PUBLIC WORKS

CHIPPING NORTON LAKE AUTHORITY

FLOYD BAY

Development Study

KINHILL
FLOYD BAY DEVELOPMENT STUDY

Prepared for

Chipping Norton Lake Authority
Public Works Department NSW

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SUMMARY

This study has been prepared for the Chipping Norton Lake Authority to report on alternative uses and designs for the Floyd Bay and Hollywood Park area. The study area is located on the eastern edge of the Chipping Norton Lake Scheme which, in contrast to other sections of the scheme, has not been rehabilitated and is still subject to continued sand extraction.

To provide a broader framework in which to consider the study area, an analysis is undertaken of regional recreation issues by reference to existing studies and recent surveys of adjoining facilities. Relevant criteria for consideration of uses within the study area are identified, the most important of which is that uses should be of a regional rather than local significance.

A site analysis, examining the physical environment, land-use pattern, flooding characteristics and landscape attributes identifies additional criteria in the form of constraints and opportunities which are summarized in a graphic format.

On the basis of identified criteria, likely design components are described individually and collectively through the formulation of alternative development plan options. Seven basic options are described and compared and a preferred option identified.

The preferred option is presented in the form of a schematic masterplan, with an accompanying written description, the main features of which are:

- the provision of a beach and boat hire facilities near Howard Park;
- an extension of the foreshore along Hollywood Drive to form a more natural lake edge alignment;
- boat launching facilities in the form of a twin boat ramp and small mooring jetty;
- limited commercial facilities in close proximity to boat launching facilities;
- the provision of a lookout on Coot Island with a boardwalk along the eastern edge;
- the landscaping of Hollywood Park in accordance with plans previously prepared by the Public Works Department including a connecting bridge to Beatty Reserve.

Outline costings and design guidelines are provided to assist the Department in its resource allocation and decision-making process.
Chapter One
BACKGROUND TO STUDY

This study was initiated by the Public Works Department, acting in its continuing role for the Chipping Norton Lake Authority, to investigate development opportunities for the Floyd Bay area.

Some earlier studies have been undertaken, but these tended to consider the entire lake system. This study considers only the area immediately surrounding Floyd Bay, and in terms of the current, proposed and recommended developments in the vicinity.

1.1 STUDY OBJECTIVES AND STAGING

The study objectives were defined by the Public Works Department and are as follows:

a) to determine the alternative uses, developments and designs for Floyd Bay and the Hollywood Drive area, and compare these alternatives to the previous studies of the area;

b) to particularly examine the recommendations of the Department of Environment and Planning study of September, 1980, which was adopted (Ref. E4);

c) to determine any changed circumstances which should be considered for the study area, for example:
   - additional dredging
   - additional survey
   - additional information
   - current uses
   - golf club development
   - adoption of Howard Park as a land area
   - possible dredging and refilling of Hollywood Park
- possible final land uses for adjoining areas such as Howard Park, Strong Park, Stantons homestead and Hollywood Park

- possibility of a major development in the area

d) to select the best development or developments for Floyd Bay/Hollywood Drive, and explain why these may differ to those adopted previously in the DEP study of September 1980;

e) to identify and consider constraints by others, for example, services such as electricity, water, sewerage and telephone;

f) to identify how the development area will relate to its surroundings, to meet the objectives of the Authority;

g) to locate areas that will require additional construction, such as drainage and services;

h) to designate areas to be protected, and select beach locations along with any groynes or the like;

k) to select off-street parking locations, and fill areas for spoil collection;

l) to recommend features to be built, so that detail designs may follow.

These objectives required that a detailed and in depth study of the Floyd Bay area be undertaken. The scope of work was defined into progressive stages:

**Stage 1:** Reappraisal and comparison of earlier schemes (1977-80) to identify general requirements, preferences and conflicting alternatives.

**Stage 2:** Summary of flooding history and data with a view to location and style of developments compatible with flood liable land, community expectations and Government policy/preferences.

**Stage 3:** Proposal of alternative schemes and development strategy for each including summary of benefits, costs and proposed timing of the works. This stage to also include external dependencies and effects of proposed and likely local area developments.

**Stage 4:** Provision of report amalgamating all of the above with recommendations.

During the preparation of the study, a draft report was prepared that stopped short of development of a Preferred Option, to allow consideration of the full range of alternative developments by the Department.
1.2 THE HISTORY OF CHIPPING NORTON LAKE

The development of the lake system visible today generally began as a limited and often unlicensed operation to remove topsoil for sale. This work appears to have started in the area now known as Howard Park, in 1950, and was originally restricted to removal of the top four feet (1.2 metres) only. Soil extraction rapidly spread to the Chipping Norton area in 1951, with about a quarter of the area now forming the main lake being mined.

On the introduction of the County of Cumberland Planning Scheme on 27 June 1951, all extraction industries within the lakes area then had existing use rights outside the local council's control.

This situation continued until 1962 when Liverpool Council took the initiative by adopting a 'Lake Area' and began granting uniform approvals for extraction. However the problem of existing usage rights continued. This situation was exacerbated by the suspension of the County of Cumberland Planning Scheme on 26 May 1961, effectively increasing the number of existing users and removing any controls over the extractors that may have existed.

Liverpool Council continued to administer their 'Lake Plan', whilst entering into discussions with the Public Works Department so that restrictions on riverbank excavation could be removed. A two chain strip (20.12 metres wide) along the riverbank was protected under the Rivers and Foreshores Improvement Act, which was administered by the Public Works Department. This provision in the Act effectively prevented the formation of an open lake.

It became clear that despite the good intentions to develop the lake, no real progress was being made save that the water body was slowly appearing in a fragmented and unattractive fashion. This was due to the ineffective controls and lack of co-ordination of the extractors, and the disappearance of the two chain strip, in a number of places, caused by over extraction and floods. There were also no royalty payments or other sources of funds occurring for the development of the lake system.

These processes continued until 1967 when the Georges River Extractive Committee was set up to attempt to resolve the administrative and extractive problems, on both sides of the river.

This committee was an inter-departmental committee established by the Minister for Public Works and the Minister for Local Government. The Committee was composed of representatives from the following authorities:

- Department of Public Works
- Maritime Services Board
- Department of Lands
- Department of Local Government
- State Planning Authority of NSW
- Liverpool City Council
- Fairfield Municipal Council
- Bankstown Municipal Council
The Committee held its first meeting on 11 December 1967 and presented the findings of its investigations through the State Planning Authority in September, 1972.

The most important recommendation of the Committee was for the formation of a single trust or body to control the activities of the extractors, and to enact new legislation to institute this body. The State Government accepted this advice, and created the Chipping Norton Lake Authority under an Act of Parliament, in 1977. Under the Act, the Minister for Public Works is the Chipping Norton Lake Authority.

The Authority has the express aim and responsibility to convert the environmental damage, caused by the uncontrolled extraction of soils and sands, into a recreational waterway for the people of Sydney's south-west.

To this end, the Authority now administers various leases which control sand extraction, dwelling rental and occupation of completed park amenities. The Authority also collects royalty and lease payments, which are used for rehabilitation of foreshores and construction and maintenance of the lakes and amenities.

Although the extraction of sand is continuing, extensive environmental and administrative controls ensure that the operations are undertaken in a responsible manner. These controls also ensure that rehabilitation of the mined areas are undertaken at appropriate times during and after extraction, with the results visible today being the provision of high quality recreation areas.

1.3 PREVIOUS STUDIES

There have been a number of studies undertaken over the years by the various authorities and parties associated with the Chipping Norton lake area, as well as some academic studies. Most of these have been internal reports and generally covered specific matters. It was not until the formation of the Chipping Norton Lake Authority in 1977 that studies concerning the entire lakes area, and its planned development, were undertaken.

A complete list of the relevant reports and studies is included under References and those referred to in the preparation of this report are so identified.

As part of the initial brief, this Study was required to examine the recommendations of a planning and development study undertaken by the then Department of Environment and Planning, in 1980 (Ref:E4). This is discussed in section 5.3 of this report.
Chapter Two
REGIONAL RECREATION ISSUES

2.1 METHODS OF ASSESSMENT

The ideal technique for qualifying regional recreational need is to establish the specific categories of opportunities that are lacking. In this study, two sources of information were used. These were the Local and State Government Officers charged with the responsibility of recreational planning, who deal with regional facilities and opportunities on a day to day level and as such are in a position to advise on inadequacies. Officers from the Liverpool Office of the Department of Sport and Recreation and Fairfield Council were approached.

The second source of information was previous Regional, Municipal or Local studies produced to ascertain Recreational Demand or Recreational Need.

Studies identified as being relevant to the development of Floyd Bay were identified. These are:

- Regional Recreational Facilities (Department of Sport and Recreation, 1986) (Ref:H1).
- Recreational Development of County Open Space, Riverside Road, Chipping Norton (Ref: H2).
- Western Sydney Regional Recreation Strategy (WSROC), February 1988: (Ref: H3)

The combination of the above data sources and anecdotal advice from statutory authorities formed the basis for identifying recreational opportunities for the study area.

2.2 METROPOLITAN STRATEGY

In its 1988 publication 'Sydney into its Third Century' (Ref: E5), the Department of Planning outlines a strategy for future development of the Sydney Region. In so far as this has effects on the study area the following objectives should be noted:

- to improve access to the region's recreation and tourism resources and facilities;
- to improve public access to the region's waterways and foreshores;
to provide recreational facilities and services to meet the diverse and changing needs of the population.

2.3 REGIONAL DEMOGRAPHIC PROFILE

In general, western Sydney differs from the Sydney Statistical Division in the following aspects:

- a higher proportion of younger age groups with highest concentrations in Blacktown, Penrith and Fairfield LGAs;
- a slightly higher proportion of youth (15-19) population;
- relatively small proportion of aged persons.

The 1988 WSROC Recreational Strategy (Ref: H3) anticipated the following likely changes within western Sydney and the resultant consequences for recreation provision:

- the youth population will demonstrate a high degree of participation in active organized sports;
- the emerging family profile indicates there will still be a strong need for large areas of parkland and formal playing fields but with a need to cater for a wider range of age groups;
- provision of passive activities for aged persons is extremely important as there will be a general shift towards an older age structure in western Sydney;
- currently, the region has a relatively high rate of car ownership which is of particular consequence to the study area.

The population of the regional centres is on the increase, although projections for Bankstown show a decline over the next 20 years. However, the increases in population for both Fairfield and Liverpool will tend to occur in areas further west of the existing residential areas as more land is released.

2.4 EXISTING RECREATION PROVISION

It is necessary to define shortfalls in existing regional recreational opportunities to avoid duplication in the development of new areas.

Because of the broad nature of recreation areas and facilities, it is useful to categorize opportunities and define the regional supply for each category. These range from highly intensive indoor recreational opportunities to low intensity extensive outdoor recreational opportunities. Eight opportunity categories have been defined for this region (defined loosely as Liverpool, Fairfield and Bankstown Local Government Areas):
• indoor facilities
• commercial outdoor facilities
• local open space - passive
• regional open space - passive
• local open space - active
• regional open space - active
• water based opportunities
• resource based opportunities

The following discussion details the provision of opportunities within each of the above categories. Due to time constraints, a preliminary survey only of regional opportunities was completed. The remainder of the information used was obtained from information supplied by the three councils and the Liverpool office of the Department of Sport and Recreation.

The distinction between active and passive, and local and regional areas is not an absolute one. For the purposes of this study, active refers to recreational opportunities predominantly geared to sporting fixtures and passive as everything else. It is recognized that all areas play some part in the provision of passive areas at times when fixtures are not being played.

Regional recreation opportunities are defined as those areas which are of 40 hectares or over or are administered by a State Government body or have a regional component of use. The definition of size mentioned above was that used in the Department of Environment and Planning 1982 open space survey (DEP, 1985) (Ref: B3). Local recreation opportunities, by default, are smaller areas that primarily serve a local population.

2.4.1 INDOOR FACILITIES

These recreational opportunities tend to be commercial by nature. They refer to such facilities as youth centres, squash courts, theatres/cinemas, performing arts centres, skating rinks, major indoor sports complexes, regional/local museums, ten pin bowling centres, community halls and indoor swimming pools.

These facilities are generally provided in regional centres which act as a hub for public transport networks.

2.4.2 COMMERCIAL OUTDOOR FACILITIES

This category encompasses the specialized opportunities. The subcategories used in this study are listed in Table 2.1 with the number of facilities available in the region.
Table 2.1 Commercial outdoor facilities

<table>
<thead>
<tr>
<th>Facility</th>
<th>Number</th>
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</thead>
<tbody>
<tr>
<td>golf courses</td>
<td>13</td>
</tr>
<tr>
<td>horse racing tracks</td>
<td>3</td>
</tr>
<tr>
<td>showgrounds</td>
<td>3</td>
</tr>
<tr>
<td>theme and amusement parks</td>
<td>4</td>
</tr>
<tr>
<td>camping/caravan facilities</td>
<td>10</td>
</tr>
<tr>
<td>horse riding schools</td>
<td>9</td>
</tr>
<tr>
<td>swimming pools</td>
<td>7</td>
</tr>
</tbody>
</table>

Source: Department of Sport and Recreation

There are two areas which may be under represented - equestrian centres and swimming pools. There are no equestrian centres currently situated in the area. However, with the proximity of Warwick Farm Racecourse it may be possible to develop further equestrian facilities such as bridle tracks. Few other regions in Sydney have developed equestrian facilities. Given the success of this type of opportunity in the eastern suburbs of Sydney using the combination of Randwick Racecourse and Centennial Park to develop facilities, this may be a feasible alternative in this region. Equestrian facilities have been demonstrated elsewhere to be truly regional facilities.

The proportion of public/commercial swimming pools in the region to the 5-39 year old population is lower for this region than the metropolitan area as a whole (Department of Sport and Recreation, 1986) (Ref: H1). However, this doesn't consider such factors as private pool ownership or the availability of rivers for swimming. Nevertheless, water based recreation opportunities such as those provided by swimming pools may be under-represented.

2.4.3 LOCAL OPEN SPACE - PASSIVE

The local open space oriented towards passive use involves small neighbourhood parks and the like. The provision of this type of open space in the region is difficult to ascertain due to the fact that the Department of Environment and Planning in their 1982 survey of open space (Ref: B3) did not distinguish between local-active and local-passive. Suffice to say that the total local open space proportions are approximately the same in this region for the metropolitan average (3.22 ha/1,000 people compared with a Sydney average of 3.85 ha/1,000 people).

The provision of passive local open space in the immediate vicinity of the site was not considered a critical area of concern by Fairfield City Council officers.

2.4.4 REGIONAL OPEN SPACE - PASSIVE

There are several regional open space areas that have been primarily reserved for passive use, particularly along the foreshores of the Georges River. These include Georges River State Recreation Area (120 ha) Mirrambeena Regional Park (105 ha), Deepwater Park and Maxwell Avenue Reserve (60 ha) and the Chipping Norton and Lake Moore
Development Area (120 ha). As well as these areas in the region, there is also the Mt Annan Native Botanic Garden and Arboretum (500 ha), located adjacent to Campbelltown.

There are considerable tracts of land, as can be seen from the above, that are fulfilling, and further areas that will soon augment, the passive regional open space system. Although the distribution of this open space is not even, particularly with regard to the City of Fairfield, this region of Sydney is well placed for this type of recreational opportunity, when compared with the remainder of Sydney.

Most of these regional areas have a common theme which is useful for later discussion. These themes are listed below:

- **Georges River State Recreation Area**: Picnicking, passive water based recreation geared towards speed boat activities.

- **Mirrambeena Regional Park**: Passive picnicking, cycling and walking area; amphitheatre; model boat sailing lake.

- **The Crest**: Passive picnicking, cycling, walking; radio controlled model car play area; formal playing fields and grandstand; sections still under construction.

- **Deepwater Park**: Currently being developed as a major educational centre with an intensive zoo and extensive boardwork system through a natural swamp.

- **Chipping Norton Lake Development Area**: Passive recreation, mostly water based but concentrating on sailing craft and pleasure boating under an eight knots speed limit.

- **Lake Moore Development Area**: Natural ecosystem, waterbird habitat area with some facilities available.

- **Mt Annan Botanic Gardens**: Education centre specializing in native Australian species. Also provision of passive areas but always with a botanical theme.

Recent visitor surveys (November 1988) for Mirrambeena Regional Park (Ref: F1) and Deepwater Park (Ref: F2) have been undertaken for Bankstown City Council. Due to the geographic similarity to the study area, these surveys have been used as an approximate guide to estimate the likely patronage of differing development options in Section 2.6.

### 2.4.5 LOCAL OPEN SPACE - ACTIVE

The active local open space, as with the passive local category, cannot be defined accurately. However, the Department of Environment and Planning Report (Ref: B3) separated the provision of playing fields for the 5-20 population. The Sydney Metropolitan Average of 764, 5-29 year olds per playing field is almost exactly reflected by this regional figure of 751. This figure is a generalized one, however, and it seems that in the particular precinct of the study area, there is a need for more local or regional active open space. There is only one existing playing field, near Strong Park, that
currently caters for the local need. However, Fairfield Council officers have found great difficulty in attracting sporting groups to this field, as it is located well away from population centres and public transport.

2.4.6 REGIONAL OPEN SPACE - ACTIVE

Currently the Crest of Bankstown is the only open space in the region which can be identified as regional active open space. It is an extensive area (95 ha) which has a large number of multi-use sporting fields. Some smaller areas in Liverpool and Fairfield may be also classified in this category but the important factors, such as variety and number of fields with grandstand provision, are not catered for as well as the Crest of Bankstown.

2.4.7 WATER BASED OPPORTUNITIES

The region is fortunate to have extensive reaches of the Georges River and part of Prospect Creek in the vicinity. As already mentioned, there are significant existing park and open space areas along these waterways including Georges River State Recreation Area, Chipping Norton and Lake Moore Development Areas, Deepwater Park and Mirrambeena Regional Park.

With regard to certain water based opportunities, such as speed boating and water skiing, sailing, canoeing and sightseeing, the region is well served by the areas mentioned above. Some swimming also occurs especially in the Georges River State Recreation Area. Because of low water quality there is a general reluctance to swim, although the water quality is measurably increasing. A further reason for the lack of 'river swimming' in the region may be the lack of family oriented water based areas with shallow, safe water and good access. In general, open swimming is discouraged in the Georges River, especially by Bankstown City Council which displays shark warning signs.

Facilities such as boat ramps are generally well catered for though there is not an even spread throughout the region. There are three boat ramps in the vicinity of Floyd Bay, with two in the Chipping Norton Lake Development, a further boat ramp is located immediately downstream of Deepwater Park. Of the three boat ramps, one of each is located in the Local Government Areas of Fairfield, Liverpool and Bankstown. Users of these facilities tend to be selective, requiring a high level of maintenance and suitability, otherwise facilities will be by-passed (DEP, 1980) (Ref: E4).

Other water based opportunities such as boat cruising and fishing are catered for in this reach.

2.4.8 RESOURCE BASED OPPORTUNITIES

The major resource based opportunities in the region involve parts of existing parks which provide other recreational opportunities as well. Examples such as Georges River State Recreation Area, Deepwater Park, Mirrambeena Regional Park and Moorebank Lakes all form part of the regional resource based open space opportunities. Experiences such as bush walking, 'natural' sightseeing, 'bird watching' and 'getting away from it all' are catered for in these areas where the physical characteristics of the site dominate the allowable activities.
The future availability of these resource based areas is extremely limited due to the large scale clearing of the catchment. Therefore, every effort should be made to conserve significant areas now in existence. This also ensures a variety of habitat protection, from riverside vegetation to swamplands to the alluvial hinterland vegetation. Currently, these three ecosystems are all represented in existing parkland, but are limited in scale.

2.4.9 UNDERPROVISION OF FACILITIES

The 1988 WSROC Regional Recreation Strategy (Ref: H3) identified a number of facilities that appear to be underprovided in western Sydney. These are:

- athletic tracks
- botanical gardens
- equestrian centres
- sports arenas
- urban parks;
- velodromes.

2.5 ECONOMIC CONSIDERATIONS

2.5.1 FUNDING

Depending upon the nature of regional recreational facilities a variety of funding sources are available. Base works of the study area would be undertaken by the Public Works Department however specific features could be assisted by other bodies, for example:

- Department of Sport, Racing and Recreation (equestrian centres, beaches, swimming pool complexes, athletic facilities);
- Chipping Norton Lake Authority and the Waterways Infrastructure Development Programme (boat launching ramps, jetties);
- National Parks and Wildlife Service (Nature Reserves);
- Private enterprise and clubs (commercial facilities, hire centres).

2.5.2 MAINTENANCE

Informal consultation with Fairfield City Council has revealed that, as the after uses of the study area are likely to be more of regional than local significance, then provision of maintenance resources could be restricted. This constraint is exacerbated by the study areas susceptibility to flooding which is discussed within the next chapter. It is therefore apparent that it would be desirable to encourage a commercial element within the study area possibly on a leasehold basis for little or no rent so as the study area does not become a financial liability. Within such a lease a provision could be incorporated to permit the review of rental arrangements to reflect the activity's financial success or otherwise.
2.6 ESTIMATED USAGE

A detailed analysis of the likely usage levels of the Floyd Bay area has not been undertaken as part of this study. Notwithstanding this, there is some recent data available from which certain deductions can be made.

Fairfield Council has produced a profile of the city for regional priority rating (Ref:G3), that includes two matters of particular relevance to this study: population composition and trends, and recreation, leisure and sport. Bankstown council has produced a visitor survey of Mirrambeena Regional Park (Ref:F1), that provides data on the number, ages, origins and preferences of users of that facility.

The Fairfield report indicates that Council considers that Lansvale and Hollywood are a "fringe area", well away from the centres of population and development within Fairfield. Accordingly, Council has placed a low priority on expenditure for both maintenance and provision of facilities within the study area, given that it has more immediate concerns regarding the provision of facilities elsewhere. Discussions with Council officers also indicated that the Council, for sometime, had no success in convincing sporting groups to even use the existing Council controlled soccer playing field located adjacent the Fogolar Furlan Club and South Park, due entirely to its remoteness. This situation has now changed, with strong support shown by schools and sporting groups for all the available parks in this area.

The Bankstown report, however, provides data that confirms the regional significance of Mirrambeena Park. It would not be inappropriate to assume that if Floyd Bay is brought to a similar standard, its catchment area of users would also be of regional extent. As an indication of the possible regional catchment of Floyd Bay, Table 2.2 has been developed from data in the Bankstown report. The table indicates selected visit rates per thousand of population by Local Government Area of family groups, on a weekend in November, 1988.

Table 2.2 Rate of visits to Mirrambeena Park (families)

<table>
<thead>
<tr>
<th>Local government area</th>
<th>Rate per 1,000 (Family groups)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bankstown</td>
<td>486</td>
</tr>
<tr>
<td>Liverpool</td>
<td>451</td>
</tr>
<tr>
<td>Fairfield</td>
<td>179</td>
</tr>
<tr>
<td>Campbelltown</td>
<td>56</td>
</tr>
<tr>
<td>Baulkham Hill</td>
<td>39</td>
</tr>
<tr>
<td>Leichhardt</td>
<td>34</td>
</tr>
<tr>
<td>Kogarah</td>
<td>32</td>
</tr>
</tbody>
</table>

Source: Mirrambeena Park Study

Table 2.3 indicates selected visit rates, per thousand of population by Local Government Area, for clubs and work groups.
It is readily seen that some visitors are willing to travel a considerable distance to use Mirrambeena Park, and also that a significant number of users are from local areas.

The Mirrambeena Park Study (ref. F1) indicates that family groups are the most common users (54.1%) followed by friendship groups (21.9%). Accordingly there is a bias in the age of users with young children and juveniles comprising almost half (46.5%), 20 to 40 year olds about a quarter (28.4%) and over 40's the remainder.

The study also indicates the range of activities that visitors intended to undertake in Mirrambeena Park. Table 2.4 demonstrates the preferences of users when a range of facilities are provided.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Percentage of users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Picnicing</td>
<td>55.7</td>
</tr>
<tr>
<td>Relaxing</td>
<td>74.3</td>
</tr>
<tr>
<td>Walking</td>
<td>68.8</td>
</tr>
<tr>
<td>Nature study</td>
<td>10.9</td>
</tr>
<tr>
<td>Photography</td>
<td>12.7</td>
</tr>
<tr>
<td>Feeding ducks</td>
<td>25.8</td>
</tr>
<tr>
<td>Walking dog</td>
<td>5.4</td>
</tr>
<tr>
<td>Boating</td>
<td>5.9</td>
</tr>
<tr>
<td>Fishing</td>
<td>3.8</td>
</tr>
<tr>
<td>Jogging</td>
<td>9.2</td>
</tr>
<tr>
<td>Training</td>
<td>3.8</td>
</tr>
<tr>
<td>Playing games</td>
<td>35.0</td>
</tr>
<tr>
<td>Watching games</td>
<td>27.8</td>
</tr>
<tr>
<td>Cycling</td>
<td>6.7</td>
</tr>
</tbody>
</table>

The study also asked visitors to identify those features that were seen by the users as attractants. Table 2.5 reflects the choices made.
Table 2.5 Attracting features in Mirrambeena Park

<table>
<thead>
<tr>
<th>Feature</th>
<th>Percentage of responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water setting</td>
<td>19.8</td>
</tr>
<tr>
<td>Natural environment</td>
<td>17.3</td>
</tr>
<tr>
<td>Spaciousness</td>
<td>9.3</td>
</tr>
<tr>
<td>Quietness</td>
<td>8.9</td>
</tr>
<tr>
<td>Good for children</td>
<td>8.9</td>
</tr>
<tr>
<td>Picnic facilities</td>
<td>6.3</td>
</tr>
<tr>
<td>Landscaping</td>
<td>5.1</td>
</tr>
<tr>
<td>Exercise facilities</td>
<td>6.3</td>
</tr>
<tr>
<td>Fauna (duck ponds)</td>
<td>3.4</td>
</tr>
<tr>
<td>Cleanliness</td>
<td>3.4</td>
</tr>
<tr>
<td>General facilities</td>
<td>2.5</td>
</tr>
<tr>
<td>Paddleboats</td>
<td>0.4</td>
</tr>
<tr>
<td>Other</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Source: Mirrambeena Park Study

It is interesting to note that the only commercial feature to enter the list is the paddleboats, for hire, with only one response. This service has now been discontinued.

Table 2.5 can be further grouped to reflect user preference categories of setting (29.1%), facilities (27.0%) and ambience (34.7%).
3.1 REGIONAL CONTEXT

3.1.1 STUDY AREA

The initial brief for this report restricted the Study Area to that portion of the Chipping Norton Lakes that is bounded by Rowleys Point Road and Hollywood Drive in the north, Prospect Creek in the east, the far bank of the Georges River to the South, and the eastern edge of Howard Park in the west as indicated in Figure 3.1. The Study Area was subsequently increased to permit discussion of development options for adjacent land, as well as Floyd Bay.

The study area therefore comprises part of the Georges River, the adjacent area of open water formed by dredging and to be known as Floyd Bay, the road reserve of Hollywood Drive and Rowleys Point Road, the Hollywood Caravan Park, the Hollywood Picnic Ground and the land to the river bank.

3.1.2 PROXIMITY TO POPULATION CENTRES

The proposed recreation area of Floyd Bay, as part of the Chipping Norton Lakes, is located on the Georges River within close proximity to three large regional cities. The major retail centres and central business districts of Fairfield, Liverpool and Bankstown are located about three kilometres north-west, four kilometres south-west and six kilometres to the east, respectively.

It should be noted that the majority of the existing populations of these cities, numbering about 400,000 are within ten kilometres of Floyd Bay. Recent studies of park users undertaken for Bankstown City Council have indicated a strong regional attraction for Mirrambeena Park (Ref: F1). This park is located adjacent to the study area, but is separated by Prospect Creek.

There are a number of other regional centres within ten kilometres of the study area, including Parramatta, Holroyd, Auburn and Glenfield, bringing the total regional population to about 700,000 (1986 census). Each of these centres have relatively stable populations.
Figure 3.1
STUDY AREA

Howard Park

Floyd Bay

Cool Island

Hollywood Park

Georges River

Long Point

Howard Street

Howard Drive

Liverpool Golf Course
3.1.3 ACCESS

The study area is accessible mainly by road and is not currently well served by the public transport network.

Roads

The local and regional road network is well developed and provides access from all directions. The Hume Highway is the main regional road. Linking to this are Henry Lawson Drive (access from the south-east), Woodville Road (north), Newbridge Road (east and west), Governor Macquarie Drive (east and south), Cabramatta Road (west) and The Horsley Drive (west and north).

Trains

The main southern railway passes through Liverpool, Cabramatta and Fairfield, and bifurcates at Cabramatta to pass through Regents Park. This rail network permits travellers from all parts of the Sydney Suburban Railway System to alight at the nearest station at Cabramatta, about three kilometres west of the study area.

Buses

A private bus service (No. 81) operates between Fairfield and Cabramatta rail stations and travels via Lansvale, about 1 kilometre from the study area. This service operates seven days a week at about 30 minute intervals on weekdays, one hour intervals on Saturday morning, one service only on Saturday afternoon, and one trip only on Sunday morning. There are no Sunday afternoon journeys at present.

Taxis

Taxis are available from all local town centres and rail stations. At present there are only restricted facilities to call taxis from the study area.

Access by water

At present there is no formal access available to the study area from the Georges River. Some boat ramps either exist or are proposed in the vicinity, but these cater only for small private craft. There are no ferry or charter services operating upstream of East Hills which is about eight kilometres downstream.

Local charter operators have expressed interest in providing services to the Chipping Norton Lakes, although the lack of facilities and low headroom of the Milperra Bridge are severe constraints.

Air

The proximity of Bankstown Aerodrome permits the influx of visitors from other parts of the country, although the frequency and practicability of such events must be regarded as low.
The provision of a helicopter landing pad (helipad) would conceivably increase the likelihood of charter air passengers visiting Floyd Bay. However, it should be noted that the noise and air currents generated by helicopters may be unacceptable to other recreational users of the area.

**Cycleways**

Currently, the study area contains no designated local or regional bicycle routes nor any off road bicycle paths. A recent study prepared for Fairfield City Council, 'Fairfield Bike Plan' (Ref: H4) did not identify any future proposals for the study area. It should be recognized that existing provision for bicycles along the edge of the main Chipping Norton Lake could be extended through the study area to link up with Mirrambeena Regional Park and beyond.

**Pedestrian network**

Due principally to the study area's current low visual quality and lack of attractions there are no established footpaths or walking trails. In addition, the precinct surrounding the study area is enclosed by water bodies which limits the desirability of pedestrian movements. The Regional Location is shown in Figure 3.2.

![Figure 3.2 REGIONAL LOCATION](image-url)
3.2 RELATIONSHIP TO CHIPPING NORTON LAKE SCHEME

The Floyd Bay Precinct is located in the north-eastern quadrant of the Chipping Norton Lake Authority's area, and is wholly contained within the boundaries of the local government area administered by the City of Fairfield. The masterplan for the Lakes Scheme is shown in Figure 3.3.

The precinct's easternmost boundary is along the western shoreline of Prospect Creek which divides Fairfield from Bankstown. From this point, at the confluence of Prospect Creek and the Georges River, the precinct stretches westward to meet the main Chipping Norton Lake.

The southernmost boundary is along the foreshore of the Georges River located entirely within the City of Liverpool.

The Floyd Bay Precinct therefore enjoys a unique position within the Lake system. It is located at the junction of three local government areas, Fairfield, Liverpool and Bankstown, and is also contiguous with the main lake.

In relative terms, the Floyd Bay water area existing is approximately 20% of the combined area of the main lake.

Floyd Bay can therefore be considered to be a significant portion of the main lake, and is located as to be accepted as an integral part of the entire lake system. This contrasts with
the location of the Lake Moore area, which is located a further 3 kilometres upstream, and is separated from the main lake.

For watercraft traveling upstream, the Floyd Bay precinct will be one of the first attractions encountered, and has the potential to be a major destination for water based visitors.

3.3 ADJOINING LAND USES AND TENURE

The Floyd Bay area is generally surrounded by open space in one form or another, within the three adjacent local government areas of Fairfield, Liverpool and Bankstown. Some of the open space is privately owned, some administered directly by the Chipping Norton Lake Authority, and some by the local councils. Land use is shown in Figure 3.4.

Within Fairfield, the privately owned open space has a commercial basis and comprises the Liverpool Golf Club, the Fogolar Furlan Club and Magic Kingdom. These properties have fully developed private facilities for their members and customers. The owners of Magic Kingdom have applied to Fairfield Council for consent to improve the site, with removal of the caravan park, establishment of a commercial motel facility and extension of the theme park attractions. The remainder of the open space is publicly owned and is either administered by the Chipping Norton Lake Authority, or Fairfield Council. Some of the open space is leased for commercial purposes by the Authority. Andreasens nursery, shown in Figure 3.4 is privately owned and located opposite 'Magic Kingdom'.

The commercially operated and leased areas are the Hollywood Picnic Grounds, the Hollywood Caravan Park and the area to become known as Howard Park, at the end of Howard Street, which is used for the sand extraction. The leases on all these properties are due to expire within the next 3 years (by 1994). A development application has recently (March 1990) been submitted to Fairfield Council, together with an Environmental Impact Statement, for sand extraction at Hollywood Park. This application is currently under consideration by Council.

The Liverpool Golf Club sub-leased a portion of their property for the purposes of a landfill and tip site. The site abuts Hollywood Drive, and is the most visually prominent feature in the immediate area. At the time of this report, the operation had closed and landscaping of the remaining mound had commenced. The mound is approximately 15 metres above the adjoining land surface and extends along the south-western boundary of the Golf Club.

The open space administered by Fairfield Council includes Strong Park and Willow Park, both of which were constructed by the Authority and handed over to the Council. Between these two parks the Authority is in the process of creating Rowley Park, which when complete will link the space from Howard Street to Willow Close.
Within Liverpool, all the open space abutting Floyd Bay is administered and owned by the Authority. A small portion opposite the confluence of Prospect Creek and the Georges River is leased for sand mining purposes. The remainder has been developed by the Authority as passive open space, and will be handed over to Liverpool Council on completion.

Within Bankstown, the abutting open space is fully owned and administered by Bankstown City Council. The entire area, known as Mirrambeena Regional Park, has been solely developed and is fully maintained by Bankstown City Council.

3.4 PHYSIOGRAPHY

With the exception of a small amount of higher land, all the land within and adjacent the Floyd Bay Precinct is low lying. Considering all of the open space area previously discussed, amounting to 98 ha, 54 ha (55%) is below 3 metres, 17 ha (17%) between 3 and 4 metres, 11 ha (11%) between 4 and 5 metres, 9 ha (9%) between 5 and 6 metres, and 7 ha (7%) above 6 metres. Of this latter, about 4 ha comprises the landfill site on the Liverpool Golf Club property. These levels are all based on Australian Height Datum (AHD).

Although the landfill mound has a much higher upper surface level than the surrounding areas, it is located on private property and is not envisaged as being available for public use. However, it is ideally located and most suitable for providing extensive panoramic views of the entire main lake system, as well as views to the Blue Mountains. With the proper agreements in place, and suitable landscaping and access, this site could become an important and distinctive feature of the Floyd Bay Precinct.

All of the low lying land is subject to flooding, at frequent intervals. The extent and frequency of flooding is discussed in the next section.

3.5 FLOODING

The area is known to be flood prone, with inundation of most of the area occurring with statistical frequency greater than 5% annual exceedance probability (AEP) (or less than 1 in 20 years). During the Sydney floods of 5 and 6 August 1986, the Hollywood Drive peninsula experienced significant flooding with many areas being more than 2 m underwater. The extent of flooding is shown on Figure 3.5.

There have been a number of floods of varying intensities in the Georges River and Prospect Creek areas since the Fairfield area was first settled more than 100 years ago. However, adequate records of flooding have only been kept since the early 1960s. This makes the task of predicting the magnitude and frequency of future flooding difficult.

Many studies have been carried out to examine and analyse the available data to derive a flood frequency analysis for the Georges River, particularly at Liverpool Bridge.
Figure 3.5
FLOODING

1986 Flood
Additional area in 1956 Flood
Additional area inundated by 1 in 100 year flood
Flood experience and records indicate that moderate flooding is likely to occur when rainfall over the whole catchment is about 200 mm in 48 hours. Major flooding can be expected when rainfall over the catchment exceeds 250 mm in 48 hours.

A tidal variation may also be superimposed on flood behaviour. With a tidal range of 2.0 m, the actual limit of flooding may depend largely on the tide at the time of the flood peak.

A refined flood forecasting system by the Bureau of Meteorology predicts peak heights at the Liverpool Bridge gauge, approximately 6.5 km upstream of the Hollywood Drive precinct. The proximity of this gauge gives confidence to the prediction of peak heights in the study area. The Bureau of Meteorology has defined flood classification at key river gauges at Liverpool Weir (State Emergency Services and Civil Defence Organization 1982):

- minor flood: 2.0 m (gauge) 4.8 m AHD
- moderate flood: 3.0 m (gauge) 5.8 m AHD
- major flood: 4.5 m (gauge) 7.3 m AHD.

The last flood of significance in the Georges River was in August 1986 when the Cutler Road gauge peaked at about 5.4 m AHD. This flood is just below the 5% AEP flood, or 1 in 20 year recurrence interval. With even the largest flood this century (1956) rating lower than the 2% AEP (1 in 50 year recurrence) flood it is clear that the Hollywood Drive area of Lansvale has not experienced a 'severe' flood in the living memory of most of its residents.

During evacuation of the area, especially the low lying section around Hollywood Caravan Park, problems are encountered as escape routes are cut by rising floodwaters before the evacuated area actually becomes inundated. This is a potentially life threatening situation.

### 3.6 EXISTING UTILITIES

The Floyd Bay Precinct is well serviced with traditional public utilities, with the exception of sewerage and gas, as shown in Figure 3.6. Overhead power and street lighting is available in Hollywood Drive, Rowleys Point Road and Howard Street, as are underground water mains with fire hydrant take-offs. Underground and overhead Telecom services are available for the same streets, however the underground Telecom services are major trunk lines which emanate from Chipping Norton and pass along the portion of Hollywood Drive that is not parallel to the shoreline of Floyd Bay.

### 3.7 ZONING

The current zoning of the study area, under the planning instruments of Fairfield City Council, is a mixture of 1(a2); non urban/rural along Hollywood Drive and 6(a); open space within the area of Hollywood Park, as shown in Figure 3.7. Surrounding areas
Figure 3.6
UTILITY SERVICES

- Long Point
- Howard Park
- Strong Park
- Hollywood Drive
- Liverpool Golf Course
- Hollywood Park
- Cool Island
- Floyd Bay
- Rovengrave Point Road

- UNDERGROUND WATER & HYDRANTS
- UNDERGROUND TELECOM
- OVERHEAD POWER & LIGHT
Table 3.1 indicates flood heights for all significant floods since 1950.

Table 3.1  Floods in Georges River Since 1950 - peak height in Hollywood Drive vicinity*

<table>
<thead>
<tr>
<th>Year</th>
<th>Liverpool Weir</th>
<th>Cutler Road</th>
<th>Junction with Prospect Creek</th>
<th>Milperra Bridge</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>7.45</td>
<td>5.0</td>
<td>4.1</td>
<td>3.45</td>
</tr>
<tr>
<td>1956</td>
<td>8.40</td>
<td>5.9</td>
<td>5.6</td>
<td>4.7</td>
</tr>
<tr>
<td>1961</td>
<td>7.15</td>
<td>5.45</td>
<td>4.55</td>
<td>3.75</td>
</tr>
<tr>
<td>1963</td>
<td>6.5</td>
<td>4.45</td>
<td>3.8</td>
<td>3.3</td>
</tr>
<tr>
<td>1964</td>
<td>7.0</td>
<td>4.85</td>
<td>4.15</td>
<td>3.6</td>
</tr>
<tr>
<td>1967</td>
<td></td>
<td>4.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1969: April</td>
<td>6.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1975: Nov</td>
<td>5.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1978</td>
<td>6.0</td>
<td>4.2</td>
<td>3.45</td>
<td>2.9</td>
</tr>
<tr>
<td>1983</td>
<td>4.62</td>
<td>1.87</td>
<td>1.50</td>
<td>1.26</td>
</tr>
<tr>
<td>1986</td>
<td>7.24</td>
<td>5.36</td>
<td>4.50</td>
<td>4.44</td>
</tr>
</tbody>
</table>

* Figures shown are in m AHD

are 1(a2) for areas to the west and, to the north, the Liverpool Golf Club is zoned 6(c); Private Recreation. These zonings do not essentially restrict the potential for alternative development options for the site as they mostly represent a cataloguing of existing uses rather than a definitive plan for eventual use. Fairfield City Council are preparing a unified Local Environmental Plan (LEP) for the entire municipality. It would be opportune to incorporate the intentions for after use as identified within this report.

3.8 LANDSCAPE/VISUAL ASSESSMENT

A landscape assessment undertaken for the study area and adjoining land identified several issues of relevance to the formulation of development options for Floyd Bay. The narrow strip of land, approximately 35 metres wide, adjoining Hollywood Drive is void of any substantial vegetation, and in conjunction with its 'right-angled' interface with Howard Park, demonstrates rigid geometry. The shoreline is not in accordance with that one would expect for a natural lake edge. Whilst it is understood that the Chipping Norton Lakes Scheme is a man-made feature, the existing form of Floyd Bay is still incongruous with the main lake pattern. The narrowness of the above mentioned strip also restricts the potential for development. Adjoining Hollywood Drive to the north, is the dominating landfill site. Currently, it is estimated that the landfill is up to 15 metres in height and while it could ultimately offer a landform benefit in terms of an open space viewing area, its current form is unacceptable in visual terms to any development within the study area. Side slopes appear to be in the order of 1.5 horizontal to 1.0 vertical on which it would be difficult to accommodate substantial vegetation.
The existing caravan park demonstrates the impact of repeated flooding in its generally low visual quality. The park is enclosed by substantial row planting, including elms, however much of the existing vegetation is over mature and as such would not represent an ultimate constraint to development.

The low visual appeal of mixed land uses in flood prone areas extends into the Hollywood Picnic Grounds where the grounds, feature attractions, buildings and structures are generally in an unkempt state. There are indications of previous prosperity but the remaining structures are not stable nor probably worthy of upgrading or restoration. Several rows of mature trees exist mainly to the south of Hollywood Picnic Grounds, closer to the river.

Coot Island is a small residual peninsula, not currently an 'island', which contains considerable numbers of regenerated she-oaks (Cassuarina spp). This landform represents a former river edge and offers very interesting views north-west to the other areas of Floyd Bay and west to restored park areas. The retention of this 'island' is considered highly desirable in that it offers a different viewing perspective of the Lakes Scheme, similar to that of Long Point. On certain low tides, a small island appears in Floyd Bay. This island is located near the original shoreline of the Georges River, and opposite the extension of the northern section of Hollywood Drive. It is understood that a Telecom junction pit is located on this island. The island may have formed by the slumping of sand into adjacent areas of sand dredging. The re-establishment of this island could provide recreational opportunities for watercraft users, and provide visual relief to Floyd Bay.

3.9 SUMMARY OF CONSTRAINTS AND OPPORTUNITIES

Following consideration of all issues previously discussed within this chapter, a graphic summary of the main constraints and opportunities with respect to the study area was undertaken and is shown as Figure 3.8. This figure is not entirely comprehensive in order to avoid confusion, for example it does not include flooding constraints. The main constraints and opportunities, most of which are included in Figure 3.8, are described in the following text under appropriate headings.

**Area-wide considerations**

It is apparent from the findings of this study that the study area should be viewed in a broader geographic sense to include all adjoining land, enclosed by the Georges River and Prospect Creek up to the 'neck' of Magic Kingdom and the residential area commencing at Willow Close. The complimentary nature of existing and future land uses necessitates such consideration. This issue will not be addressed in detail within this report, however the following opportunities were identified:

- the establishment of a circuit walk along Prospect Creek and Floyd Bay, approximately 5 km in length. This would require co-operation of the Liverpool Golf Club through the establishment of an easement, up to 5 m width, possibly in tandem with a land swap;
Rigid lake edge geometry
Narrow corridor
Open space link
Potential path
High potential for special uses
Potential for additional sand mining
Dominant land fill site

Figure 3.8
CONSTRAINTS AND OPPORTUNITIES
the retention of an open space link from the existing pathway along the main Chipping Norton Lake, through Howard Park and the Floyd Bay Study Area, to Beatty Reserve in Bankstown LGA. Such a link would undoubtedly enhance the area’s regional appeal and extend existing pedestrian and cycleway networks;

- in the long-term, commercial development of the site, (should flooding problems be adequately addressed) could take advantage of the golf course’s proximity and the recreational areas;

- upon completion, Howard Park could be merged with Strong Park to create a sizeable area with the potential for accommodating a recreational use of a nature other than passive open space, of which it has been demonstrated the area is well provided for. An equestrian area, for example could be accommodated on a leasehold basis and would be a truly regional attraction.

**Physical constraints**

The study area contains several substantial constraints to a range of development options, namely:

- the frequent flooding and high inundation levels restricts the desirability of commercial interest and the provision of permanent structures;

- the existing uses, namely the 'Hollywood' caravan park and the 'Dizzyland' amusement park should ideally be relocated away from the study area to more suitable flood-free locations;

- the dominance of the landfill site may have to be resolved before the study area could be used effectively for any recreational use. Possible solutions could include removing material from the landfill until it reaches an acceptable form or spreading the material further north through the Golf Course (with the loss of existing fairways possibly accommodated through the leasing or transfer of land within Hollywood Picnic Grounds);

- the potential exists for additional sand mining within Hollywood Picnic Grounds;

- the narrow width of the land adjoining Hollywood Drive restricts its potential for development.

**Landscape considerations**

- the existing foreshore line displays rigid geometry and is incongruous with both the main Chipping Norton Lake and the type of edge normally displayed in a natural lake;

- Coot 'island' offers a unique opportunity for viewing the lakes scheme and should be retained if possible;
• whilst it is generally desirable to retain existing vegetation, the existing stands of trees within the study area could be removed should they form an unavoidable constraint;

• consideration could be given to the re-establishment of the submerged island in Floyd Bay, to provide visual relief and recreational opportunities.
Chapter Four
DEVELOPMENT OPTIONS

4.1 IDENTIFICATION OF RECREATIONAL USES

Following a review of existing recreational facilities, anticipated future demand and the constraints and opportunities identified, the following broad conclusions have been reached with respect to suitable uses within the study area:

- the uses within the study area should be of regional rather than local significance;
- the most suitable uses should exploit the study area's natural attributes, by concentrating upon watersports and activities directly related to the enjoyment and utilization of water bodies;
- the opportunity to provide commercial outdoor facilities should be encouraged in light of the region's adequate provision of local passive open space and the apparent demand for facilities such as equestrian activities;
- it is most important to incorporate a variety of recreational uses within the study area in response to the age structure and cultural differences within the general community;
- the study area and the associated uses should be viewed in a wider context to include areas to the north and west and the long-term potential of providing a major recreational precinct with a variety of uses and links to other recreational areas;
- the need to provide for family groups for passive recreational uses such as swimming, sunbaking etc in a safe environment, which is perceived to be a different need than the sailing, canoeing, boating and fishing opportunities;
- nominated recreational uses should include those of a commercial nature which would assist in offsetting maintenance costs. Intensive development which still incorporated public recreation areas should not be discouraged.
4.2 DESIGN COMPONENTS

4.2.1 IDENTIFICATION OF ELEMENTS

Following consideration of the study area in the context of regional recreational needs and objectives and the identification of the site constraint and opportunities, an 'inventory of design components applicable to the study areas' attributes was compiled. These constitute the basis for the formulation of alternative development options.

The design components are generally related to the utilization of the Chipping Norton Lake Scheme and represent a range of 'built' elements which vary in feasibility, depending on site factors and end-user requirements. Relevant issues associated with each component are outlined to indicate the scope of consideration for detailed design.

4.2.2 BEACH

Though swimming is not encouraged within the Lakes Scheme, beaches provide for wading, sunbaking and launching areas for passive water sports, e.g. windsurfing. Sand areas can also accommodate informal ball games. Issues relevant to beaches include:

- shoreline profile
- water depth
- source of material
- stability and resistance to flooding
- water quality
- wave action and prevailing winds
- potential use of adjoining waterway
- vehicular access
- proximity to other recreation facilities such as kiosk and picnic area
- supplementary features include shade trees and children's play area.
4.2.3 PICNIC AREA

Picnic areas add considerable depth to open space areas and are particularly successful in areas adjacent large water bodies. It is most important to locate car parking within at least 100 metres of picnic facilities. Other relevant issues include:

- demand and capacity
- vehicular access
- relationship to footpath and cycleway network
- minor earthworks such as mounding
- shade, shelter and screen planting
- relationship to other recreation facilities such as beach, lookout, play area
- specific facilities such as shelters, BBQs, seats, toilets
- maintenance demands: litter, mowing
- space to permit a variety of activities.
4.2.4 LOOKOUT

Lookouts provide opportunities for viewing the entire Chipping Norton Lake Scheme as well as more distant views to the Sydney CBD and the Blue Mountains. Their location is of critical importance as well as the design treatment. Relevant issues include:

- proximity to vehicular access, footpath or cycleway network, or popular recreation facility
- extensive and attractive views
- elevated terrain
- water edge, preferably promontary
- viewing platform or tower (ref. Bicentennial Park)
- Earthworks and structural cost

Option with direct vehicular access

- relationship to road networks and other parking areas
- extent of parking and lookout area
- construction feasibility cut and fill
- visual impact
- relationship to other facilities such as promenade
- impact on flooding.
4.2.5 PROMENADE

Though essentially a 'hard' design solution to recreational areas, the provision of a promenade is considered feasible in response to the rigid geometry of the Hollywood Drive foreshore.

Issues of relevance include:

• direct pedestrian access
• proximity to vehicular access
• link between other facilities; integration with footpath/cycleway network
• proximity to the water edge
• safety
• construction feasibility retaining wall, paving
• supplementary features shade trees, lighting, seating
• relationship to other facilities e.g. kiosk, lookout, beach
4.2.6 ISLANDS

Islands essentially provide scale and interest to water bodies as well as viewing points which differ from land-based areas. They need only extend 1 m to 1.5 m above water surface and be partially or totally planted. Relevant issues include:

- erosion mitigation techniques
- consideration of existing land areas
- location of residual material won from sand mining
- access to islands
- provision of lookouts
- integration with nature trails
- stability

4.2.7 BOAT RAMP

Provision of boat ramps is considered desirable in view of existing demand in the area, the study area’s locational attributes and the emphasis on watersports. Relevant issues include:

- direct vehicular access
- car and trailer parking size and proximity
- shoreline profile
- water depth
- resistance to flooding and erosion
- boating potential of waterway
- relationship to other boat ramps, existing and proposed
- location in relation to wave action and prevailing winds: ease of launching, etc.
4.2.8 JETTY

Jetties are an efficient informal means of allowing interaction with water areas for a wide range of users. Design issues include:

- anticipated use: fishing, lookout, mooring
- size of vessels to be accommodated; clearances
- water depth and tidal range
- need for dredging
- resistance to flooding
- construction feasibility: bed conditions, timber or concrete construction
- supplementary features: shelter, tide steps
- landward connection
- direct pedestrian access: proximity to vehicular access
- relationship to other facilities: promenade, kiosk, beach
4.2.9 NATURE TRAIL OR BOARDWALK

Nature trails and boardwalks provide an opportunity for a departure from traditional passive activities such as picnicking and walking to allow observation of the natural environment. Relevant issues include:

- site capability and potential
- conservation of existing vegetation
- creation of wildlife habitats
- engineering and hydrological feasibility
- mangroves, wetlands, swamp areas
- pedestrian access with views
- relationship with other facilities such as picnic areas
- supplementary facilities such as information displays, bird hides
- versatility: link to jetty fishing platform or island

4.2.10 CONNECTING BRIDGE

When provided, small pedestrian/cycle bridges can connect nearby areas of open space to permit users to enjoy a wider range and scale of recreational activities. Relevant issues include:

- resilience to flooding
- sympathetic design detail
- location with respect to pedestrian/cyclist network
- height above passing water craft
- emergency vehicle usage
4.2.11 COMMERCIAL FACILITY

A range of facilities could be provided within this category including boat hire, a 'boat shed' restaurant, motel, waterside pub and recreational facilities (sailing club, tennis courts). Relevant issues include:

- impact on flooding: access and design constraints
- commercial and funding viability
- private licensee
- direct vehicular access
- extent of site coverage
- supporting facilities such as parking, storage
- waterside location
- boat access and views
- significant engineering and building works visual impact
- alienation of parkland
- relationship to other facilities, e.g. jetty, beach
- staging.
4.2.12 EVALUATION OF DESIGN COMPONENTS

In order to give an indication of the respective merits of each of the components discussed, Table 4.1 provides an evaluation of each component.

<table>
<thead>
<tr>
<th>Component</th>
<th>Estimated land take</th>
<th>Relative cost</th>
<th>Compatibility with other components</th>
<th>Need for vehicular access</th>
<th>Issues to success</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beach</td>
<td>Low to moderate</td>
<td>Moderate</td>
<td>High</td>
<td>Indirect</td>
<td>• Stability</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Water quality and visibility</td>
</tr>
<tr>
<td>Picnic area</td>
<td>Low to moderate</td>
<td>Low</td>
<td>High</td>
<td>Indirect</td>
<td>Visual and environmental character</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lookout</td>
<td>Low</td>
<td>Low to moderate</td>
<td>High</td>
<td>Indirect</td>
<td>Visibility</td>
</tr>
<tr>
<td>Promenade</td>
<td>Moderate</td>
<td>High</td>
<td>Moderate</td>
<td>Indirect</td>
<td>• Linear route</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Design treatment</td>
</tr>
<tr>
<td>Islands</td>
<td>Moderate</td>
<td>Moderate</td>
<td>High</td>
<td>Indirect</td>
<td>• Stability</td>
</tr>
<tr>
<td>Boat ramp</td>
<td>Moderate to high</td>
<td>High</td>
<td>Moderate</td>
<td>Direct</td>
<td>• Access</td>
</tr>
<tr>
<td></td>
<td>(incl. parking)</td>
<td></td>
<td></td>
<td></td>
<td>• Water depth</td>
</tr>
<tr>
<td>Jetty</td>
<td>Low to moderate</td>
<td>High</td>
<td>High</td>
<td>Indirect</td>
<td>• Access by craft</td>
</tr>
<tr>
<td>Nature trail/boardwalk</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td>Distant</td>
<td>• Ecological</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Design concept</td>
</tr>
<tr>
<td>Connecting pedestrian bridge</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td>None</td>
<td>• Resilience to</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(emergency</td>
<td>flooding vehicles only)</td>
<td>Demand</td>
</tr>
<tr>
<td>Commercial facility</td>
<td>High</td>
<td>High</td>
<td>Moderate</td>
<td>Direct</td>
<td>• Resilience to flooding</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Commercial viability</td>
</tr>
</tbody>
</table>

4.3 DEVELOPMENT PLAN OPTIONS

In accordance with the broad conclusions identified in Section 5.1 and the design components indicated in Section 5.2, seven development options have been identified. They are described by two characteristics; type of use and a broad investment category, and are presented in two categories:
• minor alterations to the existing shoreline, possibly as a result of additional sand mining;

• a major reduction in existing land area by extensive sand mining with limited refilling.

Each of the options is comprehensively described and illustrated in a schematic concept plan.

4.3.1 OPTION A
PASSIVE RECREATION / NATURE CONSERVATION - LOW COST EXISTING SHORELINE

This development plan is a low cost and low intensity option with the emphasis on passive recreation and the creation of natural environments. Structures would not be significant elements in the design. Refer to Figure 4.1.

The main features of this option include:

• limited extension of the land foreshore along Hollywood Drive;

• a foreshore beach along the north-western area of the bay and semi-natural elsewhere, with parking areas along the Hollywood Drive foreshore;

• built elements include a lookout tower on Coot Island, a boardwalk and connecting bridge, boat hire facility, picnic shelters and toilets;

• the creation of a large informal park and nature trail in the area currently occupied by 'Dizzyland';

• the provision of a connecting pedestrian bridge to Beatty Reserve;

• retention of the existing Hollywood Drive alignment;

• the main engineering works include the construction of a beach, parking areas and the upgrading of Hollywood Drive;

• the creation of a mangrove or similar area at the eastern end of the bay with an associated boardwalk and nature trail;
4.3.2 OPTION B
WATERSPORTS / PASSIVE RECREATION - MEDIUM COST
EXISTING SHORELINE

This plan is a variation of the master plan for the Chipping Norton Lakes Scheme prepared by Cox and Corkill Pty Ltd in 1977 (Ref: E1). Refer to Figure 4.2.

The main features of this option are:

- a minor extension of the land foreshore along Hollywood Drive to break up the rigid geometry;
- boat launching and jetty facilities at the eastern end of the bay with some ancillary commercial uses;
- a sand beach located within a small bay on the western foreshore adjacent to Howard Park;
- the provision of a connecting pedestrian bridge to Beatty Reserve;
- deviation of the existing Hollywood Drive and Rowleys Point Road alignment alongside of Floyd Bay;
- the provision of extensive areas for passive recreation, partially associated with the watersports facilities with large park areas at either end of the bay.
4.3.3 OPTION C
WATERSPORTS - HIGH COST
EXISTING SHORELINE

This plan is a relatively intensive high-cost development option with a strong commercial character which is centred upon watersports and the water bodies. Refer to figure 4.3.

The main features of this option include:

• a substantial extension of the land foreshore along Hollywood Drive, together with a realignment of the road to create a more free flowing lake edge;

• the provision of a major marina, boat ramps, a sailing club and ancillary commercial uses at the eastern end of the bay;

• a major commercial facility such as a hotel or convention centre located at the northern end of Hollywood Park which would relate to the golf course as well as the marina area;

• a linear park adjoining Hollywood Drive culminating in a small park with a sand beach adjacent to Howard Park together with boat hire facilities and a kiosk;

• re-alignment of Hollywood Drive;

• the provision of a connecting pedestrian bridge to Beatty Reserve.
4.3.4 OPTION D
WATERSPORTS HIGH COST
EXISTING SHORELINE

This plan is a high cost option characterized by a formal arrangement of significant built elements, large areas of land surfaces and relatively small areas of open space. Refer to Figure 4.4.

The main features of this option include:

• substantial extension of the land foreshore along Hollywood Drive;
• a hard surfaced promenade along the full length of the northern side of the bay separated by an avenue of trees from Hollywood Drive;
• a sailing club, ferry wharf and marina complex centred around the western end of the bay;
• a major commercial facility such as a hotel or convention centre at the eastern end of the bay with water access;
• two main parking areas located at the eastern and western ends of the bay, adjacent to built facilities;
• provision of a connecting pedestrian bridge to Beatty Reserve.
4.3.5 OPTION E
PASSIVE RECREATION / NATURE CONSERVATION - LOW COST
REDUCTION IN EXISTING LAND AREA

This plan has a low emphasis on built structures and concentrates on the creation of
habitats and viewing points from which to observe them. Refer to Figure 4.5.

The main features of this option are;

- the creation of two inter-linked islands at the eastern end of the bay to provide visual
  and nature conservation interest. These would also be connected to the main land
  mass by a series of board walks;

- re-alignment of the foreshore profile adjoining Hollywood Drive to break up the
  rigid geometry;

- a sand beach at the western end of the study area together with a boat hire facility for
  exploration of newly created areas;

- a connecting pedestrian bridge linking the study area with Beatty Reserve;

- picnic areas adjacent to Hollywood Drive close to the lakes edge;

- the creation of a viewing mound at the eastern end of the study area.
Figure 4.5

BOAT HIRE

BEACH

PICNIC AREAS

OPEN PARK

LOOKOUT

BEACH

BOARDWALK

CONNECTING BRIDGES
4.3.6 OPTION F
PASSIVE RECREATION/ WATER SPORTS - MEDIUM COST REDUCTION IN EXISTING LAND AREA

This plan locates the 'activity' zone at the western end of the bay and provides both services and facilities for boat craft as well as passive recreation users. Refer to Figure 4.6.

The main features of this option include:

- boat launching and jetty facilities at the western end of the bay with a sailing club and ancillary commercial facilities such as a restaurant;

- a minor extension to the Hollywood Drive foreshore;

- a beach area at the eastern end of the study area enclosed by a small peninsula with adjacent picnic areas and incorporated into a linear park;

- a connecting pedestrian bridge to Beatty Reserve.
4.3.7 OPTION G
WATERSPORTS/PASSIVE RECREATION - HIGH COST
REDUCTION IN EXISTING LAND AREA

- This plan reverses the main zones of the previous option to focus activities on the eastern end of the study area. Refer to Figure 4.7.

The main features of this option include;

- a sand beach with associated picnic and parking facilities at the western end of the bay;

- a minor extension to the Hollywood Drive foreshore together with a slight realignment of Hollywood Drive;

- an island with a lookout connected to the main land area by a connecting bridge;

- a pedestrian bridge linking Beatty Reserve;

- the creation of a new bay at the eastern end of the study area incorporating a marina, boat ramps, a restaurant and a sailing club;

- two main parking areas at the eastern and western ends of the study areas;
4.4 COMPARISON OF OPTIONS

4.4.1 ASSESSMENT CRITERIA

The options described in Section 4.3 vary considerably in their form, content and consequences for future works within the study area.

In order to determine a 'preferred' alternative the options were assessed against criteria identified in the course of this study. The assessment criteria based on the preceding chapters is summarized as follows:

Regional Issues

• uses for the site should be of a regional rather than local significance;

• the provision of a link between adjoining open space areas would be highly desirable;

• a variety of uses should be incorporated within the study area;

• the uses should have an emphasis on watersports;

• the incorporation of some form of commercial activity would be desirable in terms of reducing maintenance costs and providing a public facility.

Physical Factors

• resistance to flooding is determined primarily by the sensitivity to inundation of the land uses and the opportunity to increase ground levels through additional sand mining;

• the desirability of utilizing existing resources to fund future works through additional sand mining;

• the need to minimize maintenance by local government authorities.

Landscape Considerations

• the establishment of a sympathetic shoreline geometry with respect to the overall Lake Scheme;

• form and layout should display a compatible visual and physical relationship to the adjoining landfill site;

• the provision of areas with nature conservation interest.
4.4.2 COMPARISON

The development options described in the preceding section have been assessed in terms of their suitability in Table 4.2. The ratings correspond to the positive attributes of any scheme with respect to the identified criteria, for example, a 'low' in 'flooding' indicates that the option is not well suited due to flooding constraints. Several significant observations can be made of the table, these are:

- the conflict between the desirability of offsetting maintenance costs through the provision of a commercial facility and the inherent flooding constraints;
- all options are capable of providing open space links and most have (an) island(s);
- additional sand mining can be viewed as a positive factor by generating additional material to;
  - alter the foreshore line
  - increase ground levels and thus reduce flooding inundation.
- generally all of the options do not relate strongly to the landfill site.

Regional issues

In terms of satisfying the identified criteria, options B, C, D and G demonstrate strong suitability. One of the major reasons for this is the positive benefit of including some form of commercial activity which would:

- contribute to the variety of uses within the study area;
- provide opportunities for associated watersports and;
- assist in offsetting maintenance costs.

Options A and E which have a higher emphasis on passive recreation and nature conservation do not have strong regional attributes.

Physical factors

Options to utilize the existing shore line (A and B) are more favourable than those that would require a significant reduction in the existing land area. The major reason for this is that both options A to B, and to a lesser extent C and D are compatible with a development application submitted in March 1990 for additional sand extraction within the study area.

In terms of flooding, uses of a more capital intensive nature, particularly structures are less preferable. Maintenance considerations favour the incorporation of some form of commercial activity to offset maintenance costs.
Table 4.2  
Comparison of options

<table>
<thead>
<tr>
<th>ASSESSMENT CRITERIA</th>
<th>OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A  B  C</td>
</tr>
<tr>
<td>REGIONAL ISSUES</td>
<td></td>
</tr>
<tr>
<td>Regional Significance</td>
<td>●●●●●</td>
</tr>
<tr>
<td>Open space link</td>
<td>●●●●●</td>
</tr>
<tr>
<td>Variety of uses</td>
<td>●●●●●</td>
</tr>
<tr>
<td>Emphasis on watersports</td>
<td>●●●●●</td>
</tr>
<tr>
<td>Commercial activity</td>
<td>●●●●●</td>
</tr>
<tr>
<td>PHYSICAL FACTORS</td>
<td></td>
</tr>
<tr>
<td>Flooding</td>
<td>●●●●●</td>
</tr>
<tr>
<td>Sand mining</td>
<td>●●●●●</td>
</tr>
<tr>
<td>Maintenance</td>
<td>●●●●●</td>
</tr>
<tr>
<td>LANDSCAPE CONSIDERATIONS</td>
<td></td>
</tr>
<tr>
<td>Shoreline Geometry</td>
<td>●●●●●</td>
</tr>
<tr>
<td>Islands</td>
<td>●●●●●</td>
</tr>
<tr>
<td>Relationship to Landfill</td>
<td>●●●●●</td>
</tr>
<tr>
<td>Nature conservation interest</td>
<td>●●●●●</td>
</tr>
</tbody>
</table>

Key to ratings

- ● Low
- ●● Medium
- ●●● High
Landscape considerations

As previously mentioned, most options do not demonstrate a strong visual and physical relationship with the adjoining landfill site. With the exception of option D which incorporated a hard edged linear promenade, all other options have potential for a sympathetic shoreline geometry which is diminished slightly with larger berthing structures (marinas).

All options, with the exception of D, incorporated an island(s) with options A and E being of higher nature conservation interest.

4.4.3 SELECTION OF PREFERRED OPTION

On the basis of the comparison of options it is recommended that Option B; 'Watersports/Passive Recreation—Medium Cost with existing shoreline' be pursued as the preferred alternative. This option is considered to possess the following advantages:

• potential to accommodate a wide range of features necessary for the area to be of regional significance;

• high emphasis on watersports through the provision of a beach, boat ramps and a small jetty;

• the inclusion of limited commercial facilities will assist in reducing maintenance requirements and providing an income source for the Authority and Fairfield City Council;

• the development strategy would compliment the development application for sand mining of the area which is under consideration. The sand mining could also provide funds for rehabilitation works;

• the retention of a land area equivalent to that currently existing would provide the scope for extensive planted areas of nature conservation interest and sufficient land mass to match the scale of the adjoining landfill site.

A fuller description of the preferred option is provided in chapter five which includes; staging, schematic landscaping, parking areas and the location of built facilities.
5.1 DESCRIPTION OF MASTERPLAN

A copy of the proposed masterplan for the study area is shown as figure 5.1. This has been amended from the plan shown in figure 4.2 to take account of landscape plans prepared for 'Hollywood Park' by the Public Works Department (Appendix B). The masterplan is shown as 'maximum' development. It is envisaged that works would be staged depending on need and the availability of funds. The main components of the masterplan are described in the following sections.

5.1.1 BEACH AND BOAT HIRE

At the northern end of Hollywood Drive, the shoreline would extend out further than its current location to form a gently sweeping beach approximately 300 metres in length on a 13 horizontal to 1 vertical gradient to minimize sand loss. The beach would require about 100,000 m$^3$ of suitable fill material, including a sand upper layer at least 1 metre thick.

Boat hire facilities of an informal nature could be provided at this location offering windcraft and canoes, kayaks etc. It is likely that these would require some form of secure lock up facilities such as a storage shed with an office/kiosk. The siting, design and appearance of this facility would require careful consideration. Parking would need to be provided for users of this area. This may be provided in conjunction with future parking areas for Howard Park. Parking areas should be internally landscaped with 'walk-through' sections so as not to constitute pedestrian access barriers.

5.1.2 EXTENSION OF FORESHORE ALONG HOLLYWOOD DRIVE

It was identified in section 3.8 that the foreshore parallel to Hollywood Drive as a linear feature, was incongruous with the main lake pattern. The lake edge has therefore been altered to reflect a more natural arrangement. This would require the provision of additional suitable fill material in the vicinity of approximately 50,000 m$^3$ which may be undertaken in conjunction with the proposal to backfill dredged areas within Hollywood Park with material from the existing sand mining area in Dhurawal Bay, opposite. The edge treatment of the foreshore would consist of a 6 to 1 slope where grass edging is used, and steeper slopes for rock or other artificial edge treatments.

Hollywood Drive should be deviated from its current alignment to reflect the altered geometry of the foreshore. Parking areas, containing bays to accommodate up to fifty cars would be provided along the road, preferably with full access separation. These
would enable views from parking areas and convenient access for picnic facilities along the foreshore areas.

5.1.3 NORTHERN ISLAND

The presence of a sub-surface landform, exposed at certain low tides was identified in section 3.8. Additional dredging has now occurred adjacent to this area (PWD hydrographic survey, August 1990) causing the island to be further submerged (about 2 metres below low tide). This landform should be raised to provide a permanent island in the northern section of the study area. The island would be developed for recreation purposes (primarily related to native conservation) and as a habitat for native birds. The raising of the landform could be achieved by additional dredging and filling with river sand. The final landform would be landscaped with plants comprising known bird attractors.

5.1.4 BOAT LAUNCHING FACILITIES

In recognition of the need to accommodate a variety of watersports within the study area two items have been identified:

- twin boat ramps constructed in concrete, with associated parking (including provision for trailer parking);
- a small jetty, with berthing facilities for up to 6 vessels which could be used both for temporary mooring and to assist in launching heavier craft from the boat ramp.

These items would be staged, depending on demand and should be located in close proximity to each other for functional reasons. The jetty could be of timber-pole construction with timber decking and tide steps, and be designed against flooding effects.

5.1.5 LIMITED COMMERCIAL FACILITIES

It is recommended that consideration be given to the provision of small-scale commercial facilities in the vicinity of the above mentioned boat launching facilities. The main justification of providing such facilities are as follows:

- they would provide a means for offsetting maintenance costs by requiring operators to maintain adjacent park areas;
- would contribute to the range of recreational and facilities not only for users of Hollywood Park picnic grounds but from Mirrambeena Park.

Suitable commercial facilities would, ideally, demonstrate a strong relationship with the Lakes scheme and watersports in general. Uses may include:

- sailing club, with associated storage area and retail outlet;
- restaurant and/or kiosk for day-time and evening.
Other commercial facilities associated with specific recreational features would be considered on an individual basis depending upon demand e.g: archery range, equestrian centre.

5.1.6 COOT ISLAND LOOKOUT AND BOARDWALK

A lookout tower would be provided on the northern end of Coot Island from which views of the entire Chipping Norton Lakes Scheme could be experienced as well as more distant regional views. The lookout would preferably be 3-4 metres in height of timber construction with simple internal stairs with a guard rail.

A boardwalk would be provided on the eastern (sheltered) edge of Coot Island. Due to the variance in flooding levels this would need to be provided on anchored pontoons. The boardwalk should be located close to the shoreline of Coot Island enclosed by dense wetland planting. The boardwalk could constitute an alternative access route for users of the lookout. In general Coot Island would be densely planted to provide wildlife habitat. The main paths would need to be at a minimum level of 2 metres to be above daily tidal fluctuations and to avoid regular flooding. Paths and trails should be constructed in asphalt with timber direction signs and information panels.

5.1.7 HOLLYWOOD PARK

A preliminary landscape plan (Appendix B) has been prepared for Hollywood Park which indicates the general layout and planting massing for this area. This is mostly in accordance with figure 5.1 with the exception of the inclusion of boat launching facilities, limited commercial facilities and the lookout and boardwalk on Coot Island. It is considered that these additional items will generate additional short term parking requirements in excess of the 50 spaces shown in the preliminary landscape plan, with spill-over parking onto the grassed area expected. The park area proposed could accommodate a wide range of passive activities principally picnic areas. If the opportunity is afforded to implement minor level variations through the backfilling operation (should additional sand mining proceed) this should be undertaken. This would assist in drainage and providing visual relief.

5.1.8 CONNECTING BRIDGE

The provision of a connecting bridge to Beatty Reserve and Mirrambeena Park would constitute a critical element in the future planning of Floyd Bay. A bridge would reduce the geographical isolation of Hollywood Park and substantially widen the scope for recreational activities for park users either side of Prospect Creek.

The bridge could be of simple lightweight construction with provision for cyclists but not open to general vehicle usage (emergency only). The bridge would be designed to allow small craft along Prospect Creek to safely pass underneath and to withstand flooding up to the 5% average recurrence interval (1 in 20 year). The Maritime Services Board has expressed a requirement for additional headroom to allow small ferry services into Prospect Creek. The road bridge over the Georges River at Milperra will control the size of vessel able to enter the Chipping Norton Lake area.
5.2 DESIGN ELEMENTS

5.2.1 CIRCULATION NETWORK

The proposed pedestrian and bicycle circulation throughout the study area is shown in figure 5.1. Vehicular access will be restricted to the road system indicated. Most pedestrian and bicycle paths would be constructed in asphalt with timber edge boards.

5.2.2 LIGHTING

Limited mast lighting, to approximately three metres should be provided adjacent to the commercial facilities and along the main pedestrian access between parking areas and the commercial facilities. Roadway lighting would be sufficient to service the facilities, depending on the level of access required at night.

5.2.3 PARK FURNITURE

For maintenance and security reasons, park furniture; seating, benches, litter bins, water fountains should be constructed in-situ and be of a robust nature. In other completed sections of the Chipping Norton Lakes most of the furniture is of painted metal construction.

5.2.4 LANDSCAPE TREATMENT

Table 5.1 contains a recommended planting list for different areas within the masterplan. These would need to be clarified with the Public Works Department Landscape Architect and Fairfield City Council before a final selection is made.

Prior to establishment of turfing, grassing and trees, the entire area should be cleared of all weed infestations. The eradication should include all understorey exotic weeds and grasses including lantana, privet, olive, kikuyu, blackbeny etc and any other noxious infestations. Where weeds are responsible for immediate river edge stabilisation these should be trimmed back and oversown with selected native species, and then removed on establishment of the native species.

5.3 RELATIONSHIP OF MASTERPLAN TO DEP FINDINGS (1980)

A summary copy of the recommendations made by the former Department of Environment and Planning (Ref: E4) are included as Appendix A.

In view of the changes that have occurred since their study it is necessary to examine the implications of the masterplan on those recommendations.
<table>
<thead>
<tr>
<th>Botanical name</th>
<th>Common name</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LARGE TREES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Acacia dealbata</em></td>
<td>Silver wattle</td>
<td>2, 6</td>
</tr>
<tr>
<td><em>Acacia decurrens</em></td>
<td>Black wattle</td>
<td>2, 6</td>
</tr>
<tr>
<td><em>Casuarina cunninghamiana</em></td>
<td>River she-oak</td>
<td>1, 5</td>
</tr>
<tr>
<td><em>Casuarina equisetifolia</em></td>
<td>Coast oak</td>
<td>1, 5</td>
</tr>
<tr>
<td><em>Casuarina glauca</em></td>
<td>Swamp oak</td>
<td>1, 5</td>
</tr>
<tr>
<td><em>Casuarina stricta</em></td>
<td>Drooping she-oak</td>
<td>1, 5</td>
</tr>
<tr>
<td><em>Eucalyptus amplifolia</em></td>
<td>Cabbage gum</td>
<td>5</td>
</tr>
<tr>
<td><em>Eucalyptus camaldulensis</em></td>
<td>River red gum</td>
<td>5</td>
</tr>
<tr>
<td><em>Eucalyptus citriodora</em></td>
<td>Lemon-scented gum</td>
<td>2, 3</td>
</tr>
<tr>
<td><em>Eucalyptus maculata</em></td>
<td>Coastal spotted gum</td>
<td>1</td>
</tr>
<tr>
<td><em>Eucalyptus nicholii</em></td>
<td>Narrow leaved peppermint</td>
<td>2</td>
</tr>
<tr>
<td><em>Eucalyptus microcorys</em></td>
<td>Tallow-wood</td>
<td>1</td>
</tr>
<tr>
<td><em>Ficus microcarpa 'hylii'</em></td>
<td>Hills fig</td>
<td>4, 6</td>
</tr>
<tr>
<td><em>Pinus radiata</em></td>
<td>Monterey pine</td>
<td>1</td>
</tr>
<tr>
<td><em>Platanus x hybrid</em></td>
<td>Plane tree</td>
<td>4, 6</td>
</tr>
<tr>
<td><em>Tristania laurina</em></td>
<td>Water gum</td>
<td>5, 6</td>
</tr>
<tr>
<td><strong>MEDIUM-SMALL TREES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Acacia baileyana</em></td>
<td>Cootamundra wattle</td>
<td>2, 6</td>
</tr>
<tr>
<td><em>Acacia glaucescens</em></td>
<td>Coastal myall</td>
<td>2, 4, 6</td>
</tr>
<tr>
<td><em>Acacia salicina</em></td>
<td>Native willow</td>
<td>2</td>
</tr>
<tr>
<td><em>Banksia ericifolia</em></td>
<td>Coast banksia</td>
<td>2, 6</td>
</tr>
<tr>
<td><em>Banksia integrifolia</em></td>
<td>Red honeysuckle</td>
<td>2, 6</td>
</tr>
<tr>
<td><em>Banksia serrata</em></td>
<td>Willow-leaf bottlebrush</td>
<td>2, 6</td>
</tr>
<tr>
<td><em>Callistemon salignus</em></td>
<td>Weeping bottlebrush</td>
<td>2, 6</td>
</tr>
<tr>
<td><em>Callistemon viminalis</em></td>
<td>Forest oak</td>
<td>2, 6</td>
</tr>
<tr>
<td><em>Leptospermum laevigatum</em></td>
<td>Coast tea tree</td>
<td>1, 6</td>
</tr>
<tr>
<td><em>Leptospermum petersonii</em></td>
<td>Lemon-scented tea tree</td>
<td>1</td>
</tr>
<tr>
<td><em>Melaleuca armillaris</em></td>
<td>Bracelet honey-myrtle</td>
<td>2, 6</td>
</tr>
<tr>
<td><em>Melaleuca ericifolia</em></td>
<td>Swamp paperbark</td>
<td>1, 2, 6</td>
</tr>
<tr>
<td><em>Melaleuca styphelioides</em></td>
<td>Prickly-leaved tree</td>
<td>1, 6</td>
</tr>
<tr>
<td><em>Tristania conferta</em></td>
<td>Brush box</td>
<td>3, 6</td>
</tr>
<tr>
<td><strong>SHRUBS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Acacia elongata</em></td>
<td>Swamp wattle</td>
<td>2, 5</td>
</tr>
<tr>
<td><em>Acacia longifolia</em></td>
<td>Sydney golden wattle</td>
<td>2, 4, 6</td>
</tr>
<tr>
<td><em>Bauera rubioides</em></td>
<td>River rose</td>
<td>2, 3</td>
</tr>
<tr>
<td><em>Eriostemon myoporoides</em></td>
<td>Long leaf waxflower</td>
<td>2, 3</td>
</tr>
<tr>
<td><em>Grevillea asplenifolia</em></td>
<td>Spider flower</td>
<td>2, 6</td>
</tr>
<tr>
<td><em>Leptospermum flavescens</em></td>
<td>Yellow tree tea</td>
<td>2, 6</td>
</tr>
<tr>
<td><em>Melaleuca squarrosa</em></td>
<td>Swamp paperbark</td>
<td>2, 5</td>
</tr>
<tr>
<td><em>Bankia spinulosa</em></td>
<td>Hill banksia</td>
<td>2, 6</td>
</tr>
<tr>
<td><em>Grevillea punicia</em></td>
<td>Red spider flower</td>
<td>2, 6</td>
</tr>
<tr>
<td><strong>GROUND COVERS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Cissus antarctica</em></td>
<td>Kangaroo vine</td>
<td>3</td>
</tr>
<tr>
<td><em>Grevillea juniperina</em></td>
<td>—</td>
<td>3</td>
</tr>
<tr>
<td><em>Grevillea laurifolia</em></td>
<td>Spreading spider</td>
<td>3</td>
</tr>
<tr>
<td><em>Hibertia scandens</em></td>
<td>Guinea flower</td>
<td>3</td>
</tr>
</tbody>
</table>

**Key to application:**

1. Forest belt  
2. Isolated clumps  
3. Carpark areas  
4. Feature trees  
5. River banks  
6. Park trees
5.3.1 GENERAL RECOMMENDATIONS

The masterplan reinforces the general recommendations as outlined below;

**Completely available for general public use**

All areas designated within the masterplan would be for general public use. Limited commercial facilities may only restrict local internal access.

**Priority to water-orientated recreation**

Through the provision of boat ramps, a jetty, boat-hire facilities and a small island at the northern end of the bay, the masterplan is providing varied water-based recreational opportunities.

**Development for intensive use**

A wide variety of uses have been outlined within the master-plan with no-one use dominating to the exclusion of others.

**Developed and promoted with other nearby facilities as a 'Georges River Park'**

This is an underlying theme of this study reflected in the masterplan which is intended to provide facilities of a regional nature and to provide links with adjoining and nearby open space areas.

5.3.2 SPECIFIC RECOMMENDATIONS

Included within Appendix A are 22 specific recommendations. Discussed below are those which could be considered specific to this study:

- the Lake Authority should acquire all remaining land within the Development Area apart from the established residential and commercial uses;

- extensive tree planting should be undertaken to increase the attractiveness of the area;

- high speed boating such as water-skiing, water-bikes and power boating should be prohibited and an 8 knot speed limit be imposed;

- swimming should be allowed (subject to water quality and netted areas);

- parking areas should be provided in various locations linked along a service road;

- launching facilities for heavier boats should be provided by ramps, and the use of the beaches for launching light craft encouraged;
• the provision of commercial facilities should be confined to the two activity centres including Georges Hall Bay (now called Dhurawal Bay in the Chipping Norton Lake Masterplan);

• boat hire facilities should be encouraged;

• kiosk or similar facilities should be provided near the beach areas as well as the activity centres;

• the amusement park should be relocated to allow public recreational use of the land between the golf course and the present location of the park;

• Bankstown City Council should be consulted about the footbridge from the proposed Georges Hall (Hollywood Park) activity centre to Garrison Point (Beatty Reserve);

• barbecue facilities should be provided in the picnic areas.

The major variation from the recommendations relates to no. 15 which states:

The caravan/camping ground should be retained in its present location, but its condition upgraded.

The caravan park has been subject to regular inundation which has had a major impact on its appearance. It is considered that this element is not well sited and detracts from the visual potential of the study area. The use would not be compatible with the recreational activities proposed within this study and should be relocated.

5.3.3 ADDITIONAL SAND MINING

The determination of the application to undertake additional sand mining within the study area will be undertaken by Fairfield City Council. In terms of the findings of this report and the masterplan outlined within, the activity would delay implementation of the proposals for several (2 to 3) years. The major benefits would however be:

• the potential to increase ground levels through backfilling of dredged areas above the flood level;

• provision of revenue to the Chipping Norton Lake Authority to undertake rehabilitation works.

• closure of the caravan park and amusement park, and relocation of Country Music Club.
5.4 STAGING AND COSTINGS

Staging

The staging of the works can be effected in a number of ways, with the final sequence determined by factors beyond the scope of this study.

The staging indicated in Table 5.2 is dependent on the acceptance of the proposal put forward by Maron Investments (Ref:A6) for the extraction of sand from the Hollywood Park area. The table indicates the elements to be included in the preferred development option, which have been subdivided into two zones—Zone B is the area directly affected by the sand mining, and Zone A is the remainder of the Floyd Bay area. The staging relies on the closure of Hollywood Park and the caravan park.

Table 5.2 Proposed Staging (with sand mining)

<table>
<thead>
<tr>
<th>Area A (outside sand mining zone)</th>
<th>Staging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern beach</td>
<td>A2</td>
</tr>
<tr>
<td>Commercial facility (boat hire, kiosk)</td>
<td>A4</td>
</tr>
<tr>
<td>Extension of foreshore along Hollywood Drive</td>
<td>A1</td>
</tr>
<tr>
<td>Northern island</td>
<td>A3</td>
</tr>
<tr>
<td>Circulation network (bike and pedestrian paths)</td>
<td>A1</td>
</tr>
<tr>
<td>Street and other lighting</td>
<td>A2</td>
</tr>
<tr>
<td>Park furniture</td>
<td>A4</td>
</tr>
<tr>
<td>Landscape treatment</td>
<td>A1</td>
</tr>
<tr>
<td>Public facilities (toilets, BBQ areas)</td>
<td>A2</td>
</tr>
<tr>
<td>Car parks</td>
<td>A3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Area B (sand mining zone)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishment of park environment</td>
<td>B1</td>
</tr>
<tr>
<td>Completion of road access</td>
<td>B2</td>
</tr>
<tr>
<td>Commercial facilities (chandlery, restaurant)</td>
<td>B4</td>
</tr>
<tr>
<td>Boat launching facilities</td>
<td>B4</td>
</tr>
<tr>
<td>Jetty</td>
<td>B4</td>
</tr>
<tr>
<td>Coot Island (lookout, bridge)</td>
<td>B2</td>
</tr>
<tr>
<td>Boardwalk</td>
<td>B4</td>
</tr>
<tr>
<td>Bridge over Prospect Creek</td>
<td>B1</td>
</tr>
<tr>
<td>Circulation network (bike and pedestrian paths)</td>
<td>B1</td>
</tr>
<tr>
<td>Street and other lighting</td>
<td>B2</td>
</tr>
<tr>
<td>Park furniture</td>
<td>B4</td>
</tr>
<tr>
<td>Landscape treatment</td>
<td>B1</td>
</tr>
<tr>
<td>Public facilities (toilets, BBQ areas)</td>
<td>B4</td>
</tr>
<tr>
<td>Car parks</td>
<td>B2</td>
</tr>
</tbody>
</table>

An alternative staging, whereby sand extraction from Hollywood Park is not undertaken, is shown in Table 5.3. For convenience, this alternative is designated Zone C.
Table 5.3 Proposed Staging (no sand mining)

<table>
<thead>
<tr>
<th>Zone C (no sand mining)</th>
<th>Staging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishment of park environment</td>
<td>C1</td>
</tr>
<tr>
<td>Landscape treatment</td>
<td>C1</td>
</tr>
<tr>
<td>Completion/upgrading of road access</td>
<td>C1</td>
</tr>
<tr>
<td>Extension of foreshore along Hollywood Drive</td>
<td>C1</td>
</tr>
<tr>
<td>Circulation network (bike and pedestrian paths)</td>
<td>C1</td>
</tr>
<tr>
<td>Bridge over Prospect Creek</td>
<td>C1</td>
</tr>
<tr>
<td>Street and other lighting</td>
<td>C1</td>
</tr>
<tr>
<td>Coot Island (lookout, bridge)</td>
<td>C2</td>
</tr>
<tr>
<td>Northern beach</td>
<td>C2</td>
</tr>
<tr>
<td>Northern island</td>
<td>C3</td>
</tr>
<tr>
<td>Car parks</td>
<td>C3</td>
</tr>
<tr>
<td>Boat launching facilities</td>
<td>C4</td>
</tr>
<tr>
<td>Jetty</td>
<td>C4</td>
</tr>
<tr>
<td>Boardwalk near Coot Island</td>
<td>C5</td>
</tr>
<tr>
<td>Park furniture</td>
<td>C5</td>
</tr>
<tr>
<td>Public facilities (toilets, BBQ areas)</td>
<td>C5</td>
</tr>
<tr>
<td>Northern commercial facility (boat hire, kiosk)</td>
<td>C6</td>
</tr>
<tr>
<td>Southern commercial facilities (chandlery, restaurant)</td>
<td>C6</td>
</tr>
</tbody>
</table>

The commercial facilities are designated as stage C6, but should be interpreted as being closely linked to all items marked stage C5. It is envisaged that the stage C6 items will contribute either partially or completely to the provision and upkeep of the stage C5 items.

Costings

With the exception of the provision of beaches and islands, the costing of the various stagings and items is relatively straightforward. The range of costs for all other items is shown in Table 5.4, and cost of beaches and islands is shown in Table 5.5.

The cost of the commercial facilities is expected to be nil, relying on market forces and business opportunity to supply the incentive for any development. The costings shown are based on estimates for June 1989 completed by the Public Works Department, and escalated by 10% to allow for inflation.
<table>
<thead>
<tr>
<th>Item</th>
<th>Range of Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hollywood Park</td>
</tr>
<tr>
<td>Landscape treatment</td>
<td>500–800</td>
</tr>
<tr>
<td>Completion/upgrading of road access</td>
<td>105</td>
</tr>
<tr>
<td>Extension of foreshore along Hollywood Drive</td>
<td>130–270</td>
</tr>
<tr>
<td>Circulation network (bike and pedestrian paths)</td>
<td>36–45</td>
</tr>
<tr>
<td>Bridge over Prospect Creek</td>
<td>300</td>
</tr>
<tr>
<td>Street and other lighting</td>
<td>30</td>
</tr>
<tr>
<td>Car parks</td>
<td>267</td>
</tr>
<tr>
<td>Boat launching facilities</td>
<td>70–150</td>
</tr>
<tr>
<td>Jetty</td>
<td>45–75</td>
</tr>
<tr>
<td>Boardwalk near Coot Island</td>
<td>55–90</td>
</tr>
<tr>
<td>Park furniture</td>
<td>30</td>
</tr>
<tr>
<td>Public facilities (toilets, sewer system)</td>
<td>200–250</td>
</tr>
<tr>
<td>Shelters and covered picnic areas</td>
<td>45</td>
</tr>
<tr>
<td>Fencing (post and rail/timber bollards)</td>
<td>25–50</td>
</tr>
<tr>
<td>Water supply and irrigation</td>
<td>130–165</td>
</tr>
<tr>
<td>Northern commercial facility (boat hire, kiosk)</td>
<td>—</td>
</tr>
<tr>
<td>Southern commercial facilities (chandlery, restaurant)</td>
<td>—</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>1,968–2,672</strong></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3,304–4,708</strong></td>
</tr>
</tbody>
</table>

Source: PWD June 1989 estimates with 10% inflation

The construction of the beaches and islands is dependent on the availability and cost of suitable filling and armouring material, with the exception of Coot Island which already exists as a promontory.

The construction of the northern beach will require about 100,000 m$^3$ of material. This material can either comprise filling sand, clean fill, clean demolition waste, or waste material from the proposed sand mining of Hollywood Park. Each of these alternatives have cost implications, which are dependent on whether the material is:

- purchased (filling sand or clean fill);
- obtained as waste material from the mining area at minimal cost, or
- charged for by operating the area as a clean fill site (clean fill or clean demolition waste).

The cost differentials are significant, with imported sand costing about $2.5 million, clean fill costing about $4 million, mining waste costing about nothing, and clean demolition fill attracting a negative cost (profit) of between $1 million and $2 million. However, it is considered that the necessary licences to operate a clean waste tip would not be granted, and this option should not be further considered.
Mining waste when used as bulk fill is assumed to be supplied free under the terms and conditions of operation imposed on any mining venture. With the expectation that the material will self compact to a reasonable density, there is also virtually no cost associated with placement.

These costs of construction are summarised in Table 5.5.

Table 5.5 Cost of beaches and islands

<table>
<thead>
<tr>
<th>Item</th>
<th>Range of costs ($ million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern beach (imported sand fill)</td>
<td>2.5</td>
</tr>
<tr>
<td>Northern beach (imported clean fill)</td>
<td>4.0</td>
</tr>
<tr>
<td>Northern beach (mining waste)</td>
<td>nil</td>
</tr>
<tr>
<td>Northern island (mining waste)</td>
<td>nil</td>
</tr>
<tr>
<td>Coot Island (lookout, channel, armouring, bridge)</td>
<td>0.3</td>
</tr>
<tr>
<td>Southern beach (within mining area)</td>
<td>nil to 0.3</td>
</tr>
</tbody>
</table>
Appendix A

D.E.P. RECOMMENDATIONS (1980)
2. Recommendations

Recommendations, both general and specific, are drawn out of the text and set out below.

General recommendations

The objectives for the development of the Lakes and associated land area should be that the Scheme:

1. be completely available for general public use;

Private uses within the Development Area other than servicing and ancillary activities should be actively discouraged to allow maximum public use of and access to the foreshore.

2. be developed giving priority to water-oriented recreation;

The Chipping Norton Lakes should complement rather than duplicate the extensive areas of land for passive recreation in the adjoining Mirambeena Regional Park.

3. be developed for intensive use;

A larger proportion of the population will be catered for, and this will be consistent with the Lakes’ urban location.

4. provide a variety of passive and active recreation opportunities;

One activity should not dominate to the exclusion of others; as many recreation opportunities as possible should be provided.

5. be developed and promoted in conjunction with other nearby recreational facilities as a "Georges River Park";

The area as a whole is of metropolitan significance in terms of recreational potential.

Specific recommendations

These recommendations are listed in a suggested order of priority.

1. The Lake Authority should acquire the following land at the earliest opportunity:

   a foreshore strip on all those lots on the northern bank which have water frontage (to maintain the continuity of the northern bank);

   all the remaining land within the Development Area apart from the established residential and commercial uses;
any residential or commercial land which becomes available; in particular the availability of a large relatively unimproved parcel at Cutler Road should be investigated.

2. Extensive tree planting should take place to increase the attractiveness of the area.

3. An 8 knot speed limit should be imposed over the water area to ensure that the Lakes may be used by all types of boats.

4. High speed boating such as water-skiing, water-bikes and power boating should be prohibited.

5. Swimming should be allowed; this will require provision of netted bathing areas, monitoring of water quality and the erection of water quality indicator signs.

6. The amenity of adjoining residential areas should be preserved by:
   a. discouraging recreational traffic from residential streets where possible; and
   b. landscaping parking areas and recreation areas.

7. No intensive or commercial development should be permitted on the northern bank.

8. Parking areas should be provided in various locations linked along a service road (to encourage maximum use of the entire land area).

9. The Homestead should be opened to the general public as a museum, information centre, exhibition area, tea room or similar.

10. The county open space to the south of the Development Area should be developed in conjunction with the Lakes Scheme.

11. Launching facilities for heavier boats should be provided by ramps, and the use of the beaches for launching light craft encouraged.

12. The provision of commercial facilities should be confined to the two activity centres and the major beaches at Georges Hall and Chipping Norton Bays.

13. Boat hire facilities should be encouraged; light craft from the beaches, and light craft and/or motor boats from the activity centres.

14. Kiosk or similar facilities should be provided near the beach areas as well as the activity centres.
15. The caravan/camping ground should be retained in its present location, but its condition upgraded.

16. The amusement park should be relocated to allow public recreational use of the land between the golf course and the present location of the park.

17. Bankstown City Council should be consulted about the footbridge from the proposed Georges Hall activity centre to Garrison Point.

18. Barbecue facilities should be provided in the picnic areas.

19. Relocation of the scrap metal site from Riverside Road should be investigated.

20. Wherever possible, use should be made of existing buildings and multiple use of existing facilities be encouraged; in particular this could include the use of the school grounds and the use of the southern section of Warwick Farm for parking and/or picnicking.

21. The house and surrounding vegetation at the foreshore end of Riverside Road should be retained for recreation usage associated with the beach.

22. Both recreational and commercial fishing (as at present) should be allowed.
Appendix B

LANDSCAPE PLAN FOR HOLLYWOOD PARK
Appendix C

REFERENCES
Appendix C
REFERENCES

A  SAND MINING


A3  Channel Deterioration in the Georges River Between Liverpool Weir and Little Salt Pan Creek, R F Warner and G Pickup, Department of Geography, University of Sydney, February 1974.

A4  Channel Changes and the Effects of Sand Dredging in the Georges River Between Liverpool Weir and Little Salt Pan Creek, R F Warner and G Pickup, Department of Geography, University of Sydney, February 1974.

A5  The Effects of Sand Mining at Chipping Norton and the Discharge of Treated Sewage on the Upper Reaches of the Georges River, Macquarie University Diploma of Environmental Studies, 1974.


B  OPEN SPACE

B1  Sydney Region Open Space Survey, Research Study 1, NSW Planning and Environment Commission, November 1975.


C FLOODING

C1 The Effect of Construction of Proposed Lake at Chipping Norton on the Behaviour of Georges River, C H Munro, F C Bell, G S Harris, University of NSW Water Research Laboratory, Manly Vale NSW, November, 1967.

C2 The Georges River Hydraulic, Hydrologic and Reclamation Studies, C H Munro, D N Foster, R C Nelson, F C Bell, University of NSW Water Research Laboratory, Manly Vale NSW, December, 1967.

C3 Tidal Flow Pattern of Proposed Lake at Chipping Norton on the Georges River, C H Munro, D N Foster, R C Nelson, F C Bell, University of NSW Water Research Laboratory, Manly Vale NSW, April, 1968.

C4 Flood Hazards to Developments along the Lower Georges River - Liverpool to East Hills, Sinclair Knight and Partners, for the Department of Public Works NSW, April, 1968.

C5 Frequency of Floods in City of Liverpool, C H Munro, F C Bell, D N Foster, University of NSW Water Research Laboratory, Manly Vale, NSW, July, 1975.


C8 Prospect Creek Flood Model Investigation, Public Works Department Manly Hydraulics Laboratory, Report No. 348, March 1985.


C13 Lower Prospect Creek Floodplain Management Study, Willing & Partners for Fairfield City Council, May 1990 (3 volumes)

C15 Georges River Water Level Data, Computer Printout for 5th-9th July 1988, 1st-5th April 1989, 1st-6th February 1990, for cutler Road Flood Recorder, Lansvale, Manly Hydraulics Laboratory.

D HISTORICAL


E PLANNING

E1 Chipping Norton Lake Planning Study, Cox and Corkill Pty Ltd, for Department of Public Works, October 1977.

E2 Chipping Norton Lake Planning Study, Study Area Number 1, Cox and Corkill Pty Ltd, for Department of Public Works, May 1978.

E3 Chipping Norton Lake Planning Study, Study Area Number 1, Cox and Corkill Pty Ltd, for Department of Public Works, October 1978.


F USER SURVEYS

F1 Mirrambeena Park Visitor Survey 1988, M E C Sant, School of Geography, University of NSW, for Bankstown City Council, June 1989.

F2 Deepwater Park Visitor Survey 1988, M E C Sant, School of Geography, University of NSW, for Bankstown City Council, June 1989.

G GENERAL

G2 The Quality of Sydney's Natural Waterways in Relation to its Growth, State Pollution Control Commission, February 1977.

G3 Fairfield City, A Profile, for Regional Priority Rating and Review Committee, Fairfield City Council, 1989.

H RECREATIONAL STUDIES

H1 Regional Recreational Facilities, Department of Sport and Recreation, 1986 (unpublished computer printout).

H2 Recreational Development of County Open Space, Riverside Road, Chipping Norton, Cameron McNamara Consultants Pty Ltd, for the Chipping Norton Lake Authority, 1986 (unpublished).


Appendix D

STUDY TEAM
Appendix D
STUDY TEAM

The study was prepared for the Chipping Norton Lake Authority by the study team listed below. Liaison with the Authority was through Mr Karim El-azar, Mr Dennis Binai, and Mr Ted Richards of the Metropolitan South Region Office of the Public Works Department, at Chipping Norton.

KINHILL ENGINEERS PTY LTD, PRINCIPAL CONSULTANT

Rodney McMaugh          Project Supervisor, Civil Engineer
Michael J. Erickson      Urban and Regional Planner
Ying Chew               Graphic Designer
Heidi Kyriacou           Word Processing Operator
Sue Oxborrow             Water Engineer
Maureen Wade             Environmental Planner
Peter Radmall            Landscape Architect