

ECA Regional Monitoring Blueprint

Specifications and Operating Procedures

Baseline Regional Seabed Sediment Survey



Document Information

This document has been prepared by Emu Ltd on behalf of the ECA to describe the procedures that will be employed during the baseline seabed sediment survey as part of the ECA's regional monitoring programme.

This SOP is a draft version that is under discussion. Further issues of this SOP will be circulated once a final version is complete. This SOP has been circulated with Blueprint Version v071005.

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1. Introduction

This document describes the scope of works and methodology that will be employed during regional baseline seabed sediment sampling in Area 473 East. The background and rationale for the study is presented in the ECA Regional Monitoring Blueprint.

Whilst the methods described herein are specifically tailored to baseline sampling it should be noted that subsequent repeat surveys using the same techniques will employ the same methods as those described in this document.

1.1. Rationale

Current understanding of the behaviour of overflowed and screened sediments from dredging processes is that such fine sediments are redistributed at the seabed under the influence of tides, and to a lesser extent, waves.

The REA of aggregate extraction in the Eastern English Channel provided a model for the likely redistribution of sediments under the specific hydrodynamic conditions of the region (See Blueprint v0.3 071005 Section 5). The model predicts that sediment will be redistributed on the seabed following deposition to form zones with differing characteristics and associated impacts.

The seabed sediment study proposed under the terms of the regional monitoring programme has been developed to test the validity of the model presented in the REA.

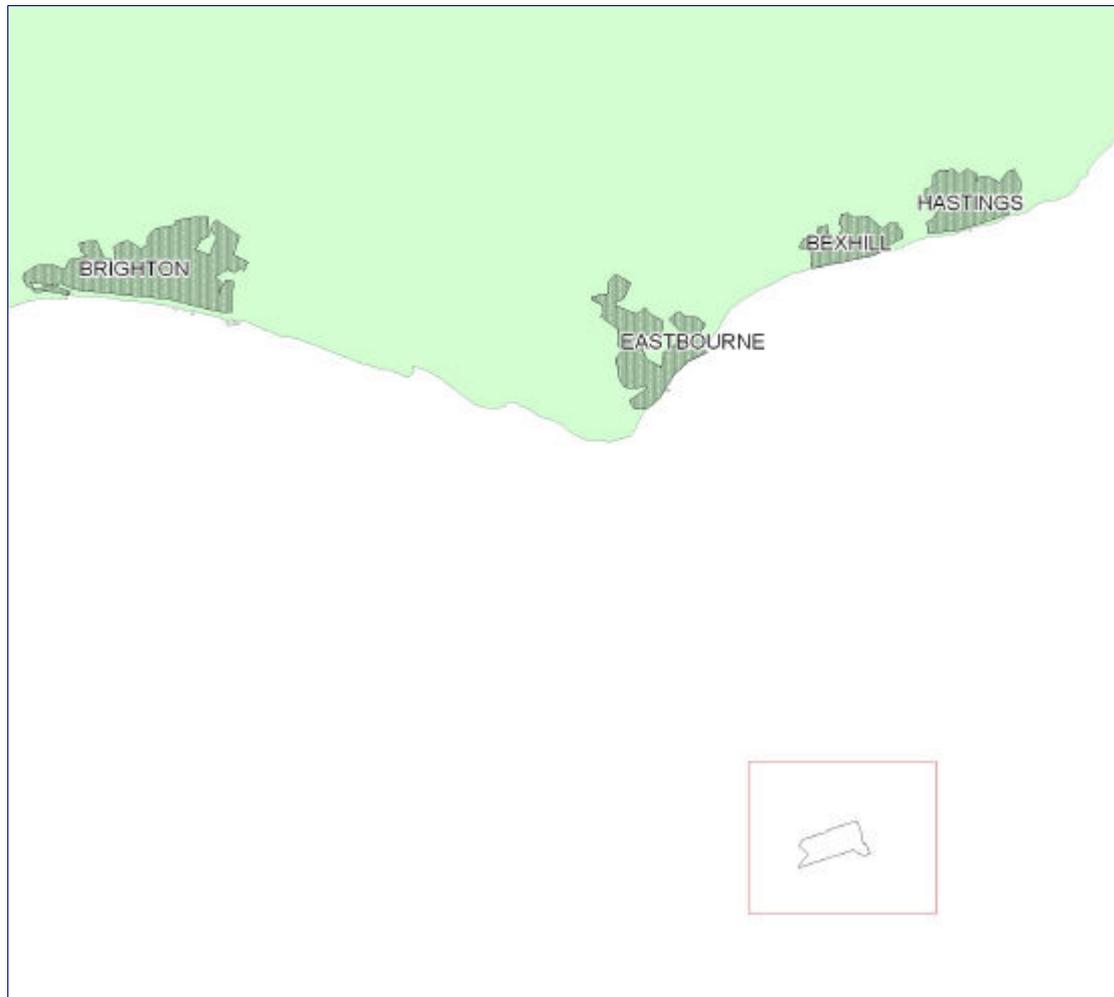
Ultimately, the works will allow a model to be developed that relates seabed sediment psd characteristics, hydrodynamic (tidal current) conditions and dredging activity to the nature and scale of sediment bedforms and features that develop.

Following discussions with CEFAS, and decisions by the applicants regarding the size of the initial active area of operations, a revised array for the baseline seabed sampling survey in Area 473 East (location shown in **Figure 1**) has been produced (**Figures 2 and 3**).

2. Location of Survey Works

The ECA has chosen Area 473 East as the location for the seabed sediment survey. It has been assumed (See Regional Monitoring Blueprint Section 5) that hydrodynamic conditions in Area 473 East are broadly comparable with those that exist across the ECR and that works undertaken in the area may be applied, with site specific adaptation resulting from DPA specific monitoring studies, to other areas in the region. **Figure 1** shows the location of the study area.

Figure 1 Location of Area 473 East and other ECR dredging permission areas.



3. Aims and Objectives of the Baseline Survey

Aims

The baseline seabed sediment study has been designed to acquire data that will:

- Describe the character (qualitative) of the seabed within and surrounding the 473 East DPA.
- Describe the physical properties (quantitative) of samples of the upper layers of sediments within and surrounding the 473 East DPA.
- Describe the benthic fauna (quantitative) that exist within the seabed samples.

Objectives

The sampling and survey works have been designed to fulfil the following objectives:

- Review of digital sidescan sonar data over the area shown in Figure 2.
- Still camera imagery and clamshell grab sampling of sites shown in Figure 3.
- Sub-sampling of grabs for purposes of psd and benthic infaunal analysis.
- Logging and photographic recording of sediment profiles evident in grab samples.
- Acquisition of video footage along transects shown in Figure 3.
- SPI imagery attempted at the sites shown in Figure 3.

Figure 2 Area over which sidescan sonar data are available for review

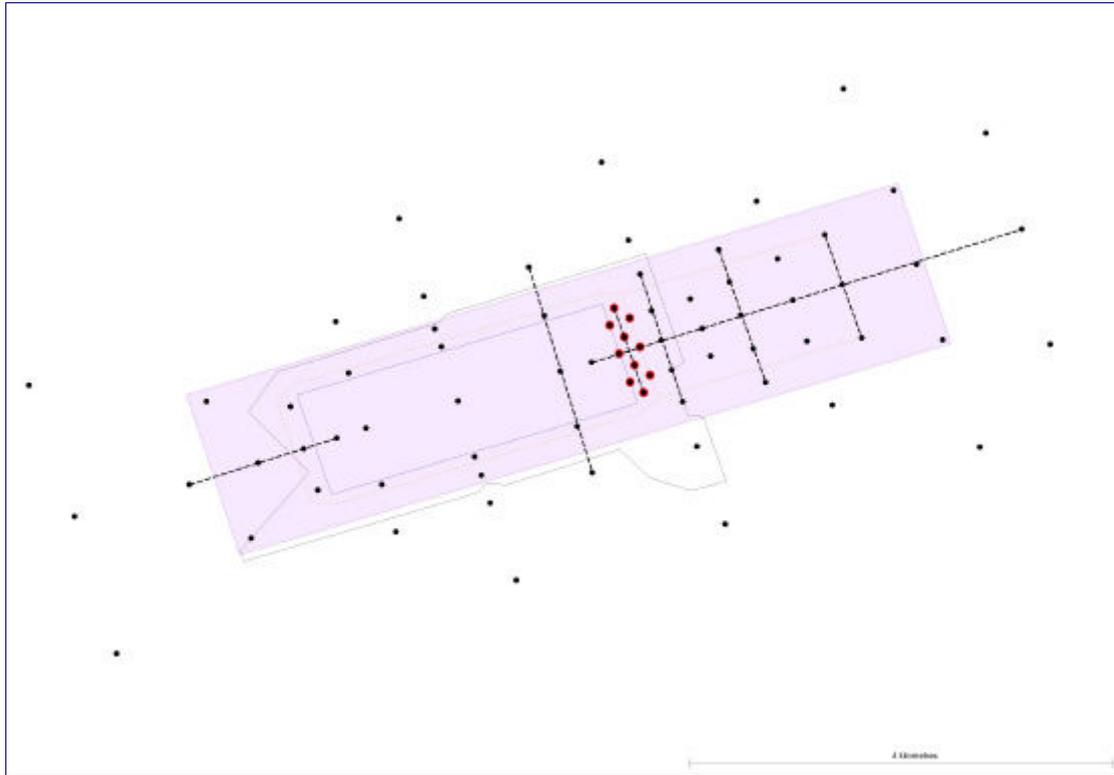
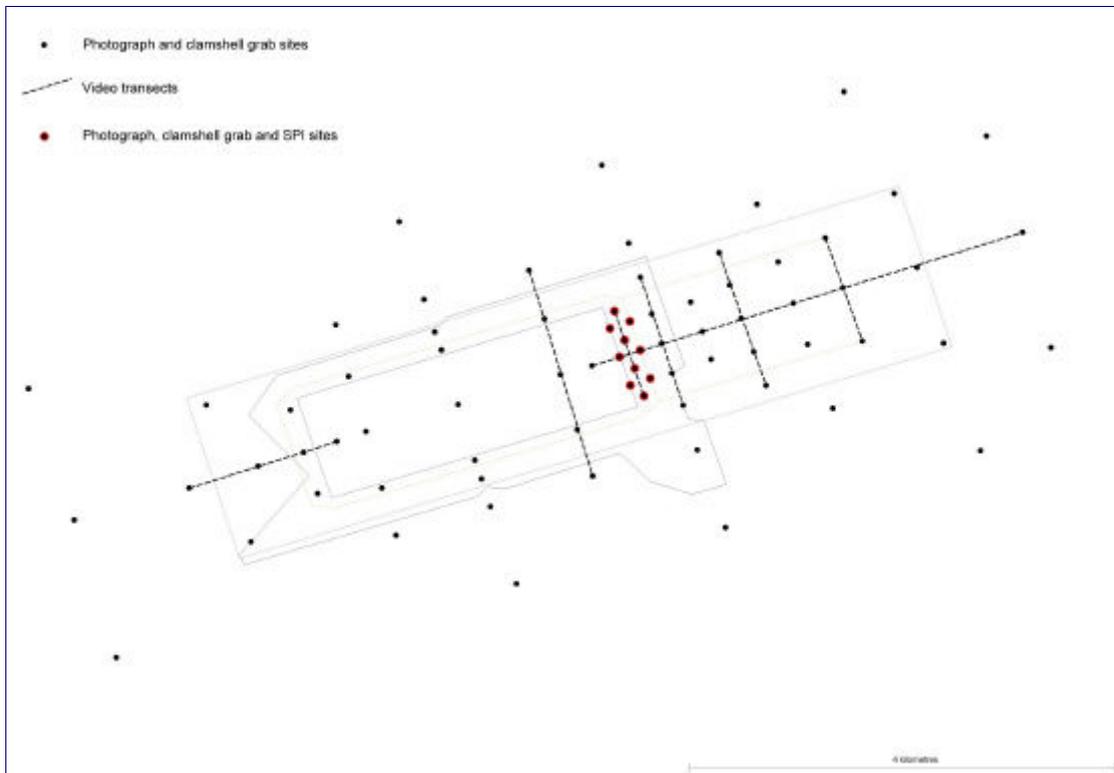


Figure 3 Sampling sites and transects



4. Constraints

It has been noted by statutory nature conservation bodies that the East Channel Region that habitats and species may exist in the region that are of conservation importance. Bearing this mind, the surveys described in this document have been designed to ensure that invasive sampling of the seabed will not be undertaken in areas where sensitive habitats or species are identified.

The methods by which sampling will be undertaken are described below. The exact sequence of events has been determined to ensure that conservation sensitivities are considered at each stage of the process.

Timing of surveys is considered to be a constraint in terms of the ability to take samples effectively in poor weather. Seasonal changes in the nature of benthic communities is less of an issue in this respect as a dedicated programme of biological sampling is required, and has been initiated, under the terms of the ECR Monitoring Blueprint.

5. Methodology for Baseline Sampling

The surveying and sampling described in this document will be undertaken as follows, in the order in which it appears below:

5.1. Vessel

Vessel specifications shall conform as closely as possible to those specified in the SOP for the ecological monitoring programme. In any event the vessel employed for the survey works shall be suitably certified and capable of undertaking the works prescribed below, within the area of operations.

Vessel operators must provide all relevant Health and Safety documentation to the ECA prior to works commencing.

5.2. Positioning

Vessel positioning systems shall conform as closely as possible to those specified in the SOP for the ecological monitoring programme. A minimum vessel positioning accuracy of <5m is required for sampling works. The vessel shall be capable of maintaining station under the conditions experienced in the area of operations to ensure that samples are taken from within a <50m radius of the prescribed sample position, although positioning of <20m is preferable.

5.3. Sidescan Sonar Survey

High frequency digital sidescan sonar data has been acquired across the area shown in **Figure 2**. Data acquisition was undertaken at 500kHz and line spacing was designed to ensure a minimum of 100% coverage of the seabed.

This data has been mosaiced and reviewed in order to determine the nature of the seabed and identify areas exhibiting distinct sedimentary characteristics. The review showed that sediment in Area 473 East is generally of uniform character.

5.4. Digital Still Camera Imaging

Stills camera systems should preferably record on a digital medium of minimum 4 Megapixel resolution or more to allow for review of the data upon recovery. Images from the camera shall be relayed to the vessel in real time. The camera should be deployed prior to the grab sampler to allow an image of the seabed to be recorded before grab samples are taken.

The configuration of the stills camera system should allow for variations in view, strobe orientation and focal length in order to maximise data quality with respect to the prevailing conditions.

For the most part, the camera should provide an oblique stills photograph of the seabed covering a surface area of approximately 1 square metre. However, a capacity for a plan view (i.e. vertical) and a closer focal length of <50cm is also required in the event of poor water clarity.

A trigger delay of no more than 2 sec shall occur between trigger and photograph timing. The camera system is to be fitted with a strobe supplied in a separate housing to allow an offset of up to 90° from the camera's view.

All photographic operations are to be annotated into a field log which will be supplied at the end of the field operations. Information included shall be as follows:

- **Client and project details**
- **Survey date**
- **Site name and replicate number**
- **Easting and Northing**
- **Water depth**
- **Interpretation of pertinent features such sediment type, bedforms, local topographic features, significant epifauna and/or mega-fauna and habitat related features**

Photographic data from all sites should be provided as hardcopy plates and digital image files. Locations of photographic sample sites shall also be presented within the context of results from previous acoustic survey interpretations in order to provide ground-truthing for these surveys.

A chart of sample locations relative to seabed features will be supplied.

5.5. Clamshell Grab Survey

A large volume hydraulic clamshell grab will be employed to take samples of the top 30-50cm of the seabed. The exact specification of the grab is not known at present. Following the tendering process for baseline sampling works the specification of the grab to be employed will be appended to this document.

5.6. Video Transect Survey

The video will be supplied with its own source of illumination which will be no less than 150 Watts. Lights will be placed in such a way that no excessive bright or dark spots exist.

The video shall be digitally recorded onboard the vessel, with a means to review, replay, capture and extract data digitally immediately after acquisition. Should data be recorded direct to flash memory of DVD disk, then a secondary means of recording is also required (i.e. VHS or DV tape).

All recorded data shall be provided on multi-region DVD media on completion of the field operations.

Along the transects, video equipment will be deployed to provide seabed imagery. All video footage will be annotated with the following:

- **Site Position**
- **Date, Time**
- **Water Depth**
- **Project Title, Client details, Site No. etc.**

5.7. Seabed Profile Imaging

A seabed profile camera will be utilised to obtain *in situ* images of the seabed where the character of the surface seabed sediment allows. The sites where SPI images will be obtained are shown in **Figure 3**. The exact specifications of the SPI apparatus will be appended to this document when known.

5.8. Sub-sampling of Clamshell Grab Samples

Each clamshell grab sample shall be processed when retrieved onboard the survey vessel as follows:

1. The surface of the sample shall be photographed using a digital camera before sub-sampling (minimum 4 megapixel resolution).
2. Before the jaws of the grab are opened a core sample shall be taken from the main sample. This shall be achieved by pushing a suitable diameter core barrel into the grab sample. The core shall be withdrawn and the ends sealed to prevent loss.
3. Before the jaws of the grab are opened a sample of the surface sediment (of at least 5litres and of sediment from <20cm deep in the grab sample) will be taken and retained in formalin for subsequent benthic infaunal analysis. The procedure for storage of benthic infaunal samples is provided in the EMSOP v1.
4. Once core and benthic samples have been taken the jaws of the grab shall be released. The release of the jaws should be undertaken in order to preserve, as far as possible, the sediment profile of the grab sample. A photograph of the sediment profile of the grab shall be taken.
5. A brief log of the profile of the sample shall be recorded. The log should note the character of the sediment profile including where relevant:
 - Colour and sediment character.
 - Thickness of discrete layers within the sediment.
 - Existence of sedimentary structure eg, lamination, grading, cross bedding etc
 - Biological characteristics including existence of live animals and shell fragments.
 - Evidence of bioturbation.

A sample identification protocol shall be employed that clearly describes the samples with unique identifiers.

6. Data/Sample Storage and Delivery

All data and samples shall be stored onboard in a secure environment until the end of survey operations. The contractor shall make available suitable shore based storage space for the samples and retain the samples until provided with instructions regarding processing.

7. Reporting

A survey report shall be provided by the survey contractor that provides:

- A complete set of Daily Progress Reports
- A Navigation/Positioning Report describing the methods used for positioning, offsets, and the as sampled coordinates and track plots for video survey.