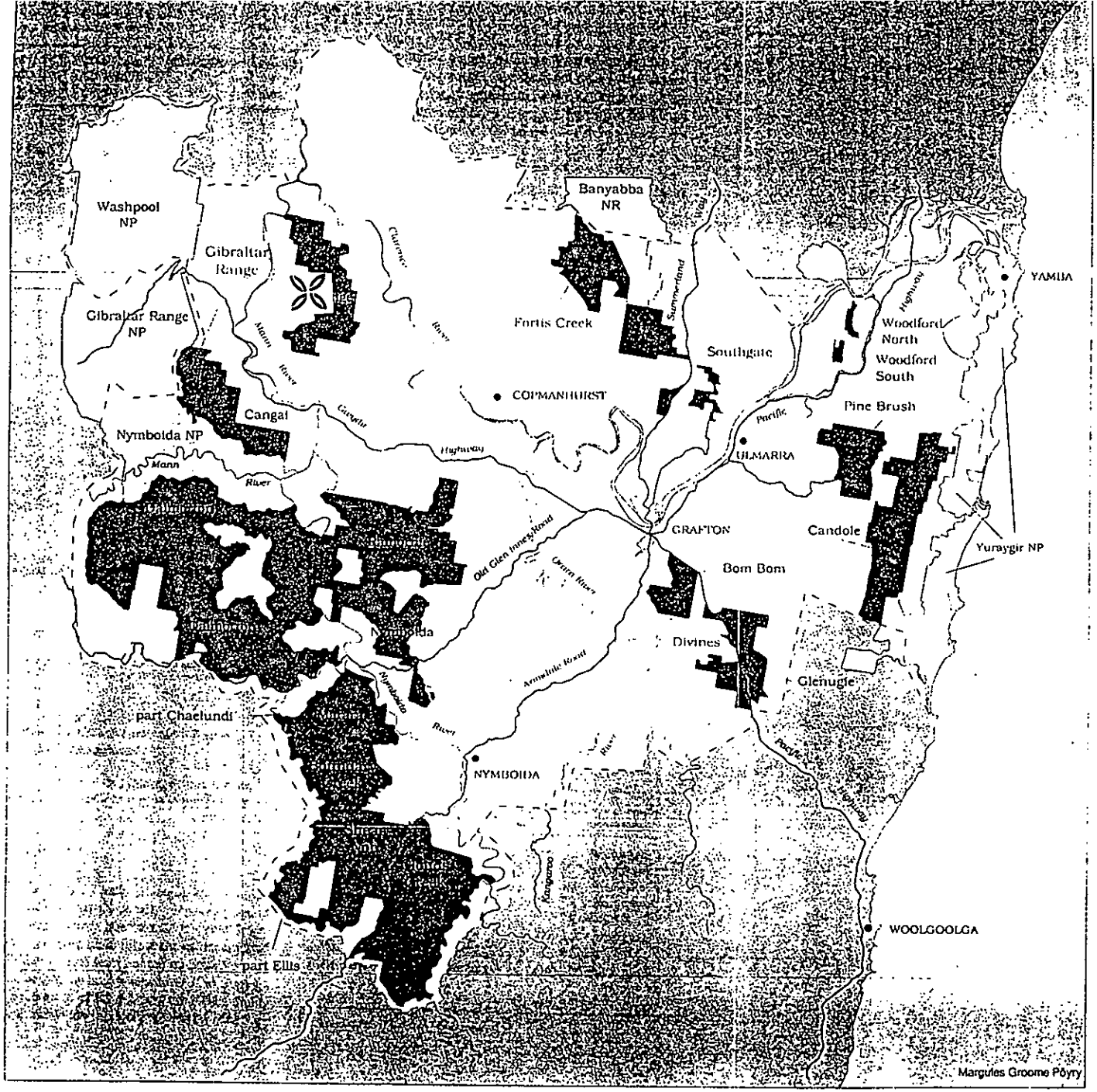
Grange

370 & 373

Grafton District
Northern Region

Harvesting Plan No GG 96/02/370;373

Contents



NSW

STATE FORESTS

NATIONAL PARKS

MANAGEMENT BOUNDARY

TOWNS

ROADS

RIVERS

0 20km N

LOCATION

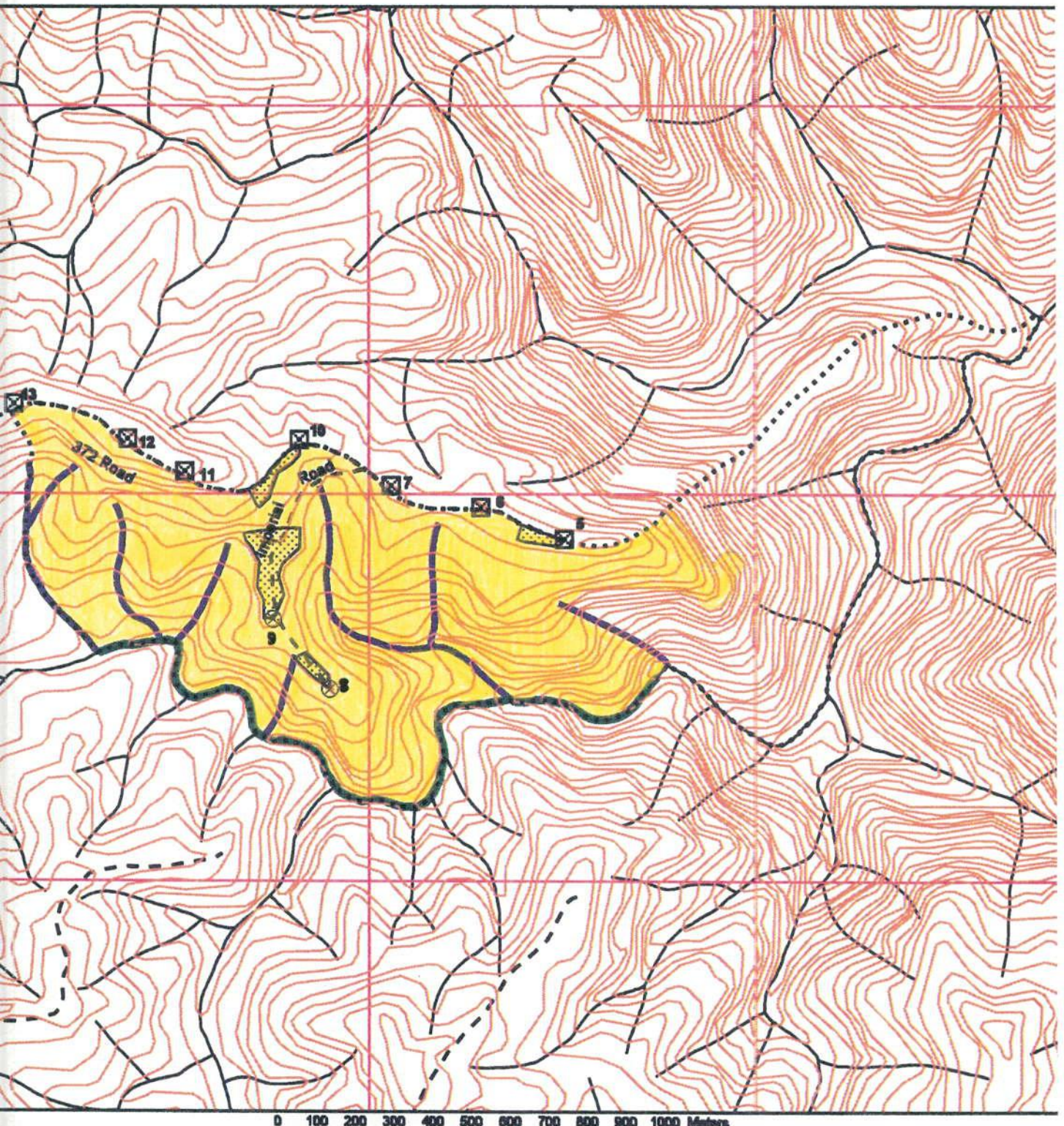
Compartments 370 & 373

FIGURE 1.2

HARVEST PLAN OPERATIONAL MAP
NORTHERN REGION - GRAFTON DISTRICT
COMPARTMENT 370
GRANGE STATE FOREST

STATE FORESTS

AMELBACK MAP SHEET
SCALE 1:15000



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

UNDARIES
Compartment Boundary

ADS
Road
Minor Road

RMAL PRESCRIPTIONS
Harvestable Area
Downhill Snigging

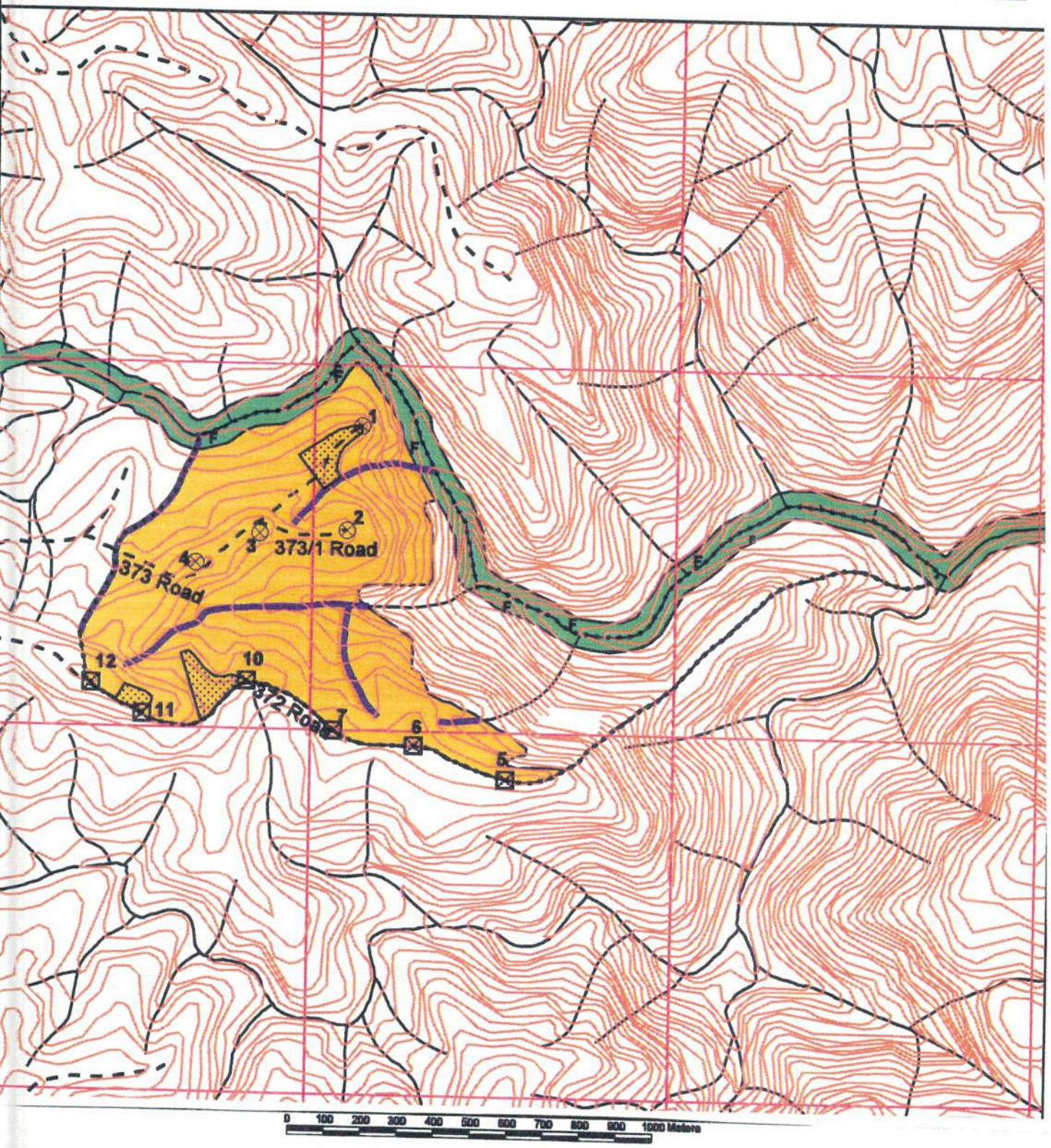
NON HARVEST AREAS
Steep/Inaccessible
Riparian Habitat Zone

DUMP SITES OR LANDINGS
Permanent Dry
Permanent Wet

WATERCOURSES & DRAINAGE
Filter strip
Approved Crossings
Drainage line

HARVEST PLAN OPERATIONAL MAP
NORTHERN REGION - GRAFTON DISTRICT
COMPARTMENT 373
GRANGE STATE FOREST

MELBACK MAP SHEET
SCALE 1:15000



BOUNDARIES
- Compartment Boundary

ROADS
- Road
- Minor Road

FORMAL PRESCRIPTIONS
- Harvestable Area
- Downhill Snigging

NON HARVEST AREAS
- Wildlife Corridor (PMP 1.1.7)
- Riparian Habitat Zone
- Steep/Inaccessible

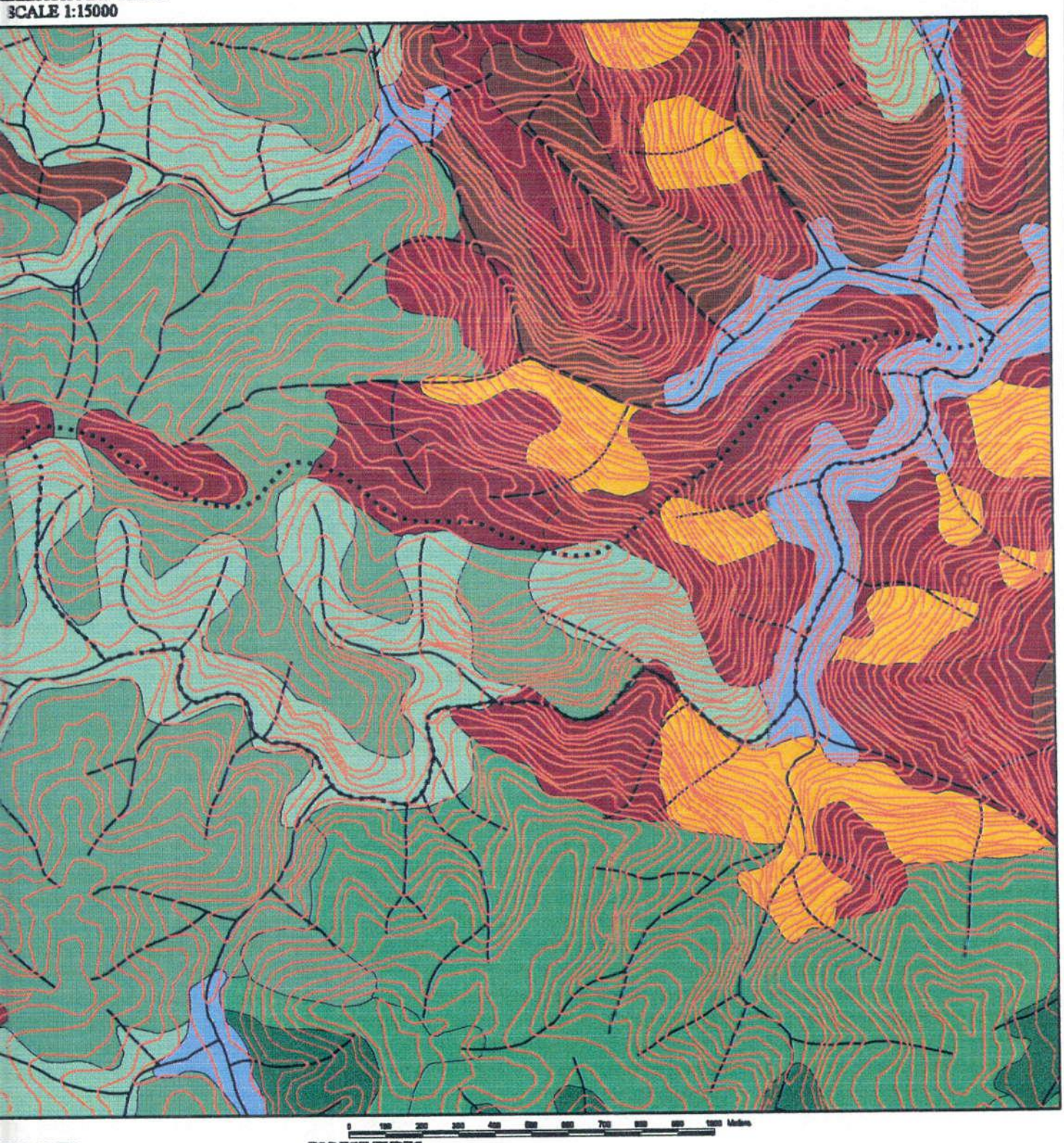
DUMP SITES OR LANDINGS
- Permanent Dry
- Permanent Wet

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

HARVEST PLAN FOREST TYPES MAP
NORTHERN REGION - GRAFTON DISTRICT
COMPARTMENTS 370 AND 373
GRANGE STATE FOREST

STATE FORESTS

ELBACK MAP SHEET
SCALE 1:15000

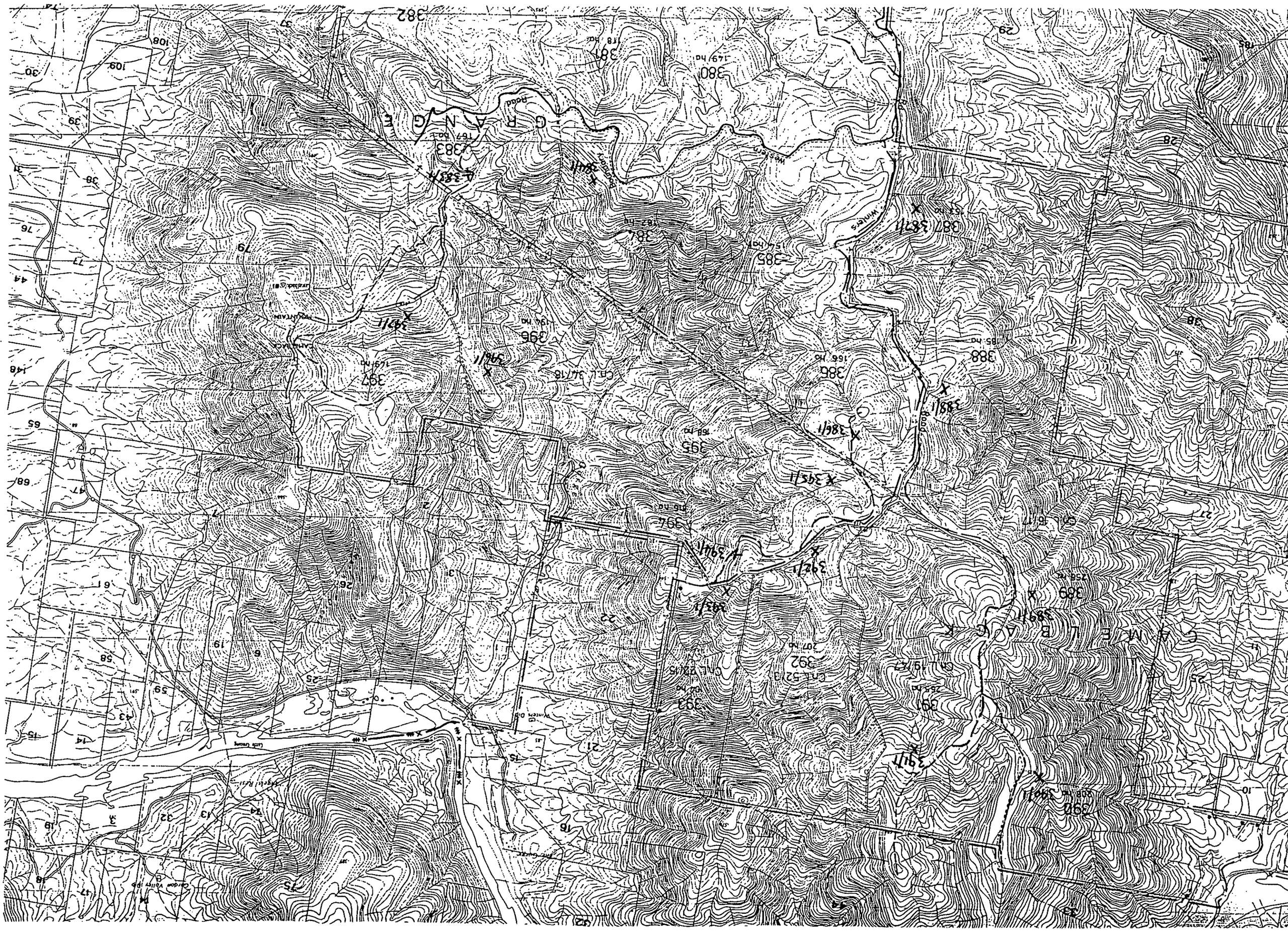


UNDARIES
Compartment Boundaries

TERCOURSES & DRAINAGE
Drainage line

FOREST TYPES
53 Brush Box
60 Narrowleaved White Mahogany-Red Mahogany - Grey Ironbark - Grey Gum
62 Grey Gum - Grey Ironbark-White Mahogany
70 Spotted Gum
74 Spotted Gum-Ironbark/Grey Gum
234 Rock

MN


GRANGE
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Creek
Ridge
Canal
Mountain
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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**	COMPARTMENTS	**370 and 373**
MANAGEMENT AREA	**Grafton**		
NORTH-EASTERN CORNER		**458726/6740464**	
SOUTH-WESTERN CORNER		**456300/6739600**	

Natural Features

General: The area contains undulating/moderate to very steep slopes, with some rocky and inaccessible areas. Together, the two compartments form a long secondary ridge running east off a main ridge system.

Catchment: Clarence River catchment. An upper branch of Towgon Creek runs along the southern boundary of cpt 370, and the creek forming the northern boundary of cpt 373 is a tributary of Towgon Creek. Towgon Creek runs north-east out of the forest into the Clarence.

Altitude range: 170 m - 530 m ASL

Aspect: Generally south in cpt 370, and generally north in cpt 373.

Topography: The planning area varies from undulating to steep. The eastern section of the area is not accessible.

Artificial Features

Roads: Western Boundary Road, the main access through the forest, runs to the west of the harvest area.

Minor Roads: 372 Road (2.8 km) runs east off Western Boundary Road through adjacent compartments, and part way along the boundary between the two compartments. Imperial Road (0.7 km) runs to the south off this road, along a side ridge. 373 Road and 373/1 road (1 and 0.2 km respectively) run north from the western boundary of cpt 373. These minor roads give access to dump sites in the two compartments.

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

A Special Emphasis Flora and Fauna Protection Zone (PMP 1.1.7 Wildlife corridor, 40 m strip either side of the stream) exists along the creek forming the northern boundary of compartment 373.

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

Reference Grafton Management Area Environmental Impact Statement

2.2 FOREST MANAGEMENT AND SILVICULTURE

Description 3 Compartment Subdivision, Forest Types

Areas:

	Cpt 370	Cpt 373
Gross Area of Compartment	141 ha	114 ha
Inaccessible (including rock)	43 ha	23 ha
Wildlife Corridor	0 ha	11 ha
Riparian Habitat Zones	8 ha	0 ha
Filter Strips	6 ha	2 ha
Proposed for Logging	**84 ha**	**78 ha**

Logging History:

The area has a long history of logging dating from the late 1800s. The first recorded logging occurred in the 1960s, with logging occurring again in the 1970s. There is evidence of sleeper and girder cutting in the compartment that pre-date these loggings.

Forest Types:

		Cpt 370	Cpt 373
53	Brush Box	13.7 ha	7.7 ha
60	Narrowleaved White Mahogany - Red Mahogany - Grey Ironbark - Grey Gum	0.5 ha	0.0 ha
62	Grey Gum - Grey Ironbark - White Mahogany	25.5 ha	49.5 ha
70	Spotted gum	57.7 ha	1.2 ha
74	Spotted Gum - Grey Ironbark/Grey Gum	39.2 ha	45.5 ha
234	Rock	2.9 ha	9.6 ha

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

Description 4 Broad Description of Vegetation

(a) Forest Types

- Type 53 a moist type located along the creek lines forming the eastern boundary of cpt 370 and part of the northern boundary of cpt 373.

- Type 60 a dry type occurring in two very small patches on the northern boundary of cpt 373.

- Type 62 a dry type occurring on the more exposed, shallow soil, rocky/steep areas and ridge tops, mainly in the eastern section of both compartments.

- Type 70 a variable type, often moist, on the sheltered or lower southern slopes sections, mainly in cpt 370.

- Type 74 a dry type located on the deeper soil ridge top areas of the compartments.

- Type 234 rock areas occur in the steeper eastern sections of both compartments.

Overstorey species

The overstorey species are Spotted Gum, Grey, Red and Narrow-leaf Ironbarks, Grey Gum, White Mahogany, Red Mahogany, Tallowwood, Red Bloodwood, Brush Box, Sydney Blue Gum and Turpentine.

(b) Understorey

The understorey on the more exposed sections is typically dry, being eucalypt regeneration, Forest Oak, Cheese Tree, Backhousia, Acacia, scattered Grass Trees and other xerophytic shrubs; Geebungs, Indigo, Hakeas and Native Cherry. The sheltered moist areas have Native Ginger, Tobacco Bush, Soft Tree Fern, Blechnum sp, Black Wattle, Tree Heath, and Forest Oak, with the Oak being prominent in places. Sections of the Type 53 have a well developed mesic understory.

(c) Ground-cover

The ground cover on the drier areas is mostly grass, bracken and litter. Litter, ferns, vines and herbs, sedges and mosses occur on the moist areas.

(d) Rare or threatened species

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

(e) Rainforest

There are no areas of rainforest in the compartments.

(f) Exotic weeds

Lantana occurs in small scattered patches through both compartments.

(g) Regeneration and serial stages

The compartment carries a multi-age forest consisting of a few remnants of the original stand, with mature regrowth seemingly resulting from the influence of settlement and original harvestings. There is widespread younger regrowth of varying ages, the result of a number of more recent selective logging operations, which have been intensive in places.

Description 5 Forest and Crop Condition

The area has a long history of selective logging of varying intensities. The first recorded logging on these compartments occurred during the 1960s, and cpt 370 was logged again during 1975/77, seemingly particularly heavy in places. There is evidence of sleeper and girder operations that pre-date these loggings. These events have induced growth responses to varying extents on retained stems and allowed regeneration to become established.

The current stand is mainly mature or maturing with groups of younger regrowth. There are widespread areas of regrowth in the eastern sections of both compartments particularly. Average growth rates would be low. There is a need to free the existing regeneration 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 younger stands. In areas with little younger regrowth, there is a need to replace a proportion of the stand to allow regeneration to establish and maintain stand vigour.

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

Description 6 Forest Management Activities

(a) Silviculture

The main silvicultural objectives are to:

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

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

Habitat trees will be retained to meet wildlife habitat requirements.

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

(b) Harvesting Method

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

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

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

(c) Fire Management

Fire management is required to;

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

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

In Compartments 370 and 373 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 the compartments and none were located during field inspections.

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

Description 8 Presence of Rainforest

There are no areas of rainforest in the compartments.

Description 9 Protection of Plant Species

Not applicable to the proposed harvesting.

2.4 FAUNA PROTECTION

Description 10 Endangered and Protected Fauna Occurrence

(a) General

No Threatened species have been recorded from compartments 370 and 373. The Powerful Owl and Golden-tipped Bat have been recorded from compartment 368, to the south of compartment 370. Threatened species expected to occur in or in the vicinity of the compartment are;

Glossy Black Cockatoo	**Powerful Owl**	**Sooty Owl**
Masked Owl	**Stephen's Banded Snake**	**Pale-Headed Snake**
Spotted-tailed Quoll	**Brush-tailed Phascogale**	**Yellow-bellied Glider**
Squirrel Glider	**Rufous Bettong**	**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

Compartments 370 and 373 contain Dry Hardwood and Moist Hardwood forest with xeromorphic understorey, and Moist Hardwood forest with mesic understorey. Sufficient potential habitat and recruitment habitat trees exist in the net harvest area to allow for the retention of enough trees to meet prescription requirements.

(c) Wildlife Corridor

A designated Wildlife Corridor exists along the creek forming the northern boundary of compartment 373, 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 Threatened species have been located in the net harvest area and no refuge areas have been set aside. Casuarina trees suitable for Glossy Black Cockatoos exist through the area and evidence has been found of the Cockatoos feeding in a nearby compartment. Forest management activities will promote the regeneration and growth of Casuarina.

Description 11 Species and Habitats Descriptions

Brief habitat descriptions for Threatened Species that might be adversely impacted by forest management activities on Compartments 370 and 373 are stated below:

(a) Critical Weight Range Species

Critical Weight Range species likely to occur in compartments 370 and 373 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. 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.

(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. Suitable Casuarina occur on the compartments and there are large hollow trees on them and nearby.

(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. There is a scattering of suitable older trees through the compartments.

(e) Brush-tailed Phascogale

This species requires tree hollows for nesting and prefers open forest areas, foraging generally in large rough barked trees. The drier Spotted Gum areas may have suitable habitat.

(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.

(i) Golden-tipped Bat

This Bat roosts in moist forests, seemingly preferring dense vegetation. There are suitable moist gully areas in the compartments.

(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

Compartments 370 and 373 are located in the central section of Grange SF, which in turn is located some 60 kilometres 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 Grange 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. The compartments are in Rainfall Zone 2. There are no monthly rainfall recordings available. 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

Compartments 370 and 373 are 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

The compartments are included in the Grafton Management Area EIS Study Soils Report carried out by Veness and Associates (published 1994). This study identifies Metasediments

("C") Unit soils as occurring in Compartments 370 and 373. Field inspection of the compartments indicate that the metasediment unit soils do occur in the compartments.

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 compartments 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

K values A horizon = 0.031 (site 373/1; simple slope) (Method B3)
K values B horizon = 0.033 (site 370/1; upper slope) (Method B3)

Texture

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

Dispersibility (Method D1) (site 372/1 simple slope)

%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 19 December 1995, Soils report Number VA1715D of 4 March 1996, and letter of 20 April 1996.

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

Field inspections indicate that there is very little erosion within the compartments. There is limited deposition of sand and fine gravel in some drainage lines. A length of rilling has occurred on a minor road in compartment 370 (it is not active and is covered with litter), and very slight erosion is occurring on a short section of 372 Road. These will be rectified during the logging operation by improving the drainage of these road sections.

(e) Landform

Slope

Slopes are generally convex or straight from the ridge tops down to the main drainage lines. The area is undulating/moderately steep to very steep with the eastern sections of both compartments being inaccessible. Over half of each compartment has slopes less than 20°. Absolute and percentage areas of slope classes are given in Table 1 below.

Table 1a - Slope Class Areas - Cpt 370

Slope Class	0° - ≤5°	>5° - ≤10°	>10° - ≤15°	>15° - ≤20°	>20° - ≤25°	>25° - ≤30°	>30°
Area (ha)	6	16	26	25	22	21	26
% Area	4	12	19	18	16	14	17

Table 1b - Slope Class Areas - Cpt 373

Slope Class	0° - ≤5°	>5° - ≤10°	>10° - ≤15°	>15° - ≤20°	>20° - ≤25°	>25° - ≤30°	>30°
Area	5	16	25	21	13	14	20
% Area	4	14	22	19	12	12	17

Terrain

The compartments are on adjacent sides of a secondary ridge running east off a main ridge system and contain a number of relatively short side ridges.

Drainage line condition

The drainage features of the compartments have been field inspected. The drainage lines are in good condition. They are mostly deeply incised, particularly on steeper areas of the compartments but not often down to bedrock.

The flow in the streams is intermittent and the drainage lines in the compartments were dry at the time of recent inspections, with the only water being scattered holes. Towgon Creek was flowing following recent heavy rains.

Aspect

The aspect is generally south in compartment 370 and generally north in compartment 373.

Rockiness

There is a rock area in the eastern section of each compartment. They are in areas that are generally inaccessible and will not directly affect snigging. Generally rockiness is not a

consideration in harvesting. The surface condition is described as friable, with up to 20% stones and a litter layer up to 1 cm thick.

(f) Hydrology

The compartments are in the Clarence River catchment. An upper branch of Towgon Creek runs along the southern boundary of compartment 370, and a tributary of Towgon Creek forms the northern boundary of compartment 373. Towgon Creek runs east for about 2 kilometres out of the forest and then for about 4 kilometres through private land to the Clarence 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 compartments.

Verification of drainage lines

All drainage features verified during harvesting plan preparation as watercourses or drainage lines are shown on the harvesting plan Operational Map with filter strip/protection strip protection. Other smaller drainage features which are not marked on the map 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, Rainfall 1200 mm+).

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

Previous harvesting

Old reports concerning the forest comment on access tracks and Red Cedar, White Beech and Hoop Pine cutting in the Towgon Creek area. It is not known if Compartments 370 and 373 were affected. The original stands were very open, readily accessible, regularly burnt and heavily grazed but the are no records of the early loggings in the compartments. The compartments were extensively harvested during the 1960s, following the construction of the original surveyed access road through the forest and again during 1975/77 following the up-grading of the access road. There is evidence of sleepers and girder cutting on the compartments that pre-date these operations.

Upstream catchment water use

Production forestry - all of the upstream catchment is within Grange SF.

Downstream catchment water use

Towgon Creek flows through grazing country before joining the Clarence River. There would be limited stock watering along its length.

Domestic water use

The only domestic water supply drawn from the Clarence below the Towgon Creek junction is the Copmanhurst town supply. Towgon Creek would amount to only a fraction of a percent of the Clarence flow and would have no influence at all on the town supply. Copmanhurst is to transfer to the lower Clarence scheme, which sources its water higher up the 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 70% live ground-cover being attained within 12 months. The tracks and minor roads utilised during previous logging have revegetated.

(h) Proposed Operation System

Use of existing roads

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

Compartments 370 and 373 are served by Western Boundary Road, which runs to the west of the compartments. Western Boundary Road is a long established, fully designed road with concrete relief pipes in side-cuts and drainage lines, mitre drains on the ridge-tops, and a consolidated gravelled pavement. It is regularly maintained.

372 Road is maintained open. This is an old, natural surface road with mitre drains where required, that has been consolidated by use. This road is stable with batters and drainage outlets well vegetated. There is very slight erosion near dump 6 (cpt 370), which will be rectified by the construction of rollover drains at the completion of the operation.

The remaining minor roads, Imperial, 373 and 373/1 Roads are accessed via 372/1 Road, the use and rehabilitation of which has been described under a previously prepared Harvesting Plan for compartment 372. These roads will be reopened for use during the harvesting operation. These are stable roads with litter and grass cover. They are drained by outfall drainage and open natural surface causeways. Reopening will require the removal of fallen timber and some regrowth and the filling of a short length of rilling on Imperial Road.

These works will be done with logging machinery and will cause minimal disturbance to the road pavement. There are no sections of road where ground slope exceeds 30° or where road grade exceeds 12°. None of the existing roads are likely to cause significant water pollution.

Use of existing drainage feature crossings

There are no drainage feature crossings on 372 Road. Imperial Road crosses 5 drainage depressions on open natural surface causeways that are long established and very stable.

The drainage feature crossing on the boundary of compartments 372 and 373 is no longer trafficable. Appendix 2 shows that the rate of discharge in a 1:5 year peak flow would be 0.15 cubic metres per second. Therefore a minimum waterway of 600 x 450 mm will be required. A State Forests Standard K1 log bridge will be constructed for the purposes of this harvesting operation, which will create an effective waterway area of 5000 x 3000 mm. All work will be done with minimal disturbance to the bed and banks of the drainage line and surrounding banks will be rehabilitated and sown with rye grass. This work will be undertaken by State Forests field staff.

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, 5, 8, 9, 10 and 11 to reduce snigging distances and take advantage of previously constructed log dumps, snig tracks and drainage line crossings. These snig tracks and drainage line crossings are stable. Less than 10% of the snigging activity will be downhill.

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

Post-harvest burning

In Compartments 370 and 373 bark and logging debris will be progressively spread through the logged area during the harvesting operation and/or accumulated in small heaps on log dumps. Logging debris will be kept approximately 5 metres clear of identified habitat trees. Bark and logging debris will be burnt, and in the longer term fine fuels will be managed as detailed in the Grafton District Fuel Management Plan (1993) and the Nymboida District Fire Plan.

Post-harvest rehabilitation

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

Description 13 Evaluation of Soil and Water Data

(a) Soil Erosion and Water Pollution Hazard Categories

Soil Erosion and Water Pollution Ratings (SE/WPR) have been assessed using SOILOSS 5.1. The Ratings have then been used to assess Soil Erosion and Water Pollution Categories (SE/WPC) for the net harvest area. The subsoil data from site 370/1 give the lowest slope limits for the categories and have been used in the calculations. Details are in table 2 below.

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

R = 3000

K = 0.017 **Topsoil (A horizon)** Method B3

K = 0.033 **Subsoil (B horizon)** Method B3

S = As factored in SOILOSS 5.1

L = 20 metres

C = 0.108 Native forest harvesting "B" Table 2

P = 1.0

Table 2: Water Pollution Hazard Categories

Slope Ranges (Degrees)	Water Pollution Category	Indicative % of Net Harvest Area	
		Cpt 370	Cpt 373
0-≤5	1	10	5
>5-≤19	2	80	80
>19-30	3	10	15
Roads	3	N/A	N/A

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

R = 3000 **K = 0.033**

(b) Dispersibility (Site 372/1, simple slope)

%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 Compartments 370 and 373.

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 no special attributes in the net harvest area that need to be considered.

Part 3 AUTHORISATION CONDITIONS

3.1 COMPLIANCE

(a) Area Identification

GRAFTON DISTRICT

Grange State Forest No. 771

Compartments 370 and 373

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

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

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

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

(d) Environmental Planning & Assessment Act Requirements

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

(e) Breaches and Infringements

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

(f) Variations and Amendments to this Harvesting Plan

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

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

Other approvals may only be made by the Supervising Forester and are also subject to the District Forester's counter approval, 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: 22 April 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: 13 MAY ..., 1996

Signature: ..... District Forester Date: 22:4 ..., 1996

(c) Receipt of External Authority Approvals

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

Table 3: External Authority Approvals

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

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

These amendments have been included in the final Plan. This Harvesting Plan comprises pages 1 -.40, attachments and the Operational, Forest Types and Locality maps marked and referenced to this Harvesting Plan. This is Harvesting Plan No. GG 96/02/370;373.

Date for commencement of operations: .....

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

District Forester

3.3 DISTRIBUTION

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

Forest Planning Branch, Head Office, for distribution to:

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

3.4 INDUSTRY ENDORSEMENT

I endorse the harvesting plan on behalf of industry.

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

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

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

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

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

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

3.5 BUSH SUPERVISORS ACKNOWLEDGMENT

I acknowledge that I have received a copy of Harvesting Plan No GG 96/02/370;373 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 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.

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.

13 dump sites have been located and marked in the compartments, as indicated on the Operational Map. Dumps 5, 6, 7, 10, 11, and 13 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 13.

(b) Wet Weather Controls - Roads

During wet weather, the wet-weather controls set out in Section 7 of the Forest Practices Code Part 2 (Timber Harvesting in Native Forests) must apply. In particular, when it is raining

and/or where runoff occurs from a road surface, haulage must not occur unless the road is a gravel or sealed road.

[FPC Pt2 7.2, PCL Sch 4 C 82]

(c) Wet Weather Controls - Snigging

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

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

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

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

4.4 Silviculture

(a) General

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

(b) Tree Marking

Tree marking must aim at:

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

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

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

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

In general tree marking and supervision must be directed towards:

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

2. Ensuring maximum economic utilisation of all trees felled.

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

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

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

(c) Harvesting Debris

Debris must be removed from within approximately 5 metres of the butts of retained habitat trees to minimise bark scorch during prescribed burning operations, or any 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 Riparian Habitat Zones, filter strips, protection strips and buffer strips.

4.5 Flora Protection

(a) Rare or Endangered Species

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

(b) Rainforest Protection

There are no areas of rainforest in these compartments.

4.6 Fauna Protection

(a) Sightings of Fauna

No Threatened species have been recorded from compartments 370 and 373. The Powerful Owl and Golden-tipped Bat have been recorded from compartment 368 to the south of compartment 370. Threatened species expected to occur in or in the vicinity of the compartment are;

Glossy Black Cockatoo	**Powerful Owl**	**Sooty Owl**
Masked Owl	**Stephen's Banded Snake**	**Pale-headed Snake**
Spotted-tailed Quoll	**Brush-tailed Phascogale**	**Yellow-bellied Glider**
Squirrel Glider	**Rufous Bettong**	**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 Threatened species to the District Marketing Forester. Such confirmed sightings or findings shall generate the application of the appropriate prescriptions to reduce the impact on the species.

(b) Habitat Trees

Compartments 370 and 373 include Dry Hardwood and Moist Hardwood forests with a xeromorphic understorey, and Moist Hardwood forest with a mesic understorey. Sufficient

potential habitat and recruitment habitat trees exist in the net harvest area to allow for the retention of enough trees to meet prescription requirements.

Prescription 1:

Habitat Tree Retention

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

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

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

Habitat trees shall be marked by the SFO.

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

(c) Non Harvest and Modified Harvest Areas

Wildlife Corridor

A designated Wildlife Corridor (PMP 1.1.7 - Flora and Fauna Protection) exists along the creek forming the northern boundary of compartment 373, as shown on the Operational Map. The corridor is 40 metres wide on either side of the creek.

- 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.

Riparian Habitat Zones

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

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

Refugia areas

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

(d) Species and Mitigation Prescriptions

Mitigation prescriptions to be applied in Grafton Management Area have been determined for Threatened species that might be adversely impacted on by forest management activities. Those relevant to Compartments 370 and 373 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 Spotted-tailed Quoll, Red-legged Pademelon, Rufous Bettong and Long-nosed Potoroo.

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.

The NPWS Manager Threatened Species, Northern Zone, shall be informed immediately a nest site is identified.

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 shall be retained.

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

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

Prescription 8:

Squirrel Glider

200 metre radius buffer zone 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

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

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

Prescription 10:

Long-nosed Potoroo

100 metre radius buffer zone 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 Compartments 370 and 373, based on the subsoil data from 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	
		Cpt 370	Cpt 373
0-≤5	1	10	5
>5-≤19	2	80	80
>19-30	3	10	15
Roads	3	N/A	N/A

(b) Approved Timber Harvesting and Extraction Method

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

(c) Marking and Location of Roads, Log Dumps, 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 5, 6, 7, 10, 11, 12 and 13, 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 convey the peak flow of a 1 in 5 year storm events.

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

0 - ≤5	>5 - ≤10	over 10
80	45	35

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 compartments are intermittent and rarely run water. They were dry at the time of recent inspections.

Western Boundary Road crosses a number of drainage lines utilising long established, stable structures. Imperial Road crosses five drainage depressions by way of natural surface open causeways. Imported gravel must be placed on these causeways if the pavement commences to deform during harvesting as determined by the SFO. At the conclusion of harvesting, any disturbed areas adjacent to these causeways must be seeded with rye grass by the SFO at the rate of 20 kg/ha.

The drainage feature crossing on 373 Road on the compartment boundary is no longer trafficable. A State Forests standard K1 log bridge must be constructed which will create an effective waterway area of 5000 x 3000 mm. All work must be done with minimal disturbance to the bed and banks of the drainage line. The crossing must be stabilised by the SFO with rye grass at the rate of 20 kg/ha immediately following the construction.

Revegetation and rehabilitation

The minor erosion on 372 Road near dump 6, and the rilling on a minor road in compartment 370 must be rectified by improving the drainage on these road sections.

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

The soils in these compartments are not significantly dispersible.

(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 of 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

A Wildlife Corridor exists 40 metres either side of the stream running along the northern boundary of compartment 373. This stream is protected by the Wildlife Corridor.

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

Filter strips and protection strips must be retained along all watercourses and drainage lines within the net harvest area of Compartments 370 and 373 at minimum widths (measured in the horizontal plane) as stated in Table 5 below. These minimum widths meet or exceed the requirements of the Pollution Control Licence.

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	<40 ha >18° slope		15m	10m
3 N/A	>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 compartments progressively ahead of harvesting operations. The contractor or operator is responsible for measuring off-sets to a filter strip from a protection strip as indicated by the SFO to determine the boundary of the filter strip 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

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

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

In areas of *High Erosion Hazard* (above 25°) the grades of snig tracks must not exceed 25°.

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

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

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

Slope boundaries	WP Category	No. Days
0-≤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	200 m	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, 5, 8, 9, 10 and 11.

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 compartments flow only intermittently and were dry at the time of recent inspections.

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. Some long established, stable snig track drainage line crossings exist in the compartments and these must be used where practical. Crossings must be rehabilitated after use, and any harvesting debris inadvertently deposited during use must be removed from the channel. As far as practicable the crossing point must be reshaped to its original condition and seeded with rye grass at the rate of 20 Kg/ha.

(o) Dispersible Soils

Not applicable to these compartments.

(p) Log Dumps

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

Before use, 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 Compartments 370 and 373.

Post-logging burning

Post-logging burning of Compartments 370 and 373 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 compartments 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 compartments and hence, decrease associated damage to regeneration and retained stems.
- to reduce the possibility of wildfire burning through the compartments 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 compartments.

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

Preferred season to burn

February to August.

4.8 Research and Inventory Plots

There are no research or inventory plots in Compartments 370 and 373.

4.9 Modified Harvest Conditions

(a) Wildlife Corridor

A designated Wildlife Corridor (PMP 1.1.7 - Flora and Fauna Protection) exists along the creek forming the northern boundary of compartment 373, as shown on the Operational Map. The corridor is 40 metres wide on either side of the creek.

- 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) 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.

4.10 Specification of Type of Products to be Removed.

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

Yield Information for Compartments 370 and 373

Estimated Yields are:

	Cpt 370	Cpt 373
Compulsory Sawlogs 40 cm +	500 m^3	500 m^3
Compulsory Sawlogs <40 cm	100 m^3	100 m^3
Salvage Sawlogs	100 m^3	100 m^3
Poles	50 m^3	50 m^3
Veneer Logs	50 m^3	50 m^3

Part 5 CONDITIONS FOR SUPERVISING FOREST OFFICERS (SFOs)

Condition 5.1 SFO' Authority to Supervise Harvesting Operations

(a) General

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

The appointed Hardwood Marketing Foreman, Grafton District.

(b) Relieving SFOs

Relieving SFOs , if required are:

The Forest Assistant, Marketing, Grafton District.

The Marketing Forester, Grafton District.

(c) SFOs Authority

The SFO has the authority to approve:

- the blading off of natural surface roads provided that damage will be minimal and the removed material is recoverable for respreading.
- downhill snigging routes where provided for in the Harvest Plan.
- use of natural surface roads for snig track crossings or as snig tracks to dumps provided restoration of the road for wheeled traffic is undertaken as necessary and use of the road significantly reduces soil disturbance.
- the exact location and type of 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 must 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, and Riparian Habitat Zones must be marked ahead of harvesting operations.

(b) Soil Erosion and Water Pollution Control

Marking of filter strips and protection strips

Wildlife Corridor and 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 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 SFO's copy of the map for future reference.

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

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

Drainage depression buffer strips

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

Drainage feature crossings

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

A State Forests Standard K1 log bridge is to be constructed on the crossing on the boundary between compartments 372 and 373. This work must be done with minimal disturbance to the bed and banks of the drainage line.

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

(c) Soil Erosion and Water Pollution Control Conditions

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

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

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

Not applicable in these compartments.

(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 Road (near dump 6) and rilling on a minor road in Cpt 370 are 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 Compartments 370 and 373.

(b) Post-logging Burning

Post-logging burning of Compartments 370 and 373 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 96/02/370;373 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 = 0.033 subsoil (B Horizon; site 370/1)

Derived from Laboratory Analysis of the B Horizon

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

S As factored in SOILOSS High

L = 10 metres

C = 0.45

Derived from 0.45 SEMGL standard

P = 1.0

Slope Ranges (Degrees)	Erosion Hazard Class	Where SEHR is	Indicative % of Net Harvest Area
<=6	Low	less than 40	10
>6 to <=25	Moderate	40 - 400	85
>25 to <=30	High	400 - 800	5
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.

(a) In areas of High Erosion Hazard, the grades of snig tracks must not exceed 25°.

(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 WELSH Signature .....

Title MARKETING FORESTER Date 22/4/96

District Approval (by District Forester)

Signature .....

District Forester

Date 22.4.96

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	No	2.5 12(e) Map
5	Are areas of WPC 4 within the net harvest area	No	2.5 13(a)
6	Drainage feature protection, prescribe stream	Yes	4.7 (h) Map
7	Any major water storage?	No	2.5 12(f)
8	Drainage depression buffer strips conditions	Yes	4.7 (h)
9.1 (c)	Filter strips on map?	Yes	Map
9.2	Protection strips on map?	Yes	Map
10	Prescriptions for marking/identifying in the field -filter strips -protection strips -buffer strips	 Yes Yes Yes	 5.2 (b) 5.2 (b) 5.2 (b)
13	Reporting accidental felling into filter strips	Yes	5.3 (c)
14, 20, 22	See 10		
24	Specify techniques in buffer strips	Yes	4.7 (k)
47	Stabilisation of roads within 12 months	Yes	2.5 12(h)
48	Are roads shown on map	Yes	Map
49	Road traverses area over 30°	No	2.5 12(h)
50 (a), (b)	Maximum road grade 10°	Yes	4.7 (f)
51	Marking of roads in field	Yes	4.7 (f)

52	Minimising road clearing widths	Yes	4.7 (f)

POLLUTION CONTROL LICENCE CONDITIONS CHECKLIST

PLAN PREPARATION - PCL Sch 2, Div 3

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

POLLUTION CONTROL LICENCE CONDITIONS CHECKLIST

PLAN PREPARATION - PCL Sch 2, Div 3

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

Harvesting Protocol Attachment
Cpts 370 and 373, Grange State Forest

API

Photography: Coaldale 1:25 000 colour NSW 4231 13/8/94
Run 13 Print 52

Interpreter: Nigel Fuller Date completed: 28 November 1995

Results summary (ocular estimate):

Candidate OGF	Net loggable area (as per photos)
Polygons >25 ha	Yes
Contiguous areas >25 ha	Yes

Mapping required? Yes
Photo overlay signed and stored with harvesting plan? Yes

Comments:
Within cpts 370 and 373, API identifies a polygon >25 ha which contains <10% CCP of regrowth forest and is contiguous with part cpt/s 368, 367 and 374.

MAPPING

Mapper: Leonie Walsh Date completed: 15 Dec 1995

Most of the area identified during the API phase falls in the steep and inaccessible eastern section of the compartments, and is not within the net harvest area (see accompanying maps). Only three small polygons (18 ha, 6 ha, and 20 ha) occur within the net harvest area.

Candidate OGF	Net loggable area	
	No	Area
Polygons >25 ha	0	0 ha

No potential candidate old growth exclusion areas

UNLOGGED AREAS

Assessor: Leonie Walsh Date completed: 16 February 1996
Sources: Logging records
Field observation

Unlogged areas >25 ha NLA present (within area to be accessed in this operation)? No
No unlogged forest exclusion areas

Prepared by LEONIE WALSH Signature [signature]

Title MARKETING FORESTER Date 22/4/96

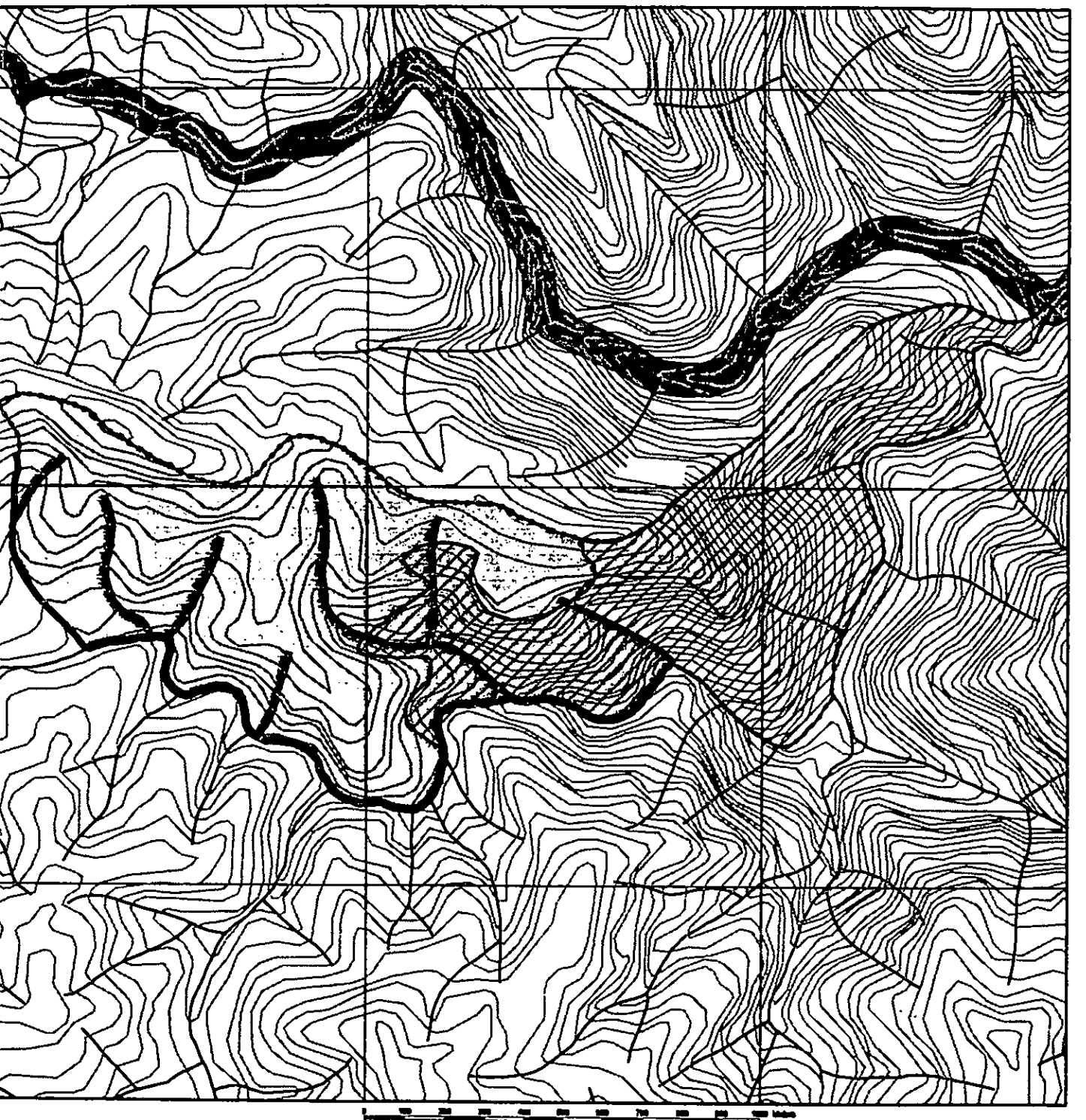
District Approval [signature] Date 22.4.96.

District Forester
GRAFTON DISTRICT

POTENTIAL CANDIDATE OLD GROWTH (API)
NORTHERN REGION - GRAFTON DISTRICT
COMPARTMENT 370
GRANGE STATE FOREST

STATE FORESTS

CAMELBACK MAP SHEET



UNDARIES
Compartment Boundaries

NORMAL PRESCRIPTIONS
Harvestable Area

WATERCOURSES & DRAINAGE
Filter strip
Drainage line

OTENTIAL CANDIDATE OLD GROWTH
Areas with <10% CCP regrowth forest (API)

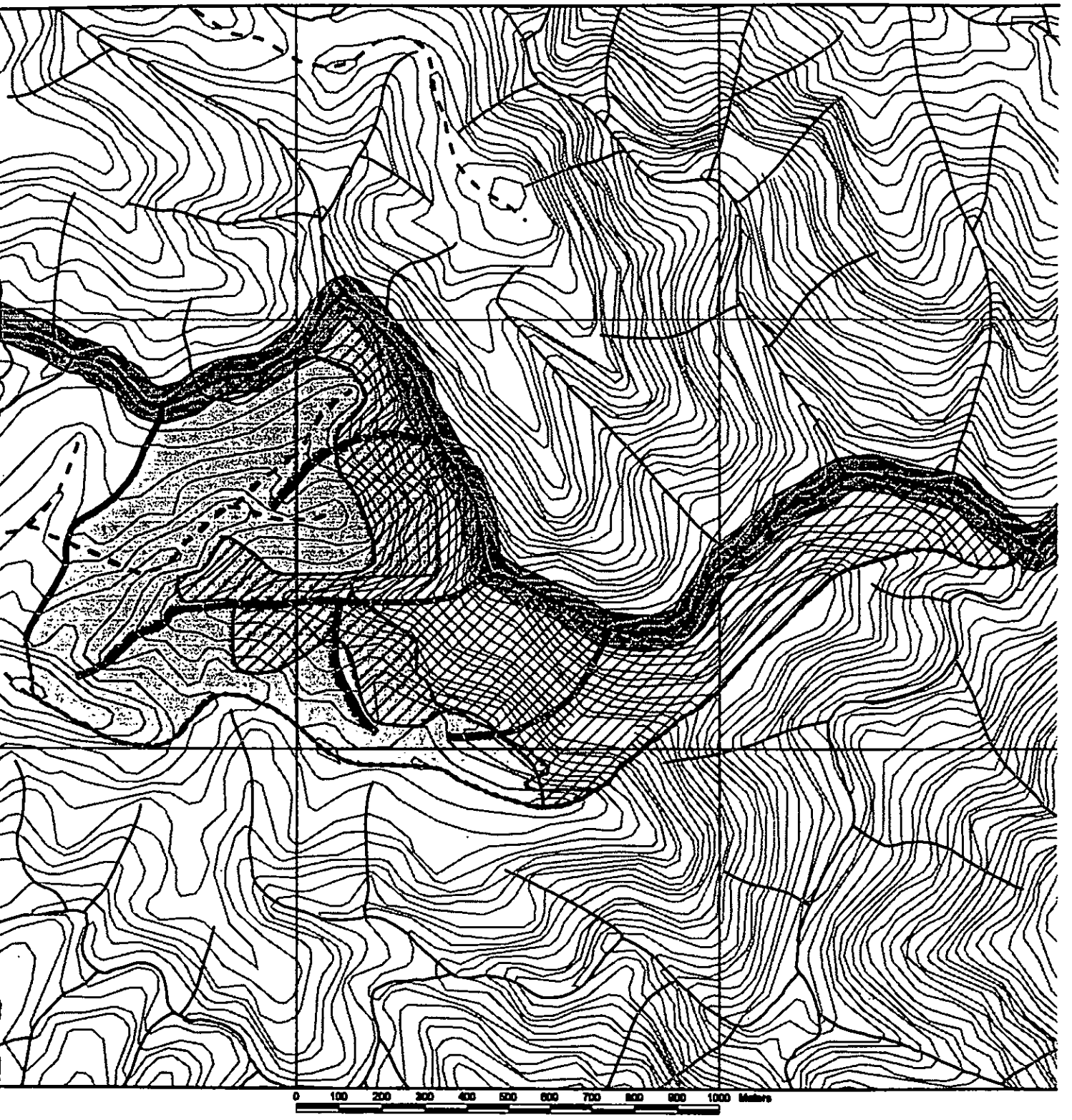
NON HARVEST AREAS
Steep/Inaccessible
Riparian Habitat Zone

MN

POTENTIAL CANDIDATE OLD GROWTH (API)
NORTHERN REGION - GRAFTON DISTRICT
COMPARTMENT 373
GRANGE STATE FOREST

STATE FORESTS

CAMELBACK MAP SHEET



BOUNDARIES
- Compartment Boundaries

POTENTIAL CANDIDATE OLD GROWTH
- Areas with <10% CCP regrowth forest (API)

NORMAL PRESCRIPTIONS
- Harvestable Area

NON HARVEST AREAS
- Steep/Inaccessible
- PMP 1.1.7 - Flora and Fauna Protection
- Riparian Habitat Zone

WATERCOURSES & DRAINAGE
- Filter strip
- Drainage line

MN

APPENDIX 2: Waterway calculation for bridge crossing on 373 Road

Catchment area (A) ..... **6.34 ha**

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

Difference in height ..... 70 m

Length of stream ..... 300 m

$$H = \frac{(0.75 \times \text{difference in height})}{\text{Length of stream}} \times 100$$ ..... 17.5 %

(a) Uncorrected time of concentration ..... 0.5 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 ..... 12.98 min

(e) Uncorrected rainfall intensity ..... 3.2 mm/hour

(f) Flood frequency factor for rainfall intensity 1.68

(g) Locality factor 17.94

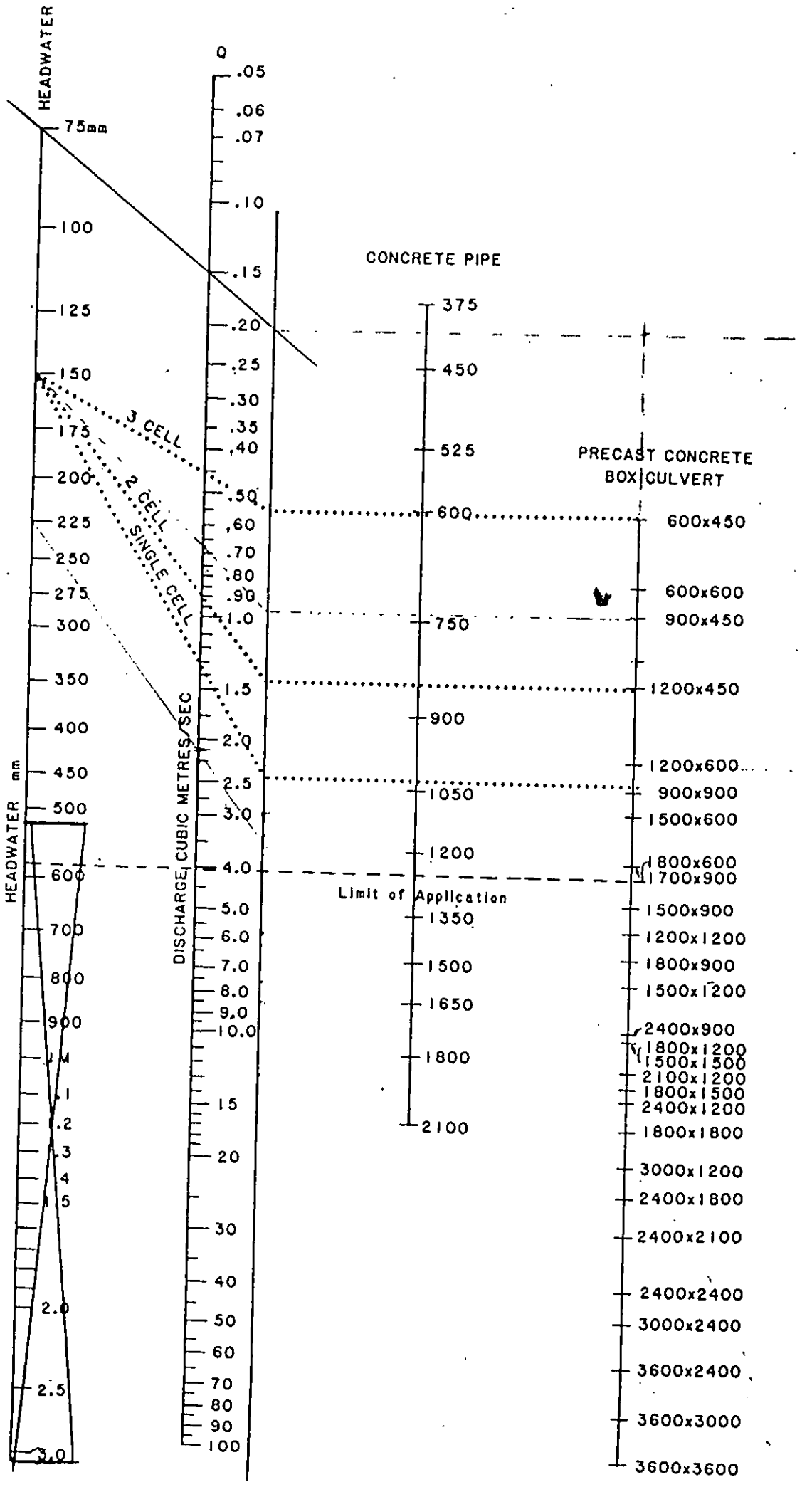
Corrected rainfall intensity I = exfxg ..... **96.44 mm/hour**

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

Discharge (Q) = 0.00278 x C x I x A ..... ***0.14 m^3/sec***

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

CULVERT CAPACITY CHART



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

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

VENESS & ASSOCIATES

Pty Limited

ACN 003 419 958

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

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)	A Horizon Texture	A Horizon 'K'	B Horizon Depth (cm)	B Horizon Texture	B Horizon '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

VENESS & ASSOCIATES

ACN 003 419 958 Pty Limited

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

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

Dear Leonie,

Re: Soil sampling for Harvesting Plans for compartments 383 - 397, Grange SF

In respect of the soil sampling and analyses program for soils from the above compartments, please be advised of the following points.

- Initially, Veness & Associates examined in detail one site from each compartment, sampling both the A and B horizons. The results of the analyses undertaken on these samples have been previously presented to you in report number VA1715D.

The soils occurring in these compartments were found to belong to soil mapping unit C, as described in the EIS soil study document. It should be appreciated that while samples were taken from each compartment, specific soil data was examined and recorded in the field. This, together with numerous observations throughout the two compartments, allowed Veness & Associates to conclude that these soil materials were consistent with the EIS descriptions.

Specific soils data has been recorded and presented to you. This includes depth of the A and B horizons. The geology underlying all of these compartments consists of Ordovician and Silurian sediments comprising of argillites, phyllites, slates and intermediate volcanics, all with abundant quartz veins.

The Grafton EIS soils mapping, undertaken by Veness & Associates, was carried out at a scale of 1:125 000. In respect of these harvesting plan samples handled by Veness & Associates, the following procedure to determine 'K' has been used:

- each soil sample was textured (after Northcote, 1979)
- each soil sample was analysed in the laboratory to determine both Particle Size Analysis and Dispersion Percentage
- the organic matter of each soil sample was determined

[the above analyses were undertaken using the methods required by EPA]

- for each soil sample, structure and permeability are determined
- the value of 'K' was determined using SOILOSS version 5.1 for each soil sample. As required by the SOILOSS program, the values for clay, silt, fine sand, coarse sand, gravel, organic matter, soil structure and soil permeability were taken as those being determined above.

Consequently, the K factor for each soil sample was determined through laboratory derived values. This methodology exceeds, and is more valid than, the determination of K

using either Method B2 or B3.

The PDS value, determined for each of the soil samples handled by Veness & Associates, was calculated using laboratory derived dispersion percentage and per cent clay values.

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%
383/1/A	Topsoil	2- 8	C	15(17)	31(34)	29(32)	15(17)	10	15	L,fsy	1	1	1.03	0.036	2.25
383/1/B	Subsoil	15-25	C	27(29)	33(35)	20(22)	13(14)	7	22	LC	1	4	0.34	0.035	5.94
384/1/A	Topsoil	2-10	C	8(17)	12(27)	13(28)	13(28)	54	19	FSCL	1	2	8.26	0.012	1.52
384/1/B	Subsoil	40-50	C	30(47)	11(17)	8(13)	15(23)	36	18	LC	2	4	1.20	0.018	5.40
386/1/A	Topsoil	5-10	C	6(10)	14(22)	25(40)	18(28)	37	11	FSCL	2	3	8.77	0.016	2.22
386/1/B	Subsoil	40-50	C	9(14)	15(24)	18(29)	21(33)	37	54	LC	2	5	2.24	0.043	4.86
387/1/A	Topsoil	5-15	C	13(20)	22(35)	18(28)	11(17)	36	8	CL	1	2	8.26	0.010	1.04
387/1/B	Subsoil	45-55	C	48(51)	21(23)	14(15)	10(11)	7	11	LC	1	4	1.72	0.012	5.28
388/1/A	Topsoil	2-10	C	25(27)	28(30)	33(35)	8 (8)	6	21	CL	1	2	7.57	0.008	5.25
388/1/B	Subsoil	55-65	C	32(41)	16(21)	15(19)	15(19)	22	35	LC	1	4	1.72	0.019	11.20
389/1/A	Topsoil	10-15	C	7(12)	26(44)	21(36)	5 (8)	41	18	FSCL	1	2	7.91	0.022	1.26
389/1/B	Subsoil	55-65	C	48(55)	14(16)	23(26)	2 (3)	13	11	LC	1	4	1.89	0.011	5.28
390/1/A	Topsoil	3-10	C	12(15)	16(20)	31(40)	20(25)	21	4	CL	1	2	6.71	0.015	0.48
390/1/B	Subsoil	20-30	C	18(29)	19(31)	14(23)	11(17)	38	17	LC	1	4	2.92	0.029	3.06

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

(Report VA1715D 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
(Managing Director)
VENESS & ASSOCIATES Pty Limited
4th March, 1996

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%
391/1/A	Topsoil	5-10	C	12(19)	20(32)	18(29)	13(20)	37	14	SiCL	1	2	8.26	0.010	1.68
391/1/B	Subsoil	45-55	C	23(34)	17(26)	12(18)	15(22)	33	34	LMC	1	4	2.06	0.023	7.82
392/1/A	Topsoil	5-15	C	11(17)	20(31)	22(34)	12(18)	35	14	L,fsy	1	1	9.12	0.004	1.54
392/1/B	Subsoil	65-75	C	9(24)	7(18)	7(18)	15(40)	62	38	FSCL	2	3	1.38	0.030	3.42
393/1/A	Topsoil	5-10	C	12(19)	15(24)	20(32)	16(25)	37	9	SiCL	1	2	7.74	0.010	1.08
393/1/B	Subsoil	35-45	C	43(50)	16(19)	17(20)	10(11)	14	17	LC	1	4	1.72	0.012	7.31
394/1/A	Topsoil	2- 8	C	9(17)	11(21)	13(25)	19(37)	48	17	SiCL	1	2	5.68	0.016	1.53
394/1/B	Subsoil	30-40	C	18(44)	6(15)	5(12)	12(29)	59	14	LC	1	4	1.72	0.016	2.52
395/1/A	Topsoil	2- 8	C	9(14)	19(29)	21(31)	17(26)	34	17	SiCL	1	2	5.50	0.021	1.53
395/1/B	Subsoil	50-60	C	30(36)	20(24)	19(22)	15(18)	16	17	LC	1	4	1.55	0.021	5.10
396/1/A	Topsoil	5-10	C	12(16)	20(27)	22(30)	20(27)	26	25	CL	2	3	5.50	0.026	3.00
396/1/B	Subsoil	20-30	C	26(27)	29(30)	23(24)	19(19)	3	33	LC	1	5	1.89	0.032	8.58
397/1/A	Topsoil	5-10	C	14(18)	14(18)	44(56)	6 (8)	22	4	SiCL	2	3	12.56	0.012	0.56
397/1/B	Subsoil	40-50	C	37(40)	26(28)	25(27)	5 (5)	7	8	LC	1	4	4.30	0.017	2.96

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

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

Jim Veness
(Managing Director)
VENESS & ASSOCIATES Pty Limited
4th March, 1996

EPA

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/D31/Not. Nos. 002871

Your Reference:

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

"**Compartments Description**

Compartments 370 & 373
Grange State Forest No. 771

Water Pollution Hazard Categories

Water Pollution Hazard Category	Slope Ranges (degrees)
1	Less than or equal to 3.
2	Greater than 3 and less than or equal to 14.
3	Greater than 14 and less than or equal to 30.
4	Not applicable.

Proportion of dispersible soils: A horizon 2.72%
B horizon 9.52%

Special Conditions

Special conditions are those conditions contained in the harvesting plan for Compartments 370 & 373, Grange State Forest No. 771, prepared by State Forests of NSW, received by the EPA on 7 May 1996, and as amended by:

1. addendum 1 received by the EPA on 20 May 1996; and

2. amending the water pollution hazard category slope boundaries in Table 2 in Description 13 on page 15 in accordance with the Water Pollution Hazard Category Slope boundaries specified in this Notice; and

3. amending the water pollution hazard category slope boundaries in Table 4 in Condition 4.7(a) on page 28 in accordance with the Water Pollution Hazard Category Slope boundaries specified in this Notice; and

4. amending the water pollution hazard category slope boundaries in Table 6 in Condition 4.7(1) on page 34 in accordance with the Water Pollution Hazard Category Slope boundaries specified in this Notice; and

5. amending the water pollution hazard category slope boundaries in Table 7 in Condition 4.7(1) on page 34 in accordance with the Water Pollution Hazard Category Slope boundaries specified in this Notice.

Water Quality Monitoring Site

Mebbin State Forest

Date of licence variation

23 May 1996."

NEIL SHEPHERD
Director-General

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

FOR ACTION OR NOTING SY	
ORIGINATOR	HL 23.5.96
1. A/MAU	
2. MWCP	25.5.96
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	**Date**	23 May 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 23 May 1996 to include the following areas:

Compartment No.	State Forest	Managenent Area
370,373	Grange	Grafton

A. HOWE
Manager
Forest Planning Branch

For State Forests Use Only (Page 1 of 1)

District Forester: Grafton

As required under the above legislation we advised EPA about our intention not to appeal against this Licence amendment **on 23 May 1996.** Accordingly you may start logging these compartments **on 25 May 1996.**

Manager, Forest Planning Branch

HARVEST PLAN DESK AUDIT CHECKLIST

Register No: 749 Date Received: 20 / 5 /1996

State Forest: GRANGE Compartment/~~Age Class~~: 370, 373

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
K	✓		✓		K = 0.046
S					as factored by SOILOSS 5.1
L					L = 20 M
C	✓		✓		C = 0.108

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

CALCULATION OF WATER POLLUTION HAZARD CATEGORIES

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

Soil Unit 1: _____

	% Cpt 370	% Cpt 373	Slope (°)	Catchment Size
WPHC 1	10	5	0 ≤ 3	
WPHC 2	60	60	3 ≤ 14	
WPHC 3	30	35	14 ≤ 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: 16 x % C: 17 / 100 = 2.72
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: MEBBIN State Forest

Annual rainfall: 1200 Geology: METASEDIMENTS

Forest Type: SPOTTED GUM ASSOCIATIONS

HARVEST PLAN DESK AUDIT CHECKLIST

Condition	Condition	Comply	Comment
1 b	**Site Specific conditions** Attached site specific conditions to harvesting plan	Nil	p15
6	**Minimum protection widths for drainage line in native forests** Any prescribed streams, swamps and wetlands	Nil	p12
7	Any major water storages present	Nil	p12
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	✓	p32
20	**Operations within Native Forest Protection strips** Person responsible for identifying P strips in the field	✓	p32. SFO
22	**Operations within Native Forest Buffer strips** Person responsible for identifying B strips in the field	✓	p32 contractor
24	Specifications of techniques for minimising soil exposure and that any disturbance will cause no channelised flow in buffer strip	✓	p33
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, 29
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	✓	p13, 29
57	**Borrow Pits and Gravel Pits** Specify techniques for 1. construction of stable batters 2. stabilisation at the completion of operations	N/C	p13

Condition	Condition	Comply	Comment
60	**Road Batters** Specify road batter stabilisation techniques	NA	
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	✓	p29
71	**Crossing of drainage features** Specify location and type of crossings at drainage features	✓	p13, 30.
78	**Road no longer required** Specify techniques to be used to stabilise roads that are no longer used	✓	p30, 24
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	✓	p34
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	✓	
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	✓	p35

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	/	p38

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 370, 373
Date : 21-05-1996 Time : 13:05 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 = 0.046
Topography :Slope: 4.0ø Slope Length: 20 m LxS = 0.747
Support Practice : No cultivation (P = 1) P = 1.000
Management :
Rotation :
Cultivations :
Stubble Mgmt :Forest land - User Supplied C = 0.1080

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

Soil Loss Targets :

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

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

Management Options :

To reduce soil loss from 11 to 10 t/ha.a the options are :
* Reduce C to 0.0970

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****
********** User's Name **********
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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 370, 373
Date : 21-05-1996 Time : 13:06 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 = 0.046
Topography :Slope: 3.0ø Slope Length: 20 m LxS = 0.571
Support Practice : No cultivation (P = 1) P = 1.000
Management :
Rotation :
Cultivations :
Stubble Mgmt :Forest land - User Supplied C = 0.1080

Long-term average annual soil loss: A = 8.5 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 8.5 to 5 t/ha.a the options are :
* Reduce C to 0.0635

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****
********** User's Name **********
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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 370, 373
Date : 21-05-1996 Time : 13:06 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 = 0.046
Topography :Slope: 14.0ø Slope Length: 20 m LxS = 3.277
Support Practice : No cultivation (P = 1) P = 1.000
Management :
Rotation :
Cultivations :
Stubble Mgmt :Forest land - User Supplied C = 0.1080

Long-term average annual soil loss: A = 49 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 49 to 10 t/ha.a the options are :
* Reduce C to 0.0221

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****
********** User's Name **********
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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 370, 373
Date : 21-05-1996 Time : 13:06 Report Number : 4

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

Rainfall Erosivity: Rainfall Zone: 2 R = 3000
Soil Erodibility : User supplied K = 0.046
Topography :Slope: 30.0ø Slope Length: 20 m LxS = 6.639
Support Practice : No cultivation (P = 1) P = 1.000
Management :
Rotation :
Cultivations :
Stubble Mgmt :Forest land - User Supplied C = 0.1080

Long-term average annual soil loss: A = 99 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 99 to 10 t/ha.a the options are :
* Reduce C to 0.0109

****

Forest Planning and Fire Management Branch

Phone No. (02) 7955372

STATE FORESTS
MANAGING · CARING · SUSTAINING

To	District Forester - Grafton / Planning Forester
From	Forestry Liaison Officer - Environment Protection Authority
Date	17 May 1996
Subject	HARVESTING PLAN GRANGE 370, 373

The harvesting plan for Grange 370, 373 has been examined by the Liaison Officer. Although comprehensive the harvesting plan will fail to satisfy the Environment Protection Authority (EPA) without some alteration to the text. Some of these changes are necessary to account for particularly relevant amendments to the PCL effective from 22 April. 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. *page 10. Part 2.5, description 12(d), soils.*

   In examining Jim Veness assessment of soils I would expect that the EPA will question why site 378/1 which is in the locality of the planning unit was not selected as relevant to the harvesting plan. It appears that the landform of site 378/1 is a landform element within the harvest area. Although another site on the same landform element has been selected for use in the assessment the EPA would consider that we have not sufficient sites on the upper slope landform element to dismiss any value within the locality. The precautionary principle adopted by the EPA would require us to use the values for site 378/1 unless we have many sites on upper slopes and statistically analyse them and use a value that represents the eighty percentile band.

   Therefore I recommend we edit the following sections

   Erodibility
   A horizon = 0.046 (site 378/1; upper slope)

   Dispersibility
   (site 378/1 upper slope & 372/1 simple slope)
   % clay A horizon 17%
   D% A horizon 16%
   % dispersible soil A horizon 17/100x16/100x100 = 2.72

   Please repeat for page 15

2. *page 15. Part 2.5, description 13(a), table 2.*

Edit table 2 to

Slope Ranges (degrees)
0 ≤ 4 3
> 4 ≤ 14
> 14 ≤ 30
roads

my calculation incorrect!

(Note that this is due to an adoption of K = 0.046.)

Please also edit tables 4, 6 and 7.

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

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

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

4. *page 28. Part 4.7(a), soil erosion and water pollution hazard categories.*

Due to a variation to PCL schedule 4, condition 5A I recommend we insert an additional stanza below table 4
'The SFO is responsible for identifying ground slopes exceeding 30 degrees in the field.'

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

In the last sentence insert after EPA 'or unless consistent with variation 24A to the Pollution Control Licence'.

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

In the first stanza, last sentence replace 'will' with 'must'. NA
previously advised by EPA as 'will'.

Please supply the summary letter by the soil scientist to justify roll-over cross-bank heights of 20 cm.

Edit spacing table due to adoption of K = 0.046.

0 - ≤5	>5 - ≤10	over 10
30	20	20

7. *page 30. Part 4.7(e), crossing of drainage features.*

Please amend your text with additional statements on:

specifics of draining the approaches (eg placement of final roll-over cross-bank to minimise catchment size, crowning or cross slope of pavement, crowning of bridge fill);

statement on if table drains can be discharged onto undisturbed vegetation before bank of drainage line, or techniques to minimise flow directly into drainage line;

relocation of old crossing debris away from filter strip;

prescription that timber for construction purposes not to be taken from the filter strip beyond the immediate clearing for the crossing construction;

comment if bridge includes kerbs.

8. *page 32. Part 4.7(j), operations within native forest filter strips.*

In the third stanza, third line replace 'hand brushing' with 'reshaping'.

9. *page 33. Part 4.7(j), operations within native forest protection strips.*

In point (d) insert after undisturbed areas 'or onto surfaces capable of handling concentrated flow'.

In the second point (b) insert after undisturbed areas 'or onto surfaces capable of handling concentrated flow'.

10. *page 34. Part 4.7(m), downhill snigging.*

Due to an amendment to PCL schedule 4 condition 109 we are required to either use one of the following techniques or a combination of

a) down-hill snig tracks must enter the log dump from the side or below

b) a drainage structure must be in place immediately before a snig track enters the log dump at the end of each days operation.

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

In the second stanza, after All 'watercourses and'.

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 96/02/370;373.

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

cc
Operations Manager
Northern Region

Grange 370 & 373

Previous Register #722

Description 43 — 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 from site 378/1 give the lowest slope limits for the categories and have been used in the calculations. Details are in table 2 below.

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

R = 3000

K = 0.046 — 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	
		Cpt 370	Cpt 373
0-≤4	1	10	5
>5-≤14	2	60	60
>14-30	3	30	35
Roads	3	N/A	N/A

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

R = 3000 K = 0.033

(b) Dispersibility (Site 378/1, crest; and 372/1 simple slope)

%dispersible soil A horizon = 17/100x16/100x100 = 2.72 (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 Compartments 370 and 373.

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.

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

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

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

(d) Environmental Planning & Assessment Act Requirements

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

(e) Breaches and Infringements

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

(f) Variations and Amendments to this Harvesting Plan

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

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

Other approvals may only be made by the Supervising Forester and are also subject to the District Forester's counter approval, 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.

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

Prescription 10:

Long-nosed Potoroo

100 metre radius buffer zone 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 Compartments 370 and 373, based on the subsoil data from 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	
		Cpt 370	Cpt 373
0-≤4	1	10	5
>5-≤14	2	60	60
>14-30	3	30	35
Roads	3	N/A	N/A

The SFO is responsible for identifying ground slopes exceeding 30 degrees in the field.

(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, 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 or unless consistent with variation 24A to the Pollution Control Licence.

(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 5, 6, 7, 10, 11, 12 and 13, 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 convey the peak flow of a 1 in 5 year storm events.

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

0 - ≤5	>5 - ≤10	over 10
30	20	20

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 compartments are intermittent and rarely run water. They were dry at the time of recent inspections.

Western Boundary Road crosses a number of drainage lines utilising long established, stable structures. Imperial Road crosses five drainage depressions by way of natural surface open causeways. Imported gravel must be placed on these causeways if the pavement commences to deform during harvesting as determined by the SFO. At the conclusion of harvesting, any disturbed areas adjacent to these causeways must be seeded with rye grass by the SFO at the rate of 20 kg/ha.

The drainage feature crossing on 373 Road on the compartment boundary is no longer trafficable. A State Forests standard K1 log bridge must be constructed which will create an effective waterway area of 5000 x 3000 mm. The approaches to the crossing must be drained by outfall drainage. On each side, there must be a rollover drain constructed just before the crossing. These drains must discharge onto undisturbed areas or surfaces capable of handling concentrated flow. The bridge must have kerb logs and a crowned pavement. Spoil from excavation of the existing crossing must be used for the bridge pavement.

Timber for the construction of the bridge must not be taken from the filter strip.

All work must be done with minimal disturbance to the bed and banks of the drainage line. Any disturbed areas adjacent to the crossing must be stabilised by the SFO with rye grass at the rate of 20 kg/ha immediately following the construction.

Revegetation and rehabilitation

The minor erosion on 372 Road near dump 6, and the rilling on a minor road in compartment 370 must be rectified by improving the drainage on these road sections.

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

The soils in these compartments are not significantly dispersible.

(f) Road Construction

No road construction is required for the harvesting.

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	<40 ha <18° slope		10m	10m
3	<40 ha >18° slope		15m	10m
3	>40 ha <18° slope	20m		5m
3	>40 ha >18° slope	20m		10m

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

The SFO must mark the Riparian Habitat Zones and protection strips (or filter strips if there are no protection strips) in the compartments progressively ahead of harvesting operations. The contractor or operator is responsible for measuring off-sets to a filter strip from a protection strip as indicated by the SFO to determine the boundary of the filter strip 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 reshaping 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 or onto surfaces capable of handling concentrated flow.

Crowns of trees may be felled into protection strips

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

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

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

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

(k) Extraction from Drainage Depression Buffer Strips

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

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

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

In areas of *High Erosion Hazard* (above 25°) the grades of snig tracks must not exceed 25°.

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

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

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

Slope boundaries	WP Category	No. Days
0-≤4	1	10
>4-≤14	2	8
>14-30	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° - ≤4°)	2 (>4° - ≤14°)	3 (>14° - ≤30°)
0 - ≤5	200 m	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, 5, 8, 9, 10 and 11.

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

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

(n) Snig Track Drainage Line Crossings

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

All watercourses and 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. Some long established, stable snig track drainage line crossings exist in the compartments and these must be used where practical. Crossings must be rehabilitated after use, and any harvesting debris inadvertently deposited during use must be removed from the channel. As far as practicable the crossing point must be reshaped to its original condition and seeded with rye grass at the rate of 20 Kg/ha.

(o) Dispersible Soils

Not applicable to these compartments.

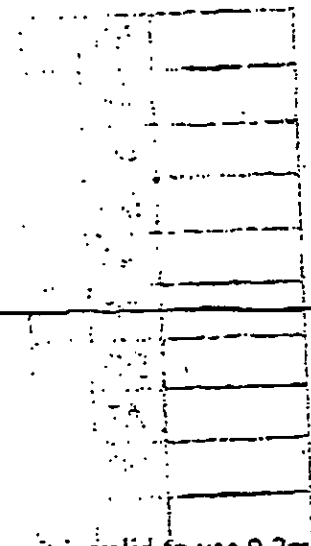
LAND & WATER CONSERVATION

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

50 Pound Street, PO Box 242, Grafton NSW 2460
Phone: (066) 43 2232 Fax (066) 43 2189

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. J. Christiansen

Kel Christiansen

*** FOREST ROADS STORM RUNOFF ***

ICATION: GRAFTON
ARI= 5 years I(1 hr,ARI)= 47.6 mm/hr Rough. Coeff.= .027
Runoff Co-efficient= .85

OAD LENGTH metres	SLOPE Deg.	STORM Tc Min.	I mm/hr	DISCHARGE Cumecs	VELOCITY m/sec
10	5.0	0.8	202.7	0.002	0.21
20	5.0	1.2	196.7	0.005	0.28
30	5.0	1.6	191.9	0.007	0.33
40	5.0	1.9	187.9	0.009	0.36
50	5.0	2.1	184.4	0.011	0.39
60	5.0	2.4	181.3	0.013	0.42
70	5.0	2.7	178.4	0.015	0.44
80	5.0	2.9	175.7	0.017	0.46
90	5.0	3.1	173.2	0.018	0.48
100	5.0	3.3	170.9	0.020	0.50
10	10.0	0.6	205.0	0.002	0.26
20	10.0	1.0	200.2	0.005	0.34
30	10.0	1.3	196.2	0.007	0.40
40	10.0	1.6	192.7	0.009	0.45
50	10.0	1.7	189.6	0.011	0.49
60	10.0	1.9	187.1	0.013	0.52
70	10.0	2.1	184.7	0.015	0.55
80	10.0	2.3	182.4	0.017	0.58
90	10.0	2.5	180.3	0.019	0.60
100	10.0	2.7	178.3	0.021	0.63
10	15.0	0.6	206.2	0.002	0.30
20	15.0	0.9	201.9	0.005	0.39
30	15.0	1.1	198.3	0.007	0.46
40	15.0	1.3	195.2	0.009	0.51
50	15.0	1.5	192.7	0.011	0.55
60	15.0	1.7	190.3	0.013	0.59
70	15.0	1.9	188.0	0.015	0.63
80	15.0	2.0	186.0	0.018	0.66
90	15.0	2.2	184.1	0.020	0.69
100	15.0	2.3	182.3	0.022	0.72
10	20.0	0.5	207.0	0.002	0.32
20	20.0	0.8	203.0	0.005	0.43
30	20.0	1.0	199.7	0.007	0.50
40	20.0	1.2	197.0	0.009	0.56
50	20.0	1.4	194.5	0.011	0.61
60	20.0	1.5	192.3	0.014	0.65
70	20.0	1.7	190.2	0.016	0.69
80	20.0	1.8	188.3	0.018	0.73
90	20.0	2.0	186.5	0.020	0.76
100	20.0	2.1	184.8	0.022	0.79
10	25.0	0.5	207.6	0.002	0.33
20	25.0	0.7	203.5	0.005	0.44
30	25.0	0.9	200.0	0.007	0.54
40	25.0	1.1	196.9	0.009	0.61
50	25.0	1.3	194.2	0.012	0.66
60	25.0	1.4	191.8	0.014	0.71
70	25.0	1.6	189.7	0.016	0.75
80	25.0	1.7	187.8	0.018	0.79
90	25.0	1.8	186.1	0.020	0.82
100	25.0	2.0	184.5	0.022	0.85

*** FOREST ROADS STORM RUNOFF ***

LOCATION: GRAFTON

ARI= 5 years I(1 hr,ARI)= 47.6 mm/hr Rough. Coeff.= .0275
Runoff Co-efficient= .85

ROAD LENGTH metres	SLOPE Deg.	STORM Tc Min.	I mm/hr	DISCHARGE Cumecs	VELOCITY m/sec
100	5.0	3.4	170.4	0.020	0.49
110	5.0	3.6	165.3	0.022	0.51
120	5.0	3.8	166.2	0.024	0.52
130	5.0	4.0	164.2	0.025	0.54
140	5.0	4.2	162.3	0.027	0.55
150	5.0	4.4	160.5	0.028	0.57
160	5.0	4.6	158.8	0.030	0.58
170	5.0	4.8	157.1	0.032	0.59
180	5.0	5.0	155.5	0.033	0.60
100	10.0	2.7	177.2	0.021	0.62
110	10.0	2.9	176.0	0.023	0.64
120	10.0	3.0	174.2	0.025	0.66
130	10.0	3.2	172.4	0.026	0.68
140	10.0	3.4	170.8	0.028	0.70
150	10.0	3.5	169.2	0.030	0.71
160	10.0	3.7	167.7	0.032	0.73
170	10.0	3.8	166.2	0.033	0.74
180	10.0	4.0	164.8	0.035	0.76
100	15.0	2.4	181.7	0.021	0.71
110	15.0	2.5	180.2	0.023	0.73
120	15.0	2.7	178.5	0.025	0.75
130	15.0	2.8	176.9	0.027	0.78
140	15.0	2.9	175.3	0.029	0.80
150	15.0	3.1	174.0	0.031	0.82
160	15.0	3.2	172.5	0.033	0.83
170	15.0	3.3	171.2	0.034	0.85
180	15.0	3.4	169.8	0.036	0.87
100	20.0	2.1	184.4	0.022	0.78
110	20.0	2.3	182.9	0.024	0.81
120	20.0	2.4	181.4	0.026	0.83
130	20.0	2.5	179.9	0.028	0.86
140	20.0	2.7	178.5	0.030	0.88
150	20.0	2.8	177.1	0.031	0.90
160	20.0	2.9	175.8	0.033	0.92
170	20.0	3.0	174.6	0.035	0.94
180	20.0	3.1	173.5	0.037	0.96
100	25.0	2.0	186.4	0.022	0.84
110	25.0	2.1	185.0	0.024	0.87
120	25.0	2.2	183.5	0.026	0.90
130	25.0	2.3	182.1	0.028	0.93
140	25.0	2.4	180.8	0.030	0.95
150	25.0	2.6	179.5	0.032	0.98
160	25.0	2.7	178.3	0.034	1.00
170	25.0	2.8	177.1	0.036	1.02
180	25.0	2.9	175.9	0.037	1.04

END OF OUTPUT