREST	**Grange No 771**	DISTRICT	**Grafton**
REGION	**Northern**	COMPARTMENT	**372**
MANAGEMENT AREA	**Grafton**		
NORTH-EASTERN CORNER		**456400**	**6740900**
SOUTH-WESTERN CORNER		**454300**	**6740300**

Natural Features

General: The compartment contains undulating/moderate to steep slopes with scattered small very steep areas. It is basically the adjacent sides of secondary ridges running east and west of the main range system.

Catchment: Clarence River catchment. The western part of the compartment drains into Hanging Rock Creek, and the eastern part drains into Towgon Creek.

Altitude range: 430 - 540 m ASL

Aspect: Generally north in the southern half of the compartment, and generally south in the northern half of the compartment.

Topography: The major part of the compartment varies from undulating to steep with slopes up to 20°. There are small, scattered areas with slopes above 20°.

Artificial Features

Roads: Western Boundary Road, the main access to this part of the forest, runs through the compartment and along parts of the southern and northern boundaries.

Minor Roads: Two minor roads run west from Western Boundary Road along the northern and southern boundaries respectively.

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

Private property joins the western and part of the northern boundary of the compartment as shown on the Operational Map. This boundary is blazed with yellow paint and partially fenced.

Grange Flora Reserve joins the northern boundary of the compartment east of Western Boundary Road. This boundary is blazed with blue paint. A Special Emphasis Flora and Fauna Protection Zone (PMP 1.1.7 Wildlife Corridor, 40 m strip either side of stream) exists along the north-eastern boundary of the compartment, as shown on the Operational Map.

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

A Special Emphasis Visual Resource Protection strip exists along Western Boundary Road. North of the intersection with 372/2 Road, this strip extends between Western Boundary Road and the fence. The remainder of the strip is 80 metres wide - 50 m west of the road, and 30 m east.

There are two Aboriginal archaeological sites in the compartment, and one near the boundary of an adjacent compartment, as indicated on the Operational Map. These have been marked in the field using three yellow rings, and are to be protected from disturbance. During the planning process, the boundaries of these sites have been refined, and the original boundaries cancelled with a red slash.

Reference Grafton Management Area Environmental Impact Statement

2.2 FOREST MANAGEMENT AND SILVICULTURE

Description 3 Compartment Subdivision, Forest Types

Areas:

Gross Area of Compartment	146 ha
Wildlife Corridor	2 ha
Riparian Habitat Zones	5 ha
Filter Strips	7 ha
Aboriginal Archaeological Sites	1 ha
Proposed for Logging	**131 ha**

Logging History:

The compartment was logged for sawlogs during the late 1960s and mid-1970s, and has been periodically harvested for fencing timber and other products (possibly girders and poles). It was harvested again for poles during 1994/95, except for the northern section near the Grange Flora Reserve.

Forest Types:

Forest Types		Area (ha)
60	Narrowleaved White Mahogany - Red Mahogany - Grey Ironbark - Grey Gum	1
62b	Grey Gum - Grey Ironbark - White Mahogany	3.3
70a	Spotted gum	29.4
74	Spotted Gum - Ironbark/Grey Gum	112.3

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

Description 4 Broad Description of Vegetation

(a) Forest Types

- Type 60 - a dry type occurring in a very small patch in the north eastern corner of the compartment.

- Type 62b - a dry type occurring in a couple of very small patches in the south-eastern corner of the compartment.

- Type 70a - a mostly dry type occurring in the north-eastern part of the compartment. This type becomes relatively more sheltered and moist on the lower drainage lines.

- Type 74 - a dry type occurring in the majority of the compartment

Overstorey species

The overstorey species are Spotted Gum, Grey Ironbark, Grey Gum, White Mahogany, Blue gum, Brush Box, Tallowwood, Red Mahogany, Turpentine and Grey Box.

(b) Understorey

The understorey on the ridges and upper slopes is typically dry and open, being eucalypt regeneration, Forest Oak, Backhousia, Acacia, scattered Grass Trees and other xerophytic shrubs, Geebungs, Indigo, Hakeas and Native Cherry. There are small patches in the gullies that are more moist, having Native Ginger, Tobacco Bush, Soft Tree Fern, Blechnum sp, Black Wattle, Tree Heath and Forest Oak.

(c) Ground-cover

The ground cover is mostly grass (kangaroo, poa and bladey), bracken fern and litter.

(d) Rare or threatened species

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

(e) Rainforest

There are no areas of rainforest in the compartment.

(f) Exotic weeds

Lantana occurs in small scattered patches through the compartment.

(g) Regeneration and serial stages

The compartment carries a multi-age forest consisting of a very few remnants of the original stand and a high proportion of regrowth resulting from earlier harvesting operations and possibly fire.

Description 5: Forest and Crop Condition

Compartment 372 has a long history of logging of varying intensities. Previous operations have removed most of the original stand and have produced significant areas of regeneration. The current stand is largely regrowth forest at varying stages. There is a need to thin the stand through the selective removal of larger mature trees not required for fauna habitat, and competing co-dominants. Increased growth rates on the retained higher quality stems will improve the overall productivity of the stand. In smaller areas where regeneration from past operations has been limited, there is a need to replace a proportion of the existing stands over the next few cutting cycles to maintain stand vigour and increase growth rates.

The forest has been managed for grazing more or less since European settlement in the mid 1800s, originally as part of *Newbold Grange* 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 compartment 372.

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.
- Enhance the growth and development of existing regeneration.
- Obtain adequate post-harvesting regeneration that is similar in species composition to that of the original forest.
- Produce multi-aged stands on a broader area basis.

The Wildlife Corridor, Riparian Habitat Zones and filter strips on the compartment will remain in a relatively undisturbed state. The Visual Strip and 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 compartment 372 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 as Rare or Threatened have been detected in this compartment and none are expected to occur.

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 compartment.

Description 9 Protection of Plant Species

Not applicable to this compartment.

2.4 FAUNA PROTECTION

Description 10 Endangered and Protected Fauna Occurrence

(a) General

No Endangered or Vulnerable species have been recorded from this compartment. The Powerful Owl and Golden-tipped Bat have been recorded from compartment 368, about 2 km to the south-east of compartment 372. Endangered or Vulnerable 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**	**Red-legged Pademelon**
Common Planigale	**Koala**	**Long-nosed Potoroo**
Great Pipistrelle	**Golden-tipped Bat**	**Little Bent-wing Bat**
Common Bent-wing Bat	**Large-footed Mouse-eared Bat**	

References Grafton Management Area Environmental Impact Statement
SFNSW GIS Records

(b) Habitat Trees

Compartment 372 contains Dry Hardwood forest and Moist Hardwood forest with xeromorphic understorey and limited areas of Moist Hardwood forest with mesic understorey. Potential habitat trees appear to be limited in some areas. Sufficient recruitment habitat trees exist in

the net harvest area to allow for the retention of enough trees to meet prescription requirements.

(c) Wildlife Corridor

A designated wildlife corridor exists along the creek forming the north-eastern boundary of the compartment, as shown on the Operational Map. The corridor is 40 metres wide on either side of the creek.

(d) 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.

(e) Refugia Areas

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

Description 11 Species and Habitats Descriptions

Brief habitat descriptions for Endangered and Vulnerable species that might be adversely impacted by forest management activities on Compartment 372 are stated below:

(a) Critical Weight Range Species

Critical Weight Range species likely to occur in compartment 372 are the Rufous Bettong, Red-legged Pademelon, Long-nosed Potoroo and Spotted-tailed Quoll. Rufous Bettongs inhabit well-grassed open forests and are commonly associated with Spotted Gum. Suitable areas may occur within the compartment. Long-nosed Potoroos prefer dense understorey vegetation and will forage in open areas. Red-legged Pademelons are dependant on dense cover for refuge and will feed in adjacent open areas. Spotted-tailed Quolls occur in a variety of forest types favouring moister areas. Areas of dense understorey appear to be limited in compartment 372.

(b) Glossy Black Cockatoo

Glossy Black-Cockatoos require stands containing species of Casuarina for food and large tree hollows for nesting in a range of hardwood forest types. Casuarina occurs on the compartment.

(c) Powerful/Masked/Sooty Owl

These Owls inhabit forest margins and open areas, require large tree hollows for nesting, roost in large trees and require a large home range.

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

These snakes require tree hollows and old trunk scars.

(e) Brush-tailed Phascogale

This species requires tree hollows for nesting and prefers open forest areas, foraging generally in large rough barked trees.

(f) Yellow-bellied Glider

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

(g) Squirrel Glider

This species requires tree hollows for nesting, feeds in upper canopies on flowers and insects, and on sap from Yellow-bellied Glider V-notches

(h) Koala

Koalas feed on eucalypt leaves from a range of species and prefer higher nutrient areas. The compartment might be suitable, but higher nutrient country in nearby private property is more likely to be.

(i) Golden-tipped Bat

This Bat roosts in moist forests, seemingly preferring dense vegetation.

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

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

(k) Large-footed Mouse-eared Bat

This Bat inhabits moist riparian forest areas and requires open water bodies for feeding.

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

Compartment 372 is located in the central western section of Grange SF, which in turn is located some 60 km north-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 area is about 1200 mm

The annual rainfall erosivity - **R = 3000**

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 recordings available. The compartment is in rainfall zone 2. The monthly erosivity details are:

	J	F	M	A	M	J	J	A	S	O	N	D
Erosivity	570	510	360	120	60	90	60	60	180	210	330	450

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 over 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

Compartment 372 is on Metasediments, being argillites, phyllites, slates and intermediate volcanics, all with abundant quartz veins, of Ordovician-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

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.

Soil types

The soil derived from the Metasediments is typed as Structured plastic and subplastic clays, at times Krasnozems, Xanthozems, Chocolate soils, Structured loams.

Description and profile

The soil is 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 layer.

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 (Method B3)

K values A horizon = 0.019
K values B horizon = 0.013

Texture

A horizon - silty clay loam, normal plastic
B horizon - light clay

Dispersibility (Method D1)

%clay A horizon	12%(inclusive of gravels)
%clay B horizon	56%(inclusive of gravels)
D% A horizon	19%
D% B horizon	17%
%dispersible soil A horizon	12/100x19/100x100 = **2.28**
%dispersible soil B horizon	56/100x17/100x100 = **9.52**

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

Reference Veness and Associates. Soils report Number VA1715B/02 of 30 November 1995.

A copy of Report Number VA1715B/02 of 30 November 1995 from J Veness is attached.

Inherent fertility

The soils are relatively fertile compared generally with soils on State forests in the Grafton area. The nearby private property is typical Clarence valley open Red Gum/Apple woodland country. Much of the original stand on 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 is very little evidence of existing erosion within the compartment. Very slight erosion is occurring on 372/1 Road just to the east of dump 18. Rollover drains will be constructed on this section during the operation. All structures built during previous logging operations seem to be functioning.

(e) Landform

Slope

Over a third of the compartment has slopes less than 10°. Areas and proportions of slope classes are given in Table 1 below.

Table 1 - Slope Classes

Slope class	0° - ≤5°	>5° - ≤10°	>10° - ≤15°	>15° - ≤20°	>20° - ≤25°	>25° - ≤30°	>30°
Area (ha)	15	35.7	51.1	31.7	10.8	1.5	0.6
% cpt area	10.3	24.4	35.0	21.7	7.4	1.0	0.2

Terrain

Western Boundary Road, in the central section of the compartment, is on one of the main ridge lines running through the forest. The major part of the compartment consists of adjacent sides of secondary ridges running east and west of the main ridge.

Drainage line condition

The drainage features of the compartment have been field inspected. The drainage lines are in good condition. They are mostly deeply incised but not often down to bedrock. Most drainage lines in the more open stands are well grassed.

The flow in the streams is intermittent. At the time of recent inspections, water was running in some drainage lines following an extended period of rain.

Aspect

The aspect is south in the northern half of the compartment, and north in the southern half of the compartment.

Rockiness

Field inspection revealed no rock areas on the compartment and rockiness is not a consideration.

(f) Hydrology

The compartment is in the Clarence River catchment. The eastern part of the compartment drains into Towgon Creek, which flows north-east out of the forest and on about three and a half kilometres to the Clarence River. The western part of the compartment drains into Hanging Rock Creek which flows north into the Mann River. There are no prescribed streams, swamps or wetlands within the net harvest area.

No major water storages occur adjacent to, or downstream 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 thus will 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 Mebbin (Sedimentary soils; 1500 mm annual rainfall; 30° slope).

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

Previous harvesting

The compartment was harvested for sawlogs during the late 1960s and mid-1970s. It was harvested again in 1994/95, mainly for poles, veneer logs and girders.

Upstream catchment water use

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

Downstream catchment water use

Both Hanging Rock and Towgon Creeks flow through grazing country downstream of Grange State Forest. There may be limited stock watering from these watercourses.

Domestic water use

The only domestic water supply drawn from the Mann/Clarence below the junctions with Hanging Rock and Towgon Creeks is the Copmanhurst town supply. These two creeks would amount to only a fraction of a per cent 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 Clarence 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 100% live ground-cover being attained within 12 months. The tracks and minor roads utilised during the 1994/95 logging have revegetated except in places where soil has been scraped off to form erosion mitigation banks.

(h) Proposed Operation System

Use of existing roads

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

Western Boundary Road, which runs through the compartment and along part of the boundary, is a fully designed road with concrete relief pipes in the side-cuts and drainage lines, and mitre drains on the ridge-tops.

Four minor roads, Reserve, 372, 372/1 and 372/2 Roads, will be reopened for use during this harvesting operation. These roads are stable, with litter and grass cover. They are drained by outfall drainage. Reopening will involve removal of fallen timber and regrowth from the road pavement and edges. The intersection of Western Boundary Road and 372/2 Road will be widened to accommodate logging trucks.

These works will be done with logging machinery and will cause minimal disturbance to the road pavement. None of the existing roads are likely to cause significant water pollution.

Use of existing drainage feature crossings

372/1 Road crosses three drainage lines on long-established, open causeways. Two of these are stable, and will be improved by the placement of a log on the lower side. This will prevent movement of gravel into the stream from the road pavement as a result of increased traffic.

Because the approaches to the centre crossing are too steep for an open causeway, a pipe will be installed for the duration of the operation. The pipe and associated soil fill will be removed on completion of the operation. This will be done with minimal disturbance to the bed and banks of the drainage line, and the site will be stabilised by sowing with grass seed.

Road construction

There is no road construction required for the harvesting. There will be no need to establish borrow pits or gravel pits.

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

Log dumps are located on ridge tops to facilitate uphill snigging, as indicated on the operational map. There will be limited downhill snigging to dumps 1, 3, 6 and 18 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. The drainage line crossings are long established utilising natural gravel or flat grassy sites. Less than 3% of the snigging activity will be downhill.

Post-harvest burning

In Compartment 372 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. Roads, log dumps and major snig tracks, associated batters, and drainage structures normally stabilise within twelve months provided crossfall and cross bank drainage is properly installed.

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 topsoil data give lower slopes 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 = 3000

K = 0.019 **Topsoil (A horizon)** Method B3

K = 0.013 **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
0-≤7	1	20
8-≤30	2	80
N/A	3	
Roads	3	N/A

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

R = 3000 **K = 0.019**

(b) Dispersibility

%dispersible soil A horizon = 12/100x19/100x100 = **2.28** (Method D1)

%dispersible soil B horizon = 56/100x17/100x100 = **9.52** (Method D1)

The A horizon is not significantly dispersible.

The B horizon is not significantly dispersible.

(c) Other Factors

There are no other soil erosion or water pollution factors which need to be considered in relation to the planned harvesting of Compartment 372.

References

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

Rosewell 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

There are no research plots or long term inventory plots in the net harvest area.

(b) Special Attributes of the Area.

There are three Aboriginal archaeological sites on the boundary of the compartment, as shown on the Operational Map.

Part 3 AUTHORISATION CONDITIONS

3.1 COMPLIANCE

(a) Area Identification

GRAFTON DISTRICT

Grange State Forest No. 771

Compartment 372

Grafton Management Area

(b) Third Party/Lessee or Other Interest

The compartment is within the area of Occupation Permit No 13556 held by Albarine Pty Ltd 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 **"Code of Logging Practice Native Forests - State Forests and Other Crown Timber Lands"** - 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 "Code of Logging Practice Native Forests - State Forests and Other Crown -Timber Lands"**. 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, and where relevant to the Pollution Control Licence, with prior approval from 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: 15 February 1996

(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: 11 March, 1996

Signature: ..... District Forester Date: 20.2.96

(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 - 40, attachments and the Operational, Forest Types and Locality maps marked and referenced to this Harvesting Plan. This is Harvesting Plan No. GG 96/03/372.

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 95/10/84 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 will 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.

The Aboriginal archaeological sites are marked by three yellow rings. Cancelled boundaries are marked with a red slash through the yellow rings.

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

Vertical line indicates location of a minor road or snig track.

Reference: Northern Region Tree Marking Code (1995)

4.3 Order of Working

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

20 dump sites have been located and marked in the compartment, as indicated on the Operational Map. Dumps 4, 8, 9, 10, 11, 12, 13, 14, 18, 19 and 20 have been designated as suitable for working when conditions are wet. While allowing for wet conditions, harvesting will commence on dump 1 and work progressively through to dump 20.

(b) Wet Weather Controls - Roads

During wet weather, the wet-weather controls set out in Section 7 of the Code of Logging Practice will apply. In particular, when it is raining and/or where runoff occurs from a road surface, haulage may not occur unless the road is a gravel or sealed road.

[COLP 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. [COLP 7.2, PCL Sch 4 C 93]

The SFO will be 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 (Jacobs, 1955) where appropriate, shall be implemented.

(b) Tree Marking

Tree marking shall 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 shall 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 shall 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 shall be removed from within approximately 5 metres of the butts of retained habitat trees to minimise bark scorch during prescribed burning operations, or any wild fire.

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 shall 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 are to be employed to minimise damage to retained trees, to avoid hang ups and to maintain values of the Wildlife Corridor, Riparian Habitat Zones, Aboriginal archaeological sites, 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 compartment and none were encountered during field inspections.

(b) Rainforest Protection

There are no areas of rainforest in the compartment.

(c) Grange Flora Reserve

Grange Flora Reserve joins the northern boundary of the compartment east of Western Boundary Road. This boundary is blazed with blue paint. No vehicles or machinery shall enter the Flora Reserve, and trees shall not be felled into, or damaged in, the Flora Reserve.

4.6 Fauna Protection

(a) Sightings of Fauna

No Endangered or Vulnerable species have been recorded from this compartment. The Powerful Owl and Golden-tipped Bat have been recorded from compartment 368, about 2 km to the south-east of compartment 372. Endangered and Vulnerable 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**	**Red-legged Pademelon**
Common Planigale	**Koala**	**Long-nosed Potoroo**
Great Pipistrelle	**Golden-tipped Bat**	**Little Bent-wing Bat**
Common Bent-wing Bat	**Large-footed Mouse-eared Bat**	

Contractors and supervisory staff shall report any sightings of Endangered or Vulnerable 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

Compartment 372 includes Dry Hardwood forest and Moist Hardwood forest with xeromorphic understorey and Moist Hardwood forest with mesic understorey. Potential habitat trees appear to be limited in some areas. Sufficient 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

Wildlife Corridor

A designated wildlife corridor exists along the creek forming the north-eastern boundary of the compartment, as shown on the Operational Map. The corridor is 40 metres wide on either side of the creek.

- no harvesting machinery shall enter the Wildlife Corridor.
- felling and snigging shall be excluded from the Wildlife Corridor.

- trees shall not be felled into the Wildlife Corridor.
- trees shall not be damaged in the Wildlife Corridor.

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 no harvesting machinery may enter Riparian Habitat Zones.
- felling and snigging shall be excluded from Riparian Habitat Zones.
- trees shall not be felled into Riparian Habitat Zones.
- trees shall not be damaged in Riparian Habitat Zones.

Refugia areas

No areas of critical habitat for Endangered or Vulnerable 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 Endangered and Vulnerable species that might be adversely impacted on by forest management activities. Those relevant to Compartment 372 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 compartment are the Rufous Bettong, Red-legged Pademelon, 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 Red-legged Pademelon is defined as moist gully vegetation and rainforest. 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 shall be made to minimise disturbance to mature seeding forest oaks throughout the logging area. 100 metre radius buffer zone shall be established around each identified nest site. This prescription is to be reviewed when more than 10 confirmed locations of the species have been recorded in the management area

Prescription 4:

Powerful/Masked/Sooty Owls

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

Prescription 6:

Brush-tailed Phascogale

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

Prescription 7:

Yellow-bellied Glider

All trees with V-notch markings will be retained. The tree with the most recent V-notch markings or other incisions shall be the centre tree of an area with a 50 metre radius. Within 50 metres of the identified V-notch scarred tree the following trees will be retained: known scarred trees, an additional 10 trees (>10 cm dbh) of the sap feed tree species, and a minimum of 5 bark shedding trees. These trees may be located within unlogged remnants, but retained sap feed trees may not count as retained bark shedding trees.

Prescription 8:

Squirrel Glider

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

Prescription 9:

Koala

Trees with identifiable use by Koalas at the time of harvesting shall be retained. If no further Koala evidence is found within 100 metres of the use tree a minimum of 5 Koala food trees shall be retained within the 100 metres. If regular activity is detected but less than 20% of the trees within 100 metres have faecal pellets underneath and no Koalas are observed, trees with evidence of regular Koala activity shall be retained; a minimum of 15 trees are to be retained within the 100 metres radius. If regular Koala activity is detected and more than one Koala is observed or more than 20% of trees within 100 metres radius have faecal pellets underneath, forestry operations, except low intensity prescribed burning, shall be excluded from the 100 metres radius and the Manager Threatened Species, Northern Zone of the NPWS shall be informed.

Prescription 10:

Long-nosed Potoroo

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

Prescription 11:

Golden-tipped Bat/Little Bent-wing Bat/Common Bent-wing Bat/Large-footed Mouse-eared Bat

100 metre radius buffer zone shall 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 this 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 Compartment 372, based on the topsoil data, are detailed in Table 4 below.

Table 4 - Water Pollution Hazard Categories

Slope Ranges (Degrees)	Water Pollution Category	Indicative % of Net Harvest Area
0-≤7	1	20
8-≤30	2	80
N/A	3	N/A
Roads	3	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, Snig Tracks and Crossings

The marking and location of roads, log dumps, snig tracks and crossings in the field will be in accordance with condition 4.2. The location of roads, drainage feature crossings and log dumps are indicated on the Operational Map and cannot be varied in the field without the prior written approval of the EPA.

(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 Code of Logging Practice. During wet weather, the wet weather controls for road usage and for snigging set out in section 7 of the Code of Logging Practice will 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.

Dumps 4, 8, 9, 10, 11, 12, 13, 14, 18, 19 and 20 as marked on the Operational Map, are suitable to be worked during wet weather periods.

(e) Existing Roads

Clearing of regrowth

A minimal amount of clearing will be required to open existing roads for use. This will involve the removal of fallen timber and small regrowth trees from the road pavement and edges. Additional clearing will be required at the intersection of Western Boundary Road and 372/2 Road to accommodate logging trucks.

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 the Table below. The banks must have a minimum design consolidated

vertical height from spillway to bank top of 20 cm. Such banks should readily cater for 1 in 5 year storm events.

Spacing of Rollover Crossbank Drainage
(grade of road - degrees)

0 - ≤5	>5 - ≤10	over 10
100m	60m	40m

Rollover crossbanks must drain at natural surface level, or by way of installed plastic sheeting, onto undisturbed vegetation. Where undisturbed vegetation is not immediately accessible to the outfall, sediment trap fences must be installed across the outlet.

Rollover banks shall be retained in situ after the roads have been closed.

Crossing of drainage features

The drainage lines in the compartment are intermittent. At the time of recent inspections, some were running water after an extended period of rain.

372/2 Road crosses three drainage lines. The first and third crossings are open, natural surface causeways that are in a stable condition. A log shall be placed at the bottom side of each of these to ensure material does not move into the stream from the road pavement with increased traffic. The approaches to these causeways shall be gravelled if pavements commence to deform. Any disturbed areas adjacent to these causeways shall be seeded with rye grass at the rate of 20 Kg/ha immediately following the logging, where considered necessary by the SFO. These causeways will remain in situ after the logging has been completed.

A pipe shall be installed at the centre crossing for the duration of the operation. The pipe and associated soil fill will be removed on completion of the operation. This shall be done with minimal disturbance to the bed and banks of the drainage line. The crossing shall be stabilised by seeding with rye grass at the rate of 20 Kg/ha immediately following the removal of the pipe.

Revegetation and rehabilitation

Revegetation of the minor roads following harvesting will be through natural regeneration. All crossbank rollover drains shall be left in working condition and crossfall (outfall) drainage reinstated.

Dispersible soils

Not applicable to this compartment.

(f) Road Construction

No road construction is required for the harvesting.

Design

Not applicable for this logging operation

Grade

Not applicable for this logging operation.

Survey

Not applicable for this logging operation.

Clearing

Not applicable for this logging operation.

Batters

Not applicable for this logging operation.

Crossing of drainage features

Not applicable for this logging operation.

(g) Slope limits for the area

Maximum slope for harvesting	30 degrees
Maximum slope for snig track construction	30 degrees
Maximum side slope for snig track construction	30 degrees
Maximum road grade permitted	10 degrees
Maximum side slope for road construction	30 degrees without design

(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 Compartment 372 at minimum widths as stated in Table 5 below. These minimum widths meet or exceed the requirements of the Pollution Control Licence.

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	<40 ha >18°slope		10m	10m
2	>40 ha	20m		
3 N/A	<40 ha <18° slope		10m	10m
3 N/A	<40 ha >18° slope		15m	10m
3 N/A	>40 ha <18° slope	20m		5m
3 N/A	>40 ha >18° slope	20m		10m

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

The SFO must mark the Riparian Habitat Zones and protection strips (or filter strips 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 shall be indicated on marked protection strip trees. The licensee or contractor shall be 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 or Riparian Habitat Zone adjacent to the protection strip. (See also 4.2, 5.2)

Contractors and operators shall be responsible for identifying drainage depressions 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 hand brushing of furrows 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.

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.

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

Soil disturbance in drainage depression buffer strips must be minimised by use of the following techniques:

- no snigging along drainage depressions.
- minimal use of blade.
- logs shall be approached in reverse gear.
- minimal change in direction while snigging logs out of drainage depressions.

(l) Snig Tracks

It is preferable that, wherever practicable, walkover extraction techniques be used in preference to snig track construction. It is anticipated that all snigging in the compartment will be carried out by this method.

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

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 licensee/contractor 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-≤7	1	10
8-≤30	2	8
N/A	3	5

Where earth banks are required they must be constructed to a minimum unconsolidated effective height of 25 cm, with spacing in accordance with Table 7.

Table 7 - Maximum Earth Bank Spacing

Track Grade (degrees)	WPH Category		
	1 (0° - ≤7°)	2 (8° - ≤30°)	3 (N/A)
0 - ≤5	200m	150m	100m
>5 - ≤10		100m	60m
>10 - ≤15		60m	40m
>15 - ≤20		40m	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, 3, 6 and 18.

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

- Crossfall drainage must be used where practicable.
- Where practicable the snigging pattern shall be uphill from the stump with the logs being bunched for the downhill portion of the snig onto a centrally located extraction track(s).
- Tracks approaching a log dump shall be located so as to direct water away from the dump immediately before reaching the dump.

(n) Snig Track Drainage Line Crossings

The drainage lines in the compartment flow only intermittently. At the time of recent inspections, some were running water following an extended period of rain.

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

(o) Dispersible Soils

Not applicable to this compartment.

(p) Log Dumps

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

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

Dumps shall be constructed with outfall drainage and shall be kept drained during use and at the completion of operations.

At the completion of operations any debris at or near the edge of a dump shall be moved away from standing vegetation into the dump area. The topsoil shall be respread uniformly over the dump area which shall be left in a neat and stable condition.

(q) Prescribed Burning

Pre-logging burning

The will be no pre-logging burning associated with the harvesting of Compartment 372.

Post-logging burning

Post-logging burning of Compartment 372 will 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

Burning will be undertaken by the lighting of individual heaps of harvesting slash and debris under conditions that will enable the fires to be contained within the compartment.

The Grafton District Operations Foreman will be 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

There are no research or inventory plots in Compartment 372.

4.9 Modified Harvest Conditions

(a) Special Emphasis Flora and Fauna Protection (Wildlife Corridor)

A designated Wildlife Corridor (Preferred Management Priority Classification 1.1.7, Flora and Fauna Protection) exists along the creek forming the north-eastern boundary of the compartment. The corridor is 40 metres wide either side of the stream.

- no harvesting machinery shall enter the Wildlife Corridor.
- felling and snigging shall be excluded from the Wildlife Corridor.
- trees shall not be felled into the Wildlife Corridor.
- trees shall not be damaged in the Wildlife Corridor.

(b) Special Emphasis Visual Resource Protection

A visual strip (PMP Classification 1.1.6, Visual Resource Protection) exists along Western Boundary Road, as indicated on the Operational Map. North of the intersection with 372/2 Road, this strip extends from Western Boundary Road to the fence. South of the intersection the strip is 30 metres wide on the eastern side of Western Boundary Road, and 50 metres wide on the western side.

- Harvesting activity in the Visual Resource Strip shall be restricted to trees under 40 cm dbhob and 50% of trees greater than 40 cm dbhob.
- Harvesting activity in the Visual Resource Strip shall be restricted so as to always maintain the high tree line as seen from a distance.
- Any roads shall run at an acute angle through the Visual Resource Strip.
- Dumps shall only be located in the Visual Resource Strip if the high canopy can be maintained.

(c) 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 no harvesting machinery may enter Riparian Habitat Zones.

- felling and snigging shall be excluded from Riparian Habitat Zones.
- trees shall not be felled into Riparian Habitat Zones.
- trees shall not be damaged in Riparian Habitat Zones.

(d) Aboriginal Archaeological Sites

The boundaries of three Aboriginal archaeological sites (indicated on the Operational Map) have been marked in the field.

- no harvesting machinery shall enter site boundaries.
- felling and snigging shall be excluded from within site boundaries.
- trees shall not be felled into site boundaries.
- where an existing road passes through a site the road may be used, but vehicles shall not move off the road within site boundaries.
- no blading-off or other alterations to roads shall be undertaken within site boundaries.

(e) Grange Flora Reserve

The boundary of Grange Flora Reserve (joining the northern boundary of the compartment) is marked in the field.

- no vehicles or harvesting machinery shall enter the Flora Reserve.
- trees shall not be felled into the Flora Reserve.
- trees shall not be damaged in the Flora Reserve.

(f) Boundary Fences

Private property adjoins the western and part of the northern boundary of the compartment, as shown on the Operational Map. This boundary is partially fenced. Damage to these fences is to be avoided. Any damage caused is to be immediately repaired.

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 Compartment 372

Estimated Yields are:

Compulsory Sawlogs 40 cm +	1000 m^3
Compulsory Sawlogs <40 cm	150 m^3
Salvage Sawlogs	150 m^3

Non-harvest areas and modified harvest areas

The boundaries of the Wildlife Corridor, the Visual Resource Strip, and Riparian Habitat Zones shall be marked ahead of harvesting operations. The boundaries of Grange Flora Reserve and the Aboriginal archaeological sites have been marked.

(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 shall 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 SFOs 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 if there are no protection strips) in the field progressively and prior to the commencement of operations in each section of the harvest area.

The SFO is responsible for ensuring that the licensee or contractor 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 (i)).

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 shall be followed.

(b) Fauna Reporting and Mitigation Prescriptions

Sightings of any Endangered or Vulnerable 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 Constructed Crossings

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

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

Not applicable to this compartment.

Condition 5.4 Pre- and Post-logging Burning

(a) Pre-logging Burning

There will be no pre-logging burning associated with the harvesting of Compartment 372.

(b) Post-logging Burning

Post-logging burning of Compartment 372 will be carried out in accordance with provisions and specifications of the Nymboida District Fire Plan and the Grafton District Fuel Management Plan.

Ignition

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

There are no other instructions concerning the supervision of harvesting Compartment 372.

Condition 5.6 Supervising Forest Officer's Acknowledgment

I acknowledge that I have received a copy of Harvesting Plan No GG 96/03/372 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" Metasediments

(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 = 3000 Derived from $R = 89.31 \times {}^{2}I_{12}{}^{1.74}$

K = 0.019 topsoil (A Horizon)

Derived from Laboratory Analysis of the A Horizon

The A 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
0 <= 9	Low	less than 40	35
>10 to <=35	Moderate	40 - 400	65
N/A	High	400 - 800	
N/A	Extreme	greater than 800	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.

(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 (k) Extraction Tracks and Snig Tracks, when necessary.)

Preparation (by Forester, Forest Assistant)

Prepared by Leonie Walsh Signature .....

Title Marketing Forester Date 15/2/96

District Approval (by District Forester)

Signature .....

District Forester

Date 20.2.96.

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	Yes	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 (e)
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)
	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 ATTACHMENT

Aerial Photography Interpretation

Photography: Coaldale 1:25 000 colour NSW 4231 13/1/94
Run 13 Print 52

Interpreter: Nigel Fuller Date completed: 28 Nov 1995

Results summary (ocular estimate):

	Candidate QGF	Whole cpt
Polygons >25 ha		No
Contiguous areas >25 ha		No

Mapping required? No

Photo overlay(s) signed and stored with harvesting plan? No

Unlogged Area

Assessor: Leonie Walsh Date completed: 5 Jan 1996

Sources: Logging records
Field inspection

Unlogged areas >25 ha NLA present? No

Prepared by Leonie Walsh
Marketing Forester

Signature.....
Date.....15/2/96.....

District Approval

District Forester
GRAFTON DISTRICT

Date 20.2.96

VENESS & ASSOCIATES

ACN 003 419 958 Pty Limited

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

4th January, 1996

Attn: Leonie Walsh
State Forests of NSW
PO Box 366
GRAFTON NSW 2460

Dear Leonie,

Re: soil testing / harvesting plans - Grange SF

Attached please find the results of the soil testing program undertaken on samples from various compartments within the Grange State Forest.

You would be aware that Veness & Associates undertook the soil survey work associated with the Grafton Forestry EIS as well as recent sampling / testing of soils within compartments located adjacent to those which are the subject of this report. In summary, the soils located within the two soil mapping units occurring in this area are very consistent within each of the units. That is, the soils found to occur in soil mapping unit D (formed from granites) within compartments 356, 357 and 358 are similar to soils found elsewhere in this unit. Likewise, the soils formed from metasediments (soil mapping unit C) are very consistent throughout the area.

Note that the C / D boundary in compartments 357 and 358 differs slightly from that recorded in the EIS study. At the scale of study required for the harvesting plan preparation, this boundary was found to deviate slightly to the east. It appears that either, this boundary is quite wide or, a small pluton occurs in this area. In either case, the soils occurring in compartments 357, 358, 359 and 361 which are located east of the boundary belong to soil mapping unit C while the soils occurring in compartments 356, 357 and 358 which are located to the west of the boundary belong to soil mapping unit D.

The metasediment soils within compartment 358 were not sampled but were observed to be very similar to the metasediment soils occurring in the adjacent compartments 357, 359 and 361. Consequently, if the "worst case" values of these adjacent soil data (i.e. at site 357/2) are adopted for the metasediment soils in compartment 358, it is considered that this would present a conservative viewpoint for these metasediment soils in compartment 358.

Despite the occasional high 'K' value, all of the soil materials in these compartments are reasonably stable according to the D% x clay% values.

If you have any queries in respect of this report, please get back to me.

Yours faithfully,

Jim Veness

Sample Number	Sample Type	Sample Depth (cm)	Soil Unit	Particle Size Analysis (%) clay	silt	fine sand	coarse sand	gravel	D%	Texture+	Structure*	Permeability*	Organic Matter (%)	'K'#	D% x clay%
356/1/A	Topsoil	5-10	D	2 (2)	17(17)	31(32)	47(49)	3	9	SCL-	2	1	3.4	0.023	0.18
356/1/B	Subsoil	50-60	D	3 (3)	10(11)	20(22)	56(64)	11	44	CLS	1	1	0.69	0.013	1.32
357/1/A	Topsoil	2- 8	D	4 (4)	15(16)	30(32)	46(48)	5	18	SCL-	2	1	2.9	0.023	0.72
357/1/B	Subsoil	25-35	D	5 (5)	17(19)	28(31)	41(45)	9	25	SCL-	2	1	1.9	0.028	1.25
357/2/A	Topsoil	5-10	C	4 (4)	38(43)	31(35)	16(18)	11	19	CL	2	2	6.9	0.028	0.76
357/2/B	Subsoil	25-30	C	13(14)	46(49)	25(27)	9(10)	7	37	SiC	2	4	2.3	0.056	4.81
358/1/A	Topsoil	2- 8	D	6 (6)	20(20)	44(45)	28(29)	2	19	FSCL	2	3	2.6	0.041	1.14
358/1/B	Subsoil	18-25	D	6 (6)	16(17)	42(44)	31(33)	5	64	SCL	3	2	0.86	0.046	3.84
358/2/A	Topsoil	5-10	D	7 (7)	22(23)	37(39)	30(31)	4	20	SCL	2	1	2.9	0.032	1.40
358/2/B	Subsoil	20-30	D	8 (9)	21(24)	26(29)	34(38)	11	29	SCL	2	2	1.4	0.034	2.32
359/1/A	Topsoil	5-10	C	10	19	48	23	-	15	CL	2	3	7.4	0.020	1.50
359/1/B	Subsoil	20-25	C	12(12)	20(21)	37(39)	27(28)	4	30	FSCL	3	3	2.4	0.041	3.60
361/1/A	Topsoil	5-10	C	3 (4)	33(42)	30(38)	13(16)	21	17	CL	2	3	9.3	0.020	0.51
361/1/B	Subsoil	20-30	C	7(10)	33(45)	20(28)	12(17)	28	27	LC	1	4	2.8	0.052	1.89

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

(Report VA1715B continued on page 2)

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
(Managir irector)
VENESS & ASSOCIATES Pty Limited
19th December, 1995

Sample Number	Sample Type	Sample Depth (cm)	Soil Unit	Particle Size Analysis (%) clay	silt	fine sand	coarse sand	gravel	D%	Texture+	Structure*	Permeability*	Organic Matter (%)	'K'#	D% x clay%
370/1/A	Topsoil	2- 8	C	6 (8)	16(22)	23(32)	27(38)	28	5	CL	1	2	6.0	0.017	0.30
370/1/B	Subsoil	35-40	C	13(19)	20(29)	24(35)	12(17)	31	6	CL	1	3	3.3	0.033	0.78
372/1/A	Topsoil	2- 8	C	12(14)	31(37)	32(38)	9(11)	16	19	SiCL	1	2	6.7	0.019	2.28
372/1/B	Subsoil	35-45	C	56(60)	16(17)	16(17)	6 (6)	6	17	LC	2	4	0.69	0.013	9.52
373/1/A	Topsoil	5-10	C	8(13)	20(33)	22(36)	11(18)	39	10	CL	2	3	6.0	0.031	0.80
373/1/B	Subsoil	40-50	C	40(49)	19(23)	13(16)	10(12)	18	10	LC	1	4	0.86	0.014	4.00
378/1/A	Topsoil	5-10	C	17(18)	36(39)	30(33)	9(10)	8	16	CL	1	2	0.52	0.046	2.72
378/1/B	Subsoil	30-40	C	43(52)	16(20)	15(18)	8(10)	18	11	LC	1	4	0.69	0.013	4.73
379/1/A	Topsoil	5-10	C	8(12)	25(35)	25(35)	13(18)	29	14	CL	1	2	7.4	0.018	1.12
379/1/B	Subsoil	20-30	C	20(36)	16(29)	11(20)	8(15)	45	18	LC	1	4	1.6	0.030	3.60
380/1/A	Topsoil	5-10	C	5(10)	15(29)	21(40)	11(21)	48	18	FSCL	1	2	6.9	0.023	0.90
380/1/B	Subsoil	30-40	C	40(46)	18(21)	18(21)	11(12)	13	21	LC	2	4	0.52	0.021	8.40
381/1/A	Topsoil	2- 7	C	6 (8)	15(20)	42(57)	11(15)	26	10	FSCL	1	2	8.1	0.016	0.60
381/1/B	Subsoil	25-35	C	41(47)	18(20)	25(28)	4 (5)	12	3	LC	1	4	1.4	0.017	1.23
382/1/A	Topsoil	5-12	C	3 (8)	13(33)	21(54)	2 (5)	61	13	SiCL	1	2	10.1	0.033^	0.39
382/1/B	Subsoil	20-30	C	11(14)	25(33)	36(47)	5 (6)	23	33	LC	2	4	2.1	0.059	3.63

NOTES: PSA values are calculated inclusive of gravels. The values in brackets have been recalculated after excluding gravels
+ textures determined after Northcote (1979);
* structure & permeability classes are those used in SOILOSS;
# 'K' value has been determined using SOILOSS version 5.1
^ this value of 'K' has been determined using the nomograph as directed by the SOILOSS program

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
(Managi- Director)
VENESS & ASSOCIATES Pty Limited
30th November, 1995

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. 795 5000
Facsimile .02. 795 5002

Our Reference: 600000/D27/Not. Nos. 002774

Your Reference:

30 April, 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, 1996.

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 further amending the harvesting plan for Compartment 557, Wild Cattle Creek State Forest No. 488, (prepared by State Forests of NSW, and received by the EPA on 27 March 1996, as amended by Notice under section 17D(3) of the Pollution Control Act 1970 issued by the EPA on 10 April 1996) by:

a) inserting the attached additional harvesting plan operational map received by the EPA on 24 April 1996 and certified by Geoff Noonan.

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

"Compartment Description

Compartment 372
Grange State Forest No. 771

Water Pollution Hazard Categories

Water Pollution Hazard Category	Slope Ranges (degrees)
1	Less than or equal to 5.
2	Greater than 5 and less than or equal to 19.
3	Greater than 19 and less than or equal to 30.
4	Not applicable.

Proportion of dispersible soils: A horizon 2.28%
B horizon 9.52%

Special Conditions

Special conditions are those conditions contained in the harvesting plan for Compartment 372, Grange State Forest No. 771, prepared by State Forests of NSW, received by the EPA on 12 March 1996, and as amended by:

1. addendum 1 received by the EPA on 18 April 1996; and

2. addendum 2 received by the EPA on 22 April 1996; and

3. addendum 3 received by the EPA on 26 Apil 1996.

Water Quality Monitoring Site

To be determined

Date of licence variation

30 April 1996."

NEIL SHEPHERD
Director-General

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

For Action or Noting by		
Originator	HL	30.4.96
1. A/MDIU		
2. MWCP		
3.		
4.		

SUBMM41-7868-KG

FACSIMILE TRANSMISSION

To	Dr. Neil Shepherd, Environment Protection Authority P O Box 1135 CHATSWOOD NSW 2057		
Attention	Mr Geoff Noonan Catchments Branch 30/4/96	**Date**	30 April 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

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 30 April 1996 to include the following areas:

Compartment No	State Forest	Managenent Area
557	Wild Cattle Creek	Dorrigo
372	Grange	Grafton

for A. HOWE
Manager
Forest Planning Branch

For State Forests Use Only (Page 1 of 3.)

District Forester; Dorrigo & Grafton

As required under the above legislation we advised EPA about our intention not to appeal against this Licence amendment **on 30 April 1996.** Accordingly you may start logging these compartments **on 2 May 1996.**

Manager, Forest Planning Branch

HARVEST PLAN DESK AUDIT CHECKLIST

Register No: 707 Date Received: 26 / 4 /1996

State Forest: GRANGE Compartment/~~Age Class~~: 372

District: GRAFTON State Forest No: 771

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 = 3000 . Zone 2
K	✓		✓		K = 0.033
S					as factored by SOILOSS 5.1
L					L = 20 M
C	✓		✓		C = 0.108

Soil Sampling personnel named and approved: VENESSA ASS (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	10	0≤5	
WPHC 2	80	7≤19	
WPHC 3	10	>19≤30	
WPHC 4			

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: 19 x % C: 12 / 100 = 2.28
B Horizon % D: 17 x % C: 56 / 100 = 9.52

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: MERRIN State Forest

Annual rainfall: 1200 Geology: METASEDIMENTS

Forest Type: SPOTTED GUM - IRONBARK / GREY GUM

HARVEST PLAN DESK AUDIT CHECKLIST

Condition	Condition	Comply	Comment
1 b	**Site Specific conditions** Attached site specific conditions to harvesting plan	N/c	p15
6	**Minimum protection widths for drainage line in native forests** Any prescribed streams, swamps and wetlands	N/c	p11
7	Any major water storages present	N/c	p11
9 (1 c)	Minimum protection widths Show filter strips on harvesting plan map	✓	
9 (2)	Show protection strips on harvesting plan map	X	
10	Prescriptions for marking F, P, and B strips in the field	✓	p31
20	**Operations within Native Forest Protection strips** Person responsible for identifying P strips in the field	✓	p31 SFO
22	**Operations within Native Forest Buffer strips** Person responsible for identifying B strips in the field	✓	p31 contractor
24	Specifications of techniques for minimising soil exposure and that any disturbance will cause no channelised flow in buffer strip	✓	p32
25	**Minimum protection widths for drainage feature in native plantations** (as per 6 and 7)	NA	
32	**Operations within Native Plantation Protection strips** (as per 20)	NA	
33	**Operations within Native Plantation Buffer strips** (as per 22 and 24)	NA	

Condition	Condition	Comply	Comment
34	**Minimum protection widths for drainage feature in Softwoods Plantations** (as per 6 and 7)	NA	
40	**Operations within Softwood Plantation Filter Strips** Person responsible for determining 5 metre machinery zone	NA	
46	**Operations within Softwood Plantation Buffer Strips** (as per 22 and 24)	NA	
47	**Road design, construction and maintenance** Specify techniques for the road design, construction and maintenance	✓	p13, 28
48	Proposed road locations are shown on harvesting plan map	✓	
49	Maximum slopes for road construction Specify techniques for road stabilisation within 6 months of construction for roads built on slopes > 30 °	NA	
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	✓	p28
57	**Borrow Pits and Gravel Pits** Specify techniques for 1. construction of stable batters 2. stabilisation at the completion of operations	N/A	p13

Condition	Condition	Comply	Comment
60	**Road Batters** Specify road batter stabilisation techniques	✓	p28
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	✓	p28
71	**Crossing of drainage features** Specify location and type of crossings at drainage features	✓	p13, 29
78	**Road no longer required** Specify techniques to be used to stabilise roads that are no longer used	✓	p29
81	**Dispersible Soil** Specify techniques used to protect roads and dispose of spoil that is dispersible	NA	
89	Snig Track Construction Specify criteria for ensuring that snig tracks are located and constructed where they can be drained effectively	✓	p33

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	✓	p33
109	**Downhill snigging** Specify measures to prevent concentrated water flow where downhill snigging occurs	✓	p33
112	**Snig Tracks and Dispersible Soil** Specify measures to protect dispersible soils	NA	
115	**Log Dumps** Specify location of log dumps on harvesting plan map	✓	p37
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	✓	p34

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	✓	p 34-38, 39-40

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

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 : GRANGE 372
Date : 23-04-1996 Time : 12:41 Report Number : 1

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

Rainfall Erosivity:	Rainfall Zone: 2	R = 3000
Soil Erodibility	: User supplied	K = 0.033
Topography	:Slope: 5.0° Slope Length: 20 m	LxS = 0.922
Support Practice	: No cultivation (P = 1)	P = 1.000
Management	:	
Rotation	:	
Cultivations	:	
Cover Management	:Forest land - User Supplied	C = 0.1080

Long-term average annual soil loss: A = 9.9 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 9.9 to 5 t/ha.a the options are :
* Reduce C to 0.0548

****

****
********** 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 : GRANGE 372
Date : 23-04-1996 Time : 12:42 Report Number : 2

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

Rainfall Erosivity:	Rainfall Zone: 2		R = 3000
Soil Erodibility	: User supplied		K = 0.033
Topography	:Slope: 19.0°	Slope Length: 20 m	LxS = 4.472
Support Practice	: No cultivation (P = 1)		P = 1.000
Management	:		
Rotation	:		
Cultivations	:		
Cover Management	:Forest land - User Supplied		C = 0.1080

Long-term average annual soil loss: A = 48 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 48 to 10 t/ha.a the options are :

* Reduce C to 0.0226

****

****
********** 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 : GRANGE 372
Date : 23-04-1996 Time : 12:42 Report Number : 3

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

Rainfall Erosivity: Rainfall Zone: 2 R = 3000
Soil Erodibility : User supplied K = 0.033
Topography :Slope: 30.0° Slope Length: 20 m LxS = 6.639
Support Practice : No cultivation (P = 1) P = 1.000
Management :
Rotation :
Cultivations :
Cover Management :Forest land - User Supplied C = 0.1080

Long-term average annual soil loss: A = 71 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 71 to 10 t/ha.a the options are :

* Reduce C to 0.0152

****

Forest Planning and Fire Management Branch

Phone No. (02) 7955372

To	District Forester - Grafton / Planning Forester
From	Forestry Liaison Officer - Environment Protection Authority
Date	23 April 1996
Subject	HARVESTING PLAN GRANGE 372.

The harvesting plan for Grange 372 has been examined by the Liaison Officer. Although comprehensive, the harvesting plan will fail to satisfy the Environment Protection Authority (EPA) without some minor alteration to the text. Please implement the amendments requested so that an amended harvesting plan can be submitted to the EPA. The amended pages must be forwarded to State Forests Forest Regulation Unit for consideration with the original harvesting plan.

Amendments requested are:-

1. enforceable language corrections

- *page 29. Part 4.7(e), road surface drainage.*

  In the second stanza, second sentence I suggest we insert after undisturbed vegetation 'or logging slash'.

- *page 29. Part 4.7(e), crossing of drainage features.*

  In the second stanza, fourth sentence insert after commence to deform 'as determined by the ~~supervising Forester~~ SFO'.

  In the last stanza insert after must be stabilised 'by the SFO'.

- *page 34. Part 4.7(n), snig track drainage line crossings.*

  In the last stanza, second sentence replace 'loose material' with 'harvest debris' as the EPA mis-interpret what loose material is and associate it with spoil.

- *page 34. Part 4.7(q), pre-logging burning.*

  Replace 'will be' with 'is'.

- *page 35. Part 4.7(q), ignition.*

  Replace 'will' with 'must'.

- *page 37. Part 5.1(a), general, third line.*

  Replace 'will be' with 'is'.

- *page 37. Part 5.1(b), relieving SFOs, first line.*

  Replace 'will be' with 'are'.

- *page 37. Part 5.1(c), SFOs authority, last point.*

  Replace 'will' with 'must'.

- *page 39. Part 5.4(a), pre-logging burning.*

  Replace 'will be' with 'is'.

- *page 40. Part 5.4(b), post-logging burning.*

  Replace 'will' with 'must'.

- *page 40. Part 5.4(b), ignition.*

  Replace 'will be' with 'is'.

2. *page 28. Part 4.7(c), marking and location of roads log dumps snig tracks and crossings.*

   Delete 'snig tracks' from the first and third point unless we do intend to mark all snig track locations.

3. *page 29. Part 4.7(e), road surface drainage.*

   Reword first stanza, last sentence as
   'Such banks must convey the peak flow from a 1:5 year storm event.'

   Some calculations for maximum discharge were received. These may be for determining that roll over cross-banks of 20 cm are adequate. If 20 cm roll over cross-banks are adequate please supply the summary letter by the soil scientist to complement the data sheets.

   However if they were for the culvert replacement then please edit roll over cross-bank height to '25 cm'.

4. *page 30. Part 4.7(g), slope limits for the area.*

   Edit second row to
   'Maximum grade of snig track construction 25 degrees'

   The SEMGL restricts maximum grade of snig tracks on high erosion category soils to 25 degrees.

5. *page 37. Part 5.1(c), SFOs authority, fifth approval point.*

   Insert after location and type of 'watercourse and'.

or Alternatively if we do not intend to cross watercourses then insert as an additional section in part 4.8(n)
'Watercourses must not be crossed.'

6. *page 40. Part 5.5, other instructions.*

   Insert
   'The SFO must ensure that plastic sheeting is installed as a drop down structure below roll over cross-banks on roads where the batter has been exposed by the logging operation.

   The SFO must ensure that sediment trap fences are installed across outlets of roll over cross-banks on roads where water flow does not discharge onto undisturbed vegetation or logging slash.'

In preparing the amendments the Planning Forester should consult 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 GG 96/03/372.

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

cc
Operations Manager
Northern Region

Grange 372

Previous Register # 624

707 NORTH 26/4/96

FACSIMILE TRANSMISSION

To	Forest Regulation Coordinator		
Attention	KRIS GOUNDER	Date	26/4/96
Your Fax		Our Fax	(066) 432131
From	Leonie Walsh	Phone	(066) 432022
No of Pages	12 (Inducing this cover page)	File No	

STATE FORESTS
NORTHERN REGION

Message

State Forests of
New South Wales
Northern Region
PO Box 368
Grafton NSW 2460
Phone (066) 432 022

Harvesting Plan GG 96/03/372
Cpt 372 Grange SF

Following are amended pages for insertion in the above Harvesting Plan in response to the request from the EPA Forestry Liaison Officer, dated 23/4/96.

All the requested amendments have been made except for the following:

- request 1, second dot point: I have written SFO instead of supervising Forester, because the supervising Forester spends all of her time in the Office writing harvesting plans.

- request 2: I don't understand the reference to "third point". My copy of the plan only has one paragraph under 4.7(c). I have deleted 'snig tracks' from the first sentence.

- request 3: I have not reworded the sentence as requested. This sentence is not an instruction, it is statement of fact. I have reworded it to read "Such banks will cater for the peak flow of a 1 in 5 year storm event". This was the wording requested by the EPA in relation to cpts 353 and 356.

  A letter from the Soil Conservationist in relation to the calculations for rollover crossbank height also follow.

Because I was in HO on Wednesday, and the Liaison Officer is not in today, I have not been able to consult with him before sending these amendments

as requested. I have taken the risk of sending them anyway, in the hope of saving a couple of days. Please contact me if there are any problems.

for R J Williams
District Forester
GRAFTON DISTRICT

- Transport of logs from the site using a jinker and prime mover.

(c) Marking and Location of Roads, Log Dumps, Snig Tracks 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 and cannot be varied in the field without the prior written approval of the EPA.

(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.

Dumps 4, 8, 9, 10, 11, 12, 13, 14, 18, 19 and 20 as marked on the Operational Map, are suitable to be worked during wet weather periods.

(e) Existing Roads

Clearing of regrowth

Reopening of existing roads will involve lowering of crossbanks, and 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..

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 must be spaced as stated in the Table below. The banks must have a minimum design

consolidated vertical height from spillway to bank top of 20 cm. Such banks will cater for the peak flow of a 1 in 5 year storm event.

Spacing of Rollover Crossbank Drainage
(grade of road - degrees)

0 - ≤5	>5 - ≤10	over 10
80 m	45 m	35 m

Rollover crossbanks must drain at natural surface level, or by way of installed plastic sheeting, onto undisturbed vegetation or logging slash. Where undisturbed vegetation is not immediately accessible to the outfall, sediment trap fences must be installed across the outlet.

Rollover banks must be retained in situ after the roads have been closed.

Crossing of drainage features

The drainage lines in the compartment are intermittent. At the time of recent inspections, some were running water after an extended period of rain.

372/1 Road crosses three drainage lines. The first and third crossings are open, natural surface causeways that are in a stable condition. Each of these must have a log placed on the bottom side to ensure material does not move into the stream from the road pavement with increased traffic. The approaches to these causeways must be gravelled if pavements commence to deform, as determined by the SFO. At the conclusion of harvesting, any disturbed areas adjacent tot hese causeways must be seeded with rye grass by the SFO at the rate of 20 kg/ha. These causeways must remain in situ after the logging has been completed.

A 450 mm pipe must be installed at the centre crossing for the duration of the operation. Installation and removal of the pipe and associated soil fill must be done in a way that minimises the bed and bank of the drainage line, and results in minimal deposition of spoil within the drainage line. Any spoil deposited in the drainage line must be removed with minimal bed or bank disturbance unless removal will cause more damage than non-removal. Spoil must not be deposited in filter or protection strips.

The approaches to this crossing must be stabilised by the SFO with rye grass at the rate of 20 kg/ha immediately following the removal of the pipe.

Revegetation and rehabilitation

The slight erosion on 372/1 Road must be rectified by the construction of rollover drains following completion of the operation.

Revegetation of the minor roads following harvesting will be through natural regeneration. All crossbank rollover drains must be left in working condition and crossfall (outfall) drainage reinstated. Road surfaces, batters and drainage structures must be left in a stable condition.

Dispersible soils

Not applicable to this compartment.

(f) Road Construction

No road construction is required for the harvesting.

Design

Not applicable for this logging operation

Grade

Not applicable for this logging operation.

Survey

Not applicable for this logging operation.

Clearing

Not applicable for this logging operation.

Batters

Not applicable for this logging operation.

Crossing of drainage features

Not applicable for this logging operation.

(g) Slope limits for the area

Maximum slope for harvesting	30 degrees
Maximum grade for snig track construction	25 degrees
Maximum side slope for snig track construction	30 degrees
Maximum road grade permitted	10 degrees
Maximum side slope for road construction	30 degrees without design

(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 Compartment 372 at minimum widths as stated in Table 5 below. These minimum widths meet or exceed the requirements of the Pollution Control Licence.

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

All snig track 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 inadvertantly 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 at the rate of 20 Kg/ha.

(o) Dispersible Soils

Not applicable to this compartment.

(p) Log Dumps

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

Before use, about 10 cm of 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.

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 the dump area which 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 Compartment 372.

Post-logging burning

Post-logging burning of Compartment 372 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

Burning must be undertaken by the lighting of individual heaps of harvesting slash and debris under conditions that will enable the fires to be contained within the compartment.

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.

4.6 Research and Inventory Plots

There are no research or inventory plots in Compartment 372.

4.7 Modified Harvest Conditions

(a) Special Emphasis Flora and Fauna Protection (Wildlife Corridor)

A designated Wildlife Corridor (Preferred Management Priority Classification 1.1.7, Flora and Fauna Protection) exists along the creek forming the north-eastern boundary of the compartment. The corridor is 40 metres wide either side of the stream.

- harvesting machinery must not enter the Wildlife Corridor.
- felling and snigging must be excluded from the Wildlife Corridor.
- trees must not be felled into the Wildlife Corridor.
- trees must not be damaged in the Wildlife Corridor.

(b) Special Emphasis Visual Resource Protection

A visual strip (PMP Classification 1.1.6, Visual Resource Protection) exists along Western Boundary Road, as indicated on the Operational Map. North of the intersection with 372/2 Road, this strip extends from Western Boundary Road to the fence. South of the intersection the strip is 30 metres wide on the eastern side of Western Boundary Road, and 50 metres wide on the western side.

- Harvesting activity in the Visual Resource Strip must be restricted to trees under 40 cm dbhob and 50% of trees greater than 40 cm dbhob.
- Harvesting activity in the Visual Resource Strip must be restricted so as to always maintain the high tree line as seen from a distance.
- Any roads must run at an acute angle through the Visual Resource Strip.
- Dumps must only be located in the Visual Resource Strip if the high canopy can be maintained.

(c) 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.

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 watercourse and 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).

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 Endangered or Vulnerable 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 or crossing 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) Dispersible Soils Exposed During Road/Snig Track Construction

Not applicable to this operation

(e) 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 existing erosion on 372/1 Road (near dump 18) is rectified during the operation.

Condition 5.4 Pre- and Post-logging Burning

(a) Pre-logging Burning

There is no pre-logging burning associated with the harvesting of Compartment 372.

(b) Post-logging Burning

Post-logging burning of Compartment 372 must be carried out in accordance with provisions and specifications of the Nymboida District Fire Plan and the Grafton District Fuel Management Plan.

Ignition

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

Condition 5.5 Other Instructions

The SFO must ensure that plastic sheeting is installed as a drop down structure below rollover crossbanks on roads where the batter has been exposed by the logging operation.

The SFO must ensure that sediment trap fences are installed across outlets of rollover crossbanks on roads where water flow does not discharge onto undisturbed vegetation or logging slash.

Condition 5.6 Supervising Forest Officer's Acknowledgment

I acknowledge that I have received a copy of Harvesting Plan No GG 96/03/372 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

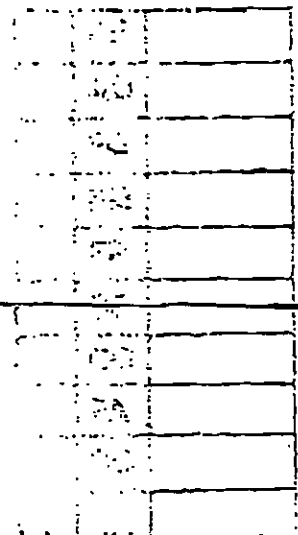
LAND & WATER CONSERVATION

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
- Mannings 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 considered 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 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

Grange 372

Addendum 2
Previous Register
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Part 2 FOREST MANAGEMENT & ENVIRONMENTAL CONSIDERATIONS

2.1 PHYSICAL FEATURES

Description 1: Physical Description of the Area

STATE FOREST	Grange No 771	DISTRICT	Grafton
REGION	Northern	COMPARTMENT	372
MANAGEMENT AREA	Grafton		
NORTH-EASTERN CORNER		456400	6740900
SOUTH-WESTERN CORNER		454300	6740300

Natural Features

General: The compartment contains undulating/moderate to steep slopes with scattered small very steep areas. It is basically the adjacent sides of secondary ridges running east and west of the main range system.

Catchment: Clarence River catchment. The western part of the compartment drains into Hanging Rock Creek, and the eastern part drains into Towgon Creek.

Altitude range: 430 - 540 m ASL

Aspect: Generally north in the southern half of the compartment, and generally south in the northern half of the compartment.

Topography: The major part of the compartment varies from undulating to steep with slopes up to 20°. There are small, scattered areas with slopes above 20°.

Artificial Features

Roads: Western Boundary Road, the main access to this part of the forest, runs through the compartment and along parts of the southern and northern boundaries.

Minor Roads: Two minor roads (Reserve Road and 372 Road) run east from Western Boundary Road along the northern and southern boundaries respectively. 372/1 Road runs off 372 Road to access a ridge at the eastern end of the compartment. 372/2 Road runs west from Western Boundary Road along, but outside, the State forest boundary.

There is also about 100 m of 373 Road within this compartment, which will be used to access the adjacent compartment.

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

Private property joins the western and part of the northern boundary of the compartment as shown on the Operational Map. This boundary is blazed with yellow paint and partially fenced.

Grange Flora Reserve joins the northern boundary of the compartment east of Western Boundary Road. This boundary is blazed with blue paint. A Special Emphasis Flora and

25 SOIL EROSION AND WATER POLLUTION CONTROL

Description 12 Site Soil and Water Data and Other Information

(a) Location

Compartment 372 is located in the central western section of Grange SF, which in turn is located some 60 km north-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 area is about 1200 mm

The annual rainfall erosivity - R = 3000

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 recordings available. The compartment is in rainfall zone 2. The monthly erosivity details are:

	J	F	M	A	M	J	J	A	S	O	N	D
Erosivity	570	510	360	120	60	90	60	60	180	210	330	450

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 over 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

Compartment 372 is on Metasediments, being argillites, phyllites, slates and intermediate volcanics, all with abundant quartz veins, of Ordovician-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

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 this and adjacent compartments, and the sampling for each element. Data from all samples covering landform elements within the compartment are used below.

Soil types

The soil derived from the Metasediments is typed as Structured plastic and subplastic clays, at times Krasnozems, Xanthozems, Chocolate soils, Structured loams.

Description and profile

The soil is 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 layer.

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 (Method B3)

K values A horizon = 0.031 (site 373/1; simple slope)
K values B horizon = 0.033 (site 370/1; upper slope)

Texture

A horizon -clay loam, silty clay loam
B horizon - light clay, clay loam

Dispersibility (Method D1)

%clay A horizon	12%(inclusive of gravels) (372/1; simple slope)
%clay B horizon	56%(inclusive of gravels) (372/1; simple slope)
D% A horizon	19%
D% B horizon	17%
%dispersible soil A horizon	12/100x19/100x100 = 2.28
%dispersible soil B horizon	56/100x17/100x100 = 9.52

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

Reference Veness and Associates. Soils report Number VA1715B/02 of 30 November 1995, and letter of 20 April, 1996.

A copy of Report Number VA1715B/02 of 30 November 1995, and letter of 20 April 1996 from J Veness is attached.

Inherent fertility

The soils are relatively fertile compared generally with soils on State forests in the Grafton area. The nearby private property is typical Clarence valley open Red Gum/Apple woodland country. Much of the original stand on 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.

(h) Proposed Operation System

Use of existing roads

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

Western Boundary Road, which runs through the compartment and along part of the boundary, is a fully designed road with concrete relief pipes in the side-cuts and drainage lines, and mitre drains on the ridge-tops.

Four minor roads, Reserve, 372, 372/1 and 372/2 Roads, will be reopened for use during this harvesting operation. There is also about 100 m of 373 Road within this compartment which will be reopened to access the adjacent compartment. These roads are stable, with litter and grass cover. They are drained by outfall drainage. Reopening will involve removal of fallen timber and regrowth from the road pavement and edges.

These works will be done with logging machinery and will cause minimal disturbance to the road pavement. None of the existing roads are likely to cause significant water pollution.

Use of existing drainage feature crossings

372/1 Road crosses three drainage lines on long-established, open causeways. Two of these are stable, and will be improved by the placement of a log on the lower side. This will prevent movement of gravel into the stream from the road pavement as a result of increased traffic.

Because the approaches to the centre crossing are too steep for an open causeway, a pipe will be installed for the duration of the operation. Appendix 2 shows that the rate of discharge in a 1:5 year peak flow would be 0.08 cubic metres per second. Therefore a minimum pipe of 375 mm would be required. Practical experience indicates that a pipe of this size is more likely to become blocked with sticks and leaf litter, therefore a 450 mm pipe will be installed.

The pipe and associated soil fill will be removed on completion of the operation. This will be done with minimal disturbance to the bed and banks of the drainage line, and the site will be stabilised by sowing with grass seed.

Road construction

There is no road construction required for the harvesting. There will be no need to establish borrow pits or gravel pits.

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

Log dumps are located on ridge tops to facilitate uphill snigging, as indicated on the operational map. There will be limited downhill snigging to dumps 1, 3, 6 and 18 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. The drainage line crossings are long established utilising natural gravel or flat grassy sites. Less than 3% of the snigging activity will be downhill.

Post-harvest burning

In Compartment 372 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 for sampling site 370/1 give lower slopes 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 = 3000

K = 0.017	**Topsoil (A horizon)**	Method B3 (site 370/1; upper slope)
K = 0.033	**Subsoil (B horizon)**	Method B3 (site 370/1; upper slope)

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
0-≤5	1	10
>5-≤19	2	60
>19-30	3	10
Roads	3	N/A

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

R = 3000 K = 0.033

(b) Dispersibility

%dispersible soil A horizon = 12/100x19/100x100 = 2.28 (Method D1) (site 372/1)

%dispersible soil B horizon = 56/100x17/100x100 = 9.52 (Method D1) (site 372/1)

The A horizon is not significantly dispersible.

The B horizon is not significantly dispersible.

(c) Other Factors

There are no other soil erosion or water pollution factors which need to be considered in relation to the planned harvesting of Compartment 372.

References

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

Rosewell 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.

25. FOREST ZONING AND SPECIAL ATTRIBUTES

Description 14 Forest Zoning and Special Attributes

(a) Research Plots

There are no research plots or long term inventory plots in the net harvest area.

(b) Special Attributes of the Area.

There are three Aboriginal archaeological sites on the boundary of the compartment, as shown on the Operational Map.

Part 4 OPERATIONAL CONDITIONS

The Tree-marking Code shown in this Plan must 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.

The Aboriginal archaeological sites are marked by three yellow rings. Cancelled boundaries are marked with a red slash through the yellow rings.

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

Vertical line indicates location of a minor road or snig track.

Reference: Northern Region Tree Marking Code (1995)

4.3 Order of Working

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

20 dump sites have been located and marked in the compartment, as indicated on the Operational Map. Dumps 4, 8, 9, 10, 11, 12, 13, 14, 18, 19 and 20 have been designated as suitable for working when conditions are wet. While allowing for wet conditions, harvesting must commence on dump 1 and work progressively through to dump 20.

(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 may 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 (Jacobs, 1955) where appropriate, must 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 wild fire.

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 Wildlife Corridor, Riparian Habitat Zones, Aboriginal archaeological sites, 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 compartment and none were encountered during field inspections.

(b) Rainforest Protection

There are no areas of rainforest in the compartment.

(c) Grange Flora Reserve

Grange Flora Reserve joins the northern boundary of the compartment east of Western Boundary Road. This boundary is blazed with blue paint. Vehicles and machinery must not enter the Flora Reserve, and trees must not be felled into, or damaged in, the Flora Reserve.

4.6 Fauna Protection

(a) Sightings of Fauna

No Endangered or Vulnerable species have been recorded from this compartment. The Powerful Owl and Golden-tipped Bat have been recorded from compartment 368, about 2 km to the south-east of compartment 372. Endangered and Vulnerable species expected to occur in or in the vicinity of the compartment are;

Prescription 9:

Koala

Trees with identifiable use by Koalas at the time of harvesting shall be retained. If no further Koala evidence is found within 100 metres of the use tree a minimum of 5 Koala food trees shall be retained within the 100 metres. If regular activity is detected but less than 20% of the trees within 100 metres have faecal pellets underneath and no Koalas are observed, trees with evidence of regular Koala activity shall be retained; a minimum of 15 trees are to be retained within the 100 metres radius. If regular Koala activity is detected and more than one Koala is observed or more than 20% of trees within 100 metres radius have faecal pellets underneath, forestry operations, except low intensity prescribed burning, shall be excluded from the 100 metres radius and the Manager Threatened Species, Northern Zone of the NPWS shall be informed.

Prescription 10:

Long-nosed Potoroo

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

Prescription 11:

Golden-tipped Bat/Little Bent-wing Bat/Common Bent-wing Bat/Large-footed Mouse-eared Bat

100 metre radius buffer zone shall 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 this management area.

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

4.3 Soil Erosion and Water Pollution Control Conditions

(a) Soil Erosion and Water Pollution Categories

The calculated Soil Erosion and Water Pollution Categories for Compartment 372, based on the subsoil data for site 370/1, are detailed in Table 4 below.

Table 4 - Water Pollution Hazard Categories

Slope Ranges (Degrees)	Water Pollution Category	Indicative % of Net Harvest Area
0-≤5	1	10
>5-≤19	2	80
>19-30	3	10
Roads	3	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, Snig Tracks and Crossings

The marking and location of roads, log dumps, snig tracks 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 and cannot be varied in the field without the prior written approval of the EPA.

(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.

Dumps 4, 8, 9, 10, 11, 12, 13, 14, 18: 19 and 20 as marked on the Operational Map, are suitable to be worked during wet weather periods.

(e) Existing Roads

Clearing of regrowth

Reopening of existing roads will involve lowering of crossbanks, and 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.

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 must be spaced as stated in the Table below. The banks must have a minimum design

consolidated vertical height from spillway to bank top of 20 cm. Such banks should readily cater for 1 in 5 year storm events.

Spacing of Rollover Crossbank Drainage
(grade of road - degrees)

0 - ≤5	>5 - ≤10	over 10
80 m	45 m	35 m

Rollover crossbanks must drain at natural surface level, or by way of installed plastic sheeting, onto undisturbed vegetation. Where undisturbed vegetation is not immediately accessible to the outfall, sediment trap fences must be installed across the outlet.

Rollover banks must be retained in situ after the roads have been closed.

Crossing of drainage features

The drainage lines in the compartment are intermittent. At the time of recent inspections, some were running water after an extended period of rain.

372/1 Road crosses three drainage lines. The first and third crossings are open, natural surface causeways that are in a stable condition. Each of these must have a log placed on the bottom side to ensure material does not move into the stream from the road pavement with increased traffic. The approaches to these causeways must be gravelled if pavements commence to deform. At the conclusion of harvesting, any disturbed areas adjacent tot hese causeways must be seeded with rye grass by the SFO at the rate of 20 kg/ha. These causeways must remain in situ after the logging has been completed.

A 450 mm pipe must be installed at the centre crossing for the duration of the operation. Installation and removal of the pipe and associated soil fill must be done in a way that minimises the bed and bank of the drainage line, and results in minimal deposition of spoil within the drainage line. Any spoil deposited in the drainage line must be removed with minimal bed or bank disturbance unless removal will cause more damage than non-removal. Spoil must not be deposited in filter or protection strips.

The approaches to this crossing must be stabilised by the SFO with rye grass at the rate of 20 kg/ha immediately following the removal of the pipe.

Revegetation and rehabilitation

The slight erosion on 372/1 Road must be rectified by the construction of rollover drains following completion of the operation.

Revegetation of the minor roads following harvesting will be through natural regeneration. All crossbank rollover drains must be left in working condition and crossfall (outfall) drainage reinstated. Road surfaces, batters and drainage structures must be left in a stable condition.

Dispersible soils

Not applicable to this compartment.

(f) Road Construction

No road construction is required for the harvesting.

Design

Not applicable for this logging operation

Grade

Not applicable for this logging operation.

Survey

Not applicable for this logging operation.

Clearing

Not applicable for this logging operation.

Batters

Not applicable for this logging operation.

Crossing of drainage features

Not applicable for this logging operation.

(g) Slope limits for the area

Maximum slope for harvesting	30 degrees
Maximum ~~slope~~ grade of snig track construction	25 ~~30~~ degrees
Maximum side slope for snig track construction	30 degrees
Maximum road grade permitted	10 degrees
Maximum side slope for road construction	30 degrees without design

(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 Compartment 372 at minimum widths as stated in Table 5 below. These minimum widths meet or exceed the requirements of the Pollution Control Licence.

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	<40 ha >18°slope		10m	10m
2	>40 ha	20m		
2 NA	<40 ha <18° slope		10m	10m
3	<40 ha >18° slope		15m	10m
3 NA	>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 Riparian Habitat Zones and protection strips (or filter strips 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 licensee or contractor 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 or Riparian Habitat Zone adjacent to the protection strip. (See also 4.2, 5.2)

Contractors and operators are responsible for identifying drainage depressions 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 hand brushing of furrows 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.

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.

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

Soil disturbance in drainage depression buffer strips must be minimised by use of the following techniques:

- no snigging along drainage depressions.
- minimal use of blade.
- logs must be approached in reverse gear.
- minimal change in direction while snigging logs out of drainage depressions.

(l) Snig Tracks

It is preferable that, wherever practicable, walkover extraction techniques 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.

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 licensee/contractor 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-≤5	1	10
>5-≤19	2	8
>19-30	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°-≤5°)	2 (>5°-≤19°)	3 (>19°-30°)
0 - ≤5	200m	150m	100m
>5 - ≤10		100m	60m
>10 - ≤15		60m	40m
>15 - ≤20		40m	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, 3, 6 and 18.

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).
- Tracks approaching a log dump must be located so as to direct water away from the dump immediately before reaching the dump.

(n) Snig Track Drainage Line Crossings

The drainage lines in the compartment flow only intermittently. At the time of recent inspections, some were running water following an extended period of rain.

All snig track 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 ~~loose material~~ inadvertantly 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 at the rate of 20 Kg/ha.

(o) Dispersible Soils

Not applicable to this compartment.

(p) Log Dumps

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

Before use, about 10 cm of 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.

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 the dump area which must be left in a neat and stable condition.

(q) Prescribed Burning

Pre-logging burning

The ~~will be~~ no pre-logging burning associated with the harvesting of Compartment 372.

Post-logging burning

Post-logging burning of Compartment 372 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

Burning will be undertaken by the lighting of individual heaps of harvesting slash and debris under conditions that will enable the fires to be contained within the compartment.

The Grafton District Operations Foreman will be 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

There are no research or inventory plots in Compartment 372.

4.9 Modified Harvest Conditions

(a) Special Emphasis Flora and Fauna Protection (Wildlife Corridor)

A designated Wildlife Corridor (Preferred Management Priority Classification 1.1.7, Flora and Fauna Protection) exists along the creek forming the north-eastern boundary of the compartment. The corridor is 40 metres wide either side of the stream.

- harvesting machinery must not enter the Wildlife Corridor.
- felling and snigging must be excluded from the Wildlife Corridor.
- trees must not be felled into the Wildlife Corridor.
- trees must not be damaged in the Wildlife Corridor.

(b) Special Emphasis Visual Resource Protection

A visual strip (PMP Classification 1.1.6, Visual Resource Protection) exists along Western Boundary Road, as indicated on the Operational Map. North of the intersection with 372/2 Road, this strip extends from Western Boundary Road to the fence. South of the intersection the strip is 30 metres wide on the eastern side of Western Boundary Road, and 50 metres wide on the western side.

- Harvesting activity in the Visual Resource Strip must be restricted to trees under 40 cm dbhob and 50% of trees greater than 40 cm dbhob.
- Harvesting activity in the Visual Resource Strip must be restricted so as to always maintain the high tree line as seen from a distance.
- Any roads must run at an acute angle through the Visual Resource Strip.
- Dumps must only be located in the Visual Resource Strip if the high canopy can be maintained.

(c) 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.

(d) Aboriginal Archaeological Sites

The boundaries of three Aboriginal archaeological sites (indicated on the Operational Map) have been marked in the field.

- harvesting machinery must not enter site boundaries.
- felling and snigging must be excluded from within site boundaries.
- trees must not be felled into site boundaries.
- where an existing road passes through a site the road may be used, but vehicles must not move off the road within site boundaries.
- blading-off or other alterations to roads must not be undertaken within site boundaries.

(e) Grange Flora Reserve

The boundary of Grange Flora Reserve (joining the northern boundary of the compartment) is marked in the field.

- vehicles or harvesting machinery must not enter the Flora Reserve.
- trees must not be felled into the Flora Reserve.
- trees must not be damaged in the Flora Reserve.

(f) Boundary Fences

Private property adjoins the western and part of the northern boundary of the compartment, as shown on the Operational Map. This boundary is partially fenced. Damage to these fences is to be avoided. Any damage caused is to be immediately repaired.

5.10 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 Compartment 372

Estimated Yields are:

Compulsory Sawlogs 40 cm +	1000 m³
Compulsory Sawlogs <40 cm	150 m³
Salvage Sawlogs	150 m³

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 will be:

The appointed Hardwood Marketing Foreman, Grafton District.

(b) Relieving SFOs

Relieving SFOs , if required will be:

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 will 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 the Wildlife Corridor, the Visual Resource Strip, and Riparian Habitat Zones must be marked ahead of harvesting operations. The boundaries of Grange Flora Reserve and the Aboriginal archaeological sites have been marked.

(b) Soil Erosion and Water Pollution Control

Marking of filter strips and protection strips

Wildlife Corridor and Riparian Habitat Zone prescriptions are equivelent 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 the Wildlife Corridor or Riparian Habitat Zones. Hence filter/protection strips must only be marked in the field where they are not embedded in the Wildlife Corridor or 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 SFOs 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 if there are no protection strips) in the field progressively and prior to the commencement of operations in each section of the harvest area.

The SFO is responsible for ensuring that the licensee or contractor 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 (l)).

Drainage feature crossings

Imported gravel must be placed on existing crossings if the road pavement commences to deform during the operation.

A 450 mm pipe is to be installed in the centre crossing on 372/1 Road. This work must be done with minimal disturbance to the bed and banks of the drainage line, in accordance with Part 4.7 (e)

The SFO must ensure that crossing approaches on roads and snig tracks are seeded in accordance with Part 4.7 (e and n).

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 Endangered or Vulnerable 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 or crossing 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) Dispersible Soils Exposed During Road/Snig Track Construction

Not applicable to this operation

(e) 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 existing erosion on 372/1 Road (near dump 18) is rectified during the operation.

Condition 5.4 Pre- and Post-logging Burning

(a) Pre-logging Burning

There will be no pre-logging burning associated with the harvesting of Compartment 372.

VENESS & ASSOCIATES
Pty Limited
ACN 003 419 958

10 Dutton Crescent
COFFS HARBOUR NSW 2450
Telephone: (066) 52 7692
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20th April, 1996

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

Dear Leonie,

Re: Further information on compartments 370, 372 & 373, Grange SF

Following our recent telephone discussions and your requirement to have more information regarding the soil materials within compartments 370, 372 and 373, Grange SF, you are advised of the following.

Jim Veness of Veness & Associates, examined compartments 370, 372 and 373, together with several other compartments in the 350's, 370's and 380's in November 1995. Other compartments in the 350's, 360's and 370's were examined by Ruth and Jim Veness of Veness & Associates in June 1995. Jim Veness further examined compartments in the 380's and 390's March 1996. The results of the soil sample analyses were presented in reports VA1715B, VA1595A&B and 1715D respectively.

Prior to the field visits, the landforms were examined from the 1:15,000 topographic maps. 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 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 compartments 370, 372 and 373, there are five landform elements. These are:

- crest
- upper slope
- simple slope
- lower slope
- open depression

It should be noted that, with the exception of open depressions, these landform elements have been sampled either within compartments 370, 372 and 373 or within other nearby / adjacent compartments. The sampling site located within 370 was situated on an upper slope while the sampling sites from 372 and 373 were sampled from the commonly occurring simple slope landform element. A crest was sampled in the adjacent compartment 379 while a lower slope was sampled in compartment 391 located to the north.

By definition (see McDonald et al. 1990) an open depression is a landform element that stands below all or most points in the surrounding terrain and extends to the limit of the observable concave curvature. Therefore, these elements are normally located along existing defined flowlines and are narrow in width. Such flowlines usually are associated with protection / filter strips and are subject to specific conditions. Consequently, this landform element has not been sampled.

All of these sampling sites are within the EIS Soil Mapping Unit C, with soils 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 relevant sites are compared in the following table.

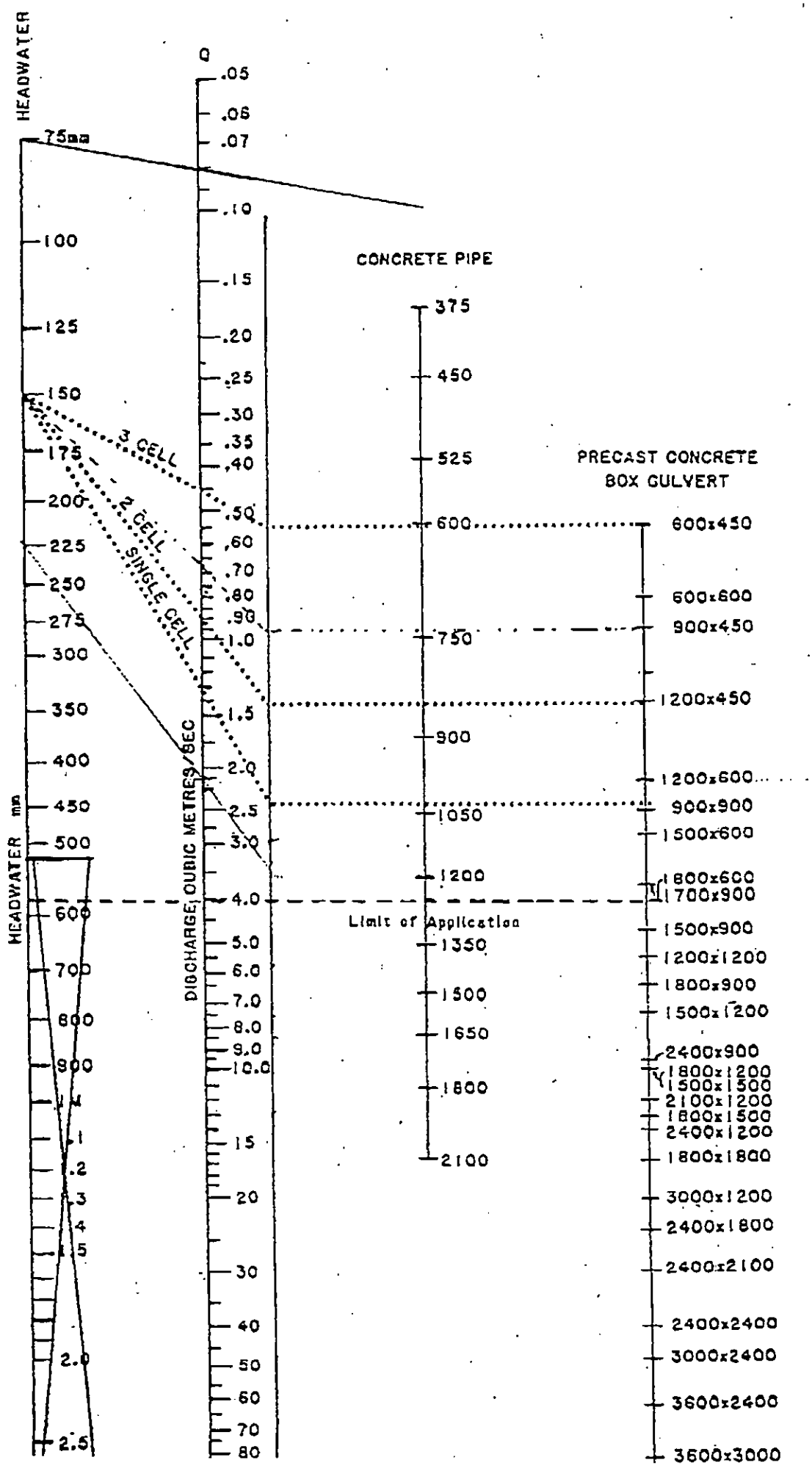
Site	Landform Element	A Horizon Depth (cm)	Texture	'K'	B Horizon Depth (cm)	Texture	'K'
370/1	upper slope	0-31	CL	0.017	31-50+	CL	0.033
372/1	simple slope	0-19	SiCL	0.019	19-56+	LC	0.013
373/1	simple slope	0-21	CL	0.031	21-82	LC	0.014
379/1	crest	0-14	CL	0.018	14-35+	LC	0.030
391/1	lower slope	0-18	SiCL	0.010	18-68	LC/LMC	0.023

As a result of this comparison, it is evident that, despite the variation in landform and location, the soil materials from each of the sampling sites contain a high degree of consistency with one another. This is also very evident when examining these soils in the field. Consequently, while the various landform elements within compartments 370, 372 and 373 have been sampled across various compartments, the uniformity of these soils permits the conclusion that these landform elements have been adequately sampled.

Yours faithfully,

Jim Veness

CULVERT CAPACITY CHART



APPENDIX 2 Waterway calculation for pipe crossing on 322 Road

Catchment area (A) ..... **3.0 ha**

Design flood frequency ..... 1 in 5 years

Difference in height ..... 70 m

Length of stream ..... 200 m

$$H = \frac{(0.75 \times \text{difference in height}) \times 100}{\text{Length of stream}}$$ ..... 26.25 %

(a) Uncorrected time of concentration ..... 0.3 min

(b) Flood frequency factor for timeof concentration 14.75

(c) Cover within catchment area factor 1.1

(d) Shape of catchment factor 1.6

Corrected time of concentration axbxcxd ..... 7.8 min

(e) Uncorrected rainfall intensity ..... 4.2 mm/hour

(f) Flood frequency factor for rainfall intensity 1.68

(g) Locality factor 17.94

Corrected rainfall intensity I = exfxg ..... **126.6 mm/hour**

Coefficient of run-off (C) **0.08**

Discharge (Q) = 0.00278 x C x I x A ..... ***0.08 m^3/sec***

Reference: Waterway Calculations - Modified McArthur Hall/Rational Method. Forestry Commission of NSW Unnumbered Circular

Addendum 1
Previous Register
#624.

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 hand brushing of furrows 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.

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.

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

Soil disturbance in drainage depression buffer strips must be minimised by use of the following techniques:

- no snigging along drainage depressions.
- minimal use of blade.
- logs shall be approached in reverse gear.
- minimal change in direction while snigging logs out of drainage depressions.

(l) Snig Tracks

It is preferable that, wherever practicable, walkover extraction techniques be used in preference to snig track construction.