



**COCKBURN CEMENT**



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



**AUGUST 2008**

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ENVIRONMENTAL MANAGEMENT PROGRAMME**

**Long-Term Shellsand Dredging  
Owen Anchorage  
Banks and Shoreline Protection Management Program**

*Prepared for:*

**Cockburn Cement Limited**

*Prepared by:*

**Oceanica Consulting Pty Ltd**

**August 2008**

Report No. 443/1\_RevA

## Client: Cockburn Cement Limited

### Version History

Version	Author	DISTRIBUTION			REVIEW	
		Recipients	No. Copies & Format	Date	Reviewer	Date
1	M. CAREY	B.HEGGE	1 x Word	17/02/05	B.HEGGE	18/02/05
2	M. CAREY	K. HILLMAN B. HEGGE	1 x Word	21/02/05	K. HILLMAN B. HEGGE	21/02/05 22/02/05
3	M. CAREY	M. ROGERS	1 x Word	22/02/05	M. ROGERS T, HUNT	23/02/05 23/02/05
4	M. CAREY	K. HILLMAN J. MAZZONE	1 x Word	25/02/05	K. HILLMAN J. MAZZONE	25/02/05
5	M. CAREY	B. HEGGE	1 x Word	28/02/05	K. HILLMAN	28/02/05
6 (Final)	M. CAREY	Cockburn Cement DoE Audit Branch Fremantle Ports DPI	1 hard copy 1 hard copy 1 hard copy 1 hard copy	01/03/05 01/03/05 01/03/05 01/03/05	DoE Audit Branch Fremantle Ports DPI	08/06/05 15/08/06 17/08/06
7	M. CAREY	B. HEGGE K. HILLMAN	1 x Word	18/09/07	B. HEGGE K. HILLMAN	5/11/07 27/11/07
7	M. CAREY	K. HILLMAN	1 x Word	04/12/07	K. HILLMAN	03/07/08
7 (Rev A)	M. CAREY	Cockburn Cement DEC Audit Branch Fremantle Ports DPI	1 hard copy 1 hard copy 1 hard copy 1 hard copy	20/08/08		

### Status

This report remains a Draft until the author and director have signed it off for final release. The “Draft” report should only be used for review with the intention of generating a “Final” version.

Approved for final release:



Author



Director

Date: 20/08/08

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# 1. Introduction

## 1.1 Long-Term Shellsand Dredging Proposal

Cockburn Cement Limited (Cockburn) dredges shellsand from Success and Parmelia Banks in Owen Anchorage. Shellsand is primarily calcium carbonate and is used in the production of lime and cement at Cockburn’s Munster operations. Lime is an essential raw material for Western Australia’s mineral processing industry, especially alumina and gold.

Cockburn’s Long-Term Shellsand Dredging project, which was approved on 8 July 2002, (Ministerial Statement 599) consists of the following two stages (Figure 1.1):

- Stage 1—Dredging within the alignment of the “Dual Channels” (approximately 4.5 km offshore) on Success and Parmelia Banks which was expected to provide sufficient shellsand resource to mid-2010 and involves:
  - Dredging along the alignment of the second shipping channel through Success and Parmelia Banks to a width of 350 m and (with the endorsement of Fremantle Ports) widening the existing Fremantle Ports channel to 350 m; and
  - Dredging an area between the two channels on Success and Parmelia Banks to maintain lime production requirements.
- Stage 2—Dredging of an unvegetated area of West Success Bank (approximately 8 km offshore), providing resource for approximately 20 years.

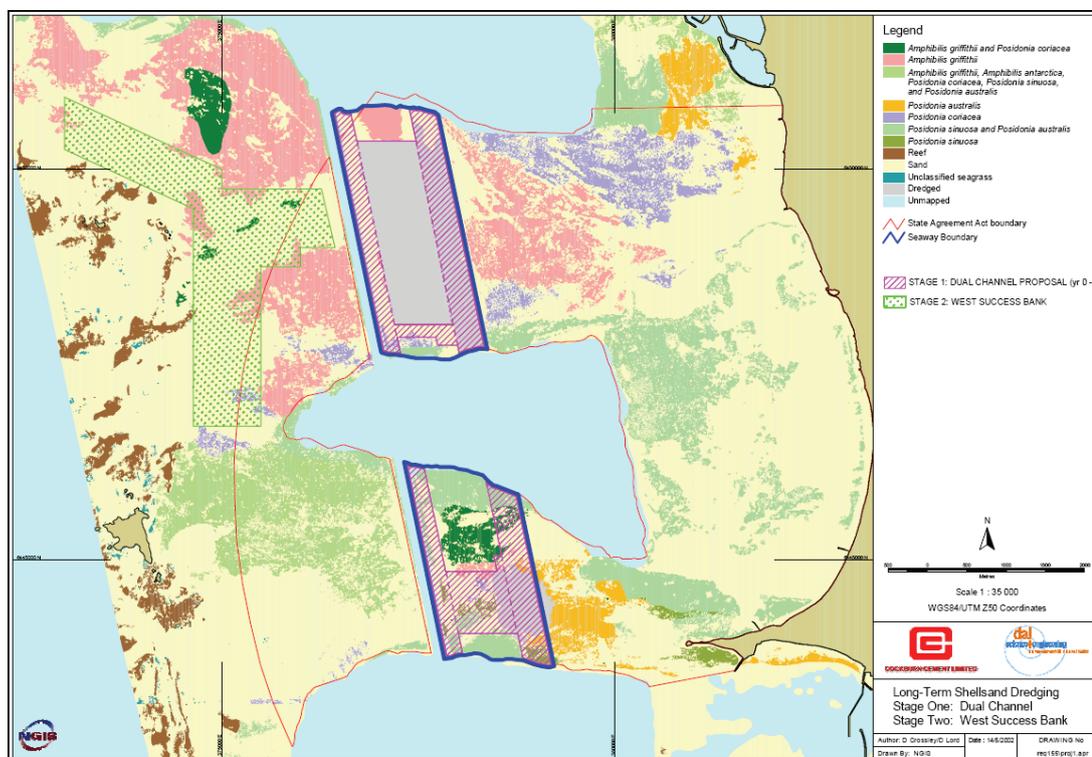


Figure 1.1 Long-term Shellsand Dredging: Stage One (Dual Channel) and Stage Two (West Success Bank)

It is noted that the Ministerial Conditions for the Long-Term dredging incorporate and supersede Cockburn’s environmental conditions arising from previous approvals, including the Short and Medium-Term area approvals. As such, all

management and monitoring actions covered by the Ministerial Conditions are designed to cover all of Cockburn’s dredging operations.

## 1.2 Ministerial Conditions

In seeking environmental approval for the Long-Term Dredging proposal, Cockburn made a commitment to prepare and implement a Banks and Shoreline Protection Management Program (BSPMP) for Owen Anchorage and Cockburn Sound. This commitment was included in the approval of Cockburn’s Long-Term dredging proposal (Ministerial Statement 599, 8 July 2002). Schedule 2 of this Ministerial Statement describes Cockburn’s commitment to prepare and implement a BSPMP for Owen Anchorage and Cockburn Sound (Table 1.1).

**Table 1.1 Cockburn’s commitment to prepare and implement a Banks and Shoreline Protection Management Program for Owen Anchorage and Cockburn Sound**

<b>Audit Code</b>	<b>Actions &amp; Objectives</b>	<b>Timing</b>	<b>Advice</b>
599:P5 Banks and Shoreline Protection Management Program—Preparation	<p><u>Action</u> Prepare a Banks and Shoreline Protection Management Program.</p> <p><u>How</u> Address:</p> <ol style="list-style-type: none"> <li>1. Maintenance of shipping and navigation on the Banks, protection of coastal structures, and maintenance of shoreline stability; and</li> <li>2. Identification of appropriate management actions and mitigation/protection options and techniques to protect these features.</li> </ol> <p>Incorporate results from the:</p> <ul style="list-style-type: none"> <li>• Wave Climate and Measurement and Modelling Plan (P1 and P2);</li> <li>• Shoreline Monitoring Plan (P3 and P4); and</li> <li>• Marine Habitat Monitoring (P7).</li> </ul> <p><u>Objective</u> To:</p> <ul style="list-style-type: none"> <li>• Maintain navigational requirements across Success and Parmelia Banks, and adjacent marine areas;</li> <li>• Protect coastal structures; and</li> <li>• Maintain shoreline stability of Owen Anchorage and Cockburn Sound.</li> </ul> <p><u>Evidence</u> As required by M5.1.</p>	Operations.	EPA <sup>1</sup> Fremantle Ports <sup>2</sup> DPI <sup>2</sup>
599: P6 Banks and Shoreline Protection Management Program—Implementation	<p><u>Action</u> Implement the Banks and Shoreline Protection Management Program referred to in P5.</p> <p><u>Evidence</u> As required by M5.1.</p>	Overall. During dredging Program and review after 5 years.	EPA <sup>1</sup> Fremantle Ports <sup>2</sup> DPI <sup>2</sup>
599:M5.1 Compliance Auditing	<p><u>Action</u> Prepare an audit programme in consultation with and submit compliance reports to the DEP.</p> <p><u>How</u> Address:</p> <ol style="list-style-type: none"> <li>(a) the implementation of the proposal as defined in Schedule 1 of this statement;</li> <li>(b) evidence of compliance with the conditions and commitments; and</li> <li>(c) the performance of the environmental management plans and programs.</li> </ol> <p><u>Objective</u> To provide evidence that the proposal is being implemented as approved, and the relevant conditions and commitments are being met.</p> <p><u>Evidence</u> Compliance report providing evidence of compliance for each audit element in the table.</p>	Overall. Annually.	EPA

Notes: 1. To be completed to meet requirements of these agencies; and  
2. To be completed with advice from these agencies.

To meet Proponent Commitment P5, Cockburn submitted the BSPMP for Owen Anchorage and Cockburn Sound to the Environmental Protection Authority (EPA) in March 2005. A letter was then received from the Department of Environment in June 2005 stating that they “consider that the requirements of commitment 5, prepare a Banks and Shoreline Protection Management Programme, have been met” (J. Treloar 2005, *pers. comm.*, 8 June (Appendix A)).

### 1.3 Revisions

The original version of the BSPMP included a commitment to review the programme following the completion of Phase 2 of the Wave Climate Measurement and Modelling Plan (WCMMP). The wave modelling has been completed and draft reports were released in July 2007. This present revision of the BSPMP also incorporates comments received from Fremantle Ports and the Department for Planning and Infrastructure (DPI) on the original BSPMP released in March 2005 (Appendix B). Table 1.2 provides a summary of the significant changes made to the BSPMP during the 2008 review. Note that other smaller changes (e.g. to wording in some paragraphs) may also have been altered, but are not listed here.

**Table 1.2 Summary of changes made from the original (March 2005) version of Cockburn’s Banks and Shoreline Protection Management Plan Programme**

Change	Comment
<b>Revision: August 2008</b>	
Removed paragraphs 3 to 6 of Section 1.1	These paragraphs provided description on physical setting for Cockburn’s dredging. Not necessary to the structure or intent of the BSPMP.
Added new paragraph to the end of Section 1.1	Explains that the Ministerial Conditions for the Long-Term Dredging approval incorporate and supercede all previous approvals.
Altered last paragraph of Section 1.2	Addition of a comment to say that the BSPMP was approved by the DEC in June 2005.
Added Section 1.3 (Revisions)	This new section in the report will keep a track of what changes and when they were made to the original EMP.
Changed Chapter 2 to “Existing Monitoring and Management Activities”	The renaming and restructuring of Chapter 2 is in response to comments received by DPI (on 17/08/06) in their review of the original BSPMP. They requested a more clear delineation between original monitoring programmes, their findings, and the recommended future monitoring. Chapter 2 now provides a brief synopsis of specific activities that relate to BSPMP objectives and that already occur as part of Cockburn’s environmental monitoring program.
Added a new Chapter: “Recommendations and Additional Monitoring”	This incorporates the old section 3.1 of the original BSPMP, and specifies the additional monitoring and tasks to be undertaken as part of the BSPMP.
Updated Chapter 4: “Management Triggers and Mitigation Procedures”	The ‘new’ Section 4 is the old section 3.2 of the original BSPMP. The management triggers for shipping and navigation and coastal structures now include an alternate trigger based on bathymetric data or structural inspections respectively. The management trigger for shoreline stability has been reworded to say “change” rather than specifying “recession”.
Altered final chapter: “Reporting and Review”	Chapter 5 now includes reporting requirements in addition to review requirements.

## 2. Existing Monitoring and Management Activities

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Cockburn has already prepared and implemented a number of monitoring plans and management activities that address the following three objectives of the BSPMP:

- Maintenance of shipping navigation requirements on the banks and adjacent areas;
- Protection of coastal structures; and
- Maintenance of shoreline stability.

These existing activities are discussed below in relation to each of the three BSPMP objectives.

### 2.1 Maintenance of Shipping and Navigation

Cockburn's dredging occurs in Owen Anchorage within the waters managed by Fremantle Ports and adjacent to the Success and Parmelia Channels along which all large vessels must travel to access Cockburn Sound. Consequently, the management of Cockburn's activities to ensure maintenance of shipping and navigability through the Owen Anchorage area is of high importance.

#### 2.1.1 Activity: Retention of a buffer strip

Cockburn's most recent *Dredging and Environmental Management Plan (DEMP) – Stage 2 West Success Bank* (Oceanica 2007b) recognises that dredging will not be undertaken within a 'buffer strip' that extends 150 m east of the existing Fremantle Ports channel until such time that an alternative navigable channel has been commissioned, or an agreement reached with Fremantle Ports on its partial removal (Oceanica 2007b). In April and May 2004, Fremantle Ports agreed that Cockburn could dredge limited areas within the buffer strip of Success and Parmelia Bank. See below a summary of the studies relating to this agreement.

##### **Summary of studies/outcomes to date**

Studies undertaken by Cockburn, in collaboration with Fremantle Ports, have shown that ship handling through the navigation channel on Success Bank will remain acceptable if the eastern buffer strip retains a width of between 60 m and 75 m (MP Rogers 1997a; Lawson and Treloar 2001). Furthermore, available data indicate that newly dredged slopes adjust over time to achieve a stable slope of gradient 1:2.5 to 1:4 (LeProvost 1996). This slumping occurs within the first 12 months of dredging, and in these depths results in an edge retreat of 10–15 m (DALSE 2004). Further changes that occur in the second year, and to a lesser degree in the third year, are not edge retreat but a slight lowering (0.5–1.0 m) of bank top immediately adjacent to the edge—this effect is no longer apparent within 30 m of the edge (DALSE 2004). After three years, the dredge slopes remain stable. Notably, much of the remaining buffer strip in the northern half of Success Bank already has a bank top width of 75 m. Recent (2006) bathymetric data confirms the presence of the buffer strip; however no further analysis has yet been undertaken (see Section 3.1).

In March 2004, Cockburn requested formal agreement from Fremantle Ports to undertake partial removal of the buffer zone on both Success and Parmelia Banks. In April 2004, Fremantle Ports approved limited dredging of the eastern buffer strip on Success Bank such that a 90 m wide bank top remains un-dredged (allowing for a predicted edge retreat of up to 15 m, and thereby leaving a minimum of 75 m-wide strip of bank top within the buffer strip) (Appendix C). Cockburn also commissioned Lawson and Treloar Pty Ltd to undertake a desktop analysis of ship-handling through Parmelia Channel. In May 2004, following receipt of a letter from

Lawson and Treloar confirming that ship handling characteristics in Parmelia Bank would remain satisfactory, Fremantle Ports approved limited dredging by Cockburn of the eastern buffer strip of Parmelia Bank such that a 90 m bank top remains (Appendix C).

### **2.1.2 Activity: Management of dredge areas**

In December 2004, Cockburn contracted out its dredging activity to WA Shell Sands Pty Ltd (a subsidiary company of Van Oord) using the vessel 'Volvox Anglia'. The Volvox Anglia is a dual head trailer-suction dredge with a hopper capacity of approximately 1,200 m<sup>3</sup>. Navigation and dredging on board the vessel is coordinated through a computerised navigation system. To ensure dredging is undertaken within the areas approved (and hence ensuring that shipping and navigation is maintained on the banks) Cockburn commissioned the DPI to review the digital datasets used in the navigation system.

Cockburn's operational requirements also necessitate the occasional storing of shellsand at its approved stockpiles. This requires careful management, both in terms of accurate placement of shellsand and the height of water maintained above the stockpile areas. Accurate placement of shellsand is required because different grades of resource are stored in different areas, and Fremantle Ports requires Cockburn to manage its stockpiles so that a minimum water depth of three metres (relative to low water mark) is maintained to ensure safe navigation in Port waters.

#### ***Summary of studies/outcomes to date***

The review by the DPI confirmed that the datasets had been correctly transferred and geo-referenced within the navigation system. WA Shell Sands use a differential global positioning system (DGPS) on board the Volvox Anglia and all coordinates are related to the WGS84 datum. The operation of the DPGS has been tested within Owen Anchorage against known points. The location and detailed status (including whether dredging or not) of the Volvox Anglia is logged every two minutes and this information is retained onboard and telemetered to land-based computer storage. This information is available for review on request.

### **2.1.3 Activity: Dredging and Management Programs (DMPs) and Dredging Environmental Management Plans (DEMPs)**

There is continued correspondence between Cockburn, Fremantle Ports, Department of Environment and Conservation (DEC; formally Department of Environment (DoE)) and the Department of Industry and Resources (DoIR) to help ensure that the dredging activities are undertaken as approved (and thereby maintaining shipping and navigation on the banks). Cockburn also notifies Fremantle Ports, in advance, of their intended dredging activities.

Cockburn has provided the DEC (and other agencies) with an ArcGIS shapefile showing the outline of Cockburn's approved dredging and operational areas. This enables independent cross-checking of Cockburn's activities by officers of the DEC.

Under Cockburn's present State Agreement Act, a Dredging and Management Program (DMP) outlining dredging activities for the forthcoming ten years, is required to be submitted to DoIR every two years. In addition, under conditions for Cockburn's environmental approval of its Long-Term Dredging (Ministerial Statement 599), Dredging and Environmental Management Plans (DEMPs) for the Stage 1 and Stage 2 dredging areas are required to be prepared, submitted the DEC, and (once approved) implemented.

### **DMPs (submitted to DoIR)**

In July 2007, Cockburn submitted its most recent *Dredging and Management Plan* (Oceanica 2007c) to the DoIR. This DMP presents a 10 year dredging programme for the period from 1 January 2007 to 31 December 2016. The DMP provides details of Cockburn's dredging programme, and for the monitoring, protection and management of the environment in connection with its dredging programme.

### **DEMPs (submitted to DEC)**

The Stage 1 *Dredging and Environmental Management Plan* was submitted to the DEC and approved in May 2003 (DALSE 2003a). This DEMP covers Cockburn's Stage One dredging programme within an area of approximately 393 ha of the central parts of Success and Parmelia Banks where an area of approximately 160 ha has been previously dredged to produce Fremantle Ports shipping channel, and by Cockburn for shellsand extraction. The Stage 2 DEMP (Oceanica 2007b) was submitted in November 2007 and is presently under review. This DEMP covers Cockburn's Stage Two dredging programme within an area of approximately 393 ha of West Success Bank.

#### **2.1.4 Activity: Benthic habitat mapping**

Cockburn have prepared and implemented a *Marine Habitats of Owen Anchorage* (MHOA) monitoring regime. The MHOA requires annual aerial photography to be taken during summer and analysed for spatial extent of benthic habitats (e.g. seagrass, reef, bare sand). This is then compared with previous years to identify any changes that are occurring in the distribution of marine habitats. The aerial photography and analyses are complemented by detailed groundtruth surveys conducted every five years.

Success and Parmelia Banks support a variety of seagrasses from the genera *Posidonia*, *Amphibolis*, *Heterozostera* and *Halophila*. Owen Anchorage is a relatively high energy environment for seagrasses, and meadows of *Amphibolis* species and *Posidonia coriacea* have been found to have little effect on sediment accumulation and stabilisation, wave energy and water turbidity over regional and annual scales (DA Lord 2000). Despite the limited influence on the physical stability of both the banks and shoreline, the spatial patterns and rates of change in seagrass loss/gain are a good indicator of changes in local environmental conditions, and the impacts of significant storm events. Such impacts have to be distinguished from any potential effects due to Cockburn's dredging activities.

The MHOA monitoring programme requires annual reports to be prepared. The most recent reports for this programme are:

- *Benthic Habitat Mapping Owen Anchorage 2004*, Prepared for Cockburn Cement Limited by Oceanica Consulting Pty Ltd and Cooperative Research Centre for Coastal Zone, Estuary and Waterway Management, Report No. 344/1, December 2005;
- *Visual Comparison of 2004 and 2005 Imagery of Owen Anchorage*, Memorandum prepared for Cockburn Cement Limited by Oceanica Consulting Pty Ltd, December 2005; and
- *Visual Comparison of 2005 and 2006 Imagery of Owen Anchorage*, Memorandum prepared for Cockburn Cement Limited by Oceanica Consulting Pty Ltd, August 2006.

## 2.2 Protection of coastal structures

The Owen Anchorage shoreline has had a varied history of uses, including public recreation, power generation and industrial uses. Historical placement of infrastructure in close proximity to the shoreline has resulted in the need for coastal engineering structures (e.g. groynes, rock revetments, seawalls) to be constructed to maintain the shoreline. Coastal structures have also been built for public and industrial uses (e.g. jetties, breakwaters, marinas).

The change in local wave climate as a result of Cockburn's dredging activities may influence the stability of existing coastal structures. However, it is important to note that Owen Anchorage is a relatively sheltered coastline and areas are likely to still be responding to the construction of existing facilities. Any changes in shoreline position or structure stability must carefully consider all processes which may be causing these changes.

### 2.2.1 Activity: Wave climate modelling

Cockburn has prepared a *Wave Climate Measurement and Modelling Plan* (WCMMP) for Owen Anchorage and Cockburn Sound (DALSE 2003b). This plan entails the measurement of wave data and the validation, modification and use of models to predict the changes in wave climate due to Cockburn's dredging works.

The WCMMP includes a series of reports relating to the model validation and forecasting and confirmation of predicted wave climate changes of Stage 1 and Stage 2 dredging activities. The following relevant reports have been prepared:

- *Variation of Wave Model and Assessment of Future Dredging*, Prepared for Cockburn Cement Ltd by MP Rogers & Associates, Report No. R04055, May 2004;
- *Cockburn Wave Modelling 2004: Wave Model Validation*, Prepared for Cockburn Cement Ltd by MP Rogers & Associates, Report No. R142, February 2005 (Draft);
- *Stage One Dredging Wave Modelling*, Prepared for Cockburn Cement Ltd by MP Rogers & Associates, Report No. R207, June 2007 (Draft); and
- *Stage One and Two Dredging Wave Modelling*, Prepared for Cockburn Cement Ltd by MP Rogers & Associates, Report No. R212, July 2007 (Draft).

### 2.2.2 Activity: Shoreline monitoring

Cockburn has also prepared a *Shoreline Monitoring Plan* (SMP) for Owen Anchorage and Cockburn Sound (DALSE and MP Rogers 2003). This SMP entails regular assessment of shoreline change through beach and nearshore profile surveys, aerial photography and mapping of shoreline position.

Beach profile surveys have been conducted at 17 sites during summer and winter in Owen Anchorage since 1988. However, as of April 2007, due to the Port Coogee development, two of these profiles are no longer surveyed, but an additional site has been added north of Port Coogee (i.e. 16 in total). Furthermore, two more profiles, south of Woodman Point were added during the spring 2007 survey. Since 1997 these surveys have been extended to approximately 250 m offshore during every second year, and since October 2006 these surveys now extend 500 m offshore. There is no regular beach profiling at sites within Cockburn Sound completed as part of the SMP, but review of the available annual aerial photography and shoreline position mapping occurs every five years.

As part of the SMP commitments, a data report is produced annually, and a synthesis report every five years. The most recent set of reports released is:

- *Owen Anchorage Shoreline Monitoring (1999–2003)*, Prepared for Cockburn Cement Limited by MP Rogers & Associates Pty Ltd, Report No. R133 Rev0, February 2005;
- *Owen Anchorage Beach Monitoring 2004 Data Report*, Prepared for Cockburn Cement Limited by MP Rogers & Associates Pty Ltd, Report No. R148 Rev0, April 2005;
- *Owen Anchorage Beach Monitoring 2005 Data Report*, Prepared for Cockburn Cement Limited by MP Rogers & Associates Pty Ltd, Report No. R172 Rev 0, December 2005;
- *Shoreline Monitoring Plan: 2003 Synthesis Report—Review of Shoreline Change in Cockburn Sound*, Prepared for Cockburn Cement Limited by Oceanica Consulting Pty Ltd, Report No. 342/1, May 2006;
- *Shoreline Monitoring Plan: Data Report—2004 and 2005 Cockburn Sound*, Prepared for Cockburn Cement Limited by Oceanica Consulting Pty Ltd, Report No. 342/2, May 2006; and
- *Shoreline Monitoring Plan: 2003–2006 Synthesis Report and 2006 Data Reports for Owen Anchorage and Cockburn Sound*, Prepared for Cockburn Cement Limited by Oceanica Consulting Pty Ltd, Report No. 342/3 (in preparation).

### **2.2.3 Activity: Benthic habitat mapping**

Refer to discussion in Section 2.1.4.

## **2.3 Maintenance of shoreline stability**

Historical uses of the shoreline and the various coastal structures have altered the local coastal processes within Owen Anchorage. Owen Anchorage is a relatively sheltered coastline and areas are likely to still be responding to the construction of existing facilities, with response times in the order of decades to a century (Stul 2005). Maintaining shoreline stability has implications across a range of activities, including public recreation, stability of coastal structures (see above section), and land development.

### **2.3.1 Activity: Wave climate modelling**

Refer to discussion in Section 2.2.1.

### **2.3.2 Activity: Shoreline monitoring**

Refer to discussion in Section 2.2.2.

### **2.3.3 Activity: Quarantine Beach realignment study**

Localised erosion has been observed at the south-western end of Quarantine Beach during the shoreline surveys conducted as part of the SMP since approximately 1989. In 1997, Cockburn commissioned MP Rogers & Associates to carry out a detailed investigation into the cause of this localised erosion.

#### ***Summary of studies/outcomes to date***

Based on findings from this investigation, it was considered that the dredging of the approach channel has altered the nearshore wave climate in the vicinity of Quarantine Beach and caused a change in beach orientation (MP Rogers 1997b). The impact of the approach channel cannot be completely removed, but steps have been taken to lessen it. To allow for operation of the Volvox Anglia, Cockburn deepened their reclaimer pocket in June/July 2004. An estimated 40,000–45,000 m<sup>3</sup> of material was dredged using a cutter-suction dredge and this material was used to

partially infill a deep (previously dredged) area adjacent to the wash plant access channel, such that the seabed is now closer to its original level. The disposal of this material resulted in shallowing of the seabed level in this area from -5 to -10 m CD to approximately -3.0 m CD. Prior to undertaking the dredging, this disposal option was discussed with the Jervoise Bay Yacht Club. The infilling of this area increases the nearshore wave attenuation, and hence is likely to mitigate against further shoreline erosion in the vicinity of Quarantine Beach.

For further details on the Quarantine Beach study, refer to the following report:

- *Quarantine Beach, Investigations into the Observed Beach Realignment*, Report prepared for Cockburn Cement Limited, by MP Rogers & Associates Pty Ltd, Job J174, Report R038 Revision 0.

#### **2.3.4 Benthic Habitat Mapping**

Refer to discussion in Section 2.1.4.

### **3. Recommendations and Additional Monitoring**

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As discussed in Section 2, many of the monitoring or management activities already in place by Cockburn address elements of the three objectives of the BSPMP. To further enhance the existing monitoring, the following recommendations for work related to existing programs, and new additional monitoring are described below.

#### **3.1 Maintenance of Shipping and Navigation**

To enable formal assessment on this element of the BSPMP, it is suggested that the following monitoring and reporting works are initiated:

- Regular bathymetric survey of the eastern buffer zone of Success and Parmelia Banks and the proposed second shipping channel; and
- Examine this survey data (and any other relevant data available from Fremantle Ports) to confirm the stability of the eastern edge of the existing and proposed second shipping channel and report to Fremantle Ports.

#### **3.2 Protection of coastal structures**

In addition to monitoring works and reporting that already occurs as part of the WCCMP, SMP, and MHOA program, the following study is suggested:

- Using the results of the latest wave climate modelling predictions, identify any areas along the Owen Anchorage and Cockburn Sound coast that may be at risk of damage to existing amenities of facilities; and
- From this assessment, conduct an engineering inspection of structures within the identified risk areas every two years or sooner if triggered by notification from agencies (see Section 4).

#### **3.3 Maintenance of shoreline stability**

Monitoring works for shoreline movement are addressed in the SMP, however specific management triggers addressing the BSPMP objectives have been defined in Section 4.

The following activities were also proposed in the 2007 Compliance Report to the DEC (Oceanica 2007a):

- Develop a conceptual model of bank dynamics;
- Examine the historical position of the southern flank of the Bank using photogrammetry; and
- Review existing work to assess (if possible) the influence of Cockburn's dredging on Bank dynamics and position.

These investigations will further enhance the understanding of sediment dynamics and shoreline movement in the Owen Anchorage area.

## 4. Management Triggers and Mitigation Procedures

The proponent commitments for the BSPMP require the identification of appropriate management triggers and mitigation techniques to achieve BSPMP objectives. Table 4.1 lists a set of triggers and management response actions to be followed by Cockburn to maintain the shipping and navigation, coastal structures and shoreline stability of Owen Anchorage and Cockburn Sound.

**Table 4.1 Management triggers and response for commitments of BSPMP**

Objective	Trigger(s)	Response
Maintenance of Shipping and Navigation	<ul style="list-style-type: none"> <li>Formal notification from Fremantle Ports to Cockburn regarding concerns for the maintenance of shipping and navigation within Owen Anchorage and/or Cockburn Sound.</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>Notification resulting from inspection of bathymetric data.</li> </ul>	<ul style="list-style-type: none"> <li>Initiate discussion between Cockburn and Fremantle Ports.</li> <li>Depending on the severity of the issue/work required, the process is to be overseen by an independent expert or arbitrator. This independent expert/arbitrator is to be appointed with mutual agreement by Cockburn and Fremantle Ports.</li> <li>Depending on the severity of the issue/work required, management actions to include the cessation of dredging within the area in question while investigations are underway.</li> <li>Cockburn to initiate any mitigation works required, <b>if</b> through the investigative process above, fault is seen to result from Cockburn's activities.</li> <li>Any significant findings also to be communicated to the Owen Anchorage sub-committee of the Cockburn Sound Management Council.</li> </ul>
Protection of Coastal Structures	<ul style="list-style-type: none"> <li>Formal notification from agencies responsible for the management of coastal structures within Owen Anchorage and Cockburn Sound (including local councils, Royal Australian Navy and private organisations).</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>Notification resulting from engineering inspections of structures within identified risk areas.</li> </ul>	<ul style="list-style-type: none"> <li>Initiate discussion between Cockburn and individual management agency;</li> <li>The process is to be overseen by a representative from DPI Coastal Assets Branch to act as an independent expert;</li> <li>Cockburn to initiate any mitigation/protection works required, <b>if</b> through the investigative process above, fault is seen to result from Cockburn's activities;</li> <li>Any significant findings also to be communicated to the Owen Anchorage sub-committee of the Cockburn Sound Management Council.</li> </ul>
Maintenance of Shoreline Stability	<ul style="list-style-type: none"> <li>A change of more than 5 m in the position of the vegetation line between annual beach surveys (Owen Anchorage only), or a change of more than 10 m in the position of the vegetation line over a 5 year period</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>Formal notification from agencies responsible for the management of the coastal land abutting Owen Anchorage and Cockburn Sound.</li> </ul>	<ul style="list-style-type: none"> <li>Cockburn shall investigate the changes and determine the significance and likely causes of the changes;</li> <li>Data and relevant reports to be reviewed by DPI Coastal Assets Branch;</li> <li>Depending on the severity, the issue is to be reviewed by an independent expert or arbitrator to be appointed with mutual agreement by Cockburn and DPI Coastal Assets Branch;</li> <li>Cockburn to initiate any mitigation/protection works required, <b>if</b> through the investigation process above, fault is seen to result from Cockburn's activities;</li> <li>Any significant findings also to be</li> </ul>

		communicated to the Owen Anchorage sub-committee of the Cockburn Sound Management Council.
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## **5. Reporting and Review**

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### **5.1 Reporting requirements**

A memorandum is to be prepared each year (due end of July) to describe the activities that have taken place during that year which address the objectives of the BSPMP. In particular, it will note if any management triggers have been exceeded and what actions have been taken in response to this. The memorandum will also form a chapter in Cockburn's annual Compliance Report which is submitted to the DEC and DoIR.

### **5.2 Review of Management Program**

The BSPMP shall be reviewed at least 12 months prior to commencement of dredging in the Stage 2 Area and thereafter every five years.

## 6. References

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- DA Lord & Associates 1998, *Association Between Seagrass Meadows and Sediments on Success Bank, Owen Anchorage (Western Australia)*, Prepared from Cockburn Cement Limited, by D.A. Lord & Associates Pty Ltd, Report No. 95/008/4.
- DAL Science & Engineering 2003a, 'Dredging and Environmental Management Plan for Success and Parmelia Banks: Stage 1—Dual Channel Dredging', Chapter 3 in *Long-term Shellsand Dredging, Owen Anchorage, Environmental Management Program*, Report No. 032/15.
- DAL Science & Engineering 2003b, 'Wave Climate Measurement and Monitoring Plan', Chapter 7 in *Long-term Shellsand Dredging, Owen Anchorage, Environmental Management Program*, Report No. 032/18.
- DAL Science & Engineering 2004, *Partial removal of FPA Buffer Strip on Success and Parmelia Banks, Owen Anchorage—Predicted extent of dredge slope retreat, and bank stability*, Prepared for Cockburn Cement Limited, by DAL Science & Engineering Pty Ltd, Report 336/1.
- DAL Science & Engineering and MP Rogers & Associates 2003, 'Shoreline Management Plan for Owen Anchorage and Cockburn Sound', Chapter 8 in *Long-term Shellsand Dredging, Owen Anchorage, Environmental Management Programme*, Report No. 032/14.
- Lawson and Treloar 2001, *Success Channel Ship Simulation*, Report prepared for Cockburn Cement Limited, Report No. J1924/R1927.
- LeProvost Dames & Moore 1996, *Project S5 Seabed Stability and Composition of Seagrass Meadows on Natural and Dredged Slopes Report on Monitoring Surveys 1991-1995*, Prepared for Cockburn Cement Limited, Report No. 11354-035-367 (R568).
- MP Rogers & Associates 1997a, *Owen Anchorage Wave Study Effects of Widening the FPA Channel in Success Bank*, prepared for Cockburn Cement Limited, Report R047 Rev 0.
- MP Rogers & Associates 1997b, *Quarantine Beach, Investigations into the Observed Beach Realignment*, Report prepared for Cockburn Cement Limited, by MP Rogers & Associates Pty Ltd, Job J174, Report R038 Revision 0.
- MP Rogers & Associates 2004, *Variation of Wave Model and Assessment of Future Dredging*, Prepared for Cockburn Cement Ltd by MP Rogers & Associates, Report No. R04055.
- MP Rogers & Associates 2005a (Draft), *Cockburn Wave Modelling 2004: Wave Model Validation*, Prepared for Cockburn Cement Ltd by MP Rogers & Associates, Report No. R142.
- MP Rogers & Associates 2005b, *Owen Anchorage Beach Monitoring 2004 Data Report*, Prepared for Cockburn Cement Limited by MP Rogers & Associates Pty Ltd, Report No. R148 Rev0.

- MP Rogers & Associates 2005c, *Owen Anchorage Beach Monitoring 2005 Data Report*, Prepared for Cockburn Cement Limited by MP Rogers & Associates Pty Ltd, Report No. R172 Rev 0.
- MP Rogers & Associates 2005d, *Owen Anchorage Shoreline Monitoring (1999–2003)*, Prepared for Cockburn Cement Limited by MP Rogers & Associates Pty Ltd, Report No. R133 Rev0.
- MP Rogers & Associates 2007a (Draft), *Stage One Dredging Wave Modelling*, Prepared for Cockburn Cement Ltd by MP Rogers & Associates, Report No. R207.
- MP Rogers & Associates 2007b (Draft), *Stage One and Two Dredging Wave Modelling*, Prepared for Cockburn Cement Ltd by MP Rogers & Associates, Report No. R212.
- Oceanica 2005, *Visual Comparison of 2004 and 2005 Imagery of Owen Anchorage*, Memorandum prepared for Cockburn Cement Limited by Oceanica Consulting Pty Ltd.
- Oceanica 2006a, *Shoreline Monitoring Plan: 2003 Synthesis Report—Review of Shoreline Change in Cockburn Sound*, Prepared for Cockburn Cement Limited by Oceanica Consulting Pty Ltd, Report No. 342/1.
- Oceanica 2006b, *Shoreline Monitoring Plan: Data Report—2004 and 2005 Cockburn Sound*, Prepared for Cockburn Cement Limited by Oceanica Consulting Pty Ltd, Report No. 342/2.
- Oceanica 2006c, *Visual Comparison of 2005 and 2006 Imagery of Owen Anchorage*, Memorandum prepared for Cockburn Cement Limited by Oceanica Consulting Pty Ltd.
- Oceanica 2007a, *Cockburn Cement Limited Long Term Dredging: Owen Anchorage, 2007 Compliance Report and Five Year Review*, Prepared for Cockburn Cement Limited, by Oceanica Consulting Pty Ltd, Report No. 335/5.
- Oceanica 2007b, *Long-term Shellsand Dredging Owen Anchorage, Dredging and Environmental Management Plan—Stage 2 West Success Bank*, Prepared for Cockburn Cement Limited, by Oceanica Consulting Pty Ltd, Report No. 575/1.
- Oceanica 2007c, *Shellsand Dredging Success and Parmelia Banks Owen Anchorage, Dredging and Management Plan 2007–2016*, Prepared for Cockburn Cement Limited, by Oceanica Consulting Pty Ltd, Report No. 334/4.
- Oceanica (in preparation), *Shoreline Monitoring Plan: 2003–2006 Synthesis Report and 2006 Data Reports for Owen Anchorage and Cockburn Sound*, Prepared for Cockburn Cement Limited by Oceanica Consulting Pty Ltd, Report No. 342/3.
- Oceanica and CRC 2005, *Benthic Habitat Mapping Owen Anchorage 2004*, Prepared for Cockburn Cement Limited by Oceanica Consulting Pty Ltd and Cooperative Research Centre for Coastal Zone, Estuary and Waterway Management, Report No. 344/1.

## **Appendix A**

**Department of Environment correspondence regarding Proponent  
Commitment P5**



Your ref:

Our ref:

Enquiries: James Treloar

Direct tel: 92227176

Mr Joseph Mazzone  
Cockburn Cement Ltd  
PO Box 38  
HAMILTON HILL  
WA 6963

Dear Mr Mazzone

**LONG TERM SHELLSAND DREDGING, OWEN ANCHORAGE - BANKS AND SHORELINE PROTECTION MANAGEMENT PLAN (STATEMENT 599)**

With regard to your correspondence of 1 March 2005, with submission of the Banks and Shoreline Protection Management Plan, the Department of Environment has reviewed the Plan and considers that it is acceptable.

Accordingly, on behalf of the Director General, I consider that the requirements of commitment 5, prepare a Banks and Shoreline Protection Management Programme, have been met.

Please note this approval for the Plan does not replace any other approvals you may require from other government agencies to implement the Plan.

Yours sincerely

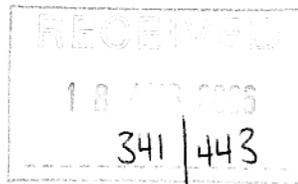
**James Treloar**  
Manager, Statement Management Section  
Environmental Impact Assessment Division

8 June 2005

cc Cockburn Sound Management Council

## **Appendix B**

**Fremantle Ports and DPI Feedback on original (March 2005) BSPMP**



15 August 2006

Joseph Mazzone  
National Manager, Safety, Health and Environment  
Adelaide Brighton Limited  
GPO Box 2155  
ADELAIDE SA 5001  
Australia

Dear Joseph,

**COCKBURN CEMENT LIMITED'S BANKS AND SHORELINE PROTECTION MANAGEMENT PLAN (BSPMP)**

In response to your letter dated 2<sup>nd</sup> May, 2006 to the CEO, Kerry Sanderson, Fremantle Ports have reviewed the documents:

- a. *Banks and Shoreline Protection Management Plan* (Version 6) – Oceanica dated 1<sup>st</sup> March 2005;
- b. *Cockburn Wave Modelling 2004 Wave Model Validation* (Rev A) – M P Rogers dated 7<sup>th</sup> February, 2005; and
- c. Independent Review Report of b. above - Prof. Ian Young dated May 2005.

As such, please find below Fremantle Ports' comments on the draft wave climate report and the BSPMP.

In overall terms, based on the data provided, Fremantle Ports considers that the wave modelling completed to date to assess the useability of the 2GWave model confirms that it is satisfactory for its intended function and is fit for purpose. The comparison of the wave climate results from predictive modelling and actual readings in 2003/4 would suggest that the use of the tool for strategic assessment of dredging proposals would be reasonable.

Although it appears that both the predictive models for significant wave height and direction are very good, there is some variation evident in the prediction of wave period(s). Fremantle Ports will be more than willing to cooperate further in refining the model in this regard by supplying additional oceanographic data if requested.

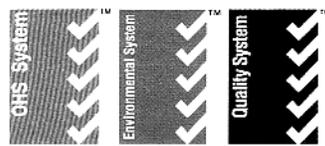
Additionally, Fremantle Ports' requests that:

- a. Future wave measurements and modelling will consider increased long wave (wave periods between 30 and 150 seconds inclusive) penetration into Cockburn Sound; and
- b. Dredging will be undertaken such that a 75 metre wide strip of bank top will be retained along the Fremantle Ports' buffer zones adjacent to the existing shipping channel through Success and Parmelia Banks, taking into consideration predicted stable slopes and dredge depths.

**Fremantle Ports:** 1 Cliff Street, Fremantle, Western Australia 6160 - Postal Address: PO Box 95 Fremantle WA 6959

Telephone: +61 8 9430 3555 • Facsimile: +61 8 9336 1391 • Email: mail@fremantleports.com.au • Web: www.fremantleports.com.au

Occupational Health and Safety Certification AS/NZ 4801 Lic OHS20045 • Certified Environmental Management ISO 14001 Lic CEM20114 • Quality Endorsed Company ISO 9001 Lic QE20949



This latter point would require monitoring of the width of the bank-top and monitoring dredge depth east of the existing proclaimed shipping channel (both as proposed within Section 3.1/Table 3.1 of the BSPMP). Management actions would then require cessation of dredging before exceeding maximum depths to prevent possible slumping and (in the extreme case) re-filling areas where dredging has exceeded depths required to maintain the bank-top buffer width.

Fremantle Ports reaffirms its commitment to contributing and cooperating in regards to the agreed data sharing arrangement with CCL. This includes bathymetric, oceanographic and meteorological data in and around Stages 1 and 2 including the second shipping channel into Cockburn Sound.

If you have any queries regarding this assessment, please do not hesitate to contact me.

Yours sincerely,

**Capt. Eric Atkinson**  
Harbour Master

Cc: Dr Karen Hillman (Oceanica)



Department for Planning and Infrastructure  
Government of Western Australia

New Coastal Assets

17 August 2006

National Manager  
Safety, Health & Environment  
Adelaide Brighton Limited  
GPO Box 2155  
ADELAIDE SA 5001

Attn: Mr J Mazzone

Dear Sir

**Cockburn Cement – Banks and Shoreline Protection Plan**

Thankyou for your letter dated 02 May 2006. We have reviewed document supplied in regard to DPI interest in shoreline and structure protection. The issue of bank stability is clearly being handled by FPA.

The Banks and Shoreline Protection Management Plan (BSPMP) incorporates both reports on findings of monitoring programs and nominations of investigations into some of the changes to shoreline behaviour. This combination makes it difficult at times to identify the actual components of the Management Plan – which should show clearly the responsibilities for actions to rectify changes to Shoreline Structure vulnerability and to Shoreline Stability.

Some improvement to the BSPMP may be made through a more clear delineation between:

- (i) Original monitoring program;
- (ii) Findings of the original monitoring program;
- (iii) Recommendations for future monitoring & evaluation;
- (iv) Identification of threatened amenity or facilities;
- (v) Definition of trigger conditions & responsible agencies;
- (vi) Proposed strategies for mitigation.

In terms of (i) & (ii), DPI have reviewed the MP Rogers 2004 report on Owen Anchorage Beach Monitoring 1999 to 2003. Beach erosion was identified at the North Dog Beach and Quarantine Beach. It is noted that the dredging at Success Bank is not believed to be contributing erosion in these areas. In particular it was noted that the erosion at Northern Dog beach appears likely to be caused by a combination of the South Beach redevelopment works in 1996, including dredging a large area offshore of South Beach, and the low number of storms experienced during 2001.

DPI has also reviewed Oceanicas' 2005 review on Shoreline Changes and Sediment Review in Cockburn Sound. Beach erosion was identified at West Point Jervois Bay, James Point, Kwinana Beach, Palm Beach and Mangles Bay. A number of factors have been identified as potential causes of this erosion, though none directly attributed to Cockburn Cements dredging activities.



Your ref:  
Our ref: DPI/03/074  
Enquiries: Stuart Barr, 9216 8847

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In terms of future monitoring and evaluation (iii), the further investigations proposed by Cockburn Cement into the Northern Dog Beach erosion would be encouraged. However, we also understand MP Rogers have undertaken a study of this area for the City of Cockburn recently.

We believe that that any investigation into the northern Dog Beach should also include the examination of the relevance of a mobile sediment bank which can be seen reaching the Catherine Point shore in 1964 air photos, immediately prior to the rapid accretion between that point and the Island St. groyne. Effort should be made to identify the source of that sediment and to link it to the sediment flux assessment on which Figure 2.1 of the BSPMP is based.

In terms of management and mitigation (v & vi), specific management actions for the eroding areas should be identified in the BSPMP (eg beach nourishment). This would likely involve discussions with the responsible local government agencies (e.g. City of Cockburn at Northern Dog Beach) and DPI. In this way, an appropriate course of action may be identified prior to evaluation of the problem or distribution of responsibility.

Additionally, DPI would appreciate being included in the distribution list of all relevant monitoring and investigation reports as soon as they are complete. Many of these reports contain data that would be directly beneficial to the beach managers (the local government agencies) and DPI.

Yours sincerely



*Martin Baird*  
AV Manager  
New Coastal Assets

#### Reference

Oceanica 2005, "Banks and Shoreline Protection Management Plan - Cockburn Cement - Long Term Shellsand Dredging - Owen Anchorage", Ch 9 of Environmental Management Program, Report 443/1, Feb-05

## **Appendix C**

**Approval for Partial Removal of FPA Channel Buffer Strips on  
Success and Parmelia Banks(Holding Pages)**



**25 May 2004**

Joseph Mazzone  
Group Safety, Health and Environment Manager  
Cockburn Cement  
PO Box 38  
Hamilton Hill WA 6963

Dear Joseph

**Approval for Partial Removal of the FPA Shipping Channel's Eastern Buffer Strip, Parmelia Bank**

I would like to confirm that the response from Lawson and Treloar satisfies Fremantle Ports requirements and that Cockburn's partial removal of the eastern buffer strip on Parmelia Bank may proceed, subject to limits contained in earlier advice.

Yours sincerely

A handwritten signature in black ink, appearing to be "Chris Bourne".

Capt Chris Bourne  
**DEPUTY HARBOUR MASTER**



20 April 2004

FILE

Our Ref: 100286

Mr Gareth Ward  
Operations Manager  
Cockburn Cement  
PO Box 38  
Hamilton Hill WA 6963

Dear Sir

**Re: Access to Shellsand Resource from Shipping Channel Buffer Strip**

I have received the DAL Science and Engineering Pty Ltd report 336/1, prepared for Cockburn Cement Limited, addressing the questions raised in my letter to you of 16 March 2004.

Based on this work, and our previous discussions with Cockburn Cement and DAL, I am pleased to advise that Fremantle Ports approves partial removal of the buffer strip adjacent to Success Channel, to the extent that the remaining buffer strip has a design bank top of no less than 90 metres width, which is expected to eventually degrade to a bank top of about 75 metres width.

It is also agreed that Cockburn Cement has conditional approval to partially remove the buffer strip adjacent to Parmelia Channel, to the extent that the remaining buffer strip has a design bank top of no less than 90 metres width, which is expected to eventually degrade to a bank top of about 75 metres width. The final approval of the works in Parmelia Channel is subject to Cockburn Cement commissioning a desk top shiphandling study, and that study unreservedly indicating that ship navigation in Parmelia Channel will not be adversely effected by the proposed works.

May I remind you again of the overarching condition that any dredging works, or dredging plant, must at no time encroach on the shipping channels in any way without the prior approval of the Harbour Master, Fremantle Ports.

We understand your need to expedite this project and we are happy to talk further to resolve matters as they may arise. Please call Captain Chris Bourne, Deputy Harbour Master, on 9430 3541 if you wish to discuss this matter further.

Yours faithfully

A handwritten signature in blue ink, appearing to read "Steve Wade".

Steve Wade  
**General Manager – Marine & Technical Services**  
**Fremantle Ports**



oceanica

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Tel: (08) 9389 9669 Fax: (08) 9389 9660 [oceanica@oceanica.com.au](mailto:oceanica@oceanica.com.au) ABN: 89 093 752 811