Department of Marine and Harbours

Mandurah Channel Dredging Public Environmental Report

Peel-Harvey Study Group
August 1985

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FOREWORD

This report is one of two documents related to Peel Inlet and Harvey Estuary that have been released this month for public review. This document is a Public Environmental Report for the proposal to dredge Mandurah Channel; the second, larger document is the Environmental Review and Management Programme for the Stage I Management Strategy proposed for the estuary as a whole.

These two documents, although closely related and cross-referenced, will be assessed separately by the Environmental Protection Authority. Public comment is sought on either or both reports.

1 INTRODUCTION

The estuary comprising Peel Inlet and Harvey Estuary (Figure 1) is connected to the ocean by a very narrow and restricted channel called the Mandurah Channel. At the upstream end of this channel where it joins Peel Inlet, a narrow waterway called the Sticks Channel is occasionally dredged by the Department of Marine and Harbours to provide safe navigation into Peel Inlet. The ocean entrance to Mandurah Channel is dredged almost annually.

The channel itself, apart from its role in providing access from Peel Inlet to the Indian Ocean, has an important role as a safe recreational waterbody, and is very popular for fishing, swimming and crabbing.

The aim of the proposed dredging works discussed in this Public Environmental Report is to improve the navigability of the Mandurah Channel, and to assist in the marine flushing of Peel Inlet. Thus, in the long term, these dredging works will contribute to a reduction in the growth of the large floating green weed (macroalgae) that is causing a considerable nuisance in Peel Inlet, although it is possible that improved water clarity resulting from this increased flushing may, in the short term, allow some increase in macroalgal weed growth there. This improvement in flushing will result from an increase in flows to and from Peel Inlet to the ocean of from 24 to 30% (summer) and 10 to 40% (winter).

In an associated report - Peel Inlet and Harvey Estuary Management Strategy, Environmental Review and Management Programme, Stage 1 - options for dredging the entire Mandurah Channel from the ocean to Peel Inlet were evaluated. Dredging was considered in that context as a means of increasing the loss of nutrients from the estuary in order to improve its biological health.

This Public Environmental Report describes the recommended proposal to dredge two sections of the Mandurah Channel: one downstream of the Mandurah traffic bridge to the ocean, the other from the Chimneys to Peel Inlet. This proposal thus incorporates some of the elements of the dredging proposals evaluated in the Environmental Review and Management Programme, but does not include others. The proposed work has been costed in 1985 dollars.

Model studies carried out in 1984 have assisted in the selection of the particular dredging strategy described in this Public Environmental Report. They also show that enlargement of the Mandurah Channel in conjunction with the possible future development of the Dawesville Channel (recommended in the Environmental Review and Management Programme) would yield a greater improvement in estuarine flushing than would result from the Dawesville Channel alone.

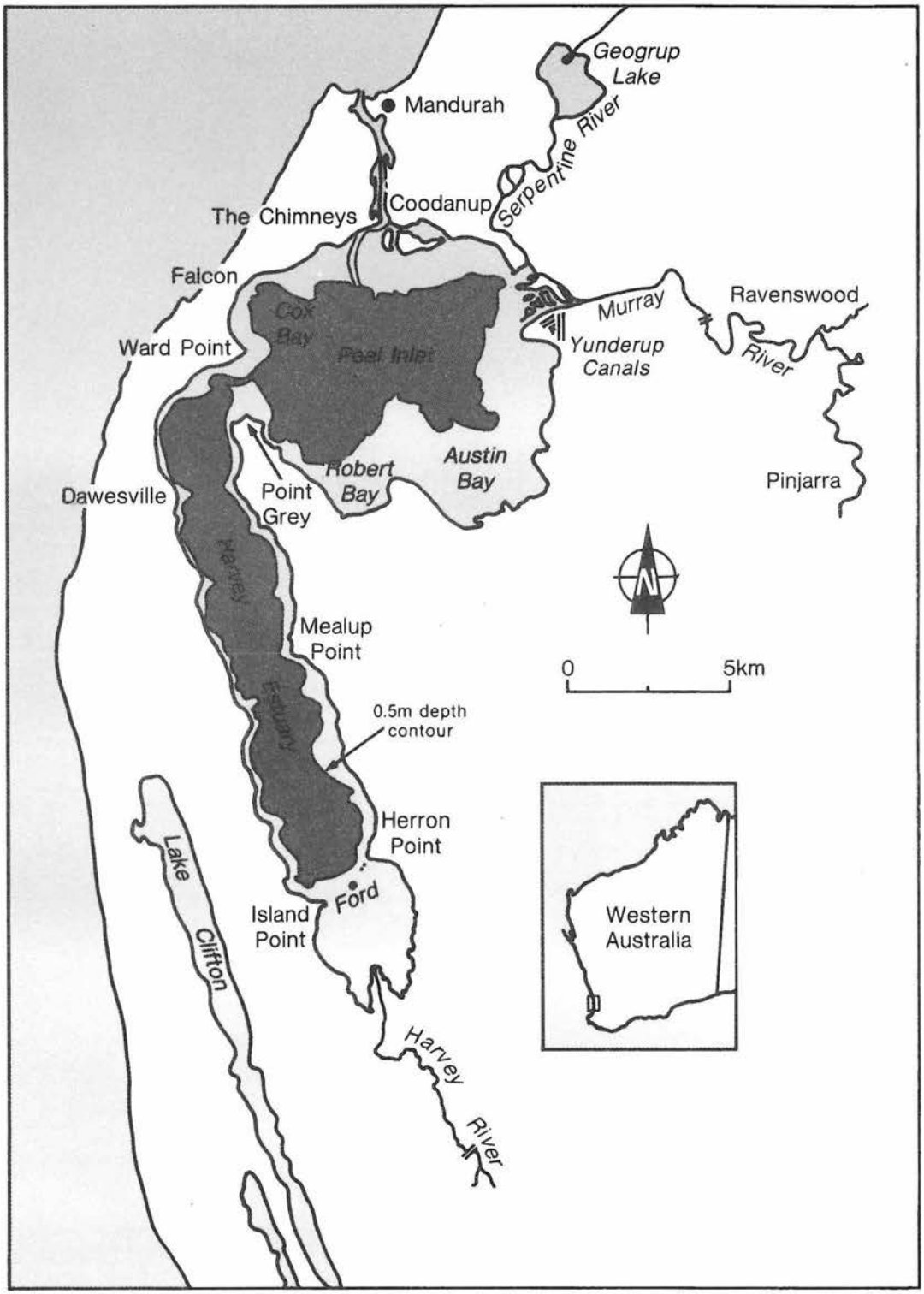

FIGURE 1 PEEL INLET AND HARVEY ESTUARY

2 PROJECT DESCRIPTION

The Department of Marine and Harbours has investigated the feasibility and cost-effectiveness of dredging the Mandurah Channel. The proposed dredging works and spoil disposal areas are shown on Figure 2. The two sections of the channel to be dredged are described as the 'downstream section' (between Mandurah traffic bridge and the ocean), and the 'upstream section' (from the Chimneys to Peel Inlet). Dredging of the ocean entrance itself is already undertaken almost annually, and some dredging has also taken place upstream from time to time.

2.1 DOWNSTREAM SECTION

A total of approximately 500,000 m^3 of spoil would need to be dredged in this section. A floating cutter suction type dredge would be the main item of plant used. Combined with the dredge would be lengths of large diameter pipeline incorporating floating, submerged and land pipe sections. In places it would be necessary to install an in-line booster pump to provide the capacity to dispose of dredged spoil over long distances (Section 3.1).

It is envisaged that the dredge would operate for at least ten hours per day, six days per week, with the work commencing in December 1985 and being completed around February 1987. The estimated cost (in 1985 dollars) of dredging this downstream section is $2,320,000.

2.2 UPSTREAM SECTION

This section would be dredged in a similar manner to the downstream section, using a cutter suction dredge, with about 670,000 m^3 of spoil being dredged. However, because of the reduced distances to disposal areas (Section 3.2), there would be no need for an in-line booster pump. Dredge operating hours would be the same as for the downstream section.

This work would follow the downstream dredging; it would start about March 1987, with completion due in about March 1988. The estimated cost (in 1985 dollars) is $1,700,000.

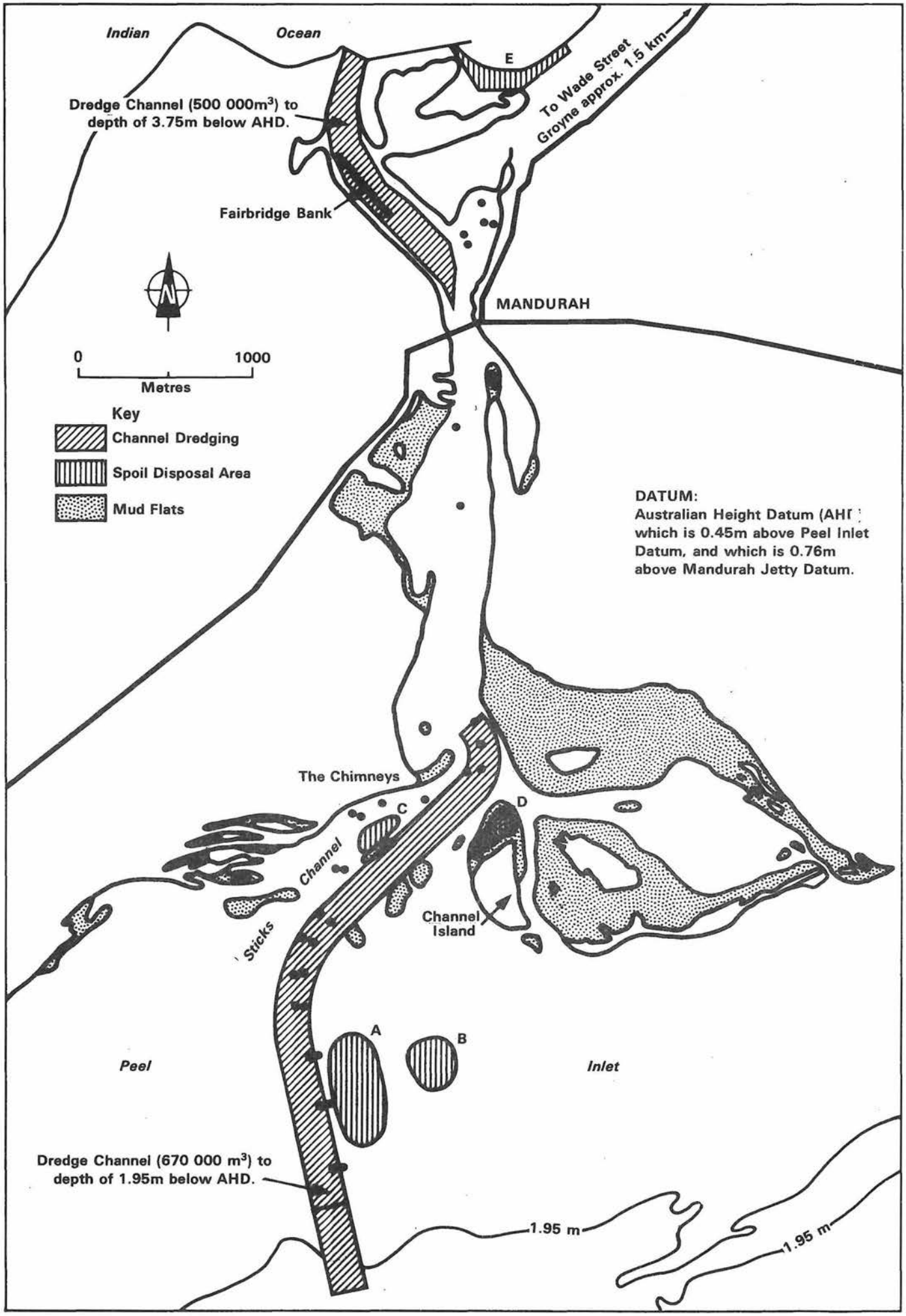

FIGURE 2 MANDURAH CHANNEL DREDGING

3 SPOIL DISPOSAL

3.1 DOWNSTREAM SECTION

Samples indicate that the 500,000 m^3 of spoil from the downstream section would consist of sand ranging from fine to medium grained near the bridge through to medium to coarse grained near the ocean entrance.

The spoil would be pumped direct to Disposal Area E (Figure 2), where it would be bunded in temporary stockpiles approximately 3 m high. It would then be moved progressively from the stockpiles by scraper or off-road trucks, for dispersal along the beaches as far as Wade Street groyne. Trucking is the present practice for disposing of spoil from the annual maintenance dredging of the ocean entrance.

3.2 UPSTREAM SECTION

Although samples have not been taken throughout this reach, previous maintenance dredging contracts carried out for the Public Works Department have required the dredging of clay pockets. Despite this, the spoil islands created by this dredging have a white sandy appearance.

The 670,000 m^3 of spoil from dredging of the upstream section of the channel would be pumped direct to the spoil disposal areas marked as A, B, C and D on Figure 2. These would be developed as follows:

- **Spoil Island A:** This island would be created by placing the spoil in shallow waters close to the channel. The finished level of the island would be as high as 5 m above Australian Height Datum (AHD).

- **Spoil Island B:** This island would be created as an intertidal salt marsh area, with a top level of approximately 0.2 m above AHD. A substantial expanse of water would be left between Islands A and B.

- **Spoil Island C:** This would be created as an intertidal salt marsh area in the same manner as Spoil Island B.

- **Spoil Area D:** Spoil Area D would be filled to a top level of approximately 5 m above AHD. At this level, it should give the visual impression of being a continuation of the elevated areas at the northern end of Channel Island.

The question of spoil disposal has been discussed informally with the Department of Fisheries and Wildlife (now the Department of Conservation and Land Management). The Peel Inlet Management Authority has indicated its support for the proposal. Spoil islands have considerable potential as bird habitats: an island previously created from dredged spoil near Yunderup Canals has proved to be successful in this respect.

4 ENVIRONMENTAL IMPACTS

4.1 CONSTRUCTION IMPACTS

Downstream section

Noise from the dredge or booster pump would be regulated to ensure that it did not exceed acceptable limits. Although the current maintenance dredging work at the ocean entrance is further from residential areas than parts of the proposed channel dredging, it is encouraging to note that there have been no complaints about this contract.

It is likely that the necessity to store and transport the required numbers of large diameter pipes on land could be a minor nuisance to residents and beach users. However, there should be little disruption to boats using the channel, as a section of the pipeline would be submerged to allow access past the dredge.

Although the temporary stockpiles would have only a minimal visual impact, the use of scrapers or off-road trucks to disperse sand along the beaches would greatly restrict the recreational use of those beaches during carting operations. Working hours could be expected to be much the same as those for the dredge: ten hours per day, six days per week. A possible alternative would be to cart sand by road through the town area; however, this has not proved popular in the past, and is probably precluded by the heavy local and through-traffic in summer.

Upstream section

Noise is not expected to be a problem in this area because of the considerable distance to any residential development. There should also be little disruption to boats, as access along the Sticks Channel would not be interrupted completely at any time.

4.2 POST-CONSTRUCTION IMPACTS

Downstream section

A large proportion of the Fairbridge Bank would be lost under this proposal (Figure 2). This bank, which has grown over the years from sand deposits washed in from the ocean, has become a popular area for crabbing.

Upstream section

In general, there should be no adverse impact on recreational activities, although small areas of intertidal marshland used by birds would be lost to the channel. However, these areas would be more than equally replaced by the judicious placement of spoil in areas B and C.

Spoil Island A would be available for development by the Peel Inlet Management Authority for recreation, and its proximity to the channel would facilitate access to the island by small boats.

Spoil Island B would be developed as a bird habitat, with its shallow edges being particularly well suited to wading birds. It is also planned to ensure that a substantial expanse of water is left between Islands A and B, so that the birds can be seen, but not easily disturbed by people and dogs.

It is suggested that Spoil Area D, at the northern end of Channel Island, be set aside as a reserve for flora and fauna. A fringe of salt marsh around Spoil Area D is proposed, in order to discourage human visitors. The salt marsh area lost on Channel Island would be more than equally replaced by the creation of Islands B and C.

Some loss of habitat for benthic invertebrate fauna would result from the creation of Spoil Islands A and B in particular. However, the extent of this area would be relatively small and would be kept to a minimum.

4.3 OVERALL EFFECT ON MANDURAH CHANNEL AND PEEL INLET

Mathematical modelling carried out by the Centre for Water Research at the University of Western Australia indicates that average maximum daily velocities and flows in the Mandurah Channel measured at the ocean entrance would be affected as shown in Tables 1 and 2.

Table 1 Mandurah Channel velocities (metres per second)

Channel	Summer		Winter	
	Ebb tide	Flood tide	Ebb tide	Flood tide
Existing channel	0.736	0.678	1.068	0.593
Dredged channel	0.661	0.617	0.802	0.539

Table 2 Mandurah Channel flows (cubic metres per second)

Channel	Summer		Winter	
	Ebb tide	Flood tide	Ebb tide	Flood tide
Existing channel	212	244	328	200
Dredged channel	280	304	356	280

The figures indicate a general reduction in channel velocities but a significant increase in flow rates. The reduced velocities would still be sufficient to scour the fine silts in the channel, and the increased flow rates would permit the transport of larger volumes of material. The rate of siltation of the dredged areas is therefore expected to be small.

Final calculations of the effect of dredging or flushing on Peel Inlet are not yet available from the mathematical modelling conducted by the Centre for Water Research. However, it is anticipated that there would be a real improvement in ocean exchange, although this would not be sufficient, on its own, to cure the

algal problems of Peel Inlet. A comparison of the change in average daily tidal amplitudes for the ocean and for Peel Inlet with and without channel dredging is shown in Table 3, and may be indicative of the expected improvement in exchange to be achieved by Mandurah Channel dredging.

Table 3 Tidal amplitudes (metres)

	Summer	Winter
Ocean	0.595	0.573
Peel Inlet with existing channel	0.069	0.067
Peel Inlet with dredged channel	0.091	0.089

4.4 NAVIGABILITY

Dredging of the channel would provide some improvement in small boat navigability. In the upstream section, dredging would provide a much wider channel although the depth would not increase. The downstream section, when dredged, would also be wider and in parts deeper.

The greatest benefits of dredging the Mandurah Channel would be gained through its conjoint effects with the continued maintenance of a permanent navigable ocean entrance channel at Mandurah and the construction of the Dawesville Channel. In conjunction with the navigable ocean entrance channel of the same 3 m depth (3.75 m below AHD), safe access from the ocean for small boats wanting to use Mandurah Channel would be provided. In conjunction with the Dawesville Channel, flushing of Peel Inlet would be greatly enhanced, and there would be a beneficial synergistic effect on the whole system. The Mandurah Channel dredging proposals are the first stage of the implementation of management measures to restore the long term health of the estuary.

REPORT PREPARATION

This Public Environmental Report has been prepared by the Peel-Harvey Study Group for the Department of Marine and Harbours.

Principal author:	Dr R.E. Black (Kinhill Stearns)
Research co-ordinator:	Dr E.P. Hodgkin (Department of Conservation and Environment)
Executive officer:	Dr P.B. Birch (Department of Conservation and Environment)
Editing:	L.R. Snooks (Kinhill Stearns)
Report production:	B.M. Stewart (Department of Conservation and Environment)
	A.L. Shillingford (Kinhill Stearns)