COCKBURN CEMENT

SHORELINE MANAGEMENT PLAN FOR OWEN ANCHORAGE AND COCKBURN SOUND

SHORELINE MONITORING PLAN

CHAPTER EIGHT OF DOCUMENT:
LONG-TERM SHELLSAND DREDGING, OWEN ANCHORAGE
ENVIRONMENTAL MANAGEMENT PROGRAMME

dal science+engineering
environmental consultants

JUNE 2003

CHAPTER EIGHT OF DOCUMENT:
LONG-TERM SHELLSAND DREDGING OWEN ANCHORAGE
ENVIRONMENTAL MANAGEMENT PROGRAMME

SHORELINE MANAGEMENT PLAN FOR OWEN ANCHORAGE AND COCKBURN SOUND

SHORELINE MONITORING PLAN

Prepared for:

COCKBURN CEMENT LIMITED

Prepared by:

DAL SCIENCE & ENGINEERING PTY LTD
M.P. ROGERS AND ASSOCIATES PTY LTD

ISBN. 1 876476 28 1

JUNE 2003

REPORT NO. 032/14

CONTENTS

TABLES

FIGURES

1. INTRODUCTION

1.1 THIS DOCUMENT: SHORELINE MONITORING PLAN FOR OWEN ANCHORAGE AND COCKBURN SOUND

Cockburn Cement Limited (Cockburn) submits this Shoreline Monitoring Plan (SMP) for Owen Anchorage and Cockburn Sound in accordance with the Statement from the Minister for the Environment and Heritage (Statement 000599) that was issued on 8 July 2002, and which provided approval for the Long-Term Shellsand Dredging, Owen Anchorage.

1.2 LONG-TERM SHELLSAND DREDGING, OWEN ANCHORAGE

Cockburn Cement Limited (Cockburn) dredges shellsand from Success Bank and Parmelia Banks, Owen Anchorage, Australia. Shellsand is primarily calcium carbonate used in the production of lime and cement.

Cockburn's Long-Term Shellsand Proposal, which was approved on 8 July 2002, (Ministerial Statement 599) consists of two stages shown in Figure 1.1. Stage One involves the completion of two 350 m wide shipping channels through Success and Parmelia Banks, as well as the removal of some high grade shellsand from between the channels both on Success Bank and Parmelia Bank. Stage One dredging will involve the loss of 53 ha of seagrass, of which 40 ha is in the alignment of the two shipping channels, and 13 is from areas to be dredged from between the two shipping channels. Stage One will be completed in eight years (i.e. by mid 2010) after which dredging will be relocated to the Stage Two area which is free of seagrass.

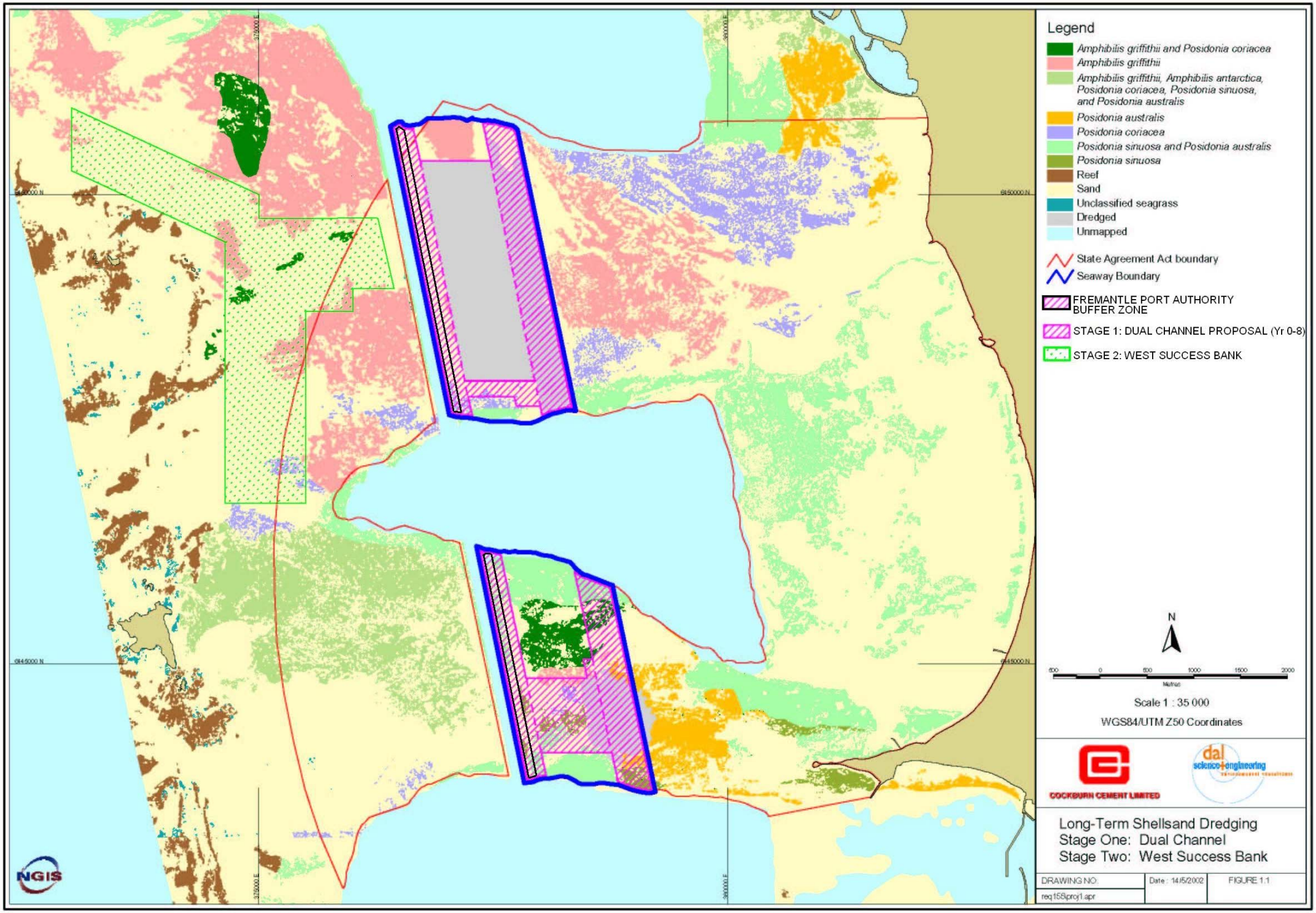
1.3 MINISTERIAL CONDITIONS: LONG-TERM SHELLSAND DREDGING, OWEN ANCHORAGE

A series of Ministerial Conditions have been imposed on Cockburn as part of the approval for its Long-Term dredging proposals. Included in these is Condition 2.1 that states that, "The proponent shall implement the environmental management commitments documented in schedules 2 and 3 of this statement". Schedule 2 contains a commitment by Cockburn, to implement a Shoreline Monitoring Plan for Cockburn Sound and Owen Anchorage. The details of this commitment are shown in Table 1.1 below.

Table 1.1 Commitment by proponent to implement a Shoreline Monitoring Plan for Cockburn Sound and Owen Anchorage

599:P3 Shoreline Monitoring Plan - Preparation	Action Prepare a Shoreline Monitoring Plan for Owen Anchorage and Cockburn Sound How Address: 1) monitoring of shoreline position (aerial photography, shoreline surveys); 2) calculation of changes in shoreline position; 3) determination of rates of sediment transport along the shorelines of Owen Anchorage and Cockburn Sound; and 4) identification of sites of erosion/accretion and rates Objective To ensure that dredging does not adversely modify the natural processes that affect the shoreline Evidence Shoreline Monitoring Plan	Operations Within 3 months of the following formal authority issued to DMA's under S45 (7) of the EP Act, that is, by 8/10/02	EPA **DPI**

To meet this commitment, Cockburn has prepared this SRP for Owen Anchorage and Cockburn Sound.


Legend
Amphibilis griffithii and Posidonia coriacea
Amphibilis griffithii
Amphibilis griffithii, Amphibilis antarctica, Posidonia coriacea, Posidonia sinuosa, and Posidonia australis
Posidonia australis
Posidonia coriacea
Posidonia sinuosa and Posidonia australis
Posidonia sinuosa
Reef
Sand
Unclassified seagrass
Dredged
Unmapped
State Agreement Act boundary
Seaway Boundary
FREMANTLE PORT AUTHORITY BUFFER ZONE
STAGE 1: DUAL CHANNEL PROPOSAL (Yr 0-8)
STAGE 2: WEST SUCCESS BANK
N
500 0 500 1000 1500 2000
Metres
Scale 1 : 35 000
WGS84/UTM Z50 Coordinates
COCKBURN CEMENT LIMITED
dal science+engineering
Long-Term Shellsand Dredging
Stage One: Dual Channel
Stage Two: West Success Bank
DRAWING NO:
req158\proj1.apr
Date : 14/5/2002
FIGURE 1.1
NGIS

2. SHORELINE MONITORING

2.1 BEACH AND NEARSHORE SURVEYS – OWEN ANCHORAGE

Beach profiles have been surveyed by Cockburn at 15 transects spread along the coast between Woodman Point and Catherine Point since 1988. The surveys extend from a fixed benchmark in the dunes to the water line and have been taken each summer and winter. In 1999 the survey program was extended to include an extra two transects north of Catherine Point. The surveys were also augmented with biennial nearshore surveys extending about 250 metres into Owen Anchorage at the location of each of the 17 transects (see Figure 2.1).

This set of historical survey data provides excellent baseline information for the Long-Term dredging SMP. It is proposed that this survey sequence for Owen Anchorage be continued as part of the SMP, such that each summer and winter beach surveys continue to be taken along the 17 transects shown on Figure 2.1. The survey of each transect will record the local distance, natural surface level reduced to the Australian Height Datum, the location of the coastal vegetation line, and indicators of the active shore position such as the seaward extent of ephemeral vegetation (accreting sandy coast) and toe of the erosion scarp (eroding sandy coast), as per the Draft Coastal Statement of Planning Policy (Statement of Planning Policy No. 2.6). This will provide an accurate and valuable record of the movement of the position of the coast (mean sea level and coastal vegetation) from one survey to another. The surveys will also help identify the upper limit of the active coastal processes.

Every 2 years, the beach surveys will be augmented by extending the transects about 250 metres into Owen Anchorage. Each survey will record the horizontal distance and bearing from a reference point and the natural surface level reduced to the Australian Height Datum, along the transect line. This will provide an accurate and valuable record of the fluctuations in the sub-aqueous profile and also contribute to the determination of the lower limit of the active height of coastal processes.

The active height of the coastal processes is important in calculations of volumetric changes of various beach sectors, which are used to determine the amounts and rates of accretion or erosion along the coast.

2.2 BEACH & NEARSHORE MONITORING SURVEYS – COCKBURN SOUND

It has been estimated that the Long-Term dredging may influence the wave climate and coastal processes of Cockburn Sound. The likelihood of this occurring is extremely low, while further, any influence from dredging will be seen closer to the completion of the dredging programme rather than the beginning.

A number of organisations have and are undertaking surveys of shoreline position in Cockburn Sound. These include:

- Jervoise Bay West Beach – Department of Industry & Technology;
- Challenger Beach – Jervoise Bay Project Office;
- Profiles of various sites eastern shore of Cockburn Sound and Western shore of Garden Island – Royal Australian Navy; and
- Eastern shore of Cockburn Sound – Department for Planning and Infrastructure.

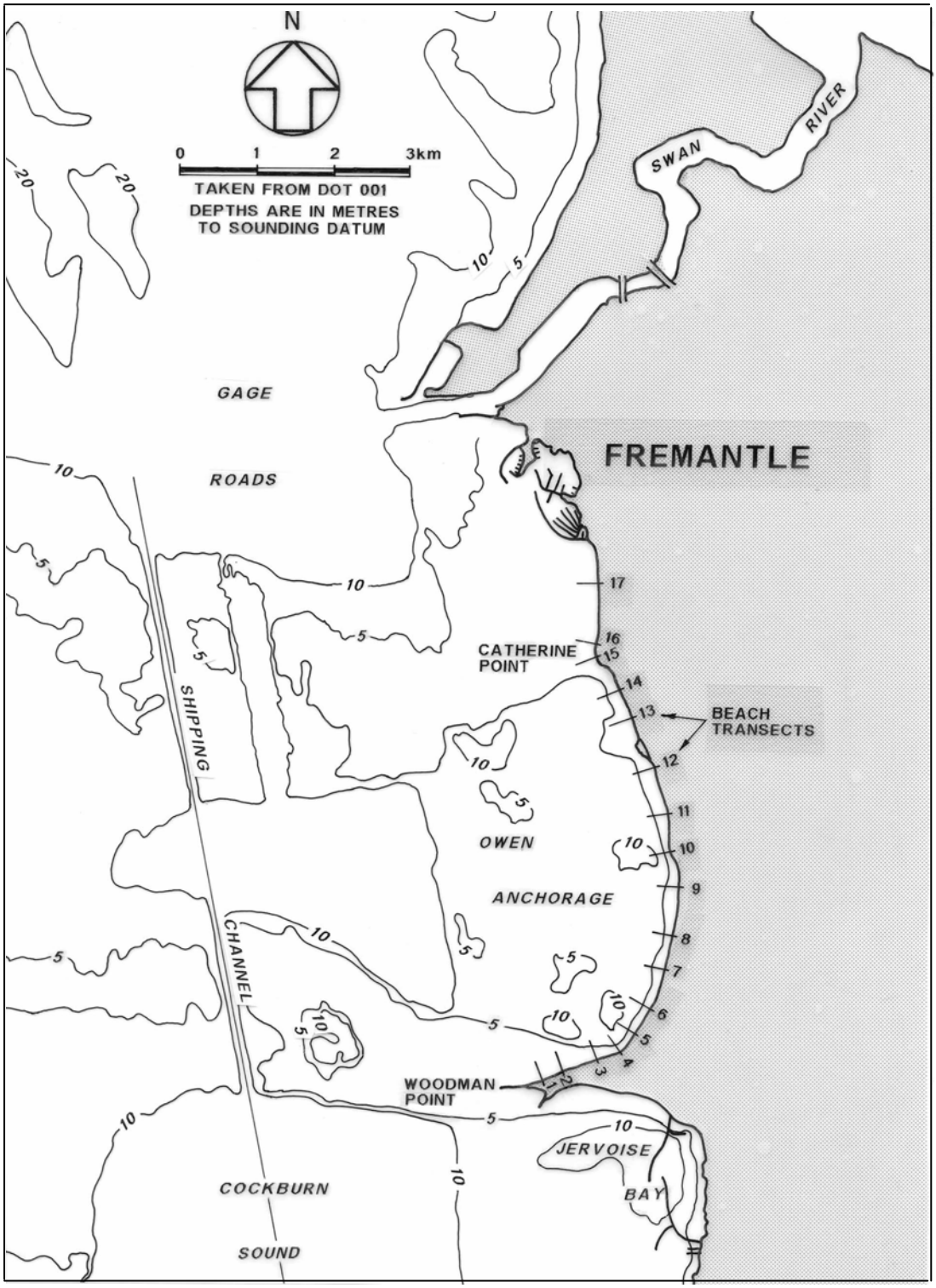


Figure 2.1 Location of Beach Survey Transects, shown as transect lines 1 to 17

It is proposed to negotiate with the various bodies who have the information from these monitoring surveys and use them in conjunction with aerial photography to monitor the position of the shoreline of Cockburn Sound. Should additional transect sites be required in the future these can be incorporated into the programme.

2.3 AERIAL PHOTOGRAPHY & PHOTOGRAMMETRY

It is proposed to collect and review aerial photography of the coastline of Owen Anchorage and Cockburn Sound each year including that especially flown for Cockburn Cement for the delineation of marine habitats of Owen Anchorage. Cockburn has committed to having aerial photographs flown every summer for this purpose, and the spatially rectified imagery will also be used for the purposes of shoreline monitoring. The review by an experienced Coastal Engineer will provide a broad interpretation of areas of shoreline accretion and erosion, and identify any major sediment transport pathways.

Aerial photographs flown each summer at a scale of about 1:15,000 are also commercially available from the Department for Land Administration (DOLA). The photographs will be used where needed for the desktop review and every 3 years controlled photogrammetry will be used to plot the position of the coastal vegetation.

The Department for Planning & Infrastructure (DPI) has historical coverage of the shoreline movements in Owen Anchorage and Cockburn Sound. The same plan layout and scale of 1:5,000 will be used for the photogrammetry completed for Cockburn Sound. The accuracy of the photogrammetry will provide positions generally within ±2 metres in the horizontal plane. Under some circumstances the coastal vegetation is difficult to distinguish even in the enlarged photographs.

The photogrammetry plots of the position of the coastal vegetation line will provide a measure of gross movements of the shoreline between photograph dates. This coupled with the estimate of the active height of coastal processes will enable quantification of the amount and rate of accretion and erosion in the various coastal sectors.

3. ANALYSIS OF DATA & REPORTING

3.1 ANALYSIS OF DATA

Each year the data will be reviewed by an experienced Coastal Engineer to provide assurance of its quality and also to ensure all of the coastline has been covered.

Every third year, the data will be carefully analysed by experienced Coastal Engineers to determine the following:

- Changes in the position of shoreline using the coastal vegetation line as the appropriate marker;
- Identification of areas of accretion and erosion along the shorelines of Owen Anchorage and Cockburn Sound; and
- Quantification of the amount and rate of accretion and erosion along the shorelines of Owen Anchorage and Cockburn Sound.

The results of these analyses will be presented on a series of plots and in tabular form. An indicative sediment budget for the Owen Anchorage and Cockburn Sound areas will be prepared using the results from the monitoring. This will be presented in a similar format to that shown in Figure 3.1 which identifies average annual sediment transport rates (sediment fluxes) for the shores of Owen Anchorage covering the period from 1976 to 1999.

3.2 REPORTING

3.2.1 Data reports

Each year a data report will be prepared and will form part of the Compliance Report issued by Cockburn to the DEP.

3.2.2 Synthesis reports

Every third year as well as after five years, the data will be analysed in detail and a synthesis report will be prepared and submitted to the EPA in order to satisfy Cockburn's commitment. This analysis and synthesis report will address the following:

- Present the results of the monitoring of the position of the shoreline of Owen Anchorage and Cockburn Sound using beach surveys and aerial photography;
- Provide calculations of the measured changes in the shoreline position;
- Determine rates of sediment transport along the shorelines of Owen Anchorage and Cockburn Sound;
- Identify sites and rates of erosion / accretion; and
- Determine any link between changes of the shoreline position and Cockburn's long-term dredging.

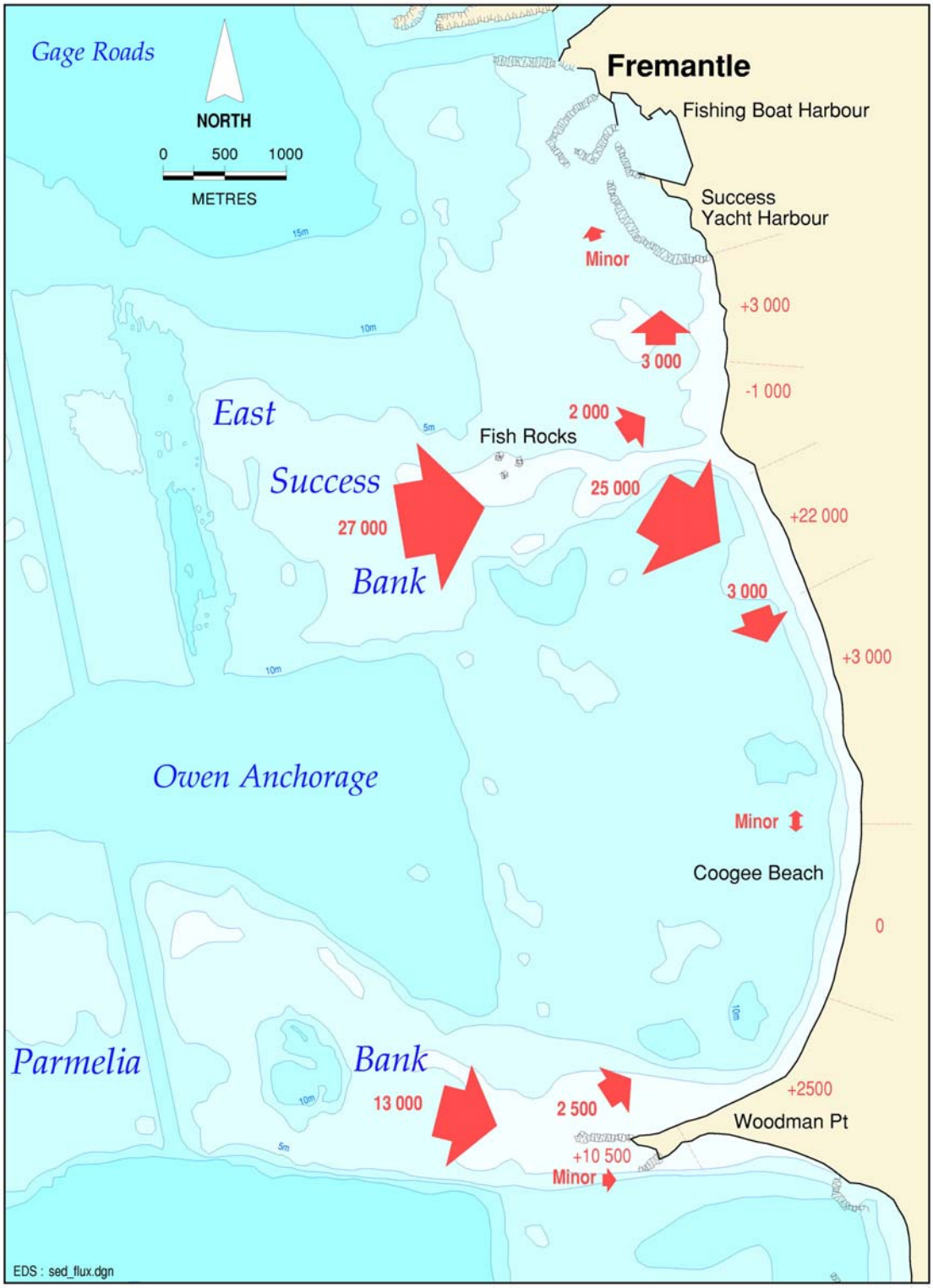


Figure 3.1 Estimated annual sediment fluxes (m^3) in the Owen Anchorage area, 1976–1999

4. SUMMARY SHORELINE MONITORING PLAN

The Shoreline Monitoring Plan has been summarised in Table 4.1 below. This provides a list of the various actions as well as the year in which the action will occur.

Table 4.1 Summary of the shoreline monitoring plan

Shoreline Monitoring Plan Action	Year										
	02	03	04	05	06	07	08	09	10	11	12
1. Summer beach survey	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2. Summer nearshore survey	✓		✓		✓		✓		✓		✓
3. Winter beach survey	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4. Winter nearshore survey		✓		✓		✓		✓		✓	
5. Review aerial photographs		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6. Photogrammetry		✓			✓			✓			✓
7. Data reports	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8. Synthesis reports		✓			✓			✓			✓