

# The Benefits of Using Dredged Material in Aquatic Systems

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SedNet, Venice November 2006

# The importance of sediments

- Sediments form an essential and integral part of riverine and estuarial systems
- Hydro-morphological regime of tidal rivers and estuaries is dependent on sediments
- Erosion, transport and sedimentation are continual processes
- Sediments are essential to support the plant and animal life of these water bodies

# The need for dredging

- Dredging to maintain navigable waterways and in relation to new developments, is essential for the economy
- Need to increase navigable depths to meet increases in size and draft of vessels
- Range of management options for dredged material

How can dredged material best be used to benefit the environment?

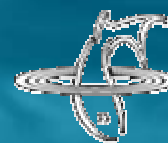


# Consequences of Dredging

- Sediment is removed from the aquatic system, dynamic equilibrium is disturbed
- To re-establish equilibrium sediment may be transported in from the sea, or from rivers, or drawn from intertidal areas.
- Change of cross sectional area of an estuary can change the way a tidal wave propagates- increase or decrease intertidal exposure
- At the same time, in some areas loss of wetlands is occurring due to many factors quite unrelated to dredging, such as sea level rise.

# Using Dredged Material

- PIANC WG 14, on 'The Beneficial Use of Dredged Material, Options and Constraints' will report in 2007
- Main findings, there are a range of possible uses of dredged material, some of which are of direct benefit to the environment.
- Recognize the value of sediments and treat dredged material as a resource rather than a waste





# Dredged sand from Poole Harbour channels and approaches being used to replenish beach at Swanage, winter 2005/6



1.65 million  
tonnes

# Case Study 1.

# Harwich Haven



- SSSI
- SPA
- Ramsar

# Harwich Haven

- **Approach Channel Deepening (1998-2000)**
- **Port of Felixstowe**
- **Capital dredge to improve navigation**
- **-12.5m CD to -14.5m CD**
- **18Mm<sup>3</sup> of material**
- **Subsequent port development projects e.g. Trinity III Terminal.**



# Channel Deepening - Effects on hydraulic and sedimentary regime

- Increase in intertidal erosion

- Approx. 2.5ha yr<sup>-1</sup>

Mitigation

- Muddy material trapped in deepened channel.

- Maintenance dredging result in fine material being lost from the estuary system.

- Decrease in tidal range

Compensation

- Decrease in exposure of approx. 4ha intertidal area.

# Mitigation Solutions

- **Sediment Replacement**
  - Subtidal placement of fine material
  - Water column recharge



**Cefas**

# Compensatory Measures



Source: Harwich Haven Authority

- **Compensating for 4ha of unmitigable 'loss' of intertidal**
- **Managed Realignment**
  - **Creation of 16.5 ha of additional intertidal area**



# Beneficial use schemes

- **Habitat enhancement schemes**
  - Higher ecological value intertidal habitat
  - Increased stability of flood defences



Source: Harwich Haven Authority



Source: Harwich Haven Authority

# Case Study 2. Humber



- SAC
- SPA
- Ramsar



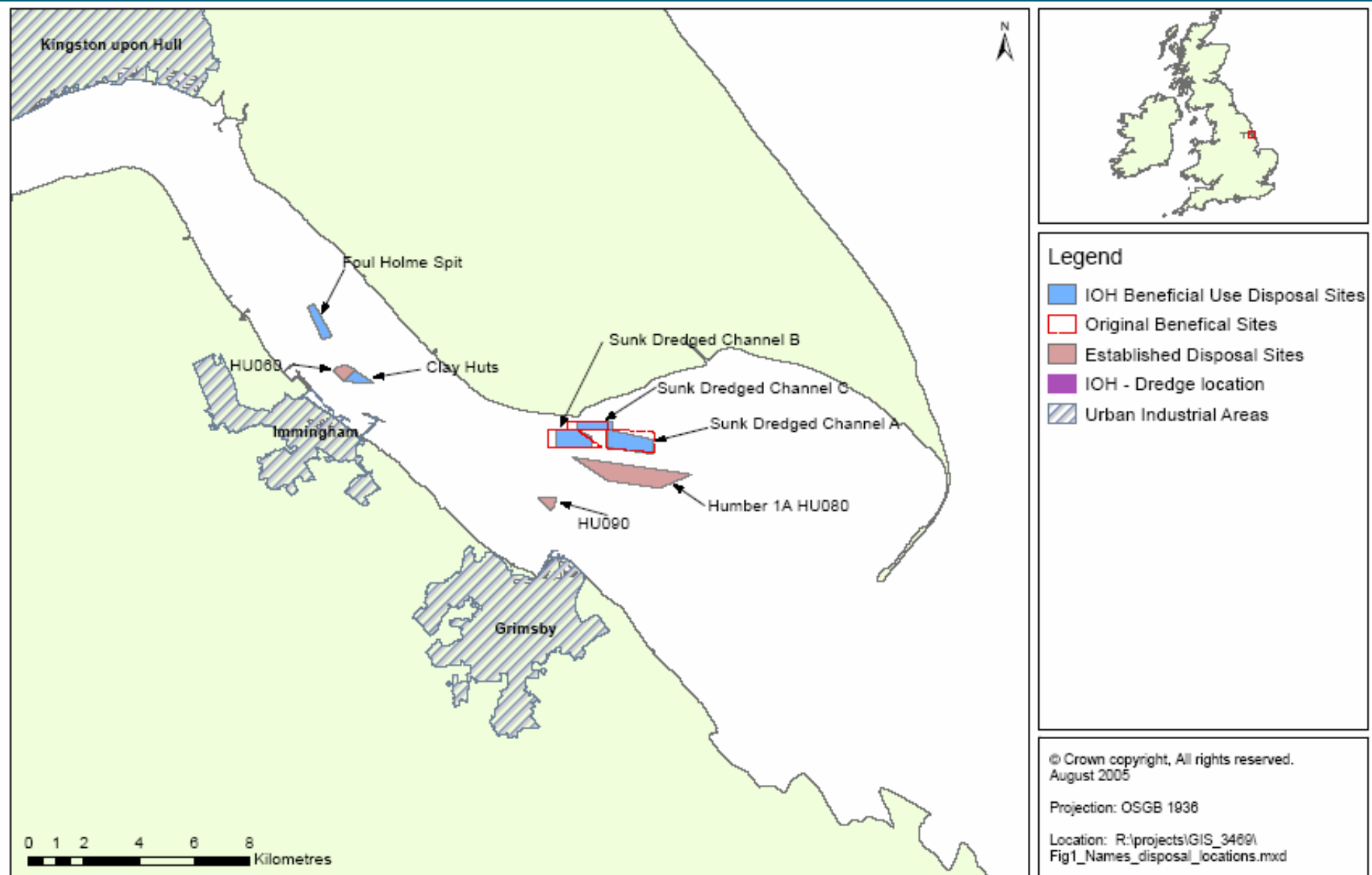
# Immingham Outer Harbour

- **Roll-on Roll-off terminal**
  - 5 berth Ro/Ro tidal harbour
- **Capital dredge** - 2.7Mm<sup>3</sup>
- **Maintenance dredge** - 600,000m<sup>3</sup>
- **EIA, Appropriate Assessment**
- **Direct loss of 22ha of intertidal area**

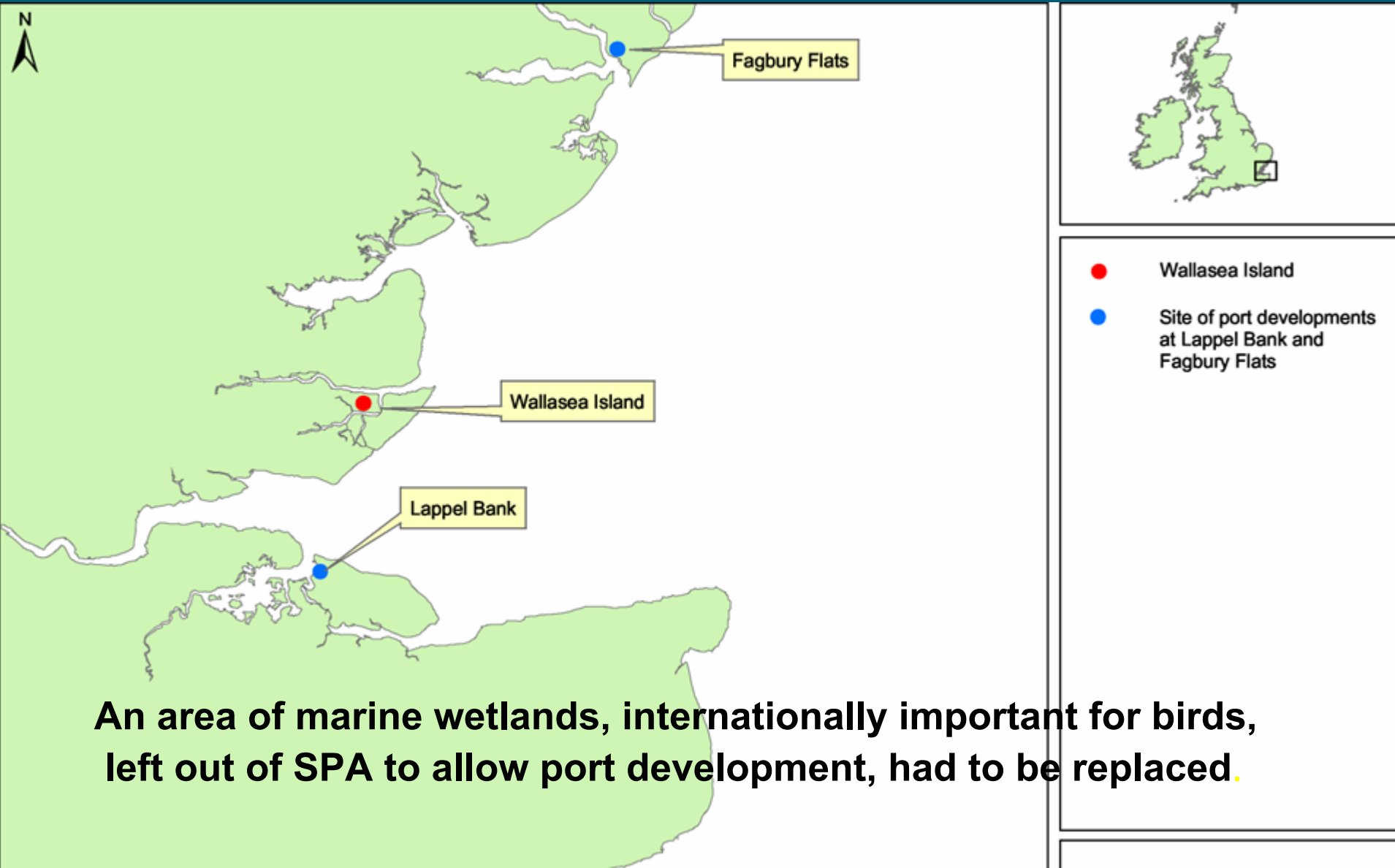
# Mitigation/Compensation Solutions

- **Beneficial use disposal sites**
  - Redistribute sediment to provide an increased supply to intertidal areas
  - Positive benefit to estuary system
- **Habitat enhancement**
  - Doig's Creek
- **Managed realignment schemes**
  - Chowder Ness & Welwick

# Disposal Site Locations used for Immingham Outer Harbour



# Case study 3. Wetland Creation, Wallasea, UK

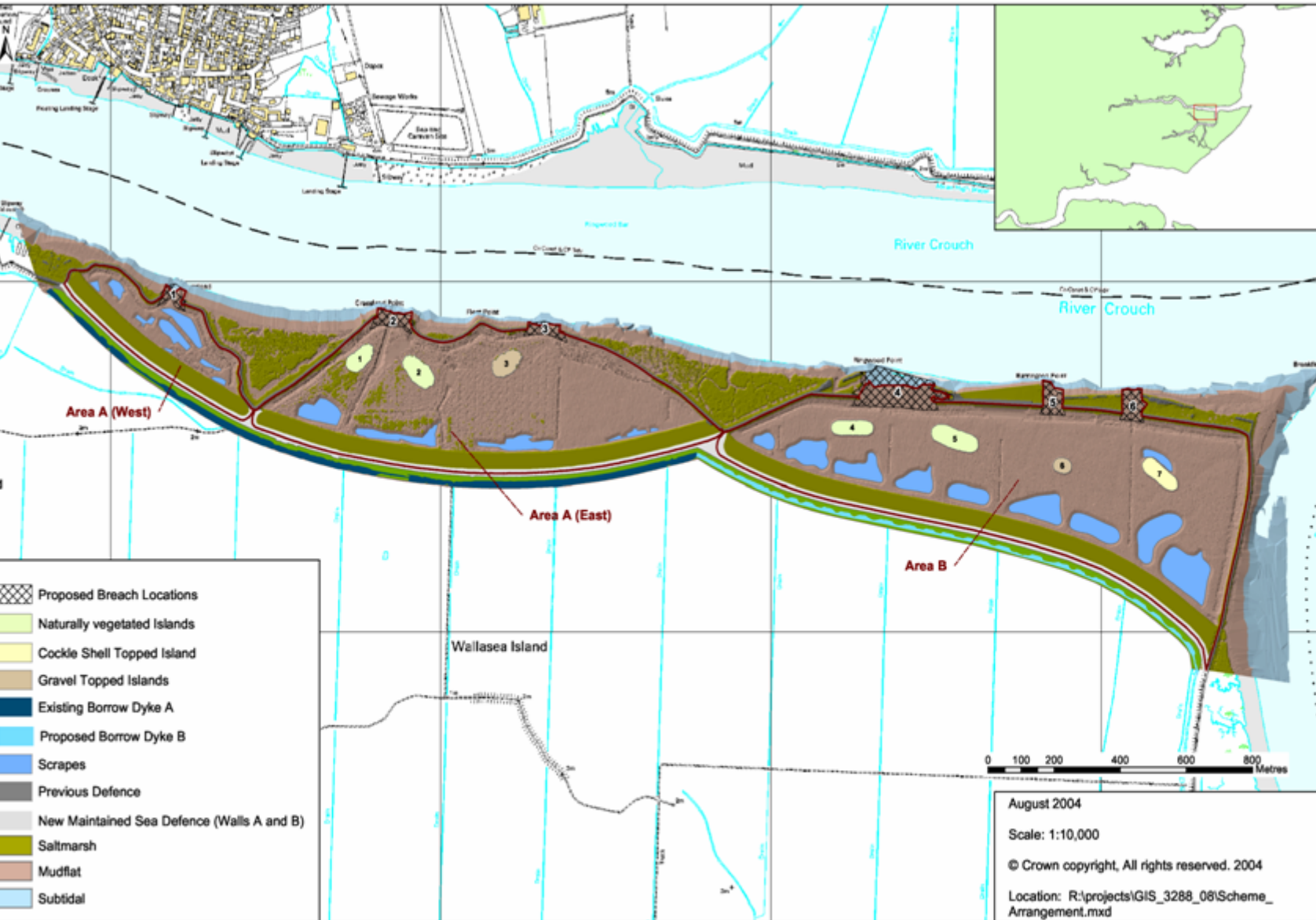


**An area of marine wetlands, internationally important for birds, left out of SPA to allow port development, had to be replaced.**

# Replacing Marine Wetland

- Managed realignment-involved the breaching of an existing seawall to allow tide back onto its old flood plain
- Wallasea chosen as preferred site after consultation with specialists and the public.
- Flood protection of Wallasea also needed to be ensured.
- To achieve the right mix of salt-marsh, saline lagoons and artificial islands, material was required to build up the site prior to breach.
- Solution -Use dredged material from the Port of Harwich





Schematic description of the proposed realignment scheme at Wallasea showing the three hydrodynamic areas and key design features

Figure 8















# Implications for River Basin Management Planning under WFD

- Recognise and accommodate the important role of sediments in estuarine and coastal systems
- Need to ensure potential conflicts with sediment management regimes under EU Birds & Habitats Directives are avoided
- Recognise and accommodate the effects of activities such as maintenance dredging, and the beneficial use of dredged material in setting GEP targets
- Need to balance the nature conservation desirability of retaining dredged sediment within the system with the requirement to meet achieve good ecological and chemical status.

# Conclusions

- There are opportunities to meet both economic and environmental requirements by the careful re-use of dredged sediments
- Failure to grasp these opportunities will be damaging, not only to the economy, but to the environment which is central to the aims of WFD





Thank you for your attention!