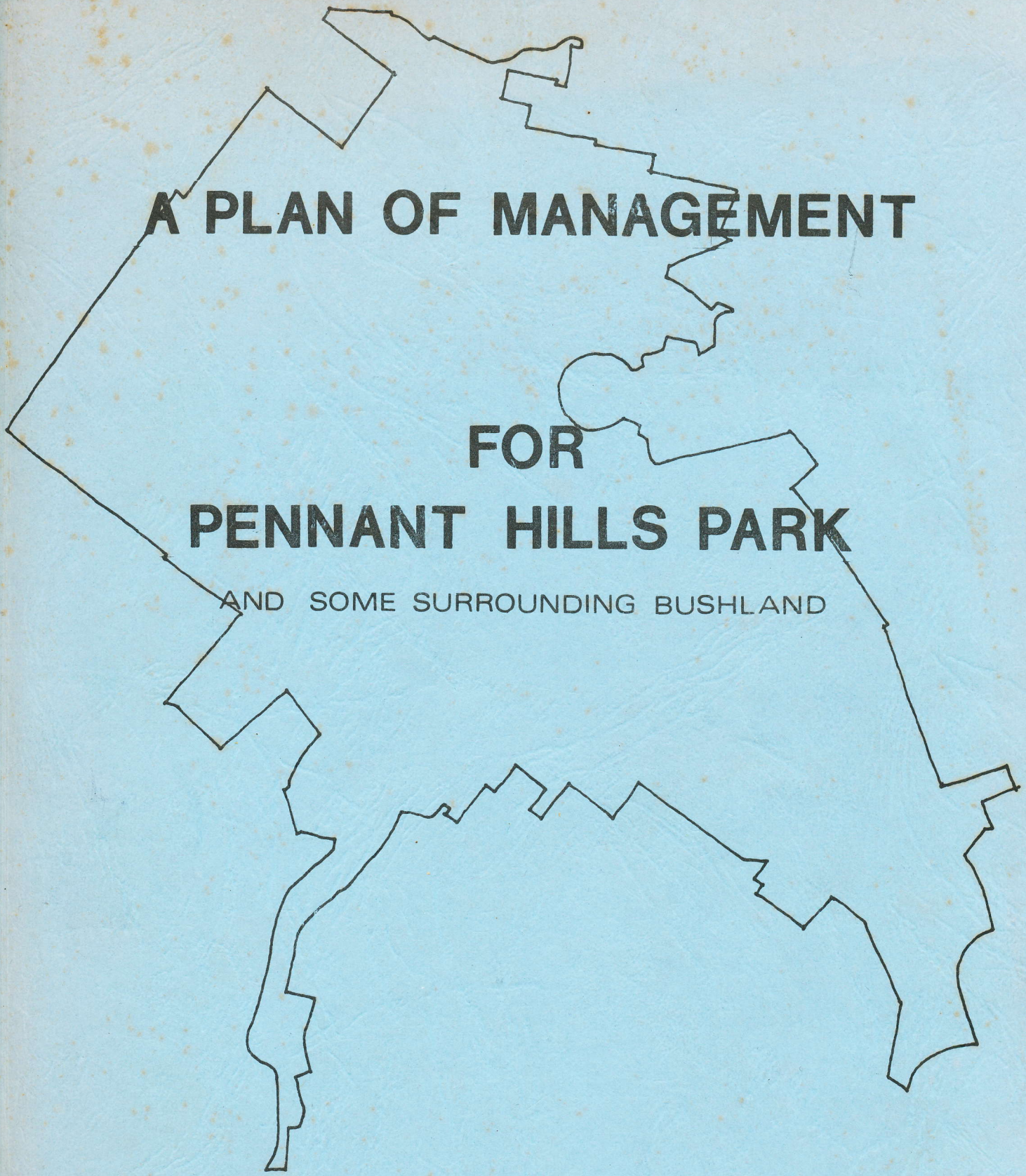
A PLAN OF MANAGEMENT

FOR PENNANT HILLS PARK

AND SOME SURROUNDING BUSHLAND



PREPARED BY

THE BEECROFT CHELTENHAM CIVIC TRUST

1976

PENNANT HILLS PARK
AND ADJOINING BUSHLAND AREAS

PLAN OF MANAGEMENT

Introduction.

The history of Pennant Hills Park dates back at least to 1893 (first recorded date of reservation. Additional land was added to it until it totalled over 300 ha. in the mid 1950s.

In recent years, however, due to insecurity of tenure; pressures for other uses, and shortage of funds and staff for specialised management, there has been a conversion of significant areas of bushland to development.

Residents of nearby suburbs use the Park to a considerable extent for passive recreation, and educational purposes. In addition, a number of sporting facilities have been established on the Park as an encouragement for active recreation. In 1974, Beecroft-Cheltenham Civic Trust sought the support of Hornsby Shire Council, who are Trustees for Pennant Hills Park, in preparation of a Plan of Management for the area. The Council subsequently indicated that it would accept a properly prepared plan as a basis for management of the Park, subject to any financial, etc., restraints.

Since December, 1974, a committee appointed by Beecroft-Cheltenham Civic Trust has been actively engaged in preparation of the Plan. As work progressed, it became obvious that any organised management on Pennant Hills Park would only be successful if a complementary approach to management was adopted on adjoining bushland areas. Consequently, the Plan has been extended to cover, either directly or by reference,

- Thornleigh Park
- Scouts Association leasehold area
- "Ahimsa" National Trust property
- Ku-ring-gai Municipal Council parklands
- Miscellaneous patches of undeveloped bushland adjoining the Park.

The Committee has been assisted by a large number of volunteers in preparation of the Plan, as well as organisations such as the Scouts Association, Hornsby Shire Council and Macquarie University.

A list of those directly involved in preparation of material for the Plan (but excluding many who gave other less direct, but valuable, assistance) is included hereafter.

LIST OF DIRECT CONTRIBUTORS TO THE PREPARATION OF THE PLAN

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PENNANT HILLS PARK
AND ADJOINING BUSHLAND AREAS

PLAN OF MANAGEMENT

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PART A

(General Description of the Resource and its Use).

I N D E X

(Continued).

PENNANT HILLS PARK
AND ADJOINING BUSHLAND AREAS

PLAN OF MANAGEMENT

PART A

1. SYNOPSIS

Pennant Hills Park covers a significant area of predominantly Hawkesbury sandstone country immediately west of the Lane Cove River. It is adjoined by other areas of undeveloped bushland which were not included in the original terms of reference for this Plan, but which it is essential should be managed on a complementary basis if the overall objects of management are to succeed. Consequently, the Plan has been extended to include them, and thus to cover most of the natural bushland area in the headwaters of the Lane Cove River.

The total area has considerable potential for provision of low intensity recreational enjoyment, and for educational use by residents and educational establishments in nearby suburbs.

Part A of the Plan gives details of the resource, its past use and capacity for future use, as a basis for the management recommendations which follow in Part B.

2. GENERAL DESCRIPTION

2.1. Location and Status

Pennant Hills Park covers an area of approximately 279.6 in the Parish of Field of Mars.

It is located in the western headwaters of the Lane Cove River (see Map M1). The Park is made up of a number of reserves, as listed below -

Date	Reserve No.	Area (ac.)	Portion
1893	18979	5	
15.6.10	45012	70 2	372
"	45380	24 1	335-347
21.12.23	56688	330	
24.8.28	60653	35 2 23	596,610,611, 627,628,814 815
27.7.34	64671	125	
9.11.34	64909	75	
24.2.39	68179	2	
26.4.63	84403	9 1 30	ML 18
		676 3 13	

= 273.6 ha.

These Reserves are administered by the Hornsby Shire Council as Trustees appointed by the Minister for Lands.

Immediately to the north of Pennant Hills Park lies leasehold land (Portions 514 and 575, Parish of South Colah, totalling 36 ha., held by the Scouts Association of Australia, N.S.W. Branch. Apart from development on the western part of the lease (entrance via Pomona Street), the bulk of the area (approx, 30 ha.) is natural bushland. With the concurrence of the Scouts Association, this area has been included in the Plan to ensure that complementary management of both areas is achieved, and that developments on either which would compromise or prevent passive recreational uses laid down in the Plan are avoided.

North of the Scouts Association lease is located Thornleigh Park, an area of approximately 23 ha. Hornsby Shire Council are also Trustees for this area. Thornleigh Park is generally similar to Pennant Hills Park in topography and vegetation, although some significant variations occur in individual species in the two areas. The original reservation of 12 ha. was made in 1897, and added to in 1932.

Between the Scouts Association Lease and Thornleigh Park, a narrow strip has been reserved for access. (R 64103 of 11.8.1933). This was the location of part of the original Lorna Pass, and was excised from the Scouts Lease to ensure public access to the area. If not reserved under a more secure tenure, it should be immediately added to Thornleigh Park as a Reserve for Recreation pending stronger protection.

The country to the east of the Lane Cove River is administered by Ku-ring-gai Municipal Council. It is, naturally, also similar to the bushland area on the opposite side of the river.

Policies for access, protection, development, etc. of all of these areas must be interrelated, hence it is essential that the Plan include this area. Information on resources there will not be as complete as for other areas, but any dearth of data at this stage should not affect management proposals.

Area of the bushland controlled by Ku-ring-gai Council has been roughly estimated (subject to definition of boundaries) at 100 ha.

Between Cobran Road and Day Road, Cheltenham, is located "Ahimsa", an area of approximately 1.5 ha., with residence which has been donated to the National Trust by Miss. M. Byles, who remains as occupant of the area. Public use of the bushland section of "Ahimsa" is permitted now, and its future use is important to management and use of the nearby section of the Park. For these reasons, it has been included in this Plan. A condition of transfer by Miss Byles is that the bushland area of "Ahimsa" be retained in its natural condition, with exclusion of weeds, and no watering or prescribed burning.

There are also several small ribbons or patches of bushland outside the Park boundaries which have not as yet been developed and whose inclusion would be very desirable for management purposes and to protect the catchments of the creeks. More detailed investigation of these will be required.

The total area of land in the headwaters of the Lane Cove River covered by, or referred to in this Plan, is therefore estimated as -

Area	Ha.
Pennant Hills Park	274
Scouts Association Leases	36
Thornleigh Park	25
Ku-ring-gai Municipal Council area	100
"Ahimsa" - National Trust	2
Miscellaneous areas for addition	10
Total	447

To the south east and outside the area covered by this Plan but of importance to it is Lane Cove River Park, now reserved as a State Recreation Area administered by a Trust appointed by the Minister for Lands.

West of Beecroft Road is Devlins Creek Reserve, which is a further area of fairly natural bushland, of area about 50 ha., and which should in due course be added to the area covered by this Plan of Management. It has not, however, been included at this stage due to lack of time and of information available.

2.2 History of Reservation and Development

The first record of reservation in the Pennant Hills Park section in the Lands Department was in 1893 when an area of 5 acres was proclaimed at the Aiken Trignometrical Station.

Over the following 70 years portions were set aside "from sale" by the Lands Department, the last section in 1963 being particularly for the preservation of native flora.

In 1940-41, after the death of William Chorley, his estate gave portions 594-595 as an addition to the nearby reserve. The Cumberland County Council classified it as Green Belt. (Southern side of Boundary Road, adjacent to 1928 reservation).

Original town planning for the area consisted of the Lands Department's laying out a grid pattern of roads regardless of topography or other geographic features. Most of the problems in this area can be attributed to this single cause - lack of an adequate master plan.

Over the years the threat of haphazard development comes from two sources: namely, building development and sporting requirements.

Of the building development, the Cheltenham Heights estate is an example. The land was originally owned by William Chorley, and was subdivided into 4½ acre lots. Under the Green Belt Ordinance, the land was safe from development, but in the mid 60's the State Government, through the State Planning Authority, abandoned the Green Belt concept. Despite very strong representations from citizens' organisations and offers to pay increased rates to cover cost of buying the land, and an active opposition from the Hornsby Shire Council, the land was sold to a developer and built on.

With regard to the demands for sporting requirements, a study of the correspondence of the Hornsby Shire Council concerning the Park shows that the question of a golf links has come up in 1936 and 1945. There was also a request for land for a bowling green at the end of Britannia Street.

Although these major developments were not approved, there has been a gradual process of conversion of natural bush and heathland to sporting area on Pennant Hills ridge. Aerial photographs show this development between 1950 and 1971. Area now taken up by sporting facilities totals approximately 40 ha. or an estimated 15% of the Park area.

Thornleigh Park (Portion 579), an area now totalling approximately 25 ha., was reserved in 1897, initially. Development has been more restricted due to topography, but the Park does contain an oval with sheds and toilet. Sewer lines have been laid down the Lane Cove River, and further work on these was carried out during 1975.

The Scouts Association has a long history of occupation in the area and use of the Park. Details of leases held by it are:

Lease No.	Year Granted	Expiry
1940/33 (Portions 514, 575)	1939	Part (23ha) Perpetual lease Part (10.1ha) Special lease terminating 1979

There has been considerable building development on the western part of the Lease near the Pomona Road entrance. There has also been establishment of camp fire circles, bush chapel, and other outdoor facilities near the buildings. The bulk of the lease is still in fairly natural condition, however, and no restriction has been placed on public walking through it. No vehicular access has been permitted. Whilst used in this way, and whilst no restraints are placed in the way of movement through the natural part of the leasehold by members of the public, retention of the lease by the Scouts Association is quite compatible with the overall objectives of management of the total bushland area.

2.3 to
2.5 PHYSICAL AND BIOLOGICAL DESCRIPTION

Resource investigation work has to date been concentrated on the Pennant Hills Park and Thornleigh Park sections of the total area, and the bulk of the descriptions which follow refer to these areas. However, the various units covered by this Plan are generally similar, and the information provided is considered quite adequate as a basis for planning, whilst accepting the fact that more detailed investigation of all areas, and ultimate review of Part A of the Plan to include information gained, will be necessary.

As the southern (Pennant Hills Park/"Ahimsa") and northern (Thornleigh Park/ Scouts Lease) sections were investigated separately, and as there are some interesting, if not vital differences between the two, these sections are dealt with separately in the descriptive chapters which follow. No resource information is yet available for the land east of the Lane Cove River. When the Plan is reviewed, a further section should be added to provide physical and biological detail on this area also. For the time being, it can be considered as essentially similar to the sections discussed hereunder, although obviously some variations may be a result from its different aspect and past use.

2.3. Physical and Biological Description - Southern Section.

2.3.1. Topography and Geology (Map M 2)

The area covered by the Plan consists, in general terms, of the remaining natural bushland areas located in the upper catchment of the Lane Cove River.

Consequently, the dominant feature of the whole area is the main valley of the river, which runs generally NW - SE, with tributaries entering from deeply dissected valleys on each side. An idea of the general topography can be formed from Photo P.

A significant topographical feature of Pennant Hills Park section is a sandstone ridge of altitude 150m. thrust in a SE direction from the Hornsby plateau. (See Map M 2) Smaller creeks flowing into Devlin's Creek and the Lane Cove River have formed gullies, which dissect the main plateau into a number of smaller ridges. The prevailing rock in the composition of the ridges is Hawkesbury sandstone. In the south-west section of the Park, the sandstone is overlain by a capping of Wianamatta shale but most of this formation is covered by the Cheltenham Heights estate. These are Triassic formations laid down by massive rivers, subsequently cracked to form extensive networks of joints, and uplifted to form the present day plateaux surrounding Sydney.

Measurement of the joints in the sandstone cliffs of the Park gives their orientation as ~~exactly~~ E - W and N - S. In a study of the river patterns of the area, these directions will be seen to be relevant to the formation of the valleys.

The fall of the Park area from its highest point at Pennant Hills to its lowest point at the junction of Devlin's Creek with the Lane Cove River is approximately 130 metres.

The Scouts Association Lease and Thornleigh Park contain similar ridge systems, as indicated on Map M 2.

The area to the east of the Lane Cove River is again of similar origin, although, as it consists of a narrower strip of bushland parallel to the Lane Cove River, it includes only the lower sections of the ridges and creeks.

.3.2. A General Statement on the Soils, Plant and Animal Life

The vegetation pattern of the area is a reflection of its geological pattern, the Hawkesbury sandstone forming a low nutrient, thin, sandy soil, while the Wianamatta shale has weathered to a richer clay soil, and supports on this base, and on sandstone downslopes from it, blackbutt (E. pilularis), red bloodwood (E. gummifera), Sydney peppermint (E. piperita), turpentine (Syncarpia glomulifera) and black she oak (Casuarina littoralis). Twenty three species have so far been recorded on these shale areas on Pennant Hills Park. On the shale derived soils in the northern section (Thornleigh Park) grey ironbark (E. paniculata) and white stringybark (E. globoidea) have also been recorded. They have not been located on the southern section, but may, of course, have been present on Cheltenham Heights before development.

Although the soil derived from the Hawkesbury sandstone is a more barren type, it supports a great variety of species, 100+ recorded to date. In addition, the differing aspects and topography have given rise to a variety of plant communities adapted to their various environmental conditions. Thus the ridge plateaux support a low open woodland, chiefly of scribbly gum (E. haemastoma) and occasional red bloodwood, with a dense understorey of sclerophyllous shrubs.

Plants on the eastern and southern sides and in the river and creek valleys are obviously more lush because of the damper nature of this aspect and the alluvium of the valley floors, and here are the tallest trees of the Park - splendid specimens of Angophora costata, blackbutt and turpentine, and here the understorey, often closed, includes mesomorphic trees and shrubs, coachwood (Ceratopetalum apetalum), water gum (Tristania laurina) and Christmas bush (C. gummiferum), usually higher up the valley.

The diversity of plant life in the Park displays year round beauty, constantly changing with the seasons. Outstanding are the various Banksia species, especially Banksia ericifolia, its glowing torches burnished by the winter sunlight, providing food for many forms of honeyeaters; and in spring the dainty pink flowered river rose (Bauera rubioides) in wet places.

Smaller beautiful plants include many delicate ground orchids, Caladenias, Diuris spp., Beardies, Sun orchids, several Greenhoods (Pterostylis), and the fascinating insectivorous plants, Drosera and Stylidium.

P 2.

Southern section.

Ducky Waterhole, Devlin's Creek firetrail, North Epping in background.

P 3.

Scouts Lease in foreground;

Thornleigh Park left centre;

Sanitarium left background.

P 4.

Scouts Lease in foreground;

part Thornleigh Park in background.

A complete list of orchids and ferns identified to date on the southern section is given in Appendix A 2.

Rare, but still occurring in secluded areas, are waratahs, Christmas bells, red bottlebrush and Boronia floribunda.

Photographs P2, P3 and P4 show the vegetation to be found in the area covered by the Plan. Map M 3 shows the vegetation types recorded and mapped.

3.3. A Description and Mapping of the Vegetation.

This study is presented using three approaches - floristic, physiognomic and ecological.

The floristic description is in the form of a simple list of plant species identified in the area. The inventory is incomplete and does not include any measurement of frequency of occurrence. The order of compilation is the same as that for the Angiosperm families in "Flora of the Sydney Region", Beadle, Evans, Carolin.

The total number of species so far recorded is 148, not a surprising record as the Sydney region is recognised as one of the richest floristic areas in Australia. Appendices A 1 and A 2 list the flowering plants and ferns identified to date. More work is needed on identification of species associations and individual species.

The physiognomic description is presented -

a) in Map M3, showing the structural forms of the vegetation as interpreted from aerial photographs and ground checking. Structural forms are defined according to the following table (C.S.I.R.O. publication):

STRUCTURAL FORMS OF VEGETATION

Life Form and Height of Tallest Stratum	Projective Foliage Cover of Tallest Stratum			
	Dense (70 - 100%)	Mid Dense (3- - 70%)	Sparse (10 - 30%)	Very Sparse (- 10%)
Trees 30 m	Tall closed forest	Tall open forest	Tall woodland	Tall open woodland
Trees 10-30 m	Closed forest	Open forest	Woodland	Open woodland.
Trees 5-10 m	Low closed forest	Low open forest	Low woodland	Low open woodland
Shrubs 2-8 m	Closed scrub	Open scrub	Tall shrubland	Tall open shrubland
Shrubs 0-2 m	Closed heath	Open heath	Low shrubland	Low open shrubland

b) in the following identification of the dominant species composing these structural forms. Dominant usually means tallest, unless a lower stratum is so dense as to have the greater effect on the ecology of the area.

STRUCTURAL FORM	DOMINANT SPECIES
Open forest - closed lower layer:	
upper storey	E.pilularis, Angophora costata, Syncarpia glomulifera, Casuarina torulosa
under storey	Ceratopetalum apetalum, Callicoma serratifolia, Tristania laurina
Open forest - woodland	E.pilularis, E.piperita, E.gummifera, Syncarpia glomulifera, Angophora costata
Low woodland - low open woodland	E.haemastoma (often malleeform), E.gummifera, Casuarina littoralis
- dense to very dense closed under storey	Banksia spp., Leptospermum spp., Hakea spp., Angophora cordifolia, Lambertia formosa, Grevillea spp. Pultenea spp.
Closed scrub - with scattered	Callicoma serratifolia, Hakea sericea, Leptospermum, Callistemon citrinus, Banksia asplenifolia, B.serrata.
emergent trees -	E.haemastoma, Casuarina littoralis
Open shrub - open heath	Banksia asplenifolia, Petrophile fusifolia

The ecological description is concerned with plant/habitat relationships. In any locality, distinct plant communities can be recognised, reflecting the characteristics of the environment. These communities are fairly accurately indicated by the structural forms which have been identified. However, within each broad unit, the vegetation shows variations according to differing environmental factors, e.g. slope, aspect, soil deficiencies, unnatural disturbance, etc. These different communities may be clearly demarked from or integrated with each other, just as the structural forms may exhibit sharply defined differences or intergrades.

An example of the former is the area designated closed - scrub at the head of the valley lying between the main ridge and the Cheltenham Heights ridge (creek 6).

This is an area of very tall shrubs, chiefly Banksia serrata, Callicoma serratifolia, Hakea sericea, Leptospermum attenuatum, Callistemon citrinus and short E.haemastoma and Casuarina littoralis, with some scattered emergent trees. It is clearly delineated from the community on the gently sloping southern side, which is composed solely of blackbutts with an open under storey of Casuarina littoralis and a ground cover of grass and Actinotus minor.

This abrupt change in plant communities is the cause of a dramatic alteration in the height of the vegetation, the pale trunks of the blackbutts rising like a wall above the moist scrub, making it appear a sunken area, whereas, in fact, the valley floor drops only slightly. If investigated, this clear-cut division may likely prove to be due to a higher soil water content in the scrub area.

The valley of creek 6 is of particular interest because it is situated between two roughly parallel ridges, both of which are developed, one as a housing estate (Cheltenham Heights), the other as a sporting complex. Despite its limited area and the surrounding development, the valley is in good natural condition, and contains a number of varied plant communities. On the northern rocky slope, the open forest is predominantly Sydney peppermint and red bloodwood with a mid-dense under storey of sclerophyllous shrubs, merging gradually into low open forest and closed scrub which borders the blackbutt community (both previously described). Further up the southern ridge, where sandstone ledges appear, this becomes a mixed forest of blackbutt, Sydney peppermint and red bloodwood with an under storey of shrubs tending to a wet sclerophyll nature with a ground cover of grasses and sedges.

The creek flows from the scrub area through a series of sandy pools overhung mainly by thickets of Bauera. At times it passes out of sight under moss covered rocks and in other places spills over rock ledges until, approaching its junction with creek 7, coachwood trees of variable height grow thickly with shorter trees of blackwattle, the shrubs Lomatia, Austromyrtus, Bauera, and ferns.

On the steep rocky eastern bank, with S.W. aspect, the vegetation has a wet sclerophyll nature. The trees of the open forest are Sydney peppermint and Angophora costata, some with lichen encrusted trunks. The understorey is composed of very tall Banksia spp. and an extremely rich variety of other spp. requiring moisture and shade.

The more gently sloping western bank, with N.E. aspect, also carried a wet sclerophyll forest. The trees are Sydney peppermint, red bloodwood and an occasional Angophora costata. The understorey here also has a very tall layer of Banksia spp. and a dense lower layer of very varied species.

An example where structural forms grade slowly one into another, due to a gradual change in environmental factors, is the bank with northern aspect on the lower section of Scouts' Creek rising to Aiken ridge, as shown by data collected at three locations (A,B,C) selected on a gradient from gully to ridge. (See table next page.)

The junctions of creek 5 and Scouts Creek with the Lane Cove River provide an interesting comparison of two areas which presumably carried closely similar plant communities in their natural state. Several years ago the main sewer line to Pennant Hills was laid along the course of Scouts Creek and most of the present differences in vegetation may be attributed to this disturbance.

	A	B	C
Structural form	Open forest/ woodland	Low woodland	Low open woodland
Species in tree layer	Ceratopetalum apetalum, E.pilularis	E.pilularis, E.gummifera, E.haemastoma, Casuarina littoralis	E.gummifera, E.haemastoma, Casuarina littoralis
Spp. in shrub layer	Persoomia spp., Hakea sericea, Lambertia formosa, Pultenea spp.	Hakea sericea, Lambertia formosa, Pultenea spp., Banksia spp.	Hakea gibbosa, Lambertia formosa, Pultenea spp., Grevillea spp., Leptospermum spp., Boronia ledifolia, Bossiaea heterophylla
Spp. in herb layer	Bracken fern	Grasses and other monocotyledons, Actinotus minor	Grasses and other monocotyledons

The junction of both creeks with the Lane Cove River is thickly overhung with privet.

The upper storey at both creeks is an open forest of mainly blackbutts, turpentines, Casuarina torulosa (forest oak) and Angophora costata.

The under storey has a closed upper layer of mainly coachwood, blackwattle and water gums at both, but the lower layer shows marked differences. Creek 5 on its rocky bed has a ground cover of the decorative fan fern (Sticherus lobatus) and Bauera rubioides, and on its banks Telopea speciosissima, Grevillea linearifolia, Persoonia levis, Platylobium formosum, Ceratopetalum gummiferum, Smilax sp., Stylidium sp. and Xanthorrhoea sp. The vegetation in the whole basin of creek 5 is in remarkably undisturbed condition.

At Scouts Creek the bed has a cover of privet which penetrates up the creek for a considerable distance. The banks carry bracken and some shrubs, Ceratopetalum gummiferum, Platylobium formosum, Zanthorrhoea sp.

The plant communities described are only a selection of the many and varied types in the whole management area.

Ecology Studies

A further example of the complexity and variability of vegetation associations and the value of the Park for study purposes is shown in Appendix A 4, which gives details of an ecological survey carried out by a study group from Macquarie University on a small area in the vicinity of Devlin's Creek.

This study aimed at establishing the relationship between environmental factors (slope, exposure, soil, disturbance, etc.) and the small scale pattern of vegetation distribution. This type of study could also establish a basis for monitoring changes which might occur as a result of park use, development or protection activities.

Animal Life

Due to the limited size of the Park and its adjacent residential areas, very few large animals remain, and those which do being chiefly nocturnal feeders, are seldom seen. Mammals present include brushtail and ringtail possums and bandicoots; and echidnas have been seen on and near the Park. On summer evenings, fruit bats are seen flying overhead from their roost in the Lane Cove Valley, east of the Park, to orchards in the west. Reptiles which have been recorded are goannas, the blue tongue lizard, water dragons, geckos and skinks, tree snakes, occasionally the common black snake and one known sighting of a death adder.

Birds and insect species are the most prolific forms of wildlife. Birds identified to date total in excess of 100 species within the Park and environs. Among those frequently seen and heard are the numerous and colourful parrots - the crimson rosella, eastern rosella, lorikeet and king parrot.

The many kookaburra families provide opportunities for a fascinating study of their highly evolved social system and identification of the roosting trees, nesting sites and defence post of each family's territory.

A few nearby residents are favoured by regular visits from a satin bower bird family, evidence of at least one pair successfully breeding in the Park.

Many of the birds listed are migrants, the majority of these arriving in October, possibly on the same day each year, and departing in March. Among them are the dollar bird with its unique flight movements, and the koel with its unmistakably distinctive call. A brief but regular winter visitor is the rose robin.

An important consideration insofar as bird life is concerned lies in the fact that not only is the bushland an ideal area for viewing birds, but it also provides nesting sites and a refuge for the many birds which appear in the surrounding properties and suburbs.

The creeks, especially those which are smaller and undisturbed, contain many invertebrates, chiefly stages in the life cycle of insects. One caddis fly larva which may prove to be a species unique to the locality forms its "case" from leaves of the blackwattle, which grows profusely along the creeks.

Altogether the remaining undeveloped areas of the Park contain an abundance of natural attractions of great value for scientific research, education and enjoyment by all.

The check list of birds identified is given in Appendix A 5.
Supplementary information on birds, insects and larger fauna will be added as it becomes available.

There is considerable scope for specialised study of remaining species, and the effect of habitat changes through development and Park use on populations. Since completion of this Section, some information has been prepared on the freshwater life in creeks in the area. This is contained in Appendix A 5 (A).

4. Physical and Biological Description - Northern Section

(Thornleigh Park and Scouts Lease).

The mapped area includes all of Thornleigh Park, part of the Boy Scouts Association land and part of Pennant Hills Park. It is bounded by the Comenarra Parkway to the north, the Lane Cove River to the east, Boy Scouts Creek to the south, and Orchard Street, Handley, Ferguson and Dawson Avenues to the west.

4.1. Topography and Geology (Map M 2)

The area consists of Hawkesbury sandstone with a narrow strip of Wianamatta shale along the western boundaries, especially near Ferguson and Dawson Avenues.

Fairly gentle slopes occur on the western side of the area, but, along the tributary creeks to the Lane Cove River and near the Lane Cove River, steep slopes with cliffs are common. A flat topped ridge orientated SE - NW occurs in the Boy Scouts Association land and in Pennant Hills Park.

4.2. Soils

Most of the soils are sandy with more clayey soils derived from Wianamatta shale present near Ferguson and Dawson Avenues. Soils directly downslope from the shales may have a higher clay content than soils further away from the shales, as the clay is washed downslope.

4.3. Description and Mapping of the Vegetation

Structural Forms of the Vegetation (Map M 3)

Woodland - open-forest occurs along the valleys with a closed lower layer present in sheltered moist places. Woodland - open-forest is also present on, and near, the shale derived soils. Woodland - low woodland is usually found on less steep slopes and on sandy soils. Smaller areas of low woodland and a scrub-heath community occur on top of the ridge.

Two areas of low open-forest are present. The area behind Handley Avenue is probably the result of some past disturbance, as it mainly consists of sapling Turpentines (Syncarpia glomulifera) with saplings of other species such as smooth-barked apple (Angophora costata) also present. As the age of the community increases it will probably be woodland or open-forest.

The other low open-forest area protrudes from Thornleigh Oval eastward into Thornleigh Park. It consists of Black She-Oak (Casuarina littoralis) with only a few taller trees of Red Bloodwood (Eucalyptus gummifera) and Sydney Peppermint (Eucalyptus piperita) present.

As these taller trees are very scattered, they have not been included in the classification.

Distribution of Dominant Species (Map M 4)

The influence of the shale capping can also be seen in the distribution of some of the dominant species. White Stringy-bark (Eucalyptus globoidea), Red Mahogany (E. resinifera) and Grey Ironbark (E. paniculata) dominate and are confined to the bushland immediately bordering Ferguson and Dawson Avenues. The soils in these areas are derived from or heavily influenced by the shales. The distribution of Blackbutt (Eucalyptus pilularis) is also influenced by presence of the shale. Blackbutt is usually confined to gullies on sandstone soils, but near Ferguson and Dawson Avenues it is also present on the gentler slopes which are probably enriched by clay washing downslope from the shales.

Black She-Oak is very common and becoming increasingly common throughout almost all the mapped area. (It is only absent from the deep gullies). Several fairly dense areas of this species are present, and their size appears to be increasing. The cause of the increase in the numbers of Black She-Oak is not known, but may be related to infrequent fires.

Species such as Forest Oak (Casuarina torulosa) and Black Wattle (Callicoma serratifolia) dominate and are present only in gullies. Coachwood (Ceratopetalum apetalum) is only found in deep sheltered gullies such as along the Lane Cove River and in the lower reaches of the tributary creeks.

The rarity of Banksia ericifolia and the absence of Scribbly Gum (Eucalyptus haemastoma) in the scrub-heath and low woodland is very unusual. Both species are common on the ridge in Pennant Hills Park. Stunted Sydney Peppermint is present on the ridge in the Boy Scouts Association land rather than the normal Scribbly Gum.

Species List

The identified species occurring in the area can be roughly divided into five groups:

1. Plants confined to shale derived and shale influenced soils; e.g. Eucalyptus paniculata.

2. Plants confined to deep sheltered gullies; e.g. Ceratopetalum gummiferum.

3. Plants confined to the scrub-heath and low woodland; e.g. Gompholobium grandiflorum.

4. Plants which are not confined to any of the above habitats but may be present in them; e.g. Eucalyptus piperita.

5. Introduced species; e.g. Ligustrum sinense.

Some species are also confined to a small area for no immediately obvious reason. Epacris longiflora and Phebalium dentatum are fairly common on the island bounded by the Comenarra Parkway and Thornleigh Road, but they do not appear to occur anywhere else in the mapped area.

Other species such as Water Gum (Tristania laurina) (lower reaches of Boy Scouts Creek only) and Bauera rubioides (Boy Scouts Creek only) are equally restricted.

Because of incomplete knowledge of the distribution and abundance of some of the smaller species, and for easy reference, the species have been listed in the order followed in Beadle, Evans and Carolin (1972) 'Flora of the Sydney Region' except for the introduced species which have been placed in a separate list.

Species identified in the northern section are given in Appendix A 3.

4. Animals

Little is known about the animals of Thornleigh Park - Boy Scouts Association land and Pennant Hills Park. Sightings of some of the animals listed below were brief and not conclusive.

Mammals:

1. Native

Brush tail possum)
Ring tail possum) - abundant

Marsupial mouse (Antichinus sp.))
Greater glider) nothing known
Sugar glider) of abundance
Bandicoot) or distribution

Grey headed fruit bat - no colonies known, but individuals roost in the gullies.

2. Introduced

Cat
Fox
Rabbit

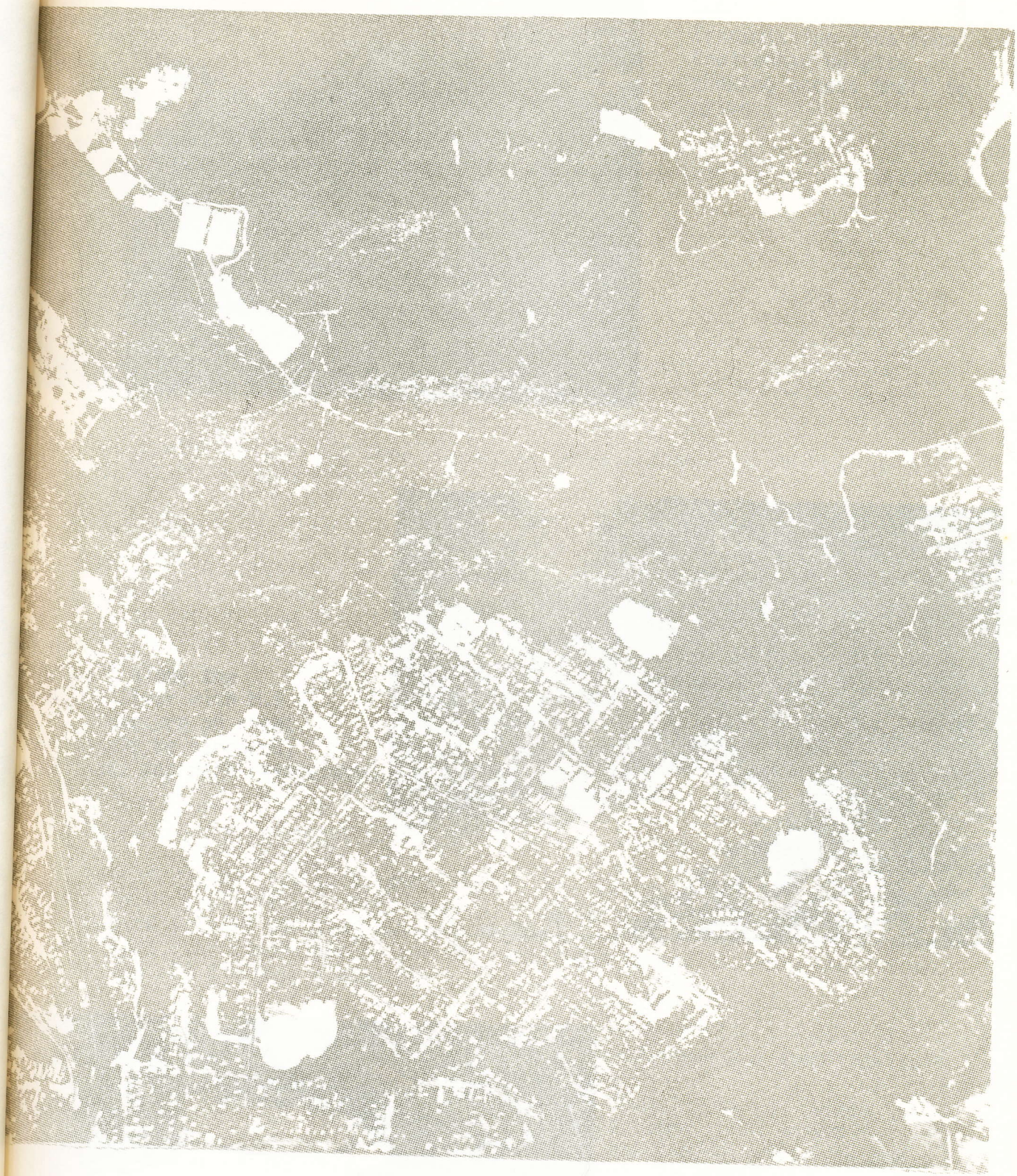
Monotremes:

Echidna - several sightings

Reptiles:

Bearded dragon
Blue tongue lizard
Lace monitor
Eastern water dragon - 1 brief sighting
Common skink
Copper tail skink
Black snake
Green tree snake
Death adder

P 5. Showing extent of developments on Pennant Hills Park and part of Ku-ring-gai Municipal Council land in 1951.



P 6. Showing extent of development on Pennant Hills Park and part of Ku-ring-gai Municipal Council lands 1970. Note: this excludes the model aeroplane field (see Photograph P12) constructed later.

P 7.

Transmission line from Cheltenham Heights showing access trail to pylon.

P6.

Fire trail along the Lane Cove River with M.W.S. & D.B. structure on right. Trail should be narrowed, stabilised, and part revegetated.

P 9.

Ovals and softball courts. A delightful setting for sportsmen and entry for Park users.

Physical and Biological Description - Ku-ring-gai Council Lands.

No resource information has yet been obtained specifically for the area east of the Lane Cove River. However, reference to Map M 2 indicates the similarity between this area and those described in Sections 2.3. and 2.4. above. It can, therefore, be assumed that, for the purposes of initial planning, it has been safe to extrapolate this information to the Ku-ring-gai Council lands to permit their inclusion in this Plan with a fair degree of safety. Subsequent resource investigation in this area will, of course, be necessary.

Developments (Map M 5)

So many major and minor developments have taken place on the Park that the information given hereunder may well prove to be incomplete. The list given does, however, indicate the urgent need for complete documentation and adequate control of future activities and developments through proper planning, and negotiation of legally binding leases or easements where the development cannot be removed from the Park.

Photographs P 5 and P 6 show the extent of development on the southern section of the Park from 1951 to 1970.

1. Power Lines

A 22 KVA transmission line constructed by the State Electricity Commission traverses the southern portion of the Park. There are 5 pylons within the Park to support the line. Each pylon is serviced by a separate maintenance track. Clearing and construction has been carried out without regard to erosion problems, aesthetics, maintenance, problems of misuse. No easement is held by the Electricity Commission for the line, pylons or access tracks.

The transmission line is obviously a fixture, but need for individual permanent access tracks to each pylon, and specifications for clearing under the line, should be carefully examined. Access to pylons in emergency, or for occasional maintenance, could be guaranteed without the need for a permanent access trail subject to erosion and misuse.

A smaller power line runs approximately E - W down Devlin's Creek to service the North Epping area. This power line is supported by wooden poles. Clearing beneath the line has been haphazard. There seems to be no reason why this line should not be transferred in due course to the edge of the Park or off the Park altogether.

No change in capacity, structure, or location of these lines should be permitted without a complete review of need, conditions and specifications.

Details of power line installations have been sought from the Sydney County Council, and if/when received will be included as an Appendix. Photograph P7 shows the effect of location of the transmission line and access tracks on the Park.

2.6.2. Metropolitan Water, Sewerage and Drainage Board Sewer Lines.

These are located on the eastern side of the Lane Cove River along Devlin's Creek, and through the Scouts Lease to the Lane Cove River.

The lines are generally underground, with frequent concrete protuberances about 1 metre high for inspection, maintenance. (See Photograph P 8) There are several ventilation pipes (about 10m. high X 30cm. steel pipe) along the route of sewer line.

The line is most obtrusive where erosion has exposed the pipes. The concrete inspection structures have been made more objectionable in many places by the rough painting of large identification numbers thereon. These should be removed.

A number of steel pipes used for drainage of the sewerage access track along the Lane Cove River, which are now useless, have been left in situ. These should be removed by the appropriate authority, as should other material (e.g. broken concrete pipes) scattered along the creeks and Lane Cove River which were used in an abortive attempt to drain the access tracks when constructed.

Details of the location of sewer lines have been sought from the M.W.S. & D.B., but the Board has advised that this information can only be obtained by inspection of maps, etc. at its office. Time has not permitted this.

2.6.3. Firetrails and Tracks

An extensive complex of low standard trails has been constructed on the Park for access to facilities (power lines, sewerage installations) or for fire protection purposes.

Most are used by walkers, but are badly designed for this purpose, and are generally highly susceptible to erosion.

There are no physical restraints (e.g. steps, stiles) to use of the trails by bikes, horses, etc., although chains at entry points and appropriate signs are intended to discourage use by motorised vehicles. Use by trail bikes, with consequent noise pollution, air pollution and track erosion, is, however, frequent.

There are few walking tracks which have been constructed specifically for that purpose. Most important are -

"Ahimsa" - a short trail linking Day Road and Cobran Road.

Lorna Pass - a trail through Thornleigh Park from Comenarra Parkway to Dawson Avenue and Thornleigh Oval, constructed during the Great Depression. This is still in good condition, except where destroyed by M.W.S. & D.B. activities. It was named after Ms. Lorna Brandt, who raised funds for its construction.

Hampden Road to Britannia Street - a link track to the sports complex.

Conscript Pass - a trail linking with Lorna Pass in Thornleigh Park, also constructed during the depression.

Scouts Association Lease - trails have been established to facilities on the lease area, and to the Lane Cove River to link with the firetrail along the river.

With the exception of the above trails, which, subject to detailed examination, should be retained, the remainder of the trail system requires complete resurvey, with subsequent redesign, relocation and/or reconstruction, so that the system meets the needs of Park users, and provides emergency access for legitimate purposes (fire, line maintenance, etc.); and is constructed to eliminate misuse (e.g. with steps, stiles, etc.) with minimum damage to the Park. Such a programme may take some years to implement, but nevertheless, improved planning would permit an early start to the necessary work.

Any mechanical maintenance of existing trails (particularly the trails along the creeks) should be avoided until the whole system has been reviewed.

Replacement of some of the present permanent access tracks to service facilities (e.g. to power line pylons) could be replaced with "tritter trails", which would permit regrowth of heath, but still be available for emergency access by the authority concerned. Hence, further maintenance of existing trails would be undesirable until this possibility has been investigated. In any case, in view of lack of use of the trails to date by the authorities concerned, such maintenance could hardly be justified.

Photograph P 8 shows the standard of construction, giving rise to erosion, weed, trailbike, etc. problems, of many of the trails on the Park.

4. Sporting Facilities

An extensive spread-out complex of sporting facilities has been constructed south east of Pennant Hills from Britannia Street in to the Park. These vary in standard, but all present an intrusion. The layout has resulted in waste of Park area without gain in efficiency or use of the facilities. Aesthetics have been disregarded in most cases, and no genuine effort made to prevent erosion, illegal access, rubbish dumping in the area.

Cost of construction of facilities to date has been estimated at $283,580 (Hornsby Shire Council of 25.3.75 - Appendix A 6).

Studies are being made of the actual use of the facilities and will be included in the final plan (see Study Sheet - Appendix A 7).

Bookings for use of the facilities (as advised by Hornsby Shire Council - 25.3.75) are shown in Appendix A 6).

The sporting facilities located on the Park are -

Ovals	...	2
Softball courts	...	5
Archery range	...	1
Hockey fields (not completed)	...	2
Tennis courts (being built)	...	16
Basket ball courts	...	14
Model aeroplane fields	...	3
Fields under construction	...	3

The escalation of facilities can be judged from aerial photographs taken in 1951 and 1970 (Photographs A 5, A 6.)

As indicated earlier (Section 2.2), the sports complex affects an estimated 15% of the Park area. The need for the facilities is accepted, despite infrequent use. It is obvious, however, that the layout of the facilities could be considerably improved so that access is shortened, expensive facilities (toilets, clubhouses, etc.) are shared, and services (lighting, drainage) provided more economically. At the same time, the effect on the Park, both in terms of area lost and the secondary effects from illegal access, erosion, pollution, rubbish dumping, weeds, etc., could be considerably lessened.

Relocation of some facilities in which there has only been a limited investment and/or which receive little use to a more compact area appears practicable, and for this reason survey and replanning of facilities is proposed in Part B of the Plan.

Unrestricted vehicular access to all areas is having an adverse effect on vegetation, particularly where vehicles are parked under trees near the sporting facilities. (Trees are showing signs of dieback as a result of root compaction or stem damage.) Parking and vehicle movement should also be carefully considered during replanning.

One oval is located east of Hanover Street at North Epping. One oval is located on Thornleigh Park, adjoining Ferguson Street.

Photographs P 9 to P 12 indicate the problems outlined above, the desirability and practicability of relocating some of these facilities if and when funds permit. Certainly, they underline the need for a cessation in establishment of further facilities until a survey of the needs of active recreationists, and the capacity of the Park to meet such needs or carry such developments, is carried out.

.6.5. Buildings

Other than buildings associated with the sporting complex, the following are located on the Park -

near Britannia Street	-	Park ranger's residence and nursery area;
" Cobran Road	-	derelict septic toilet block located on Scout camp area;
" Cobran Road	-	iron shed used for scouting purposes on Scout camp area.

P 10. Adjoining P 9.

Facilities are becoming more spread out, with increased access, servicing, rubbish dumping problems.

P 11. Adjoining P 10.

Road leading to model aeroplane field. Note car illegally dumping rubbish (ringed), and new fields being formed by legal waste dumping.

P 12.

Model aeroplane fields in complete isolation, with access tracks to encourage illegal rubbish dumping.

2.6.6. Picnic Facilities

The only picnic facilities located on the Park are -

near Day Road, Cheltenham	-	2 fireplaces;
" Cobran Road	-	a simple water supply has been reticulated to the Scout camp area;
" Malton Road	-	2 fireplaces;
" Dawson Avenue, Thornleigh	-	rubbish bins, swings, etc.

Some sites along Devlin's Creek trail and the Lane Cove River trail are obviously used for picnicking, and there is a real need for better, properly located, facilities to provide for public needs and to minimise fire risk.

A water supply tap has been provided for Park users by Miss Byles from "Ahimsa", near the Day Road picnic area. This service has been made available for about 35 years.

3. PRESENT USE OF THE PARK

3.1. Commitments

No legal, but a moral, commitment exists to permit continued use of the Park by servicing authorities - M.W.S. & D.B., Electricity Commission. No further use should be permitted except as specified later in Part B of the Plan.

Hornsby Shire Council has promised to provide further sporting facilities on the Park, and action is currently in progress (June 1975) to improve the archery area, the hockey fields, and provide tennis courts (see Appendix A 6).

3.2. Sporting Use

As indicated in 2.6.4. above, a survey of actual use is currently being carried out by Trust members. This will consist of a random sampling to determine use X area X time of existing facilities.

Full details of use will be added as an Appendix to the Plan when they become available.

Hornsby Shire Council is also conducting a survey of sporting needs throughout the Shire, and it is hoped that data from this investigation will be available for inclusion in the final Plan. Early indications are understood to show that needs are fairly stable in the eastern section of the Shire (i.e. that area served by facilities on Pennant Hills Park), but are increasing rapidly in more westerly areas.

McMichael (1971) estimated that parkland in the vicinity of Sydney had a carrying capacity of 10,000 persons per developed hectare per annum. Consequently, if 5% (20 ha.) of this Park is developed with picnic areas, trails, etc., the carrying capacity would be approx. 200,000 persons/annum, i.e. up to 4,000 persons approximately per weekend. This calculation is, admittedly, rather academic, but is included to give an indication of the potential of the Park for such use, and, consequently, its long term value.

It follows that reduction in area will directly reduce the carrying capacity of the Park, or increase the risk of overall deterioration of the environment.

3.6. Problems of Present Use

3.6.1. Erosion

Serious erosion of high use areas (Day Road, Cobran Road, firetrails) has occurred. Damage to trails from overuse by walkers and misuse by trail bikes has also taken place.

Parts of Lorna Pass and track 1 are eroding fairly rapidly. Erosion on other tracks is only slight. Large amounts of sediment from the Comenarra Parkway construction and from a new housing development between Begonia Road and Butterfield Street have been washed into the Lane Cove River. Erosion of the Comenarra Parkway embankments and in the housing development is still continuing, and suitable controls should be introduced urgently.

3.6.2. Rubbish

Dumping of rubbish has taken place at various points around the Park, generally refuse from neighbouring properties. This problem applies both to Pennant Hills Park and Thornleigh Park.

Picnic rubbish is left in the Park. Garbage facilities are inadequate; there has been little attempt to encourage Park users to carry rubbish out, and no clean-up on the Park is attempted by Council.

Much of the rubbish along the creeks consists of plastic and similar objects carried into the Park from outside and then left, caught in branches and roots.

3.6.3. Stream Pollution.

The upper reach of the Lane Cove River forms the eastern boundary of the park, being joined in the south-east of the park by Devlins Creek, a small right-bank tributary. The park area itself is drained by a number of small ephemeral watercourses.
The value of the river and creek lies in their aesthetic qualities as part of the park landscape, and there is little or no use of them for contact recreation.
Each of the two main waterways drain a much larger area of urbanised land to the north west and south of the park, and the water quality of each is significantly influenced by the land-use in their catchments adjacent to the park.
The adjacent areas include mainly low-to-medium density residential areas dissected by a pattern of roads, including two highways (Beecroft Road and Pennant Hills Road). Most, but not all areas are sewered. Flow in both the Lane Cove River and Devlins Creek is low during dry weather, and under prolonged dry conditions flow in Devlins Creek ceases.
Each of these waterways becomes "polluted" in the sense of an adverse alteration to water quality, mainly during wet weather conditions, and mainly by land drainage from residential areas. It is well established that wet weather flows from urbanised areas are a major source of pollution of receiving waters, and there are many examples of this in other parts of Sydney.

3.6.3. Stream Pollution (Continued)

Samples drawn from Devlins Creek during the last twelve months show that it is no exception and confirm that high sediment loads, floating litter, and high bacteriological counts occur as a result of activities external to the park.

As virtually all contamination comes from off the Park, there is little that can be done in Park management to improve the situation.

Council has little control under the Local Government Act. Possible improvement might be affected in the long term by application of the Clean Waters Act, and involvement of the State Pollution Control Commission.

In the northern section (Thornleigh Park and Scouts Lease) pollution of the Lane Cove River by breaks in the sewer main laid next to the river has occurred several times and will probably continue to be a problem. Creeks arising near residential areas are presumably polluted by sewerage effulent and drainage from houses and gardens. Creeks arising within the bushland appear to be unpolluted.

3.6.4. Dieback of Vegetation

This occurs where root systems of trees are affected by soil compaction (trail bikes, overuse of picnic areas), or where stems have been damaged by trail construction.

In one area, deliberate destruction of vegetation has occurred where Park neighbour(s) have cleared a section for construction of a private mini-bike track.

In Thornleigh Park, adjoining Comenarra Parkway, road construction has resulted in the death of a number of fine blackbutt trees. These should be removed and replacements planted.

A recent aerial inspection of the Park indicates that areas of bushland have suffered severe die-back from careless disposal of surplus road construction material and from the development of sporting facilities.

While regeneration of the bare sites is progressing reasonably well, a more sinister threat is apparent around the boundaries.

There are many backyard swimming pools installed, and, in the long term, slow leaks of chlorine treated water or disposal of the water above ground or into stormwater systems is likely to cause die-back of vegetation.

The matter of limiting leaks in swimming pools and treating water so that it is de-activated before discharge should be taken up with Hornsby Shire Council and perhaps with the State Pollution Control Commission.

3.6.5. Fire

The fire history of the Park appers to have been surprisingly good. Further information on this aspect will be provided in Part B, but little evidence exists to show that the environment/habitats have been significantly altered by past fire behaviour.

A significant area of the Park was burnt out during the mid 1950s. and again in Dec. 1976

Some small areas (e.g. north of Epping Bowling Club) have carried several fires in recent years, and careful observation of any undesirable burning patterns must be maintained and adequate measures taken.

3.6.6. Weeds

Uncontrolled access into the Park, and lack of control over urban activities in the catchment of creeks entering the Park, has resulted in damaging spread of some weeds. The most serious of these is privet (Ligustrum spp.). Kikuyu has spread from new construction on Comenarra Parkway. Dumping of garden refuse on some of the more fertile shale areas results in spread of some garden species. Some prickly pear occurs in the vicinity of the Pennant Hills sporting complex.

Weeds listed in the species list pose the greatest threat to bushland, as they can become established and spread in uncleared areas. At present these weeds are mostly confined to near polluted creeks or on shale derived soils, with creeks arising within the bushland free of weeds, except in their lower reaches.

4. FORECAST USE OF THE PARK

4.1. Trends

No data is available on past and present visitation, hence trends in use cannot be calculated. In similar areas, however, where maximum capacity has not yet been reached, annual increase is between 10 - 15%.

4.2. Regional Data

Data on populations within the Shire is given in Appendix A 9. From this, and the Hornsby Shire Council's 1975 "Report to Ratepayers", population growth in the Shire can be tabulated as follows -

1906	-	4,700
1939	-	30,000 (approx.)
1947	-	31,816
1954	-	43,370
1961	-	62,070
1966	-	81,170
1975	-	110,000 (approx.).

4.3. Factors Affecting Use.

Lack of facilities, lack of publicity, and the availability of better equipped alternative areas (e.g. Ku-ring-gai Chase, Brisbane Water, National Parks) have mitigated against any rapid increase in use of this Park. Access to such areas has been facilitated over recent years by improvement to highways. However, there has been a levelling off in use of these parks recently, which probably indicates that they are approaching optimum visitor load.

Shire population has been increasing at a rate of approximately 10% p.a. since the war (see 4.2. above), and shows no sign yet of falling off.

It is inevitable, therefore, that increasing pressures will be exerted on areas such as Pennant Hills Park, particularly if improved publicity and improved facilities (parking, picnic areas, walking tracks) are provided.

The distribution of pressures is, however, more difficult to forecast, as much of the increased population will be located in the western part of the Shire and could well seek recreational facilities closer to home.

The "off-Park" survey being conducted by Macquarie University (see 3.4.) is expected to yield data on likely trends if facilities, publicity, etc. are improved.

All that can be stressed in the absence of more detailed demographic and sociological data is that extreme care should be exercised by Park managers in the planning and use of all natural areas within the Shire to ensure that such areas are retained for optimum use by future generations. The temptation for public instrumentalities to use such lands for construction of facilities (power lines, sewerage easements, sporting areas, etc.) should be strongly resisted until future requirements in urban situations where the need of the individual to seek release in natural areas is much more clearly known.

This "conservative" approach is the basis for the management specifications which follow in Part B of this Plan.

APPENDIX A 1

LIST OF FLOWERING PLANTS IN SOUTHERN SECTION

(Pennant Hills Park)

Indigenous Species

RANUNCULACEAE
- Clematis L.
  - C. glycinoides D C.

VIOLACEAE
- Viola L.
  - V. hederacea Labill.

POLYGALACEAE
- Comesperma Labill.
  - C. ericinum D C.

TREMANDRACEAE
- Tetratheca Sm.
  - T. pilosa Labill.

DROSERACEAE
- Drosera L.
  - D. spathulata Labill.
  - D. auriculata Backh.

THYMELACEAE
- Pimelea Banks ex Gaertn.
  - P. linifolia Sm.

PROTEACEAE
- Petrophile R.Br. ex Knight
  - P. fucifolia (Salisb.) Knight
- Isopogon R.Br. ex Knight
  - I. anethifolius (Salisb.) Knight
  - I. anemonifolius (Salisb.) Knight
- Conospermum Sm.
  - C. longifolium Sm.
  - C. taxifolium Sm.
- Persoonia Sm.
  - P. levis (Cav.) Domin.
  - P. linearis Andr.
  - P. pinifolia R.Br.
- Banksia L.f.
  - B. ericifolia L.f.
  - B. spinulosa Sm.
  - B. marginata Cav.
  - B. integrifolia Salisb.
  - B. serrata L.f.
  - B. asplenifolia Salisb.
- Hakea Schrad.
  - H. gibbosa Cav.
  - H. sericea Schrad.
  - H. teretifolia (Salisb.) J.Britt.
- Grevillea R.Br.
  - G. buxifolia (Sm.) R.Br.
  - G. punicea R.Br.
  - G. linearifolia (Cav.) Druce
  - G. sericea
- Lomatia R.Br.
  - L. myricoides (Gaertn.f.) Domin
  - L. silaifolia (Sm.) R.Br.

APPENDIX A 1 (Continued)

Telopea R.Br.
T. speciosissima R.Br.
Xylomelum Sm.
X. pyriforme Sm.
Lambertia Sm.
L. formosa

DILLENIACEAE
Hibbertia Andr.
H. dentata R.Br. ex D C.
H. fasciculata R.Br. ex D.C.
H. diffusa R.Br. ex D C.

PITTOSPORACEAE
Pittosporum Banks ex Gaertn.
P. undulatum Vent.
P. revolutum Ait.
Billardiera Sm.
B. scandens Sm.

ELAEOCARPACEAE
Elaeocarpus L.
E. reticulalus Sm.

EUPHORBIACEAE
Ricinocarpos Desf.
R. pinifolius Desf.

CUNONIACEAE
Callicoma Andr.
C. serratifolia Andr.
Ceratopetalum Sm.
C. gummiferum Sm.
C. apetalum D.Don

BAUERACEAE
Bauera Banks ex Andrews
B. rubioides Andr.

MIMOSACEAE
Acacia Willd.
A. ulicifolia (Salisb.) Court
A. linifolia (Vent.) Willd.
A. suaveolens (Sm.) Willd.
A. longifolia (Andrews) Willd.
A. botrycephala (Vent.) Desf.
A. parramattensis Tindale
A. decurrens (Wendl.) Willd.

PAPILIONACEAE
Gompholobium Sm.
G. latifolium Sm.
Pultenea Sm.
P. daphnoides Wendl.
P. paleacea Willd.
P. rosmarinifolia Lindl.
P. stipularis Sm.
P. elliptica Sm.
P. flexilis Sm.
Dillwynia Sm.
D. retorta (Wendl.) Druce
D. floribunda var. teretifolia Blakely
Hovea R.Br.
H. linearis R.Br.

APPENDIX A 1 (Continued)

Platylobium Sm.
P. formosum Sm.
Bossiaea Vent.
B. obcordata (Vent.) Druce
B. heterophylla Vent.
B. scolopendria (Andr.) Sm.
Kennedia Vent.
K. rubicunda Vent.
Hardenbergia Benth.
H. violacea (Schneev.) Stearn.
Glycine L.
G. clandestina Wendl.

MYRTACEAE

Austromyrtus Burret
A. tenuifolia
Syncarpia Ten.
S. glomulifera
Tristania R.Br.
T. neriifolia (Sm.) R.Br.
T. laurina (Sm.) R.Br.
Angophora Cav.
A. cordifolia Cav.
A. costata (Gaertn.) Druce
Eucalyptus L'Herit.
E. haemastoma Sm.
E. gummifera (Gaertn.) Hochr.
E. pilularis Sm.
E. piperita Sm.
Leptospermum Forst. et f.
L. attenuatum Sm.
Kunzea Reichb.
K. ambigua (Sm.) Druce
Callistemon R.Br.
C. citrinus (Curtis) Skeels
Melaleuca L.
M. nodosa Soland. ex Gaertn.
M. thymifolia Sm.
Baeckea L.
B. densifolia Sm.
B. linifolia Rudge
Calytrix Labill.
C. tetragona Labill.
Darwinia Rudge
D. diminuta Briggs

CASUARINACEAE

Casuarina L.
C. torulosa Ait.
C. littoralis Salisb.

RHAMNACEAE

Pomaderris Labill.
P. aspera Sieb. ex D.C.

LORANTHACEAE

Amyema Teigh spp.

RUTACEAE

Boronia Sm.
B. ledifolia (Vent.) J. Gay
B. floribunda Sieb. ex Spreng.
B. pinnata Sm.

APPENDIX A 1 (Continued)

Ziera Sm.
Z. pilosa Rudge
Z. smithii Andr.
Correa Sm.
C. reflexa (Labill.) Vent.
Phebalium Vent.
P. dentatum Sm.

SAPINDACEAE

Dodonaea Mill
D. triquetra Wendl.

UMBELLIFERAE

Actinotus Labill.
A. helianthi D C.
A. minor (Sm.) D C.
Platysace C. Norman
P. linearifolia
Xanthosia Rudge
X. pilosa Rudge

EPACRIDACEAE

Styphelia Sm.
S. tubiflora Sm.
S. triflora Andr.
Leucopogon R.Br.
L. virgatus R.Br.
L. amplexicaule (Rudge) R.Br.
L. lanceolatus (Sm.) R.Br.
L. microphyllus R.Br.
Epacris Cav.
E. rigida Sieb. ex Spreng.
E. microphylla R.Br.
E. pulchella Cav.
Woollsia F. Muell.
W. pungens (Cav.) F. Muell.

LOGANIACEAE

Logania R.Br.
L. albiflora (Andr.) Druce

STYLIDIACEAE

Stylidium Swartz ex Willd.
S. graminifolium Swartz ex Willd.

GOODENIACEAE

Goodenia Sm.
G. bellidifolia Sm.
G. heterophylla Sm.
Scaevola L.
S. ramosissima (Sm.) Krause
Dampiera R.Br.
D. stricta (Sm.) R.Br.

COMPOSITAE

Olearia Moench
O. microphylla (Vent.) Maiden et Betche
Cassinia R.Br.
C. quinquefaria R.Br.
C. denticulata R.Br.
Helichrysum Mill.
H. diosmifolium (Vent.) Sweet
H. elatum A.Cunn. ex D C.

APPENDIX A 1 (Continued)

BIGNONIACEAE
- Pandorea Spach.
  - P. pandorana (Andr.) Steen

LABIATAE
- Hemigenia R.Br.
  - H. purpurea R.Br.

LILLIACEAE
- Blandfordia Sm.
  - B. nobilis Sm.
- Thysanotus R.Br.
  - T. juncifolius (Salisb.) Willis et Court
- Dianella Lam.
  - D. caerulea Sims
- Stypandra R.Br.
  - S. caespitosa R.Br.
- Burchardia R.Br.
  - B. umbellata R.Br.

SMILACACEAE
- Smilax L.
  - S. glyciphylla Sm.

PHILESIACEAE
- Eustrephus R.Br.
  - E. latifolius R.Br.

IRIDACEAE
- Patersonia R.Br.
  - P. sericea R.Br.

XANTHORRHOEACEAE
- Zanthorrhoea Sm.
  - X. sp.
- Lomandra Labill.
  - L. sp.

ORCHIDACEAE
- Thelymitra Forst. et f.
  - T. ixioides Swartz.
  - T. media R.Br.
  - R. rubra FitzG.
- Calochilus R.Br.
  - C. campestris Rupp.
- Diuris Sm.
  - D. sp.
- Caladenia R.Br.
  - C. alba R.Br.
  - C. carnea R.Br.
- Corybas Salisb.
  - C. sp.
- Dendrobium Swartz.
  - D. linguiforme Swartz.
- Dipodium R.Br.
  - D. punctatum (Sm.) R.Br.

CYPERACEAE
- Caustis R.Br.
  - C. flexuosa R.Br.

Omitted from this list - native grasses.

APPENDIX A 1 (Continued)

Introduced Species

LAURACEAE
- Cinnamonum Blume
  - C. camphora (L) Nees. (Camphor laurel)

CRUCIFERAE
- Rorippa R.Br.
  - R. nasturtium-aquaticum (L) Hayek (Water-cress)

OXALIDACEAE
- Oxalis L. Spp.

ROSACEAE
- Duchesnea Sm.
  - D. indica (Andr.) Focke (Wild Strawberry)
- Rubus L
  - R. vulgaris Weihe et Wees (Blackberry)

SAPINDACEAE
- Cardiosperum L.
  - C. grandiflorum Swartz (Balloon-vine)

OLEACEAE
- Ligustrum L.
  - L. lucidum Ait. (large-leaved Privet)
  - L. sinense Lour (small-leaved Privet)

CAPRIFOLIACEAE
- Lonicera L.
  - L. japonica Thunb. (Honeysuckle)

COMPOSITAE
- Eupatorium L.
  - E. adenophorum Spreng. (Crofton weed)
- Bidens L.
  - B. pilosa L. (Cobbler's Peg)
- Xanthium L.
  - X. spinosa L. (Bathurst Burr)

SOLANACEAE
- Solanum L.
  - S. mauritianum Scop. (Wild Tobacco Tree)

VERBENACEAE
- Lantana L.
  - L. camara L.

COMMELINACEAE
- Tradescantia L.
  - T. albiflora Kunth. (Wandering Jew)

LILIACEAE
- Asparagus L.
  - A. officinalis L.

APPENDIX A 2

ORCHIDS

1. Thelymitra ixiodes - open heathlands - sunny places
2. Calochilus campestris - near archery field; also C. palusosus
3. Prasophyllum elatum - open country near archery field
4. P. australe - near Britannia Street
5. Diuris aurea - near Britannia Street
6. Prasophyllum fimbriatum - near archery field
7. P. ruppii - " " "
8. P. trifidum (?) - " " " (record doubtful; later thought to be P. ruppii)
9. Genoplesium baueri - near archery field
10. Chiloglottis reflexa - in sheltered gullies
11. Acianthus exsertus - in sheltered forests and often together
12. A. fornicatus
13. Caladenia carnea - forest and heathlands
14. C. alba - " " "
15. Glossodia major - heathlands near archery field
16. Corybas aconitiflorus - sheltered places in forests
17. C. pruinosus - once near creek near The Comenarra Parkway, but the M.W.S. & D.B. messed up the area so much that it disappeared ... probably elsewhere
18. Cryptostylis erecta - in forests
19. C. subulata - wetter region, heathy land
20. Pterostylis nutans - common in sheltered forests
21. P. acuminata - forest land scattered colonies
22. P. grandiflora - sheltered forest gullies - fairly plentiful in some places
23. P. longifolia - forests generally, especially taller ones
24. P. parviflora - in poor heath land
25. Dendrobium speciosum and D. linguiforme - once occurred on rocks in the park - now very rare or absent through collecting
27. Dipodium punctatum - near archery field and Britannia Street
28. Cymbidium suave - probably high in trees in the more isolated parts
29. Sarcochilus australis - Upper Lane Cove River; rare

List compiled by Steve Clemesha.

APPENDIX A 2 (Continued)

FERNS

1. Todea barbara - along main creeks and rivers
2. Schizaea bifida - poor soiled parts among heath and low woodland
2a. Schizaea rupestris - under waterfalls
3. Gleichenia dicarpa - wet rock crevices
4. Gleichenia rupestris - only recorded in one spot, but probably occurs elsewhere
5. Sticherus flabellatus - common in wet shaded gullies
6. Hymerophyllum cupressiforme - on rocks in sheltered spots
7. Cyathea australis - rare, some isolated pockets near river
8. Cyathea cooperi - same ad for C. australis
9. Culcitia dubia - freely distributed in tall forests and damp areas
10. Hypolepis muelleri - near creeks - wet places, sun or shade
11. Pteridium esculentum - sunnier and drier situations than most ferns occur in
12. Histiopteris incisa - wet places near creeks (at the base of rock faces)
13. Lindsaea linearis - dry areas near archery field - widely distributed in heathy and dry places
14. Lindsaea microphylla - beside tracks in sheltered places - favours disturbed areas
15. Pteris tremula - not plentiful in park - damp and disturbed areas
16. Adiantum aethiopicum - open damp places
17. Adiantum hispidulum - I think it occurs beside the tracks in the area
18. Pellaea falcata - near Comenarra Parkway
19. Cheilanthes tenifolia - on rocks in gullies
20. Grammitis billardieri - near Comenarra Parkway - probably elsewhere in very sheltered places
21. Pyrrosia rupestris - on rocks near Comenarra Parkway
22. Davallia pyridata - near Comenarra Parkway (on rock near river)
23. Athyrium australe - shaded areas and wet places, i.e. in small creek beds - not common in park
24. Athyrium japonicum - on mossy rocks near creek at Comenarra Parkway end of Park
25. Asplenium flabellifolium - sheltered damp areas, on rocks.

APPENDIX A 5 (A)

(Prepared after completion of Part A of the Plan)

FRESHWATER LIFE IN PENNANT HILLS PARK

The creek system within the Park carries a variable volume of water. The upper Lane Cove River and Devlin's Creek, except perhaps in an exceptionally dry season, both carry moving water, but the creeks which drain into these two main water courses may at times be completely dry or reduced to a series of pools. Yet it is in these smaller creeks that the richer variety of living species is found, species which obviously have phases ensuring their survival during unfavourable conditions.

The creeks provide opportunities for studies of freshwater communities - the structure, function and behaviour of member organisms and their relation to one another and to their environment. For some organisms all stages of the life cycle develop in water, while for others only one or some of the stages require an aquatic environment.

The following inventory of animal forms observable in the creeks of the Park shows that most phyla are represented. No claim is made that this is by any means a complete list.

ANIMAL LIFE IN THE CREEKS

PHYLUM	REPRESENTATIVES
Protozoa	Many examples, only observable by means of a microscope, but a vital food supply for higher forms.
Coelenterata	Hydra should be found where there are submerged water plants.
Platyhelminthes	Small free-living members of the Class Turbellaria are found on the underside of rocks.
Nematoda	Free living roundworms, "hairworms".
Rotifera	Among the largest of the microscopic organisms.
Mollusca	Water snails, on both plants and rocks, and their egg masses.
Annelida	Segmented worms.
Arthropoda (1) Class Crustacea	Probably the largest aniaml and the most colourful found in the creeks is the fresh-water crayfish. Other smaller Crustaceans may also be found.

APPENDIX A 5 (A) (Continued)

PHYLUM	REPRESENTATIVES
(2) Class Insecta	Usually the most obvious inhabitants and showing remarkable adaptations for life under water.
O.Odonata	Eggs, larvae and nymph stages of Dragon-Flies, Damsel-Flies and May-Flies.
O.Ephemeroptera	
O.Trichoptera	Eggs, larvae and pupae of Caddis-Flies.
O.Coleoptera	All stages in life cycle of Whirligig Beetles and Dytiscid Beetles.
O.Diptera	Eggs, larvae, pupae of Mosquitoes and some Midges.
O.Hemiptera	All stages in life cycles of Water Striders, Back-Swimmers, Water Boatmen, Water Scorpions.
(3) Class Arachnida	Water Spiders.
Chordata	The vertebrates are represented by the tadpole stages of Amphibia. There may be some Fish and Tortoises.

APPENDIX A 3

Plant species list: Northern section

Plants identified to date:

Native -

PTERIDOPHYTA

PSILOTACEAE
- Psilotum Sw.
  - P. nudum (L.) Griseb.

SCHIZAEACEAE
- Schizaea Sm.
  - S. sp.

GLEICHENIACEAE
- Gleichenia Sm.
  - G. dicarpa R.Br.
- Sticherus Pr.
  - S. flabellatus (R.Br.) St. John

CYATHEACEAE
- Cyathea Sm.
  - C. australis (R.Br.) Dom.
- Culcita Presl.
  - C. dubia (R.Br.) Maxon

DENNSTAEDILACEAE
- Pteridium Scop.
  - P. esculentum (Forst.f.) Cockayne

LINDSAEACEAE
- Lindsaea Dryand.
  - L. microphylla Sw.

ADIANTACEAE
- Adiantum L.
  - A. aethiopicum L.
- Cheilanthes Sw.
  - C. tenuifolia (Burm.f.) Sw. sens lat.

POLYPODIACEAE
- Platycerium Desv.
  - P. bifurcatum (Cav.) C. Chr.
- Pyrrosia Mirbel
  - P. rupestris (R.Br.) Ching

ASPLENIACEAE
- Asplenium L.
  - A. flabellifolium Cav.

BLECHNACEAE
- Blechnum L.
  - B. sp.

ANGIOSPERMAE

CASSYTHACEAE
- Cassytha L.
  - C. pubescens R.Br.

RANUNCULACEAE
- Clematis L.
  - C. aristata R.Br. ex D C.
  - C. glycinoides D C.

APPENDIX A 3 (Continued)

MENISPERMACEAE
Stephania Lour.
S. japonica (Thumb.) Miers var discolor (Bl.) Forman

VIOLACEAE
Viola L.
V. hederacea Labill.
Hybanthus Jacq.
H. filiformis (D C.) F. Muell.

POLYGALACEAE
Comosperma Labill.
C. ericinum D C.
C. volubile Labill.

TREMANDRACEAE
Tetratheca Sm.
T. pilosa Labill. var denticulata (Sieb.ex Spreng.) Benth.

DROSERACEAE
Drosera L.
D. spathulata Labill.
D. auriculata Backh.

THYMELAEACEAE
Pimelea Banks ex Gaertn.
P. linifolia Sm.

PROTEACEAE
Petrophile R.Br. ex Knight
P. fucifolia (Salisb.) Knight
Isopogon R.Br. ex. Knight
I. anethifolius (Salisb.) Knight
I. anemonifolius (Salisb.) Knight var anemonifolius
Conospermum Sm.
C. longifolium Sm. var longifolium
Persoonia Sm.
P. laurina Pers.
P. levis (Cav.) Domin.
P. linearis Andr.
P. pinifolia R.Br.
Banksia L.f.
B. ericifolia L.f.
B. spinulosa Sm.
B. aspleniifolia Salisb.
B. serrata L.f.
Hakea Schrad.
H. sericea Schrad.
H. dactyloides (Gaertn.) Cav.
Grevillea R.Br.
G. buxifolia (Sm.) R.Br.
G. sericea (Sm.) R.Br.
G. linearifolia (Cav.) Druce
Lomatia R.Br.
L. myricoides (Gaertn.f.) Domin.
L. silaifolia (Sm.) R.Br.
Telopea R.Br.
T. speciosissima R.Br.
Xylomelum Sm.
X. pyriforme Sm.
Lambertia Sm.
L. formosa Sm.

APPENDIX A 3 (Continued)

DILLENIACEAE
- Hibbertia Andr.
  - H. dentata R.Br. ex D C.
  - H. spp.

PITTOSPORACEAE
- Pittosporum Banks ex Gaertn.
  - P. undulatum Vent.
  - P. revolutum Ait.
- Bursaria Cav.
  - B. spinosa Cav.
- Billardiera Sm.
  - B. scandens Sm.

ELAEOCARPACEAE
- Elaeocarpus L.
  - E. reticulatus Sm.

STERCULIACEAE
- Lasiopetalum Sm.
  - L. ferrugineum Sm. var. ferrugineum

CUNONIACEAE
- Callicoma Andr.
  - C. serratifolia Andr.
- Ceratopetalum Sm.
  - C. gummiferum Sm.
  - C. apetalum D. Don

BAUERACEAE
- Bauera Banks ex Andrews
  - B. rubioides Anar.

MIMOSACEAE
- Acacia Willd.
  - A. ulicifolia (Salisb.) Court
  - A. stricta (Andrews) Willd.
  - A. linifolia (Vent.) Willd.
  - A. oxycedrus Sieb. ex D C.
  - A. longissima Wendl.
  - A. longifolia (Andrews) Willd. var longifolia
  - A. floribunda (Vent.) Willd.
  - A. elata A. Cunn. ex Benth.
  - A. botrycephala (Vent.) Desf.
  - A. decurrens (Wendi.) Willd.

PAPILIONACEAE
- Gompholobium Sm.
  - G. latifolium Sm.
  - G. grandiflorum Sm.
  - G. glabratum Sieb. ex D C.
- Pultenaea Sm.
  - P. daphnoides Wendl.
  - P. stipularis Sm.
  - P. flexilis Sm.
  - P. elliptica Sm.
- Phyllota Benth.
  - P. phyllicoides (Sieb. ex D C.) Benth.
- Dillwynia Sm.
  - D. retorta (Wendl.) Druce var retorta
  - D. glaberrima Sm.
- Sphaerolobium Sm.
  - S. vimineum Sm.
- Zornia Gmel.
  - Z. dyctiocarpa D C.

APPENDIX A 3 (Continued)

PAPILIONACEAE (Continued)
- Hovea R.Br.
  - H. linearis R.Br.
- Platylobium Sm.
  - P. formosum Sm.
- Bossiaea Vent.
  - B. obcordata (Vent.) Druce
  - B. heterophylla Vent.
  - B. scolopendria (Andr.) Sm.
- Kennedia Vent.
  - K. rubicunda Vent.
- Hardenbergia Benth.
  - H. violacea (Schneev.) Stearn
- Glycine L.
  - G. clandestina Wendl.
  - G. tabacina Benth.

MYRTACEAE
- Acmena D C.
  - A. smithii (Poir.) Merrill et Perry
- Backhousia Hook.f. et Harv.
  - B. myrtifolia Hook.f. et Harv.
- Syncarpia Ten.
  - S. glomulifera (Sm.) Niedenzu
- Tristania R.Br.
  - T. laurina (Sm.) R.Br.
- Angophora Cav.
  - A. cordifolia Cav.
  - A. costata (Gaertn.) Druce
- Eucalyptus L'Herit,
  - E. paniculata Sm.
  - E. globoidea Blakely
  - E. resinifera Sm.
  - E. gummifera (Gaertn.) Hochr.
  - E. pilularis Sm.
  - E. piperita Sm.
- Leptospermum Forst. et f.
  - L. attenuatum Sm.
  - L. flavescens Sm.
  - L. arachnoides Gaertn.
- Kunzea Reichb.
  - K. ambigua (Sm.) Druce
- Baeckea L.
  - B. linifolia Rudge

CASUARINACEAE
- Casuarina L.
  - C. torulosa Ait.
  - C. littoralis Salisb.

MORACEAE
- Ficus L.
  - F. rubiginosa Desf. ex Vent.

RHAMNACEAE
- Pomaderris Labill.
  - P. aspera Sieb. ex D C.
  - P. multiflora Sieb. ex Fenzl.

LORANTHACEAE
- Amyema Teigh
  - A. congener (Sieb. ex Schult. et f.) Tiegh. ssp. congener

APPENDIX A 3 (Continued)

LORANTHACEAE (Continued)

Dendrophthoe Mart.
D. vitellina (F.Muell.) Tiegh

SANTALACEAE
Leptomeria R.Br.
L. acida R.Br.

RUTACEAE
Boronia Sm.
B. ledifolia (Vent.) J. Gay
B. pinnata Sm.
Zieria Sm.
Z. pilosa Rudge
Z. smithii Andr.
Correa Sm.
C. reflexa (Labill.) Vent. var. reflexa
Phebalium Vent.
P. dentatum

SAPINDACEAE
Dodonaea Mill
D. triquetra Wendl.

ARALIACEAE
Polyscias Harms
P. sambucifolia (Sieb. ex D C.) Harms

UMBELLIFERAE
Actinotus Labill.
A. helianthi D C.
A. minor (Sm.) D C.
Platysace C. Norman
P. linearifolia (Cav.) C. Norman
Xanthosia Rudge
X. pilosa Rudge

EPACRIDACEAE
Styphelia Sm.
S. longifolia R.Br.
S. tubiflora Sm.
S. triflora Andr.
Brachyloma Sond.
B. daphnoides (Sm.) Benth.
Leucopogon R.Br.
L. lanceolatus (Sm.) R.Br. var lanceolatus
L. microphyllus R.Br.
L. juniperinus R.Br.
L. ericoides (Sm.) R.Br.
Epacris Cav.
E. longiflora Cav.
E. pulchella Cav.
Woollsia F. Muell.
W. pungens (Cav.) F. Muell.
Dracophyllum Labill.
D. secundum R.Br.

LOGANIACEAE
Logania R.Br.
L. albiflora (Andr.) Druce

ASCLEPIADACEAE
Marsdenia R.Br.
M. suaveolens R.Br.

APPENDIX A 3 (Continued)

RUBIACEAE
- Morinda L.
  - M. jasminoides A. Cunn.

MYRSINACEAE
- Rapanea Aubl.
  - R. variabilis (R.Br.) Mez.

LOBELIACEAE
- Pratia Gaud.
  - P. purpurascens (R.Br.) Benth.
- Lobelia L.
  - L. gibbosa Labill.

STYLIDIACEAE
- Stylidium Swartz ex Willd.
  - S. graminifolium Swartz ex Willd.

GOODENIACEAE
- Goodenia Sm.
  - G. stelligera R.Br.
  - G. hederacea Sm.
  - G. heterophylla Sm.
- Scaevola L.
  - S. ramosissima (Sm.) Krause
- Dampiera R.Br.
  - D. stricta (Sm.) R.Br.

COMPOSITAE
- Olearia Moench
  - O. microphylla (Vent.) Maiden et Betche
- Cassinia R.Br.
  - C. aculeata R.Br.
  - C. denticulata R.Br.
- Helichrysum Mill.
  - H. apiculatum (Labill.) D C.
  - H. elatum A.Cunn. ex D C.
  - H. scorpioides Labill.

SOLANACEAE
- Solanum L.
  - S. nodiflorum

BIGNONIACEAE
- Pandorea Spach.
  - P. pandorana (Andr.) Steen.

ACANTHACEAE
- Brunoniella Bremek.
  - B. sp.
- Psuederanthemum Radlkf.
  - P. variabile (R.Br.) Radlkf. ex Lindau

COMMELINACEAE
- Commelina L.
  - C. cyanea R.Br.

LILIACEAE
- Thysanotus R.Br.
- T. tuberosus R.Br.
- Caesia R.Br.
  - C. parviflora R.Br.
- Dianella Lam.
  - D. caerulea Sims
  - D. revoluta R.Br.
- Tricoryne R.Br.

APPENDIX A 3 (Continued)

LILIACEAE (Continued).
- Burchardia R.Br.
  - B. umbellata R.Br.

SMILACACEAE
- Smilax L.
  - S. glyciphylla Sm.
- Ripogonum Forst. et f.
  - R. album R.Br.

PHILESIACEAE
- Eustrephus R.Br.
  - E. latifolius R.Br.

IRIDACEAE
- Patersonia R.Br.
  - P. sericea R.Br.
  - P. glabrata R.Br.

XANTHORRHOEACEAE
- Xanthorrhoea Sm.
  - X. arborea R.Br.
  - X. media R.Br. ssp. media
- Lomandra Labill.
  - L. longifolia Labill.
  - L. obliqua (Thunb.) MacBride
  - L. glauca (R.Br.) Ewart
  - L. multiflora (R.Br.) J. Britt.

HAEMODORACEAE
- Haemodorum Sm.
  - H. planifolium R.Br.

ORCHIDACEAE
- Thelymitra Forst. et f.
  - T. ixioides Swartz.
  - T. pauciflora R.Br.
- Calochilus R.Br.
  - C. sp.
- Diuris Sm.
  - D. aurea Sm.
  - D. sulphurea R.Br.
- Orthoceras R.Br.
  - O. strictum R.Br.
- Microtis R.Br.
  - M. parviflora R.Br.
- Prasophyllum R.Br.
  - P. elatum R.Br.
- Calaena R.Br.
  - C. major R.Br.
- Chiloglottis R.Br.
  - C. reflexa (Labill.) Druce
- Acianthus R.Br.
  - A. caudatus R.Br.
  - A. exsertus R.Br.
  - A. fornicatus R.Br.
- Caladenia R.Br.
  - C. alba R.Br.
  - C. carnea R.Br.
  - C. caerulea R.Br.
- Glossodia R.Br.
  - G. minor R.Br.
- Cryptostylis R.Br.
  - C. erecta R.Br.

APPENDIX A 3 (Continued)

ORCHIDACEAE (Continued)
- Pterostylis R.Br.
  - P. nutans R.Br.
  - P. acuminata R.Br.
  - P. grandiflora R.Br.
  - P. longifolia R.Br.
- Dendrobium Swartz
  - D. linguiforme Swartz
- Dipodium R.Br.
  - D. punctatum (Sm.) R.Br.
- Cymbidium Swartz
  - C. suave R.Br.

CYPERACEAE
- Cyathochaeta Nees
  - C. diandra Nees
- Schoenus L.
  - S. imberbis R.Br.
- Ptilanthelium Kukenth.
  - P. deustum (R.Br.) Kukenth.
- Lepidosperma Labill.
  - L. laterale R.Br.
- Gahnia Forst.
  - G. sp.
- Caustis R.Br.
  - C. flexuosa R.Br.

GRAMINEAE
- Imperata Cyr.
  - I. cylindrica (L.) Beauv.var.major (Nees) C.E. Hubbard.
- Themeda Forsk.
  - T. australis (R.Br.) Stapf.

Introduced Species

RANUNCULACEAE
- Ranunculus L.
  - R. repens L.

PHYTOLACCACEAE
- Phytolacca L.
  - P. octandra L.

BASELLACEAE
- Andredera Juss.
  - A. cordifolia (Ten.) Steen

OCHNACEAE
- Ochna L.
  - O. serrulata (Hochst.) Walp.

MALVACEAE
- Sida L.
  - S. rhombifolia L.

ROSACEAE
- Pyracantha M.J. Roem.
  - P. angustifolia (Franch.) Schneid.
- Cotoneaster Medic.
  - C. glaucophylla Franch.

CAESALPINIACEAE
- Cassia L.

APPENDIX A 3 (Continued)

PAPILIONACEAE
- Vicia L.
  - V. tetrasperma (1.) Schreb.

OLEACEAE
- Olea L.
  - O. africana Mill.
- Ligustrum L.
  - L. lucidum Ait.
  - L. sinense Lour.

ASCLEPIADACEAE
- Araujia Brot.
  - A. hortorum Fournier

CAPRIFOLIACEAE
- Lonicera L.
  - L. japonica Thunb.

PLANTAGINACEAE
- Plantago L.
  - P. sp.

COMPOSITAE
- Eupatorium L.
  - E. adenophorum Spreng.
  - E. riparium Regel
- Bidens L.
  - B. subalternans D C.
- Solvia Ruiz et Pav.
  - S. sp.
- Senecio L.
  - S. mikanioides Otto ex Walp.
- Chrysanthemoides Fabr.
  - S. moniliferum (1.) T.Nore.
- Hypochoeris L.
  - H. sp.

SOLANACEAE
- Solanum L.
  - S. mauritianum Scop.
  - S. nodiflorum Jacq.

CONVOLVULACEAE
- Ipomoea L.
  - I. indica L.

VERBENACEAE
- Verbena L.
  - V. bonariensis L.
- Lantana L.
  - L. camara L.

COMMELINACEAE
- Tradescantia L.
  - T. albiflora Kunth.

LILIACEAE
- Asparagus L.
  - A. sp.

IRIDACEAE
- Freesia Klatt
  - F. refracta (Jacq.) Klatt var.odorata (Klatt) Baker.

APPENDIX A 3 (Continued)

GRAMINEAE
- Poa L.
  - P. annua L.
- Briza L.
  - B. maxima L.
  - B. minor L.
- Pennisetum Rich.
  - P. clandestinum Hochst. ex chiov.

APPENDIX A 4

ECOLOGY SURVEY - PENNANT HILLS PARK

JANUARY, 1975.

In January, 1975, a small section of Pennant Hills Park was chosen for detailed examination by 3rd year Ecology students from Macquarie University. The location of the area studied is shown in Figure 1.

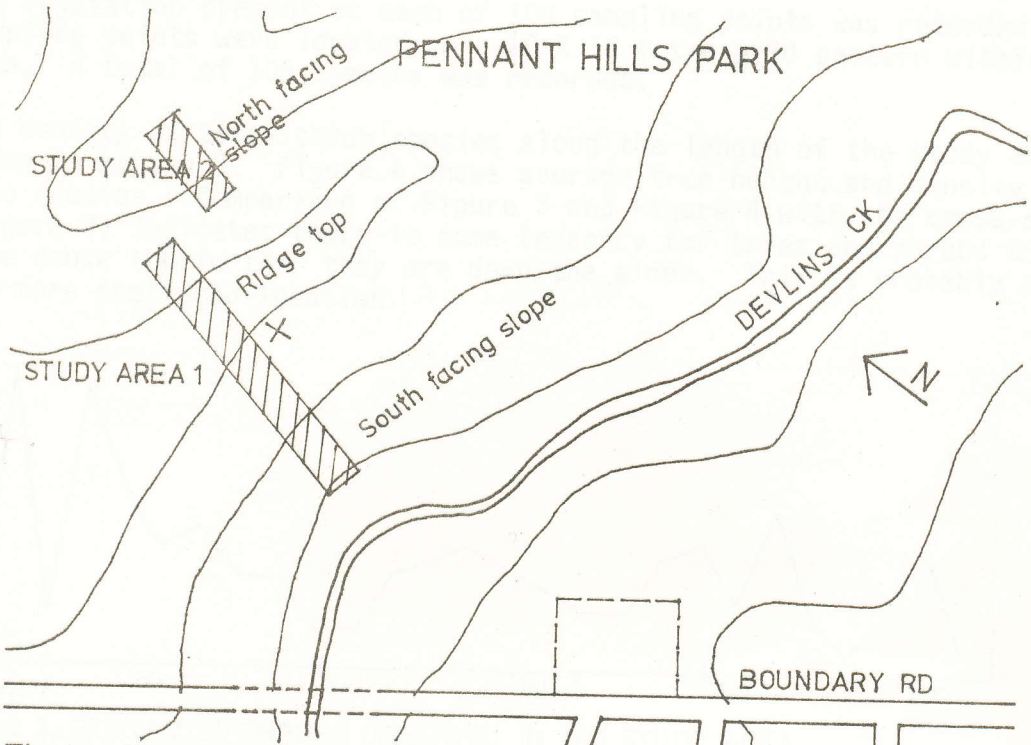


Figure 1. MAP OF SECTION OF PENNANT HILLS PARK SHOWING AREAS STUDIED BY 3rd YR ECOLOGY STUDENTS - JAN 1975

The aim of the investigation was to determine the small scale pattern of vegetation distribution. This is variation occurring within the larger scale plant community units of low woodland and open forest. Past and present environmental factors, such as slope, exposure, soil type and depth, and the past history of natural and unnatural disturbance will have led to the present pattern of vegetation. The study area was chosen so as to include three different sections; a South facing slope, the ridge top, and a North facing slope. (Figure 2).

APPENDIX A 4 (Continued)

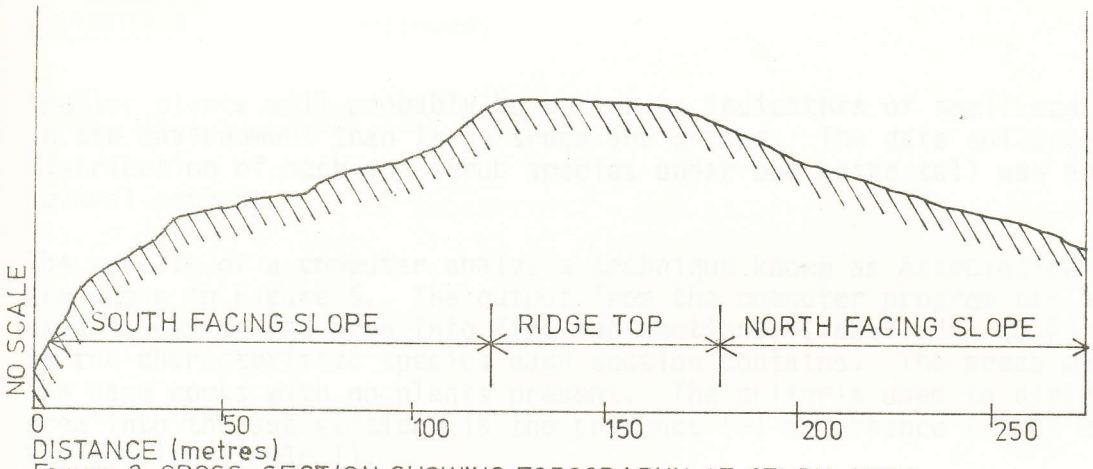


Figure 2. CROSS SECTION SHOWING TOPOGRAPHY OF STUDY AREA

The vegetation present at each of 108 sampling points was recorded. The sampling points were located on a 10 X 10 metre grid pattern within the study area. A total of 103 species was recorded.

The density of total shrub species along the length of the study area is shown in Figure 3. Figure 4 shows average tree height and density of tree species. Comparison of Figure 3 and Figure 4 with the cross-section (Figure 2) indicates there is some tendency for trees and shrubs to be more dense the further they are down the slope. This is probably due to the more sheltered location.

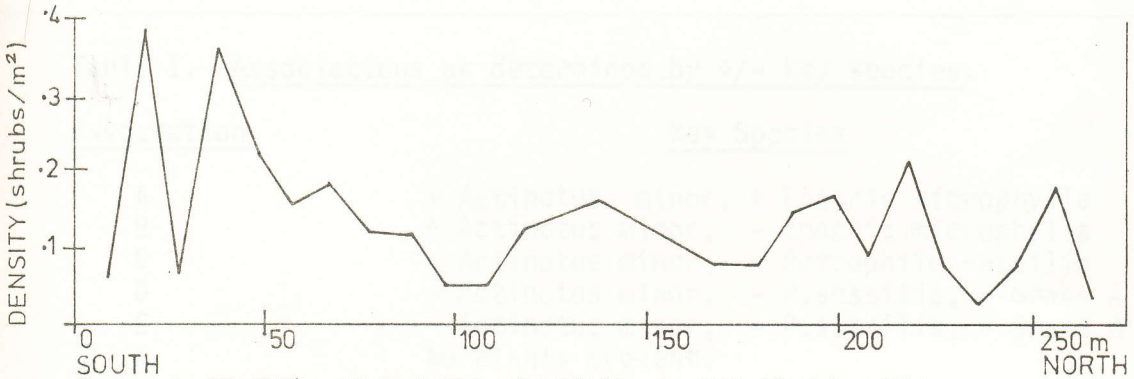


Figure 3. DENSITY OF SHRUBS OBSERVED IN THE STUDY AREA

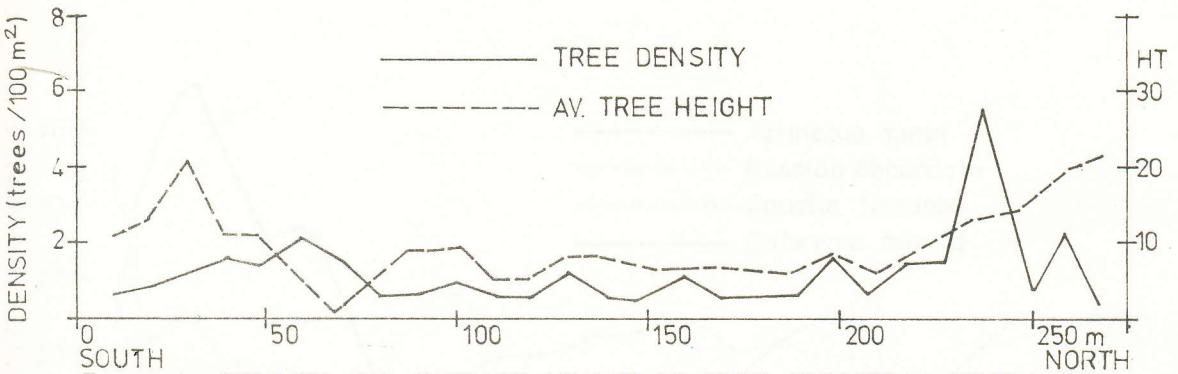


Figure 4. DENSITY AND AVERAGE HEIGHT OF TREE SPECIES IN STUDY AREA

Smaller plants will probably be better as indicators of small scale variation in the environment than large trees and shrubs. The data collected on the distribution of herb and shrub species under one metre tall was analysed by several methods.

The results of a computer analysis technique known as Association Analysis are shown in Figure 5. The output from the computer program has been used to divide the area into five sub sections, (labelled A to E) according to the characteristic species each section contains. The areas marked X are bare rocks with no plants present. The criteria used to divide the area into the sub sections is the presence (+) or absence (-) of certain key species (Table 1).

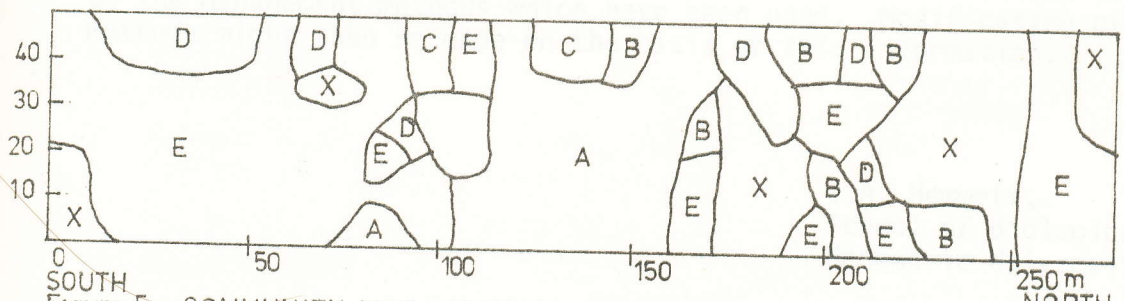


Figure 5. COMMUNITY MAP : SPECIES ASSOCIATIONS DERIVED FROM COMPUTOR ANALYSIS

Table 1. Associations as determined by +/- key species.

Association	Key Species
A	+ Actinotus minor, + Epacris microphylla
B	+ Actinotus minor, - Epacris microphylla
C	- Actinotus minor, + Petrophile sessilis
D	- Actinotus minor, - P.sessilis, + Grass A
E	- Actinotus minor, - P.sessilis, - Grass A
X	No plants present.

A second method of vegetation analysis known as Gradient Analysis was performed on the data. The Relative Importance Value (RIV) was calculated for each species present at each point along the length of the area. Figure 6 shows RIV's for 4 of the more important species.

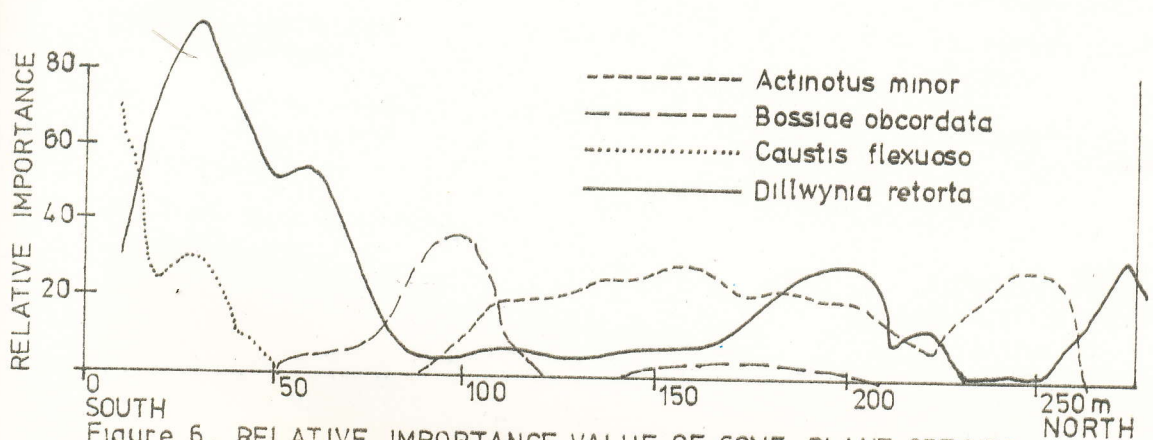


Figure 6. RELATIVE IMPORTANCE VALUE OF SOME PLANT SPECIES OBSERVED IN THE STUDY AREA

APPENDIX A 4 (Continued)

The actual pattern of vegetation is not as distinct as Figure 5 might lead one to believe. Groups of plants tend to blend into each other as indicated in Figure 6. The pattern of vegetation shown by these methods shows quite a good relationship to observed environmental differences.

The type of study reported above, together with information on the autecology of individual species of interest, can provide information to aid in developing a management program. Repeating this type of investigation at a later date will provide information on the effect of the management methods which have been used. Modification of the methods might then be made on the basis of this information.

J.A. Hemmett,
School of Biological Sciences,
Macquarie University.

APPENDIX A 5

LIST OF BIRDS IN THE PENNANT HILLS PARK - UPPER LANE COVE RIVER VALLEY AREA

BIRD	HABITAT	COMMENTS
1. Little Pied Cormorant	near waterholes	rarely seen; overhead
2. Pied Cormorant		rare visitor; overhead
3. Little Black Cormorant		rare visitor; overhead
4. White-faced Heron		occasionally seen; overhead
5. Nankeen Night Heron	roosting above creek on ridge	rare visitor
6. Black Duck	waterholes	resident
7. Brown Goshawk		occasionally seen
8. Black-shouldered Kite	overhead open paddocks near M.U. *	
9. Nankeen Kestrel	as above	
9a. Little Falcon	open forest in gullies	breeding visitor
10. Crested Hawk		occasionally seen
11. Little Eagle		rare visitor; overhead
12. Dusky Moorhen	waterholes	resident?
13. Spur-winged Plover	open spaces e.g. ovals; breed near M.U.	occasionally seen
14. Topknot Pigeon		migrant; rare visitor
15. Peaceful Dove		rare visitor
16. Brush-Bronzewing		rare visitor
17. Rainbow Lorikeet	suburban fringes; woodland	resident; breeding; very common
18. Musk Lorikeet	gardens on suburban fringe	occasionally seen at feeders
19. Scaly-breasted Lorikeet	as above	as above; spring blossom
20. Hybrid Rainbow-Scaly-breasted Lorikeet	as above	as above
21. Gang-gang Cockatoo		
22. Galah		occasionally seen;
23. Cockatiel		escaped from captivity? as above
24. Sulphur-crested Cockatoo	open forest in gullies	resident; breeding; often seen
25. Eastern Rosella	gullies	resident; breeding; frequently seen.

APPENDIX A 5 (Continued)

BIRD	HABITAT	COMMENTS
26. Crimson Rosella		resident; breeding; frequently seen
27. King Parrot	open forest in damper gullies	resident; breeding; frequently seen
28. Dollar Bird	woodland	migrant; breeding; occasionally seen
29. Pallid Cuckoo		rare visitor
30. Fantail Cuckoo		resident; breeding; often seen and heard
31. Brush Cuckoo		migrant; breding; occasionally seen
32. Horsfield Bronze Cuckoo		migrant; breeding; occasional
33. Golden Bronze Cuckoo		resident; breeding
34. Pheasant Coucal		? rare visitor
35. Koel	gullies - woodland	migrant; breeding; often seen and heard
36. Kookaburra	woodland and gullies	resident; breeding; very common
37. Barking Owl		resident; occasionally heard.
38. Powerful Owl	gullies near Turra-murra	occasionally seen and heard.
39. Boobook Owl		resident; breeding
40. Sacred Kingfisher		migrant; breeding
41. Tawny Frogmouth	woodland	resident; breeding; often seen
42. Welcome Swallow	suburban fringes	resident; often seen overhead
43. Spine-tailed Swift		non-breeding migrant; common; overhead
44. Fork-tailed Swift		non-breeding migrant; uncommon; overhead
45. Cicada Bird		migrant; ? breeding; occasional
46. Black-faced Cuckoo-shrike		resident; breeding; common
47. Magpie-lark (Peewee)	mainly on suburban fringes of the Park.	resident; breeding; common
48. Eastern Whipbird	gullies, near creeks	resident; breeding

APPENDIX A 5 (Continued)

BIRD	HABITAT	COMMENTS
49. Supurb Blue Wren	? suburban fringe	resident; ? breeding; occasionally seen
50. Variegated Wren	scrub layer in woodland; moves to heath in winter	resident; breeding; often seen
51. Brown Warbler	gullies	resident; breeding; often seen
52. White-throated Warbler		non-breeding migrant; occasional
53. White-browed Scrub-wren	scrubland near creeks; heath	resident; breeding; often seen
54. Striated Thornbill	scrub near creeks heath and woodland	resident; breeding; common
55. Brown Thornbill	as above	resident; breeding; common
56. Little Thornbill		winter visitor; occasionally seen
57. Rock Warbler	damp gullies near Turramurra	often heard
58. Rose Robin	woodland	winter visitor; often seen
59. Scarlet Robin		winter visitor; rarely seen
60. Southern Yellow Robin	woodland, open forest	resident; breeding; frequently seen
61. Grey Fantail	woodland	resident; breeding; common
62. Rufous Fantail	woodland	non-breeding migrant; seen occasionally
63. Willie Wagtail	suburban areas	rarely seen in bush; resident
64. Satin Flycatcher		non-breeding mightant; occasionally seen
65. Leaden Flycatcher		non-breeding migrant; occasional
66. Black-faced Flycatcher	woodland, open forest	migrant; non-breeding
67. Golden Whistler	open forest in gullies and woodland	resident; breeding; often seen
68. Rufous Whistler	woodland	migrant; breeding; occasionally seen
69. Eastern Shrike-tit	woodland and open forest	resident; occasionally seen
70. Grey Shrike-thrush	woodland, open forest and heathland	resident; breeding; common

APPENDIX A 5 (Continued)

BIRD	HABITAT	COMMENTS
71. Orange-winged Sitella	woodland and open forest	resident; breeding; occasionally seen
72. White-throated Tree-creeper	woodland and open forest	resident; breeding; common
73. Spotted Pardelote	tree tops in woodland and open forest	resident; breeding; common
74. Mistletoe-bird		winter visitor; rare
75. Grey-breasted Silver-eye	heath; scrub layers; suburban fringe	resident; breeding; common
76. Eastern Spinebill	heath; low open woodland	resident; breeding; common
77. Lewin Honeyeater	damp open forest near creeks	seen occasionally
78. White-eared Honeyeater	heathy ridges, low open woodland	occasionally seen
79. Yellow-tufted Honeyeater	heath; low open woodland	rare
80. Yellow faced Honeyeater	heath; low open woodland; open forest	resident; breeding; frequent
81. White-naped Honeyeater	heath; woodland	occasionally seen; ? migrant; ? breeding
82. Brown headed Honeyeater	some damp gullies near Turramurra	occasionally seen
83. White-cheeked Honeyeater	heath on ridges	resident; breeding; common
84. New Holland Honeyeater	heath on ridges	? breeding; occasionally seen
85. Noisy Miner	suburban fringe	resident; breeding; common
86. Noisy Friar Bird		occasionally seen
87. Red Wattle-bird	woodland and heath	resident; breeding; common
88. Little Wattle-bird	woodland and heath	occasionally seen; ? breeding
89. Red-browed Finch	heath and woodland	resident; breeding; common
90. Olive-backed Oriole	woodland, open forest	resident; breeding; occasionally seen
91. Grey Butcher-bird	woodland, open forest	resident; breeding; occasionally seen
92. Black-backed Magpie	woodland-open forest	resident; breeding; common
93. Pied Currawong	as above	resident; breeding
94. Satin Bowerbird	dense scrub in woodland and near creeks	occasionally seen; ? resident; ? breeding

APPENDIX A 5 (Continued)

BIRD	HABITAT	COMMENTS
95. Australian Raven	overhead; taller trees in woodland or open forest	resident; breeding; common
Introduced Species		
96. Indian Myna	suburban fringes of bush	occasionally seen; breed in bush
97. English Starling	suburban fringes of bush	occasionally seen; breed in bush
98. Spotted Turtledove	suburban fringes of bush	occasionally seen; breed in bush
99. Domestic Pigeon		rarely seen; overhead
100. Bul-bul	woodland, heath, open forest	common; breed in bush
101. Goldfinch		rare

N.B. The order of birds used in this list is that used by Peter Slater in his Fieldguide to Australian Birds; Non-passerines and Passerines (Rigby).

Assistance was gratefully received from Barbara Howie of Thornleigh.

List compiled by Heidi Fallding, Cheltenham, August, 1975.

* M.U. = Macquarie University.

APPENDIX A 6

USE OF SPORTING FACILITIES

Copy

THE COUNCIL OF THE SHIRE OF HORNSBY

HORNSBY, N.S.W.
25th March, 1975.
Council's Ref: RKW:MET

Mr. C.R. Huxtable,
65 Cheltenham Road,
CHELTENHAM. 2119.

Dear Sir,

Re: Plan of Management for Pennant Hills Park.

Further to Council's letter of 6th February, 1975, I now enclose a plan showing the location and area of ovals and plying fields for the Pennant Hills Park. Walking tracks are shown on an aerial photograph which will be made available to a representative of the Trust if they introduce themselves to the Deputy Shire Clerk at the next Ordinary Meeting of Council.

The names of Organisations that use the Park facilities, showing the times and days of use, is also attached for your perusal.

The total construction costs in providing the facilities to date is estimated to be $283,580,but this figure does not include an estimate for the cost of constructing the No. 1 oval which was constructed many many years ago. The cost of maintaining the No. 1 oval is, however, $10,800 per annum and the maintenance costs for the balance of the facilities at this stage, including the plant nursery, is $10,000.

It might be mentioned that the items on which monies have been expended or will be expended might be summarised as under:-

Construction of No. 2 oval and its enlargement, basketball courts, softball/hockey, amenities block, drainage, fencing, flood lighting provision of a plant nursery, water supply, construction of tennis courts, construction of Ranger's cottage.

Yours faithfully,

R.K. WOODWARD,
Deputy Shire Clerk.

APPENDIX A 6 (Continued)

INTENSITY OF USE

Pennant Hills No. 1 -

School Use:

Friday, 1.30p.m. to 3p.m.	- Beecroft Public School
Wednesday, 1p.m. to 4p.m.	- Normanhurst Boys' High
Thursday, 1p.m. to 3.30p.m.	- Pennant Hills High
Tuesday) Thursday) Friday) 11a.m. to 1p.m.	- Mt. St. Benedicts High

Winter Months:

Each Saturday	- Pennant Hills Rugby League or Union
Night Training Monday to Friday inclusive, 4p.m. to 9p.m.	- Pennant Hills Rugby League and Union, Gladesville-Hornsby Soccer.

Summer Months:

Each Saturday - Pennant Hills Cricket Club

Various Social Clubs use oval on Sundays on a regular basis.

Pennant Hills No. 2 -

School Use:

Friday, 1.30p.m. to 3p.m.	- Beecroft Public School
Friday, 1.30p.m. to 3.30p.m.	- Pennant Hills Public School
Wednesday, 1p.m. to 4p.m.	- Normanhurst Boys' High
Thursday, 1p.m. to 3.30p.m.	- Pennant Hills High
Monday, 1p.m. to 3.30p.m.	- St. Agatha's School

Summer Months:

Saturday morning	- Little Athletics
Saturday afternoon	- Cricket
Sunday	- Used occasionally.

Winter Months:

Each Saturday between April and August inclusive	- Australian Rules
Night Training Monday to Thursday inclusive 4p.m. to 9p.m.	- Pennant Hills Rugby League, Gladesville-Hornsby Soccer, Pennant Hills Australian Rules.

APPENDIX A 6 (Continued)

Netball Courts:

Winter Months:

Each Saturday - Hills District Netball
April to August

Summer Months:

No Summer Usage

Archery Range -

Used by Northern District Archers - each Saturday - intermittent use on Sundays.

Hockey Fields -

Basic earthworks only have been completed at this stage, no further development envisaged in the immediate future.

Tennis Courts -

Sixteen (16) courts proposed as per plan, eight (8) of which will be built during 1975, at an estimated cost of $80,000.00.

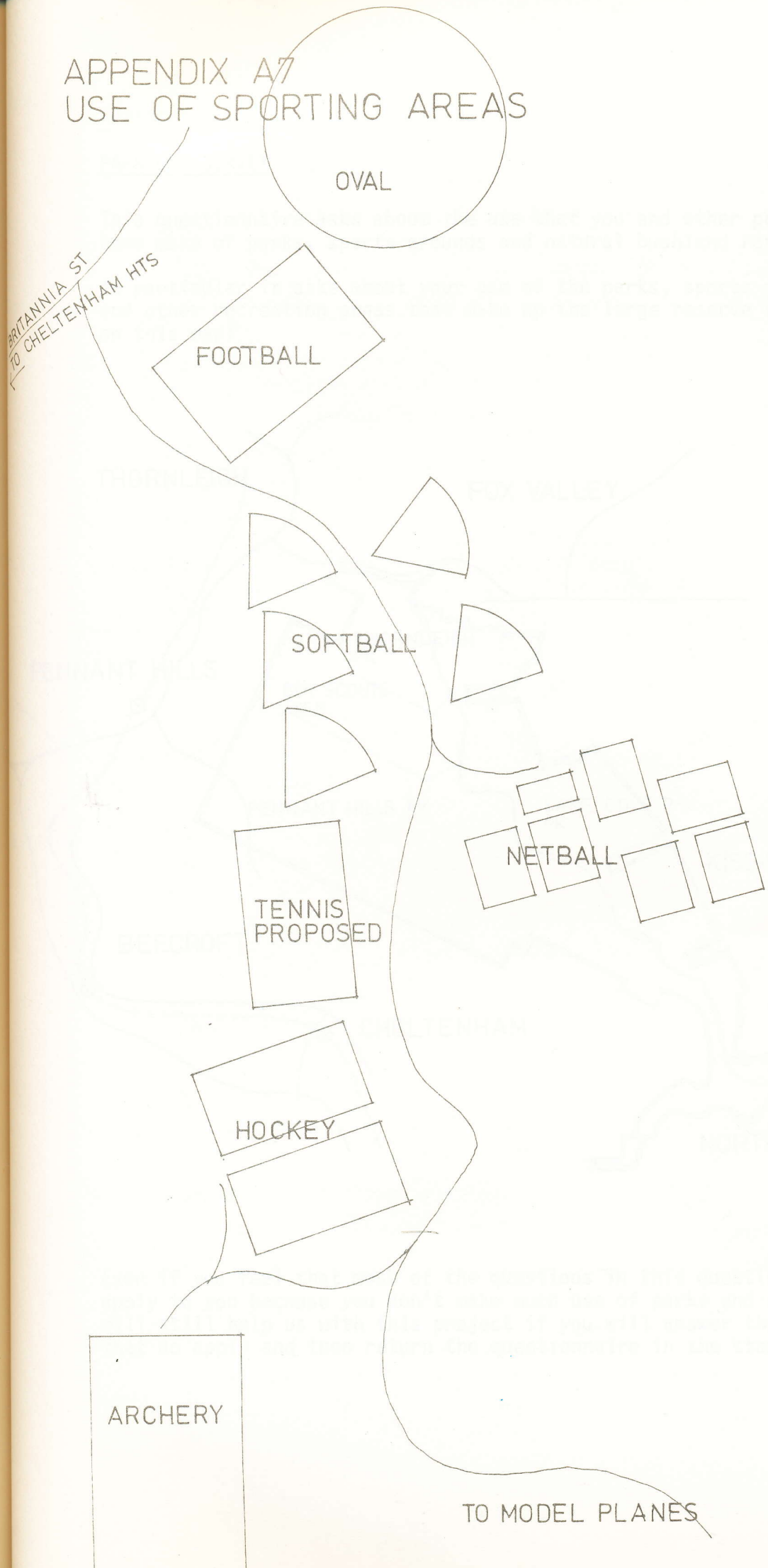
The maintenance and letting arrangements will be undertaken by the Thornleigh Eastwood Tennis Association. However, it is anticipated that the courts will be used to the full extent for day and night tennis.

At this point of time Council has not specifically set aside any areas for picnic or playground purposes.

For your information, arrangements have been made to obtain an enlarged aerial photograph of the park which will indicate the existing walking tracks and the overall development so far undertaken by Council.

. . . . . .

APPENDIX A7
USE OF SPORTING AREAS



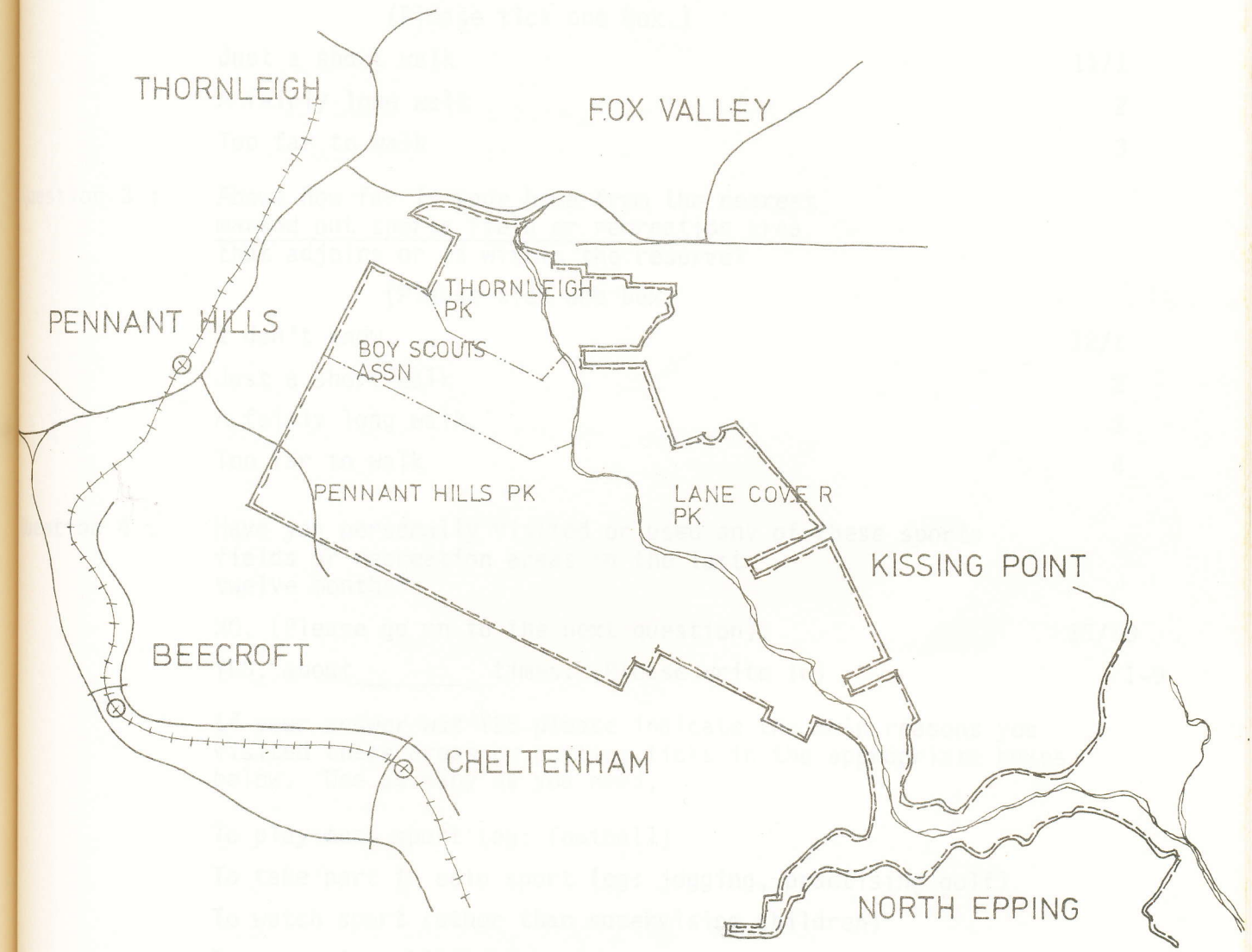
DAY	DATE	TIME	OVAL	F'BALL GND	SOFTBALL	NETBALL	HOCKEY	ARCHERY	A'PLANES

APPENDIX A 8

PARK USE SURVEY

This questionnaire asks about the use that you and other people in your home make of parks, sports grounds and natural bushland reserves.

In particular it asks about your use of the parks, sports grounds and other recreation areas that make up the large reserve shown on this map:



Even if you feel that most of the questions in this questionnaire won't apply to you because you don't make much use of parks and reserves it will still help us with this project if you will answer the questions that do apply and then return the questionnaire in the stamped envelope.

A.62

Question 1 : Were you aware that most of the area outlined (with a dotted line) on the map is a public reserve available for your use?

office use only

(Please tick one box.)

I knew that more or less the whole area was available. 10/1

I knew about parts of the area being available. 2

I didn't really know about the area at all. 3

Question 2 : About how far is your home from the nearest natural bushland part of the reserve?

(Please tick one box.)

Just a short walk 11/1

A fairly long walk 2

Too far to walk 3

Question 3 : About how far is your home from the nearest marked out sports field or recreation area that adjoins or is within the reserve?

(Please tick one box)

I don't know. 12/1

Just a short walk 2

A fairly long walk. 3

Too far to walk 4

Question 4 : Have you personally visited or used any of these sports fields or recreation areas in the last twelve months?

NO. (Please go on to the next question). 13/10

YES. about _____ times. (Please write in) 1-9

If your answer was YES please indicate the main reasons you visited these areas by putting ticks in the appropriate boxes below. Use as many as you need.

To play team sport (eg: football)

To take part in solo sport (eg: jogging, practising golf)

To watch sport (other than supervising children)

To supervise children playing

For picnic or barbeque

Other (Please specify)_____

_____

_____

office use only

Question 5 : Have you personally visited any natural bushland parts of the reserve in the last twelve months?

NO. (Please go on to the next question) 16/0

YES; about _____ times (Please write in) 1-9

If your answer was YES please indicate the main reasons you visited these areas by putting ticks in the boxes below. Use as many as you need.

Bushwalking, jogging, etc. to keep fit

Bushwalking as a family outing, or with friends

Picnic or barbeque

To see wildflowers

To take photographs, paint, etc.

Supervise children playing

Other (please specify) _____

_____

_____

Question 6 : Have you personally visited any other bushland or recreation reserves in the Sydney area over the last twelve months?

NO. (Please go on to the next question) 19/0

YES; I made about _____ trips to reserves of this type. 1-9

If you answered YES please indicate the main features that attracted you to the particular reserves or recreation areas that you visited.
(Tick as many as you need).

Sports facilities

Picnic areas

Access to large areas of still water

Access to beaches

Natural bushland

Developed bushland (with marked walking trails, etc.)

Boat hire

Nature study exhibits, aboriginal carvings, etc.

Views

Convenience of transport; ease of driving

Facilities available (shops, toilets, etc.)

The place isn't crowded

Other (please specify) _____

_____

_____

office use only

Question 7 : Are there any people between the ages of 6 and 18 years living in your home?

NO. (Please go on to the next question) 23/10

YES; there are_____people in this age group.

If your answer is YES please indicate whether they have used any part of the reserve area shown on our map for sport or recreation in the last twelve months.

YES:_____of them did 24/1-6

NO:none of them did 9

I don't know whether any of them did 0

Question 8 : Please indicate what, if any, impact the following changes to the reserve area would have on you.

(Please tick ONE box in each row)

	This would probably increase my use of the Reserve.	Wouldn't affect me	I wouldn't like this	
Additional sports fields				26
Provision of picnic/barbeque areas				27
Car parking at some entrances				28
Preserve some natural bushland areas				29
Provide marked walking trails				30
Provide trail bike paths in the area				31
Provide pony and bicycle trails				32
Develop wildlife displays				33

Question 9 : Are there any features of the reserve that you wouldn't like to see changed? (Please write them in)_____

_____

_____

_____

Thank you for completing the questionnaire.

We would like to ask the following questions about you so that we know that we have reached a cross section of the population.

(1) Your sex: M F (Please circle the appropriate answer)

(2) Your age: under 20 20 to 29 30 to 39 40 to 49 over 50

(3) The occupation of the main breadwinner in your home (Please write in)

_____

If there are any comments that you would like to make about the reserve please write them here or enclose a separate sheet.

APPENDIX A 9

POPULATION FIGURES FOR SHIRE OF HORNSBY

1961 - 1966

DISTRICT	1961	1966
CARLINGFORD	2442	4088
EPPING	6729	7508
NORTH EPPING	2211	4146
WEST BEECROFT	1388	4423
CHELTENHAM	1304	1589
BEECROFT	4046	5070
WEST PENNANT HILLS	1811	2803
PENNANT HILLS	2168	2079
THORNLEIGH	4433	5440
NORMANHURST	5268	7344
WAITARA	3807	4027
HORNSBY	8351	9072
HORNSBY HEIGHTS	1503	1700
ASQUITH	3605	5151
MT. COLAH & MT. KURING-GAI	3240	3782
BEROWRA & COWAN	2577	3583
TOTAL POPULATION	62,070	81,170

Total Population at June -

1947	31,816
1954	43,370
1961	62,070
1966	81,170
30th June, 1968	90,000

Total area of Shire -
198 sq. miles.

APPENDIX 10

SUMMARY OF RESULTS FROM PARK SURVEY.

METHOD : 800 Questionnaires were mailed or hand delivered to people who were chosen at rabdom from the Electoral Roll. An arbitary restriction that the people should live within a 2 mile band around the Park perimeter was imposed to keep the project costs within the available budget.
This meant that the population being surveyed came from the area bounded by Hornsby station, down the Pacific Highway to Lane Cove Rd, down Lane Cove Rd to North Ryde Golf Links, through Eastwood to Carlingford, along Pennant Hills Rd, then around the northern edge of West Pennant Hills and across to Hornsby.

RESPONSE : 50% of the questionnaires were returned. (The responses were anonymous so we don't know whether people closer to the Park responded more frequently than people further away. However, this seems likely.)

All the percentages expressed are percentages of the 50% who responded.

The fact that 50% response rate was achieved from a single mailing suggests that people in the sampled population are, on the whole, fairly interested in the future of the Park.

Some of the findings :

1. Demographic analysis of the sample - The age, sex and occupation distribution of the respondants tallied well with the overall distributions for the population from which the sample was drawn.

2. Knowledge of the Park - 56% claimed knowledge of the full extent
42% knew about some sections of the Park
2% knew nothing about it.

3. How far the respondents feel they live from -

	Bushland areas of the Park	Sports or Recreation areas
Short walk	52%	35%
Long walk	31%	31%
Too far to walk	17%	32%
Don't know	-	3%

4. About how often they have visited bushland and sports/recreation areas in the last 12 months -

	Bushland		Sports/Recreation
0	55%		50%
1 - 2	13%	%age visiting at	14%
3 - 10	22%	least once = 45%	20%
10 plus	10%		14%
Incomplete responses	-		2%

5. Feelings about changes in the reserve area -

	Probably increase my use	No difference	Wouldn't like
	%	%	%
Additional sports fields	19	58	23
Provision of picnic/barbecue areas	54	32	14
Car parking at some entrances	47	35	18
Preservation of some natural bush	77	22	1
Provide marked walking trails	54	36	10
Provide trail bike paths	11	23	66
Provide pony and bicycle trails	23	44	33
Wildlife displays	54	37	9

6. Uses of the Sports/Recreation areas -

The percentage figures are based on the total sample, not just on those who said they used the area.

The percentages add to more than the total number who said they used the area because respondents were allowed to give more than one reason each.

%	
11	played team sport
8	played some form of solo sport eg. jogging
20	watched sport
12	supervised children
14	went for picnics or barbecues
11	fell into a miscellaneous category including : Driving other people to the area taking short cuts

7. Uses of the bushland area -

%	
15	went bushwalking or jogging to keep fit
25	went bushwalking as a family outing
11	went for picnics or barbecues
14	went to see wildflowers
3	took photographs or painted
8	supervised children
9	were in the miscellaneous category

I N D E X

PART B

(Management Specifications)

I N D E X

(Continued)

APPENDICES

MAPS

PENNANT HILLS PARK

AND ADJOINING BUSHLAND AREAS

PLAN OF MANAGEMENT

PART B

1. Synopsis

The Park is still in manageable condition. It has considerable scientific value, and considerable and increasing recreational value.

Incompatible uses are developing, and environmental deterioration accelerating.

The emphasis in management will, therefore, be on increased protection, improved supervision, elimination of incompatible uses, and improved facilities to encourage compatible uses.

Expenditure will be minimised, but staffing of the area expected.

2. Specific Objects of Management

2.1. To maintain the scenic, cultural, scientific and natural of the Park for the use, enjoyment and optimum benefit present and future generations.

2.2. To provide facilities which encourage compatible uses of the Park.

2.3. To protect the Park against damaging fire, erosion and environmental pollution, and from misuse by man and other agencies, both within and without the Park, and to take all reasonable steps to protect neighbours from fires originating in the Park.

2.4. To restore to as a natural a condition as possible areas damaged by past misuse, and to prevent a repetition of such practices in future.

2.5. To take whatever action is practicable on the Park to improve water quality, and to encourage appropriate authorities to control pollution of the catchments of Park streams.

2.6. To oppose any further alienation of Park lands for any purpose whatsoever.

2.7. To legalise existing alien tenures by negotiating legal easements with appropriate conditions (including rentals) to ensure optimum protection of the Park.

2.8. To provide information and educational material to improve public understanding of the Park's assets and the aims of management.

2.9. To encourage educational use of the Park, and to sponsor research into the resources of the Park, particularly if it has advantage to future management and protection of the area.

3. Zoning

To facilitate management and protection, zones have been identified where differing uses, or intensities of use, are acceptible. These zones are shown in Map M 5. The zones identified on the area are -

3.1. Development Zone

These are areas where high intensity use will be permitted and, in some cases, encouraged.

Parking areas, picnic areas, sporting facilities, and major access corridors fall within this zone.

Pending more accurate data based on appropriate resource investigation, the area of Park developed for these uses should not exceed 5% (or approximately 6 hectares).

3.2. Natural Zone

For the purpose of this Plan, a Natural zone is defined as an area of land that is to be managed to maintain its natural environment, where roads, parking facilities and development are minimal for park management, interpretation and education purposes only, and where visitors are encouraged to use the area generally in its natural state. This is the appropriate zoning for most of Pennant Hills Park and Thornleigh Park.

This is an area where low key use is permitted. There are no areas of the Park large enough to be classified as wilderness. However, the natural zone should be managed so that there is a transition from high density use (development) areas to very low use areas.

Trails are not completely banned from the area, but location should be carefully planned so that any areas where wilderness experience can be approached will not be opened immediately to increased use.

The Natural Zone has been divided by the Planning Committee into the following subzones (not clearly identified on maps) -

3.2.1. Ridge Tops

Two main ridge top areas are:

(a) on the northern boundary of the Park, adjacent to and continuous with the Scouts' Association Area;

(b) the eastern part of the main ridge in the Park, between the archery range and the Lane Cove River.

These ridges contain two of the very few remaining areas of undisturbed vegetation on sandstone ridges in the Lane Cove Valley. Almost all other such areas have been developed because of their gentle topography. In addition, such ridge tops require no maintenance in order to preserve the existing native vegetation, as they are too dry and too poor in nutrients to become invaded by exotic weeds. The long-term prospect of maintaining native vegetation in a natural condition is excellent on such areas. Areas of higher nutrients and more abundant water, such as in valley bottoms, are far more prone to invasion and domination by exotic plants.

No development should be permitted which further destroys the ridge-top vegetation in the Park. In particular, it is emphasised that the main ridge in the Park east from the archery range to the Lane Cove River (and its flanks) should not be subject to further disturbance or development. The same strong recommendation for no development applies to the ridge on the northern boundary of the Park, which forms part of the Boy Scouts' Association area. Indeed, the ridge-top within the Scouts' area is contiguous with and integrally part of the natural northern edge of the Park bushland. All steps should be taken to ensure the future preservation of this northern flank of the Park, and the Scouts' Association is to be congratulated on their usage and care of the area to date.

3.2.2. Undisturbed Valleys

(a) The valley of Creek 5, draining Aiken trig. area and the main ridge east of the archery range, should receive complete protection from development. This small catchment area drains undisturbed bushland, the creek is unpolluted, and the creekbed is unsilted and composed of moss-covered rocks. The valley is free of exotic species except at the actual confluence of the creek and the Lane Cove River. This is one of the most undisturbed and unpolluted creeks and valleys in the Lane Cove Valley - indeed, it is very probably the only remaining such drainage basin. In view of its small size, it should prove possible for any programme of park management to leave it strictly undisturbed, avoiding even the construction of walking trails into the valley from the Lane Cove River or from the surrounding ridges. The area can be penetrated from the perimeter of the ridges or the Lane Cove River with only minor difficulty, whereas trails would open the area to exotic plants and to occasional very damaging use - a few unauthorised incursions by trail bikes would cause great damage to this small area.

(b) The valley of Creek 6 on the south-western side of the main ridge should also be protected from development, particularly in its upper half, where invasion by exotic plants is negligible. This valley contains very dense moist scrub of varied floristic type along the valley floor, and excellent stands of trees on the valley sides. These moist communities are heavily invaded by exotics such as privet and vines in most other parts of the Lane Cove Valley, and disturbance would open up this vegetation to similar invasion.

(c) Creek 3 in the Thornleigh Park-Scouts' Lease area is also relatively undisturbed, and planning should aim at optimum protection.

3.2.3. The Ridge-Valley Complex

The main east-pointing ridge in the Pennant Hills Park has already been recommended for protection from further development, as has Valley 5. It is also sensible to include the very steep southern flank of this ridge (to Devlin's Creek) in the area which should be preserved as bushland with minimal disturbance.

3.3. Alien Tenure Zone

This includes areas completely removed from Park use by outside instrumentalities, e.g. Electricity Commission; Metropolitan Water, Sewerage and Drainage Board; dedicated public roads. Reserved roads not dedicated should not be included in this zone, as recommendations will be made later that these should be permanently revoked and added to the Park.

4. Acceptable Activities and Uses

Within these zones, and in the light of information contained in Section A on visitor needs, site capacity, and forecast trends, permissible activities on the Park are as follows:

Zone	Activity	Discussion
Development	Picnicking	Use of facilities encouraged. Fires only in approved fire-places. All rubbish to be re-moved from Park.
	Walking	On developed trails.
	Photography, Nature Study	No restriction provided no dis-turbance of vegetation or wild-life.
	Sporting activities	Approved sports on areas nomin-ated. Booking of areas required for group activities.
	Horse riding	On nominated, signposted trails only.
	Cycling	On nominated, signposted trails only.
	Powered vehicles	Not permitted under any circum-stances.

Zone	Activity	Discussion
Development	Domestic animals	Not permitted to run loose within development areas where fouling of visitor facilities can occur. Must be under restraint and removed from the Park if a nuisance to other visitors.
Natural	Picnicking	Picnicking permitted anywhere within the Natural Zone provided no disturbance of site and all rubbish is removed from Park. Fires to be lit only in natural clearings where adherence to Bush Fire regulations, without disturbance to vegetation or damage to the Park, is possible.
	Walking, Jogging	Permissible anywhere provided no site disturbance.
	Photography, Nature study, Educational activities	Encouraged provided no disturbance to habitat or wildlife.
	Horse riding	Not permitted
	Cycling	Not permitted
	Powered vehicles	Not permitted
	Domestic animals	Dogs may be walked provided under restraint and muzzled if necessary. No cats or other animals permitted.
	Swimming	Permitted if properly attired.
	Camping	May be considered only for selected groups on restricted areas under permit. Monitor effects closely.
	Research	Permitted under permit if not possible elsewhere and creates no interference to other Park users; may be encouraged if it has Park management value.

Zone	Activity	Discussion
Natural	Rock climbing	On suitable rock faces away from public uses where no damage to vegetation, etc. likely. thornleigh Park used to some extent for this purpose.
	Orienteering	Anywhere in zone provided no site damage.
Alien	Easements by public instrumentalities	Provision of public services. No further development without full investigation.

The activities listed above are consistent with those shown in Appendix B 1 - Shire of Hornsby Rules and Regulations for the Management of Parks, Reserves and Gardens.

In order to determine the degree of use and effects on the Park, an on-going programme of visitor studies should be maintained. Macquarie University should be encouraged to maintain studies already initiated to provide continuing visitation data for management purposes.

5. Individual Policies

To achieve the specific objects of management (Section 2 above) and provide appropriate visitor enjoyment (Section 4 above) in safe and compatible situations, the following management policies and proposals are recommended:

5.1. Access (Map M 6)

5.1.1. Policy

Access policy will be based on the knowledge that the majority of visitors are from nearby urban areas, visit the Park to enjoy its natural beauty and quiet surroundings and, therefore, are quite prepared to accept peripheral parking and development so that visitors have to walk into the Park and their enjoyment of the Park atmosphere will be undisturbed. Overall access policy will, therefore, be based on total exclusion of powered vehicles, provision of a track system for walkers, and provision of specially designated tracks for pedal cyclists and horse riders.

5.1.2. External Access

It will be impossible to control entry by individuals through almost any point on the Park boundary. Access to most sections is relatively easy, and can logically be gained from a large number of dead-end streets, or direct from private blocks. In the long term, suitable fencing of some of these entry points to restrict access only to pedestrains, and prevent vehicular access and associated problems (erosion, rubbish) may be practicable.

In the interim, however, subject to detailed survey, a number of major entry points will be selected, and proposals are put forward later hereunder for construction of parking facilities and walking tracks from those points so that the maximum number of visitors will enter at points where facilities are provided, traffic control and safety are adequate, and suitable educational or instructional material can be made available.

No entry will be permitted beyond these points to any part of the Park by private vehicles under any conditions, and only by official vehicles in emergency (i.e. the tracks will not even be used by official vehicles for routine activities which can be done on foot).

The entry points suggested are as follows (commencing at the northern end of the Park and following down the western boundary) :

1. Dawson Avenue - this is considered a better entrance than from Comenarra Parkway, where present access encourages rubbish dumping and other forms of misuse. No encouragement should be given to park and enter there, although no physical restraints to pedestrian entry are suggested. There is plenty of parking space at Dawson Avenue. Relocation of a Class 1 trail to link with Lorna Pass and the Lane Cove River would be necessary.

2. Britannia Street - parking area, capacity 50 cars, to be established on eastern side of sporting facilities. This parking area will be used jointly for sports' spectators (generally only significant on Saturdays) and Park users.

3. Day Road - the present small parking area to be supplemented (extension or additional area) to cater for a total of 20 cars. This will continue to be a major entry point for access to picnic areas and walks.

4. Sutherland Road - between Somerset Street and Devlin's Creek; a car park for 5 cars should be established to cater for walkers using the trail along Devlin's Creek.

5. Braidwood Avenue or Hanover Street, North Epping - for walkers wishing to join trails along Devlin's Creek and Lane Cove River. Capacity 10 cars.

Due to lack of time and information available, no suggestions are put forward at this junction for entry to the eastern (Ku-ring-gai Municipal Council) section of the Park. This will require special consideration, but the same overall access policy is recommended.

No other major car parks or entry points, should be provided. Elsewhere, entry to the Park from vehicles should be discouraged, and any visitors not entering at the above points will have to park in the nearby streets.

At the nominated carparks, a gravelled area shall be constructed. Vehicles will be prevented from trespassing off the carpark area by bollards or other suitable means of restraint. Signs shall be erected indicating location of trails, etc. Walking track leaflets may be provided at these points in due course. No other special facilities (toilets, picnic facilities) should be provided near car parks.

5.1.3. Internal Access

From the major entry points, and from some minor entry points on suburban roads where no special parking facilities will be provided, trails will be established for visitors to penetrate into the Park.

Suitable restraints may have to be provided to restrict unauthorised entry by motorised vehicles to any trails, and by cyclists and horse riders to trails not constructed for that use.

Trail standards will vary according to approved type of use and standard of construction. Trail standards proposed are as follows, and use will be restricted by signposting and ranger patrol in due course:

Walking Tracks (Class 1) - Major walking tracks linking important development areas or providing walks expected to be used by large numbers of visitors. Width circa 2 metres, grades generally less than 20%. Construction of deterrents to horses and vehicles may be necessary to control misuse.

Walking Tracks (Class 2) - Minor tracks generally dead-end, to points of interest. Width circa 1 metre, no limit on steps, grade, etc., but care necessary in location and construction to avoid erosion.

Riding Tracks (Class 3) - for horses and bicycles (Pedal) as well as walkers. Use restricted by signposting, patrol. Tracks specifically constructed for designated use. Width circa 2 metres, no steps, grades 20%, likely to be gravelled in due course. Location and drainage important factors in view of danger of erosion from such use.

All tracks now in existence, and not included in the planned track system, to be closed and revegetated. This includes individual access tracks to service electricity commission pylons. Whilst such servicing will be essential in the interests of public service and safety, the effect of such trails on the Park must be reduced by relocation and revegetation of unwanted sections. Many sections of existing trails will be retained, but should be made narrower by allowing revegetation on the edges to reduce erosion.

The area of trails is to be included as part of the 5% developed area referred to in Section 3.1. above.

Funds have been sought for a detailed survey of access requirements to be carried out, and the tentative locations shown on Map M 6 are subject to review following such survey. It is not expected, however, that this will change the basic pattern or location of entry points and tracks, but will provide the detail (design of parking areas, marked track location and design, etc.) to permit implementation of the proposals.

Generally, subject to survey and ultimately provision of funds, the trail system will consist of -

(1) A perimeter trail traversing as much of the edge of the Park as possible, linking with suburban streets where it is not practicable to construct a continuous trail within the Park. This trail to be used by walkers, joggers, cyclists, horse riders (Class 3).

(ii) A trail along the Lane Cove River from Thornleigh Park (Dawson Avenue) to Devlin's Creek junction. Class 3 for as much of length as is practicable to permit complete range of use.

(iii) Link trails to allow access from the Perimeter Trail to the River Trail. The link trails will be to Class 1 standard (i.e. walkers only) due to grades into the Lane Cove River which prohibit the construction of Class 3 trails without introducing serious erosion problems. Suggested locations are down Park Ridge (from Pennant Hills to Devlin's Creek Junction; from North Epping to the River Trail; from a suitable entry on the eastern boundary to the River Trail.

(iv) Walking trails (Class 1 and 2) - in other locations (Devlin's Creek, Lorna Pass, Scouts Lease, Day Road to Devlin's Creek) to be restricted to use by pedestrians only so that they may enjoy use of the natural zone without competition from cyclists and horse riders.

Some of these trails will follow existing locations, with reconstruction, improved drainage, construction of steps to improve grade and deter illegal use by bikes, surfacing, etc. as necessary. Others will be closed if no longer required as part of the track system. Some trails which might be required for emergency or maintenance access (e.g. to the electricity pylons) might be converted to tritter trails to prevent public vehicular use and to eliminate erosion, but still be available in emergency.
In construction of all trails, care should be taken not to create a drain which will continue to erode and deepen with use. Trails should be elevated slightly above the natural surface rather than cut into it where any new trail construction is undertaken.

No major maintenance of any existing trails which would significantly affect their present condition or tend to confirm their location should be undertaken by Council or any other authority until the access survey has been completed and proper park management control established.

5.2. Facilities for Use

5.2.1. General Policy

Development policy is based on the following philosophy:

The Park is of relatively small size when considering likely pressures for use in the foreseeable future. Therefore, any unnecessary conversion of natural areas to development, or damage to the environment by location of facilities, should be avoided.

The majority of Park users will come from nearby urban areas, and stay will be comparatively short duration (average period estimated 2 hours - to be checked by survey); consequently, provision of extensive or sophisticated facilities does not appear to be warranted. Alternative areas are available for group use (Lane Cove River State Recreation Area specialises in such use, with development of group use areas and booking arrangements). Pennant Hills Park should, therefore be developed, with the exception of the area already committed to organised sporting activities, for use by individuals and small groups of visitors. On the assumption that staff and funds for maintenance will continue to be restricted, developments should be designed and located so as to minimise staff involvement and heavy maintenance cost. Overall development policy will, therefore, be one of restricting provision of facilities to meet proven needs, with an avoidance of unnecessary or over-sophisticated development.

5.2.2. Standards

Any facilities constructed should be to acceptable standards, which should be kept under review by the Park managers. Purchase of a National Parks and Wildlife Service Design Manual, and use as a basis for standards of development, is proposed. Direct copying of N.P. & W.S. structures and designs should be avoided, but use of the same basic criteria on Pennant Hills Park is suggested. Purchase of a N.P. & W.S. signs manual is also recommended for use as a guide.

5.2.3. Sporting Facilities

The needs of the sporting community in the Shire have been met to a large extent by the development of facilities on Pennant Hills Park. (See details Section 2.6.4.) No one could deny the need for such facilities, but the method of development on the Park (straggling down Park Ridge, obviously because of its easy topography and usefulness for dumping waste) has created much damage and many Park management problems without any compensating increase in the efficiency of layout or quality of sporting area. In fact, the spread-out nature of the facilities has necessitated construction of additional toilets, buildings, access tracks, etc.

It is anticipated that detailed survey of the sports complex and adjoining area (funds have been sought from the Australian Government -/8/75 for such survey) will indicate that a much more efficient layout will be practicable, which will also allow restoration of much of Park Ridge to natural condition. Obviously, closure of expensive developments (e.g. basketball courts) would not be considered acceptable, but there appears to be scope for relocation of some of the more easily constructed sports areas (softball courts, model aeroplane fields, etc.) to achieve increased efficiency.

Simultaneously, surveys are being carried out to determine need for such sports areas within this part of the Shire, and the level of use of the existing facilities. (Details of surveys are given in Part A, Sections 2.6.4. and 3.2., and in Appendix A 7.) These surveys are expected to show that, although present use of some facilities is high during brief periods of maximum demand, such demand is not expected to increase, and, therefore, no enlargement of developments appears justified, at least without careful investigation.

Surveys so far indicate that some of the facilities might be very underused, thus increasing the practicability of relocation, the possibility of multiple use (e.g. combine archery/model aeroplane areas), and overall improvement.

Hornsby Shire Council has made certain committments re development of facilities (see Appendix A 6), and these will have to be adhered to unless implementation can be delayed until detailed survey has been carried out and alternatives, aimed at minimising damage to the Park while still meeting committments, brought forward.

In anticipation of detailed survey and replanning of the sports complex, the following guidelines for future development of the sports complex are proposed for adoption: -

(1) Apart from any current unavoidable committments, no further development of sporting facilities, and no further dumping of fill on potential sports areas, should take place.

(2) Access beyond sporting areas, currently available, and used for legitimate sporting purposes, should be closed to vehicular traffic to prevent rubbish dumping and to reduce erosion and maintenance problems.

(3) Survey should be carried out as soon as possible, using Australian Government funds if made available; otherwise by the Shire Council and/or volunteers as soon as practicable.

(4) The sports complex should then be replanned to minimise the area of Park affected, whilst still providing the same sporting facilities for public use.

(5) Where practicable, facilities should be provided which will be of mutual benefit to sporting enthusiasts and Park visitors (e.g. parking area (see Section 5.1.2.), picnic facilities.)

5.2.4. Day Use Facilities (Map M 7)

As outlined in Section 5.2.1, the need for extensive or sophisticated day use facilities is not great at this stage. The emphasis should be to select a few well located sites and provide appropriate fireplaces, etc., then monitor use and effect on the Park to determine what additional developments will be needed.

Some existing areas require major redevelopment or restoration, details of which are given in the table hereunder:

Name of Area	Facilities Proposed/Anticipated Use
Day Road/Malton Road	The existing area below Day Road should be redesigned. Parts should be progressively closed for restoration. Fireplaces only to be provided at this stage.
Devlin's Creek	Suitable site to be selected along Devlin's Creek Trail for picnic area. Fireplaces, some Park furniture only, no garbage containers (encourage visitors to take garbage out).
Lane Cove River	Medium picnic area(s) at a few selected sites where no environmental damage will be caused. Fireplaces, Park furniture, no garbage containers or toilets.

Further developments should await survey.

2.5. Educational, Interpretation Facilities

Use of the Park by educational bodies should be encouraged.

No immediate developments for these purposes are proposed. In the longer term, provision of Park brochures could be considered. This would require installation of containers at major entry points from which visitors could collect material. However, until staffing is adequate and public appreciation of the area is assured, provision of such facilities would only create an extra workload.

.2.6. Group Activities

The Park presents an excellent location in which to bring residents together in natural surroundings. The success of the annual "Walk Through the Park", organised by the Beecroft Cheltenham Civic Trust, proves its potential for this purpose.

It has been stated elsewhere (Section 5.2.1.) that other areas are available for booking by privately organised groups. However, use of the Park by publicly organised groups should be encouraged, provided the activities proposed are compatible with approved uses for the zone and do not conflict with legitimate use of the Park by individuals.

The most promising type of development for group use is establishment of "camp fire circles" in appropriate locations. Sites must be close to the periphery of the Park to enable easy access at night or late evening (when they will mainly be used) for family groups. Potential sites (detailed location will be required) are adjoining Day Road picnic area, and on Park Ridge near the sports complex and parking area.

Facilities at these circles should consist of a large fire site, with a natural stage area, and surrounded by seating kept as natural as possible (logs, rocks, etc.)

Underground power might be added later, when funds are available, for slide shows to supplement camp fire singing, etc.

Possible controlled public use of the existing camp fire circle in the Scouts Lease Area could be discussed with that Association. Use of these sites is further discussed under Section 8.3 below.

Protection

Most protection requirements are covered by statutory provisions of relevant Acts of Parliament (Water Act, Soil Conservation Act, Bush Fires Act, Local Government Act.)

1. General Protection Policy

Where man-induced intrusions have affected the Park, or are likely to affect it adversely in future, effective land management practices may be employed to rectify or limit the likely impact.

2. Erosion

Most erosion within the Park is due to construction of sewer lines and access routes (including those to power lines);

2.1. There is a need for the authorities concerned (the Metropolitan Water, Sewerage and Drainage Board, Sydney Electricity Commission and Sydney County Council) to nominate permanent access requirements for future maintenance, and, if these are accepted by the Park managers, to agree to specifications so that soil movement is minimised - preferably by the use of native vegetation.

2.2. Creek crossing on permanent access routes require design and construction so as to limit scouring of creek beds and banks.

2.3. Where trails located below flood level cannot be satisfactorily stabilised, re-location of access above regular flood limits is required to assist the retention of adequate soil cover.

2.4. Where future access is not required by M.W.S. & D.B., S.C.C., E.C., for maintenance of developments, original ground surfaces should be restored and top soil replaced; any alien structures or materials should be removed.

2.5. Repetitive maintenance of track surfaces with machinery (e.g. tractors), which creates unstable soil surfaces and erosion, is to be avoided at all costs.

2.6. Existing tracks and picnic sites which have eroded due to poor design (too steep) or over-use should have restoration treatment by the authority responsible for the original construction as soon as possible following the survey proposed elsewhere in this Plan.

6.2.7. Ridgetop clearings, at present used for sporting purposes and which will be replaced by any re-location of facilities, as suggested in Part B, Section 5.2.3., should be mechanically treated, if necessary, and permitted to regenerate naturally once "improvements" and rubbish have been removed.

6.3. Weeds

Extensive weed infestations on the Park are associated with moist sites disturbed primarily for access, sewer lines and sporting activities. Adjacent to boundaries, noticeable weed infestations occur where drainage lines empty stormwater onto the Park. While control using selective weedicides and hand removal could be effective immediately, it is likely that shortage of funds and manpower will preclude this approach. Further, a more satisfactory long term solution will be found in encouraging native species to compete as effectively as possible - particularly in (naturally) well protected locations such as deep and narrow creek beds and banks - by reducing the influence of fire, erosion and unnatural opening up of the canopy. Such sites have in the past supported wet sclerophyll species (Turpentine, Smooth Barked Apple and Blackbutt) and rainforest (Coachwood, Water Gum and Tree Ferns). Sewer construction has altered these moister communities significantly. However, older sewer lines show an encouraging response to long term protection as regeneration of the species mentioned above, along with other primary rainforest types is quite good. In these localities (e.g. Scout Creek), selective treatment of persistent weed sources in the upper catchments, with follow-up work downstream, would be beneficial should finance to cover labour and material costs be available.

Elimination of mechanical clearing of wide trails will also reduce canopy opening and encourage the return of native species.

An effort to conduct weed control work on a neighbourly basis, rather than just on the Park, will gain more permanent protection for the Park. (i.e. Neighbours should be encouraged to control backyard weeds, also.)

4. Fire

Authority for the control of fire within the Park rests with the Board of Fire Commissioners of New South Wales as the Board's designated area embraces the whole of the Park.

The Board's policy on fire control is simple - all fires reported to the Board are extinguished.

Co-operation between the Board and Volunteer Bush Fire Brigades (who may enter the Board's area from adjoining Bush Fire Brigade areas within Hornsby Shire) is organised for the benefit of all citizens. Each control group is purely a fire extinguishing agent, and fire is not applied or regulated to attain any result other than that of restricting fire spread.

The last major fire occurred in the Park in about 1954/55 (indicated by aerial photographs.)

Judging from photographic evidence, this fire was intense and 'control' was only effected about the boundaries - either as a result of fire fighting activity or lack of combustible vegetation.

As some 20 years have now elapsed, the Park can support another intense fire as vegetation has been surprisingly free of any fire during this period. Small fires have occurred at North Epping and Thornleigh over the last few years.

No accurate record of fire intensity or area of fire influence is held.

Neighbours are apparently content to live adjacent to what is, in purely physical terms, a source of very high energy and fire risk. They are, perhaps, ignorant of the damaging effects of wildfires on private holdings.

It can be expected that a bushfire on the Park will be difficult to control. Should it burn under even moderate conditions, such a fire would be intense, and would in all probability cause an appreciable amount of property damage.

Under present conditions of advanced vegetation age and high energy values, fire prone communities, even though infested by weeds referred to earlier, are at risk from hot fires, and the need for protection action should be considered.

There is a need for park managers to recognise the threat to neighbours and to devise a scheme for mutual protection.

Priorities in fire protection must aim to secure -

(a) fire sensitive communities in deep gullies unaffected by construction works, and, consequently, weeds and erosion;

(b) fire sensitive communities where natural regrowth after construction and erosion has progressed for some years;

(c) fire sensitive communities where construction and erosion is recent, if not presently in progress;

(d) visitors;

(e) neighbours.

The safety of visitors is very much influenced by the success of activities directed towards protection of natural communities. Further protection may be afforded by the appointment, in due course, of permanent staff for the Park, by closure of the Park to visitors during extreme fire danger, and by education of the public in survival techniques.

Effective insulation from direct heat radiation in bushfires provides best safeguard for bushland, life and property. Reliance upon fire appliances (e.g. fire tankers) should not be encouraged. Heat radiation is best dissipated by establishing and maintaining a "Radiation Zone" of low fuel density about the boundary of the Park, incorporated, by agreement, into a plan for mutual protection. Such a plan should be drawn up by Park trustees, neighbours and the Board of Fire Commissioners (and Hornsby Shire, if private trustees are appointed).

Regulation of vegetation by mechanical means is to be preferred in boundary locations, although prescribed fire may be used provided adequate consideration is given to regulate intensity, frequency, and spread. It would be beneficial to locate the perimeter access trail referred to elsewhere for visitors so that it passed within and adjacent to the "Radiation Zone".

A "Radiation Zone" may be defined as a 15 metre strip of Park adjacent to a bushfire-susceptible vegetative community, or developed area, where vegetation, both living and dead, is regulated periodically to lower bushfire intensity and lower the risk to natural communities or neighbours.

Failure to establish an effective "Radiation Zone", particularly along boundaries, where neighbouring properties would be at risk, may well lead to panic situations when fire occurs - apart from possible property loss or loss of life; and the intrusion of damaging, unplanned, bushfire control will be almost inevitable if a serious fire breaks out on the Park. (e.g. use of bulldozers). Further, the fire bosses involved in suppression will be less likely to respect Park values in such an emergency.

Notwithstanding these problems, the Planning Committee feels that, at this stage in the absence of more adequate research and resource data, any introduction of hazard reduction techniques within the Park to establish "Radiation Zones" around fire sensitive communities should be avoided. Maximum protection activity should be concentrated initially on establishment of a perimeter "Radiation Zone" to protect neighbouring properties and to minimise the need for drastic fire control work on the Park.

It is unlikely that Council or any group of trustees would be able to afford to pay for the establishment of "Radiation Zones". They can, however, draw up specifications for such zones respecting natural values and such specifications will be developed when this Plan gains acceptance.

By the time such a boundary zone has been established, more data on fire occurrence and behaviour on the Park, and the management needs of different areas may be available to assist in a decision on protection action required within the Park.

Sources of assistance to establish and maintain the "Radiation Zone" concept may come from -

(a) volunteers organised by trustees;

(b) existing Bushfire Brigades outside the Board of Fire Commissioners area;

(c) workers obtained by special funding from time to time and working under the guidance of trustees and possibly the Fire Control Officer of Hornsby Shire.

A further source of assistance (and one based on mutual co-operation) would be possible if Council provided a rebate of rates to neighbours who established and maintained "Radiation Zones". This is, of course, a matter that would need discussion with Council. It is applicable to areas other than Pennant Hills Park, and Council must be given the opportunity of considering the wider ramifications of such a proposal.

Effective protection of fire sensitive vegetative communities, listed previously, can be established using prescribed burning techniques developed by wildlife management authorities. Should such action be accepted by the Park managers, the sources of assistance outlined above may again be available. However, it would be advisable to engage the assistance of personnel capable of calculating intensities of fire, so that prescribed limits are not exceeded. The effect of fire application is to prolong the period between severe wildfires on, or adjacent to, areas susceptible to burning. The technique is especially valuable for obtaining shrub communities of discrete age, and ensuring that species requiring a relatively long period free of intense fire regenerate, grow, flower and set seed. However, as stated above, the direct use of fire as a management tool to manipulate or modify environments should await the results of future research in this area.

While a twenty year fire free period is recognised at present, managers must be aware that the surrounding urban system may well be influencing the natural order of Pennant Hills Park in more subtle ways. For example, the diligence of the Board of Fire Commissioners may well be extending pre-settlement frequency of fire occurrence. While at the present time a severe fire may occur after a fifteen or twenty year period, in the past light fires may have occurred at more frequent intervals.

Fire occurrence is readily recognisable as a major determinant of bushland development. This being so, it is essential that accurate records of scheduled and unscheduled fires be kept. The following basic information will be kept:

(1) Fire
(2) Cause
(3) Point of origin
(4) Final perimeter
(shown on a master fire-map for the Park).

A fire plan indicating the basic policy outlined in this Management Plan will be drawn up and integrated with access, zoning and visitor use proposals, so that all agencies co-opted to assist with fire control and use are fully familiar with the objectives of the Management Plan. The Plan will list all available resources and outline measures for making efficient use of all resources available.

Research, which will give continuing or improving information on the effects of various types of fire application on different vegetation communities on the Park, should be initiated as soon as possible, so that fire management can be as scientifically based as possible.

7. Hygiene

7.1. Policy

This is based on the following points:

(1) The Park occupies a significant part of the headwaters of the Lane Cove River, and, therefore, prevention of pollution is vital.

(2) Although use is expected to increase, staffing is expected to be limited, thus any system for protection of hygiene must be practicable in the long term.

(3) The majority of Park users will walk in, stay a relatively short time, and carry only limited loads.

Policy on hygiene should, therefore, concentrate on education against park pollution, with only limited facilities for servicing. Signs and brochures prepared should encourage visitors to take rubbish home with them, or at least remove it to the major access points to the Park, where rubbish collection facilities will be provided.

Visitors entering the Park should be offered (from self-dispensing boxes or containers at major entry points) garbage bags, in which to carry out their own garbage and any other rubbish seen on their walk in the Park.

No toilet facilities are proposed in the early stages. Possible installation at major entry points could be kept under review. Any facilities provided should be kept simple and as vandal-proof as possible. (N.P. & W.S. has found that well designed and constructed pit toilets are far more hygienic and vandal-proof than septic toilets.

8. Education and Interpretation

8.1. General Policy

The potential of the Park for educational purposes at all levels will be appreciated when it is seen that the Shire population now stands at 110,000, and has been increasing at approximately 10% p.a. More schools, and extension to existing schools, are constantly being established, and more residents are being domiciled in high rise units.

The opportunities for students and residents to gain knowledge or satisfaction in natural areas apart from the Park are, therefore, constantly diminishing as more areas are built out and transport to more remote Parks is becoming more difficult.

Use of the Park for educational purposes should thus be encouraged, and interpretation of the Park to adult users, so that they understand its present and potential value, and the need for its continuing protection.

8.2. Use by Educational Establishments

Use by individual groups is expected to continue.

A copy of the final Plan of Management for the Park should be offered to all educational establishments within the Shire, or that use the Park, so that teachers/students will be aware of management aims and visitor controls. They should also be encouraged to provide information resulting from activities on the Park, which might be of value in management.

A record should be kept of all such use. Schools, etc. should be provided with a standard advice form on which details of visits, numbers of students, type of use, etc., may be conveyed to the Park managers.

The Department of Education should be provided with a copy of the Plan of Management, with attention drawn to this section, and the continuing use of the Park for educational purposes discussed.

Consideration might be given by the Department of Education to use of one of the nearby schools (e.g. Cheltenham Girls' High School) as a centre for training teachers in conservation training techniques, with use of the Park as a demonstration area for this purpose, during school holidays.

8.3. Education/Interpretation for the General Public

This activity, although vital to the future management and protection of the Park, has, with the exception of some activities by the Beecroft-Cheltenham Civic Trust (Annual Walk Through the Park) (occasional organised talks) been completely neglected.

Use and appreciation of the Park and its potential is essential both for the benefit of the individual or family in the Shire, and also as a defence against further revocation.

Public education should be achieved by the following measures:

(1) Printed Material

Following adoption of the Plan of Management, the Shire Council should prepare a brochure on the Park, complete with map, details of facilities, and information on management objectives and visitor controls. These brochures should be made available (via dispensing boxes) at major entry points, from Shire Office, and included (as is the annual "Report to Ratepayers") with rate notices, in due course.

(2) Signs

Information signs should be provided at major entry points displaying a map of the Park, walks and facilities available, and brief information on controls for visitors (Please Carry Rubbish Out: Fires Only In Approved Fireplaces: etc.) Generally, signs should be positive (indicating what can be done), rather than negative (stating panalties for what one cannot do).

(3) Guided Walks

The success of the Beecroft-Cheltenham Civic Trust's annual "Walk" suggests that more regular walks would be successful.

Walks are successfully conducted on National Parks during school holidays, and, if leaders are available, this would be an ideal use for Pennant Hills Park during this period, when both parents and children would be available. This possibility should be discussed with Department of Education representatives (see 8.2. above) as school teachers with conservation training might be available for such activities, as well as volunteer local residents with appropriate training or knowledge of the Park.

(4) Camp Fires

Regular camp fires could be held when bush fire danger and regulations permit.

Some experience and expertise is required in running these, and, initially, the N.P. & W.S. might be asked to volunteer staff to run the first couple to demonstrate potential and methods used.

It is forecast that, if sufficient leaders come forward to help run such activities, they would be an excellent form of Park use.

9. Action Programme

Until the detailed surveys referred to above have been completed, it will be difficult to lay down a detailed plan of action.

However, if steady progress is to be made with improvement of Park facilities, restoration of damaged areas, and institution of correct controls, it is essential that such an action plan be prepared, to be reviewed annually in the light of progress made and funds available.

The rate of development on the Park will depend on the magnitude of the works proposed (dependent on recommendations resulting from the surveys), funds available (whether limited Shire funds or supplementary funds from other sources, e.g. Australian Government), and the strength of support given by the Council, Park users, and residents of the Shire.

It is anticipated that works proposed will fall readily into two groups:-

Minor: essential, but, individually, not very major works. These should be within the scope of Shire funds, if tackled as a medium term project. Examples are provision of day use facilities, improvements to trails, closure of undesirable trails, restoration works on eroded areas, construction of parking areas at major entry points. In some cases, volunteer assistance might be available.

Major: these refer to such works as construction of a good standard perimeter trail, relocation of sporting facilities if recommended following survey. These works could become quite expensive, and will either require supplementary funds (e.g. from the Australian Government) or become an extremely long term project.

Assuming that Council funds for 1976/76 are virtually fully committed, no significant works are proposed during this financial year. During this period, and pending survey, the emphasis should be on avoiding any development which might compromise long term management and protection (e.g. construction of more sporting facilities).

An "action plan" should be prepared annually and attached to this Plan of Management as Appendix B 2. This will set out broadly action required to implement proposals in the Plan. This 5 Year plan should be revised annually in the light of information gathered, progress made during the current year, funds likely to be available, etc. It should include all work to be undertaken on the Park, whether planned for execution by park staff, contract, other authorities.

10. Plant and Staff

10.1. Plant

Whilst the two Shire Councils remain involved in management of the area, it is assumed that Shire plant will be available when priorities permit for work on the Park. No proposals are put forward at this stage, therefore, for purchase of plant specifically for Park work, although obviously this situation must be reviewed annually. Plant for any major activities might have to be obtained by private hire.

10.2. Staff

Manpower for Park work may be drawn from several sources:

10.2.1. Council Staff

It is expected that Council staff will be made available for routine work such as garbage collection and clean up at entry points. Even if responsibility for management of the Park were to be transferred, it is assumed that Council would still be prepared to contract for such work in the interests of public service. The time involved will vary with Park use and the success of the programme of educating the public to carry waste material out of the Park, but is not expected to be very great.

Council staff should also be made available to implement a continuing programme of minor development, although it is not likely that this will be very dramatic unless supplementary funds are received. However, if an annual target of minor development, e.g. complete one parking area at a major entrance; complete one day use area; restore 1 km. of track; etc; annually were aimed at, then the cost/staff involvement would not be great, and continuing progress would be made.

However, it is essential that the Park be patrolled for the major proportion of the week, particularly at weekends, and consequently appointment of a full time Ranger by Council is required as soon as practicable.

It is understood that a "ranger" is employed by Council, but he appears to be fully occupied on supervision of the sporting facilities and nursery work. A specialist ranger to cover the whole Park is required.

Minimum qualifications for the position would be-

1. School Certificate (preferably H.S.C.)

2. Experience in appropriate field situation - e.g. survey, bush work of some sort.

3. Proven affinity with field situation (e.g. member of bush walking club, etc.)

4. Experience or ability to deal with public in law enforcement, public relations, interpretations, etc. work.

5. Prepared to undertake Park Ranger correspondence course run by Department of Technical Education.

6. Knowledge in use of, or demonstrated ability to learn use of, maps, air photos, simple survey implements, etc.

7. Ability to supervise men (Council staff or contractors) in execution of routine works. (Specialised direction would be undertaken by Council Engineer, etc.)

10.2.2. Contract Works

Satisfactory progress will only be made, however, if supplementary funds can be obtained for works such as new trail establishment, relocation and improvement of some sporting facilities, provision of facilities at major entrance points).

If such funds become available (the most likely source appears to be the Australian Government at this stage), then much of this type of work could be done by contract.

Any contract works should be organised by Council and subject to Local Government audit, etc. controls.

10.2.3. Honorary Rangers

The possibility of appointment of a limited number of Honorary Rangers to assist the permanent Trust Ranger should be investigated. If such appointment is legally practicable, then applicants should be carefully vetted and appointment only made of people prepared to assist the Ranger during busy periods, or during his absence. A large number of well-motivated, but inexperienced, people acting as honorary rangers would only confuse both the public and the permanent Ranger.

10.2.4. Seasonal Rangers

If use of the Park is to be increased during school holiday periods, then supplementary staffing would be desirable.

In addition to the Honorary Rangers referred to above, use of Seasonal Rangers should be considered. These would be people with the time and training to lead walks, or be present on the Park for supervision, public relations, and routine maintenance and protection activities. Payment of expenses or a small remuneration might be justified if sufficient volunteers from nearby suburbs cannot be obtained.

10.2.5. Volunteers

A considerable amount of work has been done in the past on weed control, rubbish clean up, maintenance of minor facilities, by volunteers.

If properly directed and organised through a Plan of Management, such activities will continue to be extremely valuable. The use of volunteers should be reviewed, and a planned programme of work set out annually at time of preparation of the overall annual works programme by the Trust, in conjunction with the Ranger and representatives of volunteer groups.

Works within the scope of volunteer groups will obviously be weed control and removal, rubbish clean up, minor restoration and development works, fire control activities subject to training.

11. Concessions, Leases, Easements

The presence of servicing authorities such as the M.W.S.& D. Board, and the Sydney County Council on the management area is unavoidable. It is essential, however, that the activities of their staff be adequately controlled through an appropriate lease or other arrangement.

A guarantee against repair of damage should be held. An appropriate rental should be charged to compensate for loss of Park area and to provide funds for development of Park facilities.

A set of conditions considered suitable for control of such activities is given in Appendix B 3.

It would seem quite reasonable and logical that rent should be charged for any such easements through the Park, which is only being used by such authorities to save the cost of resumption of much more expensive properties. Such funds could be applied to maintenance of, and provision of, facilities on the Park. Application of justifiable rents (based on land value of the parkland) would also act as a deterrent to indiscriminate attempts to use the Park as an alternative to expensive resumption or easement elsewhere.

12. Security of Existing Area and Acquisition of Additional Land

At present the "Park" consists of a variety of reserves which do not give it adequate security.

Recent conversion of a lease held over the Park by North Epping Bowling Club (although opposed by the Hornsby Shire Council and Beecroft-Cheltenham Civic Trust) shows that loss of bushland for development is still possible.

The legal situation regarding possible improvement in security of tenure should be investigated as a matter of urgency. Possible alternatives would seem to be reservation in total as a "natural park" under the Crown Lands Consolidation Act; reservation as a State Recreation Area; or as a National Park. All alternatives should be fully investigated.

Acquisition of additional lands in the vicinity of Beecroft-Cheltenham should be investigated also with extreme urgency. Tenure of these areas is not clear, but as they are undeveloped bushland in the headwaters of creeks entering the Park, addition for protection purposes alone would be justified.

Any potential revenue from rates lost through non-development might be offset by charging a rental on servicing authorities occupying land on the Park, as suggested in Section B 11 above.

The section of bushland on each side of Devlin's Creek, running from Sutherland Road into the Park, is considered to be particularly important as it is a popular entry point to the Park, and retention of tree cover is essential to protect the creek.

All unconstructed reserved roads through the Park should be immediately closed and added to the Park. Those of immediate concern are -

Boundary Road, Beecroft,
Malton Road (part), Beecroft
Browns Road (part), Wahroonga,
Fox Valley Road (part), Wahroonga,
Canoon Road (part),
Vernon Street (part).
Day Road (part)

None of these appear to be needed for public access, and none could be constructed without considerable expenditure of public funds and extreme damage to the Park, both direct from disturbance to the immediate area, and indirect from pollution, siltation, spread of weeks, opening to illegal access and use.

If any opposition is raised to such closure, then the opposing authority should be asked to justify the retention of these reserved roads by an environmental impact study and examination of the community benefits which would accrue.

13. Resource Investigation and Research

13.1. Park Resources

As stated in Part A, although the resource information now available is adequate for planning purposes, progressive improvement in knowledge of the areas included in the Plan would be desirable so as to provide a more secure basis for management, and also to provide information for educational and interpretative purposes.

Continuing investigations by individuals, and educational establishments such as Macquarie University, should be encouraged.

13.2. Human Resources

The best protection for the management area, and a basic requirement for correct management, is a knowledge of the extent of, and reasons for, use of the bushland and the facilities provided.

Consequently, the Park visitor studies now initiated should be continued. Macquarie University again should be encouraged to lead this work.

The possibility of using mail-back questionnaires (distributed at major entrances) (or included with annual rate notices by the Councils) could be considered.

13.3 Research

Applied research, which will help to solve management problems, should be supported. In particular, any work which gives quantitative information on the effects of use on the environment, and will be of assistance in determining site capacity or acceptable uses, would be of particular value.

14. Future Management

14.1. Administrative Control

The individual reserves west of the Lane Cove River are at present managed by Hornsby Shire Council as Trustees appointed by the Minister for Lands.

East of the Lane Cove River the Trustees are Ku-ring-gai Shire Council.

"Ahimsa" is managed by the National Trust, and the Scouts Association naturally administers its leased area.

Correct, complementary management of the individual areas will only be achieved if there is one competent management body for the whole area of Crown land, which takes the presence, needs and management policies of the National Trust (for "Ahimsa") and the Scouts Association (for the leased area) into consideration. This management body, if properly constituted, would also be competent to advise the Scouts Association and the National Trust on methods of managing their individual areas to achieve complementary aims.

Shire Councillors are elected mainly because of their skill in urban area management, and Council staff are naturally composed of people trained in this work as this forms by far the most important section of their programme.

The individual Shire Councils, therefore, obviously cannot be expected to have staff experienced and/or trained in park management; yet such people are needed to correctly administer the areas covered in this Plan.

Alternatives open for future administrative control are:

(i) Continue the present system of divided control;

(ii) Recommend joint Hornsby/Ku-ring-gai Shire Council support for appointment of a separate Trust to manage the area. Such a Trust would have to be approved by the Minister for Lands.

(iii) Recommend reservation of all crown lands and reserves covered by this Plan as a National Park under the control of the N.P. & W.S., with an appropriate Advisory Committee to assist in management.

(iv) Recommend reservation of all crown lands and reserves covered by this Plan as a State Recreation Area under the control of the Department of Lands, with appointment of an appropriate Trust to manage the area.

Alternative (i) is not considered a satisfactory means of implementing this Plan, and thereby introducing improved management to the area.

Of the remaining three possibilities, alternative (ii) is favoured as it retains the interest and assistance of the two Councils, but ensures involvement of local residents with the correct interest and expertise in Park management.

It would, it is felt, be premature to suggest adoption of alternatives (iii) or (iv) until the Plan of Management has been approved, and implementation commenced, although one of these might well be recommended when the Plan comes up for review.

In any one of alternatives (ii) to (iv), appointment of a new Trust or Advisory Committee would be necessary.

Suitable membership of such a committee would be -

Hornsby Shire Council	1 representative
Ku-ring-gai Council	1 " "
Scouts Association (NSW Branch)	1 " "
National Trust	1 " "
Department of Education	1 " "
Macquarie University (School of Biological Sciences)	1 " "
Beecroft-Cheltenham Civic Trust	1 " "
Local sporting organisations	1 " "

If the area is subsequently taken over under different tenure by the National Parks and Wildlife Service or the Department of Lands, the existence of a Trust would cause no embarassment as it is routine practice to appoint an Advisory Committee or Trust to advise those authorities in management of such areas.

Following consideration of the contents of this Plan by Hornsby Shire Council, and reference to the other authorities listed, the future management of the area included in this Plan should be carefully reviewed. Adoption of alternative (ii) is the recommended method for implementation of this Plan.

14.2. Funds

14.2.1. Council Involvement

The most urgent need in part management after appointment of a specialist Trust is the appointment of a properly qualified, full time ranger. With ancillary costs, this would require an estimated $15,000 p.a.

Minimum development and maintenance would cost a further $10,000 - $15,000 p.a. Council investment would, therefore, not be great when one considers that Hornsby Shire Council annual budget alone is almost $9 million.

Much of this expenditure could be offset if appropriate rentals were charged for easements.

14.2.2. Special Grants - Australian Government

Special grants should be sought from the Australian Government to carry out major developmental work. No harm will be done if such funds are not available in the early stages, as this would allow more time for careful planning.

14.2.3. Other Sources

Appendix B 3 lists works which should be carried out by other organisations to rectify damage done to the Park by their past activities.

Having been responsible for the damage listed, these authorities should naturally be expected to pay for the repair work necessary.

14.2.4. General

Whilst every effort should be made to secure adequate funds for management, it will be realised that, with correct planning and the introduction of adequate controls to encourage correct use and minimum misuse of the Park, a vast improvement in management can be effected for a relatively small outlay of finance.

15. Period and Review

This Plan should operate immediately for Pennant Hills Park following acceptance by Hornsby Shire Council as Trustees. It is expected that Council, with the assistance of the Planning Committee, if desired, will approach Ku-ring-gai Council to encourage similar adoption and complementary management of its areas.

Preliminary discussions based on an earlier draft of the Plan have been held with representatives of the National Trust and the Scouts Association. It is anticipated that both organisations will agree to be represented on the Trust if appointed to assist in achieving satisfactory management of all areas.

It should remain in force for a minimum period of three years from the date of adoption, during which time the further investigations outlined in Section B 13, and review of future management outlined in Section B 14, should continue.

If not reviewed by that time, the Plan should continue in force until formally reviewed by the Trust.

APPENDIX B 1

RULES AND REGULATIONS

FOR THE MANAGEMENT OF PARKS, RESERVES AND GARDENS

OF THE SHIRE OF HORNSBY

The following Rules and Regulations refer to the whole of the area under the control and administration of the Council of the Shire of Hornsby; the work "Council" shall refer to the Hornsby Shire Council and the word "reserve" shall refer to Parks, Reserves and Gardens.

ADMINISTRATION

1. The Council may appoint an officer to be in charge of the reserve with such assistants and labourers as may be deemed necessary, and with powers and authorities necessary to enable such officer to perform such duties as the Council may from time to time direct.

2. The said officer or any officer or servant of the Council shall protect the reserve and for that purpose may remove or call in the aid of the police for the removal of any person who shall cause annoyance or inconvenience to any person in the said reserve.

GENERAL

3. A person shall not within the reserve -

(a) deposit or leave any litter, bottle rubbish or refuse, except in a receptacle provided by the Council for that purpose;

(b) break glass, deposit or leave any offal, filth, dung, dead animal or any noisome, noxious or polluted substance;

(c) deface, damage, or destroy any dam, water supply, causeway, rock, timber, plant or equipment, building, road, path, picnic area, table, seat, sign, notice or fixture;

(d) remove or interfere with any plant or equipment, building, table, seat, sign or fixture;

(e) remove, damage or destroy, or have in his possession for removal or otherwise any tree, shrub, fern, creeper, vine, palm, plant, flower, herbage or other vegetative cover, whether growing or otherwise;

(f) carry or discharge any firearms or lethal weapon; carry, lay or set any trap or snare, interfere with, hunt, capture, destroy, or have in his possession any bird or wild animal or any introduced bird or animal;

(g) take any bird's egg or interfere with any bird's nest, or habitation or resting-place of any wild animal or any beehive;

(h) light, maintain or use any fire except in accordance with the provisions of the Bush Fires Act, 1949, and the Regulations thereunder, and in accordance with any additional conditions determined and notified in a conspicuous position by the Council;

APPENDIX B 1 (Continued)

(i) bathe or swim any animal without permission of the Council, or pollute any fresh water, tank, reservoir or stream;

(j) obstruct, threaten, interfere with or refuse to comply with any lawful request by any trustee or employee of the Council or any person acting with the written authority of the Council while in the execution of his duty;

(k) allow any dog to run at large;

(l) exercise a greyhound or any other dog except on a leash and, in the case of a greyhound, where the greyhound is muzzled;

(m) drive any vehicle except for the purpose for which the reserve is provided.

4. A person shall not without the consent of the Council and subject to such conditions and payment of such fees and charges as the Council may determine and exhibit in a conspicuous position in the reserve -

(a) allow any animal to depasture on or stray into or be on the reserve;

(b) erect, occupy or use any tent, structure or vehicle within the Reserve for the purpose of camping or residing therein;

(c) place any beehive within the reserve;

(d) remove from the reserve any rock, soil, sand, gravel, clay, leaves or firewood or any other similar substance, or any dead timber, log or stump whether standing or fallen;

(e) sell or expose for sale any animal, goods or any other article or thing within the reserve;

(f) discharge any fireworks within the reserve.

5. A person shall not, without the permission of the Council, write upon or affix any bill, notice or stencil work on any building, seat, fence, pillar, rail, rock, tree or any other erection pertaining to the reserve.

6. A person shall not without permission of the Council in writing and upon such terms and conditions as the Council shall determine, place or use upon any waters in the reserve any boat or craft of any kind.

7. A person shall not without the permission of the Council in writing hold any performance or entertainment of any kind on the reserve.

8. A person shall not ride, drive or park any animal or vehicle or trailer, whether articulated or not, within the reserve without the permission of the Council except in such parts of the reserve as may be set apart by the Council for any such purpose.

APPENDIX B 1 (Continued)

9. The driver or rider of any vehicle and the rider or other person in charge of any animal proceeding along or using any road or path shall comply with the terms of any notice displayed by the Council or near the road or path with respect to the control of traffic or the use of the road or path.

10. A person shall not, without the permission in writing of the Council, set any fish trap in the waters of the reserve;

11. A person in a state of intoxication shall not enter or remain within the reserve. A person shall not within the reserve behave in a disorderly or insulting manner or use any bad language or commit any nuisance or act of indecency.

12. The Council may allow any person or persons the use of the reserve for any scientific or cultural purpose subject to such conditions as the Council may impose and such use may include the privilege of camping and use of buildings, water supplies and of all other conveniences in the reserve without charge.

The Council may permit any scientist, teacher, student, athlete, youth leader, social organiser, boy scout or girl guide officer, bush walking or hiking club officer or any other approved person to conduct research, experiment, class inspection, swimming or other approved sport, function, camp, social gathering or such like outdoor activity within the reserve under such conditions as the Council may determine.

13. The Council may make charges for admission to the reserve and exclude the public therefrom except on payment of such charges, such charges to be indicated by a notice exhibited in a conspicuous place near the entrance to the reserve.

14. The Council or any person authorised in that behalf by the Council may refuse admittance to any person who in their or his opinion would be likely to cause annoyance or inconvenience upon the reserve or any person who has been found guilty of a breach of these Regulations.

15. The Council may exclude the public from the reserve except during such hours as may be exhibited by notice in a conspicuous place near the entrance to the reserve.

PENALTY

16. Any person committing a breach of any of these Regulations shall be liable to a penalty not exceeding two hundred dollars ($200).

C. K. COOK.
SHIRE CLERK.

APPENDIX B-2

5 YEAR ACTION PLAN - 1976/7 TO 1980/1

This action plan is to be revised annually by the Management Trust and used as a basis for preparation of an annual works programme and allocation of funds.

(The plan tabulated hereunder is a simple example only - to be completed in more detail when the Plan of Management has been approved).

Year	Work Proposed	To be executed by
1976/7	Survey and planning of sporting complex - subject to	Contract
	Survey and planning of trail system	Park staff/volunteers
	Trail restoration programme - stabilise, reconstruct 1 km. - Devlin's Creek	Park staff/volunteers
	Restoration; removal of debris from sections of Park, revegetation - Comenarra Parkway - Sewer lines - Power line tracks -	 D.M.R. M.W.S. & D.B. S.C.C., E.C.
	Improve parking area at entrance	Park staff
	Weed control to approved programme	Volunteers
1977/8	Trail restoration programme - 3 km. - Devlin's Creek, Lane Cove River	Park staff/volunteers
	Provide visitor facilities, restore damaged areas - Devlin's Creek, Lane Cove River	Park staff
	Signposting, information boards at major entrances	Park staff
	Restoration, revegetation of damaged areas	D.M.R. M.W.S. & D.B.
	Weed control	Volunteers

APPENDIX B 2 - Continued

Year	Work proposed	To be executed by
1978/9	Commence programme of relocation of some sporting areas (subject to survey) and establish Park entry, parking	Council staff
	Develop visitor facilities near sporting area, and on Lane Cove River trail	Park staff
	Develop camp fire circle, Devlin's Creek	Park staff/voluntee
	Weed control	Volunteers
	Continue trail restoration programme - 2 km.	Park staff/voluntee
1979/8	Develop visitor facilities near sporting area and Park entrance, Pennant Hills Ridge	Park staff
	Improve trail, Pennant Hills Ridge to Lane Cove River	Park staff/voluntee
	Weed control programme	Volunteers
	Commence river, creek clean up (desilt waterholes; remove debris).	Park staff/voluntee
1980/1	Improve visitor facilities Thornleigh Park area	Park staff
	Trail restoration and improvement, Ku-ring-gai Council area	Park staff
	Weed control programme	Volunteers
	River, creek clean up	Park staff/voluntee

APPENDIX B 3

CONDITIONS FOR LEASES AND FOR EASEMENTS

1. For any construction or facility established on the Park by a public authority or private individual or organisation, a legally binding lease or easement shall be issued on the recommendation of the Management Trust.

2. No construction shall be carried out other than as agreed to by the Trust and specified in the lease or easement.

3. The holder of the lease or easement (hereafter termed the lessee) shall lodge a suitable guarantee (to be negotiated with the Trust) as indemnity against damage on the Park.

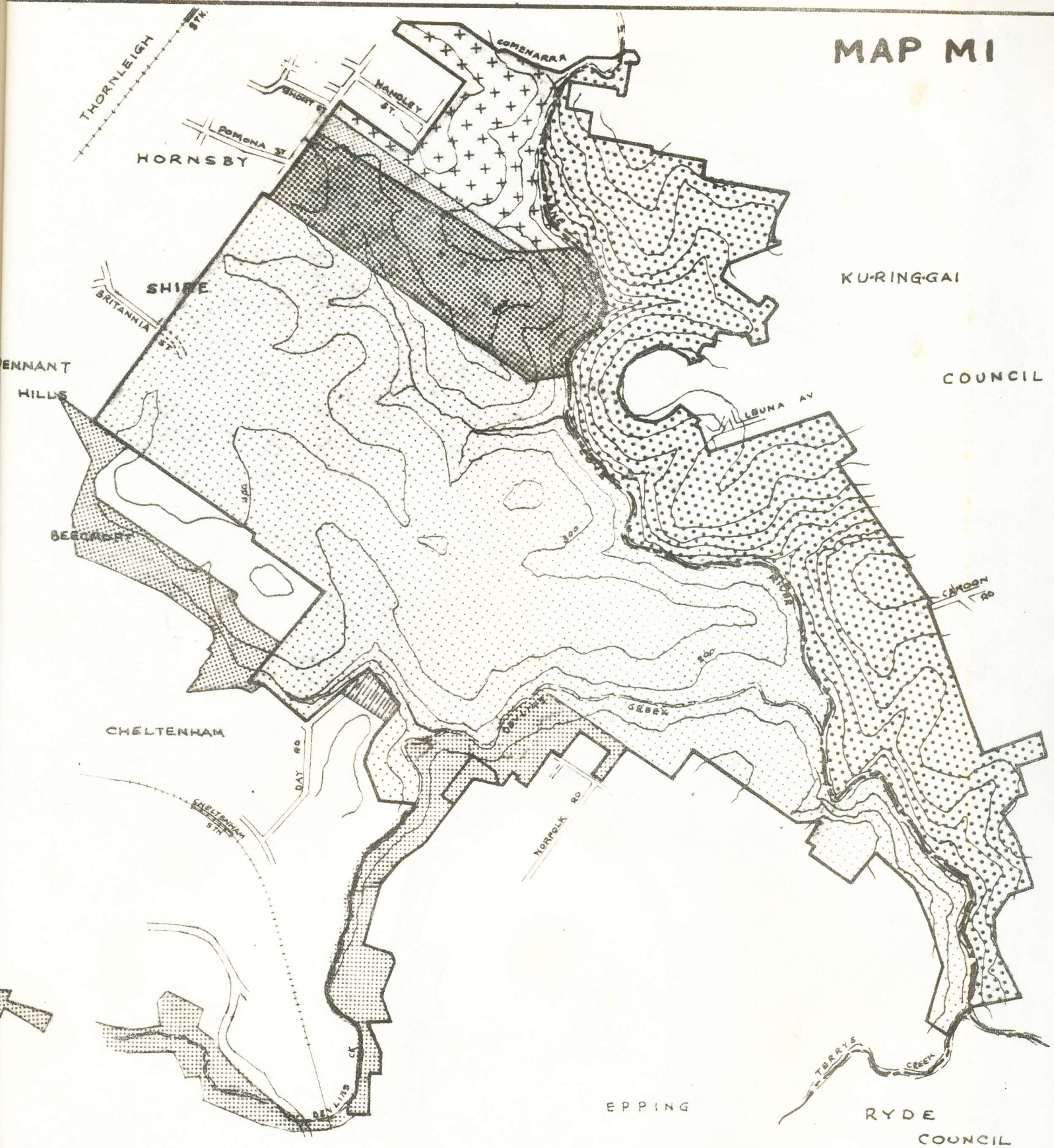
4. The lessee shall be responsible for any public indemnity or insurance, and be held fully responsible for any accident to public or Park staff occurring on the area covered by the lease or easement.

5. The lessee shall be responsible for control of noxious weeds and for the removal of rubbish or garbage deposited on the land covered by the lease or easement.

6. No fires shall be lit on the area covered by the lease or easement, and the lessee shall provide all possible assistance in eradicating fires which occur on the Park in the vicinity of the lease or easement.

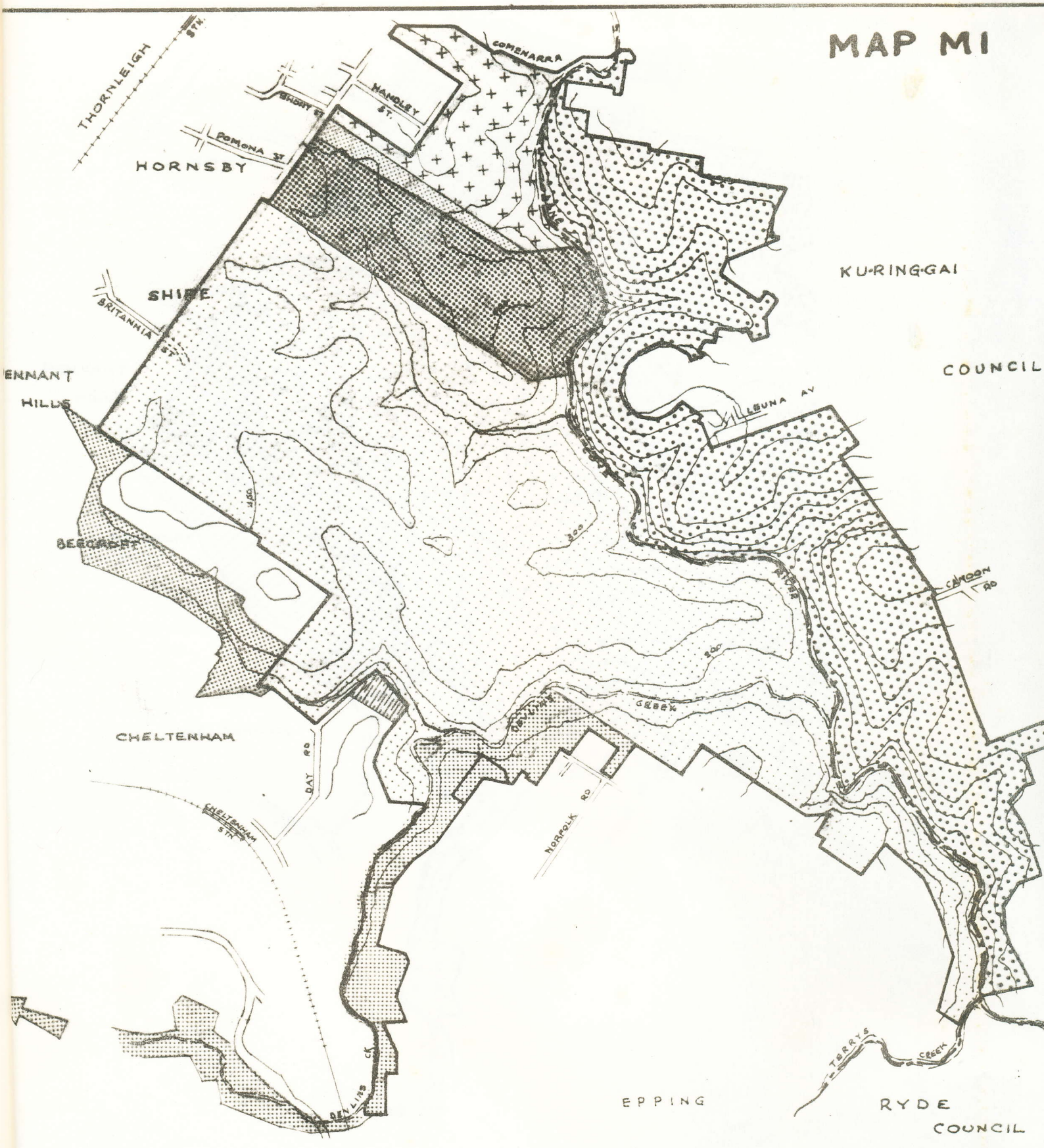
7. Conditions will be included in the lease or easement to permit access and maintenance to facilities necessary in the public interest. Prior notice of any planned maintenance shall be given to the Ranger in charge, and no unnecessary disturbance of soil or vegetation in the course of maintenance works will be permitted.

8. The lessee will pay to the Management Trust (or other appropriate authority specified) an annual rental to be negotiated to compensate for loss of land for Park use and disturbance of the area.



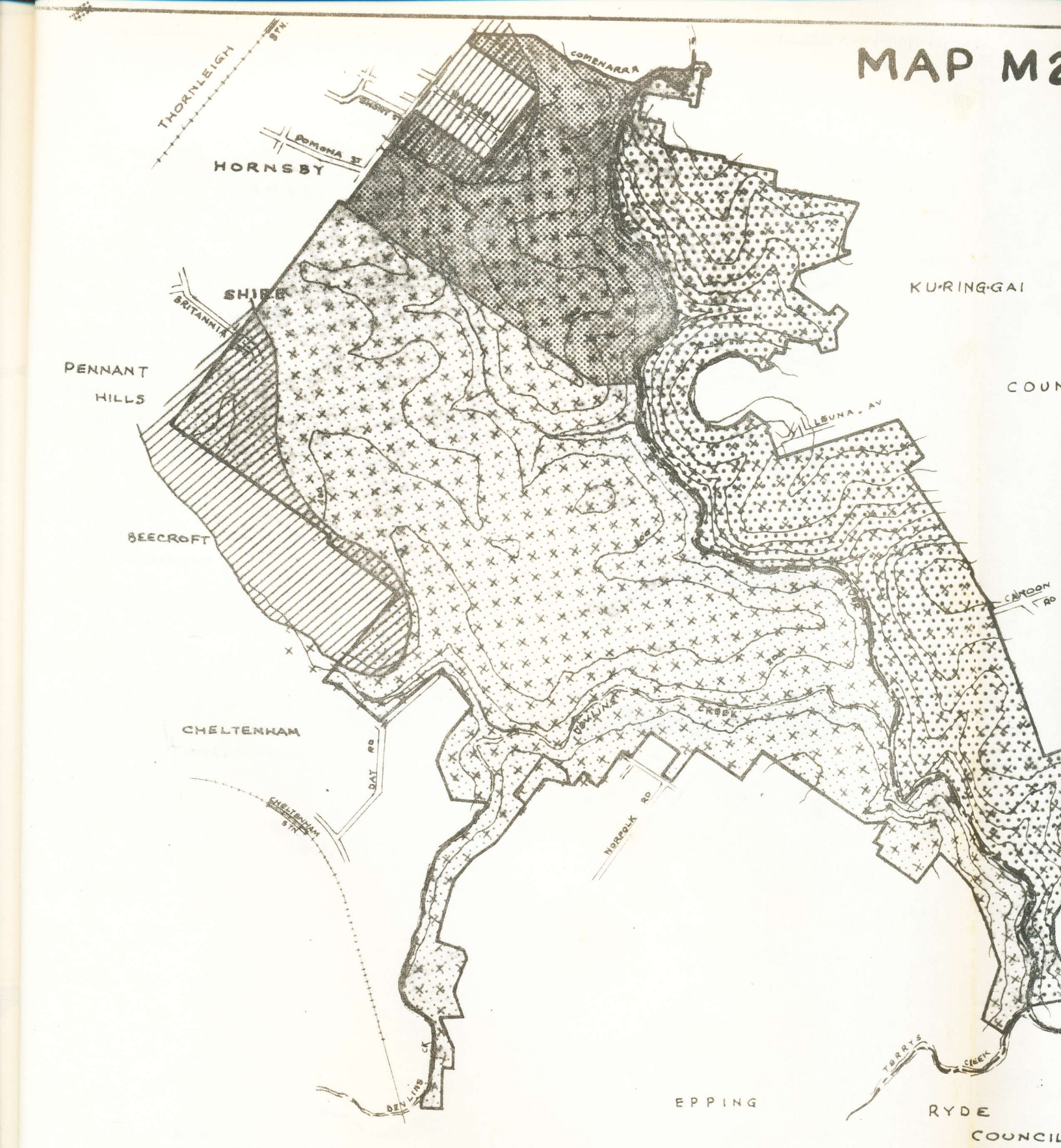
PENNANT HILLS PARK SCOUTS ASSOCIATION LEASE THORNLEIGH PARK R 64103 — ACCESS KU-RING-GAI COUNCIL LAND		AHIMSA POSSIBLE ADDITIONS	**LOCATION AND STATUS**

MAP MI



	PENNANT HILLS PARK		AHIMSA
	SCOUTS ASSOCIATION LEASE		POSSIBLE ADDITIONS
	THORNLEIGH PARK		
	R 64103 — ACCESS		
	KU-RING-GAI COUNCIL LAND		

LOCATION AND STATUS



PHYSICAL & BIOLOGICA DESCRIPTION

MAP M3

NOTE:
OPEN FOREST - CLOSED LOWER LAYER DOES NOT OCCUR FULL LENGTH OF LANE COVE R. AS SHOWN; ONLY AT JUNCTIONS OF CKS AND BOY SCOUTS CK WITH LANE COVE R.

	OPEN FOREST - CLOSED LOWER LAYER.
	LOW WOODLAND – WOODLAND – OPEN FOREST.
	LOW WOODLAND – LOW OPEN WOODLAND
	CLOSED SCRUB TO OPEN SCRUB TO HEATH.

VEGETATION TYPES

MIXTURE OF ANGOPHORA COSTATA, SYNCARPIA GLOMULIFERA EUCALYPTUS PIPERITA & E GUMMIFERA

EUCALYPTUS PILULARIS; ANGOPHORA COSTATA & SYNCARPIN GLOMULIFERA USUALLY PRESENT

CALLICOMA SERRATIFOLIA : CASUARINA TORULOSA PRESENT

CALLICOMA SERRATIFOLIA CASUARINA TORULOSA ABSENT

CASUARINA TORULOSA & SYNCARPIA GLOMULIFERA

CERATOPETALUM APETALUM: CASUARINA TORULOSA PRESENT

SYNCARPIA GLOMULIFERA

EUCALYPTUS RESINIFERA & SYNCARPIN GLOMULIFERA : UNDERSTOREY OF DENSE PITTOSPORUM UNDULATUM

EUCALYPTUS PANICULATA

EUCALYPTUS GLOBOIDEA

DENSE PITTOSPORUM UNDULATUM IN THE UNDERSTOREY

TRISTANIA LAURINA & CERATOPETALUM APETALUM

CASUARINA LITTORALIS
(1) only a few Eucalyptus piperita & Eucalyptus gummifera present Taller than the C Littorals
(2) C littorals less dense than for (1). Taller E gummifera & E piperita more important than for (1)
3) No trees taller than the C littoralis present

EUCALYPTUS PIPERITA NO OTHER TREE SPECIES PRESENT

EUCALYPTUS GUMMIFERA

BANKSIA ASPLENIIFOLIA, HAKEA DACTYLOIDES, ANGOPHORA CORDIFOLIA, PULTENAEA ELLIPTICA, COMMON

PETROPHILE SESSILIS, HEPTOSPERMUM ATTENUATUM LAMBERTIA FORMOSA COMMON

CLEARED

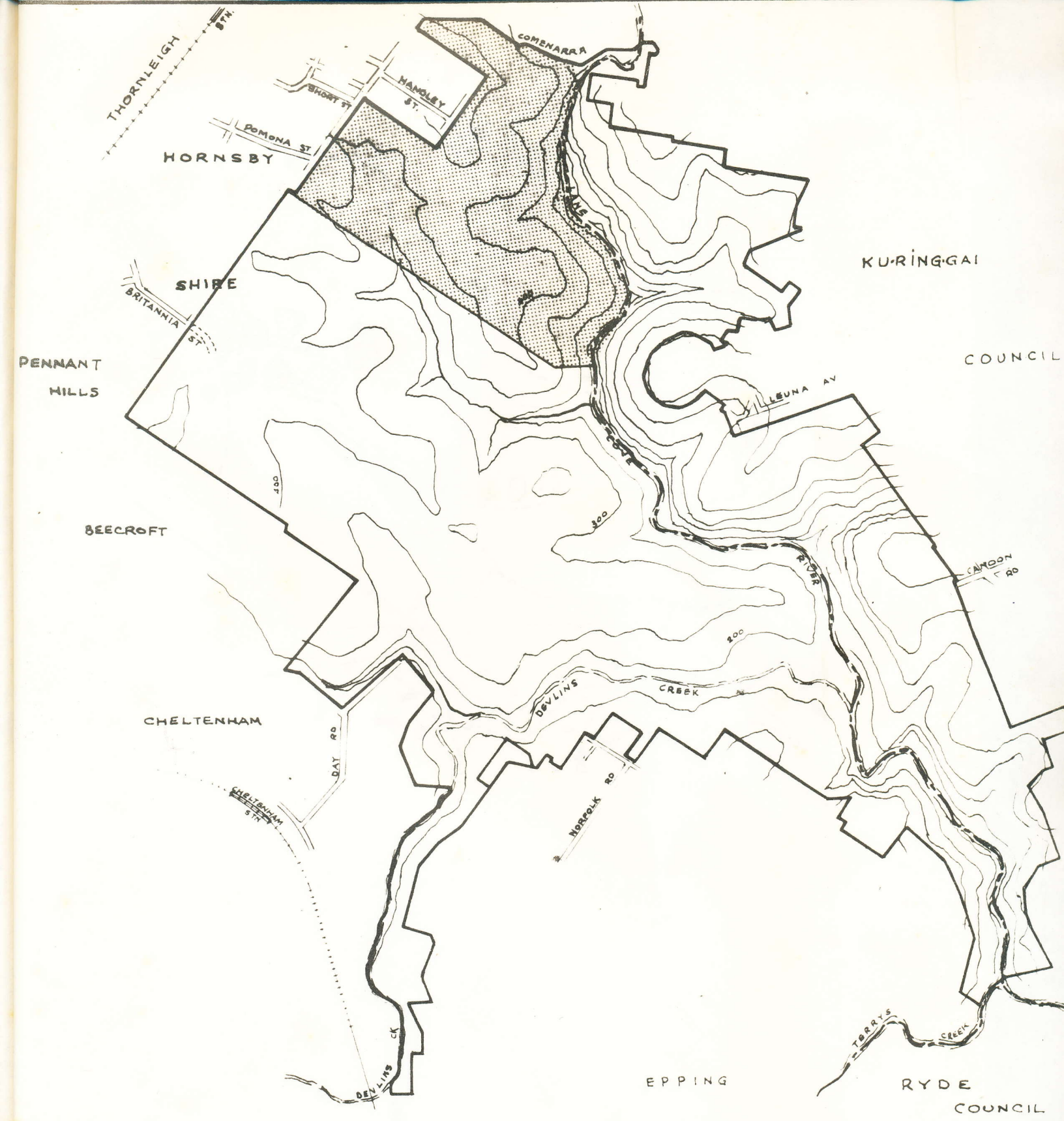
BOUNDARY VERY UNCLEAR

BACKHOUSIA MYRTIFOLIA

WHEN MORE THAN ONE SYMBOL IS SHOWN, MORE THAN ONE IMPORTANT LAYER IS PRESENT

MAP OF DOMINANT SPEC

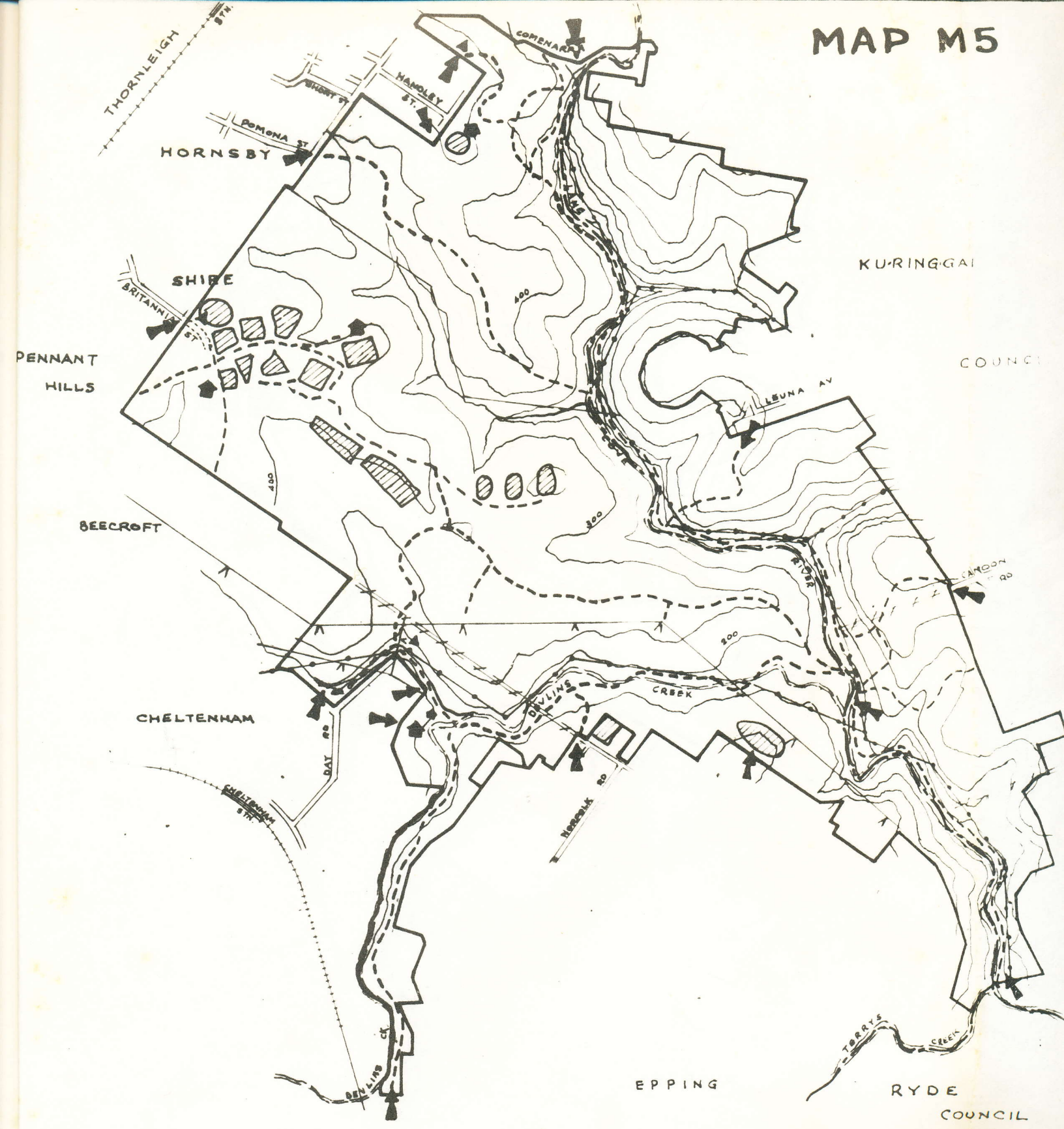
- NORTHERN SECTION



NORTHERN SECTION.

LOCATION REFERENCE FOR MAP 4.

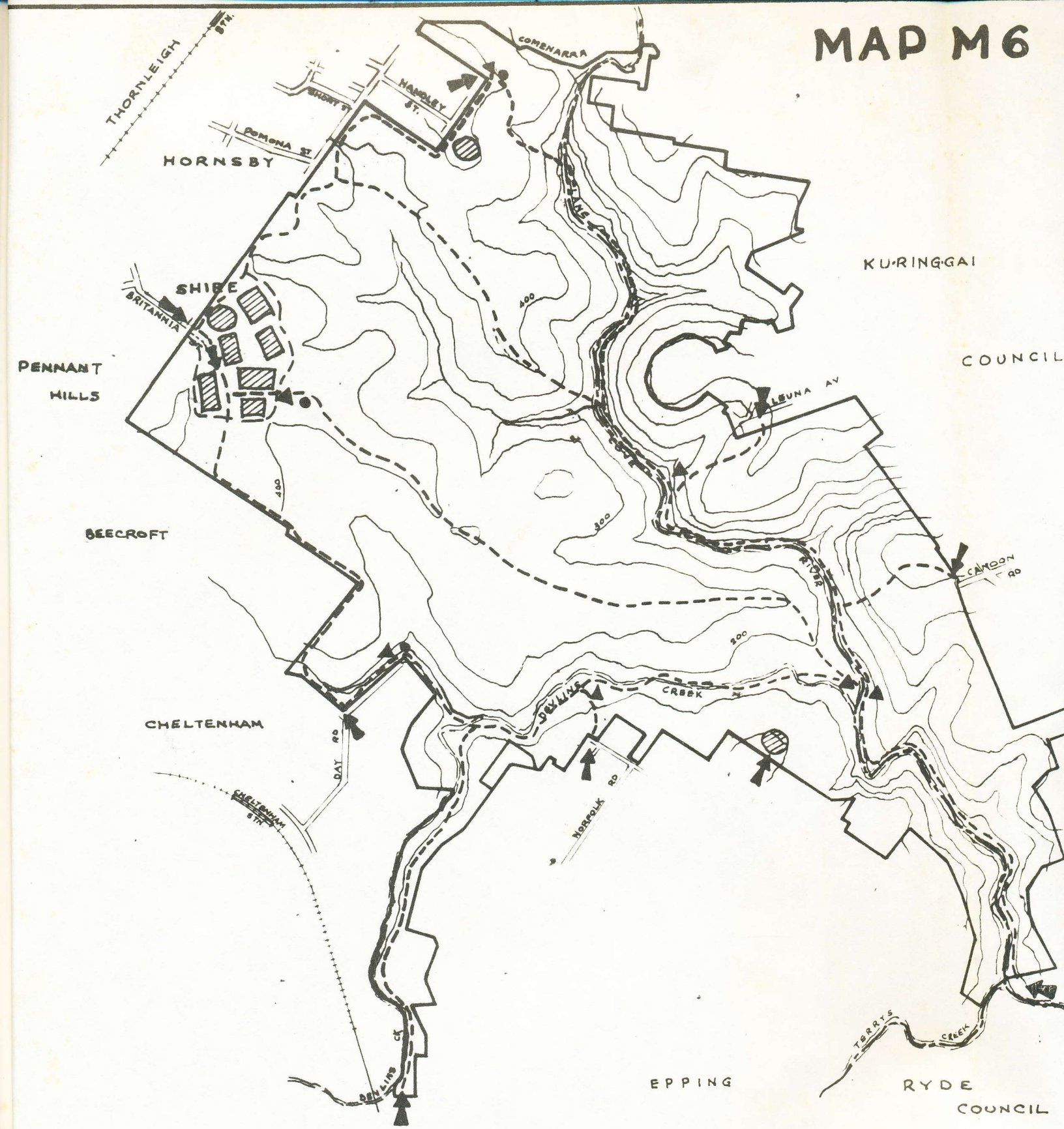
MAP M5



MAJOR ACCESS POINTS	BUILDINGS
POWER LINES	PICNIC FACILITIES
SEWER LINES	ROAD RESERVES TO BE CLOSED
SPORTING AREAS.	FIRE TRAILS AND TRACKS

EXISTING DEVELOPMENTS

MAP M6



⬅	MAJOR ACCESS POINTS.
- - -	WALKING TRACKS.
⬭	SPORTING FACILITIES. (TO BE SURVEYED)
▲	PICNIC FACILITIES.
●	CAMP FIRE CIRCLES.

PROPOSED DEVELOPMENT (SUBJECT TO FURTHER PLANNING & SURVEY)