Monkstown Marina Development, Monkstown, Co. Cork

Phase II Marina Development

Dredging Environmental Report

Date: 16 *March 2010*
(Rev.2)

Job No: *C/285*

Client: *Monkstown Bay Marina Company Ltd.*

Cronin Millar
Consulting Engineers
Civil • Marine • Structural • Environmental

Report Contents

	Page
Introduction	3
Sediment Sampling/Testing Methodology	5
Sediment Characteristics	6
Impacts of Dredging Operations	8
References	9
Appendices	10

Cronin Millar Consulting Engineers Ltd.

The Mews
Copperfields
Cobh,
Co. Cork

021 4815441
cork@cmce.ie
www.cmce.ie

Revision Control Table & Document History Record

Rev.	Date	Description & Reason for Issue	Orig.	Chkd.	App.
1	*16/03/10*	*DRAFT*	*SMC/AC*	*AC*	*AC*
2	*24/03/10*	*Final*	*SMC/AC*	*AC*	*AC*

No part of this document may be re-produced or transmitted in any form or stored in any retrieval system of any nature, without written permission of Cronin Millar Consulting Engineers, as copyright holder, except as agreed for use on this specific project.

1.0 Introduction

1.1 Background to Report

A planning application was lodged with Cork County Council for the Monkstown Marina Phase II development. As part of the second Request for Further Information issued by the planning authority, clarification regarding the class of sediments to be dredged from the marina basin was requested.

This report details the findings of a sediment testing programme and comments on the previous data in relation to the potential for erosion and/or accretion at the site.

1.2 Site Description

The proposed marina location is on the west shore of Monkstown, Cork Harbour (see figs. 1 & 2). The site is positioned on the right hand river bank adjacent to Monkstown Creek, which is an extensive mudflat area. The existing shoreline at the site includes a vertical seawall at the upper reaches of the foreshore. The intertidal area is overlain by coarse silts and sands which are underlain by dense sand and cobbles, with areas of loose clay and rock.

The location of the proposed development is an area where the river velocity decreases substantially due to the plan form of the river/estuary and the topography of the area. Monkstown creek is a natural deposition area for the river sediments due to this velocity decrease. The footprint of the proposed development is at the upstream edge of this depositional area.

1.3 Proposed Development

The proposed development includes the capital dredging of a basin to accommodate the floating marina infrastructure. The depth of dredging will vary throughout the site depending on the size/depth of vessel throughout the marina, in an attempt to minimize the amount of dredging required. The dredging will be carried out to between -1.56 CD to -3.85 CD. It is proposed to over dredge the basin by approximately 0.5m, to increase the period between maintenance dredging operations. The maximum depth of dredging will be approximately 3m. The total volume of dredged material will be approximately 70,000m^3.

The dredged material will be disposed of by two methods. Suitable material (sands, gravels etc.) will be reused as construction fill in the reclaimed platform. Unsuitable silts/muds will be dumped at sea, subject to the granting of a Dumping at Sea permit from the Environmental Protection Agency under the Dumping at Sea Acts 1996 to 2009.

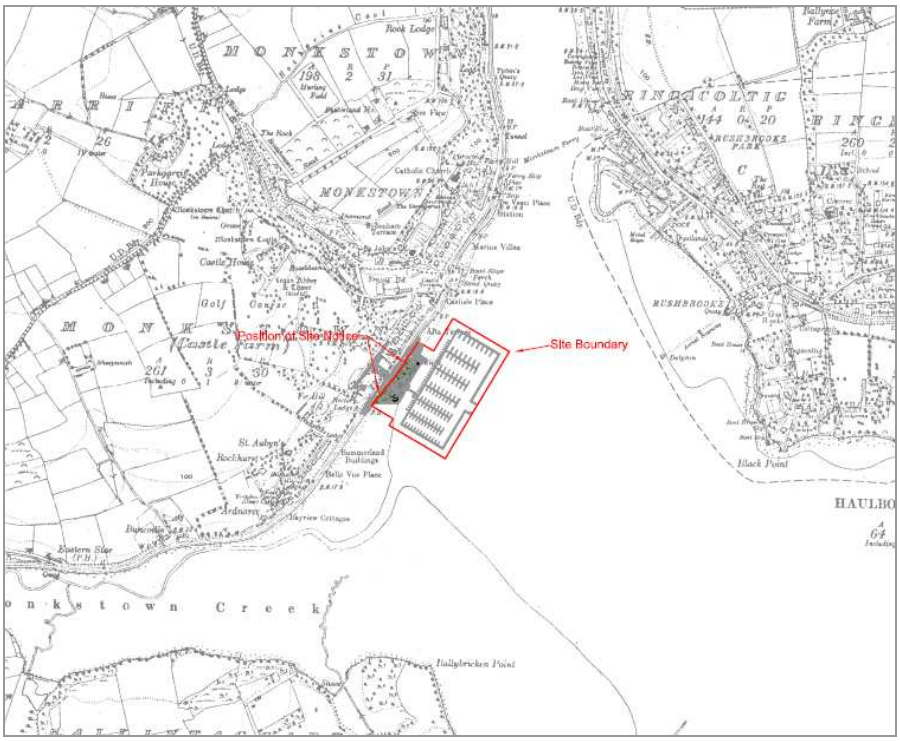


Fig. 1 – Location of Marina Development

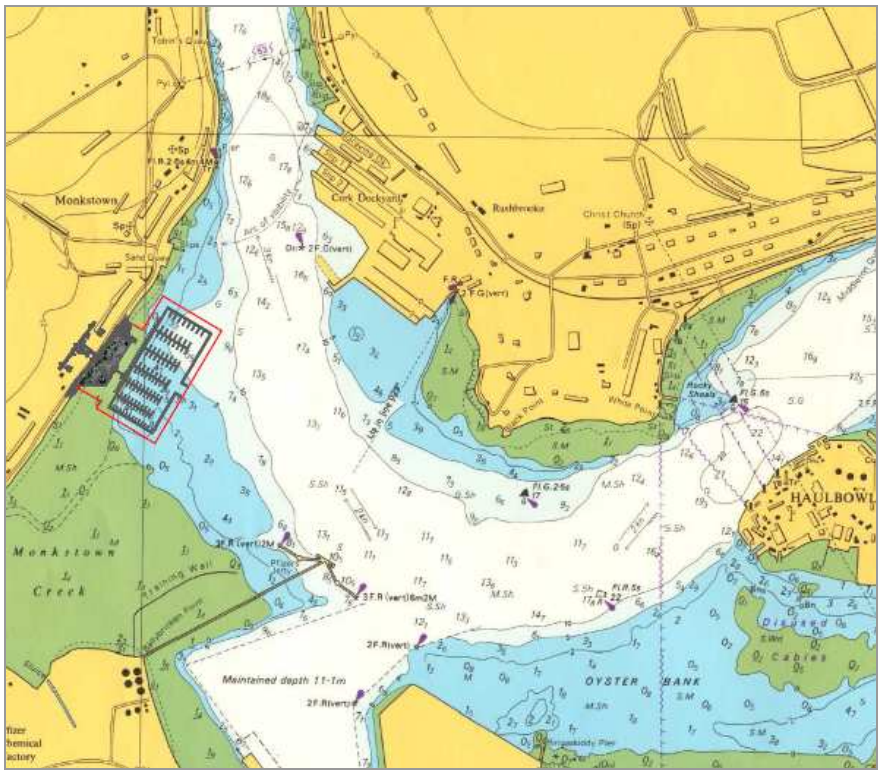


Fig. 2 – Admiralty Chart

2.0 Sediment Sampling/Testing Methodology

After consultation with the planning authority, a sediment sampling/testing specification was prepared by Cronin Millar (appendix 1) in accordance with Cronin et al 2006 and OSPAR 2009. The proposed specification was agreed with the National Parks & Wildlife Service (NPWS) prior to the commencement of sampling.

2.1 Sediment Sampling

4 No. sediment samples were taken on 12 February 2010 by Hydrographic Surveys Ltd. using a surface grab device. Samples were stored in appropriate containers and sent to the National Laboratory Service (NLS) UK. All samples were taken in accordance with Cronin et al 2006.

The location of the sample locations is shown in Fig. 3 below.

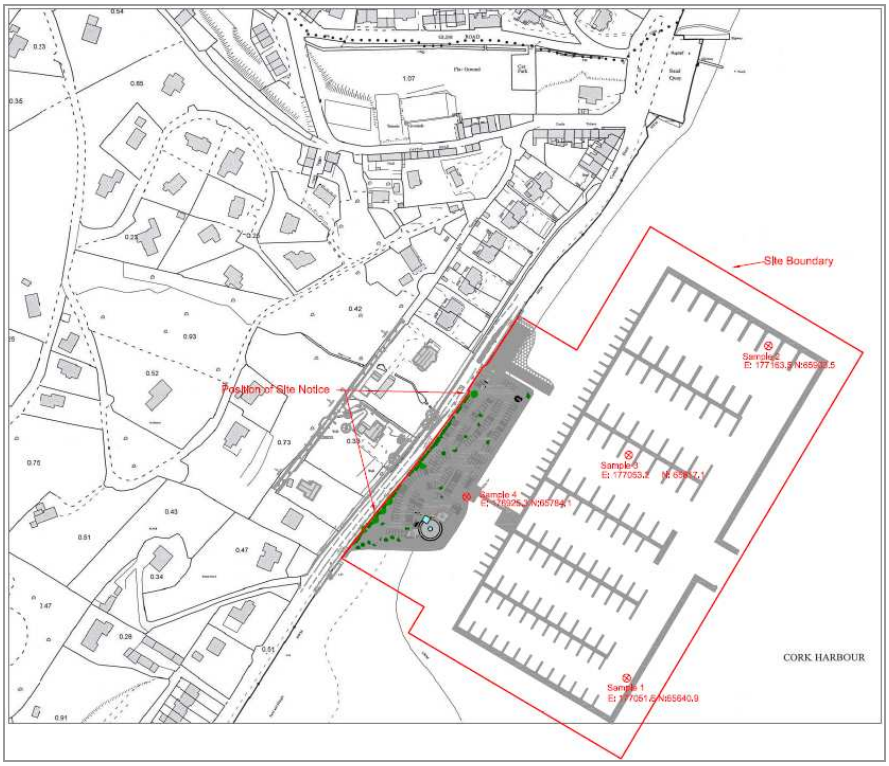


Fig. 3 – Sampling Locations

2.2 Sediment Testing

The samples were analysed by NLS for a wide range of parameters, agreed with the NPWS. The key parameters specified were:

1. Visual Inspection: Colour, texture, odour, presence of animals etc.
2. Water content, density.
3. Granulometry: % gravel, % sand, %silt.
4. The following determinants in the sand-silt fraction:
   - Total Organic Carbon
   - Mercury, arsenic, cadmium, copper, lead, zinc, chromium, nickel, lithium.
   - Tributyltin (TBT), dibutyltin (DBT).

3.0 Sediment Characteristics

3.1 Engineering Properties

The results of the analysis indicates that there is a range of sediment grain sizes. A summary of the granulometry is shown in Table 1 below.

	Sample 1	***Sample 2***	***Sample 3***	***Sample 4***
Gravel (>2mm)	0%	41%	0%	56%
Sand (63 mi to 2mm)	34%	7%	4%	6%
Silt (<63mi)	66%	52%	96%	38%

Table 1 – Sediment Granulometry

Previous site investigation results for the site area under the proposed reclaimed platform, which is predominately in the intertidal zone, indicated that the subsurface ground is comprised of coarse silts and sands underlain with dense sands and gravels/cobbles.

3.2 Chemical Properties

A summary of the sediment contaminant analysis is contained in Table 2. Guidance values for sediment quality guidelines are based on the Marine Institutes guidance levels for dumping at sea (Cronin et al 2006). Values below the lower limit are not of any concern. Values falling between the lower and upper limits may require further consideration if dumping at sea is the proposed disposal method. Values above the upper limit indicate that the material is unsuitable for dumping at sea. Where levels are below the lower limit they can be considered to be uncontaminated.

As can be seen from Table 2, contaminant levels for sediments within the proposed dredge area are all below the lower limit of the guidance values.

The levels of nickel are slightly elevated but do not exceed the lower guidance level. Nickel is widely used in the production of stainless steel. It is also used in the manufacturing of batteries, wire and other similar products and in electroplating processes. There is no marine sediment quality guideline for nickel.

The levels of arsenic were also slightly elevated, but they do not exceed the lower guidance level. Arsenic is a natural element found in soil, rivers and seawater. Arsenic is often linked to industrial discharges and it can come from the burning of coal based fuels, timber treatment and other processes. The greatest single contributor of arsenic into rivers and the sea is from run off from public roads.

The levels of other compounds associated with heavy industry, e.g. chromium, cadmium, zinc etc. were all very low.

The levels of DBT and DBT were all well below the lower guidance level.

The full analysis results from NLS are contained in appendix 2.

Parameter	Unit	Lower Level* Guidance Value	Upper Level* Guidance Value	Sample 1	Sample 2	Sample 3	Sample 4
Aluminium	mg/kg	none	none	17800	21600	13900	13900
Arsenic	mg/kg	9	70	4.69	6.08	7.88	5.76
Cadmium	mg/kg	0.7	4.2	0.175	0.184	0.249	0.114
Chromium	mg/kg	120	370	27.4	29.0	34.3	22.5
Copper	mg/kg	40	110	11.9	18.6	18.8	10.3
Lead	mg/kg	60	218	23.0	34.6	31.1	18.6
Lithium	mg/kg	none	none	27.2	31.2	34.0	22.8
Mercury	mg/kg	0.2	0.7	0.156	0.0820	0.098	0.0140
Nickel	mg/kg	21	60	15.6	17.3	19.5	16.4
Zinc	mg/kg	160	410	80.4	88.0	98.9	61.7
DBT	mg/kg	0.1	0.5	< 0.005	< 0.006	< 0.007	<0.004
TBT	mg/kg	0.1	0.5	< 0.005	< 0.006	< 0.007	< 0.004

Table 2 – Sediment Quality Results

3.3 Additional Sediment Information

Sediment sampling was carried out as part of the preparation of an EIS for the Port of Corks proposed development at Oysterbank, Ringaskiddy. A number of sediment samples were taken close to the proposed Monkstown Marina site. Sampling and analysis was carried out in accordance with Cronin et al, 2006.

A review of the sediment analysis results for the relevant samples (indicated on drawing in Appendix 3), shows that the samples were not contaminated and the sediments in question would be suitable for dumping at sea or re-use.

4.0 Impacts of Dredging Operations

4.1 Dredging

As outlined in the Construction Method Statement, which was submitted as part of the Environmental Impact Statement (EIS), dredging will be carried out using a long reach excavator mounted on a floating barge. A total of 70,000m^3 of material will be dredged from the proposed marina basin as part of the capital works. The dredged material will be disposed of by two methods. Suitable material (>63 microns) will be used as engineering fill in the construction of the reclaimed platform. Unsuitable material (<63 microns) will be disposed of at sea.

An application for a Dumping at Sea permit to the EPA will be made in due course. It is proposed to use the existing Cork Harbour dump site for the disposal of the unsuitable material.

Impacts can be caused by dredging, transport of dredged material and relocation of material (on shore and off shore).

4.1.1 Impacts at Dredge Site

Potential impacts caused by dredging operations at the dredge site are as follows:

Interference with Navigation
Dredging plant can obstruct other navigating vessels. The proposed site however is located away from the main navigation channel and impacts are considered unlikely.

Noise
While all excavation activities generate noise, underwater dredging is relatively quiet. The excavation of rock can generate significant noise; however no rock will be dredged as part of this project.

Fishing
There are no commercial fishing operations at the proposed dredge site.

Turbidity & Suspended Sediment
Dredging operations will mobilise the silt fraction and release suspended sediments into the water column. The existing river transports huge volumes of silt, much of which settles out at various locations in the harbour, including Monkstown Creek.

It is proposed to restrict dredging operations to the ebb flow period of the tidal cycle to minimise settlement in the Monkstown Creek area. For a full examination of the impacts on the SAC, please refer to the EIS and Appropriate Assessment (AA) reports.

Coastal Erosion & Accretion
The potential for erosion and accretion to occur due to both the dredging operations and reclamation works were examined in Cronin Millar's Hydrodynamic Report, which was submitted as part of the planning application. The report concluded, based on the outputs from a numerical hydrodynamic model (analysis of changes of water velocities and therefore potential for mobilisation/deposition of sediments) that the dredging operations and the reclamation works would have only a negligible impact on the coastal processes in the area. Please refer to the Monkstown Marina Phase II Coastal Processes Report.

4.1.2 Impacts at Disposal (Dump) Site

The impacts of the disposal operations at the Cork Harbour dump site will be examined as part of the Dumping at Sea permit application.

5.0 References

(1) Cronin et al. 2006. Guidelines for the assessment of dredge material for disposal in Irish waters. Marine Institute, Ireland.

(2) RN Bray et al. 1997. Dredging – A handbook for engineers. Butterworth Heinemann, Oxford.

(3) OSPAR. 2009. Guidelines for the management of dredged material. Ref: 2009/04.

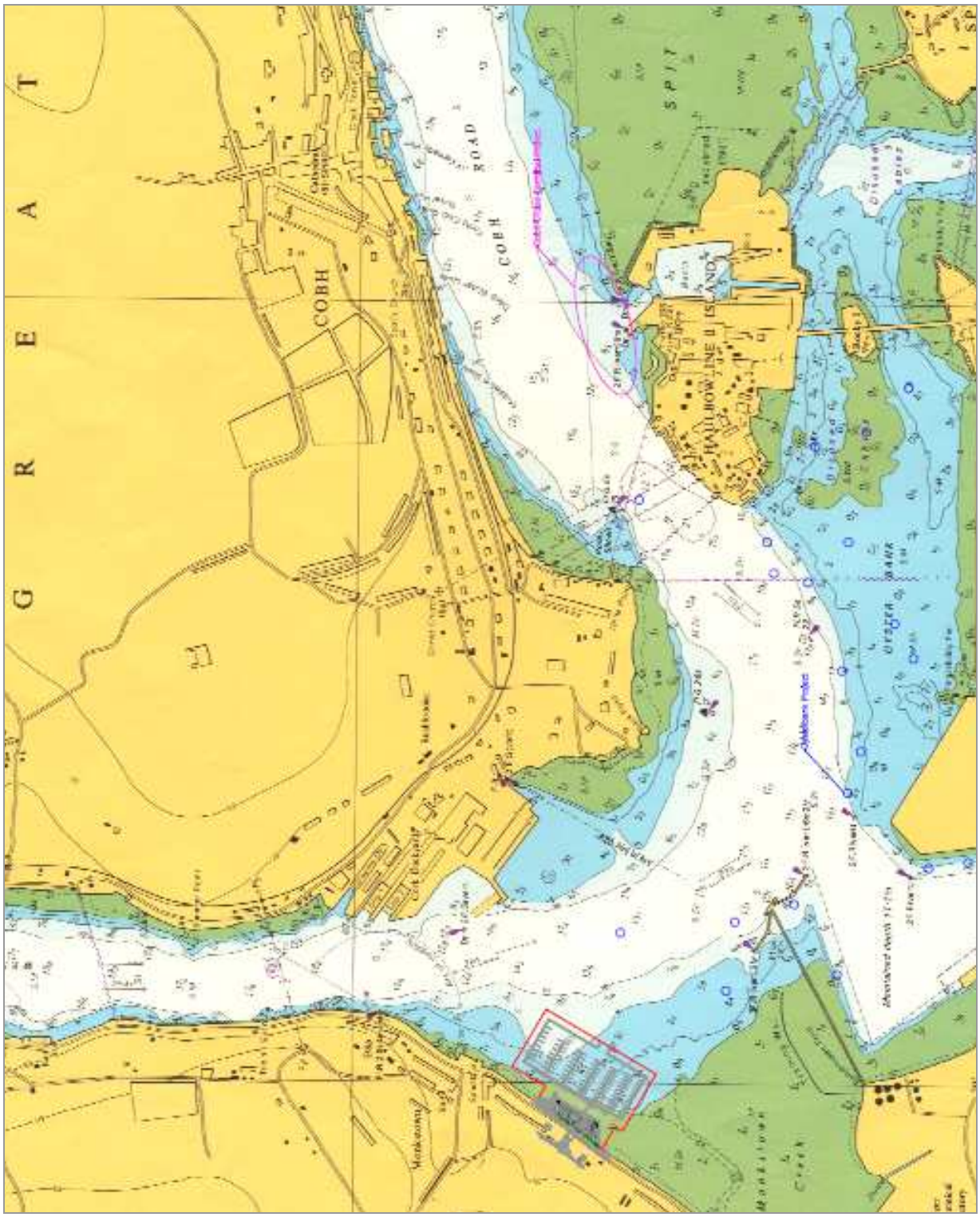
(4) OSPAR. 2008. Overview of contracting parties National Action Levels for dredged material.

Appendix 1

Appendix 2

Appendix 3

Sediment Sampling Points (Oysterbank Development)


G R E A T
COBH
ROAD
COBH
SPIT
HAULBOWLINE
ISLAND
OYSTER
BANK