

# Contaminated Dredged Marine Sediments: Developing a UK Management Framework

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Partrac Ltd

# Document Control

Version History				
Version	Date	Prepared by	Reviewed by	Approved by
V01	DATE	NAME	NAME	NAME

Changes from the Previous Version	
Section	Description of Changes
	n/a – original version

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# Research and Support for Developing a UK Strategy for Managing Contaminated Sediments

*'a decision that an area needs to be dredged has been taken'*

## Project Co-Funders

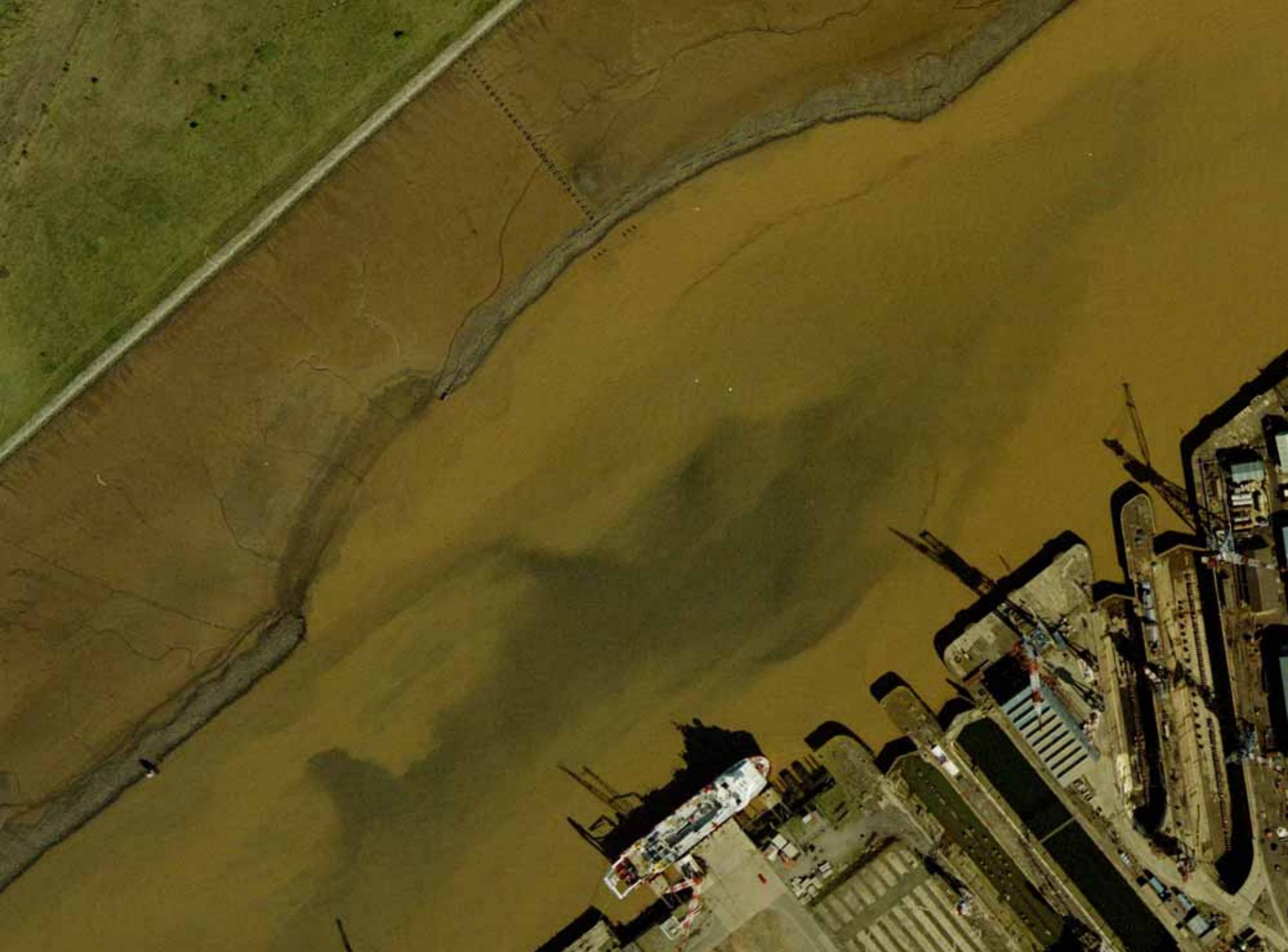


Budget

**£267,809**

Research duration

2.5 years



## Managing Contaminated Dredge Sediments

- **Complex and politically charged issue**
- **Requires integrated economic, environmental and social framework**
- **Bias towards dredging needs**
- **Requires a sustainable, long-term solution**
- **Key project components include:**
  - **Problem definition on national scale**
  - **Legal (regulatory) barriers**
  - **BPEO**
  - **Wide consultation**
  - **Waste management ↔ DM management framework**
  - **Information gaps; future R&D**

## Project History and Inception

Jan 2006 Internal review by the Defra

May 2006 Committee formed:

CEFAS,

Natural England,

Welsh Assembly & the Scottish Executive,

The Crown Estate,

Industry representatives (ABP, BPA, PLA),

Major UK conservation agencies and green NGO's (e.g. CCW, JNCC, MCS).

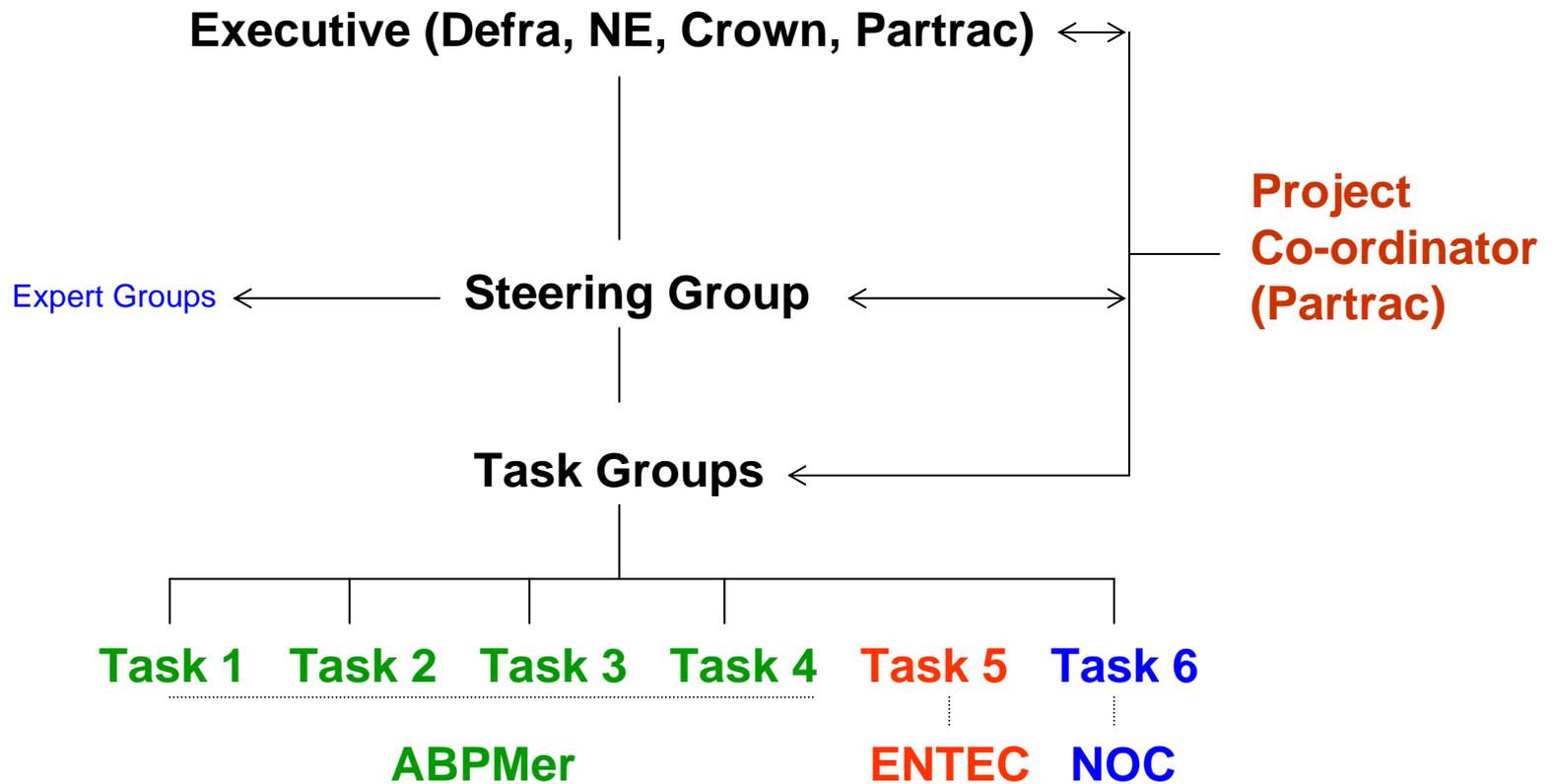
Terms of Reference for this group was *'to assist and facilitate the development of the UK strategy for handling and managing contaminated material to be dredged from UK marine waters, and to support and advise on the practical implementation of the strategy'*.

Feb 2007 Competitive tender issued for Tasks, including Co-ordination

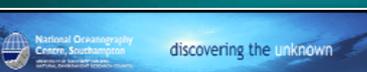
Apr 2007 Project commences

End Date October 31 2009

# Project Management Structure



## Project Work Packages

Task 1		Characterising the issue and delivering a national database of UK CMS
Task 2		Exploring liability and polluter pays issues issues.
Task 3		Identifying existing relevant legislative and regulatory barriers with respect to CMS
Task 4		Establishing Best Practise for the prevention of pollution arising from CMS
Task 5		Establishing Best Practise for current disposal and treatment options for CMS
Task 6		Identifying future R7D related to CMS

### **TASK 7** INTEGRATION/DELIVERY

- ‘analysis’ of the central issues →advise MFA in Defra (ditto for Wales, Scotland, NI)

## Task 1 Characterising the issue and delivering a national database of contaminated marine sediments in UK waters.

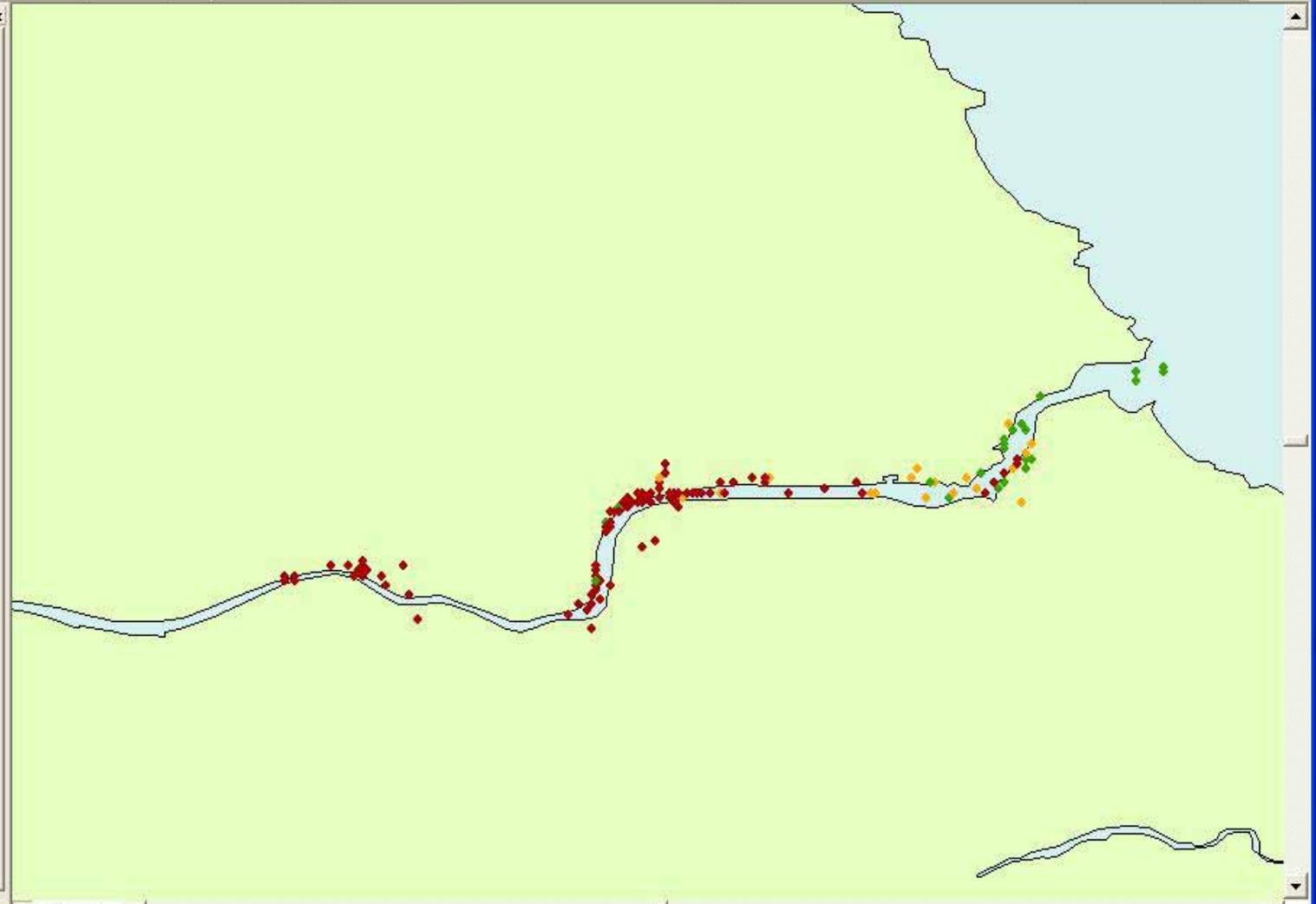
- Generation of GIS data layers in ArcGis 9.2
- Population with data from;
  - CEFAS FEPA data
  - National governments (WAG, SE, NI)
  - BGS metals in sediments (subject to licensing agreements)
- Sediment type information from MESH
- Sediment fraction information
- AL ½ scripts
- Stored within Defra MAGIC database; system inter-operability
- Future maintenance? To be defined
- End user access? To be defined

1:132,909

Editor Task: Create New Feature Target:

**Layers**

- Zinc 2007
  - Zn
    - 0 or Not Recorded
    - < 130 ppm
    - 130 - 180 (Action Level 1)
    - > 180 (Action Level 2)
- Zinc 2006
- Zinc 2005
- Zinc 2004
- Zinc 2003
- Zinc 2002
- Zinc 2001
- Zinc 2000
- Zinc 1999
- Zinc 1998
- Zinc 1997
- Zinc 1996
- Zinc 1995
- Europe
- UK\_Continental\_Shelf



Display Source Selection

Drawing

Arial 10 B I U

-1.39 55.068 Decimal Degrees

## Task 2 Exploring liability and the Polluter Pays principle

PROGRESS Draft report submitted

- Generic examination of the central issues; paper produced for review
- Transfer of costs  $\Leftrightarrow$  legal mechanisms
- Importance of the Environmental Liability Directive 2009
- Liability at the point of dredging key focus area
- Liability/risk during transport-disposal
- Examination of supplied case studies ongoing
- Discussions with Defra legal representatives ongoing

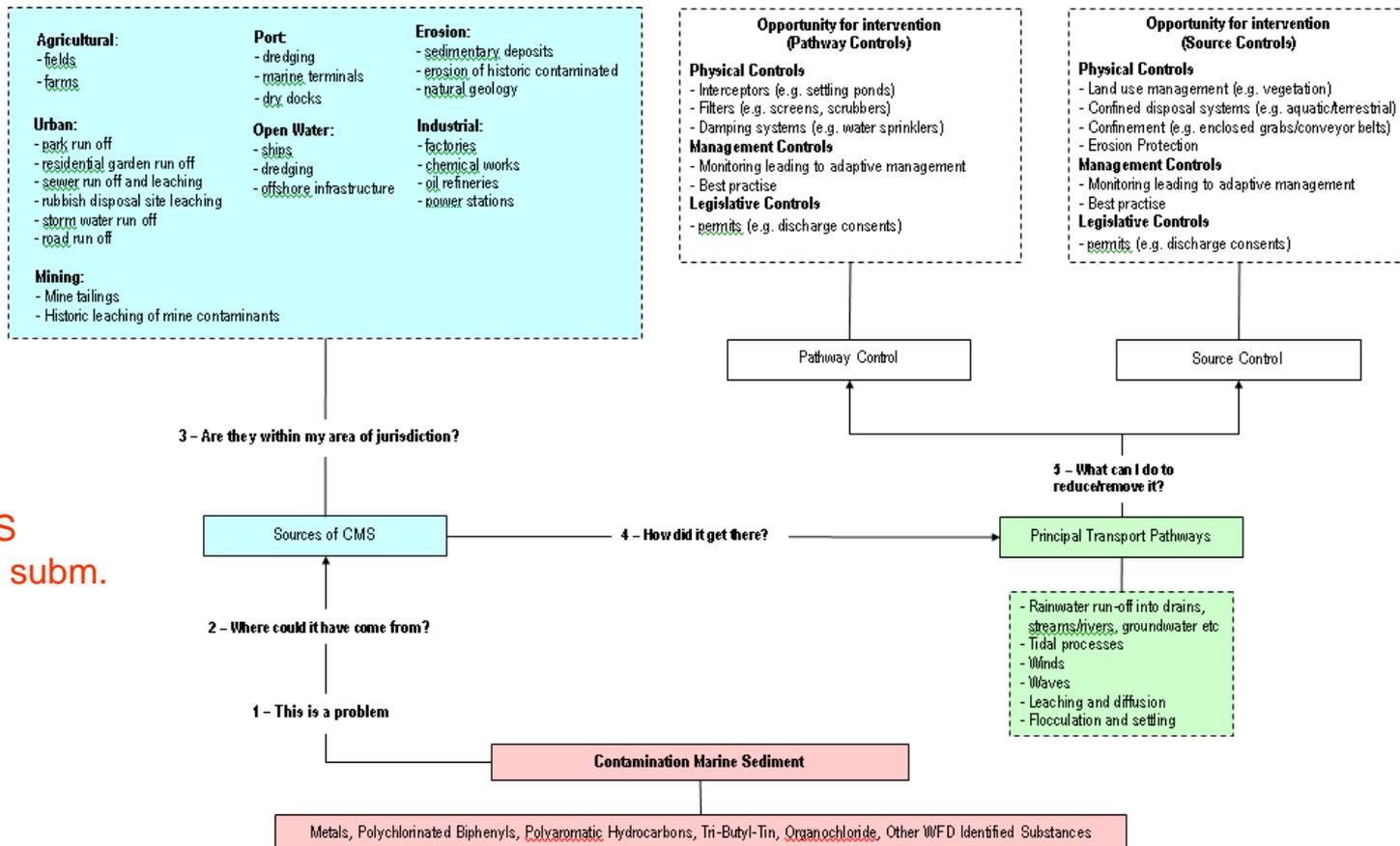
### **Task 3** Identifying existing relevant legislative and regulatory barriers, and guidelines and protocols, with respect to CDMS

PROGRESS draft report submitted

- Initial review of
  - general legislation of relevance to the CMS management
    - EU Directives
    - Domestic legislation (FEPA, CP Act, Marine Bill)
    - EU UK waste management legislation
- Examine classification/categorisation and options available for disposal/re-use within leg. boundaries
- Land versus Marine management trees
- Identification of regulatory barriers ⇒ way forward
- Identify and document connectivity to legislation within other tasks (Task 2 & 5)
- Industry/stakeholder consultation to identify barriers/experience
- Production of narrative identifying key legislation, barriers and present policy area recommendations
  - Case studies

# Task 4 Establishing best practise for the prevention of pollution arising from CDMS

Simplified Flow Diagram – Source – Pathway - Control



PROGRESS  
-draft report subm.

# Task 5 Establishing best practise for current disposal and treatment options for CDMS

PROGRESS draft report submitted

•SedNet research

## Purpose of this Report

### 1. Background

### 2. Information Sources

#### 2.1 Introduction

#### 2.2 Treatment Options

2.2.1 Treatment Options – Consultations

#### 2.3 Disposal Options and Beneficial Use

2.3.1 Disposal Options and Beneficial Use – Consultations

### 3. Treatment Options

#### 3.1 Introduction

#### 3.2 Treatment Methods

3.2.1 Pre-treatment

3.2.2 Physico-chemical

3.2.3 Biological

3.2.4 Thermal

3.2.5 Electrokinetic

3.2.6 Immobilisation

#### 3.3 Summary

### 4. Disposal and Beneficial Use

#### 4.1 Introduction

#### 4.2 Disposal Options

4.2.1 Open Sea with Capping/Isolation Techniques

4.2.3 CDFs

4.2.4 Land Disposal and Landfill

#### 4.3 Beneficial Use of CMS

4.3.1 Backfilling of Aquatic Borrow Pits

4.3.2 Engineering

4.3.3 Construction Industry

### 5. Socio-Economics

### 6. Summary of BPG for CMS

#### 6.1 Introduction

6.1.1 Heading 3 – Alt+3

6.1.2 Introduction

6.1.3 Sediment Quality Guidelines (SQGs) and Chemical Screening

6.1.4 Biological Screening

6.1.5 Disposal of Type 3 (Special Treatment/ Disposal) CMS

6.1.6 Disposal of CMS at the CAD Facility

6.1.7 The Environmental Monitoring & Audit Programme

6.1.8 Discussion

## Task 6 Identify relevant marine sediment related R&D relevant to the management of CDMS

PROGRESS draft report submitted

- bibliographic software

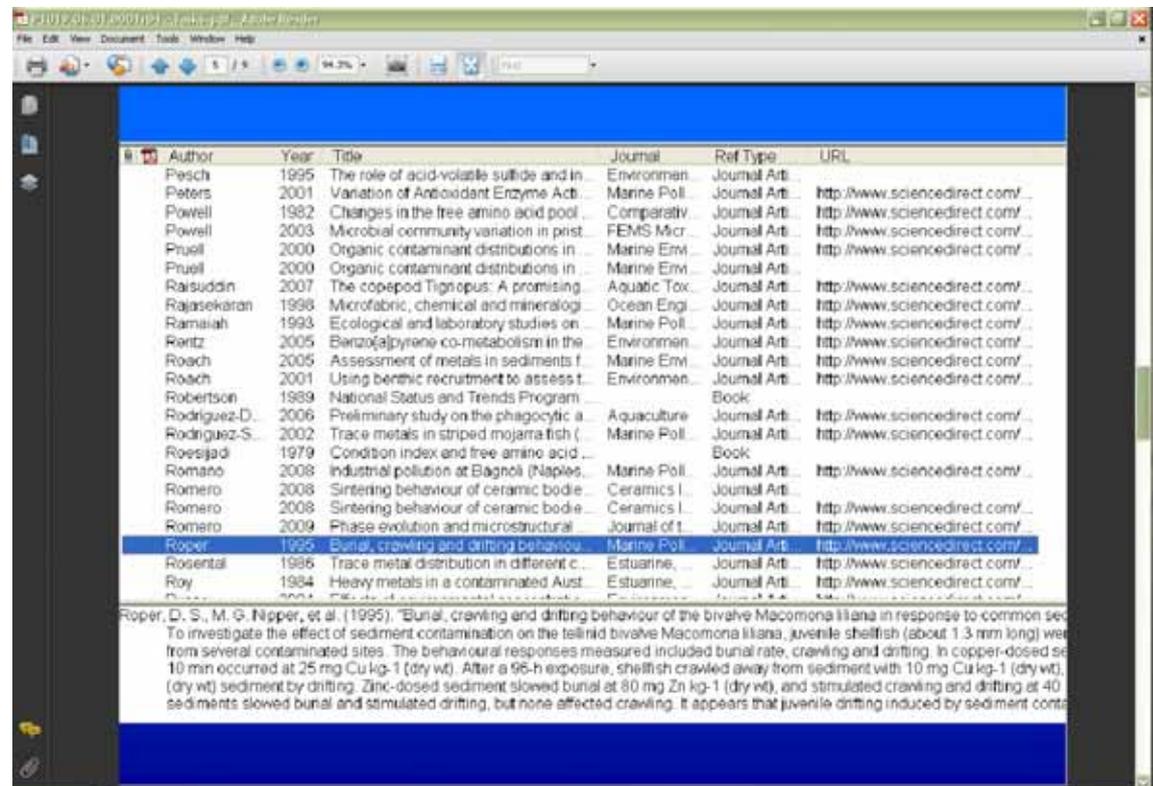
*Endnote 10*

- identify gaps and future priorities

- easily searchable format

- export to a variety of formats

- on-line database



Author	Year	Title	Journal	Ref Type	URL
Pesch	1995	The role of acid-volatile sulfide and in	Environmen	Journal Arti	
Peters	2001	Variation of Antioxidant Enzyme Acti...	Marine Poll	Journal Arti	<a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a>
Powell	1982	Changes in the free amino acid pool...	Comparativ	Journal Arti	<a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a>
Powell	2003	Microbial community variation in pist...	FEMS Micr	Journal Arti	<a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a>
Pruell	2000	Organic contaminant distributions in	Marine Envi	Journal Arti	<a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a>
Pruell	2000	Organic contaminant distributions in	Marine Envi	Journal Arti	<a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a>
Raisuddin	2007	The copepod <i>Tigropus</i> : A promising	Aquatic Tox	Journal Arti	<a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a>
Rajasekaran	1998	Microfabric, chemical and mineralogi	Ocean Engi	Journal Arti	<a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a>
Ramaiah	1993	Ecological and laboratory studies on	Marine Poll	Journal Arti	<a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a>
Rantz	2005	Benzo[a]pyrene co-metabolism in the	Environmen	Journal Arti	<a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a>
Roach	2005	Assessment of metals in sediments f...	Marine Envi	Journal Arti	<a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a>
Roach	2001	Using benthic recruitment to assess f...	Environmen	Journal Arti	<a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a>
Robertson	1989	National Status and Trends Program		Book	
Rodriguez-D.	2006	Preliminary study on the phagocytic a...	Aquaculture	Journal Arti	<a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a>
Rodriguez-S.	2002	Trace metals in striped mojarra fish (...)	Marine Poll	Journal Arti	<a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a>
Roesijadi	1979	Condition index and free amino acid ...		Book	
Romano	2008	Industrial pollution at Bagnoli (Naples,	Marine Poll	Journal Arti	<a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a>
Romero	2008	Sintering behaviour of ceramic bodie...	Ceramics I	Journal Arti	<a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a>
Romero	2008	Sintering behaviour of ceramic bodie...	Ceramics I	Journal Arti	<a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a>
Romero	2009	Phase evolution and microstructural	Journal of I	Journal Arti	<a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a>
Roper	1995	Burial, crawling and drifting behaviour...	Marine Poll	Journal Arti	<a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a>
Rosental	1986	Trace metal distribution in different c...	Estuarine,	Journal Arti	<a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a>
Roy	1984	Heavy metals in a contaminated Aust...	Estuarine,	Journal Arti	<a href="http://www.sciencedirect.com/">http://www.sciencedirect.com/</a>

Roper, D. S., M. G. Nipper, et al. (1995). "Burial, crawling and drifting behaviour of the bivalve *Maccomona liliana* in response to common sea To investigate the effect of sediment contamination on the tellinid bivalve *Maccomona liliana*, juvenile shellfish (about 1.3 mm long) were from several contaminated sites. The behavioural responses measured included burial rate, crawling and drifting. In copper-dosed se 10 min occurred at 25 mg Cu kg<sup>-1</sup> (dry wt). After a 96-h exposure, shellfish crawled away from sediment with 10 mg Cu kg<sup>-1</sup> (dry wt), (dry wt) sediment by drifting. Zinc-dosed sediment slowed burial at 80 mg Zn kg<sup>-1</sup> (dry wt), and stimulated crawling and drifting at 40 sediments slowed burial and stimulated drifting, but none affected crawling. It appears that juvenile drifting induced by sediment conta

## INTEGRATION Analysis/Synthesis

- Just commenced
- Final Report to Defra end November-early December, 2009
  
- What is the problem? Incl. nature and extent of contamination, socio-economic implications for potential areas of development.
  
- What are the potential options when addressing the problem? Incl. technical possibilities and the scenario of simply not developing where economics do not make viable.
  
- What are the considerations when determining the best option? Incl. cost, regulatory framework, liability, ownership.
  
- What are the pros and cons of each option? What is the recommended way forward?

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## Contaminated Dredged Marine Sediments: Developing a Management Framework

### Marine & Fisheries home

#### Contaminated Marine Sediments

- Project Background
- Project Co-ordination
- Lead Task Organisations
- News
- Publications
- Tasks



In conjunction with [The Crown Estate](#) and [Natural England](#), Defra is leading a 3-year initiative to provide a management framework to address contaminated marine sediments.

Years of historic industrialisation at the coast and within the ports of the UK have given rise to a legacy of pollution and contamination in the bottom sediments, and these pose both environmental and social risks. Increasingly these sediments need to be dredged in order to support ever increasing port developments and associated maritime trade.

The framework will provide stakeholders with guidelines for the management of contaminated marine sediments in UK waters and will:

- Promote objective, transparent assessment of all disposal options and Best Practice Environmental Option (BPEO) based on the principles of sustainable development (including the polluter pays principle and the precautionary principle) on a case by case basis.
- Act as a focus for existing work and good practice (not to duplicate work being done elsewhere e.g. The London and OSPAR Conventions, PIANC, CFDA etc.) including investigating the need to promote planning for treating and reusing contaminated dredged material

### Looking for...

- ▶ News
- ▶ Publications
- ▶ Statistics
- ▶ Grants & funding
- ▶ Forms & licences
- ▶ Consultations

### Related links

- ▶ SedCom UK
- ▶ SedNet
- ▶ SMWG
- ▶ CL:aire
- ▶ Partrac

