# FREMANTLE INNER HARBOUR DEEPENING PROJECT

## FREMANTLE PORT AUTHORITY

Report and Recommendations
of the
Environmental Protection Authority

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## i. SUMMARY AND RECOMMENDATIONS

The Fremantle Port Authority proposes to deepen the Inner Harbour of the Port of Fremantle by dredging the harbour by 2 metres to achieve a depth of approximately 13 metres. The dredge spoil would be used to reclaim an area of 27 hectares to the north of the North Mole, to be contained by a sea wall to the west and a bund wall to the north. A small harbour (14 hectares) would be located adjacent to the reclamation, capable of providing for up to 150 vessels. It is proposed that the reclaimed land be used to create an industrial estate, occupied by private lease holders engaged in industrial marine activities.

Following the preparation of a Notice of Intent by the Fremantle Port Authority in November 1987, the Authority determined that the proposal should be assessed under Part IV of the Environmental Protection Act as a Public Environmental Report. This was prepared by the Fremantle Port Authority and released for public comment for a period of eight weeks, ending on June 3 1988.

This assessment report was prepared following consideration of both the PER and public and Government department submissions received during the public review. Further advice has also been received from the Fremantle Port Authority.

RECOMMENDATION 1

**The Environmental Protection Authority concludes that the proposal to deepen Fremantle Inner Harbour and associated land reclamation as described in the Public Environmental Report is environmentally acceptable, subject to the following recommendations and compliance with commitments made by the proponent within the PER and recommends that the proposal could proceed accordingly.**

RECOMMENDATION 2

**The Environmental Protection Authority recommends that the proponent should meet Schedules 5 and 16 of the document 'Water Quality Criteria for Marine and Estuarine Waters of Western Australia' pertaining to the use of water for passage of fish and for navigation and shipping to the satisfaction of the Environmental Protecion Authority.**

RECOMMENDATION 3

**The Environmental Protection Authority recommends that proposals for location of refuelling facilities, stormwater drainage, pumpout facilities and runoff containment be referred to the Authority for approval when these are finalised by the proponent and before construction commences.**

RECOMMENDATION 4

**The Environmental Protection Authority recommends that the development be deep sewered.**

RECOMMENDATION 5

**The Environmental Protection Authority recommends that a detailed monitoring programme should be prepared by the proponent and submitted to the Authority**

for approval before construction commences. In addition to the commitments made in the Public Environmental Report, the monitoring programme should provide for:

(1) monitoring of the extent and impact of any plume created from rock dumping during construction work or from dredging, and spoil disposal;

(2) monitoring of the extent of any changes to Leighton and Port Beaches and any consequent effects on the adjacent offshore communities;

(3) monitoring of heavy metal concentrations in the sediments at sites both within and outside the small craft harbour (the latter as a control to enable long term effects to be assessed), commencing before the reclamation starts and continuing for an initial period of five years;

(4) monitoring of dust levels during the construction phase of the operation;

(5) monitoring being carried out for a period of five years initially, then reviewed, with interim reports on monitoring and management submitted to the Environmental Protection Authority by the proponent on an annual basis; and

(6) reporting after five years of the reclamation, with reference to the monitoring results obtained during the full five year period, including interpretation of the results, recommendations relating to future requirements and with a commitment to amend management in accordance with the monitoring results.

RECOMMENDATION 6

The Environmental Protection Authority recommends that any further dredging activity associated with the land reclamation not addressed within the Public Environmental Report be referred to the Authority for assessment prior to commencement.

RECOMMENDATION 7

The Environmental Protection Authority recommends that the proponent prepare a land use management plan for the portion of North Fremantle likely to be affected by potential environmental impacts of the proposal. Specifically, the plan should address the environmental consequences of the development on other land uses, such as traffic impacts and noise. The plan should address in stages, both construction and operational phases of the proposal and be prepared in consultation with appropriate Government agencies and the City of Fremantle to the Environmental Protection Authority's satisfaction prior to construction commencing.

## 1. INTRODUCTION

Department of Transport studies have indicated that increasing numbers of container vessels, particularly those engaged in Australian - European trading routes, are bypassing Fremantle due to the lack of deep berth facilities. It is thought that if deep berth facilities did become available at Fremantle, shipping could be rescheduled to take advantage of the new facilities and so enhance economic benefit to the State through increased trade. As a consequence of this the Fremantle Port Authority (FPA) approached the Environmental Protection Authority in November 1987 with plans to dredge the entrance and part of the Inner Fremantle Harbour.

The Inner Harbour was originally constructed to a depth of 9.2 metres in the 1890's, and further dredged to a uniform depth of 11 metres in the 1920's. The latest FPA dredging proposal involves dredging the approaches to and within the harbour sufficiently to allow vessels of up to 12.5 metres draft to use berths 4 to 8 on the North Quay. This would involve the removal of between 1.5 and 1.8 million cubic metres of material including silt, sand and limestone. It is proposed that the dredge spoil be pumped 2 kilometres to the west of the dredge site, and would involve the reclamation of 27 hectares of ocean adjacent to the foreshore north of the north mole, as indicated in Figure 1. A breakwater wall would be constructed in advance of this filling to contain dredge spoil. It is proposed that the reclaimed land be used to create an industrial estate and a small boat harbour, occupied by private lease holders engaged in industrial marine activities.

Following the preparation of a Notice of Intent by the Fremantle Port Authority in November 1987, the Authority determined that the proposal should be assessed under Part IV of the Environmental Protection Act as a Public Environmental Report. This was prepared by the FPA and released for public comment for a period of 8 weeks, ending on 3 June 1988.

This assessment report was prepared following consideration of both the PER and public and Government department submissions received during the public review. Further advice has also been received from the Fremantle Port Authority.

## 2. BACKGROUND

### 2.1 INNER HARBOUR

Land adjacent to the Inner Harbour (North Quay to the north and Victoria Quay to the south) is Crown Land, vested in the FPA under the Fremantle Port Authority Act, 1902 - 1986. It is zoned under the Metropolitan Region Scheme as Reserved for Port Installations.

The Inner Harbour is utilised seasonally for the passage of heavy volumes of ferry, commercial and private craft, but is not available for the berthing of such craft, other than for the picking up and setting down of passengers at approved landing places and for the loading of bunker fuels by barge at the extreme eastern end.

Fishing is permitted along the full length of Victoria Quay and from both moles, however fishing from North Quay was officially prohibited by the FPA in September 1986 due to potential danger from the unloading of heavy containers. Recreational scuba diving is undertaken on the seaward side of both the North and South Moles, but is not permitted within the confines of

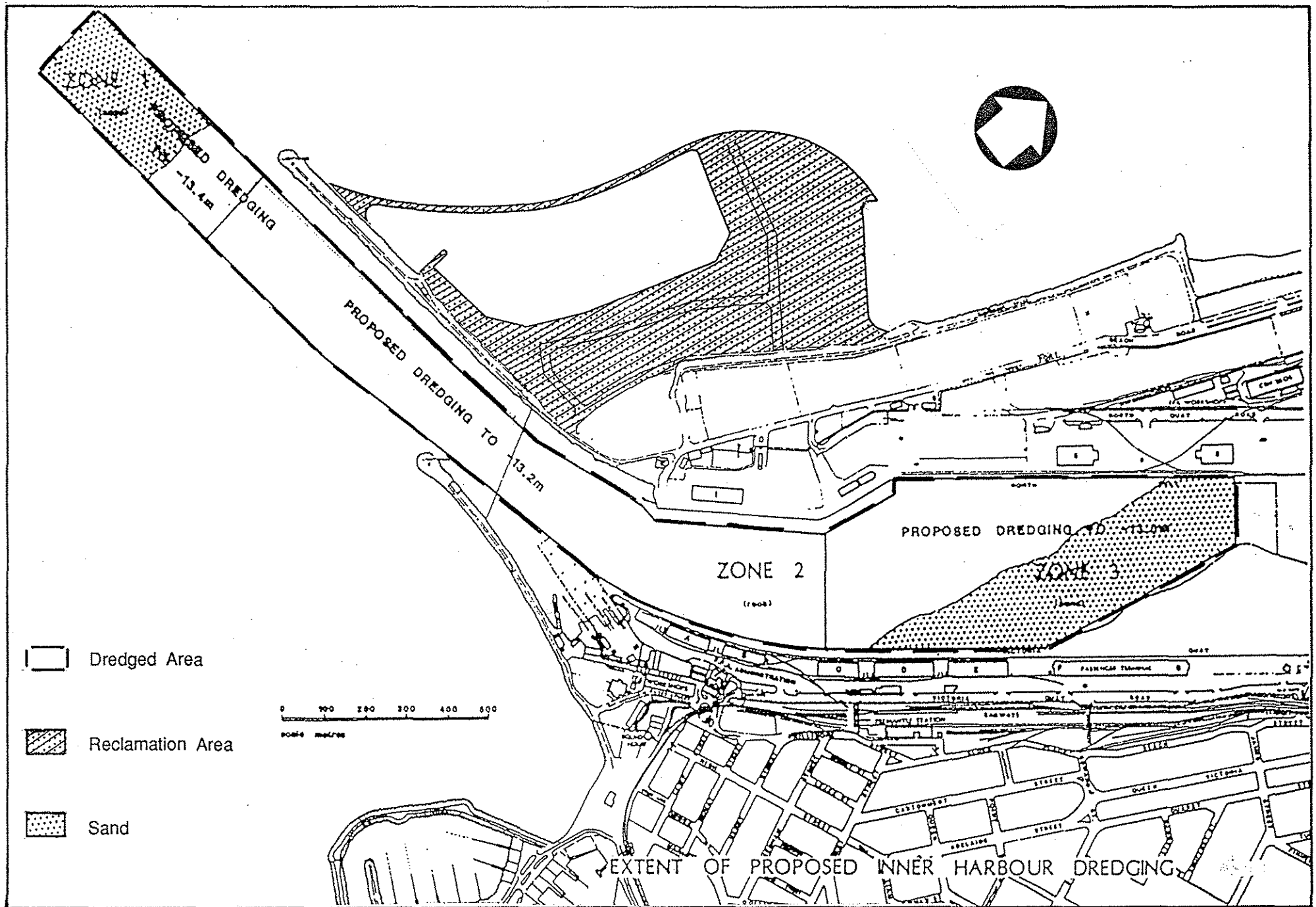



Figure 1. Map indicating location of dredging operations and reclamation area (Source: FPA, 1988 )

the Inner Harbour (FPA, 1988). No significant change in port related land use between berths 4 to 8 on the North Quay is anticipated, other than by increased intensity of container storage.

## 2.2 PROPOSED RECLAMATION AREA

Approximately one third of the shore line affected by the proposed reclamation is a small, reclaimed beach, approximately 300 metres long and 30 metres wide, backed by two low dune ridges. The remaining two thirds consists of an area of dredge spoil, resulting from earlier dredging activities associated with the Port, enclosed by a retaining wall. The seaward side of the retaining wall has been used for the dumping of waste including ready mixed concrete and builders' rubble.

This land is currently reserved under the Metropolitan Region Scheme for Port Installations, and is vested in the FPA. In the event of the proposal proceeding, the newly reclaimed land would also be vested in the FPA.

The beach foreshore adjacent to the North Mole is presently used for a variety of recreational activities including swimming, scuba diving, fishing and surfing. Land adjacent to this beach is currently occupied by a 600 bay public parking facility.

# 3. DESCRIPTION OF PROJECT

In 1984 the State Government initiated a Review of the Proposed Port Facility at Magles Bay, and identified a need for a new container terminal to accommodate an anticipated increase in port container trade. Two possible sites were considered, Catherine Point and north of the North Mole. Both were expected to cost approximately the same ($140m), however the potential environmental impact associated with Catherine Point in relation to the marine ecology of Cockburn Sound was considered by the FPA to be greater.

Having determined the need for dredging of the Inner Harbour and following investigation of the material to be removed, alternative disposal sites for the dredge spoil were considered by the FPA. These included:

- transportation by hopper dredge or barge for dumping at sea;
- pumping to a fill site; or
- pumping to a reclamation area adjacent to the sea shore.

As there is no area within the immediate vicinity of the port considered by the FPA as being capable of accepting the volume of material involved, reclamation of the shore appeared to be the only viable alternative, and would also generate a number of benefits.

Reclamation of waterfront land for port related use is viewed by the FPA as beneficial. It would provide a good opportunity to both dispose of spoil and increase port land. Further, it is the Fremantle City Council's long term plan to relocate existing port related facilities away from pedestrian and waterfront areas on the southern side of the River, so that those areas can be redeveloped for commercial and recreational usage, and thus regain its relationship to the ocean. Income generated by leasing of blocks on the reclaimed land, together with increased port trade would also significantly offset the cost of the project.

The entrance channel and berths 4 to 8 inclusive on the North Quay would be deepened to a depth of 13 metres. These berths have been determined as being the areas of greatest opportunity to improve container handling efficiency, and are deemed to be capable of handling associated increased traffic (FPA, 1988). The up river limit of proposed dredging is to be at a line extending from Berth 8 on North Quay to Berth E on Victoria Quay. Seaward of that line to the end of the North Mole the target depth increases to 13.2 metres to allow for vessel movement during wave swell conditions. Seaward of the North Mole (600 m) a minimum depth of 13.4 metres has been planned to allow for squat and wave action. 'Squat' action is a nautical term which refers to vessels sitting lower in the water as they gather speed.

The volume of material to be moved at the time of the preparation of the PER was estimated to be approximately 1.8 million cubic metres. However, the total volume has since been recalculated as being 1.5 million cubic metres. Alternative sites for the collection of additional spoil to make up this difference (0.3 million cubic metres) are currently being considered and would be the subject of ongoing discussion with the EPA.

The proposed deepening of the Inner Harbour and associated land reclamation as described in the PER would involve four stages.

### 3.1 CONSTRUCTION OF A SEA WALL TO ENCLOSE THE RECLAMATION AREA AND PROPOSED SMALL CRAFT HARBOUR

This wall would be constructed of quarried limestone core, with limestone and granite armouring. A freestanding breakwater wall would be built in advance of the dredging. The final configuration has been determined as a result of the physical modelling of the expected wave intensity at the Coastal and Hydraulic Engineering Laboratory at the University of Western Australia's Centre for Water Research. A road would be constructed along the top of the bund and sea wall to allow for vehicular access to the North Mole.

The sea wall would be constructed in water 4 to 6 metres deep, and form the boundary of the reclamation and small harbour area. The entrance is proposed to be through the North Mole to the west of the existing incinerator. A rock bund wall would also be built on the northern face to form a sea -land link around the small harbour. Final quarry sites for the limestone and granite have yet to be determined.

### 3.2 DREDGING OF THE INNER HARBOUR AND THE PUMPING OF DREDGED MATERIAL TO THE RECLAIMED AREA

The dredged material would be pumped to an area of the foreshore adjacent to and to the north of the North Mole, and levelled to reclaim an area of approximately 27 ha, with 14 ha of water within the small harbour.

A cutter suction dredge would be necessary to cut the limestone rock at the bottom of the harbour as well as sucking up the sand and muddy sediments. This will operate 24 hours per day, seven days per week, with the exception of a 12 hour maintenance break each Saturday.

The dredge would pump spoil to the shore via a floating pipeline 1 metre in diameter. The discharge line would connect at a series of points along the North Quay and North Mole and would be laid in a dredged trench while working within the harbour, to minimise interference with through harbour traffic. A shore pipeline would then lead to the reclamation site, buried at

particular points to allow vehicular access to both the mole and wharf areas. The surface of the spoil, to a depth of about 1 metre would be compacted by dozer activity. Below that level spoil would be compacted naturally be water pressure. This spoil would be principally composed of granular material and be free draining.

A small area within the newly created small craft harbour would also be dredged to a depth of 6 metres (Appendix 3).

### 3.3 MODIFICATION OF THE NORTH MOLE PROVIDING AN ENTRANCE TO ALLOW ACCESS TO THE SMALL CRAFT HARBOUR

This would be done once vehicular access is available around the rock bund and sea wall surrounding the site. The entrance will be 50 metres wide, and subject to slight modification to the original design as described in the PER as a result of the physical modelling tests, to maximise water exchange and flushing.

### 3.4 DEVELOPMENT OF RECLAIMED LAND

A total land area of 27 ha would be reclaimed, surrounding a harbour which could provide for up to 150 vessels. Eighty two percent of the land would be put into industrial use after allowing for roads, services and set back distances from the sea wall.

The reclaimed land is planned to be used for industrial marine and related activities, including providing a permanent berthing facility for tugs and small ships in sheltered water and associated jetties and ramps, as well as other port activities on a leasehold basis. No provision will be made for recreational boating. The present car park will be replaced by 3 smaller parking areas adjacent to the water front, as indicated in Figure 2.

### WASTEWATER DISPOSAL

The PER states that the volume of wastewater generated on site is expected to be approximately 19 000 litres per day. Septic tank disposal of this wastewater is preferred by the proponent. Connection to deep sewerage has also been investigated.

Main surface drainage discharge is planned to be located along the proposed Rudderham Drive and discharge into the sea clear of the reclamation area via a silt/oil trap. Existing drains already located in the area would be diverted.

Following modifications to the original construction timetable described in the PER as a result of physical modelling tests, it is anticipated that construction of the sea wall would commence in September 1988, dredging and associated land reclamation in March 1989, removal of the section of the North Mole in May 1989, and reclamation completed in July 1989 (see Appendix 3).

## 4. REVIEW OF PUBLIC SUBMISSIONS

A total of 22 submissions were received, including 8 from local and State government authorities, 5 from private organisations and 9 individual submissions from members of the public. All issues raised in these submissions related to activity associated with land reclamation, and no direct comment was actually made regarding the actual dredging activity itself, although its justification was questioned.

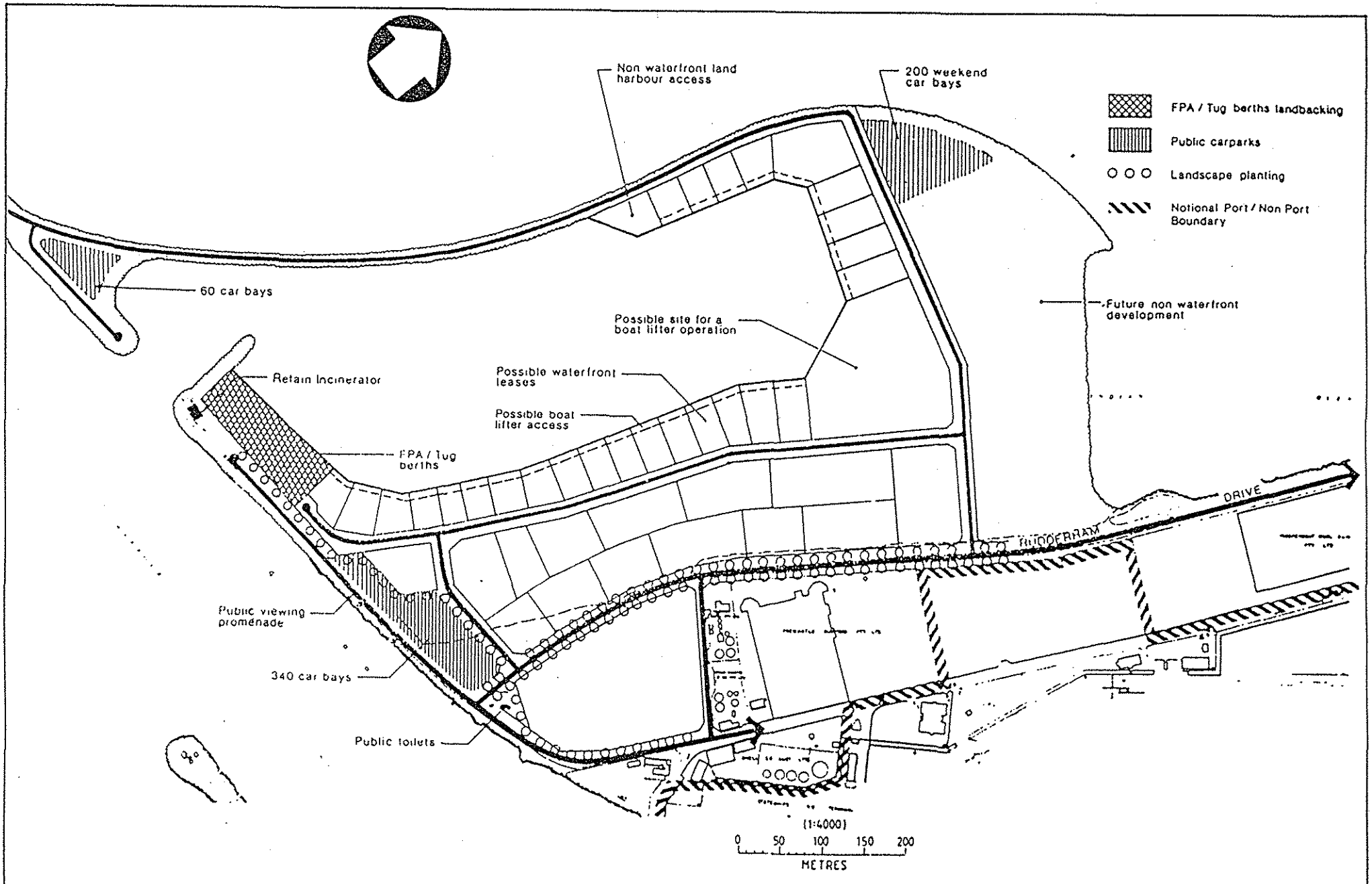



Figure 2 Preliminary concept plan for proposed reclamation and small craft harbour. (Source: FPA, 1988)

(Note: Original breakwater design as presented in PER now slightly modified.)

The following list is a summary of the issues raised.

- There is the need for a properly considered and competently prepared regional plan for the future development of the North Fremantle peninsula, to place the proposal in a context.

- Simply deepening the port does not guarantee an increased volume of shipping or lower freight costs. Inefficiencies in the Port may be a more pressing need.

- There does not appear to be any economic justification by way of economic projection of comparative costs and revenues to support the deepening of the harbour.

- The FPA has been aware for many years of the need for third generation container vessels. Why has it taken so long to make a decision about a permanent facility and why is another temporary facility being proposed?

- How does this proposal for a small boat harbour fit with the then Minister for Transport's statement (West Aust 1 July 1988) that the facilities between the two Fremantle Traffic Bridges will not be duplicated.

- Where are the proposed industries being relocated from?

- Will this project lead to further development along North Mole?

- This proposal encroaches on scarce metropolitan beaches, especially when increasing population will apply more pressure on them. Recreational demands will require more beaches to be developed.

- The threat of water pollution is disregarded on the basis of a once only test.

- Possible air pollution from relocating industry is ignored in the PER.

- The beach at the base of North Mole is a popular picnic and bathing area, used for fishing and for diver training.

- The visual amenity of the area is marred by the existing industry. The way to improve this is not to establish more industry.

- Increasing traffic in the narrow entrance to the harbour and the small boat harbour presents an extreme risk to all craft and boats.

- Fremantle should be developed as a tourist, convention and yachting port and industrial development restricted. The Victoria Quay should be developed as part of Fremantle centre with liners still visiting. North Quay should be developed for small to medium craft as existing facilities around Fremantle become more congested.

- This opportunity should be used to develop a longterm solution for large vessels, such as Catherine Point.

- The substantial increase in traffic flow, especially heavy trucks, leading to an increase in present noise levels in North Fremantle streets is unfavourable and objectionable to residents.

- Port Beach and neighbouring beaches need to be maintained to a high standard. Further research needs to be undertaken to ensure that turbidity etc does not spoil these beaches.

- In the event of delays in the construction of the sea wall or bunds, dredging should cease, to minimise turbidity along the coast.

- No industries should be located on the reclaimed area which may pollute or discharge waste.

- Longterm protection of Port Beach from port expansion and related industrial development should be assured now.

- The exclusion of recreational craft from the small boat harbour and the lack of public launching facilities is short sighted and of concern.

- North Mole has been identified previously (eg Norgaard Report) as an ideal location for a recreational launching site and yet no provision is made in this proposal. This would reduce congestion and environmental impacts of craft using the River to gain ocean access. Such a facility should include fueling point and access for disabled people, such as a pontoon.

- What effect would this proposal have on the safety at Port Beach, in terms of the gentle offshore slope and water pollution.

- The overall concept of the project is not disagreed with, especially the dredging, and the industrial site will generate jobs.

- If the industrial site were expanded in the future, would deep sewerage be required then if not incorporated now? Deep sewerage should be installed with this proposal.

- A marina should be built at the northern end of the industrial area by extending the breakwater to within a short distance of Rudderham Drive and creating an enclosed area within which jetties and a boat ramp could be developed. Relocation of the northern carpark to thismarina would be included.

- This proposal will eliminate one of the best shaped surfing waves in the metropolitan area. The design should incorporate provision for a replacement surf area at the northern end of the facility, by constructing a shallow sand bar at the northern point.

- The proposed harbour model cannot be used for research of a surf beach due to problems of scaling. It would be better to construct an experimental prototype.

- Construction of artificial reefs should be considered to improve and replace loss of surf opportunities.

- The proposal will affect a yacht racing start and finish line near the end of North Mole.

A copy of the Fremantle Port Authority's response to these issues is included in Appendix 2.

## 5. ENVIRONMENTAL IMPACTS

The Authority has identified the following potential environmental impacts associated with the project if it proceeds:

- increased water turbidity both within the Inner Harbour and the reclamation site as a result of dredging and spoil deposition;
- impact on marine ecosystems as a result of the dredging activity and land reclamation;
- increased noise levels associated with machinery involved in dredging and land reclamation, and increased traffic associated with the transport of rock for sea wall and bund construction;
- impact on sea water quality, both within and outside the proposed new small craft harbour;
- impact on recreational activities including swimming, sailing, diving, fishing and sightseeing which focus on the North Mole and adjacent beach; and
- loss of a small sandy beach.

### 5.1 WATER TURBIDITY

Water turbidity and disturbance of benthic sediments would be associated with dredging activity and land reclamation.

#### 5.1.1 INNER HARBOUR DREDGING

Water turbidity associated with dredging in the Inner Harbour would be minimised through the use of a cutter suction dredge, which would reduce disturbance to the upstream environment. The harbour is also regularly flushed through tidal movement and water exchange.

The Authority considers dredging within the harbour to be environmentally acceptable, however dredge spoil deposition at the reclamation site has the potential to generate offshore sediment plumes.

#### 5.1.2 LAND RECLAMATION

A study of the potential off shore plumes associated with spoil deposition and water turbidity has been undertaken by the FPA in association with the Department of Marine and Harbours. During this exercise a scale model was built, modelling wave and littoral drift movements off shore. Sediment dispersion predictions were made through the release of bentonite clay at a predetermined rate to represent the flow of dredge spoils. As a result of these experiments, the original timetable for the construction of the sea wall was changed and would now be in a more advanced stage prior to the dredge spoil deposition. If this is followed, the model suggests that no significant sediment plumes would be generated.

Experiments involving the release of rhodamine dye adjacent to the reclamation site were undertaken by the FPA in March 1988 and suggest that sea currents in the reclamation area are not strongly defined in speed or direction, further reducing likelihood of sediment plume generation (PER).

### 5.1.3 SEA WALL CONSTRUCTION

Rock armouring of the sea wall would keep pace with the progress of the dump face of the limestone core material of the sea wall to minimise exposure to wave action. Staging of the sea wall construction is designed to ensure that spoil discharge into the reclamation area would be retained for a sufficient time to allow the fine particulate matter in suspension to settle. A settlement pond will be constructed in the north east corner of the reclamation area to allow all sediments to settle, prior to being clean filled.

The FPA would monitor the settlement of the sea wall following construction.

## 5.2 MARINE ECOSYSTEMS

### 5.2.1 INNER HARBOUR

The harbour has been identified as a significant pathway for fish migrating through from the ocean to the river estuary. The harbour has also been identified as an important overwintering habitat for numerous fish species (Fisheries Department).

Successive dredging projects within the harbour have reduced the biological value of the area, and subsequent mechanical agitation by ship propeller movement and manoeuvering has not allowed significant colonisation of the bottom by benthic flora. The main area of biological activity is under the wharves, and other than between Berths 4 to 8 on the North Quay, these areas would not be disturbed. Once the dredging has finished the newly exposed bottom environment would be recolonised and it is expected that there would be no significant long term impact.

### 5.2.2 RECLAMATION AREA

The reclamation area has been used as a spoil dumping ground in the past by the FPA and is typical of sandy beach habitats found along much of the metropolitan coast.

There will be permanent loss of a small area associated with the land reclamation, however the area is not considered to be regionally significant, and the sandy bottom has less than 20 % seagrass cover. Turbidity will have a short term impact on nearby seagrass communities as a result of light limitations on the plants.

Limestone would be placed on the surface of the drying reclamation area to minimise dust nuisance.

## 5.3 NOISE AND TRAFFIC

Noise will be created during the construction of the sea wall and during dredging operations. However the nearest residential area is 2 kilometres away and it is anticipated that social disruption would be minimal.

Increased traffic will be experienced particularly during the construction of the sea wall when large trucks will be transporting rock fill to the site. The PER states that increases in traffic would be limited to Tydeman Road and its approaches. The anticipated volume of trucks carrying rocks to the sea wall is up to 200 vehicles per day. Operations would be limited to a 12 hour period from 6.00 am to 6.00 pm daily except Sundays. Main access would be via Stirling Bridge, Tydeman Road, Port Beach Road and the proposed Rudderham Drive along the bund and sea wall.

The Authority does not anticipate a significant noise problem as a result of traffic associated with the proposal travelling across Stirling Bridge, Tydeman Road or Port Beach Road. However other residential areas through which the trucks must pass between the quarry sites and reclamation area are currently not subject to the same intensity of traffic, and truck movement through these areas is viewed as a potential environmental impact. The final traffic route selection should be discussed with appropriate local authorities and officers from the Pollution Control Division of the EPA once the final quarry site is determined and prior to commencement of the project.

Discussions with representatives from both the FPA and Main Roads Department are ongoing and should continue.

## 5.4 WATER QUALITY

The PER states that the preferred method of wastewater disposal would be via septic tank.

Hydrological studies commissioned by the FPA indicate that the principle source of organic and inorganic nutrients entering the proposed harbour would be derived from septic tank effluent. However the total water exchange period within the proposed harbour is predicted to be approximately 10 days, as a result of tidal flushing, wind circulation and mixing, and gravitational circulation. Studies by Lewis and Imberger (1988) have concluded that nutrients leaching from septic tanks from the reclaimed area are unlikely to cause algal problems within the harbour. However, in view of the fact that the exact nature of all industries that would be located on the reclamation site are not yet known, the Authority recommends that the development be connected to deep sewerage. This would also allow for proper boat pump-out facilities for sullage to be incorporated.

The potential for oil spills would be controlled by existing FPA equipment and facilities.

## 5.5 RECREATION

Impacts associated with the project include:

- Loss of wreck although it is not considered to be historically significant by the Western Australian Maritime Museum, it is a popular site for novice scuba divers. The FPA are currently negotiating with the Western Australian Maritime Museum about the feasibility of relocating it out of the reclamation area.

- Short term sediment plumes on nearby swimming beaches as a result of reclamation.

- Temporary loss of access of popular recreation site (sightseeing, fishing, diving) at the North Mole during construction of the sea wall and bund wall. The North Mole would be closed to the public for 7 months (September 1988 to March 1989). The entrance to the new harbour through the North Mole will not be opened until vehicular access is available along the new sea wall. The Authority believes that further investigation should be undertaken by the FPA regarding public access to the North Mole during the sea wall and bund construction.

  While the temporary closure of the North Mole would mean an interruption to recreational fishing along the North Mole, fishing potential will be improved once the project was completed. The Authority believes further consideration should be given by the proponent to encouraging recreational activities which would take advantage of the proposed sea wall and bund.

- Permanent loss of a small sheltered sandy beach, used by surfers, scuba divers, and yachting events.

### 5.6 LAND USE

The creation of new land associated with the proposed reclamation creates an opportunity and provides potential to resolve environmental issues related to land uses adjacent to residential areas.

As these are planning issues the Authority recommends that a reappraisal of land use in the North Fremantle area be conducted by the State Planning Commission.

## 6. CONCLUSION

After consideration of the PER and public and State government submissions, the Authority has concluded that the proposal is environmentally acceptable subject to the following recommendations.

**RECOMMENDATION 1**

**The Environmental Protection Authority concludes that the proposal to deepen Fremantle Inner Harbour and associated land reclamation as described in the Public Environmental Report is environmentally acceptable, subject to the following recommendations and compliance with commitments made by the proponent within the PER and recommends that the proposal could proceed accordingly.**

In view of the potential impact on water quality associated with the proposed development in relation to stormwater discharge, wastewater disposal and potential oil and fuel spills, the Authority recommends that regular water quality monitoring be undertaken within and adjacent to the proposed harbour. Whilst it is recognised that complete water exchange is theoretically possible within the harbour every 10 days, connection to deep sewerage is recommended by the Authority. Water Quality should be maintained as defined in the Department of Conservation and Environment Bulletin 103 'Water Quality Criteria for Marine and Estuarine Waters of Western Australia' (1981).

RECOMMENDATION 2

**The Environmental Protection Authority recommends that the proponent should meet Schedules 5 and 16 of the document 'Water Quality Criteria for Marine and Estuarine Waters of Western Australia' pertaining to the use of water for passage of fish and for navigation and shipping to the satisfaction of the Environmental Protection Authority.**

RECOMMENDATION 3

**The Environmental Protection Authority recommends that proposals for location of refuelling facilities, stormwater drainage, pumpout facilities and runoff containment be referred to the Authority for approval when these are finalised by the proponent and before construction commences.**

RECOMMENDATION 4

**The Environmental Protection Authority recommends that the development be deep sewered.**

Although off shore sediment plumes, if generated are not considered to have a long term detrimental impact on the environment, they detract from the natural beauty of adjacent beaches, popular for surfing, swimming, fishing and a variety of other recreational activities.

The Authority believes that the Fremantle Port Authority should undertake a turbidity monitoring programme which should take particular consideration of the following points:

. observation of plume extent, direction and distribution;

. relationship to wind, wave and water current, and river flow conditions;

. relationship to the stage, activities and procedures of reclamation; and

. mechanism for effective consultation between monitoring and construction team to discuss modifications to minimise turbidity.

Results of this monitoring should be made publicly available.

RECOMMENDATION 5

**The Environmental Protection Authority recommends that a detailed monitoring programme should be prepared by the proponent and submitted to the Authority for approval before construction commences. In addition to the commitments made in the Public Environmental Report, the monitoring programme should provide for:**

**(1) monitoring of the extent and impact of any plume created from rock dumping during construction work or from dredging, and spoil disposal;**

**(2) monitoring of the extent of any changes to Leighton and Port Beaches and any consequent effects on the adjacent offshore communities;**

**(3) monitoring of heavy metal concentrations in the sediments at sites both within and outside the small craft harbour (the latter as a control to enable longterm effects to be assessed), commencing before the reclamation starts and continuing for an initial period of five years;**

(4) **monitoring of dust levels during the construction phase of the operation;**

(5) **monitoring being carried out for a period of five years initially, then reviewed, with interim reports on monitoring and management submitted to the Environmental Protection Authority by the proponent on an annual basis; and**

(6) **reporting after five years of the reclamation, with reference to the monitoring results obtained during the full five year period, including interpretation of the results, recommendations relating to future requirements and with a commitment to amend management in accordance with the monitoring results.**

As a result of further investigation into the precise quantities of dredge spoil material available for use in the reclamation it has been determined that there is not the quantity of spoil as originally calculated. The original figure was 1.8 million cubic metres, however as a result of more precise investigation the total dredge spoil figure has now been calculated to be 1.5 million cubic metres. Therefore an additional 0.3 million cubic metres needs to be found if the original area of land to be reclaimed remains the same as proposed within the PER (See Appendix 4). A number of alternative options are being considered by the Fremantle Port Authority for additional spoil. The location of these additional spoil sites should be subject to the Authority's approval.

RECOMMENDATION 6

**The Environmental Protection Authority recommends that any further dredging activity associated with the land reclamation not addressed within the Public Environmental Report be referred to the Authority for assessment prior to commencement.**

In view of the increased density of land use associated with the proposal if it proceeds, and the long term FPA plan to relocate port related facilities to the north side of the harbour, the Authority believes that a long term plan should be prepared which takes into consideration the reclamation area as well as adjacent land and port facilities. A traffic study should also be undertaken to assess the impact of increased traffic on the nearby public road system associated with the proposal, in particular in relation to Tydeman Road and Port Beach Road.

RECOMMENDATION 7

**The Environmental Protection Authority recommends that the proponent prepare a land use management plan for the portion of North Fremantle likely to be affected by potential environmental impacts of the proposal. Specifically, the plan should address the environmental consequences of the development on other land uses, such as traffic impacts and noise. The plan should address in stages, both construction and operational phases of the proposal and be prepared in consultation with appropriate Government agencies and the City of Fremantle to the Environmental Protection Authority's satisfaction prior to construction commencing.**

## 7. REFERENCES

Fremantle Port Authority (1987) Inner Harbour Dredging to 13 metres - Feasibility Study. Fremantle Port Authority.

Fremantle Port Authority (1988) Inner Harbour Deepening Project - Public Environmental Report. Fremantle Port Authority.

Halpern Glick Pty Ltd (1988) Fremantle Port Authority Small Ships Harbour Development, North Mole.

Lewis, D P & Imberger, J (1988) An Assessment of Harbour Exchange for the Inner Harbour Deepening Project. Coastal and Hydraulic Engineering Laboratory. Centre for Water Research, University of Western Australia.

## APPENDIX 1

LIST OF INDIVIDUALS AND ORGANISATIONS WHO CONTRIBUTED SUBMISSIONS

## LIST OF INDIVIDUALS AND ORGANISATIONS WHO CONTRIBUTED SUBMISSIONS

Mr M S Crawford
Stirling WA 6021

Mr D Simon
Lesmurdie WA 6076

Mrs S M Tehan
North Fremantle WA 6159

Ms M Dixon
Beaconsfield WA 6162

Ms L Bluntschli
Lathlain WA 6100

Mr P Habershon
Beaconsfield WA 6162

Mr R Marsh et al.
Leeming WA 6155

Mr B Bethersmill
East Fremantle WA 6158

Ms L Burall
East Fremantle WA 6158

The President
WA Surfriders Assoc Inc
Fremantle WA 6160

The Executive Director
Yachting Assoc of WA (Inc)
Nedlands WA 6009

The Chairman
WA Recreational and Sportfishing Council Inc
Booragoon WA 6154

Community Action for Rational Development
Fremantle WA 6160

The Facilities Chairman
Boating Industry Assoc of WA
East Perth WA 6000

The Shire Clerk
City of Femantle

The City Manager
City of Cockburn

The Commissioner
Main Roads Department

The Chairman
Swan River Management Authority

The Director
Western Australian Museum

The Director
WA Maritime Museum

The Director
Department of Fisheries

The Director General
Department of Transport

**APPENDIX 2**

PROPONENTS RESPONSE TO ISSUES RAISED IN PUBLIC SUBMISSIONS

# PROPONENTS RESPONSE TO ISSUES RAISED IN PUBLIC SUBMISSIONS

## Long Term Planning

1. A plan is being prepared for the development of all FPA land north of the river, bringing about the rationalisation and redevelopment of the port area and its hinterland. Detailed planning meetings are currently being held with the Main Roads Department, Co-operative Bulk Handling, Westrail and the Fremantle City Council. Deepening of the Inner Harbour, with its associated reclamation, is the starting point for locating the focal point of container shipping at berths 4 - 8.

4. The proposal is not a short term or temporary solution, being adequate for the foreseeable future and economically justifiable. An expenditure in excess of $200 million for a completely new container terminal cannot be justified today to meet a demand which may not occur for more than 30 years, if at all.

7. The proposal forms a part of the long term development of the area, which aims to rationalise port activities. Further development along the North Mole would only be undertaken if the option to develop an additional deep water container handling facility were exercised, well into the 21st Century.

14. The focus of Inner Harbour cargo handling activity has gradually shifted from Victoria Quay to North Quay over the past twenty years. This shift can be expected to continue, with non-cargo handling activities increasing on the south side of the Inner Harbour; but neither the FPA nor the State of Western Australia can afford to restrict port and industrial development or bear the cost of relocating the existing facilities.

15. see 4 above.

20. There is no intention to allow any adverse effect on Port Beach, thus keeping the options open for decisions on future utilisation to be made by future generations. See also 8 above.

Economic Issues

2. Inefficiencies on the Waterfront are being addressed at both state and national level. The FPA is actively involved in the work of the Inter State Commission - a Commonwealth Government Waterfront Strategy initiative - but it must be recognised that regardless of the efficiency or reliability of the port, unless an adequate depth of water is provided, the newer, larger and - most importantly - deeper draft ships will not come to Fremantle.

3. An economic analysis has been carried out by the Department of Transport, which indicated that revenue generated would make the project self sufficient. Significant increases in port revenue were identified. In addition, income from leasing areas within the development, and other areas vacated by the relocation of FPA activities, ensures the economic viability of the project. It is not possible to quantify the value of direct shipping services to local businesses, but it is confidently asserted that failure to accommodate large vessels would very soon lead to their being faced with the alternatives of shipping through a feeder service from Singapore or a rail link from the Eastern States, with a considerable increase in costs.

Small Boat Harbour Facilities

5. Far from being a duplication of the facility between the bridges, this proposal offers an alternative location to which the businesses currently occupying that area could relocate, to the eventual benefit of the

riverside environment. The Ministerial statement referred to noted that the development between the bridges had evolved over forty years, and that planning aimed to avoid an uncoordinated mix of activity.

6. Certain port activities will be relocated from the Slip Street and Inner Harbour areas, but the emphasis will be on the development of new port related industries.

Recreational Issues

8. The loss of one small man-made beach is acknowledged as an environmental cost of the project; however, there will be some compensatory benefits in the provision of new roads, recreational facilities and parking.

11. The description of the beach as, "....a popular picnic and bathing area...." is contested; it is an artificial, degraded area. The Mangles Bay Study (Town Planning Department:Perth Metropolitan Region - A Review of the Proposed Port Facility at Mangles Bay. Final report. 1984) refers (p 151) to the beach as "....not important from a recreational viewpoint and is not intensively used." FPA observations support this latter point. See also 8 above.

21. The reservation of the proposed small boat harbour to commercial vessels is considered to be an essential safety precaution. With regard to the lack of facilities, the then Minister noted on 30 October, 1985 that the number of ocean ramps between Ocean Reef and Point Peron was to be increased from 9 to 21. The present situation is that there are 19 ramps available at 8 ocean sites, with a further 5 ramps at 3 river sites with close access to the ocean.

22. The reference in the Norgaard Report was not to the North Mole, but to the area north of the existing sea wall surrounding an earlier reclamation, some 750 metres north of the proposed project area. The Department of Marine and Harbours did not support the proposition to establish a ramp in that area.

23. There is no reason to suppose that the project would have any detrimental effect on the safety of Port Beach; if anything, there should be increased protection from the south west. Safeguards written into the environmental management programme will ensure that water pollution does not occur.

26. The provision of a marina on the northern side of the proposed development is not contained in the development plan. The suggestion to establish a marina is viewed with concern since it would introduce a substantial volume of non-commercial traffic to an area where improved traffic flow is an essential element of the overall port development and rationalisation plan. In addition, a northward extension could encroach upon the environment of Port Beach.

27. The assertion as to the quality of the surfing wave in the vicinity of the project is at odds with its apparent lack of utilisation by surfers. An unstabilised sand bar at the northern end would divert valuable reclamation material from the project area, and could adversely affect the principal attraction of Port Beach - its suitability for young families.

28. The primary purpose of the physical model is to test the construction sequence of the sea and bund walls as a function of the environmental management programme to control turbidity. Its secondary purpose is to

demonstrate wave penetration into the project area under various conditions of wind speed and direction. Research into surf beaches is not included in the programme.

29. Subject to the remarks in 27 above, there is nothing in the proposal which would preclude the construction of artificial reefs should they be deemed a desirable adjunct.

30. Should the remaining water area in the lee of the North Mole to seaward of the proposed sea wall be inadequate, the area to the north of the development will be available, unless it is subjected to further works as proposed in 22, 26, 27 and 29 above.

Pollution Issues

9. Knowledge of the likely movement of turbid water was acknowledged to be inadequate at the time of writing the report. Research is currently being carried out at the Centre for Water Research as a result of which, modifications being incorporated into the phased construction of the sea and bund walls will adequately control the escape of turbid water from the reclamation area. A programme of monitoring by the Centre is in course of preparation.

10. Normal environmental constraints will apply to any activity established within the project area.

12. Controlled industrial and commercial development of the area under environmentally acceptable guidelines is a necessary adjunct to the State's principal port. In addition, the upgrading of the roads in the immediate area will be a tangible improvement, as will the removal of the Mobil storage tanks and associated buildings. The area vacated will be incorporated into the development of container handling operations.

17. see 9 above.

18. It is accepted that the sea wall construction must be kept well ahead of the reclamation. It is possible that the start of the dredging will be rescheduled to March, which will be environmentally advantageous.

19. The design of the drainage pattern will ensure that surface drainage is carried clear of, not into, the small boat harbour. The types of industries and method of waste disposal will be subject to environmental approval and guidelines. The Centre for Water Research has been commissioned to make a further study of the water exchange pattern.

25. A further study into the question of water quality is being undertaken by the Centre for Water Research at UWA which will help determine the need for deep sewerage at this stage.

Traffic Issues

13. This criticism is rejected totally. Traffic control falls within the province of, and will be exercised by the FPA. In that usage of the proposed small boat harbour will be limited to commercial vessels, it is reasonable to assume that peak small boat harbour activity will occur on weekdays, whilst peak recreational craft activity is at weekends.

16. The temporary increase in heavy vehicular traffic during the period of construction is acknowledged as an environmental cost of the proposal. The intersection of Tydeman and Port Beach Roads is being re-planned to enhance the flow of north/south non-port traffic, and to provide for North Quay and reclamation area activity. Current thinking is that this will best be accomplished by the provision of a round-about.

Other

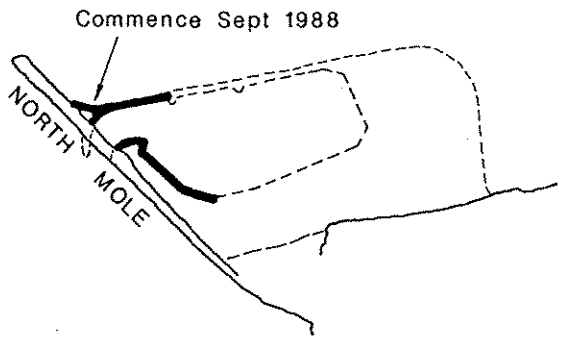
24. This submission is appreciated.

Research into the wave climate, as it will affect the design of the sea wall and the flushing characteristics of the proposed small boat harbour, being conducted by the Centre for Water Research has already generated modifications to the design. These modifications relate to the rock size, the final alignment and the construction schedule of the sea wall, and do not significantly alter the proposal as published. The Centre has also been commissioned to prepare a programme to monitor the turbidity levels during the construction period.

**APPENDIX 3**

AMENDED SEA WALL, BUND AND LAND RECLAMATION TIMETABLE

# AMENDED SEAWALL, BUND AND LAND RECLAIMATION TIMETABLE

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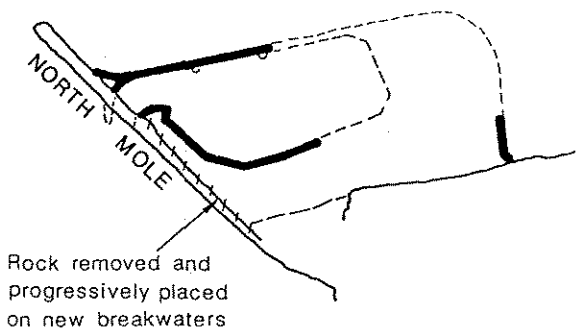


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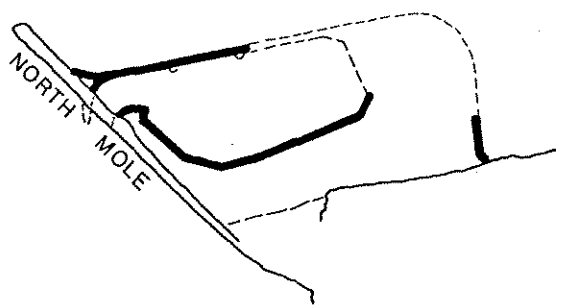
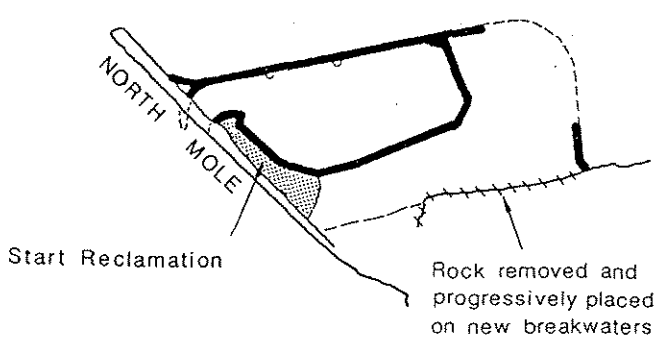
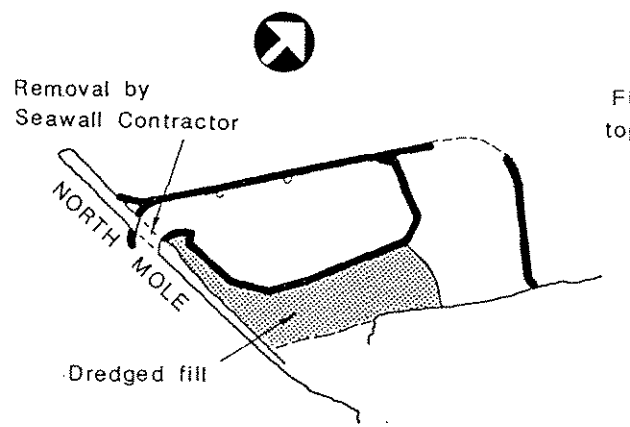


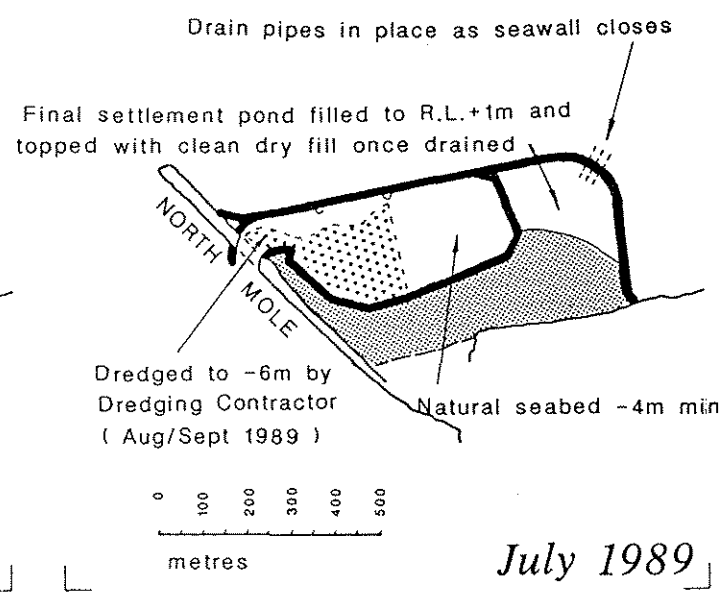

*January 1989*




*March 1989*




*May 1989*




*July 1989*

## APPENDIX 4

FREMANTLE PORT AUTHORITY LETTER TO THE ENVIRONMENTAL PROTECTION AUTHORITY DESCRIBING MODIFICATIONS TO ORIGINAL PROPOSAL AS DETAILED WITHIN THE PER

# FREMANTLE PORT AUTHORITY

Your Ref:
Our Ref: PJS.CC

The Chairman
Environmental Protection Authority
1 Mount Street
PERTH WA 6000

Attention : Mr Colin Murray



Dear Sir

INNER HARBOUR DREDGING & SMALL BOAT HARBOUR DEVELOPMENT
PUBLIC ENVIRONMENTAL REPORT

1. Sea Wall Construction Sequence

Further to our letter in response to the issues raised following the publication of the Public Environmental Report on the above project, I herewith enclose a copy of the Department of Marine & Harbour's Report dealing with the modelling which has been undertaken over a period of 2 months at the Floreat Park facility of the Centre for Water Research.

The Report deals in great detail with the construction sequence for the sea walls, which has been proposed as a most appropriate way to deal with the control of turbid water created by discharge of dredge material within the reclamation area.

As you are aware, the proposal called for the construction of the Northern arm of the sea wall prior to the commencement of dredging, as well as the partial construction of the bund and sea walls in a Northerly direction off North Mole to a stage where partial containment of the reclamation would have been achieved.

As you can see by examining the photographs in the Report, this sequence would have been extremely successful in containing the movement of dredge fines out of the reclamation area into the surrounding areas where wave action may have moved it Northwards. The tests were done by introducing a suspension of Bentonite clay at a pre-determined rate to represent the flow of dredge spoils. Whilst reclamation proceeds behind the bund wall little or no fines escape into the ocean and indeed it was necessary to model the point of deposition of spoils beyond the end of the partially built bund wall before any rapid dispersion of material took place.

1 CLIFF STREET, FREMANTLE, WESTERN AUSTRALIA 6160 TELEPHONE: (09) 430 4911
P.O. BOX 95, FREMANTLE TELEGRAMS: "FREMPORT" FREMANTLE W.A. TELEX: "FREPA" PERTH AA92951 FACSIMILE: (09) 336 1391

In the subsequent series of photographs later stages of the reclamation/sea wall development have been modelled and these also show that by appropriately staging the development the question of controlling turbidity is being adequately addressed.

In a separate development, and as part of the process of writing tender documents and interfacing with Contractors tendering for the sea wall contract, it became clear to the Port Authority that an alternative construction sequence to that modelled would further reduce the effective risk of damage to the bund wall in the event that the sea wall construction was delayed and an early winter (1989) storm occurred. We therefore explored ways of modifying the construction sequence and have come up with that depicted on the revised drawing, which I enclose with this letter.

This new sequence virtually eliminates any risk of damage to the armour of the bund wall and the unprotected inside face of the sea walls whilst also providing earlier alternative access (in a loop along the bund wall and sea walls) to the end of North Mole permitting early excavation of the cut through North Mole. Final closure of the sea wall is planned to be on the North West corner. With a delayed start to dredging of 2 months (now due to commence March 1989) the sea and bund walls will be well advanced to provide complete containment of dredge spoil.

2. Dredge and Reclamation Volumes

As advised in the Public Environmental Report (Sections 5.2 to 5.4 inclusive) the maximum proposed dredging volume including overdredge tolerance is 1.8 million cubic metres and the reclamation area has been designed to accept approximately 2.0 million cubic metres. This will ensure that after allowing for contingencies and for provision of a 3 to 4 hectare settling / detention pond in the N-W corner, there is more than adequate accommodation in the reclamation area for all dredge spoil and no risk of requiring an alternative disposal site.

We are still in the process of fine tuning our design to provide the most acceptable balance between dredging and reclamation volumes and further work on the design for Inner Harbour Deepening has shown that -

> the total volume in the approach channel, turning circle and berth pockets, including a realistic allowance for over-dredge, and for deepening of the small boat harbour to 6M will provide a total of approximately 1.5M cubic metres of material for reclamation.

Subject to a final review of operational needs and project costs, the measures being considered to fine tune the balance between dredging and reclamation volumes as discussed with officers of the Environmental Protection Authority are -

1) Further strategic channel widening and deepening to improve navigation

2) dredging of sand material from zones 1 and 3 shown on Figure 1 of the P.E.R. to provide a buffer against the possibility of further siltation

3) a limited extension up river of the dredge area to provide deep water to Berth 9 and/or increased room for ship handling

4) a reduction in the volume of material in the reclamation area by reducing the area within the sea wall, the layout within the area or the final levels within the area.

We are also considering the possibility of utilising the contract dredge to undertake some maintenance dredging adjacent to Berth 10 to remove approximately 50,000 cubic metres of river deposited siltation material.

Final decisions will not be made until Tenders have been evaluated and we undertake to consult fully with the Environmental Protection Authority when we consider the options available.

Yours faithfully

A T Poustie
GENERAL MANAGER

July 14, 1988

Enc.