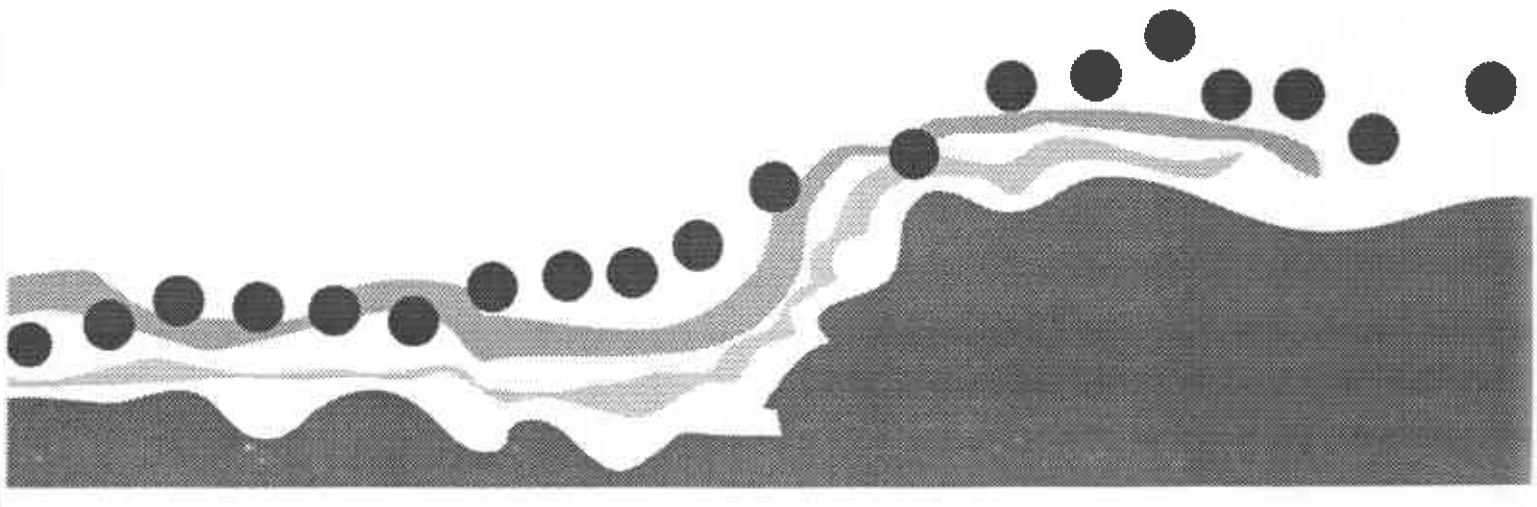
Category 7 — Management & maintenance

Goals

Manage the study area to ensure the preceding goals and objectives are fulfilled.

Where feasible, enforce regulations to maximise protection and enjoyment of the bay.



7.1 Minimising vandalism

Anti-social behaviour, including car dumping, trail-bike riding in public recreation areas and scavenging inter-tidal marine life, have been raised as problems in the study area. Once the actions in this plan of management are implemented, and once visitation begins to increase, this behaviour will likely decline, as the study area will no longer be perceived as a backwater where anti-social behaviour can go easily undetected. Nevertheless, certain actions can be taken to minimise this behaviour.

Action	Capital cost ($)	Annual cost ($)	Year to begin	Role	Evaluation
Encourage local residents to take a role in enforcing management measures within the study area. This should help reduce anti-social behaviour, such as scavenging of inter-tidal marine life, and car dumping	0	0	94/95	Rec'n Assets Mnr	
Erect appropriate signs to advise visitors of the study area's special features and the need to respect them, and of inappropriate activities, and relevant penalties	500	0	94/95	Mnr, Parks & Rec'n	
Appoint a beach inspector during summer holiday periods and on summer weekends to help manage the beach and rock pool and complement the role of the ranger patrols	Nil	30000	95/96	Mnr, Works	
Total	**500**	**30,000**			

7.2 Public awareness

The plan of management, together with the work being undertaken by the Water Board in Cromwell Park, represents a turning point for the study area, from a neglected and degraded natural area to one of great natural and rugged beauty. It is important that this fact be widely known to help promote the new image of the area and respect for it, particularly by visitors. An ongoing public awareness program is central to this goal. The publication and distribution of a brochure, which advised the public of the plan of management and the proposed changes, has been an important part of the process to raise awareness of the area.

Action	Capital cost ($)	Annual cost ($)	Year to begin	Role	Evaluation
Begin a photo library documenting the study area as it is now and on an annual basis once key actions in the plan of management have been implemented	0	1000	94/95	Rec'n Assets Mnr Snr L'scape Architect	
Produce regular news releases to local and metropolitan media to publicise major upgrading milestones in the study area	0	1000	94/95	Public Relations Officer	
Total	**0**	**2000**			

7.3 Continuing community involvement

Active community involvement — principally via the Consultative Committee — has been critical in identifying issues and generating the plan of management process. It is essential that this community involvement continues, helping to implement actions recommended in this plan of management, and providing feedback to Council on the success of these actions once they have been implemented. Also, new issues will inevitably arise in the study area, particularly as visitation increases, and it is important that these be discussed within the forum that has already been established. Keeping alive this formal channel of communications will also:

- Foster a sense of 'ownership' of the study area among the local community, which will contribute to community cohesion, and pride in and responsibility for the area.
- Provide an expeditious way to separate perceived from real issues, and to address these issues accordingly.

Action	Capital cost ($)	Annual cost ($)	Year to begin	Role	Evaluation
Maintain the Malabar Beach and Foreshore Consultative Committee to monitor the implementation of the plan of management and to identify other measures that may need to be implemented. The Committee to meet three-to-six monthly, depending on need	0	2000	94/95	Rec'n Assets Mnr	
Undertake a visitor use monitoring program every two years to ascertain use of the study area and satisfaction levels. Consultative Committee to play a leading role in the survey	0	2500	94/95	As above	
Total	**0**	**4500**			

FINANCIAL PLAN

The tables below present a schedule for implementing the actions presented in this plan of management report, and indicate the priority areas. In **Table 1**, actions are costed over a five year planning period. However, given the substantial cost estimates, it is highly likely that these actions would be spread over a much longer period, as Council finances allow, and as funding becomes available through other sources. Actions with a lower priority, which should be undertaken on an as needed basis, are listed separately in **Table 2**.

Table 1 - Annual cost estimates, 1994/95 - 1998/99

Action	Capital cost ($)	Annual cost ($)
1994/95		
Restore rock pool — stage 1	78000	6500
Survey and map dive trail	0	0
Upgrade Cromwell Park amenities block, install outdoor shower	56000	5000
New seating, especially in Cromwell Park	30000	200
Develop new gateway to the bay (shared pedestrian zone, paving, etc)	30000	0
Remove staircase to beach and replace with new path to beach through Cromwell Park	21500	0
Redevelop Dacre St car park and redirect main traffic to Fishermans Rd	11500	0
Investigate feasibility of re-using stormwater to irrigate golf courses	0	0
Prepare concept design for trash racks on the bay's stormwater outlets	6000	0
Investigate, design and install trash racks on all pipes carrying urban storm flow into the bay	29500	2000
Install covered refuse bins (including recycling bins) in Cromwell Park	2500	0
Restore eroded area below existing Dacre Street car park and fence off	64000	0
Introduce measures to ban jet-skis and reduce high boat speeds in bay	2500	0
Establish a Long Bay bush regeneration group and begin bush revegetation/regeneration in Cromwell Park & Randwick Golf Course	12000	1000
Replace aboveground power lines with underground system in Cromwell Park, and install new lighting and poles	8000	2150
Erect signs along northern shore warning of danger of falling material from landfill area	5000	0
Erect signs advising of need to protect the local area	500	0
Begin a photo library of changes to the bay, prepare regular news updates about improvements	4000	2000
Maintain the Malabar Beach and Foreshore Consultative Committee	0	2000
Encase the large stormwater pipe in concrete to reduce visual impact	18000	0
Restore monument in Cromwell Park	1000	0
Undertake visitor use monitoring program	2500	0
Subtotal 1994/95	**382,500**	**20,850**

Continued/...

Table 1 (continued)

Action	Capital cost ($)	Annual cost ($)
1995/96		
Install dive trail, provide diver access, apply for partial spearfishing ban	24500	0
Install new play equipment in Cromwell Park	54000	1500
Build new car park for 25 vehicles near northern boat ramp	25000	0
Begin public awareness program about stormwater pollution	0	2000
Upgrade northern boat ramp and install pipe to prevent runoff over ramp	7500	1000
Prepare EIS for removal of landfill from northern shoreline and engage contractor to remove and crush the fill	40000	0
Dune protection fencing on beach	40000	0
Bush revegetation/regeneration along north side of Bay Parade	70000	7000*
Landscape plan for Randwick golf club house and car park	5000	0
Development control plan covering the area up to the ridgeline	7000	0
Appoint a part-time beach inspector	0	30000
Subtotal 1995/96	**273,000**	**30,000**
1996/97		
Restore rock pool — stage 2	37500	1500
Install new picnic and barbecue facilities	43500	2950
New fencing around Cromwell Park	15000	0
New fencing above rock pool	4000	0
Restore eroded area in site of former surf club and maintain for 3 years	151500	12500*
Implement landscape plan for Randwick golf club house and car park	50000	5000*
Replace tank traps with sandstone blocks	9500	0
Undertake visitor use monitoring program	2500	0
Subtotal 1996/97	**313,500**	**21,950**
1997/98		
Develop the Malabar link of the Randwick coastal walk	30000	500
Replace fencing along Bay Parade	20000	0
Encase the large stormwater pipe in concrete to soften appearance	18000	0
Subtotal 1997/98	**68,000**	**500**
1998/99		
Face concrete retaining wall below Bay Parade with natural paving	14000	0
Undertake visitor use monitoring program	2500	0
Subtotal 1998/99	**16,500**	**0**
TOTAL (1994/95 - 1998/99)	**671,000**	**73,300**

* *Three year maintenance period*

Table 2 - Cost of long-term actions (works to be undertaken as needed)

Action	Capital cost ($)	Annual cost ($)
Long term actions		
Revegetate 1 km strip between cliffs and top of fill area on golf course	200000	5000#
Pave Fishermans Road car park with concrete lattice slabs	10000	0
Restore landfill area on northern side of the bay (includes Aboriginal archaeological sites)	305000	20500*
Replace aboveground power lines with underground system on Bay Parade, and install new lighting and poles	60000	4400
Subtotal long term	**575,000**	**29,900**

** Three year maintenance period*
 # Golf club assistance

MONITORING & EVALUATING THE PLAN OF MANAGEMENT

As required by the Local Government Act, it is necessary for Council to monitor and evaluate the success of the plan of management. This will help ensure the implementation of the plan of management is achieving the plan's specified goals. An appropriate tool for managing areas like Malabar, which has high resource values and increasing visitor use, is called Visitor Impact Management (VIM). The VIM process can help highlight both the success of the plan and any problems that may be occurring, such as whether there are some local environmental problems in certain areas (like the rock pool) which require Council action, or whether the study area's environmental and social carrying capacity are being exceeded (as reflected by such indicators as parking, litter and user conflicts).

Key elements of the VIM process are to:

- **Identify key indicators** which can be used to monitor change. Indicators need to be simple and cost-effective to measure. They need to relate to changes in visitor use/environmental conditions, and be seen to respond quickly after ameliorative action has been taken.
- **Define desired conditions** for these indicators. These desired condition provide a yardstick by which to measure the success of the plan of management. Where possible, desired conditions should be expressed as quantitative standards rather than qualitative statements.
- **Design a system to monitor** these indicators. The system needs to be flexible to meet changing information and environmental conditions.
- **Recommend actions for Council to respond** to the monitoring results. Where perceived and actual problems are identified, these need to be acted upon.

The following tables provide Council with a framework for undertaking a Visitor Impact Management program for the study area. Each table pertains to the respective categories in this report and identifies possible indicators that could be monitored for that category. Quantifying the indicators in the tables is beyond the scope of this study, but can be developed by Council as it implements the VIM approach. Ideally, Council should assign a designated officer to undertake the VIM process, and that officer should produce a regular report (every two years, following the proposed visitor use survey) showing any changes in the key indicators and assessing the need for an appropriate management response.

Category 1: Recreation

Issue	Possible indicator	Desired condition	Method of monitoring	Potential management response
Rock pool	Accidental injuries	No injuries	Insurance claims on Council, and complaints to Council	Increase management of pool
	Pollutants increasing above background levels	Safe water for swimming, as set by the EPA, etc	Water sampling in pool	Assess golf course drainage
	Litter build-up	No litter	Inspection by Council & feedback to committee	Regular clean-up patrols; community education and involvement
	Crowding	Sustainable use (maximum of 100 people at any one time)	Visitor use survey every 2 years	Install lap swimming lanes
	Under-use	Average minimum of 50 people per day during summer months	Visitor use survey every 2 years	Increase publicity
	Visitor satisfaction	75% of visitors satisfied or very satisfied with the pool	Visitor use survey every 2 years	Depends on survey feedback
Dive trail	Damage to seagrass beds	Negligible damage	Divers who establish the trail to monitor	Check if chain or divers are causing damage
	Conflicts with other users	No conflicts	Feedback to consultative committee	If divers (or dive groups) are causing problems, limit use through permit system
	Crowding	Maximum of 6 pairs of divers on the trail at any one time	Divers who establish the trail to monitor	Permits, as above
Cromwell Park facilities, ie:				
Amenities and showers	Litter build-up	No litter	Visual inspection, feedback to committee, and visitor use survey (for all indicators)	More patrols, community education and involvement
Seating	Vandalism	No vandalism		
Play equipment	Crowding	Sustainable use		Increase number of facilities, maintain
Picnic and BBQ areas	Under-use	Sustainable use		Increase publicity
	Visitor satisfaction	75% of visitors satisfied or very satisfied with facilities		Depends on feedback
Gateway to the bay	Car accidents on Dacre Street/Bay Parade	Public perception of safety	Feedback to committee, police accident records	Additional traffic calming measures

Category 2: Access

Issue	Possible indicator	Desired condition	Method of monitoring	Potential management response
Pedestrian access to the beach	Wear lines in the grass where people choose a different path to the beach	The path to be in ideal position for most people to access beach without affecting area's natural features	Photo surveys/ visual inspection	Alter path to match desire lines, or manage pedestrian flow with low barriers, bollards, or plantings
Car parking	Parking sufficiency on Fisherman's Road, near the rock pool, and along Dacre Street	Sufficient on-street and off-street parking to cater for demand on all but peak days (eg public holiday weekends)	Feedback to committee, and to Council; formal car parking and traffic study, if warranted in the longer term	Request State Transit to provide additional bus services on peak days, and publicise these new services; additional angle parking on Fishermans Road; angle parking on Raglan Street and Bay Parade (near rock pool)
Coastal walk	Over-use	Visitors to enjoy an uncrowded coastal experience	Photo surveys/ visual inspection/Feedback to committee, and to Council, survey	Pave or formalise over-used areas, improve interpretative material

Category 3: Health and safety

Issue	Possible indicator	Desired condition	Method of monitoring	Potential management response
Improve water quality of the bay	Water quality in terms of gross pollutants and faecal coliform	Reduced gross pollution due to trash screens; no increase in faecal coliform. If golf courses to re-use stormwater, then improvement in both indicators	Beachwatch sampling; visitor survey of perceptions	Regularly maintain trash screens and assess re-use by golf courses and need for additional filters further up in the catchment
Northern boat ramp	Accidents around boat ramp Over-use	Relatively safe launching area, except during storm seas Sustainable use	Feedback to committee, and to Council Feedback to committee, and to Council	Clean slipway to prevent build-up of algae Patrol boat ramp during peak periods
Litter	Increased litter	Relatively litter-free areas	Feedback to committee, and to Council; visual inspection; visitor survey	Additional bins; more frequent patrols; community education and involvement
Fencing	Level of safety Intrusion by people into protected dune area	Maintain public safety Protect sensitive dune system	Reports to Council of accidents Photo monitoring and visual inspection	Maintain or improve fencing in sensitive areas
Water craft	Continued conflicts between users; high noise levels interfering with quiet enjoyment of the area	Relatively few conflicts; natural background noise levels	Feedback to committee, and to Council; visitor survey	Contact Maritime Services Board to regularly patrol the bay and issue fines to people who contravene the regulations

Category 4: Restoration and rehabilitation

Issue	Possible indicator	Desired condition	Method of monitoring	Potential management response
Erosion	Condition of area around old surf club site	Rehabilitation of the area	Photo monitoring; visual inspection	Maintenance as required
Landfill area	Rate of removal of fill	Removal completed by 1998/99	Liaison with Council Works Dept	Ensure removal is undertaken according to timeframe set out in plan of management
	Dust, noise and other local impacts	Negligible environmental impacts	Feedback to committee, and to Council	Increase hose-down of trucks; work to be undertaken on week days only between set hours
	Damage to Aboriginal artefacts	No damage	Visual inspection	Council to fully brief contractor of need for sensitivity around known archaeological sites, and request NPWS inspection of the area prior to, and during excavation of the area
Bush regeneration and revegetation	Number of weed species and extent of cover	No noxious weeds	Assessment by trained Council staff	Weed control on a priority basis, focusing on target species. Educate staff to recognise potential problems

Category 5: Aesthetics

Issue	Possible indicator	Desired condition	Method of monitoring	Potential management response
Landscape planting	Enhanced visitor and resident perception of the area's natural resource	75% of survey respondents satisfied or very satisfied	Attitude survey of perceptions to plantings Increased birdlife	Measured reaction to broad community perception of plantings rather than hasty reaction to minority demands
Lighting and power lines	Use of park at night; vandalism	Increased use (but not for anti-social activities, eg vandalism); reduced vandalism at night	User survey and feedback from committee	More lighting in strategic locations, if required
Development control plan for adjacent areas	Visitor satisfaction; quality of new development	Consistency of development with attractive coastal landscape	Visitor survey; expert survey	Adherence to sympathetic building design within the study area, including within the area covered by the development control plan
Other issues: Camouflage stormwater pipe Replace tank traps Resurface concrete retaining wall	Visitor and resident perception of the area's visual quality	Visitors and residents with perception that the area's visual quality has improved	Visitor survey	Will depend on response to visitor survey (ie has the area's visual quality improved as a result of these and other measures?) If not, Landscape Architect to assess need for further actions

Category 6: Conservation

Issue	Possible indicator	Desired condition	Method of monitoring	Potential management response
The bay and its ecology	Species diversity and population levels	Increased diversity and population to natural levels	Ecological surveys and feedback from committee	Increase patrols, community education and involvement
Cromwell Park monument	Level of repair	Restoration complete	Visual assessment	Maintain as necessary

Category 7: Management and maintenance

Issue	Possible indicator	Desired condition	Method of monitoring	Potential management response
Ranger patrols and community vigilance	Need for these especially in peak periods	Well managed open space area with a high level of community acceptance and involvement	Visitor survey and feedback from committee and Council staff	Increase patrols, community education and involvement
Public awareness	Level of appreciation of Malabar's values	High level of appreciation of Malabar's values	Visitor survey and feedback from committee and Council staff	Increase public awareness of the study area and ongoing improvements to it
Continuing community involvement	Effectiveness of ongoing management committee	Active, direct role of committee in Malabar's management	Regular meetings with Council, as per the Plan of Management	As required
Cost estimates	Accuracy of plan of management estimates	Actual costs equal to or below cost estimates	Annual audit of costs	If over-budget, Council to re-assess timetable of works and maintenance budget and/or seek additional funds from State government grants; if under-budget, Council to consider bringing forward actions in the plan of management

References

Department of Environment and Planning (1988). Sydney Regional Environmental Plan No 14 — Eastern Beaches

Department of Environment and Planning (1988). Design and Management Guidelines — Eastern Beaches

Manidis Roberts Consultants (1990). Malabar Headland Draft Plan of Management

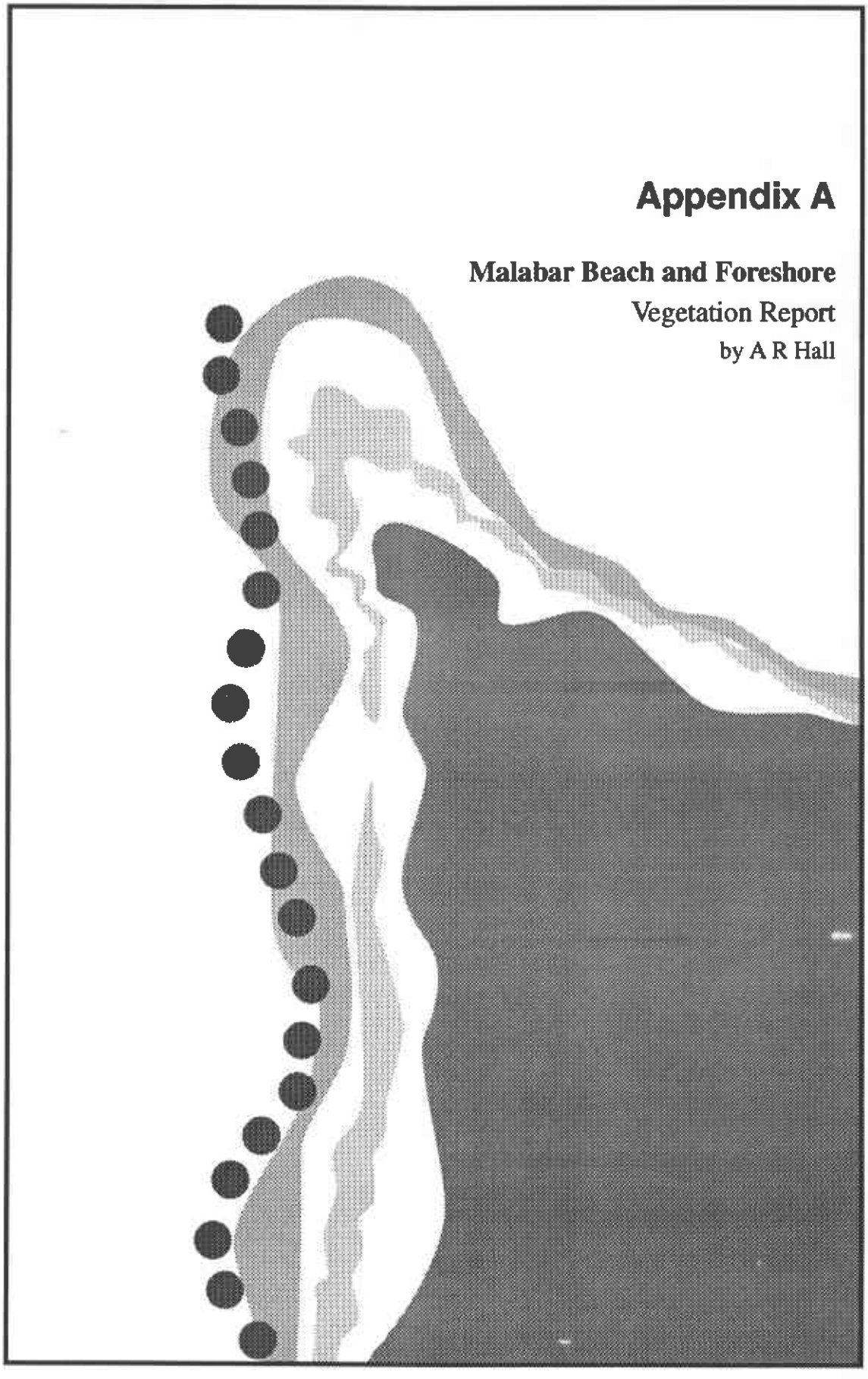
Manidis Roberts Consultants and Department of Conservation and Land Management (1993). Local Government Act 1993 — Land Management Manual

Appendix A

Malabar Beach and Foreshore

Vegetation Report

by A R Hall



Malabar Beach And Foreshore Vegetation Report

by A R Hall

Overview

As recently as thirty five years ago large sections of the study area were still covered by coastal heath and scrub. Since then millions of tons of fill - over ten million tons on Randwick Golf Course alone - have virtually destroyed this native vegetation. All that remains of this indigenous vegetation are small remnants confined to more or less inaccessible spots.

Elsewhere the study area consists of attractive formal parks and unused waste land. The developed area (Zone 2) and being developed area (Zone 1) of Cromwell Park, apart from the lawn areas, have mainly been planted with local native species although they do contain some introduced and exotic species.

The bulk of the remainder of Cromwell Park (Zone 4) and the southern foreshore (Zone 3) is covered with introduced grasses and contains a wide range of weed species. Where mowed and maintained these areas, given the setting of Long Bay, are visually not unattractive. When not maintained, as in the eastern section of Cromwell Park and along the steep edges of the southern foreshore, the vegetation is badly degraded and unsightly.

At places along the cliff edges there are serious infestations of the invasive weed, Bitou bush, (Zone 6) and of the declared noxious weed, Parietaria judaica commonly known as asthma weed, (Zone 4).

Given the now man-made character of virtually the whole of the study area the constraints on its vegetation management are the preferences of local residents, existing planning guidelines and recognition of the climatic conditions of the foreshore area, notably the frequent strong and salt-laden winds. It is worth noting that the President of Randwick Golf Club attributes the now very open nature of the golf course to wind damage after the early fairways were created. The amount of fill used to build up the level of the course must also have contributed to this outcome.

The main relevant planning guidelines are contained in the Design and Management Guidelines of Sydney Regional Environmental Plan No 14 - Eastern Beaches. The relevant paragraphs are 1.1.1.2; 2.1.8 and 2.2.7). The only item of the vegetation guidelines which is now inappropriate is their support for the planting of exotic trees, in particular, Norfolk Island Pine and New Zealand Christmas Bush. These, fortunately, are not very common in the study area the indigenous nature of whose vegetation should be maintained and strengthened.

An "important regional planning objective" of S R E P No 14

is the establishment of a coastal walkway. Randwick City Council has been giving effect to this objective for some time. The precise location of the proposed walkway within the study area has some effect on vegetation planning. It will presumably be in the vicinity of that part of Randwick Golf course most amenable to revegetation with coastal heath species and most likely to enhance the character of the whole Long Bay foreshore area. This is the strip between the cliff top and the top edge of the fill. A list of the main species growing in the good bush on the northern side of the bay, which would be suitable for this area, is attached.

The substantial size of the foreshore areas worth regenerating; the time required to control weed infestations in badly degraded areas; and the probable need, largely for climatic reasons, to revegetate gradually; all point to the necessity that Council recognise that it will need to make a long term commitment of resources if the restoration of the vegetation of the Long Bay foreshore is to be achieved effectively. This may be in the form of a sequence of outside contracts or of the addition of a number of bush regenerators to its staffing establishment.

Specific Areas

Zone 1 - Northern section of Cromwell Park

The formal park now taking shape here on top of the extensive mound of fill from the Water Board tunnel promises to be an attractive one. The plantings consist of indigenous species. They suffer mainly from the limited range of species used. There is thus scope for adding a variety of locally indigenous shrubs and ground covers. Two problems noted were the apparently impervious nature of the underlying fill and the drainage problems this creates and the speed with which the area is being invaded by the Western Australian species Acacia saligna. Culling of these is necessary before they become a serious problem.

The firm maintaining the site is Landscape Construction and Maintenance. Ph. 450 1444

Zone 2 - Cromwell Park just above the beach

No particular comment is necessary on this small but very pleasant park. The small dunal area has a limited number of native species. There is a weed problem on the adjacent cliffs.

Zone 3 - Southern foreshore from beach to Randwick Golf Course

The problem area of this zone is the steeply sloping section above the cliff line which borders the southern shore. This slope is badly infested with a wide range of weeds including the awkward-to-handle blackberry. The cliffs are not high but in combination with the steepness of the slope create a dangerous

working situation. At the expense of some loss of the existing native species the weeds can largely be controlled by repeated spraying. Their replacement by native grasses, sedges and heath species adapted to cliff-top conditions is not likely to be an easy task. Re-vegetation, after weed control, may well need to proceed on a piecemeal, somewhat experimental, basis.

Zone 4 - Eastern section of Cromwell Park

(i) Left of road to boat ramp

This area contains the one relatively extensive section of native coastal vegetation in the study area. Unfortunately the degree of site disturbance and the narrowness of the range of species - mainly Banksia integrifolia and Lomandra longifolia - point to it being a human creation. However that may be it is well worth keeping and could be enhanced with additional plantings.

Further comment is difficult because at the time of visits to the site the above mentioned vegetation was being weeded and the grassy area bordering it was undergoing major landscaping changes. The nearby slope, above the large storm-water pipe, was being covered with fibre matting.

The firm doing the work was Joanne Green Landscape Design - Ph. 979 5363

Tree planting to obscure the long brick wall of the Water Board site is highly desirable.

(ii) Right of road to boat ramp

The more or less level section of this part of Zone 4 consists of deep fill. The prescription for its treatment in S.R.E.P. No 14 still stands: "upgrading the area where fill has been placed ... containing the built plateau and planting it and the rock retaining wall with indigenous heath species, and revegetating eroded areas".

This site could be made ready for re-vegetation by blanket spraying. Alternatively it might be more effective to re-shape the site with heavy earth-moving equipment. In this case some follow-up spraying would be necessary.

The rock retaining wall contains a serious infestation of the noxious weed Parietaria judaica (Asthma weed).

Zone 6 - Randwick Golf Course

Randwick Golf course contains an unexpected range of indigenous species - survivors of the original coastal heath vegetation - but many of them are confined to only one or two specimens. Most survive on or near rocky outcrops above the cliff edge and managed not to be covered by fill. They do not form the

basis for a bush regeneration exercise.

What would be possible, and worth doing to improve the appearance of the golf course from both near and far, would be to clear the severe infestations of Bitou bush from the cliff top area. Then, on the basis of the existing native species remnants, re-vegetate the strip between the cliffs and the top of the fill. This is not very wide but is about a kilometre in length and would be a substantial re-vegetation exercise.

It is to be hoped that the dumping of fill in this area, which is still continuing, will soon be stopped.

Elsewhere on the golf course the Club's efforts to increase the vegetation cover should be encouraged, with the proviso that it should only plant indigenous species.

Predominant Vegetation on north side of Long Bay

Acacia longifolia
Allocasuarina distyla
Baeckea imbricata
Banksia aemula
Banksia ericifolia
Hakea teretifolia
Isolepis nodosa
Leptospermum laevigatum
Lomandra longifolia
Melaleuca armillaris
Monotoca elliptica
Pimelia linifolia
Westringia fruticosa
Zoysia macrantha

	Site Location				
	1	2	3	4	6
Centrolepis fascicularis (Tufted Centrolepis)				*	
Correa alba (White Correa)	*	*		*	
Correa sp.	*				
Cyperus brevifolius (Mulumbimby Couch)			*		
Cyperus polystachyos			*		*
Cyperus tenellus				*	*
Dampiera stricta (Blue Dampiera)					*
Darwinia fascicularis					*
Dianella caerulea (Paroo Lily)					*
Dodanea triquetra (Common Hop Bush)					*
Doryanthus excelsa (Gymea Lily)	*				
Epacris longiflora (Fuchsia Heath)					*
Eriostemon buxifolius (Box-leaf Wax-flower)	*				*
Eucalyptus obtusiflora (Port Jackson Mallee)					*
Eucalyptus sp.	*	*			
Eustrephus latifolius (Wombat Berry)					*
Gleichenia dicarpa (Pouched Coral Fern)					*
Gonocarpus micranthus (Creeping Rushwart)					*
Hakea gibbosa	*				
Hakea teretifolia (Dagger Hakea)			*		*
Hardenbergia violacea (Purple Twining-pea)	*				
Hibbertia fascicularis					*
Hibbertia scandens (Climbing Guinea-flower)	*	*		*	
Imperata cylindrica (Blady Grass)			*	*	
Isolepis nodosa (Knobby Club-rush)		*	*	*	*
Juncus krausii (Sea Rush)			*	*	*
Juncus planifolius (Broad Rush)			*		*
Kennedia rubicunda (Dusky Coral-pea)			*	*	
Kunzea ambigua (Tick Bush)		*			*
Kunzea parvifolia#	*				

MALABAR BEACH FORESHORE VEGETATION

Species List
as at May 1994

Native Species

(* indicates species present; # indicates introduced species)

	Site Location				
	1	2	3	4	6
Acacia longifolia var. sophorae (Coast Wattle)	*	*	*	*	*
Acacia mearnsii# (Black Wattle)	*				
Acacia saligna#	*	*		*	*
Acacia suavolens (Sweet-scented Wattle)					*
Acacia sp.#					*
Acmena smithii (Lily Pilly)			*		
Actinotus helianthi (Flannel Flower)					*
Allocasuarina distyla (Scrub She-oak)					*
Angophora costata (Sydney Red Gum)	*				
Baeckea imbricata			*	*	*
Banksia ericifolia (Heath Banksia)	*				*
Banksia integrifolia (Coastal Banksia)	*	*	*	*	*
Banksia robur (Swamp Banksia)		*			
Banksia serrata (Old Man Banksia)		*			
Banksia spinulosa (Hairpin Banksia)	*	*			
Baumea juncea (Bare Twig-rush)			*	*	*
Billardiera scandens (Dumplings)					*
Bossiaea scolapendria					*
Brachycombe multifida (Cut-leaf Daisy)	*				
Breynia oblongifolia (Breynia)				*	
Callistemon linearis (Narrow-leaved Bottlebrush)	*				*
Callistemon sp.#			*		*
Carpobrotus glaucescens (Pigface)				*	*
Casuarina glauca (Swamp Oak)	*		*		

	Site Location				
	1	2	3	4	6
Lasiopetal ferrugineum (Rusty-petals)					*
Lepidosperma laterale (Variable Sword-sedge)					*
Leptospermum laevigatum (Coast Tea-tree)	*	*			*
Leptospermum squarrosum (Pink Tea-tree)					*
Leucopogon ericoides					*
Leucopogon parviflorus (Coast Beard-heath)					*
Lobelia alata			*	*	*
Lomandra longifolia (Spiny-headed Mat-rush)	*		*	*	*
Melaleuca armillaris	*	*	*		*
Melaleuca nodosa			*		*
Melaleuca quinquenerva (Broad-leaved Paper-bark)	*				*
Melaleuca resaphylla#	*				
Micromytus ciliata (Fringed Heath-myrtle)					*
Mirbelia rubiifolia					*
Monotoca elliptica (Tree Broom-heath)				*	*
Notalaea longifolia# (Mock Olive)	*				
Opercularia aspera (Common Stinkweed)					*
Pelargonium australe (Coastal Geranium)		*	*		
Persicaria decipiens (Spotted Knotweed)	*		*		
Persoonia lanceolata (Lance-leaf Geebung)					*
Petrophile pulchella (Conesticks)					*
Phragmites australis (Native Reed)			*		
Pimelia linifolia (Slender Rice-flower)					*
Platysace lanceolata (Lance-leaf Platysace)					*
Plantago debilis (Slender Plantain)					*
Pomax umbellata (Pomax)					*
Pteridium esculentum (Bracken)			*		*
Rapanea variabilis (Muttonwood)			*		
Rulingia hermanniifolia					*

	Site Location				
	1	2	3	4	6
Samolus repens (Creeping Brookweed)				*	
Tetragonia tetragonioides (New Zealand Spinach)		*			
Triglochin striata (Streaked Arrow-grass)			*		
Typha orientalis (Bulrush)			*		*
Viola hederaceae (Native Violet)	*				
Westringia fruticosa (Coast Rosemary)	*	*	*	*	*
Xanthorrea resinosa					*
Zieria pilosa (Hairy Zieria)					*
Zoysia macrantha (Coast Couch)			*	*	*

Site locations:

1. Cromwell Park north of Fishermans Road
2. Cromwell Park south of site 1
3. Southern foreshore from beach to rock-pool
4. Cromwell Park east of site 2
6. Randwick Golf Course

In the preparation of this list I wish to acknowledge the help of the Royal Botanic Gardens and Randwick Community Nursery.

MALABAR BEACH FORESHORE VEGETATION

Species List
as at May 1994

Exotic and Weed Species

(* indicates species present)

	Site Location				
	1	2	3	4	6
Acetosa sagittata (Potato vine)			*	*	*
Albizia lophantha (Crested wattle)	*				
Alstroemeria psittacina (Peruvian lily)			*		
Araucaria heteophylla (Norfolk Island pine)	*				
Araujia hortorum (Moth vine)			*		
Asparagus densiflorus (Asparagus fern)		*	*		*
Asparagus setaceus (Asparagus fern)			*		
Bidens pilosa (Cobblers peg)	*	*	*	*	*
Brassica fruticulosa (Twiggy turnip)			*	*	*
Canna indica (Canna)			*		*
Cassia sp. (Cassia)			*		*
Ceratonia siliqua (Carab)	*				
Cestrum parqui (Green cestrum)			*		
Chenopodium ambrosioides (Mexican tea)	*				
Chrysanthemoides monilifera ssp. rotundata (Bitou bush)		*		*	*
Conyza bonariensis (Fleabane)	*			*	*
Coprosma repens (Mirror bush)		*	*	*	*
Cortaderia selloana (Pampas grass)				*	*
Cotoneaster glaucophylla (Cotoneaster)			*		*
Cynodon dactylon (Common couch grass)	*	*	*	*	*

	Site Location				
	1	2	3	4	6
Cyrtomium falcatum cv. Rochfordii (Japanese hop fern)				*	
Eleusine indica (Crowsfoot grass)				*	
Eragrostis curvula (African lovegrass)				*	
Erythrina sykesii (Coral tree)					*
Euphorbia peplus (Petty spurge)	*				
Ficus benjamina	*				
Fumaria sp. (Fumitory)			*		
Hydrocotyle bonariensis (Kurnell curse)	*	*	*	*	*
Hypochoeris radicata (Catsear)	*	*	*	*	*
Ipomoea cairica (Morning glory)			*		*
Kalanchoe tubiflora (Mother-of-millions)					*
Lagurania patersoni (Norfolk Island hibiscus)			*		*
Lantana camera (Lantana)			*	*	*
Lonicera japonica (Honeysuckle)			*		
Metrosideros excelsa (Mirror bush)		*	*	*	*
Ochna serrulata (Ochna)			*		
Onopordium acanthium (Scotch thistle)	*				
Opunta stricta (Prickly pear)			*	*	
Parietaria judaica (Asthma weed)				*	*
Paspalam dilatatum (Paspalam)	*	*	*	*	*
Pennisetum clandestinum (Kikuya grass)	*	*	*	*	*
Pittosporum crassifolium	*				
Plantago lanceolata (Lamb's tongue)	*	*	*	*	*
Ricinus communis (Castor oil plant)			*	*	*
Rubis sp. (Blackberry)			*		*
Senecio madagascariensis (Fireweed)	*	*	*	*	*
Senecio sp.			*		*

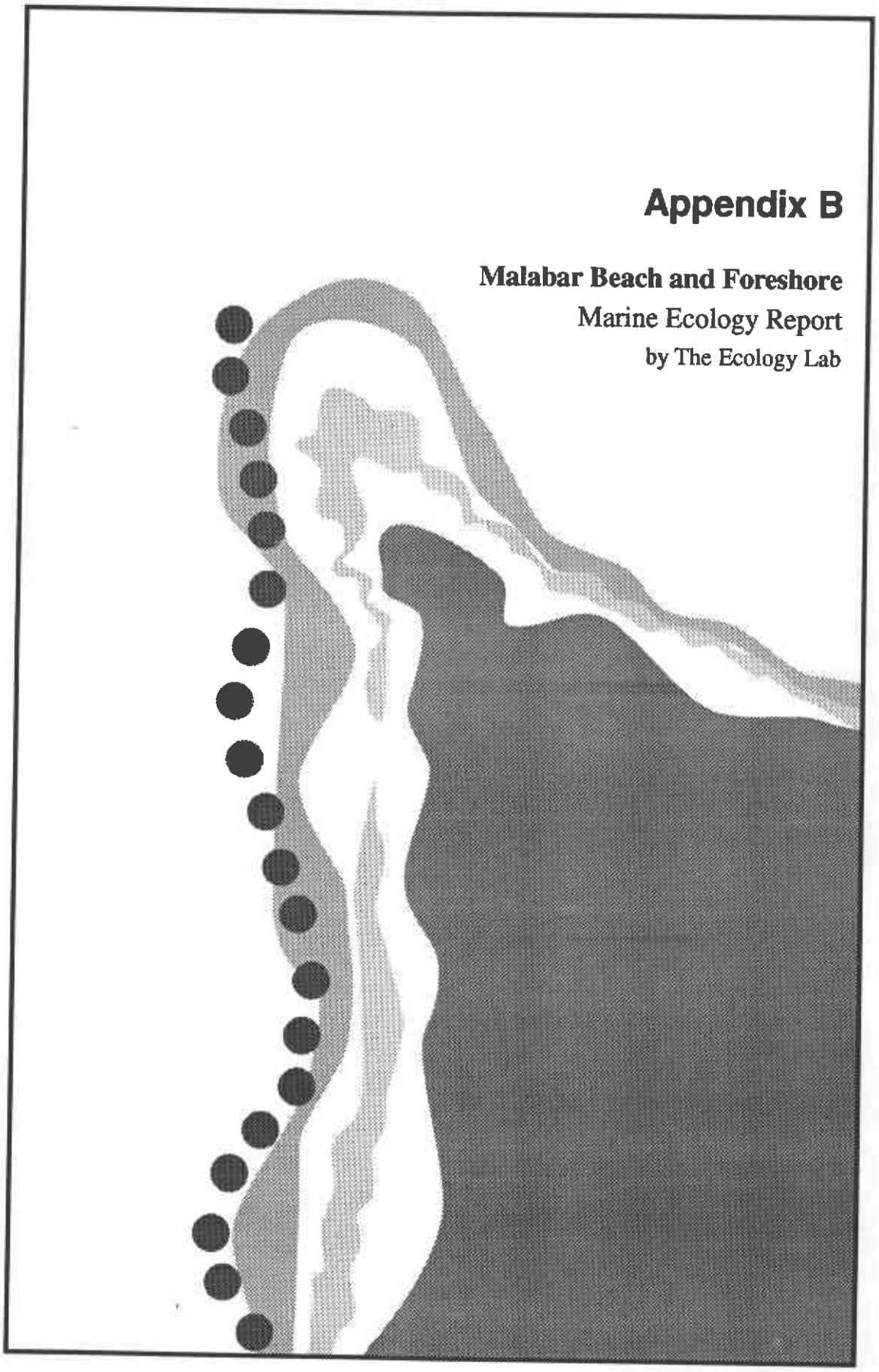
	Site Location				
	1	2	3	4	6
Sida rhombifolia (Paddy's lucerne)		*			
Solanum nigrum (Blackberry nightshade)	*		*		*
Sonchus oleracius (Common sowthistle)	*	*	*	*	*
Sporobolus africanus (Parramatta grass)	*			*	*
Stenotaphrum secundatum (Buffalo grass)		*	*	*	*
Taraxacum officinale (Dandelion)		*	*	*	*
Tradescantia albiflora (Wandering Jew)			*		*
Tropaeoleum majus (Nasturtium)			*		
Verbena bonariensis (Purple top)			*		
Vicia sativa (Vetch)			*		

Appendix B

Malabar Beach and Foreshore

Marine Ecology Report

by The Ecology Lab



MALABAR BEACH AND FORESHORE PLAN OF MANAGEMENT

ECOLOGICAL ISSUES

for
Manidis Roberts Pty Ltd.

Prepared by Phillip Hawes, Marcus Lincoln Smith and Graeme White

The Ecology Lab Pty Ltd.
14/28-34 Roseberry St.
Balgowlah, NSW 2093.
ph. (02) 907 9399

Contents

1.0 BACKGROUND

The Ecology Lab Pty Ltd was contracted by Manidis Roberts Pty Ltd to assist in the preparation of the Malabar Beach and Foreshore Plan of Management. The need for a plan of management for the area arose from Randwick Council's aim to better manage the coastal environment of Malabar Bay by conserving and enhancing the natural environment, while providing a diversity of local and regional recreational opportunities.

This study aimed to:

1) Describe and assess the marine environment from an ecological and recreational view.

2) Prepare a coastal environmental management strategy for the conservation of the foreshore and enclosed waters areas of the bay.

3) Assess ways to improve recreational opportunities, including improving access for diving and establishing the potential for, and possible location of, an underwater dive trail.

The following report is based on information received from Manidis Roberts, published accounts, anecdotal information and a limited field investigation done on the 7 June 1994.

2.0 EXISTING ENVIRONMENT

2.1 General Description

Malabar Bay, also known as Long Bay, is about 12 km south of the City of Sydney, located within Randwick City Council.

The deeply incised and narrow form of Malabar Bay is characteristic of a number of such embayments situated between Bondi Beach and Botany Bay. These embayments are unusual in the Sydney regional context and represent the inundated heads of short incised coastal stream valleys (MPR 1993).

Malabar Bay is a long wide inlet, by far the largest and most sheltered along this stretch of coast (DEP 1988). Malabar Bay is aligned approximately NW and is about 1 300 m long. It is about 1 000 m wide at the heads and narrows to about 150 m at the beach. Water depths within the bay are generally less than 10 m ISLW (Indian Spring Low Water). Backed by a small park, Malabar Beach, at the end of Malabar Bay, is small but visually attractive (DEP 1988).

There are two boat ramps in the bay, one each on the northern and southern shores (Figure 1). The northern ramp is used by the general public, while the southern ramp is used by two local fishing clubs, the Water Board and the Malabar Surf Life Saving Association.

2.2 Description of Habitats

Biologically, the intertidal and shallow subtidal communities of Malabar Bay are similar to sheltered oceanic communities throughout the Sydney region. Descriptions of habitats have been done using air photos and notes from the site inspection.

2.2.1 Intertidal Areas

The intertidal foreshores of Malabar Bay are predominantly rocky shelves and boulder slopes which merge into subtidal rocky reef (Figure 1). The shores of Malabar Bay, from Boora Point to Tupia Head, have been declared an Intertidal Protected Area (IPA) by NSW Fisheries. Two beaches occur within the bay; Malabar Beach at the western end of the bay, and Chinaman's Beach, a small shelly beach just east of the boat ramp on the northern shore. No surveys of intertidal organisms were made, however, intertidal organisms common in the Sydney region were observed.

2.2.2 Subtidal Areas

The subtidal zone fringing the shoreline (i.e. to 10 m beyond mean low water) is covered by the NSW Fisheries IPA designation, beyond this is presently unprotected.

Diver surveys done during the field investigation identified some of the sub-tidal habitats within Malabar Bay. These included bare rock reef (also known as "barrens"), sandy patches and channels, flat rock covered with kelp and flat rock covered with turfing brown and red algae with a veneer of sand. The relief of the rocky reefs within the bay varies from low and structurally simple to structurally complex reef with overhangs, crevices and caves. Photographs taken during the site inspection show the different habitat types. The distribution of reefs within the bay was mapped using air photos (Figure 1).

A brief diver survey of the dive trail in Gordons Bay was also done. Habitats along the trail were similar to those seen in Malabar Bay, except that water depths were generally slightly deeper and Gordons Bay had a small drop-off. Species of fish and macroinvertebrates recorded in Gordons Bay were also similar to those in Malabar Bay, with the exception of a number of sponges which were recorded

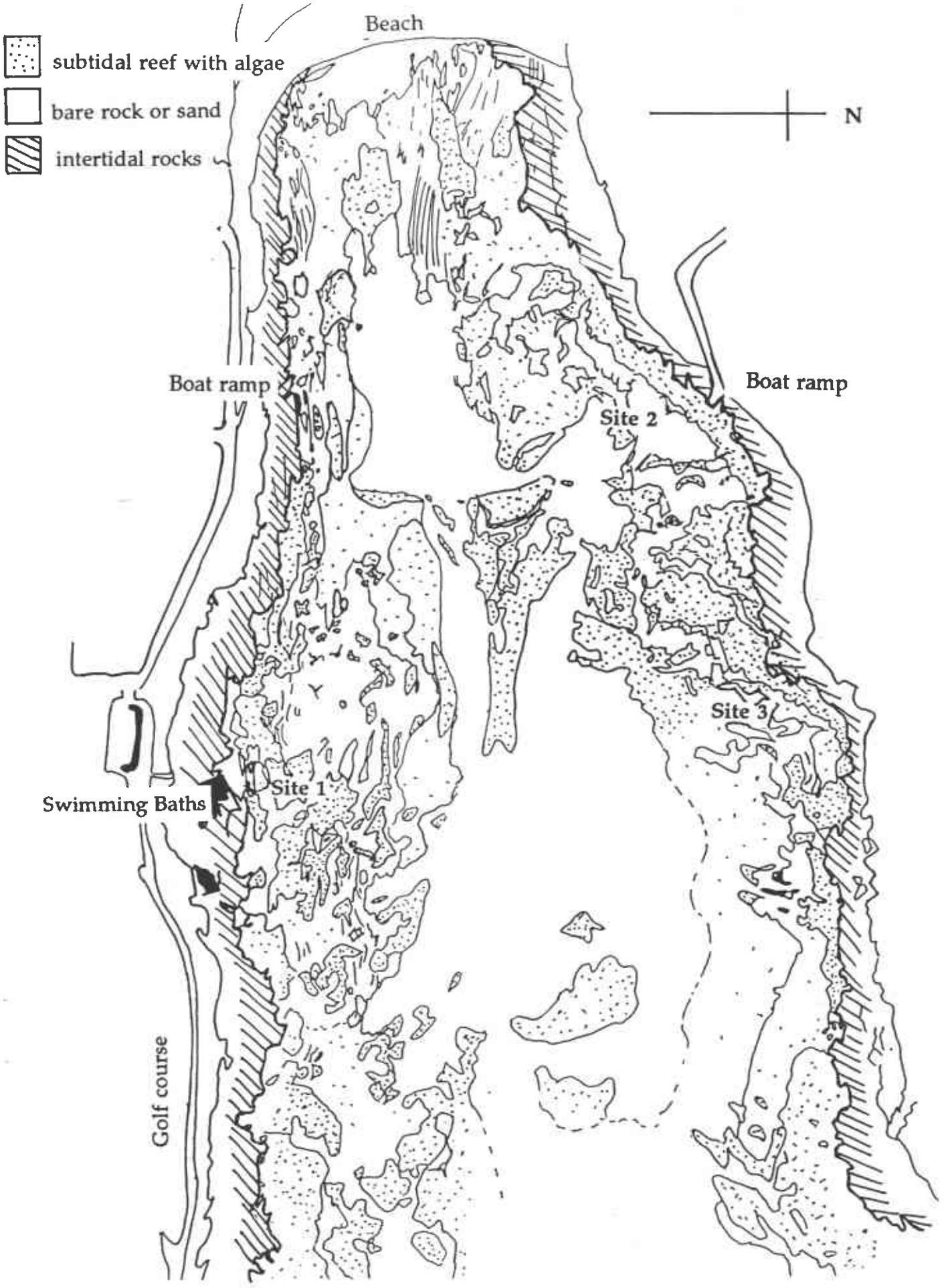


Figure 1. Malabar Bay's intertidal and subtidal features.

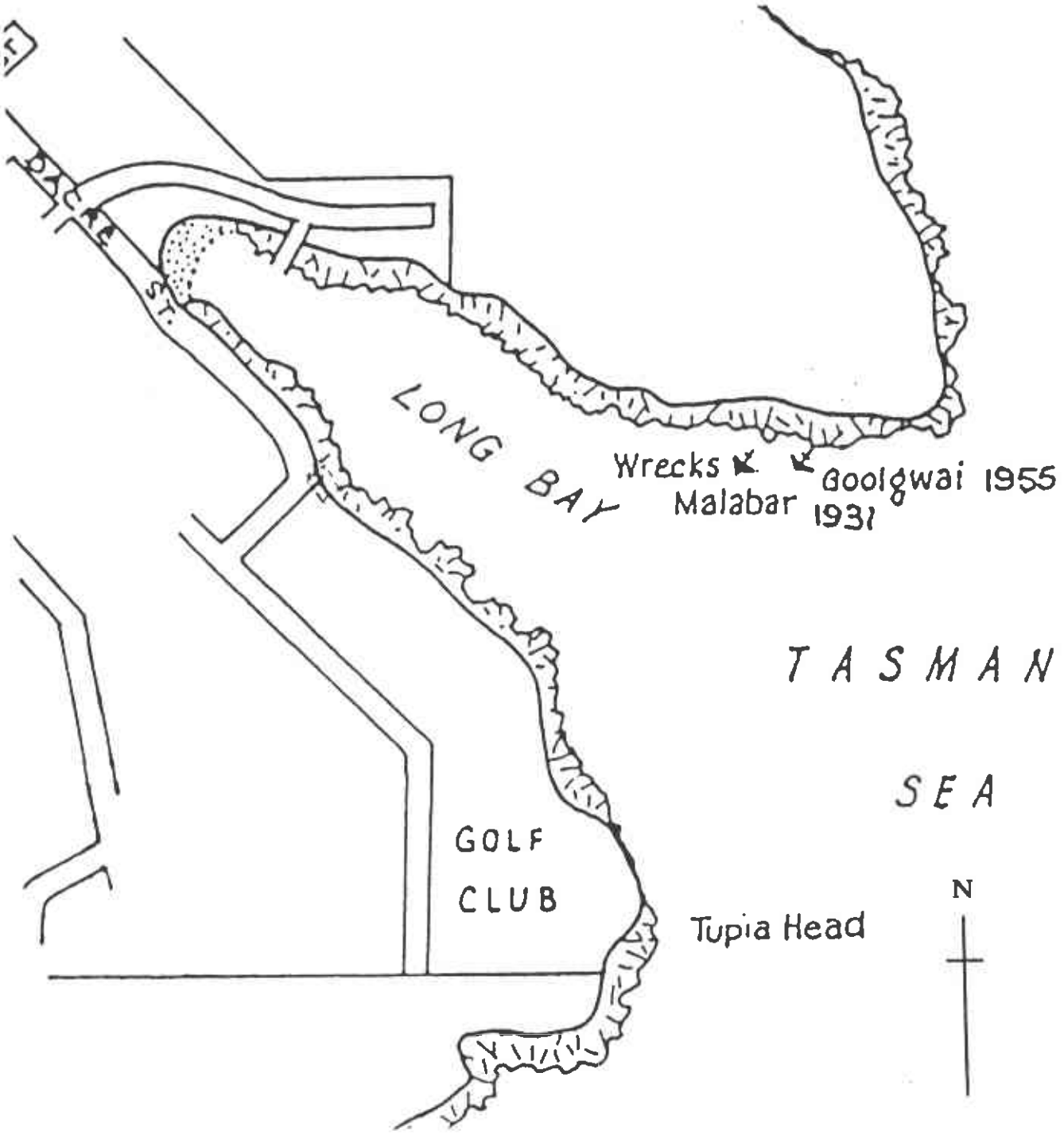


Figure 2. Approximate location of shipwrecks in Malabar Bay (source: Byron 1986)

growing on the wall of the drop-off in Gordons Bay. This drop-off was quite different from anything seen in Malabar Bay and was considered to be a significant feature of the Gordons Bay dive trail.

2.3 Commercial Fishing

There is limited commercial fishing within Malabar Bay (W. Curry NSW Fisheries, pers. comm.). There are seven fishers in the region who licensed to use lobster traps within the bay. Lobster fishing is seasonal with traps being set from May to September. Traps are generally set close to shore and tend to be concentrated along the southern shore (W. Curry pers. comm.). Purse seining is done infrequently for garfish, this occurs between March and May (W.Curry, pers. comm.).

2.4 Water-based Recreational Activities

The sheltered waters of Malabar Bay provide a number of recreational opportunities including fishing, scuba diving, snorkelling, swimming, boating, spearfishing and jet skiing.

2.4.1 Scuba Diving

Malabar is a popular location for scuba diving, particularly with learning and novice divers. It is sheltered from most prevailing seas and swell and ocean water entries and exits can be made easily. The bay's overall shallow depth make it an ideal site for learners.

One of the most appealing aspects of scuba diving is observations and photography of fish. Many of the reef fish in the Sydney region are very colourful and they may be inquisitive, allowing divers to swim very close to them. Some are territorial and one small species, the white-ear (*Parma microlepis*) will sometimes charge at divers during the breeding season (spring and early summer). Many species of fish become accustomed to the presence of divers and allow divers to get very close and even hand feed them e.g. Blue grouper (*Achoerodus viridis*).

There are two shipwrecks within Malabar Bay (Figure 2). They lie close together near Boora Point on the northern shore and can be reached from the shore (Byron 1986). The wrecks are the SS Malabar, sunk in 1931, and the Goolgwai which went down in 1955. It is difficult to distinguish the remains of the Goolgwai from the Malabar (David Nutley NSW Department of Planning, pers comm.). Today the Malabar is a pile of twisted rusting steel in about 12 m depth of water (Byron 1986). The wreck is good for beginners because it is in shallow water, unlike many other wrecks, and it is close inshore (Byron 1986).

There are two acts which cover NSW shipwrecks; the Commonwealth *Historic Shipwrecks Act 1976* and the *NSW Heritage Act 1977*. The NSW Department of Planning administers these acts within NSW waters. Neither of these acts is currently being used to protect the shipwrecks in Malabar Bay and divers are free to dive upon them. It is a policy of the Department of Planning to encourage the implementation of shipwreck trails (David Nutley pers. comm.). The Department of Planning's Maritime Archaeology section should be consulted if the proposed underwater dive trail is to include the shipwrecks within the bay.

2.4.2 Recreational Fishing

Two main fishing clubs operate out of Malabar Bay; the Malabar RSL Fishing Club (includes the RSL Rockhoppers) and the Malabar Boat Owners Club. The clubs have several hundred members and are very active (J. Harte, President Malabar RSL Fishing Club, pers. comm.). Both clubs use the boat ramp on the southern shore. Club members generally fish in the ocean waters outside the bay, however, when sea conditions are adverse fishing is done within the more sheltered waters of Malabar Bay (J. Harte pers. comm.).

Spearfishing also occurs within the bay. Novices tend to use the shallow sheltered waters of the bay, while more experience spearfishers would fish around the headlands and beyond where large pelagic species are more likely to be found.

2.5 Water Quality

The NSW Health Department has closed Malabar Beach for public health reasons for decades. There has been a significant improvement in the water quality of the bathing area of Malabar Beach and the waters of Malabar Bay since the commissioning of the deep water ocean outfall and faecal coliform levels now satisfy the NSW Health Department bathing water criteria (O'Brien *et al.* 1991).

There are 21 stormwater drains discharging into Malabar Bay. Water samples collected from 5 drains showed that the quality of water discharged is generally poor. However, the impact that the discharge has on the water quality of the beach and bay is restricted to the areas of initial dilution of the discharge. (O'Brien *et al.* 1991).

3.0 MANAGEMENT ISSUES

3.1 Dive Trail

Dive trails provide a focus for divers, they are ideal for learners and novices as they increase safety and highlight habitats.

The installation of a dive trail requires consideration of a number of factors, including; demand for such dive trail, adequate parking and amenities, diver access, diver safety, boating activity and the trail route.

Currently there are several good access points within the bay for divers. These include the boat ramps (particularly the northern shore where gear can be driven to the waters edge), the old swimming baths and directly off the beach.

During the field inspection three sites were investigated as potential scuba trails, these were off the old swimming baths, off the northern boat ramp and north of Chinaman's Beach (Figure 1). A brief survey was also done at Gordons Bay, where there is already a dive trail. As part of the studies, species of fish were recorded at each site. Algae and invertebrates likely to be of interest to divers and the types of habitats present were also noted (see Appendix for further details). Although there were minor differences between each site, overall they were similar in terms of habitats and the species present. Detailed surveys of the bay would be necessary to determine the most appropriate route for a dive trail.

The issue of diver safety is important when considering the potential location of a dive trail, particularly regarding the movements of boats within the bay. It is preferable for boats to be kept away from areas where people are diving. A trail which starts around the swimming baths would probably achieve this best. Marker buoys would enable boats to remain clear of the diver frequented area. A speed restriction on all watercraft within the bay would further enhance diver/boat safety.

Experience at Gordons Bay has shown that the most appropriate method of marking a dive trail is using heavy chain attached to large weights (R. Poole, ProDive, Coogee, pers. comm.). The estimated cost of constructing an underwater dive trail similar to the one in Gordons Bay is approximately $15 000 (R. Poole, pers. comm.). Mr Poole also recommended that responsibility for the dive trail be formalised and provision for maintenance made. He suggested that the best way to achieve this was through a dive club, in this way there is local interest, a volunteer work force and the ability to receive financial assistance through grants.

Impacts which might be associated with a dive trail include the disturbance of habitats through abrasion by chain, increased visitation by divers and associated damage, and loss of visual amenity ("natural appearance") by introduction of the trail.

3.2 Boat Traffic

Long Bay is used by many people as a launching place for small boats and jet skis (J. Harte pers comm.). Concern has been expressed for the safety of divers, many of whom dive without a dive flag and are therefore at risk of being struck by boats. Objections to jet skis have also being raised, with their presence being considered by some to be noisy and undesirable (Manidis Roberts pers. comm.).

The introduction of speed limits within all or part of the bay would assist in reducing the risk of divers being struck by boats. Moreover, jet skis generally require high speeds to operate effectively, the introduction of a speed limit would therefore reduce the quality of recreational experience for jet skiers within the speed limited area, without preventing their access.

Signs should be erected at the boat ramps to warn motorcraft operators of the location of the dive trail, the hazard that it represents and the appropriate actions to take.

3.3 Conservation

The shores of Malabar Bay, from Boora Point to Tupia Head, have been declared an Intertidal Protected Area (IPA) by NSW Fisheries. There are presently 14 declared IPA's within the Sydney region. The IPA's extend from mean high water to 10 metres beyond mean low water. Collecting of invertebrate animals within an IPA is prohibited, however, angling and spearfishing are permitted. Although invertebrate animals may not be collected, anglers may bring bait with them, up to the quantity allowed by the bag limit (NSW Fisheries 1993).

Although Marine Reserve status would provide further protection for the habitats and marine life of Malabar Bay it is unlikely that NSW Fisheries would give the bay such status, as the bay is not considered unique nor an outstanding representative habitat (NSW Fisheries pers. comm.).

4.0 RECOMMENDATIONS

The following points deal briefly with the issues outlined in the study brief and are further summarised in Table 1.

* Ecology and Fisheries. Existing information suggests that Malabar Bay is not sufficiently unique or outstanding to justify marine reserve status. The foreshores and fringing subtidal areas are presently protected under NSW Fisheries Intertidal Protection Area scheme. Further surveys of the ecology of the bay would be required to determine if there are grounds for increased protection. An application to the Director of Fisheries for the marine reserve

status would then need to be made.

* Spearfishing: The regulation of fishing closures is controlled by NSW Fisheries. To get a spearfishing closure declared an application to the Director of Fisheries would be required. The closure may only need to include the portion of the bay containing the dive trail, rather than the whole bay.

* Dive Trail: Mapping of the seabed at potential trail locations would be necessary to determine the optimal trail route. The mapping could be carried out by professionals or volunteers. Once the trail route has been determined permission for construction from NSW Fisheries, NSW Public Works Department and the NSW Department of Lands would be needed. Materials used for construction should be similar to those used at Gordons Bay.

* Diver Access: Access to the water needs to be provided to the start of a dive trail. Access should not be steep or slippery. Walkways or stairs need not go all the way to the waters edge if the rock platform is sufficiently level to walk upon. If it is intended to provide access for handicapped divers then ramps are preferable to stairs and may need to go right to the waters edge.

* Vehicle Parking: The provision of adequate parking is important for both divers and boat operators. Diving equipment is both bulky and heavy therefore car access/parking should be close to beginning of the dive trail. Boat operators require sufficient space to turn around in and to park cars and trailers.

* Water Craft: Boat ramps in the bay provide access to a number of user groups. The exclusion of any one of these (e.g. jet skis) is likely to be difficult. The application of speed restrictions within the bay would increase safety and reduce the use of the bay high speed and noisy vessels such as jet skis.

* Chinaman's Beach: The extent of collection of shell grit and its impacts would need to be determined before an informed decision could be made regarding its continuation.

* Submerged Rocks: The removal of submerged rocks from within the bathing area is not considered to be ecologically desirable as they are thought to provide important microhabitats. Small boulders are often moved around during periods of large swell.

Table 1. Policies and Action

Issue and objective	Action	Approx. Cost ($)
Ecology and Fisheries Classify the bay as a marine reserve, but maintain line fishing from rocks and boats. Evaluate desirability of maintaining lobster trap licences.	Existing information suggests that the bay is not considered to be significantly unique or outstanding to justify marine reserve status. Foreshores currently listed as IPA. To change status: 1) further surveys, 2) apply to Director of NSW Fisheries.	$5 000 to $10 000
Spearfishing Obtain ban from State Government	Apply to Director of NSW Fisheries. Fisheries to erect signs.	$1 000
Dive Trail Install a dive trail. Preferred route offshore from swimming pool.	Undertake survey to determine optimal route. Obtain permission from PWD and NSW Fisheries. Apply to NSW Lands Office for Permissive Occupancy. Construct dive trail.	staff time staff time $15 000 to $20 000
Divers Access Provide safe access for divers to dive trail	Provide access from carpark to rock platform/waters edge.	not determined
Vehicle Parking Provide adequate parking close to boat ramp and dive trail access point(s).	Assess required space. Construct/upgrade parking area near dive trail access.	not determined
Water craft Ban noisy and 'unwanted' motorcraft, particularly Jet Skis. Apply a speed restriction on all craft in the bay. Signs warning of dive trail at boat ramps.	Banning of 'unwanted' craft not considered practical. Application of speed limit more realistic. Apply to MSB. MSB to erect speed signs.	$1 000 to $2 000
Chinaman's Beach Maintain the natural state of Chinaman's Beach. Check on status and desirability of shell grit collection lease at Chinaman's Beach.	Determine current levels of shell grit collection and assess potential impacts.	$2 000
Submerged Rocks off Beaches Assess feasibility and desirability of removing submerged rocks in the bathing area	Relocation of rocks not considered ecologically essential.	not determined

5.0 REFERENCES

Bennet, I. (1992). *Australian Seashores.* Angus and Robertson, Pymble, Australia.

Byron, T. (1986) *Scuba Divers Guide Southern New South Wales Coast.* Aqua Sports Publications Pty Ltd.

Dakin, W.J. (1987). *Australian Seashores.* Angus and Robertson, Australia.

Department of Environment and Planning (DEP) (1988). Sydney Regional Environmental Plan No.14 Eastern Beaches.

Kuiter, R. H. (1993). *Coastal Fishes of South-eastern Australia.* Crawford House Press, Bathurst, Australia. 437 pages.

Marine Pollution Research (MPR) (1993). Marine Ecology Report. Report to LandSystems EBC for Gordon Bay Draft Plan of Management. Prepared for Randwick Council.

Land Systems EBC Pty Ltd. (1993) Gordon Bay Draft Plan of Management. Report to Randwick Council.

NSW Agriculture and Fisheries (1989). Aquatic Reserves. Agfact F0.3.2.

O'Brien, E.J., W.G. Rowlands and J.H. Dolton. (1991). Long Bay and Malabar Beach Water Quality Assessment Report. Environmental Management Unit, NSW Water Board.

APPENDIX

Malabar Bay Field Investigation

1. Introduction.

As part of the evaluation of Long Bay, species of fish, macroinvertebrates and habitat types were recorded along potential scuba trails at three sites in Long Bay and on the scuba trail in Gordons Bay.

2. Methods

Species of fish and macroinvertebrates and habitat types were recorded on a perspex slate as divers swam along potential scuba trails in Long Bay (Figure 1) and the scuba trail in Gordon Bay. All diving was done between 10:00 and 13:00 h on 7/6/94. Water visibility was relatively poor, ranging from 3 - 5 m, skies were overcast and there was light rainfall.

Notes were made on the habitats in which fish were recorded and their relative abundance. The names of fish follow Kuiter (1993), a book which is popular with many divers in south-eastern Australia. The names of macroinvertebrates follow Bennett (1992) and Dakin (1987) which are popular books dealing with Australia's seashores.

3. Results and Conclusions

Twenty-nine families of fish were recorded, with a total of 45 species (Table A1). A total of 19 species of macroinvertebrates were recorded (Table A2). All the species are common coastal species, occurring on rocky reefs and sand. Relatively distinctive habitats that were recorded included bare rock reef (also known as "barrens", sandy channels, flat rock covered with kelp (*Ecklonia radiata*) and flat rock covered with a thin veneer of sand and with turfing brown and red algae. From the brief investigation made, there appeared to be more of the barrens habitat at Site 2, more kelp at Site 3 and a greater mixture of sand channels and algal turf at Site 1. Gordon Bay tended to have a large amount of sand, with kelp, turf and barrens close to the shore. Gordon Bay also had a reef with steep wall habitat, nothing comparable was seen at Malabar Bay.

The numbers of species were similar at all sites, including Gordon Bay, except in the case of sponges which dominated the wall habitat of Gordon Bay. The largest number of species was recorded at Site 2, in Malabar Bay. It was noted that this site had a relatively large area of rock reef, with a complex relief. This provides crevices and caves that can shelter reef fish.

In conclusion, the habitats, macroinvertebrates and fish recorded in Malabar Bay were typical of relatively sheltered embayments along the Sydney coastline, including Gordon Bay. The diversity of fish was not considered to be very large, but further work (including sampling during other seasons) would be necessary to adequately describe the fish fauna. The species that are present, however, would provide interesting viewing for scuba divers.

Table A2. Macroinvertebrates recorded in Malabar Bay and Gordons Bay, 7 June 1994.
+ indicates species recorded during a 20-25 minute scuba dive at that site.

Family	Species	Common Name	Long Bay			Gordons Bay Trail
			Site 1	Site 2	Site 3	
Echinoderms						
Centrechinidae	*Centrostephanus rodgersii*	Long-spined urchin	+	+	+	+
Strongylonglocentrotidae	*Heliocidaris erthyrogramma*	Burrowing urchin	+	+	+	+
Cidaridae	*Phyllacanthus parvispinus*	Pencil urchin	+	+	+	+
Gastropods						
Patellidae	*Cellana tramoserica*	Limpet	+	+	+	+
	Patella chapmani	Star limpet	+	+	+	+
Turbinidae	*Turbo torquatus*	Turbo shell	+	+	+	+
	Australium tentoriforme	Tent shell	+	+	+	+
Cymatiidae	*Cabestana spengleri*	Splengler's triton	+	+	+	+
Muricidae	*Thais orbita*	Cart rut shell	+	+	+	+
Pulmonates						
Siphonariidae	*Siphonaria denticulata*	False limpet	+	+	+	+
Nudibranchia						
Chormodorididae	*Chromodoris* sp.	Nudibranch				+
Coelenterates						
Alcyoniidae	*Parerythropodium memebranaceum*					+
Sponges						
		Orange sponge			+	+
		Brown sponge				+
		Purple sponge				+
		Finger (blue) sponge				+
		Barrel (black) sponge				+
Tunicates						
Pyuridae	*Pyura stolenifera*	Sea squirt			+	
		White ascidian				+
Octopoda	*Octopus cyaneus*	Rock-pool octopus		+		

Table A1. Species of fish recorded at Malabar Bay and Gordons Bay, 7 June, 1994.
+ indicates species recorded during a 20-25 minute scuba dive at that site.

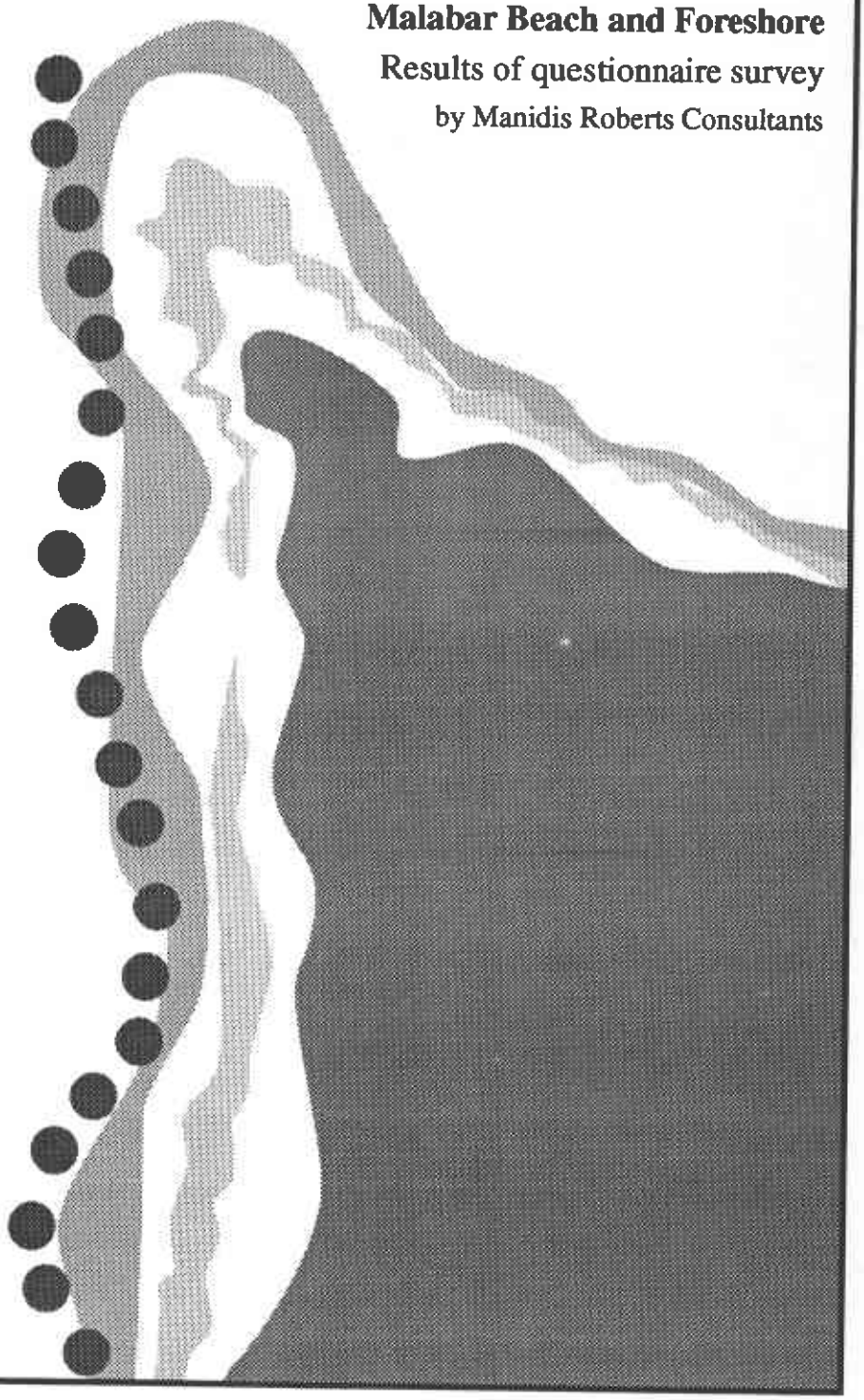
Family	Genus & Species	Common name	Malabar Bay			Gordons
			Site 1	Site 2	Site 3	Bay
Heterodontidae	*Heterodontus portusjacksoni*	Port Jackson shark				+
Orectolobidae	*Brachaelurus waddi*	Blind shark				+
Urolophidae	*Urolophus sufflavus*	Yellow-back stingaree				+
Gobiesocidae	*Aspasmogaster costata*	Eastern clingfish			+	
Hemirhamphidae	*Hyporhamphus australis*	Eastern garfish		+		
Platycephalidae	*Platycephalus fuscus*	Dusky flathead		+		
Scorpaenidae	*Scorpaena cardinalis*	Red rock cod	+			
Serranidae		Eastern wirrah				+
	Hypoplectrodes mccullochi	Half-banded sea perch				+
Plesiopidae	*Trachinops taeniatus*	Eastern hulafish		+	+	+
Apogonidae	*Apogon limenus*	Sydney cardinalfish	+		+	
	Apogon aureus	Ring-tail cardinalfish	+			
Dinolestidae	*Dinolestes lewini*	Longfin seapike		+		
Sparidae	*Acanthopagrus australis*	Yellowfin bream	+			+
Mullidae	*Parupeneus signatus*	Black-spot goatfish	+	+	+	+
	Upeneichthys lineatus	Blue-lined goatfish	+	+	+	+
Pempheridae	*Pempheris compressa*	Small-scale bullseye	+	+	+	+
	Pempheris multiradiata	Common bullseye	+			
Monodactylidae	*Schuettea scalaripinnis*	Eastern pomfret	+	+	+	
Scorpididae	*Atypichthys strigatus*	Mado	+	+	+	+
	Scorpis lineolatus	Silver sweep		+		
Girellidae	*Girella tricuspidata*	Luderick		+		+
Pomacentridae	*Chromis hypsilepis*	One-spot puller		+	+	
	Mecaenichthys immaculatus	Immaculate damsel		+	+	
	Parma microlepis	White-ear	+	+	+	+
	Parma unifasciata	Girdled parma	+	+		
Chironemidae	*Chironemus marmoratus*	Kelpfish				+
Aplodactylidae	*Crinodus lophodon*	Rock cale	+	+	+	+
Cheilodactylidae	*Cheilodactylus fuscus*	Red morwong	+	+	+	+
Labridae	*Achoerodus viridis*	Eastern blue groper		+	+	
	Notolabrus gymnogenis	Crimson-banded wrasse	+	+	+	+
	Opthalmolepis lineolatus	Maori wrasse	+	+	+	+
	Pictilabrus laticlavius	Senator wrasse	+	+		+
	Stethojulis interrupta	Cut-ribbon wrasse	+	+		+
Odacidae	*Odax cyanomelas*	Herring cale	+			
Blenniidae	*Plagiotremus rhinorhynchos*	Tube-worm blenny		+		
Acanthuridae	*Acanthurus maculata*	Spotted sawtail		+		
	Acanthurus olivaceus	Orange-blotch surgeon				+
Monacanthidae	*Brachaluteres jacksonianus*	Pygmy leatherjacket	+			
	Meuschenia flavolineata	Yellow-stripe leatherjacket	+		+	+
	Pennicipelter vittiger	Toothbrush leatherjacket		+	+	+
	Scobinichthys granulatus	Rough leatherjacket		+	+	
Aracanidae	*Anoplocapros inermis*	Eastern smooth boxfish	+		+	+
Tetraodontidae	*Tetractenos glaber*	Smooth toadfish	+			
Diodontidae	*Dicotylichthys punctulatus*	Three-bar porcupinefish		+		
Total number of species			23	27	20	24

Appendix C

Malabar Beach and Foreshore

Results of questionnaire survey

by Manidis Roberts Consultants



SURVEY RESULTS

In June 1994, self-complete surveys were delivered to homes surrounding the study area. To maximise the return, a self-addressed envelope was provided by Council. 381 completed forms were returned by the due date, representing a return of about 33%. A further 41 were returned after the due date. Results of the survey are shown and analysed below.

Q1 How often do you and your family visit Malabar Bay?

Response	Total	%*
Daily	134	35
Weekly	149	39
Monthly	40	10
Every few months	32	8
Yearly	3	1
Hardly ever	16	4
No response	7	2
Total	**381**	**100**

* Does not add to 100 due to rounding

Analysis
The response indicates frequent visitation to the study area by local residents, with 74% indicating they visit daily or weekly.

Q2 Why do you like to visit?

Response	Total	%
Close to home	299	79
Natural environment	156	41
Family atmosphere	60	16
Uncrowded and quiet	210	55
'Away from it all'	72	19
Variety of things to do	43	11
No response	16	4

Other

Playground for children	5
Visual beauty	3
Walking	3
Water sports (snorkelling, surfing, etc)	3
Other	4

Analysis
Reflecting the result of question 1, 79% of respondents indicated they like to visit the study area as it is close to home. The area's uncrowded and quiet atmosphere was indicated as the next most important reason for visiting (55%), followed by the natural environment (41%). These findings are significant in terms of planning:

- Access to the area.
- The facilities to provide.
- The need to include the maintenance/enhancement of the area's natural features in the plan of management.

Q 3 What activities do you like doing there?

Response	Total	%
Relaxing/sitting	204	54
Playing golf	101	27
Picnicking	75	20
Fishing	125	33
Meeting friends	63	17
Boating	46	12
Walking the dog	117	30
Walking	249	65
Swimming	150	39
Running	31	8
Surfing	48	13
Snorkelling/SCUBA	55	14
No response	4	1

Other

Play on play equipment	15
Rock walking/beach combing	4
Other	7

NB About 10 responded that they would swim if the water were clean

Analysis

The response to this question shows that people visit the area for a variety of reasons. Very few people indicated only one or two reasons for visiting. Unstructured 'unwinding' activities are most popular with visitors, particularly walking (65%) of respondents, relaxing/sitting (54%), and swimming (39%). Fishing and walking the dog are also undertaken by about a third of respondents. These findings are significant in terms of planning facilities such as:

- Walking tracks.
- Benches and shelters.
- Water-related facilities.

Q 4 What do you dislike about Malabar Bay?

Response	Total	%
Stormwater pollution	305	80
No showers	107	28
Poor pedestrian access	87	23
Litter	164	43
Dogs on beach	111	29
Car parking problems	26	7
Spear fishing	56	15
Swimming pool closed	253	66
Poor boat access	33	9
Sewage treatment plant	210	55
No response	2	1

Other

Jet skis	11
Smell from sewage treatment plant	7
Ugly stormwater pipe	6
Poor park/beach maintenance	5
Scavenging of shellfish	5
Ugly Water Board building	3
Other	24

Analysis

The overwhelming dislike of respondents (80%) is stormwater pollution. This is followed by the closure of the pool for swimming (66%) and the existence of the adjacent sewage treatment plant (55%). Litter, dogs on the beach and lack of showers were also indicated as strong dislikes. These findings are significant in terms of planning measures to:

- Reduce water pollution.
- Re-open the pool.
- Screen the adjacent treatment plant from view to help reduce its visual dominance.

The importance placed on litter and dog control also indicates that measures need to be taken, as does the relatively high unsolicited response regarding the dislike for jet skis.

Q5 What improvements would you like to see?

Response	Total	%
Cleaner water	237	62
Showers	87	23
More seating	63	17
Protect marine life	128	34
Better litter control	126	33
Landscaping in Cromwell Park	117	31
Picnic facilities	102	27
Better stairs to beach	104	27
Swimming pool opened	260	68
Better boat access	25	7
Rationalise car parking	19	5
Remove weeds & regenerate bush	170	45
No response	2	1

NB
1 Respondents were asked to nominate three preferred improvements, but most nominated more
2 Many respondents marked that the pool should be the first priority

Other

Better play equipment	15 (4%)
Screen the sewage treatment with trees	10
Cover or move the northern stormwater pipe	9
Coastal walkway/cycleway	8
Better dog controls	8
Better park and beach maintenance	6
Better amenities block	6
More trees (generally)	6
Patrol marine scavengers	5
Remove rocks from water	5
Other	32

Analysis

The two most wanted improvements are both water-related, namely, to have the swimming pool re-opened (68%) and to have cleaner ocean water (62%). Significant among the responses were the great number of people who wrote on their survey form that re-opening the pool should be the first priority.

Interestingly, the third highest response is for weed removal and bush regeneration, indicating a strong desire to enhance the area's natural appeal. Well down the list, but still significant, are the desire to protect marine life, control litter and landscape Cromwell Park. The relatively high unsolicited response regarding the need for better play equipment in Cromwell Park is also significant. These findings are significant in terms of planning measures to:

- Re-open the pool.
- Reduce water pollution.
- Regenerate the area's indigenous vegetation.

Q6 Do you have any other comments?

Response	Total	%
Re-open the pool	21	13
Keep Malabar low key and natural	17	11
Stop the STP smell/close the incinerator	16	10
Bush regeneration/screen the STP	16	10
Improve maintenance, reduce litter	13	8
Upgrade amenities block and picnic shelters, and provide BBQs and showers in Cromwell Park	10	6
Protect marine life	10	6
Coastal walk/cycleway	7	4
Control dogs	7	4
Traffic measures on Dacre St/Bay Pde/Fishermans Rd	5	3
Rehabilitate the landfill area	4	3
Rangers/inspector to stop vandals	4	3
Better play equipment	4	3
Other suggestions*	25	16
Total	**159**	**100**

* These included: raise the bay's image, build a surf club/kiosk/restaurant, better lighting, better beach access, improve Little Bay, open up Malabar Headland for recreational use, operate the windmill, better boat access, SCUBA trail, move the bus terminus and provide a bus shelter, ban jet skis, and stabilise eroding banks.

Analysis

This open-ended question was included to help confirm the strength of people's views in the earlier questions. Many people opted to not answer or to write "nothing to add", but a number of people did respond. Significantly, the most frequent response was for the pool to be re-opened, which echoed earlier sentiments. This was followed by a strong desire for the study area to retain its natural character (many wrote they "didn't want another Coogee"). This was closely followed by a desire that the smell from the sewage treatment plant be stopped/the incinerator be closed, and that more trees be planted in the area/bush be regenerated/the treatment plant be screened by trees. These findings are useful as they help to reinforce the findings in relation to the earlier questions.

Conclusion

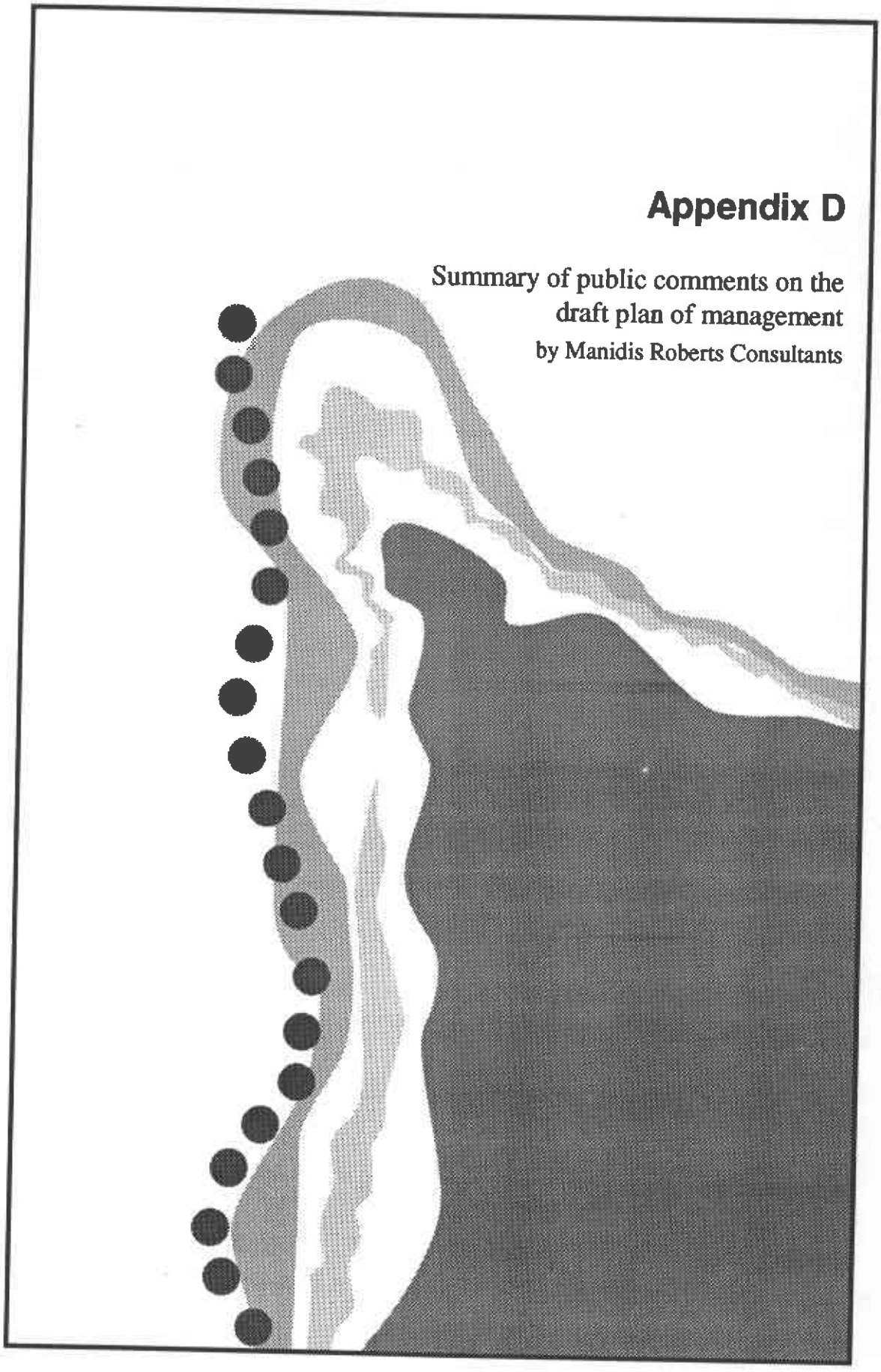
The salient findings of the survey are that the local community strongly believes there is a need to:

- Reduce water pollution.
- Re-open the pool.
- Regenerate the area's indigenous vegetation.
- Screen the adjacent treatment plant from view to help reduce its visual dominance.
- Keep the study area low key and natural.
- Protect marine life
- Reduce litter and improve general maintenance, and provide increased ranger/police patrols to reduce the incidence of dogs, vandalism and shellfish poaching
- Upgrade amenities, such as the toilet block, picnic shelters and play equipment; and install other items such as showers and barbeques.

Appendix D

Summary of public comments on the draft plan of management

by Manidis Roberts Consultants



SUMMARY OF PUBLIC COMMENTS ON THE DRAFT PLAN OF MANAGEMENT

Following the display of the draft plan of management, 34 submissions on the report were received from the general public and one from the Water Board. This is a reasonably low response rate given the relatively high public exposure given to the draft plan of management, which included:

- Numerous items in local and metropolitan newspapers.
- 4000 copies of a brochure distributed to homes in the local area.
- An open day to launch the draft plan of management, which attracted about 100 people.

This report summarises the submissions and presents proposed actions in relation to them. These will be discussed at the next meeting of the Consultative Committee.

1 General flavour of responses

From the responses — and, more so, the lack of responses — it is clear the draft plan of management is widely accepted and supported by the community. Given the high public exposure, the low response rate indicates an unstated acceptance of the proposals in the report. (In all such projects, the tendency is that people who agree with the proposals are much less likely to write submissions than those who perceive they may be adversely affected.)

While there were objections to some sections of the draft plan, these were mostly restricted to a small number of residents in Dacre Street who objected to some aspects of the gateway concept. The Water Board also advised that the plant species list for Cromwell Park (north), which was provided by the landscape contractor for the vegetation assessment, was incorrect in places.

2 Support for the draft plan of management

The submissions contained numerous supportive comments. These are summarised in **Table 1**. As shown, 18 of the 33 letters contained overall support for the draft plan of management. Of those which mentioned actual issues, the main support was for the rock pool and the proposed changes to the Dacre Street car park area (including the 'gateway' concept, and the 40 km zone). Proposals to address the stormwater issue also received strong support.

TABLE 1 — Comments in support of the draft plan of management

Issue	No of responses
Overall support for the draft plan of management	18
Restore rock pool (including shower and stopping seepage	10
Landscape Dacre St car park; create gateway to the bay; move bus stop, etc	10
Address stormwater problem: trash screens/re-use of stormwater by golf courses	6
Upgrade Cromwell Park: amenities block, seating, play equipment, shelters	5
Upgrade the beach: improve access, install shower, stabilise dunes	5
Screen the Water Board building with vegetation; camouflage stormwater pipe	5
Extend/formalise the coastal walk	3
Create a 40 km zone on Dacre Street	3
Install a new lighting scheme	2
Install BBQs	2
Continue community involvement	2
Remove stairs to beach	2
Ban jet skis	1
Remove weeds	1
Undertake works on northern shore (in general)	1

3 Absence of objections

Significantly, there was no negative feedback in relation to the following issues:

- The rock pool
- The dive trail
- Showers
- Play equipment
- Seating
- Improving water quality
- Boat ramps
- Litter management
- Fencing
- Water craft
- Erosion management
- The landfill area
- Bush regeneration
- Landscape planting
- Lighting and power lines
- Development control plan
- The bay and its ecology
- Cromwell Park monument
- Ranger patrols
- Public awareness
- Continuing community involvement

This indicates that the recommended actions are not contentious and that Council can undertake them in the knowledge that they have broad community support.

4 Objections to proposals in the draft plan of management

The main objections are summarised in **Tables 2** and **3**, and relate to the Cromwell Park area. In particular, there is some limited local objection to:

- Changes to the area near the intersection of Dacre Street/Bay Parade and Raglan Street. The main concerns relate to the proposals to remove the stairs, to create a new 'gateway' to the bay by replacing the car park with parkland and replacing parallel parking with angle parking, removing some trees to create the angle parking, and moving the bus stop on Dacre Street.
- The installation of BBQs in the park as it is feared that they will become vandalised and attract litter. A similar concern is raised about the proposed picnic shelters.

In analysing these objections, it should be noted that:

- A number of submissions (especially in regard to the proposed changes to the Dacre Street area) were written by the same person, so raw figures should be downplayed.
- As shown in **Table 1**, a number of respondents were strongly in favour of the recommendations along Dacre Street, and some expressed concern that the plan of management should represent community interests rather than sectional minority interests. This view was repeated by a number of people at the open day and by people who telephoned our office to compliment the draft plan.
- The draft plan of management received a great deal of publicity. The total number of negative comments should be read against the background of the many people who showed tacit approval with the recommendations by not objecting.
- The negative submissions often reveal a lack of understanding of the actual recommendations. For example, objections in relation to:
  - **The removal of trees to create the new angle parking on Dacre Street**. Several people read this as environmental vandalism. In reality, the draft plan of management calls for a major long-term net increase in the number of trees in Cromwell Park and along Bay Parade, and only .... trees would be removed to create angle parking.
  - **The creation of angle parking on Dacre Street**. Several people read this as the creation of a major parking lot eyesore. There is confusion as to whether there would be more parking — thereby enticing 'outsiders' to park in the street — or less parking, so that residents would have nowhere to park. In reality, all that is proposed is the replacement of parallel parking on Dacre St with attractively landscaped, angle parking. It is not proposed to reduce the total number of car parks.
  - **The replacement of the existing Dacre Street car park**. It is not generally understood that the relatively large, ugly and inefficient parking area on Dacre St would be replaced with parkland, which would greatly increase residential amenity.

TABLE 2 — Responses in relation to Category 1: Recreation

Issue	Comment	Number	Proposed action
Picnic shelters	Retain existing shelters as they are vandal-proof	2	Leave in plan of management
The pool	Need a pump to maintain water level (However, three long-time residents disagree with this comment in their submissions)	6	The aim of the pool restoration is to make the pool safe and useable as cost-effectively as possible. Thus, no pump will be provided, though this may need to be re-assessed after restoration is complete. Similarly, pool height and length will remain as is, with bungs used for emptying/filling
	Raise pool wall by 30 cm	1	
	Need valve/stop cock system	1	
	Ensure minimum 30 m length	1	
Life Saving Facility	A life saving facility is needed, especially if more people are drawn to the beach. Incorporate it within the Offshore Rescue Boat facility, with the ORB group to staff it on weekends	2	This is not supported. However, Council will assess the need for on-site beach inspector, as outlined in plan of management
Picnic/BBQ facilities	Prefer no change to present set up as the proposal will generate rubbish problems	4	Install free-to-use (ie with timer switch) BBQs in conjunction with adequate bin system
Artificial reef	Create reef with sandstone boulders north of the pool to enhance wave action and attract surfers	1	Surf zone would create conflicts with divers, and is thus not supported
Amenities block	Don't provide changing area	1	Leave in plan of management
Gateway to the bay	Don't do	1	Leave in plan of management

TABLE 3 — Responses in relation to Category 2: Access

Issue	Comment	Number	Proposed action
Dacre St car park	No car park at all in Dacre St	2	Leave concept in plan of management, but hold meeting with Dacre Street residents (between Raglan St and Fishermans Rd) to explain proposal in more detail and gain feedback. This input to feed into detail design, and these residents to again be consulted at detailed design phase
	Angle parking on south sides of Dacre St and Bay Pde and east side of Raglan St	1	
	Don't remove trees	7	
	Don't change existing parking, or just upgrade it	7	
	More parking in Fishermans Rd	6	Yes, in long-term, if needed
Traffic calming	No speed humps	5	Use alternative traffic calming methods (eg road narrowing, paving and bollards)
Bus stop	Don't move or provide a bus bay	8	Council to discuss whole issue of bus routes and stops with STA (Mr Peter Rowley, 399-0639)
	Move into car park or into Raglan St, or to end of Bay Pde	3	
Stairs to beach from Dacre St	Repair and retain	8	Remove stairs as they are in very poor condition and unlikely to meet standards. Possibly replace with timber staircase ($50,000)
Coastal walk	Incorporate a bike trail, especially along Bay Pde to the pool	2	Mark a cycleway line on the road