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ROCKINGHAM MARINA

JOHN HOLLAND GROUP

Report and Recommendations
by the
Environmental Protection Authority

Department of Conservation and Environment
Perth, Western Australia
Bulletin No. 254 March 1986

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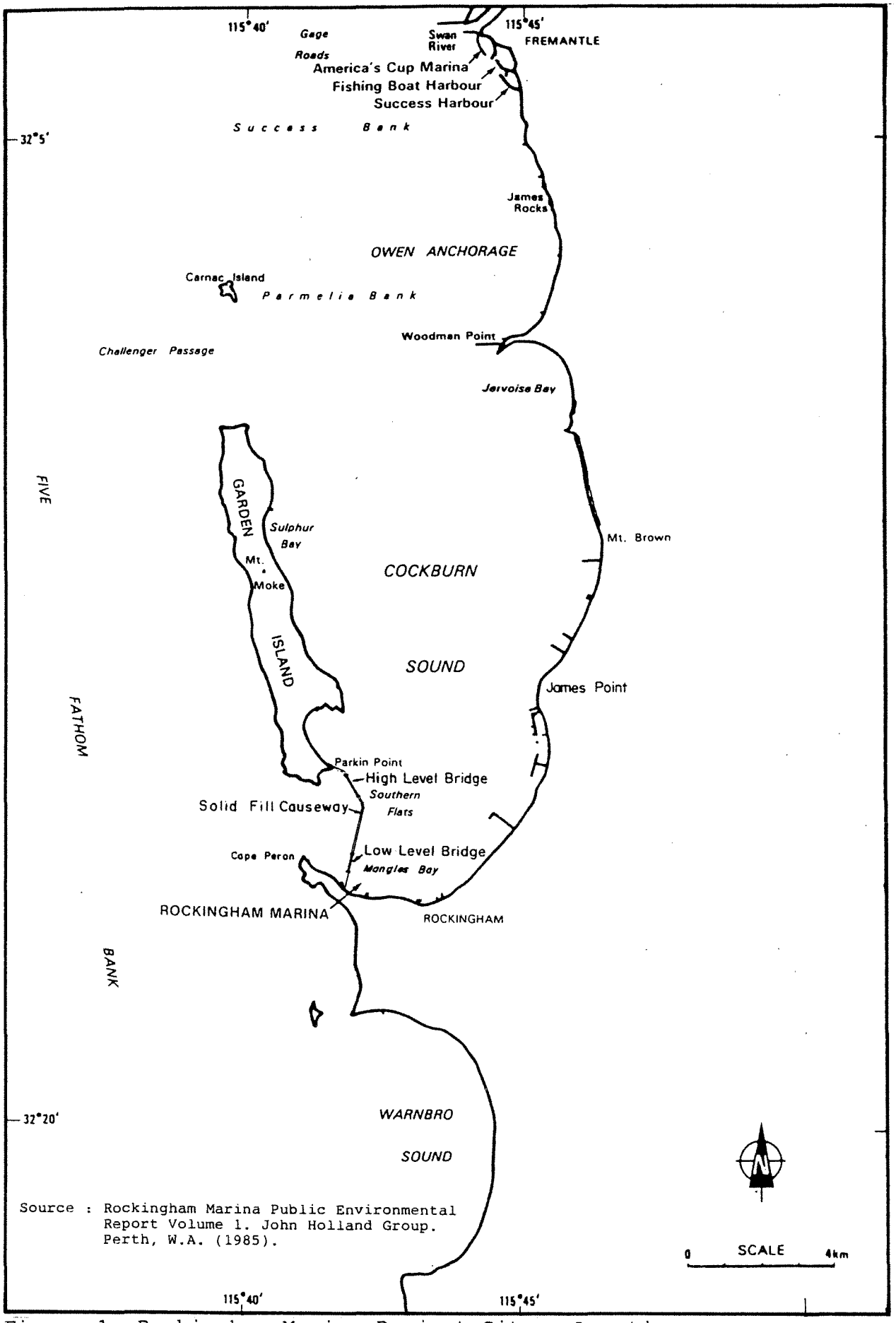

Source : Rockingham Marina Public Environmental Report Volume 1. John Holland Group. Perth, W.A. (1985).

Figure 1. Rockingham Marina Project Site - Location.

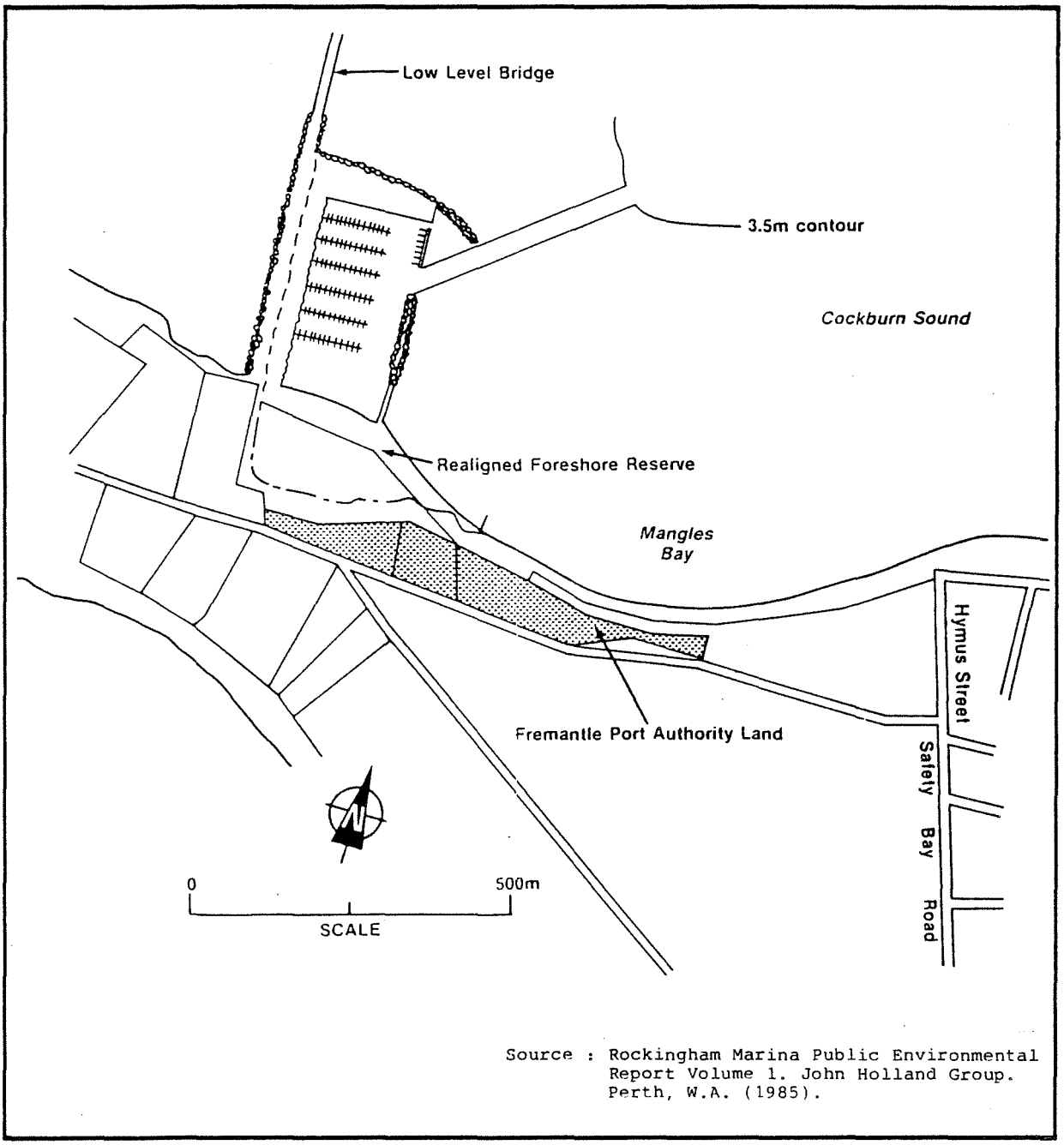

Figure 2. Development Concept - Proposed Rockingham Marina.

1. SUMMARY

The Rockingham Marina project is a proposal from the John Holland Group (referred to as the proponent) to develop a 330 berth marina immediately east of the Garden Island Causeway adjacent to the low-level causeway bridge.

A Public Environmental Report (PER) was prepared by the proponent under guidelines issued by the Environmental Protection Authority (EPA). The PER was released for a six-week public review period which ended on 31 January 1986.

The EPA has assessed the environmental aspects of the project from the PER, public and Government agency comments on the PER, the proponent's response to those comments, and existing information on environmental conditions in Cockburn Sound.

The EPA has concluded that, with the exception of the direct destruction of 10-15 ha of seagrass meadow the proposed marina would cause, its other impacts on the environment would be manageable. Taking all issues into account, the EPA considers the project to be environmentally acceptable.

2. BACKGROUND

In early 1985 the Rockingham Shire engaged engineering consultants to examine possible locations in Mangles Bay for a sheltered boat mooring facility. Various options were considered on the basis of:

. water depths;

. sediment movement;

. wind and wave climate; and

. the type of vessels likely to use the facility.

The following preferred locations were identified:

. between the Garden Island Causeway and Hymus Street; and

. east from Hymus Street approximately to the existing boat launching ramps.

The consultants (1) reported to the Rockingham Shire and, on the basis of this report, the Council sought submissions from parties interested in developing and operating a boat mooring facility in Mangles Bay. The John Holland Group submission proposing a marina adjacent to the southern extremity of the Garden Island Causeway was accepted by the Council subject to the resolution of certain issues, including the requirement for environmental investigations.

The proponent submitted a Notice of Intent outlining the marina proposal in September 1985. This document plus supplementary information from the

proponent was considered by the EPA in October 1985. Based on the considerable community interest in several recent proposals for boating facilities, the EPA decided that the Rockingham Marina project should be subjected to public review. It also decided that a PER rather than an Environmental Review and Management Programme should be prepared. This decision was based on the following considerations:

. the area affected by the proposal had been modified through construction of the causeway;

. the conditions prevailing throughout Cockburn Sound, of which Mangles Bay is part, were well researched and documented; and

. the environmental issues and inter-relationships requiring investigation were readily identifiable.

The PER was prepared under guidelines issued by the EPA, and was released for public review. Following consideration of the public and Government agency submissions, and the proponent's response to them, the EPA has prepared this Assessment Report.

3. THE PROPOSAL

3.1 DESCRIPTION (See Figures 1 and 2)

The proposal involves the partial enclosure with rock breakwaters of a water body approximately 5 ha in area immediately east of the Garden Island Causeway and south of the low-level causeway bridge. The northern breakwater would extend some 300 m east of the causeway and, at its eastern extremity, would curve towards the south-east. Combined with an island breakwater (linked to the foreshore by a trestle bridge), this would protect the marina basin from the east. The breakwater configuration adopted is intended to facilitate flushing of the marina.

The marina basin would be dredged and connected to deep water in Mangles Bay by a dredged channel. The capacity of the marina would approximate 330 vessels accommodated in a system of floating pens. It would also provide hard standing areas for the dry storage and maintenance of boats, and for car parking.

Dredge spoil would be used as fill during construction of the marina, and to re-align a section of the adjacent foreshore to enable the development of land-based public and tourist facilities at some later time to complement the marina. The site desired for this future development is partly within the Foreshore Reserve vested in the Rockingham Shire, and partly within land owned by the Fremantle Port Authority. Re-alignment of the foreshore has been proposed in order to preserve public access along the beach, while providing a site for the public and tourist facilities the proponent wishes to develop.

The proponent is negotiating with the Council and the Port Authority concerning the future development and has indicated in the PER that the marina might not proceed if these negotiations are unsuccessful. The proponent also acknowledges in the PER that the impacts of this future development would need to be assessed before it could proceed.

3.2 ALTERNATIVES

In establishing the need for a boating facility in Mangles Bay, the proponent draws on information from a number of studies and reports, and the consideration of alternative sites is based on the engineering consultants' report to the Rockingham Shire. The actual site selected for the marina is within the more westerly of the preferred areas identified by the consultants. The greater availability of land for supporting development, and the reduced likelihood of disturbance to existing community facilities influenced the proponent's choice.

Several alternative designs for the marina were mathematically modelled to determine the best breakwater configuration for flushing.

The proponent submits that the "do nothing" option would be inappropriate because it ignores the following:

. the need for a boating facility and the consequent disbenefits that would arise if such was not established; and

. the basic suitability of the selected site for the facility.

3.3 BENEFITS AND DISBENEFITS

The benefits of the project perceived by the proponent and identified in the PER are:

. "a safe haven in Cockburn Sound for recreational and commercial craft having a draft up to 3 m;

. protected mooring and launching facilities for easy access to the Sound and ocean for the substantial south-west metropolitan boating community;

. an alternative destination for Swan River-based craft which have traditionally used Rottnest Island;

. a tourist destination for metropolitan boat owners;

. an opportunity for the Fremantle Port Authority and the Cruising Yacht Club to rationalise moorings of large craft with the option of pen moorings in lieu of swing moorings in Mangles Bay;

. a pleasant deep-water swimming beach adjacent to the marina where shallow water currently exists;

. a new focus for water-oriented activities in the Rockingham-Palm Beach area;

. improved public access to an area which is presently undeveloped and fenced off and which offers great potential as a tourist resort with waterfront access; and, at a later stage,

. a resort offering accommodation to metropolitan and country holidaymakers who desire a waterfront site with access to supporting marina facilities".

The perceived disbenefits of the project identified in the PER are:

. "increased noise levels in the immediate area - particularly during construction;

. increased human/recreational pressure on the fishing grounds in the area;

. an increase in traffic using Point Peron Road and Oleander/Lease Road;

. the loss of about 15 ha of seagrass meadow in the area encompassed by the breakwaters, dredged entrance channel and the reclaimed land; and

. some decline in water quality and a gradual enrichment of sediments by nutrients and by metals from anti-fouling paints within the marina".

3.4 RESPONSIBILITIES

In order to set out the respective responsibilities of the proponent, the State and the Rockingham Shire, a legal Agreement is being negotiated between the parties. The EPA understands that it is not proposed to ratify this Agreement in the Parliament. The EPA has made comments to the proponent on a draft of the Agreement, and these comments have also been transmitted to the State Government.

4. ENVIRONMENTAL IMPACTS

In deciding that a PER should be prepared for the Rockingham Marina project, the EPA identified the following areas in which the proposal had environmental implications:

. seagrass loss;

. interruption/modification of sediment movement; and

. water quality.

Many specific issues were identified in the guidelines issued and, in most instances, these have been addressed in the PER. The proponent acknowledges that certain impacts are inevitable if the marina is constructed, but maintains that these are either manageable or are sufficiently minor to be regarded as acceptable.

This Chapter of the Assessment Report examines more specifically the impacts likely to arise from development of the marina and draws conclusions as to their manageability. Where necessary, the management initiatives required to mitigate these impacts will be discussed in Chapter 5 of the Report.

4.1 HABITAT DISTURBANCE AND DESTRUCTION

The direct loss of about 15 ha of seagrass (of which some 4 ha is expected to regenerate) would be the marina's most significant impact.

The seagrass meadows sustain complex and productive floral and faunal communities, and stabilise the bottom sediments. They are generally

regarded as the foundation of the Cockburn Sound ecosystem. Since 1955 (when industrial development fringing the Sound began), the area of seagrass has been reduced from approximately 4 000 ha to 900 ha in 1979.(2) Material in the PER indicates that significant areas of seagrass have re-established in Cockburn Sound since 1977.(3) This is apparently attributable to improvements in water quality.

In spite of the reduction of seagrass in Cockburn Sound, the further area that would be destroyed by the marina represents less than 1% of the remaining meadows.(4) However, because of its importance to the ecology of Cockburn Sound, the seagrass loss the marina would cause should not be viewed in isolation. This fact is implicitly recognised in the proponent's suggestion that one benefit of the project would be a possible reduction of damage to seagrass caused by boat swing moorings (the contention is that boats would use the marina rather than swing moorings, enabling the number of such moorings to be reduced). The likelihood of a reduction in swing moorings as a result of the marina's construction has not, however, been established.

As it represents such a small proportion of the remaining seagrass meadows, the loss that would result from construction of the marina would not have any major ecological impacts. The loss would, however, mean that subsequent proposals likely to damage the seagrass meadows would require increasingly critical scrutiny as to their ecological implications.

While the loss of seagrass at the project site is unavoidable, seagrass away from the site could also be affected by the following impacts:

. increased water turbidity and sedimentation caused by dredging;

. the release of nutrients and toxic substances from dredged material into the water column; and

. deoxygenation of the water column.

The proponent submits that these impacts could be contained through careful management of dredging and spoil disposal operations. The EPA accepts this proposition and considers that the proposals put forward in the PER are acceptable.

The need to consider the impact of the project on the nearby area affected by System 6 Recommendation M101 (see Appendix A) was indicated in the PER guidelines. The proponent concludes that the System 6 area would not be adversely affected, although the above impacts were not specifically considered. The EPA has been advised that the intertidal and subtidal reef communities within the System 6 area are susceptible to such impacts. This concern is acknowledged. However, as indicated above, the EPA accepts that these impacts could be contained. Accordingly, the physical separation between the marina site and reef communities within the System 6 area indicates the unlikelihood of damage.

If established, the marina would have certain ecological impacts that could not be ameliorated by management measures. However, these impacts are not sufficient to conclude that the project should be considered environmentally unacceptable. The EPA considers most potential ecological impacts to be manageable, the specific requirements in this regard being discussed in the following Chapter.

4.2 WATER QUALITY AND OTHER POLLUTION CONSIDERATIONS

The likelihood of some decline in water quality within the marina, and enrichment of its bottom sediments with heavy metals, are acknowledged by the proponent. These effects are a potential problem within the marina, and concern has been expressed that, through dispersion, they could extend into the wider environment.

This concern presupposes that water quality in the marina would be so poor that, on mixing with the adjacent waters, pollution levels would remain a threat to biota. It is also based on the projected lower rates of water movement east of the marina following its construction.

The marina has been designed to maximise flushing. Mathematical modelling done for the project shows that, under summer conditions, the marina would flush on a daily basis, and the EPA has been advised that this modelling is reasonable. However, the EPA has been advised that modelling should also have been done for the autumn/winter period. During this period there may be conditions that could reduce the frequency of flushing, and increase the likelihood of water quality problems in the adjacent portion of Mangles Bay.

With daily flushing and effective management, severe water quality problems within the marina should not occur. It would also be difficult to envisage severe problems arising even with a reduced frequency of flushing, again assuming proper management. While the lack of autumn/winter modelling is acknowledged as a deficiency, the EPA does not regard it as a critical omission, as the issues it raises could be adequately addressed through management measures.

Some heavy metal pollution would occur in the marina. The flaking of anti-fouling paint from boat hulls, and settlement of these flakes to the marina bed, would be the greatest source of heavy metal contamination. The removal of anti-fouling paint, and re-painting of boat hulls during maintenance could also contribute to heavy metal pollution of the marina sediments. Elevated concentrations of heavy metals in the marina water body, either from anti-fouling paints or sacrificial anodes would not be considered likely, because the amount released into solution would rapidly dilute to insignificant levels.

Unlike hull maintenance operations which could be controlled, little could be done to restrict the paint flaking process and the resultant concentration of heavy metals in the marina sediments. However, by removing the sediments before excessive heavy metal levels occur, this problem could be managed.

The EPA considers that the implementation of appropriate management practices should minimise the likelihood of adverse impacts on the ecological environment because of pollution in the marina and adjacent waters. However, because the adjacent public beach is an integral part of the project, water quality and pollution effects must also be considered in terms of human well-being.

In this regard, the EPA notes that water quality criteria for direct contact recreation identified in the publication "Water Quality Criteria For Marine And Estuarine Waters Of Western Australia" (5) have not been adopted for the marina. Although the criteria adopted are very similar, if the re-created beach is to be regarded as suitable for swimming

(as is inferred in the PER), criteria for direct contact recreation (shown in Appendix B of this Report) should be adopted. If the direct contact criteria are not adopted, or could not be achieved, the adjacent beach could not be regarded as a swimming beach.

RECOMMENDATION 1 The EPA recommends that, in addition to the criteria specified for marina water quality in the PER, the criteria specified in Schedule 1 of the report "Water Quality Criteria For Marine And Estuarine Waters Of Western Australia" should be adopted.

RECOMMENDATION 2 The EPA recommends that if the Schedule 1 criteria are not adopted, or could not be achieved, the adjacent beach could not be regarded as a swimming beach and appropriate steps should be taken to notify the public of this.

4.3 INTERRUPTION AND MODIFICATION OF COASTAL PROCESSES

Interest in this regard centres on:

. possible worsening of foreshore erosion east of the Garden Island Causeway; and

. increased scouring in the vicinity of the causeway low-level bridge.

Advice the EPA has received confirms the proponent's contention that, if constructed, the marina would be unlikely to worsen erosion of the Mangles Bay foreshore. Monitoring of the foreshore is, however, suggested, and this is taken up in the next Chapter.

Mathematical modelling done by the proponent indicates that construction of the marina would modify flow velocities, particularly to the south-east of the marina, but also in the vicinity of the low-level causeway bridge.(6) The conclusion is, however, that even when current velocities have been increased, they remain below the threshold velocity necessary for sediment mobilisation.

However, the modelling done does indicate that current velocities nearing the mobilisation threshold (0.20 m per second compared with the threshold of 0.22 m per second) would occur along the northern breakwater and adjacent to the southern extremity of the low-level causeway bridge. The EPA therefore considers that predictions regarding the lack of scouring in these areas should be viewed with caution, and that contingency plans to counter scouring should be developed.

The proponent has done this in respect of scouring along the northern breakwater, and has identified an appropriate management response (ie the placement of gravel or crushed rock sheeting). The same commitment should be provided in relation to the Causeway.

Other needs relating to the coastal sector identified as a consequence of the project are:

. stabilisation of the reclaimed foreshore area;

. restabilisation of areas disturbed during construction; and

. control of human access through the foreshore areas.

The EPA acknowledges these needs but considers that the nature of the response to them would largely depend on the type and timing of the future land-based development. The matters could, nevertheless, be satisfactorily dealt with by management measures. The proponent should provide a commitment to deal with these matters to the satisfaction of the relevant Government agencies.

4.4 SOCIAL AND COMMUNITY IMPACTS

The proposal has various implications for the human environment, and the EPA is satisfied that most of these issues have been adequately addressed and that the absence of any unacceptable impact has been demonstrated. Nevertheless, the EPA does wish to address the following matters.

4.4.1 RECREATIONAL OPPORTUNITY

Mangles Bay is an important recreation area for both beach-related and boating activities.(7) Concern exists that development of the marina and the supporting facilities could diminish recreational opportunities in the area.

The proponent submits that the general area near the project site is little used for recreation, and that the project would be unlikely to disrupt this activity as the public beach would remain, and a useful boating facility would be provided.

The EPA is aware that a recreation/tourism plan is being prepared for the Point Peron/Mangles Bay area, and that the proponent has liaised with the group preparing this plan. The EPA regards the proposed marina as compatible with the present planning initiative for the Point Peron/Mangles Bay area. Negotiations concerning the later land-based public and tourist development are still underway. However, as has been pointed out to the EPA, this development would require formal planning approval. Accordingly, mechanisms for assessing its acceptability in terms of the overall proposals for the Point Peron/Mangles Bay area do exist.

The EPA considers that the marina itself is notionally acceptable in terms of its recreational implications, and that the only basis on which an adverse impact in this regard could be attributed to the facility would be if it directly caused any marked reduction in recreational opportunity in the near vicinity. As initiatives directed principally towards maintaining environmental quality in the vicinity of the marina would also maintain conditions for recreation, such would not be considered likely, particularly in terms of boating. The possibility of water quality inadequate for direct contact recreation at the re-created beach would be the most likely occurrence that could restrict recreational opportunity.

4.4.2 COMMUNITY CONSIDERATIONS

With the following exceptions, the project site is removed from any community facilities that it could affect, or that could affect it:

. the immediately adjacent Garden Island Causeway; and

. the Water Authority of Western Australia's Point Peron Wastewater Treatment Plant.

The implications of the project for these facilities are examined at Sections 4.4.2.1 and 4.4.2.2.

The separation of approximately 1 km between the project site and areas of permanent human settlement indicates the unlikelihood of any adverse impacts, certainly once the facility was operational. During the construction phase, some impacts may occur, particularly as a result of vehicle and machinery movements to and from the site. These are further discussed at Section 4.4.2.3.

All necessary services are available for extension to the site.

4.4.2.1 The Garden Island Causeway

The Causeway is under Commonwealth Government jurisdiction (through the Department of Defence). The EPA has, however, been advised that the Commonwealth Environment Protection (Impact of Proposals) Act, 1975 does not apply to the marina proposal. The procedure for resolving matters affecting the Causeway is, therefore, by negotiation between the parties involved. The EPA has been advised that several matters relating to the Causeway have yet to be resolved. The question of scouring is one of these matters and, as indicated at Section 4.3, the EPA also has some doubts in this regard (these are canvassed further at Section 5.3.1). Other outstanding issues that have been drawn to the EPA's attention are principally administrative matters, for example, relating to security arrangements. Beyond pointing out the need for resolution of these matters through negotiation, the EPA is unable to deal with them. The EPA is, however, aware that negotiations between the parties are proceeding.

4.4.2.2 The Point Peron Wastewater Treatment Plant

The impact of the treatment plant on the future land-based public and tourist facilities has been raised in several submissions on the PER. The Water Authority of Western Australia endeavours to maintain a 1 km non-development buffer around its treatment plants in order to minimise odour problems. The land-based facilities would be well within this buffer and there is concern that if these facilities were established, pressures would be applied to prevent the occurrence of malodours.

There is little information available to indicate the likely frequency or severity of odour problems if the land-based facilities were developed. Meteorological data do, however, show a significant occurrence of westerly winds that would direct odours towards the development site under relatively stable atmospheric conditions. Another relevant factor is that the plant is a long-term facility currently operating below its ultimate capacity.

The EPA therefore considers it inevitable that odours from the plant would adversely affect the land-based facilities if they were established. Given the nature of the facilities, the concern that pressure would be applied to eliminate the odours is considered valid. Accordingly, for the land-based public and tourist facilities to proceed, it would be necessary for the proponent (and its successors) to acknowledge the existence of the treatment plant and its implications for the development.

RECOMMENDATION 3 The EPA recommends that, if the land-based public and tourist facilities are to be developed, some arrangement such as a formal agreement between the developer (and its successors) and the Water Authority of Western Australia would be necessary to ensure that the developer:

. *recognises the pre-existence of the Point Peron Wastewater Treatment Plant, currently operating at less than full capacity; and*

. *accepts the adverse consequences of its proximity to the development site.*

4.4.2.3 Air and Noise Emissions

These would occur during the construction phase and could downgrade environmental quality (including recreational amenity) adjacent to the project site. Off-site impacts could also arise, for example, from the movement of vehicles and machines to and from the site. The explosive clattering of unladen tip trucks is a particularly intrusive form of noise that could arise and cause serious concern and objection within the community.

The proponent has undertaken to control air and noise emissions within statutory limits, and to respond to any public complaints. In view of this undertaking, serious problems appear unlikely. However, the EPA considers that if the project proceeds, the proponent should liaise with the relevant authorities (particularly the Rockingham Shire and the Pollution Management Division of the Department of Conservation and Environment) during the construction phase concerning the following:

. the hours of operation (particularly on weekends and public holidays);

. the timing of any particularly noisy procedures; and

. the routes to be used by service and construction vehicles and machines.

The proponent should provide a commitment to liaise as necessary on these matters.

Combined with the undertakings given, this should avoid the possibility of any problems and promote harmonious relations with the community.

5. ENVIRONMENTAL MANAGEMENT

The overall environmental acceptability of a project like the Rockingham Marina will be influenced by:

. the degree to which anticipated environmental impacts can be managed; and

. a demonstrated capacity for implementation of the necessary management initiatives.

As indicated at various points throughout the preceding Chapter, the impacts likely as a consequence of the marina could generally be regarded as acceptable subject to appropriate management. While management issues have, in most instances, been adequately canvassed in the PER, several specific requirements are considered to warrant examination. This is done later in this Chapter.

Demonstration of the capacity for implementation of the required management initiatives would involve:

. identification of the responsibilities of the respective management agencies, and acceptance of those responsibilities;

- definition of clear, legally enforceable mechanisms to ensure implementation of the management measures;

- identification of the resources required for management and clear commitments to allocation of these resources (including contingency funding);

- initiation of a monitoring programme and incorporation of the results obtained in the management strategies implemented;

- submission of periodic reports as specified to the appropriate authorities; and

- implementation of all approved management conditions and commitments given.

In broad terms, the proponent has addressed those of the above requirements applying to it. Commitments from other agencies involved are, obviously, beyond the proponent's control. As indicated at Section 3.4, a legal Agreement is being negotiated between the proponent and the State and Local Government agencies associated with the project. Presumably, this Agreement would provide the mechanism for identifying the responsibilities of the respective parties, and would represent the commitments from them.

The proponent indicates that the Agreement would incorporate all commitments made in the PER. The EPA notes that the early draft of the Agreement did not apparently contain any specific management-related commitments, although it is acknowledged that this draft was prepared in advance of the PER. Provided the final Agreement does incorporate all commitments given in the PER, and the additional requirements identified in this Assessment Report, the EPA would be satisfied that the capacity for implementation of the management strategies required as a consequence of the project has been acceptably demonstrated.

Particular management-related requirements (including monitoring) arising from the proposal will now be examined.

5.1 CONSTRUCTION PHASE REQUIREMENTS

Proposed safeguards against the spread of impacts from dredging and spoil disposal operations beyond the project site appear adequate. The EPA does, however, consider it necessary to respond to concerns about the effects of fine sediments and other contaminants in the dredging plume, and the return waters (and possibly subsequent leachates) from dredge spoil.

Whether a management response in addition to those proposed in the PER would be necessary cannot be determined at this time. Initially, this matter would need to be considered in terms of the monitoring programme instituted, and it is further discussed in this context at Section 5.3.1. At this juncture, however, the possible need for an appropriate additional management response should be acknowledged by the proponent and addressed during contingency planning. A commitment to do so should be provided by the proponent.

The need for liaison between the proponent and State and Local Government agencies in relation to air and noise emissions during the construction phase is an additional requirement the proponent should also acknowledge. The need for a commitment in this regard has already been indicated.

5.2 POST CONSTRUCTION REQUIREMENTS

The management programme presented in the PER should adequately safeguard against unacceptable environmental impacts. The following matters are, however, considered to warrant particular attention:

5.2.1 DISPOSAL OF SEAGRASS WRACK

The proponent suggests that seagrass wrack removed from the marina could be disposed of either on land, or through the low-level causeway bridge on ebb tides. The EPA considers land disposal preferable, with the material possibly being used as a stabilising mulch.

5.2.2 WATER QUALITY CONSIDERATIONS

5.2.2.1 Drainage Control

It is proposed to discharge surface runoff from hard standing areas through the northern marina breakwater. The proponent acknowledges the need for sumps in the drainage system to improve the quality of runoff prior to discharge. Provided the drainage system was effectively trapped to remove floating debris, greases, oils and other hydrocarbons, sediments and other suspended matter, and provided the system was properly maintained, the EPA would regard the drainage proposals as acceptable.

5.2.2.2 Heavy Metal Contaminated Sediments

The proponent intends to monitor heavy metal levels in the marina sediments and, if concentrations become sufficiently elevated, to remove and dispose of the sediments. Dispersal through the low-level causeway bridge is one disposal option identified. This should not occur.

RECOMMENDATION 4 The EPA recommends that sediments removed from the bed of the marina because of elevated heavy metal concentrations should not be dispersed through the low-level causeway bridge or otherwise directed to Mangles Bay or Cockburn Sound.

5.2.2.3 Water Quality Adjacent To the Marina

At Section 4.2, the possibility that the marina might affect water quality in Mangles Bay was discussed, and adoption of water quality criteria appropriate for direct contact recreation was recommended. If such criteria could not be met, members of the public using the marina and adjacent beaches would need to be warned.

The proponent acknowledges that signs would need to be erected within the marina and on the adjacent foreshores if water quality standards could not be maintained. Clearly, the management response in such an event would need to be acceptable to the relevant health authorities. (Refer also to Recommendation 2 at Section 4.2).

The ecological implications for Mangles Bay of poor water quality in the marina also needs to be considered. As discussed at Section 4.2, concern in

this regard presupposes that pollutants emanating from the marina would remain at sufficient concentrations in the adjacent waters to cause problems. The lack of mathematical modelling of the marina's flushing characteristics during the autumn/winter period, and the lower current velocities it would cause in waters to the east, contribute to the concerns expressed.

Again, whether a specific management response would be required cannot be determined at this juncture, and this would depend on monitoring results. The possibility that measures to supplement those proposed in the PER might be needed should be acknowledged by the proponent, and a commitment given to incorporate appropriate provisions in contingency planning.

5.3 MONITORING PROGRAMME

5.3.1 SCOPE OF THE PROGRAMME

A comprehensive monitoring programme is proposed in the PER. It has, however, been suggested that the impact of the marina on the existing beach erosion east of the project site should also be monitored, and that if an adverse impact is demonstrated, appropriate remedial action should be implemented. The EPA agrees.

The EPA also considers that the monitoring programme should make specific reference to sediment movement in the vicinity of the northern marina breakwater and the low-level causeway bridge.

The possibility of scouring along the breakwater has been acknowledged by the proponent and, as indicated at Section 4.3, the same should be acknowledged in relation to the low-level bridge. Sediment movement would need to be monitored in these areas to determine if corrective action was required.

RECOMMENDATION 5 The EPA recommends that, in addition to the parameters identified in Table 4 of the PER, the monitoring programme should include the observation of beach erosion east of the project site, and of sediment movement in the vicinity of the marina northern breakwater and the Garden Island Causeway low-level bridge. The proponent should provide commitments to undertake appropriate remedial action in the event that the marina produces adverse impacts in these regards.

The Rockingham Marina project raises a variety of particular monitoring requirements, both during and after construction, and with the recommended additions, the monitoring programme would include all parameters requiring observation. Not all parameters would need to be observed at the same frequency and, obviously, some parameters would require observation only at specific locations. The basic need would be for a flexible monitoring programme that could respond to the particular requirements arising from the project. It would be appropriate for the proponent to liaise with the Department of Conservation and Environment on matters relating to implementation of the monitoring programme to avoid unnecessary observations while ensuring that all needs were met.

5.3.2 REPORTING OF RESULTS

The EPA notes proposals in the PER regarding the analysis, interpretation and reporting of monitoring results. Reports on the monitoring and management programme should, however, also be forwarded to the EPA.

RECOMMENDATION 6 The EPA recommends that all periodic reports submitted by the proponent/marina operator relating to the monitoring programme and management of the marina should also be directed to the EPA for consideration.

The EPA agrees with the proponent's suggestion that the monitoring programme should be reviewed annually, with a major review after five years, and accepts that monitoring/management reports should be submitted on this basis.

To provide a sound basis for the major review of the monitoring programme and for decisions concerning future monitoring and management requirements, the report submitted after five years' operation of the marina should draw on data collected and management undertaken during the full five year period.

RECOMMENDATION 7 The EPA recommends that the report submitted after five years' operation of the marina should refer to the monitoring results obtained during the full five year period, interpret these results, and make recommendations relating to future requirements.

In addition to the reporting requirements arising from the annual and five year reviews, the EPA considers it important that any unforeseen or extraordinary occurrence that affects environmental conditions within or adjacent to the marina should also be reported. Such events should be reported as soon as practicable after their occurrence as well as in the next periodic report.

RECOMMENDATION 8 The EPA recommends that any unforeseen or extraordinary event that adversely affects environmental conditions within or adjacent to the marina, and the management response to that event, should be reported immediately by the proponent/marina operator. Reference to any such event in the annual and five year monitoring reports would also be necessary.

6. SUBMISSIONS RECEIVED

Seventeen submissions on the PER were received, two from individual members of the community, one from a community-based organisation, and the remainder from Commonwealth, State and Local Government agencies. Most were supportive of the project, with opposition being expressed in only two, one based on water quality issues, the other because of implications for the Point Peron Wastewater Treatment Plant.

The EPA has considered the environmental issues raised in the submissions during its assessment of the marina project and, in most instances, the matters have been incoporated in the recommendations made (either directly or through the underlying rationale). The possibility of the facility being expanded in the future was, however, raised in two Government agency submissions, both contending that decisions on the present proposal should not preclude later expansion. As the PER deals only with the current proposal, it has obviously not been possible for the EPA to address the possibility of future expansion. At this juncture, therefore, the EPA can only emphasise that the environmental implications of any proposal for expansion of the facility would need to be formally assessed.

Several of the Government agency submissions received raise issues that are beyond the EPA's specific brief although, in some instances, these issues have been mentioned in the discussion of related environmental matters. Such issues include:

. the requirement for planning approval for the land-based public and tourist facilities; and

. administrative matters (such as security arrangements) relating to the Garden Island Causeway.

The issues that have been raised in submissions from Government agencies, but have not been specifically dealt with elsewhere in this Assessment Report, are identified below. These issues are drawn from the submissions received and reflect the comments made by the respective Government agencies. The EPA is not making any judgement as to how the proponent should respond to these matters, as this would need to be negotiated between the proponent and the respective agencies.

6.1 HISTORIC AND ETHNOGRAPHIC SITES

No wrecks are registered from the site of the marina, but if dredging uncovered the remains of an historic wreck the provisions of the Maritime Archaeology Act would need to be complied with.

No Aboriginal sites are registered in the area, although unrecorded sites may exist as no survey has been done (an Aboriginal sites survey prior to construction has been suggested). The provisions of the Aboriginal Heritage Act would need to be complied with.

6.2 PLANNING ISSUES

The adequacy of the car-parking areas proposed has been questioned.

7. CONCLUSIONS

The Rockingham Marina project has arisen from an initiative by the Shire of Rockingham in response to the perceived need for a sheltered boat mooring facility in Mangles Bay. Alternative locations for the facility were examined, and the near-causeway site of the Rockingham Marina project is one of the two preferred locations identified. The Shire called for submissions from developers interested in establishing a boating facility in Mangles Bay, and the proponent's submission was selected.

The EPA accepts the demand for a recreational boating facility in Mangles Bay, and that a satisfactory examination of alternative locations for the facility has occurred. The EPA has assessed the Rockingham Marina project from this standpoint.

The major environmental impact of the marina would be the loss of 10-15 ha of healthy seagrass meadow, and cannot be avoided. The actual area of seagrass lost as a consequence of the marina would depend on the extent of recolonisation in the dredged access channel, and whether scouring occurs along its northern breakwater and near the low-level causeway bridge. As the seagrass meadows underpin the ecology of Cockburn Sound and Mangles Bay, this loss must be regarded as important. Nevertheless, as the

area involved approximates 1% of the seagrass meadows, the loss would not cause major ecological disruption. It would, however, emphasise the need for future proposals that could affect seagrass in Mangles Bay and Cockburn Sound to be closely scrutinised as to their ecological implications.

The EPA considers that other environmental impacts likely to arise from the project would be manageable, and, in most instances, regards the management proposals in the PER as acceptable. Various management related issues do, however, require attention, and some are the subject of recommendations. Where these matters are not specifically addressed by a recommendation, the need for a commitment from the proponent to respond to them has been indicated.

If the proposed development does proceed, monitoring of its effects would be essential. The PER proposes a comprehensive monitoring programme which, notwithstanding the recommended addition of two further parameters, could be regarded as a model for programmes instituted at other boating facilities. Several matters relating to the reporting of results obtained are the subject of recommendations.

Having considered the material presented in the PER for the Rockingham Marina project, the matters raised in submissions on the PER, and supplementary information provided by the proponent, the EPA concludes that the project as described in the PER is environmentally acceptable subject to the following:

. compliance by the proponent with the provisions for environmental management contained in the PER;

. implementation of the recommendations contained in this Assessment Report; and

. provision of commitments from the proponent as sought in this Assessment Report.

8. LIST OF RECOMMENDATIONS

RECOMMENDATION 1 The EPA recommends that, in addition to the criteria specified for marina water quality in the PER, the criteria specified in Schedule 1 of the report "Water Quality Criteria For Marine And Estuarine Waters Of Western Australia" should be adopted.

RECOMMENDATION 2 The EPA recommends that if the Schedule 1 criteria are not adopted, or could not be achieved, the adjacent beach could not be regarded as a swimming beach and appropriate steps should be taken to notify the public of this.

RECOMMENDATION 3 The EPA recommends that, if the land-based public and tourist facilities are to be developed, some arrangement such as a formal agreement between the developer (and its successors) and the Water Authority of Western Australia would be necessary to ensure that the developer:

. *recognises the pre-existence of the Point Peron Wastewater Treatment Plant, currently operating at less than full capacity; and*

. *accepts the adverse consequences of its proximity to the development site.*

RECOMMENDATION 4 The EPA recommends that sediments removed from the bed of the marina because of elevated heavy metal concentrations should not be dispersed through the low-level causeway bridge or otherwise directed to Mangles Bay or Cockburn Sound.

RECOMMENDATION 5 The EPA recommends that, in addition to the parameters identified in Table 4 of the PER, the monitoring programme should include the observation of beach erosion east of the project site, and of sediment movement in the vicinity of the marina northern breakwater and the Garden Island Causeway low-level bridge. The proponent should provide commitments to undertake appropriate remedial action in the event that the marina produces adverse impacts in these regards.

RECOMMENDATION 6 The EPA recommends that all periodic reports submitted by the proponent/marina operator relating to the monitoring programme and management of the marina should also be directed to the EPA for consideration.

RECOMMENDATION 7 The EPA recommends that the report submitted after five years' operation of the marina should refer to the monitoring results obtained during the full five year period, interpret these results, and make recommendations relating to future requirements.

RECOMMENDATION 8 The EPA recommends that any unforeseen or extraordinary event that adversely affects environmental conditions within or adjacent to the marina, and the management response to that event, should be reported immediately by the proponent/marina operator. Reference to any such event in the annual and five-year monitoring reports would also be necessary.

9. REFERENCES

1. HALPERN GLICK (1985), Rockingham Shire Council Proposal for Breakwater at Mangles Bay, Halpern Glick Pty Ltd Consulting Engineers, West Perth, WA.

2. DCE (1979), Cockburn Sound Environmental Study 1976-1979, Department of Conservation and Environment Report No 2, Perth, WA, p 83.

3. HILLMAN (1985), Distribution and Composition of the Seagrass Communities of Cockburn Sound, K Hillman, Botany Department, University of WA, Appendix 3 in Volume 2 Rockingham Marina Public Environmental Report, John Holland Group, Perth, WA, Figure 3.

4. HILLMAN, op cit, p 11.

5. DCE (1981), Water Quality Criteria for Marine and Estuarine Waters of Western Australia, Department of Conservation and Environment Bulletin No 103, Perth, WA, p 10.

6. HUNTER & HEARN (1985), Physical Oceanography and Meteorology of the Rockingham Marina Site, and Predicted Physical Impacts of the Marina, J R Hunter, Centre for Marine Science and Technology, WAIT, and C J Hearn, Centre for Water Research, University of WA, Appendix 2 in Volume 2 Rockingham Marina Public Environmental Report, John Holland Group, Perth, WA, (Section 3 and Figure 8).

7. DCE (1979), op cit, pp 37-38.

APPENDICES

M101 — Cape Peron, Shoalwater Bay and Warnbro Sound

The recommended area is situated off the coast between Cape Peron and Port Kennedy and comprises Reserve A17070, for Recreation, Camping and Enjoyment by the Public and Purposes Ancilliary Thereto; Reserves C24204, C31893 and C31894, for Conservation of Fauna, all vested in the W.A. Wildlife Authority; and four small islands — Passage Rock, First Rock, Second Rock and another between White Rock and the mainland — being vacant Crown land (Figure 159).

Penguin Island, Reserve A17070, is the subject of a management plan being developed by the Department of Conservation and Environment together with the National Parks Authority, for the enhancement of the Island's high conservation, education and recreation values. The area is affected by the construction of the Cape Peron effluent disposal pipeline.

The waters around Cape Peron contain a variety of marine habitats ranging from sheltered seagrass meadows to more exposed limestone reefs and cliffs with tidal and sub-littoral reef platforms. The fauna and flora of the reefs exhibit well marked patterns of zonation. The range of reef and seagrass communities are of high value in the teaching of ecological principles, being close to the metropolitan area and easily accessible, in contrast to offshore islands.

Reserve C27853, at Cape Peron, is used intensively for recreational activities most of which are based on the beaches and near-shore waters. With increasing use of the recreation reserve in recent years, there has been severe diminution of rock fish inhabiting the inshore reefs. Abalone, once plentiful on reef platforms, have almost disappeared. There is a need to protect the marine life around the Reserve, with people being free to dive and view the seascape but not to remove fauna or flora, nor to damage the substrate.

Penguin Island has a similar flora to the slightly larger Carnac Island (C46).

The islands of Shoalwater Bay and Warnbro Sound and Carnac Island, are the most northerly nesting area for the little penguin. At least seven other species of birds nest here. The Sisters and Tub Rocks groups are important rookeries for the pied cormorant. Being close to the mainland the islands are convenient for research.

The recommended area constitutes open space of regional significance (see Figure 1, Chapter 4) because of its high conservation, education and recreation values and its proximity to the Perth residential areas. Important management considerations include: the protection of the marine fauna; a detailed survey of the area's marine resources; and restriction of public access to areas of high conservation value.

Recommendations:

M101.1 That our general recommendations on planning and management of Regional Parks be applied to this area (see Recommendations 15 and 16, Chapter 5).

M101.2 That Reserves C24204, C31893 and C31894 be amended to Class A.

M101.3 That each area of vacant Crown land be made a Class C Reserve for the Conservation of Fauna and be vested in the W.A. Wildlife Authority.

M101.4 That a study of the area be commissioned by the Environmental Protection Authority with the aim of establishing a Marine Reserve to be managed for the purpose of conservation.

M101.5 That, subject to the implementation of M101.4, a management plan be prepared for the Marine Reserve.

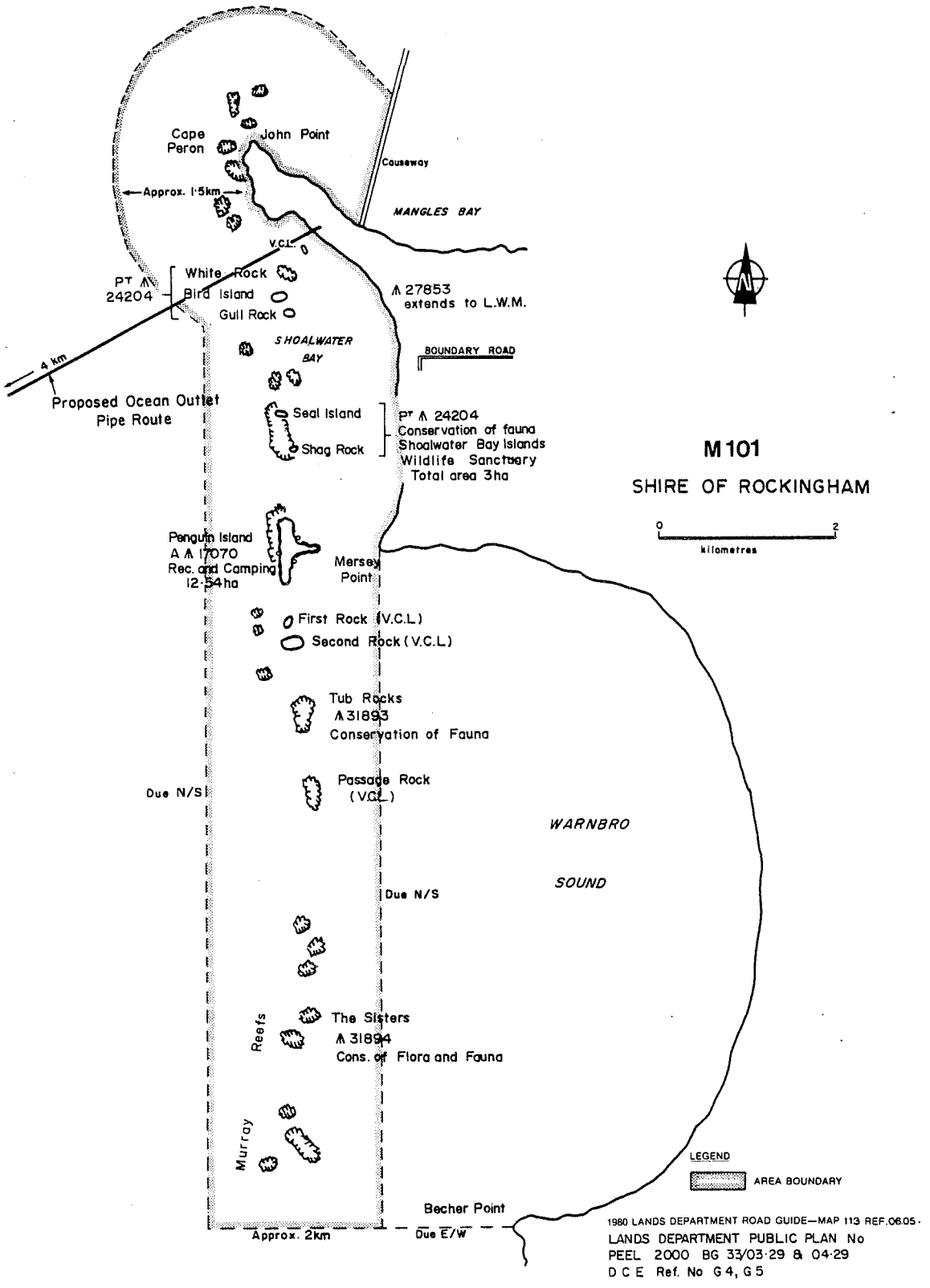
Cape Peron
John Point
Causeway
Approx. 1·5km
MANGLES BAY
V.C.L.
PT A 24204
White Rock
Bird Island
Gull Rock
A 27853
extends to L.W.M.
SHOALWATER BAY
BOUNDARY ROAD
4 km
Proposed Ocean Outlet Pipe Route
Seal Island
Shag Rock
PT A 24204
Conservation of fauna
Shoalwater Bay Islands
Wildlife Sanctuary
Total area 3ha
M 101
SHIRE OF ROCKINGHAM
0
2
kilometres
Penguin Island
A A 17070
Rec. and Camping
12·54ha
Mersey Point
First Rock (V.C.L.)
Second Rock (V.C.L.)
Tub Rocks
A 31893
Conservation of Fauna
Due N/S
Passage Rock
(V.C.L.)
WARNBRO
SOUND
Due N/S
The Sisters
A 31894
Cons. of Flora and Fauna
Reefs
Murray
LEGEND
AREA BOUNDARY
Becher Point
Approx. 2km
Due E/W
1980 LANDS DEPARTMENT ROAD GUIDE—MAP 113 REF.06.05
LANDS DEPARTMENT PUBLIC PLAN No
PEEL 2000 BG 33/03·29 & 04·29
D C E Ref. No G 4, G 5

Figure 159

APPENDIX B EXCERPT FROM "WATER QUALITY CRITERIA FOR MARINE AND ESTUARINE WATERS OF WESTERN AUSTRALIA"

SCHEDULE 1

MARINE AND ESTUARINE WATER QUALITY CRITERIA FOR DIRECT CONTACT RECREATION

Parameter	Criterion	Source
Aesthetic Considerations	As on page 8.	USA EPA (Comp)
Physical Hazards	The water in bathing and swimming areas should be free of submerged bodies and other subsurface hazards.	NH&MRC
Light Penetration	A Secchi disc should be visible to a depth of 2m except in "learn to swim" areas where a Secchi disc should be visible on the bottom.	NH&MRC
pH	6.5-8.5, except for waters with a low buffer capacity where a range of pH between 5.0 and 9.0 may be tolerated.	NH&MRC
Chemicals and Biological Materials	The waters should not contain chemicals and biological materials in such concentrations as to be irritating to the skin or mucous membranes of the human body upon brief immersion. In addition, they should not contain chemicals and biological materials in such concentrations as to be toxic to man if small quantities are ingested.	NH&MRC
Faecal Coliforms	A health investigation level for water in open and unenclosed bathing and swimming areas may be established on the basis of a minimum of five samples taken over not more than a 30-day period under conditions representative of the water quality to which users are commonly exposed, and is reached either when the median reading of such samples exceeds 150 organisms/100mL, or when more than 20% of the total samples during this period exceed 500/100mL. For this purpose samples during the wettest quarterly interval may be omitted if users are not commonly exposed during that interval. The water in bathing and swimming areas in which the median reading ordinarily exceeds 50/100mL and/or in which more than 20% of samples ordinarily exceed 150/100mL, should be protected against any degradation in that quality from a new or increased source of pollution. Water of higher quality should be similarly protected against degradation beyond the levels mentioned in this paragraph.	WG
Faecal Material	The water in bathing and swimming areas should be protected against direct contamination with fresh faecal material of human or domesticated animal origin.	WG
Radioactive Substances	The waters should not contain radioactive substances in such concentrations as to be deleterious to man if small quantities are ingested.	DH&MS

II. MARINE AND ESTUARINE WATER QUALITY CRITERIA FOR RECOGNISED BENEFICIAL USES

For ease of reference and for the sake of completeness, a certain amount of deliberate repetition has occurred in several Schedules corresponding to different beneficial uses. This repetition also permits independent future modification to any given Schedule without perturbation of the others.

GENERAL AESTHETIC CRITERIA

The following general aesthetic criteria should apply to all water bodies regardless of the declaration of beneficial uses unless otherwise specified.

Waters should be:

1. Free from substances which will settle to form putrescent or otherwise objectionable sludge deposits.
2. Free from floating debris, oil, grease, scum, foam and other floating materials, in amounts sufficient to be unsightly or otherwise objectionable.
3. Free from materials which will produce colour, odour, turbidity, or other conditions to such a degree as to be unsightly or otherwise objectionable.

CRITERIA FOR RADIOACTIVE SUBSTANCES

Although the Working Group consulted as widely as it was able in order to obtain specific criteria for radioactive substances, the information provided in most cases was not relevant and lacked specificity.

For example, the World Health Organization figures which are available apply only to drinking water and are not considered applicable to any envisaged beneficial uses of marine and estuarine waters.

Given the nature of the information available the following narrative criteria from the Water Quality Control Plan for Ocean Waters of California is currently adopted and should apply to all water bodies:

> Radioactive substances should not be present in concentrations that are deleterious to human, plant, animal or aquatic life or that result in the accumulation of radioactive substances in the food web to an extent that presents a hazard to human, plant, animal or aquatic life.