



TUGGERAH LAKES

The Future of the Waterway



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Introduction



The Tuggerah, Budgewoi and Munmorah Lakes, located on the Central Coast of New South Wales, are important to the State and its people as a natural resource, with high potential for recreational use.

The three inter-connected lakes, which have a total area of 80 square kilometres, are separated from the sea by a large barrier dune system. The water level within the lakes varies between 10 centimetres and a metre above mean sea level, and the lake level is affected by rain more than it is by tides.

The Government of New South Wales is most anxious to preserve the lakes system as a natural asset, and has therefore set up a committee comprised of representatives of various government authorities, together with the Wyong Shire Council, to look closely into the extent of problems associated with the lakes, and to recommend methods of overcoming them.

For some years now, the committee has been identifying and studying the problems which need to be dealt with in the preparation of a comprehensive development plan for the Tuggerah Lakes and the nearby areas.

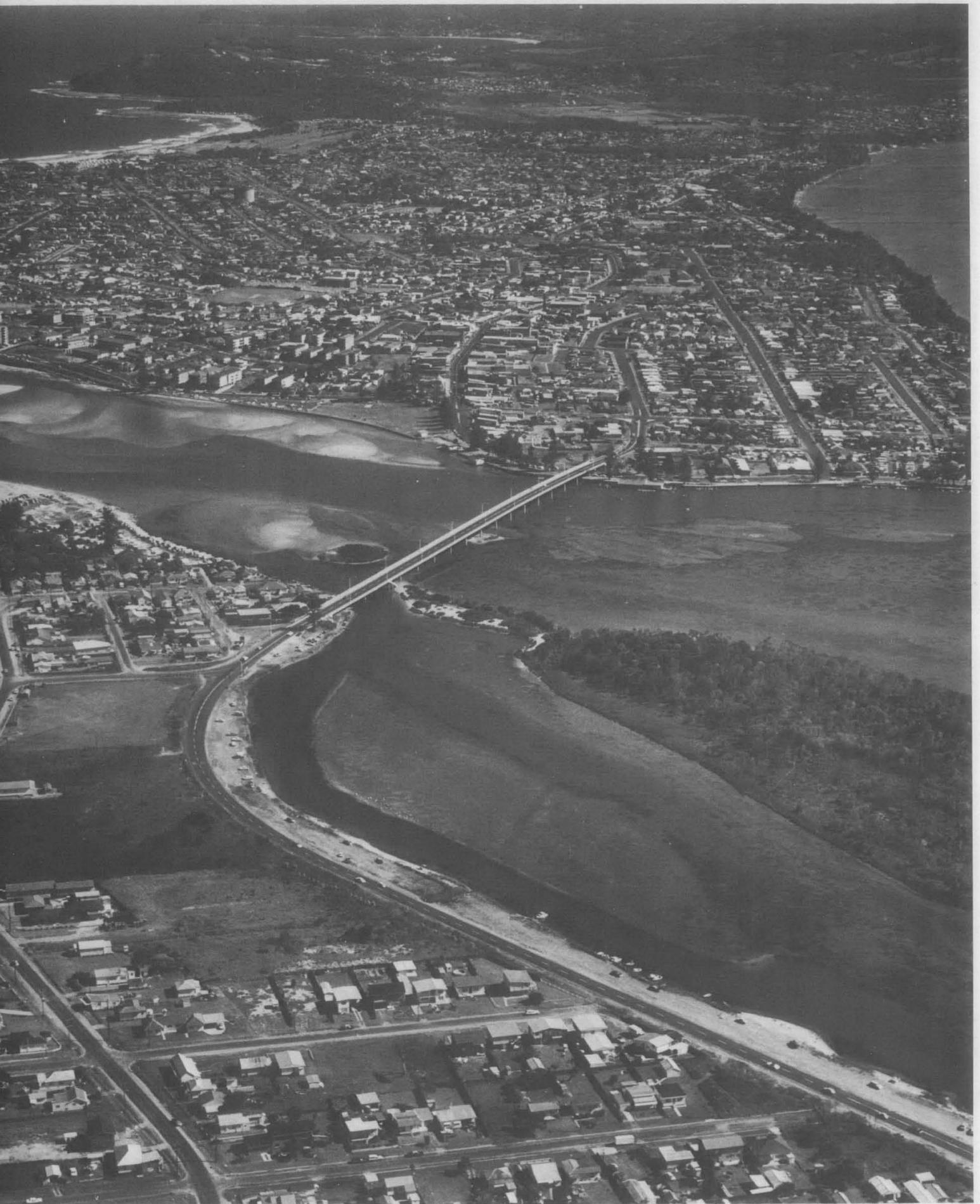
The purpose of this brochure is to outline details of the progress made to date, and to invite public comment on the series of plans so far prepared which are illustrated within the brochure.

The proximity of the lakes to the cities of Sydney and Newcastle serves to emphasize their importance. I strongly encourage constructive comment from interested bodies and from private citizens.

JACK FERGUSON,
Deputy Premier
and Minister for Public Works and Ports

Left:
Toukley, thriving community on
the foreshore

Cover:
Lakes, bays and beaches — an ideal
recreational setting



The Present Use of Tuggerah Lakes

The dominant uses of the lakes are recreation in its many forms, together with commercial fishing and prawning.

The recreational activities include sailing, rowing, ski-ing, amateur fishing and swimming. Apart from providing recreation for local residents of the surrounding districts, the lakes are a popular tourist attraction.

The principal locations of the various activities are shown on Plan 3.

Left:
The Entrance Channel



Right:
Both people and birds fish the
lakes

A Growing Demand for the Recreational Use of the Lakes

In recent years, there has been a spectacular increase in the pursuit of leisure activities which has been accelerated by such economic and social changes as higher wages, shorter working hours, and increased annual and long service leave. As more leisure time and improved travel facilities become available, further use of the waterways of the State is inevitable.

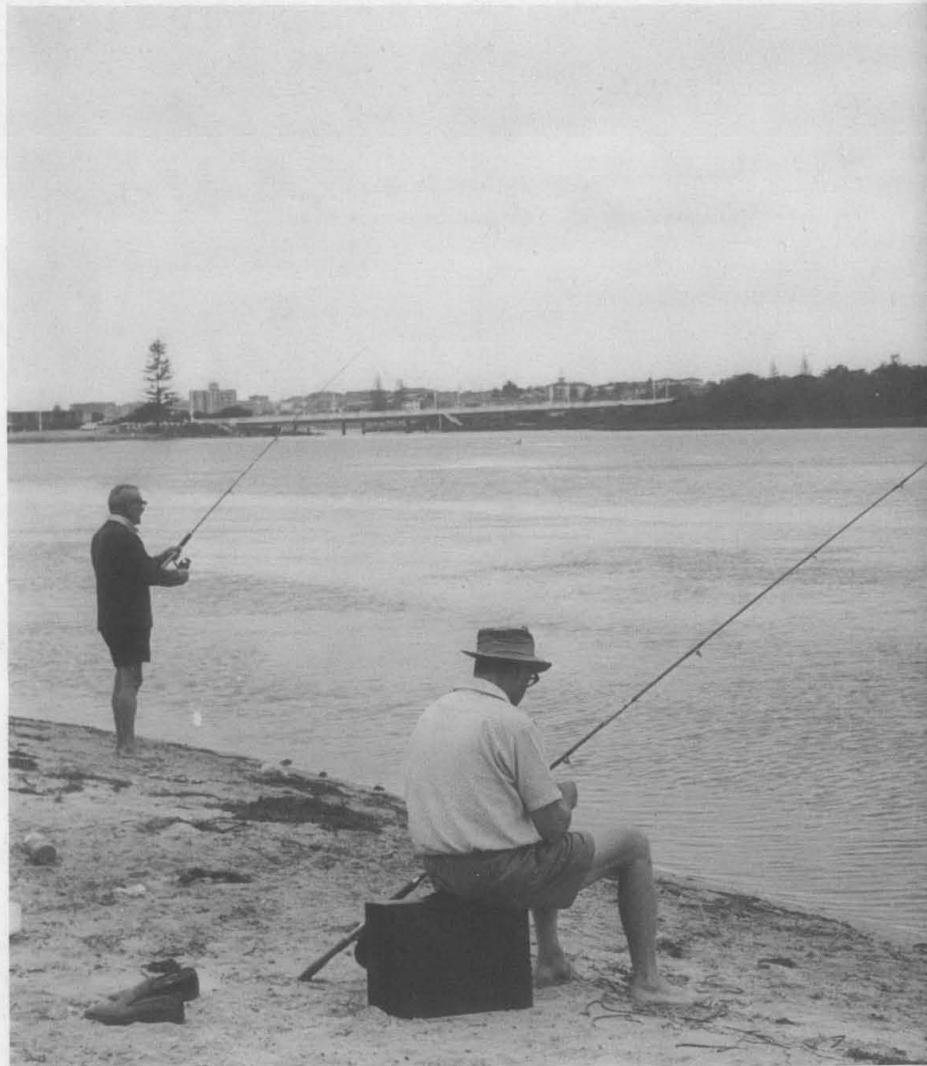
The number of registered power boats in New South Wales, for example, is increasing at a rate of more than 12% per annum. With a predominantly coastal population, the trend towards water-based leisure is bound to continue and suitable plans need to be laid to meet the growing demand for water-based leisure activities.

Right:

. . . but you don't need a boat to enjoy the lakes

Far Right:

Some people would rather be sailing!







Development Philosophy

With the rapid population growth taking place in the region, the amenity of the lakes will assume increasing importance.

With this in mind, the development philosophy adopted by the committee looks towards long term maintenance or improvement of the ecology of the lakes, together with the development of the waterway and foreshores, to allow both residents of the Wyong area and visitors to enjoy the leisure potential of the lake to the full.

These objectives will only be achieved through long term planning, and it may be necessary to restrain development that appears expedient or profitable in the short term, so as to ensure that long term goals are met. Failure to adopt such a policy would minimise the chances of achieving an integrated and attractive plan.

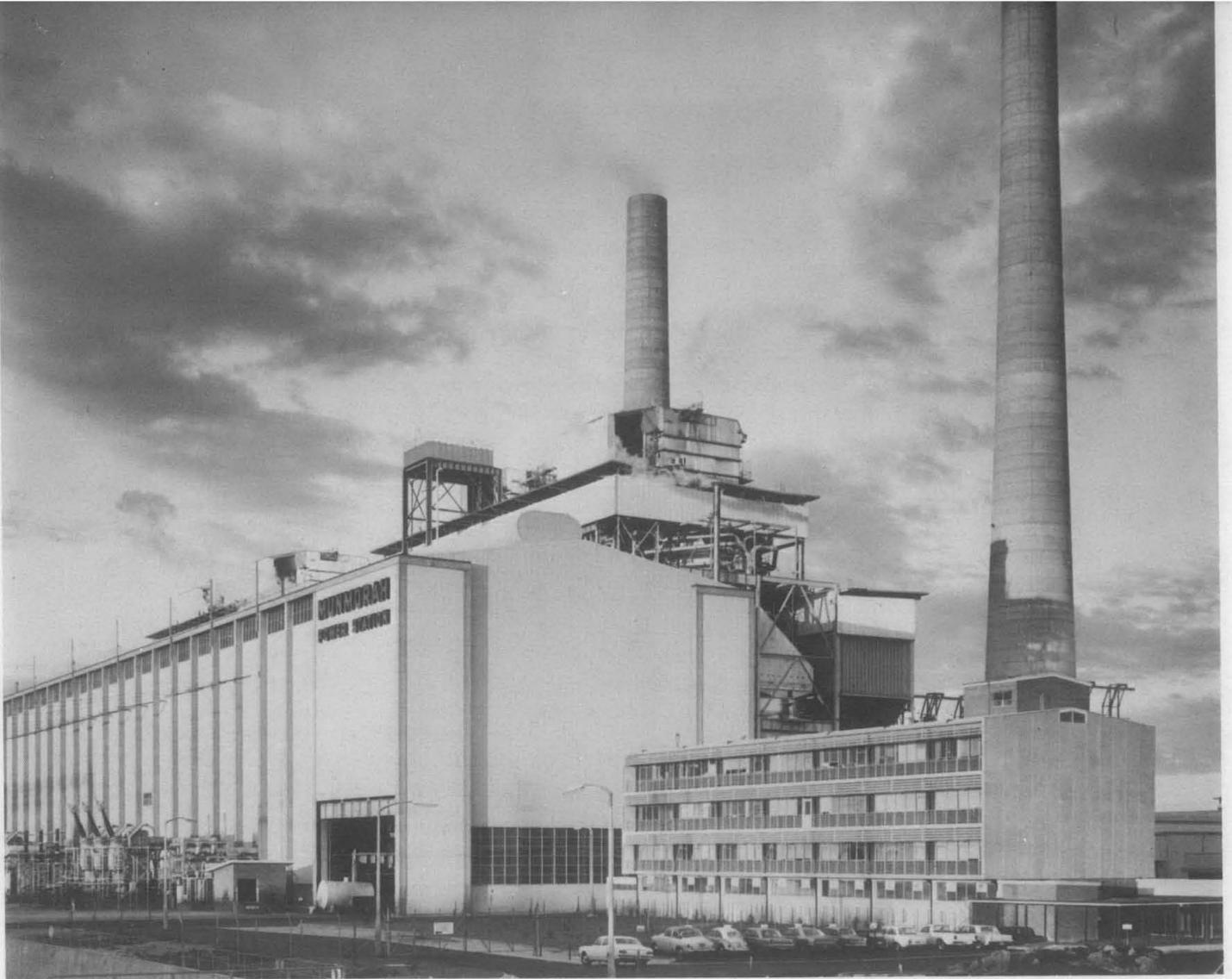
Increased pressure for the use of the lakes for recreational and waterway purposes is expected to move north from The Entrance and Long Jetty areas.

The studies undertaken to date indicate that the eastern foreshores of the lakes hold the best possibilities for further developing waterway use and facilities.

Left:
Development is slowly encircling the lakes

Below:
Can their beauty and assets be maintained?





The biggest local industry, power generation, uses the lakes . . .

Matters Being Investigated

POWER STATION OPERATION

Studies of the effects on the Tuggerah Lakes of the Munmorah power station are continuing but, to date, no adverse effects have been observed in the aquatic environment.

AQUATIC SEAWEEDS

Although the growth of aquatic seaweeds in the lakes is not a recent problem, an annual cycle of growth and decay causes unpleasant odours and organic sludge. However, it needs to be kept in mind that the role of aquatic seaweed is important in providing food and shelter for the aquatic animals, and any future control of seaweed growth should consider this environmental balance.

LAKE LEVELS

The investigations undertaken to date indicate that, if the channel to the sea at The Entrance were widened and deepened, there would be a decrease in flood levels. However, the increase in the exchange of ocean



water between the sea and the lakes would have the effect of lowering the normal lake level, as well as increasing the tidal influence within the lakes.

... and so can wildlife

SEDIMENTATION

There is no reliable information available on the rate of sedimentation within the lakes. It is estimated that the average rate is one to two millimetres per year, although there are some areas where a higher rate of siltation has been observed. Observations are continuing on the quantities of silt entering the lakes through local creeks.

WATER QUALITY

Monitoring carried out by the State Pollution Control Commission indicates that the lakes show none of the characteristics of nutrient enrichment. The water is well oxygenated, contains low levels of nitrogen and phosphorus and has low bacterial counts.

Measurements are regularly made in foreshore areas by Wyong Shire and Health Commission Officers. Occasionally high coliform counts are found, invariably in areas adjacent to storm water drains, indicating that septic tank wastes have entered the lakes by illegal discharges or overflows into street drains.



Recreation Suitability Study

It is important that future planning decisions on recreation be made in full knowledge of the potential of the foreshores of the lake. With a view to determining those areas around the lakeshores most suitable for recreation, activities were divided into two types – those associated with water or which are water-based, and those associated solely with land-based activities.

The potential or suitability of a particular piece of land for recreation is dependent upon a number of factors, both natural and man made. The factors considered in this study were:

- foreshore slope.
- the slope of the bottom of the lake.
- the extent of weed beds.
- the type of foreshores (e.g., sand, rock or mud and silt).
- the stability of the foreshore.
- the orientation of the foreshore.
- the proximity of the foreshore to roads.
- existing foreshore development and use.

As a result of this study, two suitability maps have been prepared which may be used directly as a guide for the future planning of recreation areas around the Tuggerah Lake system. They may also be used in planning other types of lake edge development, both in the water (such as dredging operations), and on the foreshore. In this way, the alienation of prime recreation land may be considered in any cost/benefit studies undertaken.

Right:

The hills form a natural backdrop to the lakes

Visual Analysis

The surrounding hills, ridges, and lowlands to the lakes have a twofold advantage. They not only provide an interesting and varied background when viewed from the lakes themselves, but also give passing motorists attractive views of the foreshores and areas of water. The visual catchment of the land as seen from the water, together with views of the lakes from surrounding major roads, have been defined and mapped, with key elements identified. This information was overlaid on a map showing the extent of vegetation, thus providing a composite or summary map which identifies areas of visual sensitivity.

It is considered that certain specified guidelines or controls should be applied to development in these areas of varying visual sensitivity.

Moreover, areas of high sensitivity should be controlled by strict landscape guidelines covering aspects such as siting and size of structures to be built, the materials to be used and site restoration works.

Development in areas of medium sensitivity needs to be controlled by building guidelines. These would reflect limits on the size and bulk of buildings, and the colours and reflecting elements of the materials used.

Areas of low visual sensitivity would be protected in a similar manner, but perhaps to a lesser degree.

Left:

There are popular caravan parks on the lake foreshores



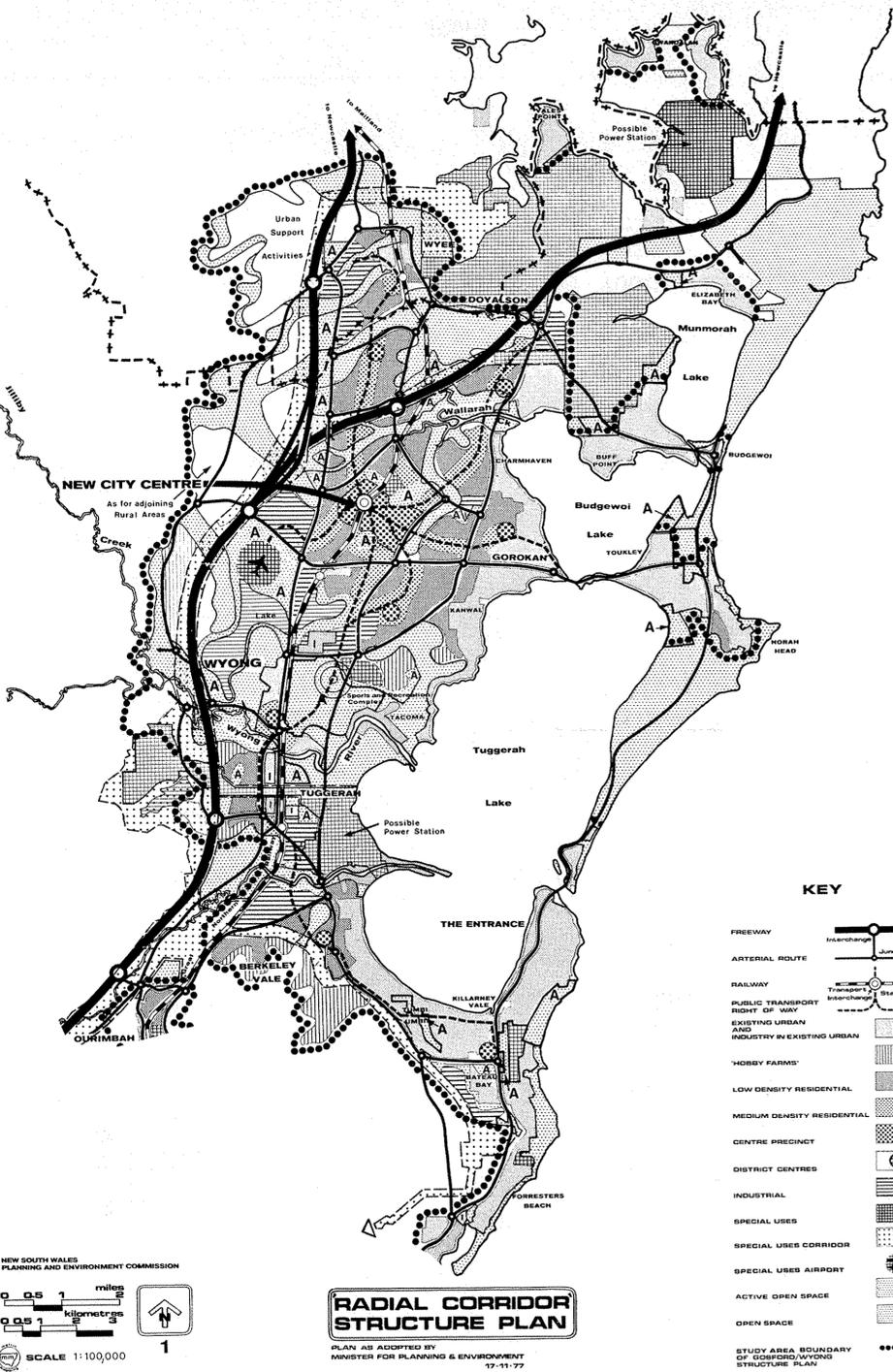


INSERT SHEET

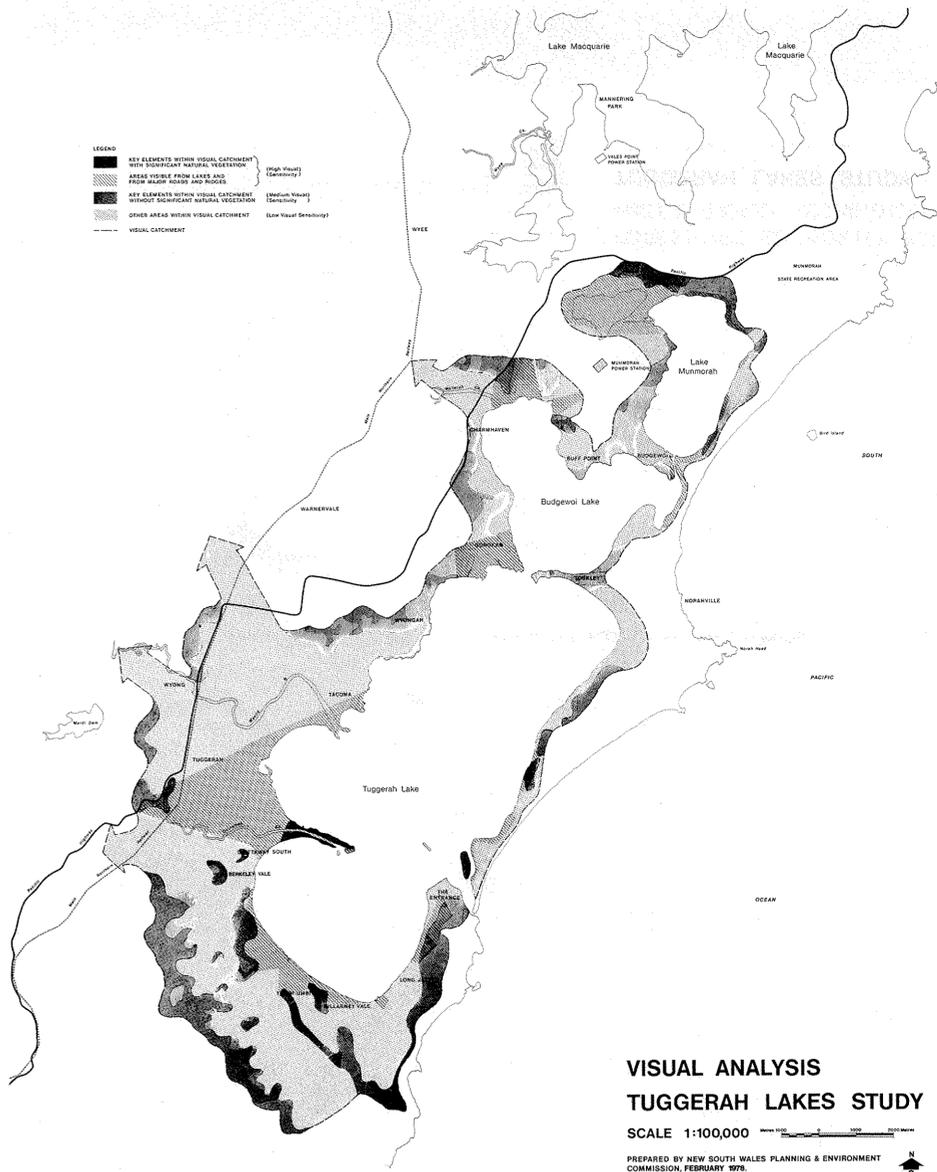
PLANS (6)

TUGGERAH LAKES
The Future of the Waterway

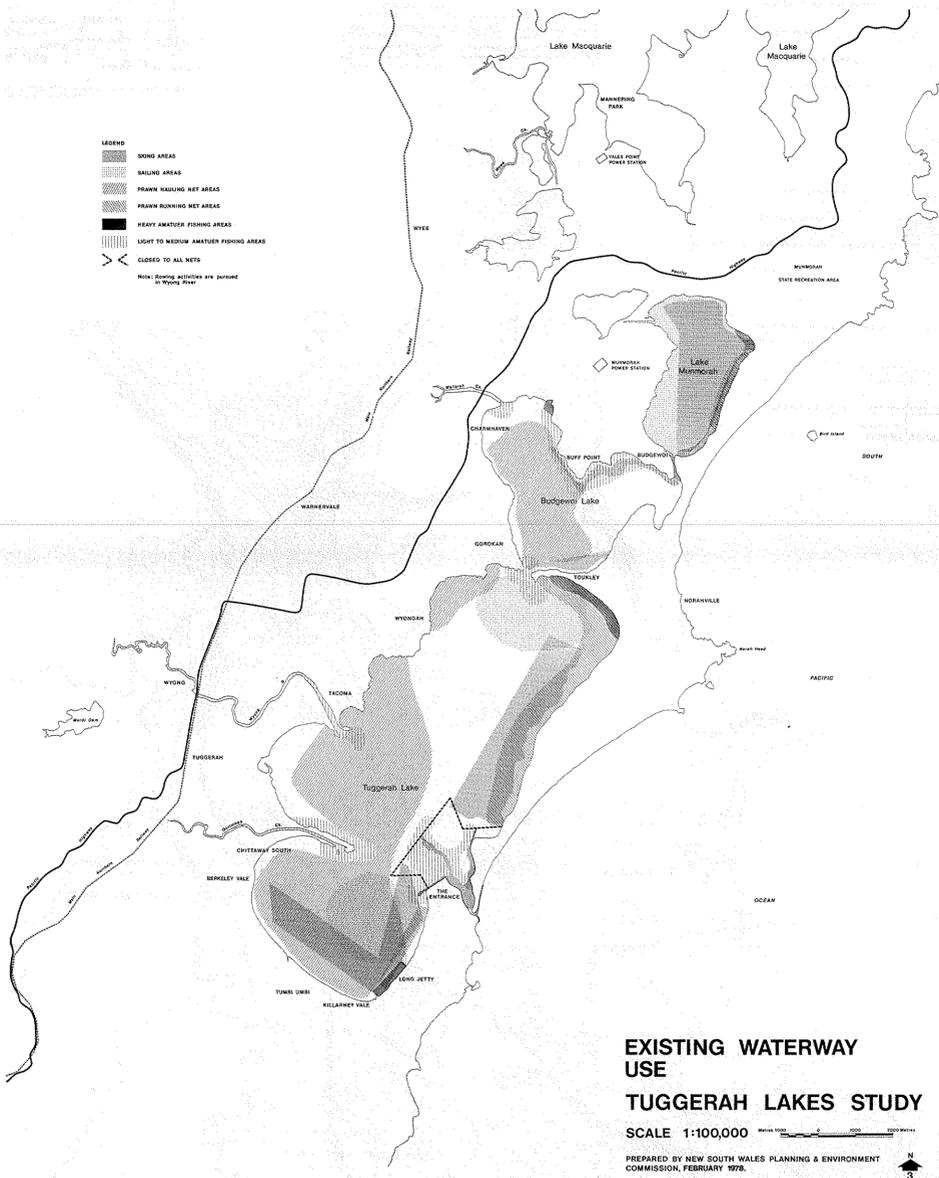
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"TUGGERAH LAKES • The Future of the Waterway"



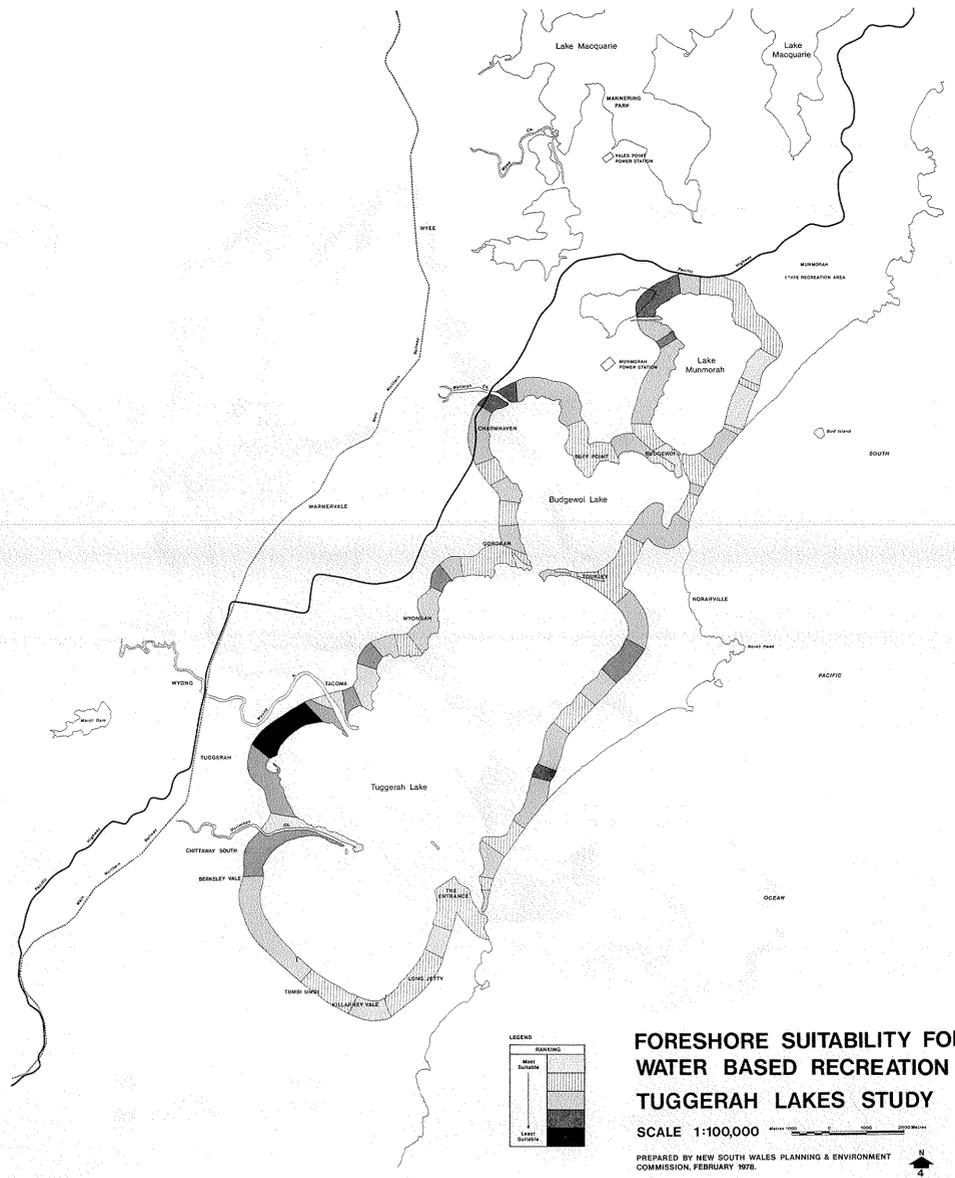
Plan 1



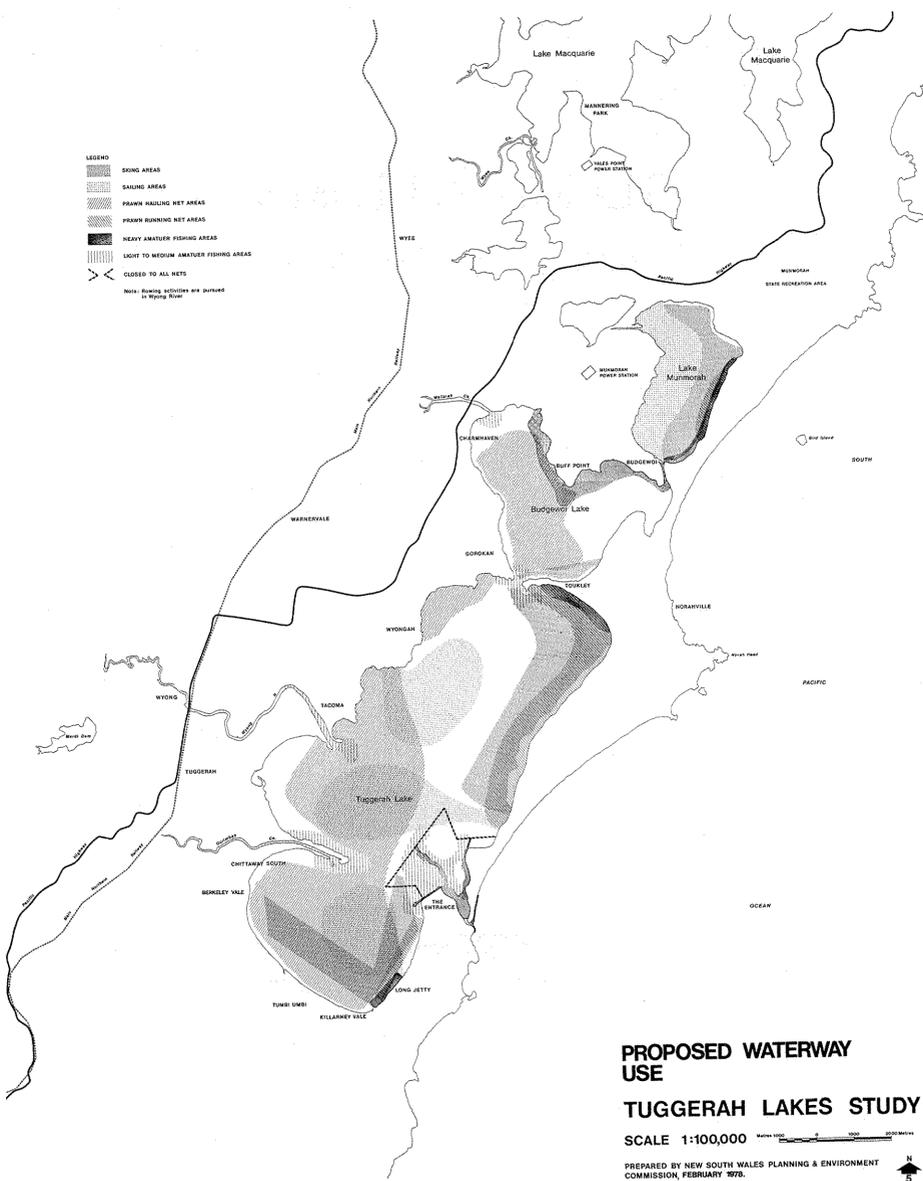
Plan 2



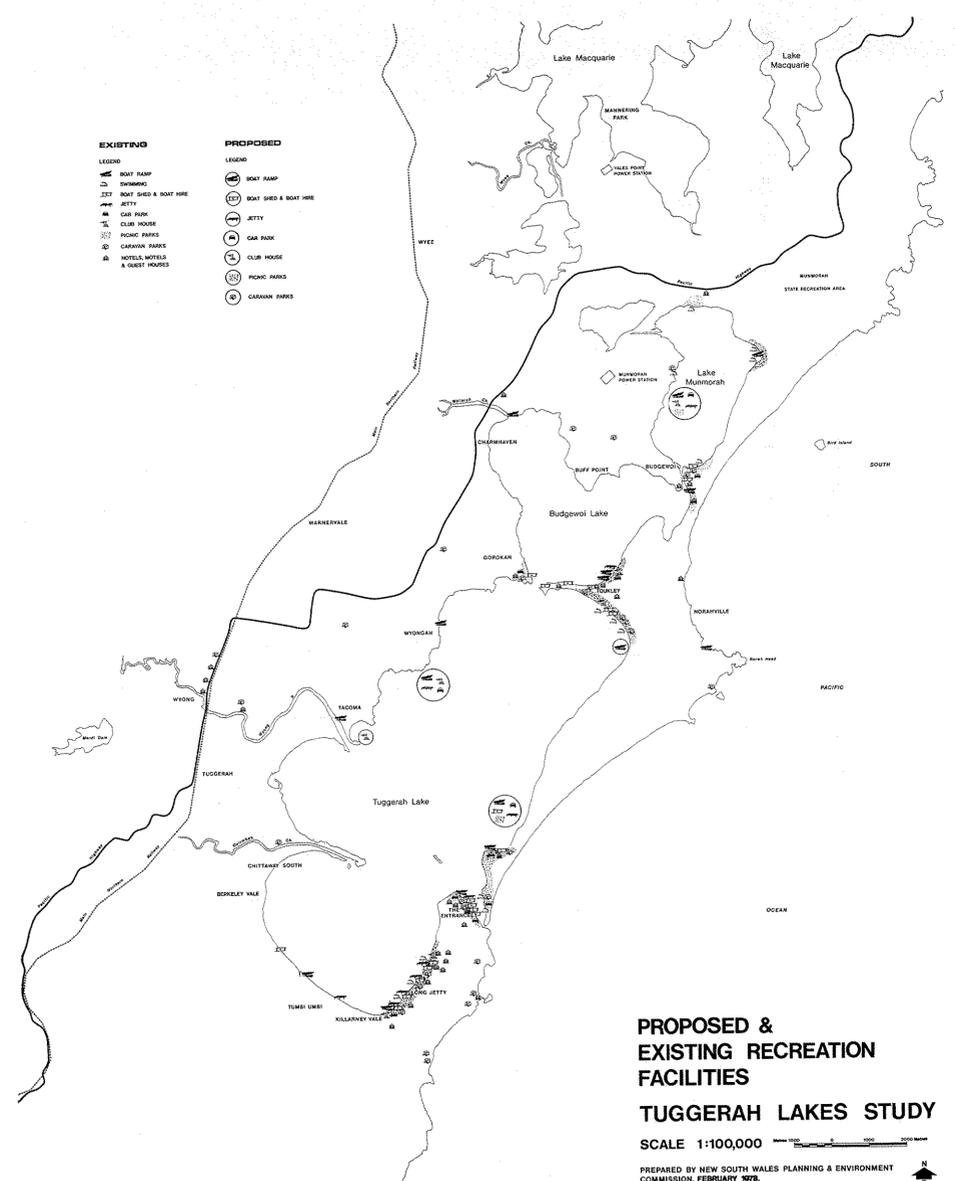
Plan 3



Plan 4



Plan 5



Plan 6

Land Use

There are about 30 400 people living between the lakes and the coastline at Elizabeth Bay, Budgewoi, Toukley, The Entrance, Bateau Bay and Berkeley Vale. These coastal areas will be physically separated by the lakes from the Warnervale New City area and the Wyong urban expansion proposed in the adopted Radial Corridor Structure (Plan 1). That plan envisages a population for those areas of between 180 000 to 200 000 and between 60 000 and 90 000 for the coastal areas, including Terrigal and Avoca. Development along these lines will mean that more people will want foreshore parkland and facilities on the western side of lakes for picnicking, walking, swimming, sailing, fishing, outdoor sports and other water oriented recreational uses.

It will be necessary to provide recreation and open space corridors through the urban areas to the west of the lakes. These will serve as access to the lake foreshore areas and provide additional recreation space for residents. Additionally, natural areas of scenic beauty, vegetation and wildlife will be protected in open space areas to satisfy environmental needs.

Top Left:
Coastal areas are nearly built out

Existing Waterway Use

The present location of sailing activities on the lakes is determined mainly by suitable wind conditions and depth of water, as well as the location of existing facilities.

Water ski-ing is located in the relatively sheltered areas such as the southeast parts of Tuggerah Lake between the North Entrance Peninsula and Canton Beach at Toukley, Buff Point in Budgewoi Lake and in most of Munmorah Lake.

Amateur fishing is one of the most popular water sports and its facets allow it to be practised almost anywhere.

Swimming is generally restricted to the areas with clear water and sandy beaches.

Rowing activities are mainly pursued in the Wyong River.

Commercial fishing, especially prawning, is carried out in most of Tuggerah Lake as well as in the western parts of Budgewoi Lake and along the eastern shore of Munmorah Lake.

Float planes operate on the lakes and because of the manoeuvrability of the planes, conflicts do not occur with other lake activities.

Bottom Left:
Future growth will take place to the west of the lakes

Proposed Recreational Waterway Use

TUGGERAH LAKE

The future demand for increased facilities and water use is expected to take place in the northern part of the lake because of its proximity to the future urban population. It is considered that parking and associated facilities need to be improved to the existing launching ramps and jetties in The Entrance and Long Jetty areas. A two-lane boat ramp with associated facilities, including dry storage, could be constructed on the North Entrance Peninsula without detracting from the unique features of the area. A ramp could be constructed on the south side of Canton Beach, adjoining the caravan park.

However, in order to allow swimming and amateur prawning to continue on the beach, it is suggested that boats be not allowed to land west of this ramp. A sailing club exists at Canton Beach, but relocation

Pressures from increased population



of the club on the western side of the lake would help to reduce the conflicts of waterway use.

BUDGEWOI LAKE

Budgewoi is the shallowest and most sheltered of the three lakes. It would be desirable to restrict this lake to sports such as fishing, canoeing and birdwatching, which do not alienate large areas of the lake. Under the future proposal, skiers would be required to ski in the other lakes when conditions prevent them from ski-ing in the existing zone on the southern banks of the lake. Sailing and ski-ing should not be encouraged to develop any further in Budgewoi Lake.

LAKE MUNMORAH

As use of Lake Munmorah increases, it is becoming necessary to segregate incompatible forms of recreation — water ski-ing and sailing. Water ski-ing is best located on the eastern side of the lake, allowing sailing to take place on the western shores. A suitable location on the western foreshores is available for the development of a marina. The existing launching ramps are adequate for future water ski-ing needs, with only back-up facilities needing to be developed.

... will require improved facilities and management



The Committee, and Public Participation

The authorities represented on the interdepartmental committee are:

- The N.S.W. Department of Public Works.
- The Electricity Commission of N.S.W.
- The Health Commission of N.S.W.
- N.S.W. State Fisheries.
- The Maritime Services Board of N.S.W.
- The Department of Lands.
- The N.S.W. Planning and Environment Commission.
- Wyong Shire Council.
- State Pollution Control Commission (co-opted member).

The six plans enclosed within this brochure are small scale plans forming part of a series of eleven plans prepared for the interdepartmental committee. Larger scale copies of individual plans are available for \$5.00 each from:

The Secretary,
Tuggerah Lakes Interdepartmental Committee,
c/- N.S.W. Department of Public Works,
Room 4109, Chief Secretary's Building,
Cnr Bridge and Macquarie Streets,
SYDNEY. 2000

or from:

The Shire Clerk,
Wyong Shire Council,
WYONG. 2259

The total series includes plans showing existing land use, population, foreshore suitability for facilities for land-based recreation and an environmental inventory.

Interested members of the public or local bodies are invited to submit comment on the proposals outlined within this brochure to either of the two addresses shown above, before October 1st, 1978.

TUGGERAH LAKE REPORT INVENTORY

Last Update: 03/11/94

File Name: g:\ssmproj\panagopoulos\tugrepot.wb1

Public Works is in possession of the following reports as of 11/3/94 *2 drawer filing cabinet N.W. crnr fl 12*

| No. | Title | Author | Date | ISB No. | Report No. | Prepared for: |
|-----|--|--|----------------|-----------|--------------------|--------------------------|
| 1 | Tuggerah Lakes / The Future of the Waterway | Public Works | 1978 | | | |
| 2 | Tuggerah Lakes Study Appendix | Inter-Departmental Committee | 1979 | | | |
| 3 | Tuggerah Lakes Study Report | Inter-Departmental Committee | 1979 | | | |
| 4 | Jet Pump System for Maintaining Tidal Entrances | Public Works | October 1987 | 724028854 | P.W.D. 87051 | Wyong Shire Council |
| 5 | Draft - Tuggerah Entrance Improvements / Entrance Restraining Wall / Concept Design Report | Patterson Britton & Partners | September 1988 | | | PW & Wyong Shire Council |
| 6 | Tuggerah Lakes Entrance Improvements / Entrance Restraining Wall / Concept Design Report | Public Works | October 1988 | 730559998 | P.W.D. 88069 | Wyong Shire Council |
| 7 | Draft Report on Tuggerah Lakes System Restoration Requirements | Public Works | January 1988 | | | Wyong Shire Council |
| 8 | Specification for Tuggerah Lakes - Area 5 (Picnic Point, Tuggerah Lake) Extraction of Sediment | Wyong Shire Council | September 1989 | | Contract No: 8931 | |
| 9 | Investigation Report / Tuggerah Lakes - Areas 1 to 4 / Mud Profiles | GHD | December 1989 | | 221/22845/01 | Wyong Shire Council |
| 10 | Draft Report / Geotechnical Investigation / Proposed Eastern Restraining Wall / Tuggerah Lakes, The Entrance | Dames & Moore | October 1989 | | 19491-001-70 | Public Works |
| 11 | Geotechnical Report / Tuggerah Lakes - Area 5 / Sediment Extraction | GHD | August 1989 | | 221/3191/00 | Wyong Shire Council |
| 12 | Final Report / Geotechnical Investigation / Proposed Eastern Restraining Wall / Tuggerah Lakes, The Entrance | Dames & Moore | November 1989 | | 19491-001-70 | Public Works |
| 13 | Tuggerah Entrance Restraining Wall / Stage II - "Detailed Design and Documentation" | Patterson Britton & Partners | April 1990 | | GWB:hf:388/LB851 | Public Works |
| 14 | Catchment Management Issues in the Lake Macquarie Catchment - A Survey of community Perception | State Catchment Manage. Coord. Committee | 1990 | | | |
| 15 | Specification for Contract No 9001 / Tuggerah Lakes - Area 1 (south Eastern Tuggerah Lakes) / Extraction of sediments | Wyong Shire Council | January 1990 | | SPEC9001 | |
| 16 | Tuggerah Ministerial Task Force - Minutes of Meetings | | May 1990 | | | |
| 17 | Specification for Tuggerah Lakes - Area 3 (Western Budgewoi Lake) Extraction of Sediments | Wyong Shire Council | January 1990 | | Contract No: 9003 | |
| 18 | Tuggerah Lakes Dredging Programme / Long Jetty Sampling Exercise | Coffey Partners | July 1990 | | N4233/2-AB | Wyong Shire Council |
| 19 | Specification for Tuggerah Lakes - Area 2 (South Western Tuggerah Lakes) Extraction of Sediments | Wyong Shire Council | January 1990 | | Contract No: 9002 | |
| 20 | Evaluation of Wave Impacts on Stability / Proposed Eastern Restraining Wall / Tuggerah Lakes, The Entrance | Dames & Moore | May 1990 | | 19491-3-70 | Patterson & Britton |
| 21 | Specification for Tuggerah Lakes - Area 4 (Western Lake Munmorah) Extraction of sediments | Wyong Shire Council | January 1990 | | Contract No: 9004 | |
| 22 | Ooze Removal Trials at Long Jetty Aquatic Club | Public Works | 1990 | | | |
| 23 | Tuggerah Lake Entrance Improvements / Investigation of Mobile Dredge Systems | Patterson Britton & Partners | August 1990 | | | Wyong Shire Council |
| 24 | Tuggerah Entrance Restraining Wall : Stage II - Detailed Design and Documentation | Patterson Britton & Partners | April 1990 | | GWB:hf:388/LB851 | Public Works |
| 25 | Stormwater Quality Control in Tuggerah Lakes | Wyong Shire Council | June 1991 | | | IE Aust Water Eng Panel |
| 26 | Specification for Tuggerah Lake Entrance Improvements / Detailed Design, Manufacture, Supply and Commissioning of a Mobile Dredge System for the Entrance to Tuggerah Lake | Patterson Britton & Partners | June 1991 | | | Wyong Shire Council |
| 27 | Draft - Specification for Tuggerah Lake Entrance Improvements / Detailed Design, Manufacture, Supply and Commissioning of a Mobile Dredge System for the Entrance to Tuggerah Lake | Patterson Britton & Partners | June 1991 | | Contract No: 9121 | Wyong Shire Council |
| 28 | Draft - Trial Dredge Monitoring Program for a Floating Dredge System / Operating at the Entrance to Tuggerah Lakes (March to April 1991) Volume 2 - Appendices | Patterson Britton & Partners | June 1991 | | | Wyong Shire Council |
| 29 | Environmental Impact Statement for Extraction of Sand from Budgewoi Lake | Resource Planning | August 1991 | | | Wyong Shire Council |
| 30 | Report on Geotechnical Investigation / Tuggerah Lakes Restoration Programme / Area 10 - Budgewoi Lake | Douglas & Partners | June 1992 | | Project No. 16179A | Wyong Shire Council |
| 31 | Report on Geotechnical Investigation / Tuggerah Lakes Restoration Programme / Buff Point - Budgewoi Lake | Douglas & Partners | December 1992 | | Project No. 16174B | Wyong Shire Council |
| 32 | Specification for Tuggerah Lakes Restoration Project / Beach Renourishment Works / Area 1 and 2 : South Tuggerah Lake | Wyong Shire Council | April 1992 | | ENGSPC88 | |
| 33 | Report on Geotechnical Investigation / Tuggerah Lakes Restoration Programme / Long Jetty to Chittaway Point | Douglas & Partners | May 1992 | | 16174 | Wyong Shire Council |
| 34 | Specification for Tuggerah Lakes Restoration Project / Beach Nourishment Works / Areas 1 and 2 : South Tuggerah Lake | Wyong Shire Council | April 1992 | | Contract No: 9211 | |
| 35 | Tuggerah Lakes Entrance Improvements / Detailed Design, Manufacture, Supply and Commissioning of a Mobile Dredge System for the Entrance to Tuggerah Lake - Tender Review | Patterson Britton & Partners | May 1992 | | Contract No: 9121 | Wyong Shire Council |
| 36 | The Tuggerah Lakes Restoration Project / Status Report as at 30 June 1992 | Patterson Britton & Partners | December 1992 | | | Wyong Shire Council |
| 37 | Report on Geotechnical Investigation / Tuggerah Lakes Restoration Programme / Resurvey of Area 10 - Budgewoi Lake | Douglas & Partners | June 1993 | | Project 16, 179C | Wyong Shire Council |
| 38 | Draft - Tuggerah Lakes Sediment Study / Berkeley Vale | Dominic Cheng, UTS | January 1993 | | | |
| 39 | Tuggerah Lakes Entrance Survey / Assessment of Channel Behaviour | Public Works - C&E MP | January 1993 | | | |
| 40 | Draft - Beachcomber Resort, Budgewoi Lake, Toukley / Beach Stabilisation and Maintenance | Patterson Britton & Partners | December 1993 | | | |
| 41 | Report on Geotechnical Investigation for Tuggerah Lakes Restoration Programme at Colongra Bay, Lake Munmorah | Douglas & Partners | June 1993 | | Project 16, 174F | Wyong Shire Council |
| 42 | Report on Geotechnical Investigation / Tuggerah Lakes Restoration Programme / Sediment Mapping - Berkeley Vale | Douglas & Partners | June 1993 | | Project 16, 174E-2 | Wyong Shire Council |
| 43 | Report on Geotechnical Investigation / Tuggerah Lakes Restoration Programme / Resurvey of Area 3 - Budgewoi Lake | Douglas & Partners | June 1993 | | Project 16, 179B | Wyong Shire Council |
| 44 | Report on Geotechnical Investigation / Tuggerah Lakes Restoration Programme / Sediment Mapping - Halekulani | Douglas & Partners | June 1993 | | Project 16, 174E-1 | Wyong Shire Council |

Photography: N.S.W. Government Printer and
Australian Air Photos

