Exmouth boat harbour (formerly Coral Coast Marina, residential subdivision and quarry, Exmouth) - Change to environmental conditions

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Department of Transport

Report and recommendations
of the Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia
Bulletin 806
January 1996

THE PURPOSE OF THIS REPORT

This report contains the Environmental Protection Authority's environmental assessment and recommendations to the Minister for the Environment on the environmental acceptability of the proposal.

Immediately following the release of the report there is a 14-day period when anyone may appeal to the Minister against the Environmental Protection Authority's report.

After the appeal period, and determination of any appeals, the Minister consults with the other relevant ministers and agencies and then issues his decision about whether the proposal may or may not proceed. The Minister also announces the legally binding environmental conditions which might apply to any approval.

APPEALS

If you disagree with any of the contents of the assessment report or recommendations you may appeal in writing to the Minister for the Environment outlining the environmental reasons for your concern and enclosing the appeal fee of $10.

It is important that you clearly indicate the part of the report you disagree with and the reasons for your concern so that the grounds of your appeal can be properly considered by the Minister for the Environment.

ADDRESS

Hon Minister for the Environment
12th Floor, Dumas House
2 Havelock Street
WEST PERTH WA 6005

CLOSING DATE

Your appeal (with the $10 fee) must reach the Minister's office no later than 5.00 pm on 16 February 1996.

Environmental Impact Assessment Process Timelines

Date	Timeline commences from receipt of full details of proposal from proponent for public review	Time (weeks)
28/08/95	Proponent Document Released for Public Comment	4
25/09/95	Public Comment Period Closed	
06/10/95	Issues Raised During Public Comment Period Summarised by EPA and Forwarded to the Proponent	2
15/12/95	Final Proponent response to the issues raised	10
23/01/96	EPA reported to the Minister for the Environment	6

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Summary

The Environmental Protection Authority (EPA) has been requested by the Minister for the Environment under Section 46 of the *Environmental Protection Act 1986*, to report on proposed modifications to the Exmouth Boat Harbour project (formerly Coral Coast Marina, Residential Subdivision and Quarry).

The Coral Coast Marina, Residential Subdivision and Quarry project was assessed by the EPA and approved by the Minister for the Environment on 20 January 1992 (Appendix 1).

The EPA identified the main environmental topics in this assessment, requiring detailed consideration as being:

- foreshore stability
- dune protection
- source of construction materials for breakwaters
- subterranean fauna in marina and quarry
- marina water quality (including sewage disposal and turbidity)
- marine habitat
- drainage provisions
- visual impact
- evaluation of existing environmental conditions and commitments for the Exmouth Boat Harbour project.

In relation to shoreline stability and coastal dunes it has been concluded that any impacts can be minimised and effectively managed by the proponent's commitments. In relation to maintenance of acceptable water quality, it has been concluded that the water quality of the harbour can be maintained at acceptable levels. With regard to the impact on subterranean fauna it is concluded that subterranean fauna should not be adversely affected by the development of the offshore boat harbour .

In terms of the proposed alternative quarry site, it is concluded that the use of the alternative quarry site could be environmentally acceptable, however, any approval for this site should wait until it has been assessed under the Whitecrest project and the necessary approval given by the Minister for the Environment. This is due to the fact that the alternative quarry site forms part of the Whitecrest Enterprises Pty Ltd limestone quarry and quicklime plant proposal.

With regard to other topics, primarily marine habitat, drainage, turbidity, construction impacts, and visual amenity, it is considered that these issues can be managed adequately by the proponent's commitments.

The Authority has also reviewed the existing conditions and commitments for the Exmouth Boat Harbour project, and has consolidated the conditions and commitments in a single environmental statement.

Following the assessment of this amended proposal, and the modifications and management commitments made by the proponent, the Environmental Protection Authority finds the project to be environmentally acceptable.

1. Introduction and background

1.1 Purpose of this report

The Environmental Protection Authority (EPA) has been requested by the Minister for the Environment under Section 46 of the *Environmental Protection Act 1986*, to report on the proposed modifications to the Exmouth Boat Harbour Development Project. This report (Bulletin 806) contains the EPA's advice and recommendations to the Minister for the Environment on the environmental acceptability of the proposed Exmouth Boat Harbour.

1.2 Background

In March 1991, the Environmental Protection Authority formally assessed a proposal by the Department of Transport (formerly the Department of Marine and Harbours) for an inland marina, provision for an associated recreational holiday resort and commercial facilities, and a residential subdivision inland from the marina development at Exmouth (Bulletin 498) (see Figures 1 & 2). The proposal also included the development of a quarry site to provide armour stone for the marina breakwaters and groynes. The key issues considered in the assessment focused on dewatering impacts, dredge spoil disposal, marina water quality, management of drainage, and location, management and rehabilitation of the quarry and its access road.

The proposal was found to be environmentally acceptable subject to a number of Environmental Conditions and environmental approval was issued on 20 January 1992.

In April 1995, the proponent proposed some changes to the project (construction having not yet been commenced) and the EPA advised the Minister that such changes to the proposal were substantial and should be assessed under Section 46 of the *Environmental Protection Act* 1986. The changes to the proposal include re-designing the marina from an inshore harbour basin to a smaller offshore harbour basin, retention of the floodway, removal of sections of dune either side of the floodway, deferral of the residential component and an alternative quarry site (See Figure 3).

The Section 46 environmental review document was released for public comment for a period of four weeks from 28 August to 25 September 1995.

1.3 Structure of the report

This document has been divided into seven sections.

Section 1 describes the background to the proposal and its assessment, and describes the structure of the report. Section 2 briefly describes the proposal (more detail is provided in the proponent's Section 46 environmental review document {Bowman Bishaw Gorham 1995}). Section 3 explains the method of assessment and provides an analysis of public submissions.

Section 4 sets out the evaluation of the key environmental topics associated with the proposal. In each sub section, the objectives of the assessment are defined, the likely effect of the proposal is explained, and advice to the EPA from submissions and the proponent's response to submissions is outlined. The adequacy of the response by the proponent is then considered in terms of project modifications and environmental management commitments in achieving an acceptable outcome. The EPA analysis and recommendations with respect to identified issues are contained in this section.

Section 5 summarises the EPA's conclusions and recommendations and Section 6 describes the recommended environmental conditions. References cited in this report are provided in Section 7.

Recommendation No.	Summary of recommendations
1	The amended proposal could proceed subject to the proponent's environmental management commitments.
2	The use of the alternative quarry site for the supply of breakwater rock could be environmentally acceptable but its acceptability is dependent upon its separate assessment and if appropriate its subsequent approval as part of the Whitecrest assessment.

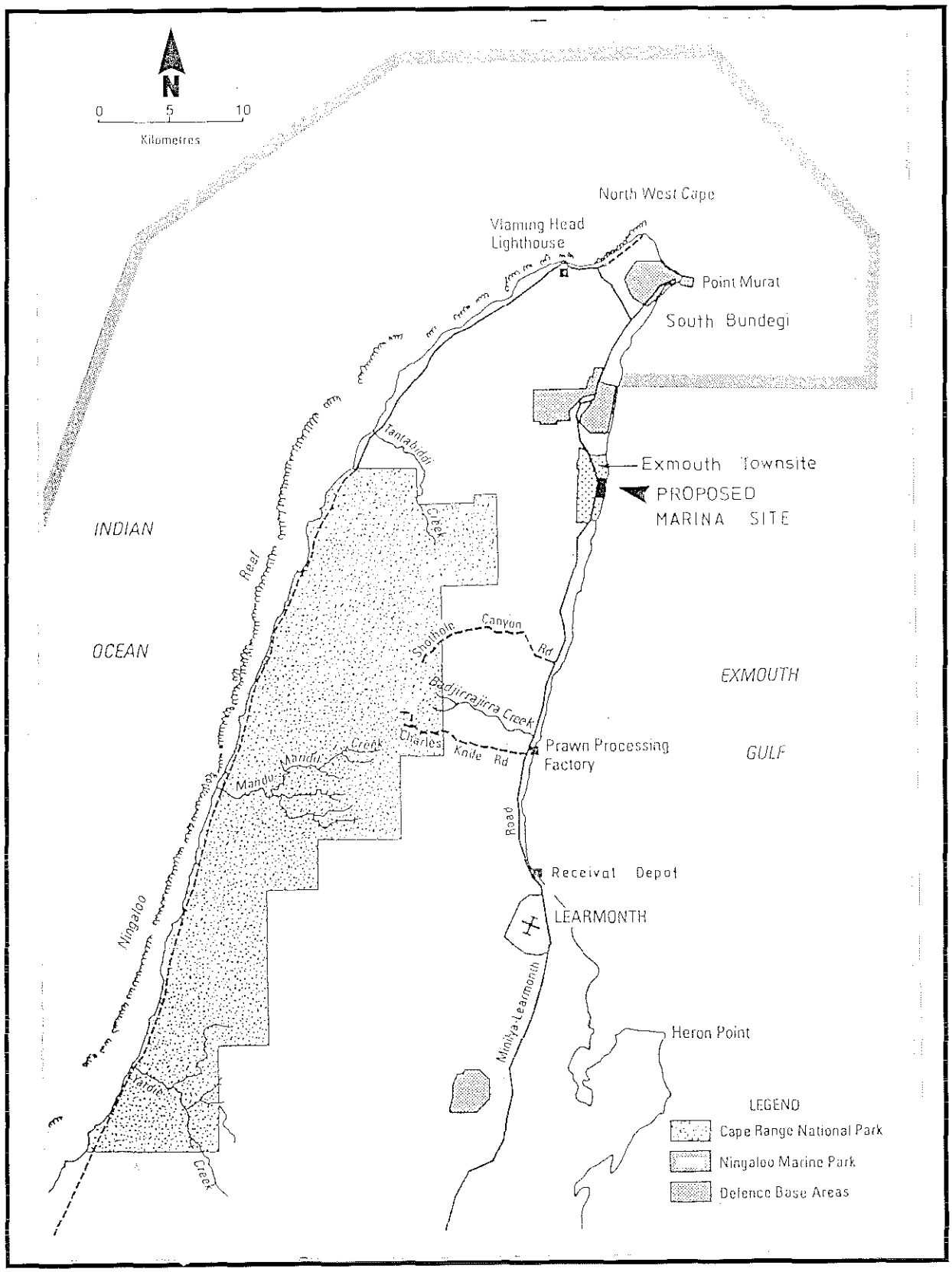


Figure 1. Coral Coast Marina Resort Project Location, Exmouth (Bowman Bishaw Gorham, 1989).

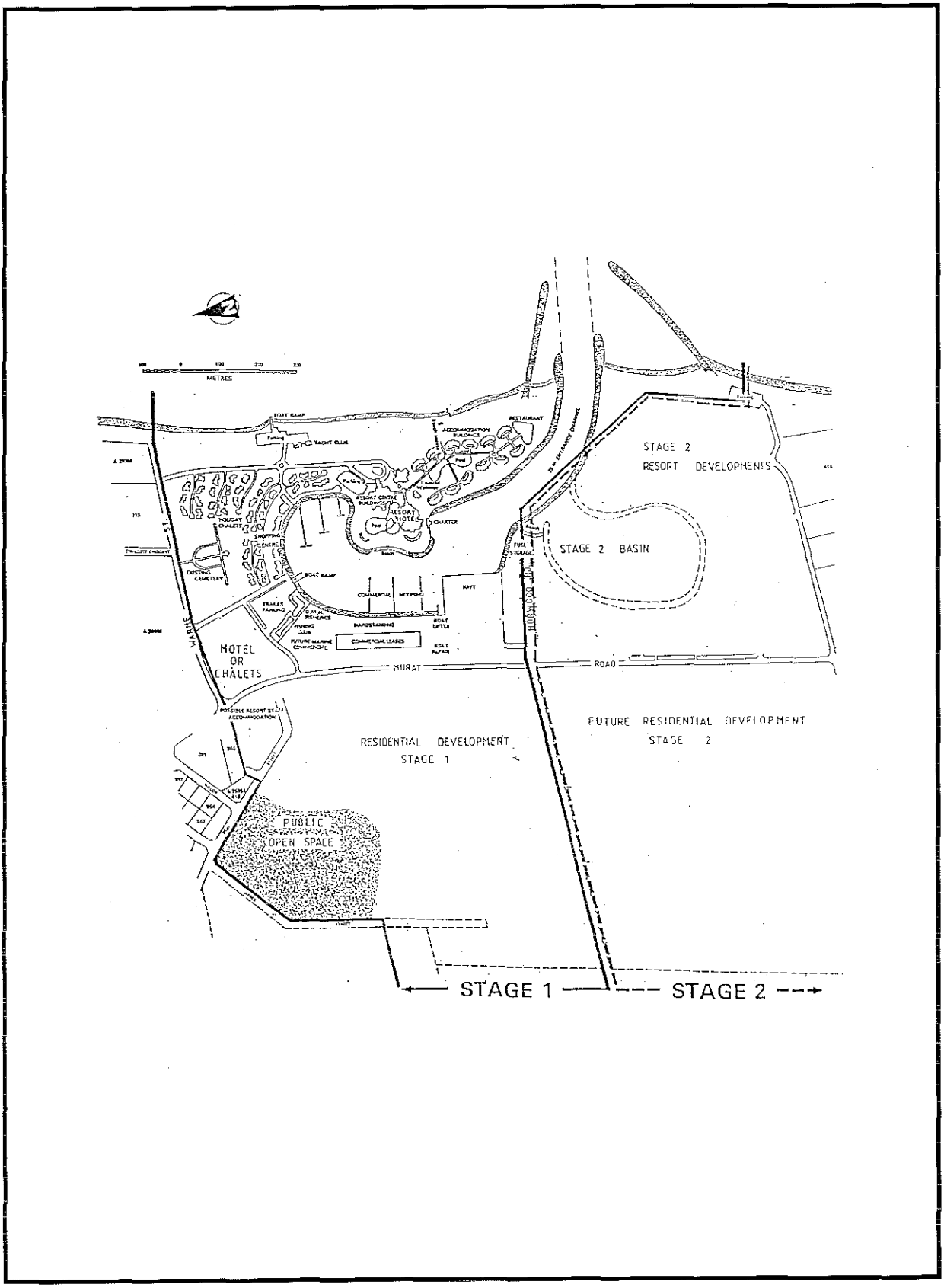


Figure 2. Proposed development concept for 1989 Coral Coast Marina Resort Project (Bowman Bishaw Gorham, 1989)

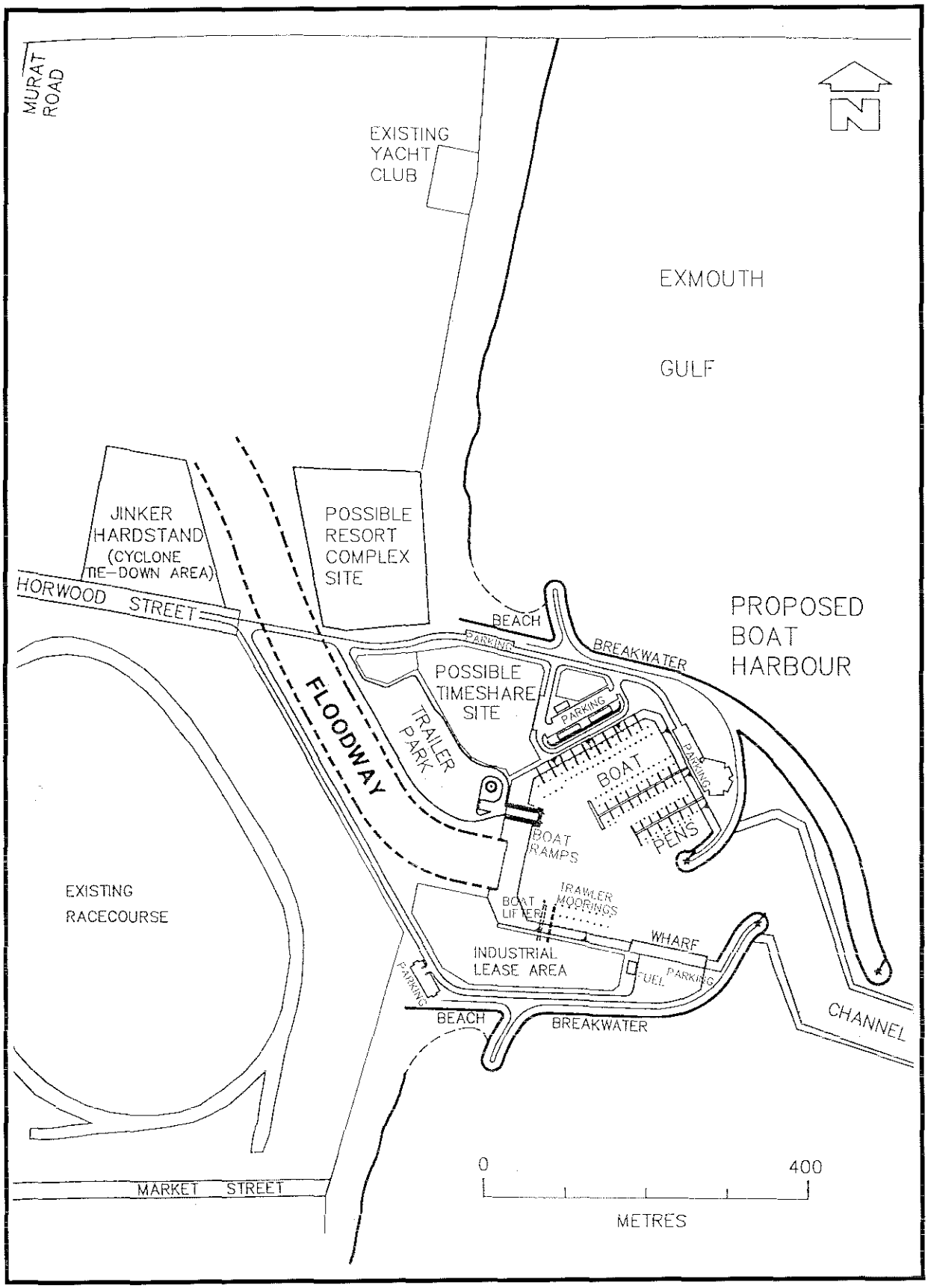


Figure 3. Proposed Exmouth Boat Harbour Layout (from Bowman Bishaw Gorham, 1995).

3. Identification of issues

3.1 Description of methodology

The purpose of the environmental impact assessment is to determine whether a proposal is environmentally acceptable or under what conditions it could be environmental acceptable.

In undertaking this assessment the following approach was taken.

The initial steps of the method involve the identification of environmental topics and the consideration of these topics by the proponent in the Section 46 environmental review both in terms of identifying potential impacts as well as making project modifications or devising environmental management strategies.

The Section 46 environmental review document is checked to ensure that each topic has been discussed in sufficient detail by the proponent prior to release for government agency and public comment. The submissions received are summarised by the Department of Environmental Protection (DEP) on behalf of the EPA and this process can add environmental issues which need to be evaluated in terms of the acceptability of potential environmental impact.

Proponents are invited to respond to the issues raised in the submissions. Appendix 2 contains a summary of the issues raised in submissions and the proponent's response to those issues. A list of submitters appears in Appendix 3. Eight submissions were received, of which four were from government agencies and four from members of the public and conservation groups. The proponent's revised commitments following their response appears in Appendix 4.

The information, namely the proponent's Section 46 environmental review document, the submissions and the proponent's response, is then subjected to analysis for environmental acceptability. For each environmental issue, an objective is defined and where appropriate an evaluation framework identified.

The expected impact of the proposal, with due consideration to the proponent's commitments to environmental management, is then evaluated against the assessment objective. The EPA then determines the acceptability of the impact. Where the proposal, as defined by the proponent, has unacceptable environmental impacts the EPA can either advise the Minister for the Environment against the proposal proceeding or make recommendations to ensure the environmental acceptability of the proposal.

Limitation
This assessment has been undertaken using information currently available. The information has been provided by the proponent in the Section 46 environmental review document and supplementary documentation, by DEP officers utilising their own expertise and reference material, by utilising expertise and information from other State government agencies and by contributions from EPA members.

The environmental impact assessment for this proposal followed the *Environmental Impact Assessment Administrative Procedures 1993*. In addition to following the administrative procedures, DEP officers undertook discussions with the proponent and site visits.

The EPA recognises that further studies and research may affect the conclusions. The EPA considers that if the proposal has not been substantially commenced within two years of the date of this report, then such approval should lapse. After that time, further consideration of the proposal should occur only following a new referral to the EPA.

Dune protection

Submissions were concerned about whether the proponent would monitor the impact of the marina on the dune system and what remedial management the proponent would take if the marina had an adverse effect on the dune system.

In one submission it was noted that the primary dunes in the area of the harbour, which have been badly denuded over the years, would be subject to a management plan and that the loss of some of the degraded dune would not cause a problem due to the construction of the outer groynes.

The proponent has acknowledged the need to minimise dune disturbance.

The EPA's evaluation of the impacts of dune protection is contained in Section 4.2.

Source of construction material for breakwaters

Submissions recommended that previous conditions for the original quarry site should apply to the alternate quarry and that geological testwork should be carried out on the alternative quarry site before the final quarry site is chosen.

Concern was expressed with regard to possible contamination of groundwater by quarrying operations. It was considered imperative that potential point source contamination sites (eg bulk storage facilities, refuelling, explosive stores) be fully contained against the worst case accident.

One submission recommended that two additional commitments be made relating to containment and disposal of accidental spillage and servicing of any plant outside Water Reserve 34055 (see Figure 5). The EPA's evaluation of the construction impacts is contained in Section 4.3.

The proponent has acknowledged the need to reduce the risk of groundwater contamination and to water level in the subterranean environment.

The EPA's evaluation of the impacts of the alternative quarry site proposed is contained in Section 4.3.

Subterranean fauna - marina and quarry

The main issue raised in submissions focussed on monitoring the impact of the marina on subterranean fauna and the impact of quarrying on water flow and water level in the subterranean environment.

The proponent has indicated that the marina harbour and entrance channel will not directly affect troglobitic fauna and will only directly disturb a small thickness of submarine limestone, which may or may not be habitat for stygofauna.

Quarry operations will be operated above the groundwater table (30+m DOT site, +50m alternative site) and will be managed to prevent groundwater contamination. The proponent further indicates that the 34+mAHD base of the proposed quarry provides a 30m buffer above the water table and cannot expose the groundwater regime to increased evapotranspiration. The proponent acknowledges that one potential hydrological effect would be potential changes to rainfall recharge within the quarry tot he underlying groundwater aquifer. Surface drainage within the quarry would be directed through a silt trap prior to discharge from the site to minimise potential 'clogging' of downsteam karst terrain.

4. Evaluation

The Environmental Protection Authority has considered twelve topics raised during the environmental impact assessment process including matters identified in public submissions and guidelines. In addition to the topics raised in submissions additional topics considered comprise the visual impact and the evaluation of existing conditions and commitments. These topics have been considered given that the boat harbour will be visible from the township and the desire to achieve a single environmental statement that provides for adequate protection of the environment and for efficient and effective environmental auditing of compliance criteria.

The topics are as follows:

Biophysical impacts

- foreshore stability;
- dune protection;
- source of construction materials for breakwaters;
- subterranean fauna in marina;
- subterranean fauna in quarry;
- impact on nearshore marine habitat; and
- drainage provisions if residential development takes place.

Pollution issues

- marina water quality (including sewage disposal); and
- turbidity.

Other

- visual impact;
- development of strategic plan for the Cape Range area; and.
- evaluation of existing environmental conditions and commitments for the Exmouth Boat Harbour Project.

Table 2 summarises the topics raised, the characteristics of the proposal and the comments received in order to identify issues warranting evaluation. The EPA has evaluated the following key environmental topics arising from this proposal, based on existing information and advice from other government agencies.

The EPA considers that other topics raised during the environmental impact assessment process can either be appropriately managed by the proponent in accordance with their environmental management commitments (Appendix 4) or are issues which should be dealt with by the proponent in concert with other agencies. One such topic relates to the development of a strategic plan for the Cape Range area. This topic is not considered to be an issue requiring further EPA evaluation in this report and is not discussed in the following section (refer to Section 3.3 for discussion).

There are eleven topics identified in Table 2 warranting further evaluation by the EPA. Some of the topics have been combined (for example water quality and turbidity). In addition, a further topic involving the evaluation of existing environmental conditions and commitments has been identified and is also addressed in this section.

An evaluation of the following issues is set out below.

- foreshore stability
- dune protection
- source of construction materials for breakwaters

4.1.5 EPA evaluation

The EPA notes that the proponent has made a commitment to monitor and manage foreshore impacts and that this remains unchanged from the previous proposal (Notice of Intent Sections 7.3.3 and 7.4.1 and Commitment 23). The EPA notes proponent Commitment 17 to monitor coastal sediment movement following construction of the marina as outlined in Notice of Intent Section 7.4.1, and to undertake sand by-passing around the breakwaters if necessary.

The EPA concludes that based on the above information and Proponent Commitment 17, shoreline stability would not be adversely affected by the marina development (See Recommendation 1).

This recommendation is reflected in Recommended Environmental Condition 1 included in Section 5.

4.2 Dune protection

4.2.1 Objective

To ensure the impact on the dune system from the project is minimal.

4.2.2 Technical information

The proposed boat harbour is aligned with the same break in the coastal dune as was the previous 1989 proposal. The break in the dune was initially caused by flood drainage but has been substantially widened by off-road vehicle use (Bowman Bishaw Gorham, 1995). Although the revised proposal still takes advantage of the break in the dune, it also requires the removal of a short section of the degraded dune either side of the floodway in order to accommodate the floodway and the access road.

4.2.3 Comments from key agencies/interest groups

Key Agencies submissions

The Shire of Exmouth indicated in their submission that the primary dunes in the area of the harbour which have been badly denuded will be subject to a Management Plan and that the loss of some of the degraded dune will not cause a problem due to the construction of the outer groynes.

Interest Groups submissions

Concern was expressed in public submissions with regard to whether the proponent would monitor the impact of the marina on the dune system and what remedial management the proponent would take if the marina had an adverse effect on the dune system. In addition the implications of floodwater washing into the marina in the event of a cyclone was raised.

4.2.4 Response from the proponent

In response the proponent indicated that as part of the monitoring programme, the proponent would monitor the dune profile as stipulated in Commitment 17 (see Appendix 2). The proponent acknowledged that the primary attribute of a coastal foredune in terms of shoreline stability is to act as a sand reservoir from which sand can erode during storms and thus provide some protection for the hinterland. The proponent also commented that the section of dune to be removed is behind the harbour and this protection function will no longer be necessary.

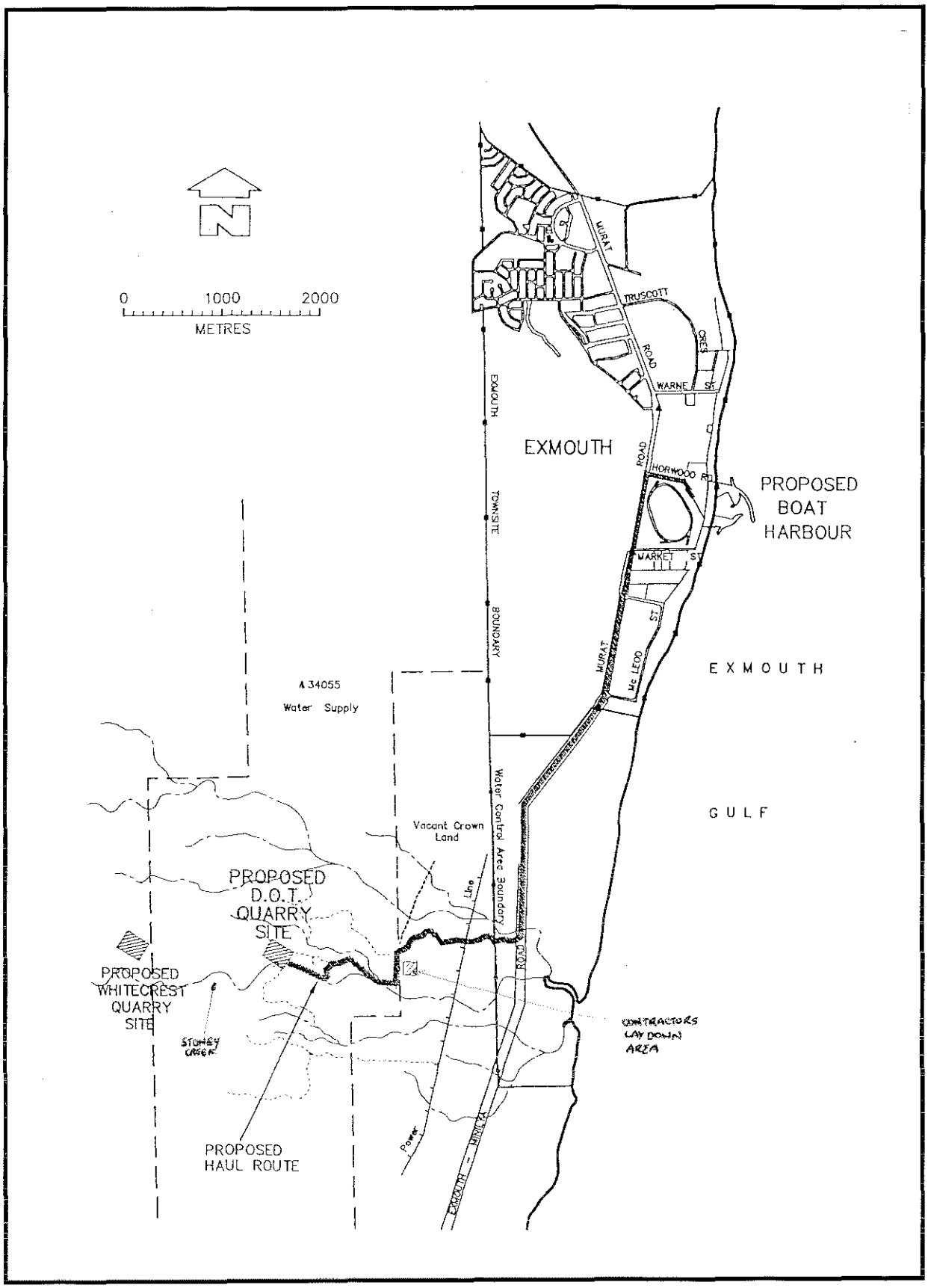


Figure 5. Location of Quarry sites - approved site and proposed alternative site (Bowman Bishaw Gorham, 1995).

- both sites would be operated well above the groundwater table (+30m approved DOT site, +50m alternative site) and would be managed to prevent groundwater contamination;
- both sites are located within Exmouth Water Reserve and accordingly are designed so as to minimise any risk to this water resource; and
- both sites are located in the creek valley with excavation designed such that neither site will be visible from Exmouth or Murat Road.

The EPA considers the proposed relocation to have a range of benefits including environmental and that the relocation would minimise the number of sites disturbed. This is considered to be desirable. However, given that the alternative quarry site forms part of the Whitecrest quarry and quicklime plant proposal, the EPA believes the alternative quarry site must undergo assessment as part of the Whitecrest proposal. Therefore the EPA considers that to consider the alternative quarry site at this time could be seen as pre-empting the Whitecrest assessment.

The EPA notes that two additional commitments (Commitment 25 in relation to management of accidental spills and 26 in relation to off site servicing of plant) which can relate to either quarry, have been made to minimise groundwater contamination and additional Commitment 27 relating to the facilitation of speleological inspection of voids encountered during mining operations (see Appendix 2). It is also noted that Commitment 27 would relate to both quarry site locations.

Furthermore, the EPA notes that a draft Quarry Management plan has been submitted in accordance with Environmental Condition 4 of the Minister's 1992 Statement for the approved quarry site. Topics addressed in the QMP include dust control, noise, access to the quarry site, rehabilitation and decommissioning.

The Environmental Protection Authority advises that any decision to use the alternative quarry site for the supply of breakwater rock should wait until the assessment of the Whitecrest proposal is completed and approval given by the Minister for the Environment.

Recommendation.

The Environmental Protection Authority recommends that, although the use of the alternative quarry site for the supply of breakwater rock could be environmentally acceptable, its acceptability is dependent upon its separate assessment and if appropriate its subsequent approval as part of the Whitecrest assessment.

4.4 Subterranean fauna in marina and quarry

4.4.1 Objective

To ensure that potential impact on subterranean fauna is avoided.

4.4.2 Policy

Specific policy statements

Western Australian Wildlife Conservation Act 1950

This Act, which is operated by the Department of Conservation and Land Management, provides for the protection of specified Western Australian flora and fauna. Two species of stygofauna are listed under Schedule 1, ie fauna which is rare or likely to become extinct, of the Wildlife Conservation (Specially Protected Fauna Notice 1994). In the current Notice there are four threatened subterranean fauna species on the North West Cape.

If dewatering of the harbour basin is proposed to allow excavation "in the dry", the proponent has made a commitment to determine the impacts on the groundwater levels and quality near the marina basin (Commitments 18 which specifies groundwater investigations and monitoring if dewatering is required and 21 which specifies the development of a monitoring programme if indicated by the results of groundwater investigations) through a program of investigations and monitoring.

No monitoring is proposed of potential stygofauna or habitat within the area of the offshore harbour basin and entrance channel.

4.4.6 EPA evaluation

The EPA notes Proponent's Commitments 8, 18, 21, 25 & 26 and revised Commitment 19. The commitments relate (respectively) to defining the nature of the sediments to be dredged from the entrance channel and identification of dredging methodology and requirements for blasting; harbour excavations and de-watering; management of accidental spills, offsite servicing of the plant and minimising adverse impacts from blasting operations.

The EPA concludes that, based on the above information and the proponent's commitments, subterranean fauna should not be adversely affected by development of the offshore boat harbour (See Recommendation 1).

This recommendation is reflected in Recommended Environmental Condition 1 included in Section 5.

4.5 Marina water quality (including sewage disposal and turbidity)

4.5.1 Objective

To ensure that water quality permits existing uses to be maintained.

4.5.2 Policy

The evaluation of water quality within the marina should meet water quality criteria guidelines as described in the Environmental Protection Authority's Bulletin 711 titled *"Draft Western Australian Water Quality Guidelines for Fresh and Marine Waters"* (EPA, 1993a). This document outlines environmental values of fresh and marine waters, and establishes chemical, physical and biological guidelines which, if not exceeded, should result in the environmental value being maintained.

Water quality criteria that should be met for this proposal are those relating to the protection of marine aquatic systems and recreational water quality and aesthetics.

4.5.3 Technical information

The marina has been re-designed from a 15.5ha inshore excavated harbour basin to a 4.4ha offshore, breakwater protected facility. It is expected that the offshore marina would be better flushed by tides than the approved inshore marina.

4.5.4 Comments from key agencies/interest groups

Key Agencies submissions

The DEP advised that the proponent is committed to monitoring water quality in the harbour and the adjacent area of Exmouth Gulf, as proposed in Section 7.4.2 of the NOI and in Commitment 15. The DEP further advised that tidal flushing for the boat harbour of

4.6 Marine habitat

4.6.1 Objective

To ensure that construction and operation of the marina minimises impact to the local marine habitat.

4.6.2 Technical information

The nearshore marine habitat is a limestone pavement with minor pockets of sand and supports a sparse algal and invertebrate community. This habitat is widespread along the western shore of Exmouth Gulf (Bowman Bishaw Gorham, 1995).

There are no developed coral reefs or other communities that may be sensitive to an increased suspended sediment load near the proposed harbour site and that isolated *Porites* coral colonies, occur on the outer part of the limestone platform, are tolerant of temporary increases in water column turbidity (Bowman Bishaw Gorham, 1995)

4.6.3 Comments from key agencies/interest groups

Key Agencies submissions

The Shire of Exmouth commented that it believes the relocation of the harbour from the land will have less impact on the environment generally, although it will have a minor effect on the marine habitat.

The DEP advised that marine habitat is a limestone pavement with minor pockets of sand and supports a sparse algal and invertebrate community. This habitat is widespread along the western shore of Exmouth Gulf.

Interest Groups submissions

Public submissions indicated that the reduction in the scale of the project was welcomed.

4.6.4 EPA evaluation

The EPA notes that the nearshore marine is widespread along the western shore of Exmouth Gulf (Bowman Bishaw Gorham, 1995). There are no marine habitats of special significance located within the area of direct disturbance, although some isolated Porites coral communities are within the vicinity of the marina.

The EPA also notes commitment 19 which relates to managing blasting operations to minimise any impact to the environment.

Based on the above information, the EPA concludes that the issues relating to marine habitat, can be minimised and managed effectively by the proponent's commitments.

4.7 Drainage provisions

4.7.1 Objective

To ensure that drainage through the site is adequately managed to minimise environmental impacts to the coast.

It is therefore considered that the existing conditions which relate to drainage should be incorporated into the updated statement, in the event that residential development takes place in the future. These conditions will be transferred to the proponent of the residential development at the appropriate time.

4.8 Visual impact

4.8.1 Objective

To ensure that the boat harbour will blend in with the visual values of the coastline.

4.8.2 Comments from key agencies/interest groups

Key Agencies submissions

The DEP advised that the boat harbour should be designed so that it is sympathetic to the environment.

Interest Groups submissions

Public submissions indicated that the reduction in the scale of the project was welcomed and that there was community support for the project.

4.8.3 EPA Evaluation

Tourism is a major component of the economy of Exmouth. With regard to visual amenity, the EPA notes that there is support for this proposal within the community and that the proponent has made a commitment (Commitment 29) to ensure that the boat harbour will blend in with the visual values of the coastline to the satisfaction of the DEP. The EPA concludes that visual amenity can be managed effectively by this commitment.

4.9 Assessment of existing environmental conditions and commitments

The Exmouth Boat Harbour project is currently subject to Environmental Conditions and commitments set as a result of the environmental impact assessment of the former Coral Coast Marina, Residential Subdivision and Quarry proposal in 1991.

4.9.1 Objective

The objective of reviewing existing conditions and commitments is to achieve a single environmental statement and one list of proponent commitments that provides for adequate protection of the environment and for efficient and effective environmental auditing of compliance criteria. It is also considered that this objective will assist the public, the proponent and relevant agencies to easily identify the environmental requirements associated with the Exmouth Boat Harbour project and the subsequent modifications to the proposal.

4.9.2 Changes to environmental conditions

Existing environmental conditions have been reviewed, revised and consolidated. The status of conditions are summarised in Table 3. Table 3 should be examined in conjunction with the original statement of Environmental Conditions contained in Appendix 1. The revised statement containing the recommended environmental conditions arising from this assessment is included in Section 6 of this report.

New standard conditions have also been included in the recommended environmental conditions and these relate to non substantial changes to the project (recommended condition 2-1) transfer of ownership (recommended condition 7-1) and compliance auditing (recommended condition 8-1).

It should be noted that existing Environmental Conditions 3-4 to 3-7 refer specifically to the residential component proposed in the original assessment. Although the amended proposal no longer has this residential component, the conditions will not be deleted and have been retained as recommended environmental conditions 5-1 to 5-6. In the event that this future residential development does take place, these Environmental Conditions will be transferred to the proponent for that development.

It should be noted that there has been a modification to condition 3 of the Ministerial Statement for the proposal of 20 January 1992, to reflect the EPA's review of conditions (see recommended conditions 3 & 4). It should also be noted that some conditions have changed in structure, but the content remains the same.

4.9.3 Changes to proponent commitments

In the proposal documentation submitted by the Department of Transport, a revised list of environmental management commitments was included. These have been rationalised with the initial commitments attached to the current Ministerial Statement of approval. Previous commitments have been amalgamated, and commitments which duplicate existing statutory requirements have been removed. The proposed new consolidated and updated list of environmental commitments, which will be included as part of the DEP's compliance auditing programme, is included as a schedule of the recommended environmental conditions in Section 6.

Table 4. summarises the changes to the proponent's environmental commitments.

Original proponent commitment No.	Issue	Evaluation/ comment and revised condition number
1	Marina facilities will be constructed behind the frontal dune	Commitment relates to proposal as originally assessed. Commitment has been deleted due to proposal revision.
2	Preparation of an EMP for the rehabilitation and conservation of dunes	Repeated in 1995 Environmental Commitment 1.
3	Beach access	Commitment relates to proposal as originally assessed. This commitment does not relate to the revised proposal and has been deleted. It should be noted, however, that as a resort complex or residential development could take place in the future, this commitment has been retained.
4	Marina and associated facilities to comply with legislation and standards	Repeated in 1995 Environmental Commitment 2.
5	Construction activities - dust suppression and blasting	Repeated in 1995 Environmental Commitment 3.

23	Shoreline stability monitoring and management	Repeated in 1995 Environmental Commitment 17.
24	De-watering investigations	Commitment amended to reflect amended proposal. Amended commitment repeated in 1995 Environmental Commitment 18.
25	Monitoring of private bores	Commitment relates to proposal as originally assessed. Commitment no longer relates to amended proposal and has been superseded by 1995 Environmental Commitment 21.
26	Blasting operations	Commitment has been amended to reflect potential impact of blasting on stygofauna. Amended commitment repeated in 1995 Environmental Commitment 19.
27	Drainage outfalls	Commitment relates to proposal as originally assessed. Commitment no longer relates to amended proposal and has been deleted.
28	CALM conservation ethic	Commitment has been updated and repeated in 1995 Environmental Commitment 20.

A number of the proponent's commitments repeat the intent of existing commitments summarised in the table above. Where this is the case, the wording of the most recent commitment has been retained. The proponent's full list of 1995 commitments is included in Appendix 4.

Although the proponent is legally bound by all commitments made for the project, and reported in the Minister's Statement, not all of these will be subject to audit. A schedule of these auditable environmental management commitments is provided in Section 6 and are indicated by an asterix.

As a consequence of the submissions and discussions with government agencies, new commitments have been made by the proponent (see Appendix 4). These relate to:

- a monitoring programme for possible de-watering effects to groundwater (Commitment 21),
- the cessation of de-watering activities if the results from Commitment 21 indicate unacceptable impacts (Commitment 22);
- construction of settling ponds (Commitment 23);
- fill material (Commitment 24);
- accidental spillages (Commitment 25);
- servicing of any plant (Commitment 26);
- voids encountered during mining operations (Commitment 27);
- turbidity control (Commitment 28); and
- visual amenity (Commitment 29).

5. Conclusions and recommendations

The EPA concludes that the change to the proposal by the Department of Transport to construct a boat harbour at Exmouth is environmentally acceptable subject to the proponent's commitments and the EPA recommendations. This does not include the proposed alternative quarry.

3 Quarry Management (Water Supply Reserve 34055)

Quarry operations should be managed so as to prevent unacceptable environmental impacts.

3-1 Prior to the commencement of quarry operations, the proponent shall prepare an Environmental Management Programme, giving due consideration to the draft guidelines of the Working Party on Conservation and Rehabilitation in the Mining Industry, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority, the Shire of Exmouth and the Water Corporation.

This programme shall include, but not be limited to the following:

1. measures to protect the groundwater quality below the quarry, particularly with respect to management and contingency plans for liquids (eg oil, fuel) used on site;
2. consideration of impacts on Water Corporation operations on or adjacent to the quarry site;
3. effects on site drainage;
4. rehabilitation of the quarry and access roads; and
5. monitoring and reporting of compliance with measures outlined in the Environmental Management Programme.

3-2 The proponent shall implement the Environmental Management Programme required by condition 3-1.

4 Alternative Quarry Site (Whitecrest)

Environmental approval for the alternative quarry on the Whitecrest site has not been given at this time.

4-1 The proponent shall not use limestone extracted from the Whitecrest site unless and until approved by the Minister for the Environment following completion of the assessment of the Whitecrest Enterprises Pty Ltd Limestone and Quicklime proposal (Assessment No. 715).

5 Residential Development

5-1 Prior to filling the residential area, the proponent shall prepare a plan of slopes and their stabilisation programme to be used in the residential subdivision, to the requirements of the Minister for the Environment on advice of the Department of Environmental Protection and the Ministry for Planning.

5-2 The proponent shall implement the plan of slopes and their stabilisation programme to be used in the residential subdivision, required by condition 5-1.

5-3 Prior to construction of the residential area, the proponent shall prepare a drainage management plan showing amongst other things the location of outlets for drainage downstream of the residential subdivision, to the requirements of the Minister for the Environment on advice of the Department of Environmental Protection and the Shire of Exmouth. The drainage system shall be designed so that there is minimal impact from sediments on important biological communities, such as corals.

5-4 The proponent shall implement the drainage management plan required by condition 5 -3.

5-5 The proponent shall advise, all prospective purchasers of land within the subdivision development area that private groundwater bores will not be permitted nor licences issued by the Water Corporation for private bores within the subdivision development area.

Schedule of Proponent's Environmental Management Commitments to be audited by the Chief Executive Officer

(* = commitments to be audited by the DEP).

The proponent makes the following commitments:

*1. An environmental management plan for the rehabilitation and conservation of the dunes bordering the development site will be prepared in consultation with the Shire, the Ministry for Planning and the Commissioner for Soil Conservation and implemented by the proponent to the satisfaction of the Commissioner for Soil Conservation and the Department of Environmental Protection.

2. The marina and all associated facilities will comply fully with applicable legislation, regulations and by-laws. All construction materials and practices would be in accordance with the relevant Australian and international codes.

3. Construction activities will be restricted to normal daylight hours and, if found to be necessary, appropriate dust suppression techniques would be employed. Any blasting that is required to enable excavation of the marina harbour and entrance channel will be conducted between 9.00 am and 5.00 pm on weekdays, and will be publicised in the Exmouth community.

4. During earthworks and construction, appropriate care will be taken to exclude incursion of machinery into conserved areas of the dune and foreshore.

*5. The proponent will be responsible for quarrying operations to provide armourstone for the breakwaters and will liaise with the Department of Minerals and Energy, the Shire and the Department of Environmental Protection to define appropriate environmental management measures, including rehabilitation of the quarry site and access roads.

*6. If the harbour is to be de-watered for excavation then the extracted water will be directed to a settling pond to reduce suspended solids prior to discharge to Exmouth Gulf. If excavation were to occur "in the wet", drainage water from the excavated material will be similarly directed to a settling basin prior to discharge to Exmouth Gulf. This commitment will be to the requirements of the Department of Environmental Protection.

7. Recontouring of areas receiving fill material will meet the following objectives:

1) The redeveloped areas should form a stable and varied landscape, reflecting naturally occurring topography elsewhere within the coastal strip.

2) The boundary relief should co-ordinate with existing contours.

3) The filled sites will be compacted in accordance with the requirements for building purposes and covered with previously stockpiled topsoil. Filled areas will be stabilised, if necessary, using brush matting, sprayed membranes or mulch.

*8. The proponent will undertake further investigations to define the nature of the sediments to be dredged from the entrance channel, and to identify the preferred dredging methodology and requirements for blasting. The results and proposed works will be submitted to the Environmental Protection Authority for approval prior to initiation of dredging.

9. As an interim measure, sewage from facilities within the harbour development will be disposed to sullage tanks and the proponent will be responsible for regular pump out and delivery of the sewage to the Exmouth treatment works. The proponent will

Lipid levels would also be determined to assist in data interpretation. The sediment and mussels will initially be monitored at six-monthly intervals.

Specialist marine scientists engaged by the Department of Transport will supervise monitoring and interpretation of the results and recommend management action. The results will be presented to the Department of Environmental Protection for review on an annual basis."

16. The level of revetments and areas surrounding the proposed harbour will be +3.0m CD, and floor levels will be a least +4.0m CD. This floor level is sufficient to contain extreme seawater levels, including anticipated seawater level rises due to the "Greenhouse Effect".

*17. Coastal sediment movement will be monitored following construction of the marina as outlined in Section 7.4.1. If by-passing of sand around the breakwaters is occasionally necessary it will be undertaken by the Department of Transport.

Section 7.4.1 of the Notice of Intent is reproduced below.

"The position of the shoreline, vegetation line and dune profiles adjacent to the breakwaters will be established prior to construction. Surveys will be conducted at distances of 50 m, 100 m, 200 m, 500 m, 1 km and 2 km to the north and south of the entrance channel.

Following construction, water depth in the marina and entrance channel, and the position of the shoreline, vegetation line and the dune profile, will be regularly monitored. Surveys will be conducted quarterly for the first year and thereafter at intervals to be determined in consultation with the Commissioner for Soil Conservation."

*18. In the event that de-watering of the harbour basin is proposed for excavation "in the dry", then the proponent would apply the recommendations of the Test Pit Report. Recommendations adopted from Test Pit Report:

1) Prior to commencement of harbour excavations, it is strongly advised that a series of piezometers be drilled and constructed along the perimeter of the harbour and along the estimated radius of influence, which is expected to be approximately 200 m from the western perimeter of the harbour basin.

These will allow the monitoring of any effects of de-watering on the adjacent areas.

2) Piezometer monitoring will be performed by a technician not employed by the earthmoving contractor (possibly the Water Authority). The data should be analysed and reported on by a hydrogeologist.

3) One or two de-watering bores should be sunk into suitable locations to penetrate the hard rock layer and pumping tests carried out to determine:

   i. Magnitude of water flow expected in the full scale operation.
   ii. Allow for a more accurate method of de-watering design.
   iii. Provide more reliable data on the possible zone of influence during the main excavation phase.

*19. Blasting operations will be managed to minimise any impact to the environment or residences beyond the project area, or nuisance as was previously proposed and approved.

7. References

Bowman Bishaw Gorham (1989), *Proposed Coral Coast Marina Resort, Exmouth*, Notice of Intent, Report prepared for Department Marine and Harbours, Bowman Bishaw Gorham, Perth.

Bowman Bishaw Gorham (1995), *Exmouth Boat Harbour, Proposed Changes to Environmental Conditions*. Report prepared for Department of Transport, Bowman Bishaw Gorham, Perth.

Environmental Protection Authority (1991), *Coral Coast Marina, Residential Subdivision and Quarry, Exmouth*, Report and Recommendations of the Environmental Protection Authority, Bulletin 498, Environmental Protection Authority, Perth.

Environmental Protection Authority (1993a), *Draft Western Australian Water Quality Guidelines for Fresh and Marine Waters*, Bulletin 498, Environmental Protection Authority, Perth.

Environmental Protection Authority (1993b), *Environmental Impact Assessment Administrative Procedures*, Environmental Protection Authority, Perth.

Environmental Protection Authority (1995), *Coral Coast Resort, Mauds Landing*, Report and Recommendations of the Environmental Protection Authority, Bulletin 796, Environmental Protection Authority, Perth.

Humphreys, W. F and Blyth, J (1994), *Subterranean Secrets, Hidden Treasures of the Cape Range*, Landscope, WA's Conservation, Forests and Wildlife Magazine, Department of Conservation and Land Management, Perth

Humphreys, W. F (1994), *The Subterranean Fauna of the Cape Range Coastal Plain, North Western Australia*. Report to the Australian Heritage Commission and the Western Australian Heritage Committee. (unpub).

Humphreys, W. F (1995), *Subterranean Fauna* Appendix D of Extensions to Exmouth Water Supply Borefield, Consultative Environmental Review. Report prepared for the Water Authority of Western Australia, Perth.

Muir Environmental (1995), *Extensions to Exmouth Water Supply Borefield, Consultative Environmental Review*, Report prepared for the Water Authority of Western Australia, Perth.

Table 5: Summary of Environmental Protection Authority recommendations

Issues	Environmental Objective	Evaluation Framework	Commitment No	Proponent's Commitment	EPA Recommendation
Biophysical impacts					
Impact on shoreline stability (including littoral drift)	To protect the shoreline from unacceptable changes, such as erosion, arising from the proposal.	Coast is stable. Little sand drift occurs. Protection from offshore reef platform.	17	Coastal sediment will be monitored following construction of the marina. By-passing of sand to be undertaken if required.	Not considered necessary as proponent's commitment is considered adequate.
Dune protection	To ensure impact on dune system is minimal.	Protection and rehabilitation of dunes.	1	Preparation of an environmental management plan for the rehabilitation and conservation of the dunes bordering the development site.	Not considered necessary as proponent's commitment is considered adequate.
Sourcing of construction materials for breakwaters from alternative quarry site	To ensure the site will not impact on significant fauna or flora and groundwater.	Environmental acceptability dependent on assessment of Whitecrest quarry proposal.	5 25 & 26	The DOT will be responsible for quarrying operations to provide armour stone for the breakwaters and will liaise with DOME, the Shire and the DEP to define appropriate environmental measures, including rehabilitation of the quarry and access roads. This commitment applies equally to either the currently approved quarry site or the alternative Whitecrest quarry site. Spillage's of hydrocarbon based fuels will be cleared immediately and disposed of offsite. servicing of any plant will only be undertaken at an approved site outside Water Reserve 34055.	The EPA recommends that environmental approval for the alternative site not be given at this time.
Impact on subterranean fauna at the marina and quarry sites	To ensure impact on subterranean fauna is avoided.	Western Australian Wildlife Conservation Act 1950 for protection of threatened species.	18 19 21 25 26 27	Commitments relate to possible de-watering effects to groundwater quality or quantity; blasting and reduction of risk by contaminants to the groundwater. Proponent to make commitment regarding voids encountered during mining operations.	Not considered necessary as proponent's commitments are considered adequate.
Impact on nearshore marine habitat	To ensure that construction and operations of the marina minimise impact to the local marine habitat.	Marine habitat is widespread along the western shore of the Exmouth Gulf.	19	Commitment relates to managing blasting operations to minimise any impact to the environment.	Proponent's commitments are adequate.
Drainage provisions	To ensure that drainage through the site is adequately managed to minimise environmental impacts to the coast.	Marina design has been amended	6 10	Drainage waters to be directed away from harbour into silt traps, or settling basins.	Not considered necessary as provided for in project design.
Pollution					
Water quality within the marina	To ensure that water quality permits existing uses to be maintained	WA Water Quality Guidelines for Fresh and Marine Waters. Adequate tidal flushing	15	Water quality in the marina harbour and adjacent area of Exmouth Gulf will be monitored.	Flushing times half previos proposal. Proponents commitments are considered adequate.
Turbidity control	To ensure that values and water quality are maintained.	Turbidity management.	6 23 28	Commitments relate to de-watering, dredging and settling ponds. Proponent to make a commitment with regard to breakwater construction and filling operations.	Not considered necessary as proponent's commitments are considered adequate.
Social Surrounds					
Visual impact	To ensure that the boat harbour will blend in with the visual values of the coastline.	Minimise visual intrusion.	29	Proponent to make a commitment with maintaining visual values of the coastline.	Not considered necessary as proponent's commitment is considered adequate.

Table 2: Identification of Issues

Topic	Proposal Characteristics	Government Agency Comments	Public Comments	Identification of Issues
Biophysical				
Foreshore stability	Location of breakwaters essentially coincide with previous proposal.	The DEP notes proposed monitoring and management of the foreshore remains unchanged from previous proposal	Impact of marina on energy along coast. Implications of floodwater washing into the marina in the event of a cyclone.	Requires EPA evaluation to confirm shoreline stability.
Dune protection	Removal of short section of degraded dune from either side of floodway.	Shire of Exmouth notes that the primary dunes in the area of the harbour which have been badly denuded will be subject to a Management Plan and that the loss of some of the degraded dune will not cause a problem due to the construction of the outer groynes.	The impact of the marina on the dune system needs to be addressed. Remedial management of dunes.	Requires EPA evaluation to ensure protection of dune stability.
Source of construction material for breakwaters	Approved quarry site within Water Supply Reserve 34055 (Ministerial Condition 4), (see Attachment 2). Alternative quarry site proposed within Whitecrest Enterprises Pty Ltd mining tenement (see Attachment 2).	WAWA recommended two additional commitments be made relating to containment and disposal of accidental spillage and servicing of any plant outside Water Reserve 34055 and that previous conditions for the original quarry apply. The Shire of Exmouth is satisfied with the measures that have been taken in relation to the proposed quarry. DOME indicated that geological testwork should be carried out on the alternative quarry site before final quarry site is chosen.	Impact of quarry sites on water catchment. Impact of quarry on water flow and water level in subterranean environment.	Requires EPA evaluation to ensure alternative quarry site is environmentally equivalent.
Subterranean fauna - marina	Marina involves excavation into coastal limestone and blasting.	The DEP notes that the widespread occurrence of aquatic subterranean fauna (stygofauna) has been confirmed within the unconfined aquifer of the coastal plain of the peninsula.	Possible impact of development on subterranean fauna, therefore monitoring required.	Requires EPA evaluation to ensure impact on subterranean fauna is minimal.
Subterranean fauna - quarry	Coastal limestone's at the quarry sites are likely to contain unique subterranean aquatic fauna.	The DEP notes that the risk to subterranean fauna, both aquatic and terrestrial would be identical for both sites. The DEP notes that there has been no significant subterranean systems identified on the sites or in the immediate vicinity of either site, however, recognises that the risk to terrestrial cave fauna would be direct if such fauna existed. The WA museum indicated that aquatic fauna extends far inland, close to the proposed quarry site and includes a number of species listed under Schedule 1 of the Wildlife Conservation Act, 1950. The museum also commented that the proponent should make a commitment to examine and assess fauna in voids opened up by mining operations.	Impact of quarrying on water flow and water level in the subterranean environment.	Requires EPA evaluation to ensure impact on subterranean fauna is minimal.
Impact on nearshore marine habitats	Boat harbour relocated from inshore to offshore.	The DEP notes that marine habitat is a limestone pavement with minor pockets of sand and that this habitat is widespread along the western shore of Exmouth Gulf. The Shire of Exmouth believes the relocation of the harbour from the land will have less impact on the environment generally, although it will have a minor effect on the marine habitat.		Requires EPA evaluation to ensure impact on marine habitat is acceptable.
Drainage provisions	Residential development is no longer part of this proposal.	The DEP notes that the amended harbour layout and design will accommodate continued stormwater outflow via the existing floodway.	Down scaling of project welcomed. Consideration of drainage provisions if residential development takes place in the future.	Requires EPA evaluation to ensure adequacy of drainage provisions for future residential development.

2. The proposal

The Department of Transport proposes to develop a marina at Exmouth immediately to the south of Exmouth township, between the Yacht Club and the Racecourse (Figure 3).

The proposed changes to the proposal can be seen in Figure 4 and involve the following elements:

- change of name to "Exmouth Boat Harbour" to avoid confusion with the proposed development near Coral Bay;
- deferral of the residential component - this is being revised by Landcorp, and will be the subject of a separate submission;
- re-designing the marina from a 15.5ha inshore excavated harbour basin to a smaller 4.4ha offshore harbour basin and entrance channel, protected by breakwaters. Table 1 compares the dimensions of the re-designed harbour with the previously assessed Coral Coast Marina Resort Project;
- removal of sections of dunes from either side of the floodway in order to accommodate the floodway and access road;
- retention of the floodway through the harbour basin; and
- an alternative quarry west of the previously approved site.

Table 1 Comparison of Previous Coral Coast Marina Resort Proposal and Amended Exmouth Boat Harbour Dimensions.

Boat Harbour Dimensions	Previous Proposal	Amended Proposal
Basin area	15.5ha	4.4ha
Basin depth	-4.8m AHD to -5.8m AHD	-4.2m AHD to -4.6m AHD
Entrance Channel - width - depth - length	 75m -5.8m AHD 800m	 60m -4.6m AHD 600m
Excavation volume	1,360,000m3	210,000m3
Number of Pens	250	60
Boat Ramps	2	2

AHD = Australian Height Datum

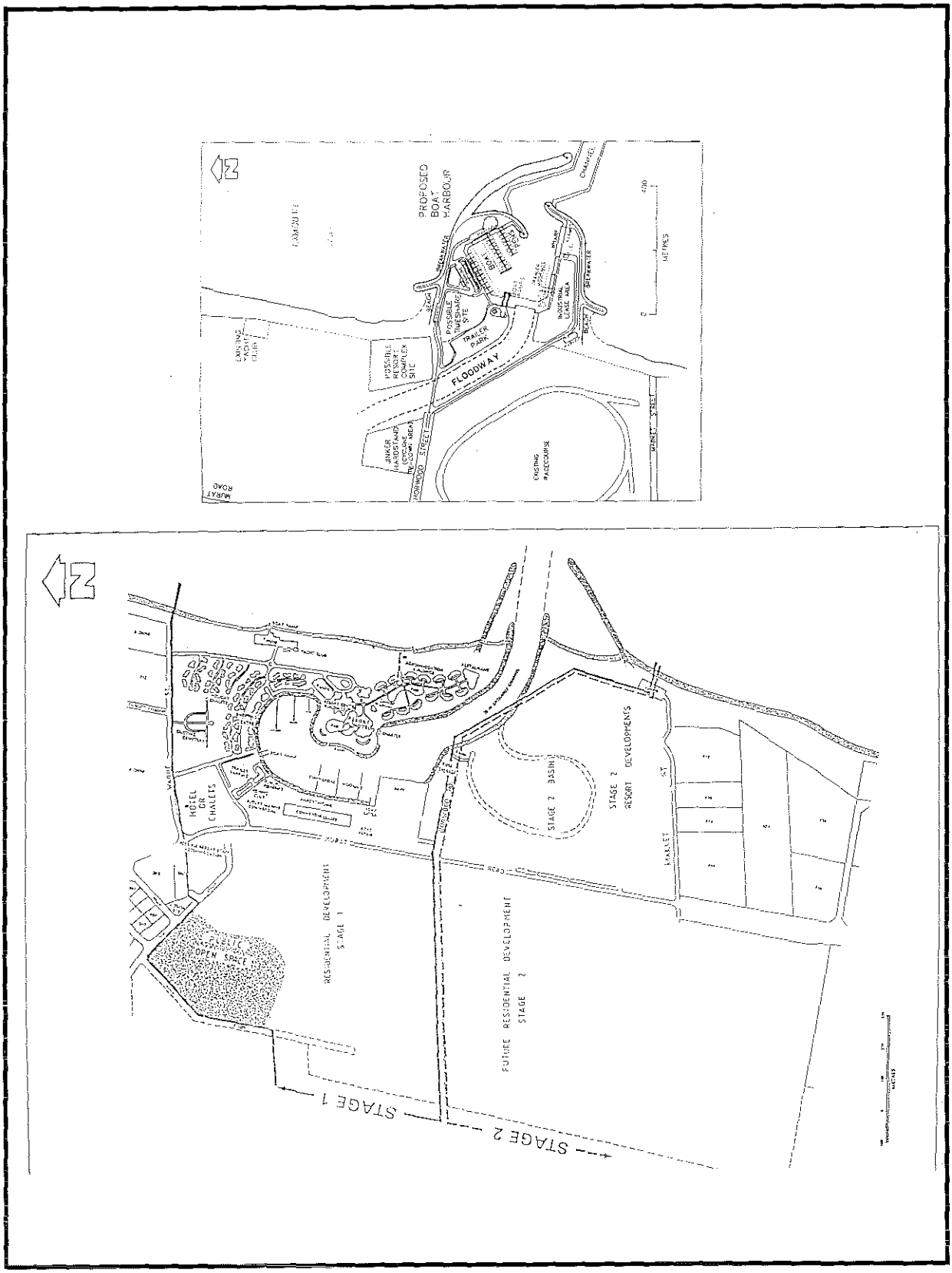


Figure 4. Original Development Plan (shown above - Bowman Bishaw Gorham, 1989) and Revised Development Plan (shown below - Bowman Bishaw Gorham, 1995.)

3.2 Public and agency submissions

Comments were sought on the proposal from the public, community groups as well as local and State government agencies. During the public submission period between 28 August 1995 to 25 September 1995, seven submissions were received. A summary of these submissions was forwarded to the proponent for response. Submissions received by the EPA were within the following categories:

- 2 from members of the public;
- 2 from groups and organisations; and
- 4 from State and other government agencies.

The principal topics of concern raised in public submissions included (in summary):

Biophysical impacts

- foreshore stability
- dune protection
- source of construction materials for breakwaters
- subterranean fauna in marina
- subterranean fauna in quarry
- impact on nearshore marine habitat
- drainage provisions if residential development takes place

Pollution issues

- marina water quality (including sewage disposal)
- turbidity

Other

- development of strategic plan for the Cape Range area.

The EPA has considered the submissions received and the proponent's response as part of the assessment of the proposal.

3.3 Review of topics raised in submissions

Submissions received by the EPA were concerned with the following topics.

Foreshore stability

Concern was expressed with regard to the impact of the marina on foreshore stability along the coast and the implications of floodwater washing into the marina in the event of a cyclone.

Effects of the marina breakwaters on coastal stability has been examined in the Section 46 document and the proponent concluded that the impacts would be minor and managed. Outflow channel is aligned with the harbour entrance in the project design so that flood discharge will pass quickly through the marina basin.

This topic is considered an issue warranting EPA evaluation and the impacts of shoreline stability are evaluated in Section 4.1.

The EPA's evaluation of the impacts on subterranean fauna associated with the marina and the impact of quarrying (including the impact of the quarry on subterranean fauna) is contained in Sections 4.3 and 4.4

Marina water quality and turbidity

Concern was expressed in submissions with regard to the provision of sewage pump-out facilities and alternatives to sullage tanks within the marina. Concern was also expressed with regard to turbidity from construction of the marina.

The proponent acknowledges the need for sewage pumpout facilities once demand has been demonstrated and that provision will be made in the public toilet block for disposal of wastes from the portable chemical toilet. The proponent acknowledges the use of sullage tanks is a temporary measure and that the marina will be connected to deep sewerage when there is sufficient development to justify it. The proponent also acknowledges the need to reduce turbidity during construction to a minimum and that anticipated increased turbidity would be minimal and temporary.

The EPA's evaluation of the impacts of water quality is contained in Section 4.5

Marine Habitats

Submissions indicated that the relocation of the boat harbour from the land would have less of an impact on the environment, compared to the previous proposal, although it will have a minor effect on the marine habitat.

he proponent has indicated that marine habitat is widespread along the western shore of the Exmouth Gulf.

The EPA's evaluation of the impacts of marine habitat is contained in Section 4.6.

Drainage Provisions

Concern was expressed in submissions with regard to consideration of drainage provisions if residential development takes place in the future and whether sediments would be adequately removed from incoming floodwaters in an area on the eastern side of Murat Road.

The proponent has indicated that the boat harbour proposal should not jeopardise any future drainage proposals for any future residential developments.

The EPA's evaluation of the impacts of drainage provisions and turbidity is contained in Section 4.7.

Strategic Plan

One submission indicated that a strategic plan should be developed prior to any further development in the Cape Range area.

The EPA has recently raised this issue in its report on the Coral Coast Resort proposal at Mauds Landing (EPA Bulletin 796). Specifically, the EPA has pointed out "the need for an integrated regional strategy combining environmental and planning objectives for land based tourism development proposals along the Gascoyne Coast, which identifies adjacent marine and terrestrial conservation areas" (EPA 1995, p. 60).

- subterranean fauna in marina and quarry
- marina water quality (including sewage disposal and turbidity)
- marine habitat
- drainage provisions
- visual impact
- evaluation of existing environmental conditions and commitments for the Exmouth Boat Harbour Project.

4.1 Foreshore stability

4.1.1 Objective

To protect the shoreline in the vicinity of the marina from unacceptable changes such as beach erosion arising from the proposal.

4.1.2 Technical information

Section 6.1.2 of the 1989 Notice of Intent for the Coral Coast Marina Resort indicates that the coast is stable in the vicinity of the development and that little sand drift occurs. The location of the breakwaters for the relocated boat harbour essentially coincide with those for the previous proposal. Under prevailing conditions, the transport of sediment along the coast appears to be negligible (Bowman Bishaw Gorham, 1995).

Transport during storms and cyclones is potentially more significant but, owing to the protection afforded by the nearshore reef platform, is still considered only minor (Bowman Bishaw Gorham, 1989). The 1989 Notice of Intent also indicates that comparative plots of shoreline movement from aerial photography (1961-1985) indicate that the beach has accreted by 0-10m during this period.

4.1.3 Comments from key agencies/interest groups

Key Agencies Submissions

The DEP advises that proposed monitoring and management of the foreshore remains unchanged from previous proposal (NOI Sections 7.3.3 and 7.4. and Commitment 23) and that the proponent is committed to monitor coastal sediment movement and undertake sand by-passing if necessary (Commitment 17).

Interest Groups submissions

Concern was expressed with regard to the impact of the marina on foreshore stability and energy along the coast.

4.1.4 Response from the proponent

In its response, the proponent has indicated that the original NOI examined the effects of the marina on the breakwaters on coastal stability and concluded that the impacts would be minor and could be managed (see Appendix 2). The new breakwater extends approximately 150m further seaward than originally proposed and is not expected to have any significantly different effect on coastal processes than that anticipated for the original proposal. The majority of littoral movement is in the nearshore zone.

Topic	Proposal Characteristics	Government Agency Comments	Public Comments	Identification of Issues
Pollution				
Marina water quality	Marina will receive drainage water and be semi-enclosed.	The DEP considers that flushing will be improved compared to the original proposal and that water quality in the harbour and the adjacent area of Exmouth Gulf will be monitored as originally proposed. The DEP notes that potential inputs of contaminants to the marina waters will be controlled.	Sewerage pump-out facilities required. Alternatives to sullage tanks.	Requires EPA evaluation to ensure management of marina water quality meets environmental objectives.
Turbidity	Offshore dredging and breakwater construction.	The DEP notes that water column turbidity will be associated with dredging and breakwater construction, and that this increase in turbidity will be temporary. The DEP also notes that no developed coral reefs or other communities that may be sensitive to an increased suspended sediment load occur near the proposed harbour site.		Requires EPA evaluation to ensure turbidity during construction is managed. Proponent should make a commitment.
Social surrounds				
Visual impact	Boat harbour would be visible from Exmouth.	The DEP notes that there is support for this proposal within the community and that the impact on visual amenity can be managed adequately.		Requires EPA evaluation to ensure visual impact is minimised.
Strategic Development Plan	Boat Harbour satisfies long term requirement for marine facilities in the Exmouth area.		Strategic plan should be developed prior to any further development in the Cape Range area	EPA has raised this need in its report on Coral Coast Resort (Bulletin 796). No further evaluation required in this report.

In the event of a flood, the proponent indicated that the effect of floodwaters on dune erosion will be no greater than it is without the boat harbour and, given the size of the proposed flood channel compared with the existing natural channel, it is expected to be less.

With regard to the implications of floodwater washing into the marina, the proponent indicated that the outflow channel has been aligned with the harbour entrance, and that flood discharge will pass quickly through the marina basin. The proponent further indicated that pens and other marine structures have been located on either side of the basin, and are not expected to be affected by floodwaters. There may be some sediment deposited at the back of the basin, but the proponent will carry out maintenance dredging if required to clear this sediment.

4.2.5 EPA evaluation

The EPA notes Proponent Commitment 1 to prepare an environmental management plan for the rehabilitation and conservation of the dunes bordering the development site and that the proponent intends to monitor the shoreline, vegetation line and dune profile within 2km to the north and south of the harbour under Commitment 17.

The EPA concludes that, based on the above information, the impact on the dune system can be minimised and managed effectively by the proponent's commitments (See Recommendation 1).

4.3 Source of construction materials for breakwaters

4.3.1 Objective

To ensure the quarry will not impact on significant fauna or flora and groundwater.

4.3.2 Technical information

The proponent has indicated that it may not need to use the quarry site (Water Supply Reserve 34055) already given approval in the original assessment. Whitecrest Enterprises Pty Ltd are proposing to quarry limestone from another site nearby (see figure 5). The Department of Transport has indicated that it could acquire limestone from this site rather than the already approved site. However, the proposal to quarry by Whitecrest Enterprises Pty Ltd is subject to a separate assessment by the EPA and no environmental approval has been given for that site.

4.3.3 Comments from key agencies/interest groups

Key Agencies submissions

The Water Corporation recommended two additional commitments be made relating to containment and disposal of accidental spillage and servicing of any plant outside Water Reserve 34055. The Water Corporation also recommended that previous conditions for the original quarry apply.

The Shire of Exmouth indicated that it was satisfied with the measures that have been taken in relation to the proposed quarry sites.
The Department of Minerals and Energy suggested that geological testwork should be carried out on the alternative quarry site before the final quarry site is chosen.

Dr Humphreys of the WA Museum indicated that aquatic fauna has been documented to extend far inland close to the proposed quarry site and includes a number of species listed under Schedule 1 of the Wildlife Conservation Act 1950. It was suggested that the proponent make a commitment to examine and assess fauna in voids opened up by mining operations.

Interest Groups submissions

Concern was expressed in public submissions with regard to the impact of the quarry sites on the water catchment as well as the impact of the quarry on water flow and water level in the subterranean environment.

4.3.4 Response from the proponent

The proponent has made two additional commitments (25 and 26) to reduce the risk of groundwater contamination in accordance with the Water Corporation's suggestions (see Appendix 2). These two commitments would apply to either quarry site.

The proponent indicated that both quarry sites (the proposed Whitecrest quarry and the approved DOT quarry) are located in the surface water catchment of Stoney Creek and in the Water Corporation's groundwater reserve. The proponent also indicated that the potential for degradation of groundwater quality is recognised and will be managed accordingly. For example, fuels, oils, lubricants and explosives will not be stored at the quarry site, but at a dedicated laydown area outside the water reserve. Excavation and haulage vehicles will be re-fuelled at the laydown area.

With regard to impact on the subterranean environment, the proponent indicated that the quarries will not impact on water flow and water level as the +34m Australian Height Datum (AHD) base of the proposed quarry provides a 30m buffer above the water table. The groundwater regime, therefore, is not exposed to increased evapotranspiration which may be of concern if quarrying proceeded down to, or below the water table. One potential hydrological effect would be potential changes to rainfall recharge within the quarry to the underlying groundwater aquifer. Surface drainage within the quarry would be directed through a silt trap prior to discharge from the site to minimise potential 'clogging' of downstream karst terrain.

The proponent, however, did state that there would be a direct impact on potential troglobitic fauna (fauna which spend their entire life cycles in caves) in any fissures or caves opened during quarrying but that given the small area and volume of potential troglobitic habitat affected, it does not intend to commission detailed assessments of potential troglobite occurrence. The proponent did indicate that an inspection of the operations by a nominated speleological group would be welcomed and the proponent would endeavour to assist their assessment within the limitations of an on-going quarry operation.

The proponent also indicated that geological testwork will be carried out on the alternate quarry site.

In terms of other construction impacts, the proponent has submitted a draft quarry management plan to the DEP for approval, and all fuel storage, refuelling and explosives mixing will be conducted at a dedicated laydown area remote from the quarry site (Commitment 26).

4.3.5 EPA evaluation

The EPA notes that the proponent intends to establish and operate the alternative quarry site in accordance with all conditions placed on the approved existing quarry site (see Condition 4, Appendix 1). The EPA also notes that the report demonstrating environmental equivalence by Whitecrest Enterprises Pty on the alternative quarry site (Bowman Bishaw Gorham, 1995) indicates that:

- the alternative quarry site lies 1km to the west of the approved quarry site;
- both sites are located on the eastern flank of Cape Range, approx 8km south of Exmouth;
- both sites lie adjacent to Stoney Creek and overlie the unconfined aquifer;

4.4.3 Technical information

Aquatic subterranean fauna (stygofauna) are widespread within the unconfined aquifer of the coastal plain of the Exmouth Peninsula. While most recorded species occur within shallow lens of fresh to brackish groundwater, some stygofauna are only found below the salt water interface of inland caves connected at depth to sea (Humphreys, 1994).

Fauna which spend their entire life cycle in caves are known as troglobites (or stygobites if they are aquatic). The invertebrate fauna (insects, shrimps, etc) are usually pale and eyeless, with enhanced antennae and long limbs. Two atyid shrimps (*Sygiocaris stylifera* and *S. lancifera*) in the subterranean fauna of the Cape Range peninsula have been included in Schedule 1 of the Wildlife Conservation Act 1950 (Humphreys, 1995). Two species of fish, the blind cave eel (*Ophisteernon candidum)* and the blind Gudgeon *(Milyeringa veritas*) are also present. These are the only vertebrate troglobites known in Australasia.

The closest affinities of the Cape Range terrestrial troglobitic fauna lie with the ground litter fauna of closed canopy moist forests, both temperate and tropical, that are today typically found on the eastern seaboard of Australia. The fauna is considered to be relic, isolated from similar species by the onset of an arid climate in the late Miocene or early Pliocene (Humphreys, 1994). Two species of terrestrial fauna, a micro-whip scorpion (*Schizomus vinei* now *Draculoides vinei*) and cockroach (*Nocticola flabella*), in the subterranean fauna of Cape Range have been included in Schedule 1 of the Wildlife Conservation Act 1950.

4.4.4 Comments from key agencies/interest groups

Key Agencies submissions

The DEP advised that the widespread occurrence of aquatic subterranean fauna (stygofauna) has been confirmed within the unconfined aquifer of the coastal plain of the peninsula and that whilst most recorded species occur within shallow lens of fresh-to-brackish groundwater, some stygofauna are only found below the salt water interface of inland caves connected at depth to sea. The DEP also advised that the proponent has amended commitment 19, in relation to blasting, in order to minimise any impact to the environment or residences beyond the project area, or nuisance as was previously proposed and approved.

With regard to the quarry sites, the DEP advised that the risk to subterranean fauna, both aquatic and terrestrial would be identical. The risk to aquatic fauna (stygofauna) is considered negligible as neither quarry would have any direct impact on the local or regional groundwater and that there is minimal risk of indirect impact given operational strategies to prevent contamination of groundwater.

The DEP further advised that there have been no significant subterranean systems identified on the sites or in the immediate vicinity of either site, but recognises that the risk to terrestrial cave fauna would be direct if such fauna existed.

Interest Groups submissions

Concern was expressed with regard to the possible impact of development on subterranean fauna. Specific concern focused on monitoring, in particular what form of monitoring would be undertaken given the lack of information on distribution and abundance of the fauna.

4.4.5 Response from the proponent

In its response to submissions the proponent indicated that the marina harbour and entrance channel will not directly affect troglobitic fauna and will only directly disturb a small thickness of submarine limestone, which may or may not be habitat for stygofauna (see Appendix 2). The proponent further indicated that given the likelihood that the marina will be constructed in the wet, it is considered that the potential impacts of the marina on stygofauna are insignificant.

approximately 1 day during spring tides and 3.5 days during neap tides and that potential inputs of contaminants to the marina waters will be controlled as discussed in Section 2.2.10 of the Environmental Review document.

The DEP also advised that water column turbidity will be associated with dredging and breakwater construction, and that this increase in turbidity will be temporary. The DEP also noted that no developed coral reefs or other communities that may be sensitive to an increased suspended sediment load occur near the proposed harbour site and that isolated *Porites* coral colonies, occur on the outer part of the limestone platform, but that these coral are tolerant of temporary increases in water column turbidity.

Interest Groups submissions

Concern was expressed with regard to the provision of sewage pump-out facilities and alternatives to sullage tanks. Concern was also expressed with regard to turbidity control during construction.

4.5.5 Response from the proponent

The proponent indicated that sewage pump-out facilities will be provided once the demand for such a facility has been demonstrated (Commitment 12). Provision will be made in the public toilet block for the disposal of wastes from the portable chemical toilet. The proponent's commitments to the provision of waste disposal facilities remain as per the original approval with the exception of the deferral of the pumpout facility.

The use of sullage tanks is considered by the proponent as a temporary measure. The marina will be connected to deep sewerage when there is sufficient development in the marina and adjacent land to justify deep sewerage.

In terms of turbidity, the proponent indicated that the anticipated increased turbidity associated with harbour construction from the breakwaters and spoil dumping would be reduced to a minimum.

4.5.6 EPA evaluation

The EPA notes that the proponent has calculated tidal exchange for the new boat harbour and predicts flushing times of approximately 1 day during spring tides and 3.5 days during neap tides, which is half that for the previous proposal. The EPA considered the previous marina would be adequately flushed to maintain good water quality.

The EPA also notes that water quality in the harbour and the adjacent area of Exmouth Gulf will be monitored as proposed in Section 7.4.2 of the NOI (Bowman Bishaw Gorham, 1989) and in Commitment 15, and that potential inputs of contaminants to the marina waters will be controlled.

With regard to turbidity, the EPA notes that water column turbidity associated with dredging and breakwater construction will be temporary; and notes Proponent Commitment 28 which relates to reducing turbidity to a minimum during construction.

The EPA considers that, on the basis of the above information, flushing will be improved compared to the original proposal and that satisfactory water quality can be maintained.

This recommendation is reflected in Recommended Environmental Condition 1 included in Section 5.

4.7.2 Technical information

Drainage was a key element in the previous EPA's assessment (Bulletin 498). Conditions and commitments relating to drainage referred to the preparation and implementation of a drainage management plan, construction of formal drainage to prevent flooding of the project site, drainage away from marina hardstand areas and provision for drainage overflow (Condition 3-5 and Commitments 13, 15, 16).

The proposed residential development as discussed in Bulletin 498, is however no longer included as part of the present proposal.

4.7.3 Comments from key agencies/interest groups

Key Agencies submissions

The DEP advised that the outflow channel is aligned with the harbour entrance and flood discharge is likely to pass quickly through the marina basin. The DEP also advised that stormwater drainage from all marina hardstand areas would be directed away from the marina and discharged to general drainage via silt traps.

Interest Groups submissions

Public submissions indicated that the proponent should take into consideration drainage provisions if residential development goes ahead in the future. Concern was also expressed with regard to whether the extensive area of diffused drainage and infiltration on the eastern side of Murat Road is adequate to remove suspended sediments from incoming floodwaters.

4.7.4 Response from the proponent

In the response to submissions the proponent indicated that the boat harbour should not jeopardise any future drainage proposals for any future residential development as adequate provision for storm water flow through the marina had been made. The proponent also indicated that flood waters entering the ocean will carry similar suspended sediment loads as they already experience and that the only effect the marina will have on the drainage system will be the realignment of the last few hundred metres of the outfall channel.

4.7.5 EPA evaluation

The EPA notes:

- the amended harbour layout and design will accommodate continued stormwater outflow via the existing floodway;
- Proponent Commitments 6 and 10 which relate to the direction of drainage waters away from the harbour into silt traps or settling basins; and
- it is no longer necessary to divert and intercept stormwater around the development area to alternative outlets to the north and south given the relocation of the boat harbour and the delay and review of the adjoining residential development;

Based on the above information, the EPA concludes that the issue relating to drainage can be managed effectively through the proponents commitments and existing conditions. Residential development behind the marina, as considered in Bulletin 498, is being reviewed. The Department of Transport is not proposing to proceed with that component of the original proposal at this time. However, the issues relevant to the residential development are significant.

Table 3. Summary and evaluation of changes to environmental conditions.

Original Condition No.	Issue	Evaluation	New Condition No.
1	Proponent's commitments	This is a standard condition - now updated	1-1
2	Implementation	Condition has been updated.	2
3-1	Development of a monitoring programme fro groundwater and salinity levels around the marina	This condition has been incorporated within Proponent Commitment 15.	No condition required
3-2	Groundwater monitoring	This condition has been incorporated within Proponent Commitment 22.	No condition required
3-3	Use of settling ponds	This condition has been incorporated within Proponent Commitment 23.	No condition required
3-4	Preparation and implementation of a plan to stabilise slopes to be used in the residential subdivision	Residential subdivision no longer forms part of the amended proposal, however, should residential development form part of a future proposal this condition should be transferred to that development. Condition to remain.	5-1
3-5	Drainage management	Drainage diversion no longer proposed at this stage. Residential subdivision no longer forms part of the amended proposal, however, should residential development form part of a future proposal this condition should be transferred to that development. Condition to remain.	5-3
3-6	Groundwater abstraction	Residential development no longer proposed at this stage. Residential subdivision no longer forms part of the amended proposal, however, should residential development form part of a future proposal this condition should be transferred to that development. Condition to remain.	5-5
3-7	Groundwater management	Residential subdivision no longer forms part of the amended proposal, however, should residential development form part of a future proposal this condition should be transferred to that development. Condition to remain.	5-4
4	Quarry management	Condition amended and carried over.	3
5	Proponent	Condition has been updated.	7
6	Time limit	Condition has been updated.	6

6	Dune and foreshore protection	Repeated in 1995 Environmental Commitment 4.
7	Quarrying operations	Repeated in 1995 Environmental Commitment 5.
8	Excavation management	Repeated in 1995 Environmental Commitment 6.
9	Deleted	
10	Recontouring of areas receiving fill	Amended to reflect that the residential component is no longer part of the proposal. Main elements repeated in 1995 Environmental Commitment 7.
11	Geotechnical investigations	Repeated in 1995 Environmental Commitment 8.
12	Marine disposal of dredged material	Commitment relates to proposal as originally assessed. As this aspect of the proposal is no longer proposed, the commitment has been deleted.
13	Drainage diversion	Commitment relates to proposal as originally assessed. It should be noted, however, that as a resort complex or residential development could take place in the future, this commitment has been superseded by Recommended Condition 5-3 and would be transferred to that development.
14	Deep sewerage	This commitment has been amended as 1995 Environmental Commitment 9 to reflect the amended proposal.
15	Hardstand drainage	Repeated in 1995 Environmental Commitment 10.
16	Flood dissipation	Commitment relates to proposal as originally assessed. Commitment no longer relates to amended proposal and has been deleted. It should be noted, however, that as a resort complex or residential development could take place in the future, this commitment has been retained.
17	Fuel storage	Repeated in 1995 Environmental Commitment 11.
18	Discharge of sewage, hydrocarbons or litter from boats	Commitment has been amended and included as 1995 Environmental Commitment 12.
19	Use of antifouling paints	Repeated in 1995 Environmental Commitment 13.
20	Operation and maintenance of the marina	Repeated in 1995 Environmental Commitment 14.
21	Water quality monitoring	Commitment amended to reflect Bulletin 711 and reflected in 1995 Environmental Commitment 15.
22	Allowance for Greenhouse effect	Repeated in 1995 Environmental Commitment 16.

In reaching this conclusion the EPA identified the main environmental topics requiring consideration as:

- foreshore stability;
- dune protection;
- source of construction materials for breakwaters;
- subterranean fauna in marina and quarry;
- marina water quality (including sewage disposal and turbidity);
- marine habitat;
- drainage provisions;
- visual impact; and
- evaluation of existing environmental conditions and commitments for the Exmouth Boat Harbour project.

The EPA believes that these topics (with the exception of the alternative quarry site) are adequately addressed by the commitments made by the proponent, the proponent's response to the issues raised in public submissions, and the EPA's recommendations in this report. Table 5 provides a summary of the EPA's position on these key topics.

The proponent has made a number of environmental management commitments to ameliorate the impacts arising from this proposal. These commitments are included in Appendix 4. The EPA considers that while the proponent should be required to implement all the commitments, compliance with commitment numbers 1, 5, 6, 8, 15, 17, 18, 19, 21, 22, 23, 28 and 29 should be audited by the DEP.

The EPA is satisfied that, using information currently available, the following recommendations may be made to the Minister for the Environment.

Recommendation 1

The Environmental Protection Authority concludes that the modified proposal by the Department of Transport for the Exmouth Boat Harbour project is environmental acceptable subject to the satisfactory completion of proponent's environmental management commitments.

The Environmental Protection Authority concludes that the environmental factors mentioned above have been addressed adequately by either environmental management commitments given by the proponent or by the Environmental Protection Authority's recommendations in this report.

Accordingly, the Environmental Protection Authority recommends that except for the use of the alternative quarry site the proposal could proceed subject to:

- **the Environmental Protection Authority's recommendations in this Assessment Report;**
- **the revised recommended conditions which consolidate and update the conditions for this project; and**
- **the proponent's commitments (See Appendix 4).**

Recommendation 2

The Environmental Protection Authority recommends that, although the use of the alternative quarry site for the supply of breakwater rock could be environmentally acceptable, any approval should wait until its separate assessment as part of the Whitecrest proposal and subsequent approval by the Minister for the Environment.

6. Recommended environmental conditions

Based on its assessment of this proposal and the recommendations in this report, the Environmental Protection Authority considers that the following Recommended Environmental Conditions are appropriate for the Exmouth Boat Harbour Project:

STATEMENT TO AMEND CONDITIONS APPLYING TO A PROPOSAL (PURSUANT TO THE PROVISIONS OF SECTION 46 OF THE ENVIRONMENTAL PROTECTION ACT 1986)

PROPOSAL:	EXMOUTH BOAT HARBOUR (965) - FORMERLY CORAL COAST MARINA, RESIDENTIAL SUBDIVISION AND QUARRY, EXMOUTH (223)
CURRENT PROPONENT:	DEPARTMENT OF TRANSPORT
CONDITIONS SET ON:	20 JANUARY 1992

The implementation of this proposal is now subject to the following conditions which replace all previous conditions:

1 Proponent Commitments

The proponent has made a number of environmental management commitments in order to protect the environment.

1-1 In implementing the proposal, including the documented modifications of August 1995 described in "Exmouth Boat Harbour, Proposed Changes to Environmental Conditions", the proponent shall fulfil the relevant environmental management commitments made in the Notice of Intent and reported on in Environmental Protection Authority Bulletin 498, in documentation on the modifications to the proposal (August 1995), and those made in response to issues raised following public submissions; provided that the commitments are not inconsistent with the conditions or procedures contained in this statement.

A schedule of environmental management commitments (November 1995) which will be audited by the Department of Environmental Protection has been published in Bulletin 806 and a copy is attached.

2 Implementation

Changes to the proposal which are not substantial may be carried out with the approval of the Minister for the Environment.

2-1 Subject to these conditions, the manner of detailed implementation of the proposal shall conform in substance with that set out in any designs, specifications, plans or other technical material submitted by the proponent to the Environmental Protection Authority with the proposal.

2-2 Where, in the course of the detailed implementation referred to in condition 2-1, the proponent seeks to change the designs, specifications, plans or other technical material submitted to the Environmental Protection Authority in any way that the Minister for the Environment determines, on the advice of the Environmental Protection Authority, is not substantial, those changes may be effected.

5-6 If as a result of further research it can be demonstrated to the requirements of the Environmental Protection Authority on advice of the Western Australian Museum that a limited degree of groundwater extraction would not adversely affect cave-dwelling fauna, then limited groundwater extraction may be permitted to the requirements of the Environmental Protection Authority.

6 Time Limit on Approval

The environmental approval for the proposal is limited.

6-1 If the proponent has not substantially commenced the modified project within two years of the date of this statement, then approval to implement the modified proposal shall lapse and be void. The Minister for the Environment shall determine any question as to whether the modified project has been substantially commenced.

Any application to extend the period of two years referred to in this condition shall be made before the expiration of that period, to the Minister for the Environment.

Where the proponent demonstrates to the requirements of the Minister for the Environment on advice of the Department of Environmental Protection that the environmental parameters of the proposal have not changed significantly, then the Minister may grant an extension not exceeding five years.

7 Proponent

These conditions legally apply to the nominated proponent.

7-1 No transfer of ownership, control or management of the project which would give rise to a need for the replacement of the proponent shall take place until the Minister for the Environment has advised the proponent that approval has been given for the nomination of a replacement proponent. Any request for the exercise of that power of the Minister shall be accompanied by a copy of this statement endorsed with an undertaking by the proposed replacement proponent to carry out the project in accordance with the conditions and procedures set out in the statement.

8 Compliance Auditing

To help determine environmental performance, periodic reports on progress in implementation of the proposal are required.

8-1 The proponent shall submit periodic Progress and Compliance Reports, in accordance with an audit programme prepared by the Department of Environmental Protection in consultation with the proponent.

Procedure

1 Unless otherwise specified, the Department of Environmental Protection is responsible for assessing compliance with the conditions contained in this statement and for issuing formal clearance of conditions.

2 Where compliance with any condition is in dispute, the matter will be determined by the Minister for the Environment.

connect the harbour facilities to deep sewerage when deep sewerage is extended to any reasonably proximate development.

10. Drainage from marina hardstand areas will be directed away from the harbour and discharged to general drainage via silt traps.

11. Fuel storage facilities in the marina will be above ground and contained within a sealed bund capable of holding the entire tank contents. Boat refuelling facilities will include manually operated nozzle valves with automatic shut-off. The fuel storage and refuelling facilities will comply with the requirements of the Explosives and Dangerous Goods Division of the Department of Minerals and Energy.

12. The discharge of sewage, hydrocarbons or litter from boats into the marina will prohibited, with appropriate signs to inform all users of the marina. Waste disposal facilities, including rubbish bins, oil recycling bins are sewered public toilets will be provided around the marina. A sewage pump out facility for boats equipped with a holding tank will be provided once demand for such a facility is demonstrated.

13. The use of antifouling paints containing tributyl tin will be prohibited in the marina, and this will be included as a lease condition for boat repair facilities in the marina.

14. Operation and maintenance of the marina will remain the responsibility of the Department of Transport, and will include:

1) Daily inspection of the marina harbour and immediate implementation of any corrective action required to maintain water quality and aesthetics to the required standard;

2) Maintenance of specified navigable depths;

3) Maintenance of breakwaters, jetties, wharves, revetments and foreshores.

*15. Water quality in the marina harbour and the adjacent area of Exmouth Gulf will be monitored to confirm the predictions made in the NOI regarding the adequacy of flushing and the maintenance of suitable water quality. The minimum water quality criteria required to be met are described in Table 2.2 of Environmental Protection Authority Bulletin 711 (Environmental Protection Authority, 1993). The proposed monitoring programme is described in Section 7.4.2 of the NOI, and the results will be reported to the Environmental Protection Authority.

Section 7.4.2 of the NOI reads:

"Water quality and contaminant levels in sediments and organisms will be monitored during operation of the marina.

Water quality parameters measured will be those specified in the Canal Guidelines (Steering Committee on Canal Developments, 1984), and will include suspended solids, pH, dissolved oxygen, temperature, bacterial counts and nutrient concentrations. Monitoring will be conducted quarterly for the first year and thereafter at intervals dictated by experience. Samples will be collected from surface and bottom water at representative sites in the marina and adjacent Gulf waters.

Sediments and mussels within the marina will be monitored for toxic trace metals and hydrocarbons. Surface sediments will be sampled from the central basin of the marina where deposition is anticipated, and the fine fraction would be analysed for nickel, zinc, copper, lead, polyaromatic hydrocarbons (PAHs) and phosphorus levels. Mussels collected from the marina will be analysed for tissue concentrations of nickel, zinc, copper, lead and PAHs, using standard methods for the mussel watch programme.

1) The earthworks Contract document will include Clauses that require the Contractor to consider weather conditions prior to and during blasting, with the aim of minimising adverse impacts.

2) The Department of Transport undertakes to repair obvious damage caused by blasting activity associated with excavation of the marina.

20. All promotional material under the control of the proponent will incorporate a conservation ethic as advocated by CALM.

*21. If de-watering of the harbour basin is proposed and if the de-watering investigations described in Commitment 18 indicate that possible de-watering effects to groundwater quality or quantity may extend as far as Murat Road to the west or 500 m to the north or south of the harbour perimeter then, prior to commencement of de-watering, the proponent shall develop a monitoring program and then subsequently monitor groundwater levels and salinity near the marina basin. The monitoring program will be to the requirements of the Department of Environmental Protection on advice from the Geological Survey of Western Australia, the Water Authority of Western Australia and the Western Australian Museum.

*22. If the results of groundwater monitoring proposed in Commitment 21 indicate unacceptable de-watering effects at Murat Road to the west or 500m to the north or south of the harbour perimeter, then the proponent shall cease de-watering activities. The commitment shall be implemented to the requirements of the Department of Environmental Protection on advice from the Geological Survey of Western Australia and the Water Authority of Western Australia.

*23. Prior to the commencement of de-watering or to construction of the marina "in the wet", the Department of Transport shall construct and subsequently utilise settling ponds as near as practicable to the ocean, to the satisfaction of the Department of Environmental Protection.

24. Material excavated from the harbour and entrance channel will be exclusively used for fill within the proposed development area.

25. Any accidental spillage of hydrocarbon based fuels and oils or hydraulic fluids or potentially contaminating fluids will be cleared immediately and the contaminated soil/materials will be disposed of offsite at a suitable approved disposal site. An incident logbook will be maintained and a record will be kept of any incident that has the potential to pollute. The Regional Water Resources Officer will be informed within 24 hours of any incident.

26. The servicing of any plant will only be undertaken at an approved site outside of Water Reserve 34055.

27. Should voids be encountered during mining operations, the proponent will facilitate inspection by a nominated speleological group and assist their assessment within the limitations of an on-going quarry operation.

28. Turbidity will be reduced to a minimum during breakwater construction and filling operations to the requirements of the Department of Environmental Protection.

29. The proponent will construct the marina to blend in with visual values of the coastline, to the satisfaction of the Department of Environmental Protection.

Appendix 1

Environmental Statement - January 1992

Ass # 223

Bull # 498

State # 212

WESTERN AUSTRALIA

MINISTER FOR THE ENVIRONMENT

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED (PURSUANT TO THE PROVISIONS OF THE ENVIRONMENTAL PROTECTION ACT 1986)

CORAL COAST MARINA, RESIDENTIAL SUBDIVISION AND QUARRY, EXMOUTH (223)

DEPARTMENT OF MARINE AND HARBOURS

This proposal may be implemented subject to the following conditions:

1 Proponent Commitments

In implementing the proposal, the proponent shall fulfil the commitments (which are not inconsistent with the conditions or procedures contained in this statement) as published in Environmental Protection Authority Bulletin 498. (A copy of the commitments is attached).

2 Detailed Implementation

Subject to these conditions, the manner of detailed implementation of the proposal shall conform in substance with that set out in any designs, specifications, plans or other technical material submitted by the proponent to the Environmental Protection Authority with the proposal. Where, in the course of that detailed implementation, the proponent seeks to change those designs, specifications, plans or other technical material in any way that the Minister for the Environment determines on the advice of the Environmental Protection Authority, is not substantial, those changes may be effected.

3 Management of Subdivision and Marina Development

The subdivision and marina development should be managed so as to prevent unacceptable impacts on the environment.

3-1 Prior to commencement of dredging activities (dry or wet), the proponent shall develop a monitoring programme, establish monitoring bores and then subsequently monitor, amongst other things, groundwater and salinity levels around the marina basin. The monitoring programme shall be to the satisfaction of the Minister for the Environment on advice of the Environmental Protection Authority.

The proponent shall seek advice on the preparation and implementation of this monitoring programme from the Geological Survey of Western Australia, the Water Authority of Western Australia and the Western Australian Museum.

Published on

20 JAN 1992

3-2 The proponent shall cease de-watering activities if the results of the monitoring programme required by condition 3-1 indicate unacceptable de-watering effects at 300 metres from the marina basin, to the satisfaction of the Environmental Protection Authority on advice of the Geological Survey of Western Australia and the Water Authority of Western Australia.

3-3 Prior to commencement of de-watering or construction of the marina "in the wet", whichever is the sooner, the proponent shall construct and subsequently utilise settling ponds to the east of the westernmost edge of the proposed marina as near as practicable to the ocean, to the satisfaction of the Minister for the Environment on advice of the Environmental Protection Authority.

3-4 Prior to filling the residential area, the proponent shall prepare and then subsequently implement a plan of slopes and their stabilisation programme to be used in the residential subdivision, to the satisfaction of the Minister for the Environment on advice of the Environmental Protection Authority and the Department of Planning and Urban Development.

3-5 Prior to construction of the residential area or marina, whichever is the sooner, the proponent shall prepare and then subsequently implement a drainage management plan showing amongst other things the location of outlets for drainage downstream of the residential subdivision, to the satisfaction of the Minister for the Environment on advice of the Environmental Protection Authority and the Shire of Exmouth. The drainage system shall be constructed so that there is minimal impact from sediments on important biological communities, such as corals.

3-6 The proponent shall advise, to the satisfaction of the Environmental Protection Authority, all prospective purchasers of land within the subdivision and marina development area that private groundwater bores will not be permitted and that licences will not be issued by the Water Authority of Western Australia for private bores within the subdivision and marina development area.

3-7 If as a result of further research it can be demonstrated to the satisfaction of the Environmental Protection Authority on advice of the Western Australian Museum that a limited degree of groundwater extraction would not adversely affect cave-dwelling fauna, then limited groundwater extraction may be permitted to the satisfaction of the Environmental Protection Authority.

4 Quarry Management

The quarry development should be managed so as to prevent unacceptable environmental impacts.

4-1 Prior to the commencement of quarry operations, the proponent shall prepare and then subsequently implement an environmental management programme which shall be to the satisfaction of the Minister for the Environment on advice of the Environmental Protection Authority, the Shire of Exmouth and the Water Authority of Western Australia. The programme shall include, but not be limited to the following:

1. measures to protect groundwater quality below the quarry, particularly with respect to management and contingency plans for liquids (eg. oil, fuel) used on site;
2. consideration of impacts on Water Authority operations on or adjacent to the quarry site;

3. effects on site drainage;
4. rehabilitation of the quarry and access roads; and
5. monitoring and reporting of compliance with measures outlined in the programme.

4-2 The proponent shall give due consideration to the draft guidelines of the Working Party on Conservation and Rehabilitation in the Mining Industry.

5 Proponent

No transfer of ownership, control or management of the project which would give rise to a need for the replacement of the proponent shall take place until the Minister for the Environment has advised the proponent that approval has been given for the nomination of a replacement proponent. Any request for the exercise of that power of the Minister shall be accompanied by a copy of this statement endorsed with an undertaking by the proposed replacement proponent to carry out the project in accordance with the conditions and procedures set out in the statement.

6 Time Limit on Approval

If the proponent has not substantially commenced the project within five years of the date of this statement, then the approval to implement the proposal as granted in this statement shall lapse and be void. The Minister for the Environment shall determine any question as to whether the project has been substantially commenced. Any application to extend the period of five years referred to in this condition shall be made before the expiration of that period, to the Minister for the Environment by way of a request for a change in the condition under Section 46 of the Environmental Protection Act. (On expiration of the five year period, further consideration of the proposal can only occur following a new referral to the Environmental Protection Authority).

Bob Pearce, MLA
MINISTER FOR THE ENVIRONMENT

23 JAN 1992

PROPONENT'S COMMITMENTS

CORAL COAST MARINA, RESIDENTIAL SUBDIVISION AND QUARRY, EXMOUTH

DEPARTMENT OF MARINE AND HARBOURS

The proponent has made the following commitments:

1. The marina facilities will be constructed behind the frontal dune and will not encroach upon the dune except for the harbour entrance and a constructed walkway from the resort to the beach.
2. An environmental management plan for the rehabilitation and conservation of the dunes bordering the development site will be prepared in consultation with the Shire, the Department of Planning and Urban Development and the Commissioner for Soil Conservation and implemented by the Department of Marine and Harbours to the satisfaction of the Commissioner for Soil Conservation.
3. Existing access to Town Beach will be maintained. Additional public access to the beach and northern breakwater will be accommodated by the provision of controlled pathways from the proposed resort complex.
4. The marina and all associated facilities would comply fully with applicable legislation, regulations and by-laws. All construction materials and practices would be in accordance with the relevant Australian and international codes.
5. Construction activities would be restricted to normal daylight hours and, if found to be necessary, appropriate dust suppression techniques would be employed. Any blasting that is required to enable excavation of the marina harbour and entrance channel will be conducted between 9.00 am and 5.00 pm on weekdays, and will be publicised in the Exmouth community.
6. During earthworks and construction, appropriate care will be taken to avoid incursion of machinery into conserved areas of the dune and foreshore.
7. The Department will be responsible for quarrying operations to provide armourstone for the breakwaters and will liaise with the Department of Mines, the Shire and the Environmental Protection Authority to define appropriate environmental management measures, including rehabilitation of the quarry site and access roads.
8. If the harbour is to be de-watered for excavation then the extracted water will be directed to a settling pond to reduce suspended solids prior to discharge to Exmouth Gulf. If excavation were to occur "in the wet", drainage water from the excavated material will be similarly directed to a settling basin prior to discharge to Exmouth Gulf.
9. DELETED
10. Recontouring of areas receiving fill material will meet the following objectives:
    a) The redeveloped areas should form a stable and varied landscape, reflecting naturally occurring topography elsewhere within the coastal strip.
    b) The boundary relief should co-ordinate with existing contours.
    c) The land should be contoured in order to facilitate its development into a prime residential and holiday area.
    d) The filled sites will be compacted in accordance with the requirements for building purposes and covered with previously stockpiled topsoil. Filled areas will be stabilized, if necessary, using brush matting, sprayed membranes or mulch.
11. The Department will undertake further investigations to define the nature of the sediments to be dredged from the entrance channel, and to identify the preferred dredging methodology

and requirements for blasting. The results and proposed works will be referred to the Environmental Protection Authority for approval prior to initiation of dredging.

12. Engineering and environmental management details of the proposed disposal strategy for material dredged from the entrance channel will be referred to the Environmental Protection Authority and the Commonwealth Department of Arts, Sport, Environment, Tourism and Territories for approval.

13. Formal drainage will be constructed to ensure that the project site is not flooded and that it does not cause flooding of the hinterland behind it. Approval to conduct two new drainage outlets across the shore, and to incorporate an existing natural drainage outlet within the formal drainage, will be sought from the Environmental Protection Authority following finalization of the proposed drainage design. Appropriate rehabilitation procedures will be implemented in order to ensure stability of the beach and dune in the vicinity of the new outlets, to the satisfaction of the Commissioner for Soil Conservation.

14. All facilities to the proposed development will be deep sewered.

15. Drainage from marina hardstand areas will be directed away from the harbour and discharged to general drainage via silt traps.

16. The design criteria for drainage will be for the dissipation of at least a one in 100 year rainfall without unacceptable flooding, and without overflow into the marina harbour. There will be provision for drainage overflow into the harbour during more extreme rainfall events.

17. Fuel storage facilities in the marina will be above ground and contained within a sealed bund capable of holding the entire tank contents. Boat refuelling facilities will include manually operated nozzle valves with automatic shut-off. The fuel storage and refuelling facilities will comply with the requirements of the Explosives and Dangerous Goods Division of the Department of Mines.

18. The discharge of sewage, hydrocarbons or litter from boats into the marina will be prohibited, with appropriate signs to inform all users of the marina. Waste disposal facilities, including rubbish bins, oil recycling bins and sewered public toilets will be provided around the marina. A sewage pump out facility will be provided for boats equipped with holding tanks.

19. The use of antifouling paints containing tributyl tin will be prohibited in the marina, and this will be included as a lease condition for boat repair facilities in the marina.

20. Operation and maintenance of the marina will remain the responsibility of the Department of Marine and Harbours, and will include:

    a) daily inspection of the marina harbour and immediate implementation of any corrective action required to maintain water quality and aesthetics to the required standard;

    b) maintenance of specified navigable depths;

    c) maintenance of breakwaters, jetties, wharves, revetments and foreshores.

21. Water quality in the marina harbour and the adjacent area of Exmouth Gulf will be monitored to confirm the predictions made in this NOI regarding the adequacy of flushing and the maintenance of suitable water quality. The minimum water quality criteria required to be met are described in Schedule 2 of Environmental Protection Authority Bulletin 103 (Department of Conservation and Environment, 1981). The proposed monitoring programme is described in Section 7.4 2 of this NOI, and the results will be reported to the Environmental Protection Authority.

    Section 7.4.2 of the NOI reads;

    Water quality and contaminant levels in sediments and organisms would be monitored during operation of the marina.

Water quality parameters measured would be those specified in the Canal Guidelines (Steering Committee on Canal Developments, 1984), and would include suspended solids, pH, dissolved oxygen, temperature, bacterial counts and nutrient concentrations. Monitoring would be conducted quarterly for the first year and thereafter at intervals dictated by experience. Samples would be collected from surface and bottom water at representative sites in the marina and adjacent Gulf waters.

Sediments and mussels within the marina would be monitored for toxic trace metals and hydrocarbons. Surface sediments would be sampled from the central basin of the marina where deposition is anticipated, and the fine fraction would be analysed for nickel, zinc, copper, lead, polyaromatic hydrocarbons (PAHs) and phosphorus levels. Mussels collected from the marina would be analysed for tissue concentrations of nickel, zinc, copper, lead and PAHs, using standard methods for the mussel watch programme. Lipid levels would also be determined to assist in data interpretation. The sediment and mussels would initially be monitored at six-monthly intervals.

Specialist marine scientists engaged by the Department of Marine and Harbours would supervise monitoring and interpretation of the results and recommend management action. The results would be presented to the E.P.A. for review on an annual basis.

22. The level of revetments and areas surrounding the proposed harbour will be +3.0 m AHD, and floor levels will be at least +3.5 m AHD. This is sufficient to contain extreme seawater levels, including anticipated seawater level rises due to the "Greenhouse Effect".

23. Coastal sediment movement will be monitored following construction of the marina as outlined in Section 7.4.1. If by-passing of sand around the breakwaters is occasionally necessary it will be undertaken by the Department of Marine and Harbours.

Section 7.4.1 of the Notice of Intent is reproduced below.

The position of the shoreline, vegetation line and dune profiles adjacent to the breakwaters will be established prior to construction. Surveys will be conducted at distances of 50 m, 100 m, 200 m, 500 m, 1 km and 2 km to the north and south of the entrance channel.

Following construction, water depth in the marina and entrance channel, and the position of the shoreline, vegetation line and the dune profile, will be regularly monitored. Surveys will be conducted quarterly for the first year and thereafter at intervals to be determined in consultation with the Commissioner for Soil Conservation.

24 Recommendation adopted from Test Pit Report.

a) Prior to commencement of harbour excavations, it is strongly advised that a series of piezometers be drilled and constructed along the perimeter of the harbour and along the estimated radius of influence, which roughly correspond to Warne and Murat Roads, and northern edge of the race course. These will allow the monitoring of any effects of de-watering on the adjacent areas.

b) Piezometer monitoring will be performed by a technician not employed by the earthmoving contractor (possibly the Water Authority). The data should be analysed and reported on by a hydrogeologist.

c) One or two de-watering bores should be sunk into suitable locations to penetrate the hard rock layer and pumping tests carried out to determine:

(1) Magnitude of water flow expected in the full scale operation.

(2) Allow for a more accurate method of de-watering design.

(3) Provide more reliable data on the possible zone of influence during the main excavation phase.

25. Monitoring of private bores as recommended by the Water Authority

With regard to their (ie Water Authority letters 16 March and 5 June 1990 in Appendix 2B of this report) comments concerning impacts on private bores in the vicinity of the marina site, water samples will be collected and tested before, during and after construction to monitor any variation on quality. This work will be undertaken by the Water Authority.

26. Blasting:

a) The earthworks Contract document will include Clauses that require the Contractor to consider weather conditions prior to and during blasting, with the aim of minimising adverse impacts.

b) The Department of Marine and Harbours undertakes to repair obvious damage caused by blasting activity associated with excavation of the marina.

27. Where possible drainage outfalls to the sea will be located at natural outfalls. Compensating basins will be used to settle sediment.

28. All promotional material under the control of the Department of Marine and Harbours will incorporate a conservation ethic as advocated by CALM.

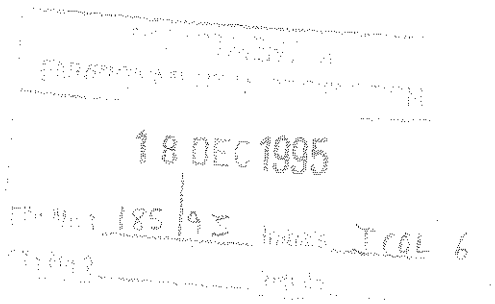
Appendix 2

Summary of submissions and proponent's response

TRANSPORT
Department of Transport

My ref: 416/94
Your ref: 185/93 Vol 4

Chairman
Department of Environmental Protection
Westralia Square
141 St Georges Tce
PERTH WA 6000



Attn: Ms J Cole

Dear Ms Cole

Exmouth Boat Harbour - Change to Environmental Conditions (956)

The following is our response to the issues and questions raised following the public comment period for the above proposal.

1 Dune Protection

1.1 Will the proponent monitor the impact of the marina on the dune system?

It is not expected that the marina will have any ongoing impact on the dune system. Some areas of dune will be removed, and others will be stabilised. However, as part of the beach monitoring program, the proponent has undertaken to monitor the dune profile (Commitment 17).

1.2 If the marina impacts negatively on the dune system (for example, erosion), what remedial management will the proponent undertake?

The original Notice of Intent discussed the effect of the marina on coastal stability and concluded that the impacts would be minimal, and could be managed with occasional sand by passing. If marina does not affect the beach stability, then it can be confidently inferred that it will not affect dune stability. The proponent has made the commitment to bypass sand to maintain beach stability if required (Commitment 17).

1.3 It is noted that the primary dunes in the area of the harbour which have been badly denuded over the years will be subject to a Management Plan, and that the loss of some of the degraded dunes will not cause a problem due to the construction of the outer groynes. Can the proponent comment further?

A primary attribute of a coastal foredune in terms of shoreline stability is to act as a sand reservoir from which sand can erode during storms, thus providing some protection for the

092756 /EPO

Fremantle Office
1 Essex Street
PO Box 402 Fremantle
Western Australia 6959
Telephone (09) 239 2399
Facsimile (09) 239 2279

hinterland. The section of dunes to be removed is behind the harbour and the protection function will no longer be necessary.

2 Quarrying Operations

2.1 The Exmouth Water Supply Reserve 34055 is a proposed P1 classification Reserve. This classification for water source areas is to give a level of protection to the water source that is consistent with the need to use the land for other requirements. The P1 classification is to apply to areas with low levels of development and valuable water resources and to protect the quality of the water by limiting development to non-polluting activities.

It is considered that all previous conditions that were submitted for the original quarry should still apply. It is also considered that the following two suggestions apply:

(i) Any accidental spillage of hydrocarbon based fuels and oils or hydraulic fluids or potentially contaminating fluids will be cleared immediately and the contaminated soil/materials will be disposed of offsite at a suitable approved disposal site. An incident logbook will be maintained and a record will be kept of any incident that has the potential to pollute. The Regional Water Resources Officer will be informed within 24 hours of any incident.

(ii) The servicing of any plant will only be undertaken at an approved site outside of Water Reserve 34055.

Could the proponent indicate whether the above two suggestions will be made commitments?

The Proponent is prepared to make the following further commitments:

Commitment 25

Any accidental spillage of hydrocarbon based fuels and oils or hydraulic fluids or potentially contaminating fluids will be cleared immediately and the contaminated soil/materials will be disposed of offsite at a suitable approved disposal site. An incident logbook will be maintained and a record will be kept of any incident that has the potential to pollute. The Regional Water Resources Officer will be informed within 24 hours of any incident.

Commitment 26

The servicing of any plant will only be undertaken at an approved site outside of Water Reserve 34055.

2.2 One quarry site is located in the water catchment. What impact will this have?

Both quarry sites (the proposed Whitecrest quarry and the proposed Department of Transport quarry) are located in the surface water catchment of Stoney Creek. In addition, it is understood by the proponent that the Exmouth Water Supply Reserve embraces the entire

Whitecrest mining tenement and, therefore, both quarry sites are in the Water Authority's groundwater reserve.

The potential for degradation of groundwater quality is recognised and will be managed accordingly. For example, fuels, oils, lubricants and explosives will not be stored at the quarry site, but at a dedicated laydown area outside the Water Reserve. Excavation and haulage vehicles will be re-fuelled at the laydown area. Additional commitments have been made by the proponent (refer commitments 25 and 26 above) to further reduce the risk of groundwater contamination.

The proponent is confident that the short-term quarrying activity for harbour construction will result in no adverse water quality effects in the groundwater and surface water catchments.

2.3 Although quarrying will not extend below +34 AHD, will the quarry impact on water flow and water level in the subterranean environment?

The quarry will not impact on water flow and water level in the subterranean environment. The +34m AHD base of the proposed quarry provides a 30 metre buffer above the water table and, therefore, cannot expose the groundwater regime to increased evapotranspiration which, otherwise, may be of concern if quarrying proceeded down to, or below, the water table.

The only other hydrological effect would be potential changes to rainfall recharge within the quarry to the underlying groundwater aquifer. For example, compaction of the quarry floor by earthmoving machinery may reduce the rainfall infiltration rate to a lower rate than the surrounding natural terrain. However, this would be partially or completely offset by the reduced rainfall losses via interception on, and evapotranspiration from, the natural vegetation which would be removed to establish the quarry.

A reduction in the rainfall infiltration rate across the quarry floor would tend to express as increased run-off which would flow off-site into undisturbed areas of the Stoney Creek catchment, where infiltration and other natural processes would again dominate. Surface drainage within the quarry would be directed through a silt trap prior to discharge from the site to minimise potential 'clogging' of downstream karst terrain.

Recharge of the coastal plain aquifer will not be affected by the very localised and small-scale changes in hydrological processes within the quarry site. Therefore, no impacts are expected on water flow and water level in the subterranean environment.

2.4 Will geological testwork be carried out on the alternate quarry site?

Yes.

3 Coastal Stability

3.1 What effect will the marina have on energy along the coast?

The original Notice of Intent examined the effects of the marina breakwaters on coastal stability and concluded that the impacts would be minor and could be managed. The new breakwater extends approximately 150 m further seaward than those originally proposed and is not expected to have any significantly different effect on coastal processes than that anticipated for the original proposal. The majority of littoral movement is in the nearshore zone.

3.2 In the event of a cyclone, what are the implications of flood water washing into the marina?

The outflow channel has been aligned with the harbour entrance, and flood discharge will pass quickly through the marina basin. Pens and other marine structures have been located on either side of the basin, and are not expected to be affected by flood waters. There may be some sediment deposited at the back of the basin, but the proponent will carry out maintenance dredging if required to clear this sediment. Floods are infrequent events, and are not expected to disrupt the operation of the harbour for any significant period. The effect of floodwaters on dune erosion will be no greater than it is without the boat harbour, and given the size of the proposed flood channel compared with the existing natural channel, it is expected to be less.

4 Troglobitic Fauna

4.1 Given the report acknowledges that little is known about the distribution or abundance of the troglobitic fauna, what monitoring will the proponent undertake to determine the impact of the marina on the fauna?

While there is little detailed information regarding the distribution and abundance of the troglobitic fauna, the following general statements can be made in respect of potential impacts of the marina based on existing information, including recently published reports (particularly the CER, Extensions to the Exmouth Water Supply, WAWA, June 1995):-

a) Troglobitic fauna are terrestrial animals that are specially adapted to living underground in air-filled, high-humidity caverns. Troglobites would not occur under the proposed marina harbour and entrance because these facilities will be located entirely offshore in an aquatic environment.

b) The widespread occurrence of aquatic subterranean fauna (stygofauna) has been confirmed within the unconfined aquifer of the coastal plain of the peninsula. While most recorded species occur within the shallow lens of fresh-to-brackish groundwater, some stygofauna are only found below the salt water interface of inland caves connected at depth to the sea.

c) Cavernous limestone is likely to be present on the east coast of the peninsula to depths of approximately 100 metres below sea level.

d) Construction of the marina harbour and entrance channel will involve excavation of a variable thickness of the submarine formations, but the harbour basin will only be excavated to -4.4m AHD (-3.0 m below low water) and the excavations will be predominately confined to the upper layers of sand, old coral and some conglomeritic calcirudite. Excavation will not extend into the limestone substrata.

It is clear from the above that the marina harbour and entrance channel will not directly affect troglobitic fauna (terrestrial cave fauna) and will only directly disturb a small thickness of submarine limestone, which may or may not be habitat for stygofauna (in an area in which the potential habitat for stygofauna may extend to a depth of 100 metres). Furthermore, the shallow coastal limestone formation, which overlies the older Tulki Limestones, is not as cavernous as the underlying formation and, therefore, has less potential as stygofauna habitat.

On balance, and given the likelihood that the marina will be constructed "in the wet", it is considered that the potential impacts of the marina on stygofauna are insignificant. Therefore, no monitoring is proposed of potential stygofauna or habitat within the area of the offshore harbour basin and entrance channel.

If dewatering of the harbour basin is proposed to allow excavation "in the dry", then the proponent has committed to a program of investigations and monitoring to determine the impacts on groundwater levels and quality near the marina basin (Commitments 18 and 21). The monitoring program would be devised in consultation with the Western Australian Museum, among others, and the requirement for fauna monitoring would be determined at that time.

4.2 In Appendix 3, Section 3.7 it is stated that "no significant subterranean systems have been identified in the vicinity of either site". This is argued as Humphreys, 1994, has documented that aquatic fauna extends far inland, close to the proposed quarry site and includes a number of species listed under Schedule 1 of the Wildlife Conservation Act, 1950 (Milyeringa veritas, Stygiocaris stylifera) as well as a wide range of other species (which are documented in detail for this area in the CER: Extensions to the Exmouth water supply borefield published by the WAWA in June 1995).

Can the proponent comment on this?

The most pertinent comment on the above is to simply apologise for an inappropriate use of words in the phrase "no significant subterranean systems have been identified in the vicinity of either site". A more appropriate use of words would have been "... identified on the sites or in the immediate vicinity of either site". This phrase is basically a statement referring to the apparent lack of obvious cave systems and sinkholes noted during visits to the quarry locations by representatives of the proponents.

It is accepted that records of subterranean fauna elsewhere on the peninsula, especially in the nearby WAWA borefield area, suggest that these observations can be extrapolated to predict

the likely occurrence or stygofauna below the water table at both quarry sites, as well as the likely presence of troglobites in caves, small fissures and interstitial habitats in the sub-surface. Quarry operations will not extend to the water table and will be managed to prevent groundwater contamination. Therefore, no impacts on potential stygofauna populations are anticipated. However, there will be a direct impact on potential troglobitic fauna in any caves and fissures opened during quarrying.

There is no practical means to avoid these potential impacts. An extensive drilling program could possibly be conducted in an attempt to identify small caves and fissures in advance of quarrying, so that consideration could be given to avoiding them within the limits of on-going quarry development. Overall, it is considered unlikely that a workable program could be devised and, in any event, an extensive drilling program may result in deleterious habitat effects due to fracturing and induced humidity changes in the sub-surface habitats encountered.

4.3 Cavernous limestone contains interconnected voids and the subterranean drainage is characteristically discordant with the surface drainage. As such, contaminants easily move through the matrix and if they reach the groundwater they may move in directions and rates that are unpredictable. In addition, in the WAWA borefield, these highly transmissive karstic features allow the groundwater levels to be influenced by tides up to at least 3.5 km from the coast (Forth, 1973). Hence, contaminants would be flushed back and forth widely through the groundwater system.

As it is imperative that surface operations are fully contained against the worst case accident, will potential point source contamination site (eg bulk storage facilities, refuelling, workshop, explosive stores, etc) be fully contained from both lateral and vertical movement requiring membrane protection whose integrity can audited?

The bulk fuel storage facilities in the marina are proposed to comprise above-ground tanks located in sealed enclosures capable of holding the entire stored fuel contents. Public and private ablution facilities will also be connected to fully-contained sullage tanks for regular pump-out and transfer to the Exmouth treatment works. Other than the above, there are no specific plans to fully seal and contain other facilities within the marina precinct. Indeed, this proposal does not seek approval for any specific developments which might be attracted to the infrastructure provided by the marina.

A Quarry Management Plan has been submitted to the Department of Environmental Protection for approval. All fuel storage, refuelling and explosives storage/mixing will be conducted at a dedicated laydown area remote from the proposed quarry site, ie on the eastern side of the Water Reserve (see new Commitment 26).

The quarry operation and harbour construction are only temporary activities and are estimated to require 30 weeks for completion, followed by a similar period for the construction of the harbour infrastructure (roads, services, pens etc). As such, the risk of serious point source contamination during the construction phase is not considered to be significant. All bulk quantities of potential contaminants will be stored in bunded enclosures of compacted soil to

minimise lateral movement of potential spillage and allow for rapid clean-up during the short-term construction period.

Part of the statement from the above public submission warrants particular comment:-

> *"Hence, contaminants would be flushed back and forth widely through the groundwater system"*

It is accepted that tidal influence on groundwater levels has been observed at distances of up to at least 3.5km from the coast. However, this does not mean that potential contamination at the coast (eg at the proposed marina) will migrate 3.5 km inland under the influence of tidal fluctuations. The "back and Forth" movement of any liquid which recharges the aquifer at a particular point would only be localised. Overall, there must be net movement of any infiltrating water and contaminants to the east (eg, discharge to the ocean) to maintain the current equilibrium position of the salt water interface. If this net migration of recharge liquid did not occur then, by definition, the salt water interface would continue to migrate further inland.

4.4 What residues occur from the explosives to be used and what effect will spillage have?

The explosives generally used for quarry blasting are the ANFO type (ammonium nitrate/fuel oil mixtures). Explosives would be stored and mixed at the off-site laydown area in accordance with the specifications of the Department of Minerals and Energy (DOME). A bunded compound would be provided for this purpose.

Discussions with the Explosives and Dangerous Goods Branch of DOME reveal that substantial technological advances have been made over the last 10 years in regard to ANFO explosives. The preparation of water-proof emulsions, extremely high efficiency of explosive and a predominantly gaseous by-product means that solid residues are likely to be insignificant. Furthermore, these would tend to be removed from the site with the quarry product.

4.5 Bore logs from the Exmouth borefield confirm the limestone to be cavernous. These voids are the habitat of a wide range if terrestrial troglobites. Given that the northern end of the Cape Range limestones contain a large proportion of endemic taxa, not found elsewhere in Cape range, will the proponent make a commitments to examine and assess fauna in such voids, opened up by mining operations?

The quantity of limestone including core required from the quarry for the harbour construction is approximately 180,000m^3. This is a small volume of material and the removal of this amount would, therefore, only result in disturbance of a very small volume of potential troglobite habitat on a local scale. It would be a 'once-only' disturbance over a period of less than 30 weeks.

In view of the small area and volume of potential troglobite habitat affected, and the fact that assessment of voids opened by quarrying could cause lengthy delays to a short-term operation, it is not intended to commission detailed assessments of potential troglobite occurrence. The

proponent would welcome inspection of the operations by a nominated speleological group and would endeavour to assist their assessment within the limitations of an on-going quarry operation.

5 Sewerage Disposal

5.1 Will the proponent provide sullage disposal?

Yes, as stated in Commitment 9.

5.2 Have alternatives to sullage tanks been considered, for example biocycle toilets?

The use of sullage tanks is a temporary measure. It is intended that the marina will be connected to deep sewerage when it is installed. This will happen when there is sufficient development in the marina and adjacent land to justify deep sewerage. Sullage tanks will provide convenient disposal with no risk to the marina environment.

5.3 Will sewerage pumpout facilities be provided?

Sewage pumpout facilities will be provided once the demand for such a facility has been demonstrated, as stated in Commitment 12. Provision will be made in the public toilet block for the disposal of wastes from the more common portable chemical toilet.

5.4 The proponent proposes to amend Commitment 18 (page 25) so that a sewerage pump out facility will be provided once demand has been demonstrated. This is considered unacceptable and contrary to good practice in marine pollution.

The inadequate provision of waste reception facilities is recognised as being a serious limitation to implementing environmental protection obligations. ANZECC's current review "Maritime Accidents and Pollution; Impacts on the Marine Environment from Shipping Operations AGPS (1995) reaches the conclusion that:

> *"The adequate provision of port waste reception facilities is not only an obligation under MARPOL 73/78, but is an essential factor in the prevention of pollution from ships. Action must be taken to ensure that the adequate provision of waste reception facilities is given a high level of priority".*

(i) How will the proponent determine that the demand for a sewerage pumpout facility has been demonstrated?

(ii) Will the proponent provide waste reception facilities as per the original approval?

The quotation above is taken from Attachment 4 of the ANZECC review, and is related to reception facilities for "oils and oily residues, chemicals and garbage". Attachment 4 also states "There is little in the draft on sewage disposal as the relevant MARPOL Annex is not

yet in force internationally". The main body of the review does not discuss sewerage discharge.

The Department does recognise that sewerage pumpout facilities are desirable, however, they are not currently available in any of the public or private boat harbours in the state and it is difficult to justify the expenditure of public moneys on such a facility in this instance. The number of boats equipped to use pumpout facilities is small, with many boats using portable toilets. Provision will be made for the disposal of sewage from portable toilets in the public toilet block to be included in the development.

If and when the Department of Conservation and Land Management, as the managers of the Ningaloo Marine Park, identify a problem with sewage disposal practices, then alternative strategies, which may include public information campaigns as well as the provision of pumpout facilities, will be implemented.

The proponent's commitments to the provision of waste disposal facilities remain as per the original approval with the exception of the deferral of the pumpout facility.

6 Drainage

6.1 If residential development goes ahead in the future, has the proponent taken into consideration drainage provisions and what will these provisions be?

Residential development is not a part of this Section 46 amendment. However, nothing in the planning of the Boat Harbour is expected to jeopardise any future drainage proposals for any future residential developments.

6.2 On page 11 it is stated "The extensive area of diffused drainage and infiltration on the eastern side of Murat Road will act as a natural settlement basin to remove suspended sediments from incoming floodwaters." Will this adequately remove sediments from the drainage water?

The flood waters entering the ocean will carry similar suspended sediment loads as they already experience. The only effect the marina will have on the drainage system will be the realignment of the last few hundred metres of the outfall channel.

6.3 With regard to Commitment 6 (page 29) where will the settling ponds be located?

The settlement ponds will be located in the proposed reclamation areas on either side of the basin.

7 Residential Development

7.1 Why is land being contoured for residential development when this is no longer part of the proposal (Page 30, point 7)?

This is an error, and part (c) should have been deleted as it will not occur as part of the proposal. Commitment 7 has been amended to reflect this.

7.2 With regard to tourism and recreational facilities, where will these be located on Figure 3?

Tourism and recreation facilities will be located on the north side of the harbour basin. marine commercial and light marine industrial will be located on the south side of the basin.

7.3 On page 15, Should Holgate Street be Horwood Road?

Yes.

8 Acquifer Contamination

8.1 Given that it is extremely difficult to reverse contamination of acquifers, how does the proponent intend to manage accidental or deliberate discharges of effluent, illegal TBT use or mechanical or automatic shutoffs?

There will be no effluent or TBT use in the vicinity of the freshwater aquifer under the quarry site. Any discharge into the harbour basin would be into salt water, and any contamination of any adjacent freshwater aquifer would, therefore need to be accompanied by a salt water intrusion which would in any event render the aquifer unuseable for water supplies.

9 Strategic Plan

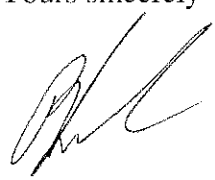
9.1 A strategic plan for the area should be developed prior to any further development in the Cape Range area. It is also considered that better knowledge should be obtained with regard to the ecology of the area. Can the proponent comment on this?

The concept of a marina in Exmouth at about the location selected has been a part of the strategic planning for the area for many years. A number of studies have been carried out in the region and strategic plans have been prepared, including the recently completed Gascoyne Coast Regional Strategy which supports the development of a boat harbour at Exmouth. The Shire of Exmouth is presently revising its Town Planning Scheme, and this development is being integrated into that scheme.

The ecology of the area has been considered in the original Notice of Intent

The support for this proposal within the community is enormous, and the proponent has not been able to identify any opposition despite considerable publicity and a well attended public meeting. It is considered that further planning and strategy development which may delay this project would not meet with approval from the Exmouth community. The project has been approved by Cabinet on the existing timetable.

Yours sincerely



Peter Boreham
Project Manager

20 October 1995

Appendix 3

List of submissions

State and local government agencies

Department of Minerals and Energy

Shire of Exmouth

Water Authority of Western Australia

Western Australian Museum

Organisations

Conservation Council of Western Australia

Greenpeace

Members of the public

Mr N. Evans

Mr P. Green

Appendix 4

Summary of Revised Proponent Commitments (November 1995)

SUMMARY OF REVISED PROPONENT COMMITMENTS

The Department of Transport makes the following commitments:

1. An environmental management plan for the rehabilitation and conservation of the dunes bordering the development site will be prepared in consultation with the Shire, the Ministry for Planning and the Commissioner for Soil Conservation and implemented by the Department of Transport to the satisfaction of the Commissioner for Soil Conservation and the Department of Environmental Protection.

2. The marina and all associated facilities will comply fully with applicable legislation, regulations and by-laws. All construction materials and practices would be in accordance with the relevant Australian and international codes.

3. Construction activities will be restricted to normal daylight hours and, if found to be necessary, appropriate dust suppression techniques would be employed. Any blasting that is required to enable excavation of the marina harbour and entrance channel will be conducted between 9.00 am and 5.00 pm on weekdays, and will be publicised in the Exmouth community.

4. During earthworks and construction, appropriate care will be taken to exclude incursion of machinery into conserved areas of the dune and foreshore.

5. The Department will be responsible for quarrying operations to provide armourstone for the breakwaters and will liaise with the Department of Minerals and Energy, the Shire and the Department of Environmental Protection to define appropriate environmental management measures, including rehabilitation of the quarry site and access roads. This commitment applies equally to either the currently approved quarry site or the alternative Whitecrest quarry site.

6. If the harbour is to be de-watered for excavation then the extracted water will be directed to a settling pond to reduce suspended solids prior to discharge to Exmouth Gulf. If excavation were to occur "in the wet", drainage water from the excavated material will be similarly directed to a settling basin prior to discharge to Exmouth Gulf. This commitment will be to the requirements of the Department of Environmental Protection.

7. Recontouring of areas receiving fill material will meet the following objectives:

   a) The redeveloped areas should form a stable and varied landscape, reflecting naturally occurring topography elsewhere within the coastal strip.

   b) The boundary relief should co-ordinate with existing contours.

   c) The filled sites will be compacted in accordance with the requirements for building purposes and covered with previously stockpiled topsoil. Filled areas will be stabilised, if necessary, using brush matting, sprayed membranes or mulch.

8. The Department will undertake further investigations to define the nature of the sediments to be dredged from the entrance channel, and to identify the preferred dredging methodology and requirements for blasting. The results and proposed works will be referred to the Environmental Protection Authority for approval prior to initiation of dredging.

9. As an interim measure, sewage from facilities within the harbour development will be disposed to sullage tanks and the Department of Transport will be responsible for regular pump out and delivery of the sewage to the Exmouth treatment works. The Department of Transport will connect the harbour facilities to deep sewerage when deep sewerage is extended to any reasonably proximate development.

10. Drainage from marina hardstand areas will be directed away from the harbour and discharged to general drainage via silt traps.

11. Fuel storage facilities in the marina will be above ground and contained within a sealed bund capable of holding the entire tank contents. Boat refuelling facilities will include manually operated nozzle valves with automatic shut-off. The fuel storage and refuelling facilities will comply with the requirements of the Explosives and Dangerous Goods Division of the Department of Minerals and Energy.

12. The discharge of sewage, hydrocarbons or litter from boats into the marina will prohibited, with appropriate signs to inform all users of the marina. Waste disposal facilities, including rubbish bins, oil recycling bins are sewered public toilets will be provided around the marina. A sewage pump out facility for boats equipped with a holding tank will be provided once demand for such a facility is demonstrated.

13. The use of antifouling paints containing tributyl tin will be prohibited in the marina, and this will be included as a lease condition for boat repair facilities in the marina.

14. Operation and maintenance of the marina will remain the responsibility of the Department of Transport, and will include:

a) Daily inspection of the marina harbour and immediate implementation of any corrective action required to maintain water quality and aesthetics to the required standard;

b) Maintenance of specified navigable depths;

c) Maintenance of breakwaters, jetties, wharves, revetments and foreshores.

15. Water quality in the marina harbour and the adjacent area of Exmouth Gulf will be monitored to confirm the predictions made in the NOI regarding the adequacy of flushing and the maintenance of suitable water quality. The minimum water quality criteria required to be met are described in Table 2.2 of Environmental Protection Authority Bulletin 711 (Environmental Protection Authority, 1993). The proposed monitoring programme is described in Section 7.4.2 of the NOI, and the results will be reported to the Environmental Protection Authority.

Section 7.4.2 of the NOI reads:

"Water quality and contaminant levels in sediments and organisms would be monitored during operation of the marina.

Water quality parameters measured would be those specified in the Canal Guidelines (Steering Committee on Canal Developments, 1984), and would include suspended solids, pH, dissolved oxygen, temperature, bacterial counts and nutrient concentrations. Monitoring would be conducted quarterly for the first year and thereafter at intervals dictated by experience. Samples would be collected from surface and bottom water at representative sites in the marina and adjacent Gulf waters.

Sediments and mussels within the marina would be monitored for toxic trace metals and hydrocarbons. Surface sediments would be sampled from the central basin of the marina where deposition is anticipated, and the fine fraction would be analysed for nickel, zinc, copper, lead, polyaromatic hydrocarbons (PAHs) and phosphorus levels. Mussels collected from the marina would be analysed for tissue concentrations of nickel, zinc, copper, lead and PAHs, using standard methods for the mussel watch programme. Lipid levels would also be determined to assist in data interpretation. The sediment and mussels would initially be monitored at six-monthly intervals.

Specialist marine scientists engaged by the Department of Transport would supervise monitoring and interpretation of the results and recommend management action. The results would be presented to the Department of Environmental Protection for review on an annual basis."

16. The level of revetments and areas surrounding the proposed harbour will be +3.0m CD, and floor levels will be a least +4.0m CD. This floor level is sufficient to contain extreme seawater levels, including anticipated seawater level rises due to the "Greenhouse Effect".

17. Coastal sediment movement will be monitored following construction of the marina as outlined in Section 7.4.1. If by-passing of sand around the breakwaters is occasionally necessary it will be undertaken by the Department of Transport.

Section 7.4.1 of the Notice of Intent is reproduced below.

"The position of the shoreline, vegetation line and dune profiles adjacent to the breakwaters will be established prior to construction. Surveys will be conducted at distances of 50 m, 100 m, 200 m, 500 m, 1 km and 2 km to the north and south of the entrance channel.

Following construction, water depth in the marina and entrance channel, and the position of the shoreline, vegetation line and the dune profile, will be regularly monitored. Surveys will be conducted quarterly for the first year and thereafter at intervals to be determined in consultation with the Commissioner for Soil Conservation."

18. In the event that de-watering of the harbour basin is proposed for excavation "in the dry", then the Department of Transport would apply the recommendations of the Test Pit Report. Recommendation adopted from Test Pit Report:

a) Prior to commencement of harbour excavations, it is strongly advised that a series of piezometers be drilled and constructed along the perimeter of the harbour and along the estimated radius of influence, which is expected to be approximately 200 m from the western perimeter of the harbour basin.

These will allow the monitoring of any effects of de-watering on the adjacent areas.

b) Piezometer monitoring will be performed by a technician not employed by the earthmoving contractor (possibly the Water Authority). The data should be analysed and reported on by a hydrogeologist.

c) One or two de-watering bores should be sunk into suitable locations to penetrate the hard rock layer and pumping tests carried out to determine:

i. Magnitude of water flow expected in the full scale operation.
ii. Allow for a more accurate method of de-watering design.
iii. Provide more reliable data on the possible zone of influence during the main excavation phase.

19. Blasting operations will be managed to minimise any impact to the environment or residences beyond the project area, or nuisance as was previously proposed and approved.

    a) The earthworks Contract document will include Clauses that require the Contractor to consider weather conditions prior to and during blasting, with the aim of minimising adverse impacts.

    b) The Department of Transport undertakes to repair obvious damage caused by blasting activity associated with excavation of the marina.

20. All promotional material under the control of the Department of Transport will incorporate a conservation ethic as advocated by CALM.

21. If de-watering of the harbour basin is proposed and if the de-watering investigations described in Commitment 24 indicate that possible de-watering effects to groundwater quality or quantity may extend as far as Murat Road to the west or 500 m to the north or south of the harbour perimeter then, prior to commencement of de-watering, the Department of Transport shall develop a monitoring program and then subsequently monitor groundwater levels and salinity near the marina basin. The monitoring program will be to the satisfaction of the Minister for the Environment on advice from the Department of Environmental Protection, the Geological Survey of Western Australia, the Water Authority of Western Australia and the Western Australian Museum.

22. If the results of groundwater monitoring proposed in Commitment 21 indicate unacceptable de-watering effects at Murat Road to the west or 500m to the north or south of the harbour perimeter, then the Department of Transport shall cease de-watering activities. The commitment shall be implemented to the requirements of the Department of Environmental Protection on advice from the Geological Survey of Western Australia and the Water Authority of Western Australia.

23. Prior to the commencement of de-watering or to construction of the marina "in the wet", the Department of Transport shall construct and subsequently utilise settling ponds as near as practicable to the ocean, to the satisfaction of the Department of Environmental Protection.

24. Material excavated from the harbour and entrance channel will be exclusively used for fill within the proposed development area.

25. Any accidental spillage of hydrocarbon based fuels and oils or hydraulic fluids or potentially contaminating fluids will be cleared immediately and the contaminated soil/materials will be disposed of offsite at a suitable approved disposal site. An incident logbook will be maintained and a record will be kept of any incident that has the potential to pollute. The Regional Water Resources Officer will be informed within 24 hours of any incident.

26. The servicing of any plant will only be undertaken at an approved site outside of Water Reserve 34055.

27. Should voids be encountered during mining operations, the proponent will facilitate inspection by a nominated speleological group and assist their assessment within the limitations of an on-going quarry operation.

28. Turbidity will be reduced to a minimum during breakwater construction and filling operations to the requirements of the Department of Environmental Protection.

29. The proponent will construct the marina to blend in with visual values of the coastline, to the satisfaction of the Department of Environmental Protection.