

# Harwich Haven Approach Channel Deepening

## Scoping Report



**Harwich Haven Authority**

February 2014  
Final Report  
PB1184



**Co-financed by the European Union**  
**Trans-European Transport Network (TEN-T)**

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Document title Harwich Haven Approach Channel  
Deepening  
Scoping Report

Status Final Report  
Date February 2014  
Project name Approach Channel Deepening  
Project number PB1184  
Client Harwich Haven Authority

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## ABBREVIATIONS

Abbreviation	Description
AA	Appropriate Assessment
AADT	Annual Average Daily Traffic
ABP	Associated British Ports
Ag	Silver
AL	Action Level
AONB	Area of Outstanding Natural Beauty
AQMA	Air Quality Management Areas
As	Arsenic
BAP	Biodiversity Action Plan
bCD	below Chart Datum
BPM	Best Practicable Means
BTO	British Trust for Ornithology
Cd	Cadmium
CD	Chart Datum
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CHaMP	Coastal Habitat Management Plan
CIA	Cumulative Impact Assessment
CO	Carbon Monoxide
CPA	Coast Protection Act
Cr	Chromium
CROW	Countryside and Rights Of Way Act
Cu	Copper
DCLG	Department for Communities and Local Government
DEFRA	Department for Environment, Food and Rural Affairs
DO	Dissolved oxygen
EC	European Commission
EIA	Environmental Impact Assessment
EIFCA	Eastern Inshore Fisheries Conservation Authority
EMP	Environmental Management Plan
EMS	European Marine Site
EPA	Environmental Protection Act
EQO	Environmental Quality Objectives

Abbreviation	Description
EQS	Environmental Quality Standard
EU	European Union
ES	Environmental Statement
FDC	Flood Defence Consent
FEPA	Food and Environment Protection Act
FOCI	Features of Conservation Interest
FSR	Felixstowe South Reconfiguration
GB	Great Britain
GEART	Guidelines for the Environmental Assessment of Road Traffic
GES	Good Ecological Status
Ha	Hectare
Hg	Mercury
HGVs	Heavy Good Vehicle
HHA	Harwich Haven Authority
HIP	Harwich International Port
HRA	Habitats Regulations Assessment
HRO	Harbour Revision Order
IBA	Important Bird Areas
ICES	International Council for the Exploration of the Sea
IEMA	Institute of Environmental Management and Assessment
IG	Inner Gabbard
IGE	Inner Gabbard East
JNCC	Joint Nature Conservation Committee
LAQM	Local Air Quality Management
LBO	Landguard Bird Observatory
LDF	Local Development Framework
LNR	Local Nature Reserve
LSE	Likely Significant Effect
M	Million
MALSF	Marine Aggregate Levy Sustainability Fund
MAREA	Marine Aggregate Regional Environmental Assessment
MCAA	Marine and Coastal Access Act 2009
MCS	Marine Conservation Society

Abbreviation	Description
MCZ	Marine Conservation Zones
MDP	Maintenance Dredging Protocol
MHW	Mean High Water
MHWS	Mean High Water Springs
MMD	Minimum Maintained Depths
MMO	Marine Management Organisation
MoD	Ministry of Defence
MPS	Marine Policy Statement
Ni	Nickel
nm	Nautical mile
NNR	National Nature Reserves
NO2	Nitrogen Dioxide
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NPSE	Noise Policy Statement for England
NSIP	Nationally Significant Infrastructure Projects
ODPM	Office of the Deputy Prime Minister
ONS	Office for National Statistics
OSPAR	Oslo and Paris (Conventions)
PAHs	Polycyclic Aromatic Hydrocarbons
Pb	Lead
PCBs	Polychlorinated Biphenyls
PEL	Probable Effect Level
PM10	Particulate Matter
PPG	Pollution Prevention Guidance
PSD	Priority Substances Directive
Ramsar	Ramsar Convention on Wetlands
REC	Regional Environmental Characterisation
rMCZ	Recommended Marine Conservation Zone
Ro-Ro	Roll-on Roll-off
rRA	Recommended Reference Areas
RSPB	Royal Society for the Protection of Birds
RYA	Royal Yachting Association

Abbreviation	Description
SAC	Special Area of Conservation
SACFOR	Super abundant, Abundant, Common, Frequent, Occasional, Rare
SCDC	Suffolk Coast District Council
SCIs	Sites of Community Importance
SMP	Shoreline Management Plan
SNCB	Statutory Nature Conservation Bodies
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
SWT	Suffolk Wildlife Trust
TDC	Tendring District Council
TEls	Threshold Effects Level
TEUs	Twenty-foot Equivalent Units
TSHD	Trailing Suction Hopper Dredge
UK	United Kingdom
USA	Updating and Screening Assessment
VMS	Vessel Monitoring System
WeBS	Wetland Bird Survey
WFD	Water Framework Directive
WQS	Water Quality Standards
WSI	Written Scheme of Investigation
yr	Year
Zn	Zinc

## **1 INTRODUCTION**

### **1.1 Harwich Haven Authority**

Harwich Haven Authority (HHA) on the Essex/Suffolk border in England was set up in 1863 by an Act of Parliament with duties to manage, regulate, improve and maintain the Harbour and its seaward approaches. HHA has the power to dredge the seabed in order to maintain and improve navigation. The jurisdiction of HHA covers the River Stour, the lower part of the River Orwell, Harwich Harbour and an area seaward extending 12 nautical miles from the Harbour entrance out into the Outer Thames Estuary and covering 150 square miles. As the conservancy and pilotage authority, HHA provides services for shipping using the Haven ports of Felixstowe, Ipswich, Harwich International, Harwich Navyard and Mistley and also boarding and landing services for the rivers Thames, Medway, Blackwater, Colne and Crouch (HHA, 2013a).

The Haven Ports constitute a highly significant port complex on the East Coast which play a vital role in the regional and national economy. The Port of Felixstowe, which is the UK's largest deep sea container port and a significant international gateway, has long term expectations for continued container growth into the period 2020-2030. The location of the Stour and Orwell estuaries, including Harwich and Felixstowe, is shown in **Figure 1.1**.

### **1.2 Project Background**

HHA is considering dredging to deepen the approach channel to the Haven Ports and disposing offshore any material that cannot be used beneficially. The deepening of the approach channel is required to ensure the ports can respond to changes in global shipping patterns whereby fewer, but larger, container vessels access these ports. These larger ships have a deeper draught, and in order to safeguard the future of the Haven it is necessary to deepen the harbour and main channel. Deepening would improve accessibility to the ports by increasing the maximum draft that can be accommodated, increasing the draft that would be unrestricted by the tides and widening the tidal window for all vessels with drafts between the two extremes.

The deepening project will also encourage future private investment in the facilities handling these vessels, ensuring their long term sustainability. The area of the proposed channel deepening is shown in **Figure 1.2**.

### **1.3 Need for the Proposed Scheme**

The vessels which currently arrive in the Haven with drafts of over 13.0m and those expected in the future at even greater drafts, are all large container vessels calling at the Port of Felixstowe. There is a significant number of vessels using the port which could operate at deeper drafts than they currently do and there are vessels on order which will operate with maximum drafts of up to 16m. Since Felixstowe Berths 8 and 9 were opened in 2011, the first vessels operating at drafts between 15m and 15.5m have used the port. It is clear that in order to maintain the Haven Ports' competitive position and to be able to offer the maximum access window and flexibility to the shipping lines, the possibility of deepening the navigation channel and Harbour should be considered. HHA will continue to work closely with the Port of Felixstowe and the other Haven ports, in planning to ensure the long-term sustainability of the Haven.

**Figure 1.1** Location of the Stour and Orwell estuaries





## **1.4 Scoping Report**

This Environmental Scoping Report describes a series of steps undertaken to identify the key potential environmental issues associated with the construction and operational phases of the proposed capital dredging and disposal scheme and to determine the scope of work required for the preparation of an Environmental Statement (ES).

The objectives for the Scoping Report are as follows:

- To provide consultees with a description of the proposed scheme and an overview of the need for the scheme.
- To provide an overview of the nature of the existing (baseline) environment with respect to those features of the natural, human and built environment that have the potential to be impacted by the proposed scheme during its construction and operational phases.
- To identify any potentially significant impacts of the proposed scheme on the existing environment.
- To set out the scope of further studies and (if necessary) data collection (e.g. survey work) required to describe the characteristics of the existing environment in sufficient detail to inform the assessment of potential impacts.
- To describe the work that is proposed to be undertaken (and has so far been carried out) during any Environmental Impact Assessment (EIA) process determined to be required in order to fully assess the significance of potential impacts.

## **1.5 Study Area**

The study area for the Scoping Report in respect of the proposed capital dredging and disposal is the area over which the direct and indirect effects of the proposed scheme may be detected during the construction and operational phases.

The proposed dredging and disposal activities are likely to have an influence on the environmental and social baseline of the following areas:

- The dredging footprint in the approach channel.
- The footprint of the disposal area(s) and associated navigation routes to be used by the dredgers.
- The potential area of influence of any hydrodynamic changes associated with the deepening of the approach channel.
- The area of influence of the sediment plume both in terms of suspended sediment and sedimentation generated by the dredging activities and the dredged material disposal at sea.
- The Stour and Orwell estuaries.
- Relevant nature conservation designated sites (statutory and non-statutory).
- The Haven Ports and their neighbouring areas.

## 1.6 Scoping Report Structure

The Scoping Report is subdivided into 27 sections. This section provides an introduction to the proposed scheme and the environmental scoping process. **Section 2** provides further details on the nature of the scheme and **Section 3** provides an overview of the consultation undertaken to date.

**Section 4** provides an outline of the legislative requirements for the environmental investigations.

**Section 5** describes the nature conservation designations in the study area and highlights the designations that are relevant to this study.

**Sections 6 to 23** provide the main detail of the scoping assessment and identify the recommended nature and level of investigations proposed for each relevant environmental parameter during the EIA process, including the requirements for compliance under the Water Framework Directive (**Section 8**) and the information required for Habitats Regulations Assessment (**Section 24**). For each parameter the following information is provided:

- description of the baseline conditions, based on existing data sources;
- consideration of the potential impacts of the scheme – these have been separated into the construction and operation phases; and
- details of the investigations that have already taken place and the investigations that would need to be undertaken through the EIA process in order to fully determine the significance of any impacts.

**Section 25** sets out our current understanding of other projects in the study area which may impact on relevant environmental parameters when considered in combination with the proposed works.

**Section 26** summarises the proposed scope of the EIA, including the next steps of the EIA process, and finally **Section 27** lists the references used in preparing this document.

## 2 DESCRIPTION OF THE PROPOSED SCHEME

### 2.1 Construction Phase

The construction phase of the proposed scheme comprises the following main components:

- capital dredging of the existing approach channel; and
- disposal of the dredged material (including the potential for beneficial use).

Details of each of the above are provided in the following sub-sections.

#### 2.1.1 Capital dredging of the approach channel

The proposed footprint of the capital dredging – the Approach Channel – is shown in **Figure 1.2**.

Two new channel depths are currently being considered by HHA. These depths were selected by reviewing the capacity of the present channel and assessing port accessibility. This enabled various possible deepening scenarios to be considered and their benefits to be calculated. The work was undertaken by Marico Marine in conjunction with HHA in 2011 (Marico Marine, 2011) and provided the basis for determining the options for the proposed new channel depth.

Following this work it was determined by HHA that deepening to either -15.5m Chart Datum (CD) or -16 mCD, from the existing channel depth of -14.5 mCD, should be considered. Initial modelling studies into the likely physical impacts that could arise (waves, tides, erosion, accretion etc.) if the channel was dredged to a new depth of -15.5 mCD or -16 mCD were then carried out and indicated only minor differences between the two depths. For the purposes of the modelling the worst case scenario of -16 mCD (plus an allowance of another 0.3m for overdredge) has been selected.

The approximate volumes of material that would need to be dredged for the different depth options are outlined in **Table 2.1**. It is proposed that the entire approach channel would be dredged to the same depth.

**Table 2.1 Proposed dredging depths and associated volumes of material**

Current Channel Depth (mCD)	Proposed depth of channel (mCD)	Volume to be dredged (million m <sup>3</sup> )	Volume to be dredged including 0.3m over-dredge allowance (million m <sup>3</sup> )
-14.5m	-15.5	10.6	16.0
	-16.0	18.4	23.5

Source: HR Wallingford (2013a)

#### *Dredged material*

Geotechnical information for the entire channel length was collected through 125 trial pits investigated in 1997. The trial pits were divided into different pre-designated channel blocks, which are indicated in **Figure 2.1**. The average maximum depth of the

trial pits was -14.9 mCD, with the deepest extending to -16.5 mCD. Where possible, particle size and bulk density were measured.

The information provided by the trial pitting in 1997 allowed the material in each block to be described and this has been summarised in **Table 2.2** below (in order of travel from the Harbour).

**Table 2.2 In-situ material within each dredging block in 1997**

Block name	Material present
Felixstowe	Sandy gravel, clayey / silty sand and soft to stiff, occasionally sandy, clay
Fort	Stiff to very stiff clay
North West Beach	Firm to stiff silty clay and some silty sand
Beach End	Very stiff clay and some silty sand
Rolling Ground	Silty / gravelly sand, some very stiff clay and some sandy gravel
Platters	Very soft to stiff sandy / silty clay with occasional lumps of sandstone / claystone, and some sand
Number 7	Silty / gravelly sand, firm to very stiff clay, some very soft clay and some sandstone blocks
Number 1	Very soft silty clay and gravelly sand
Harwich Approach	Firm to stiff clay and sand
Haven	Stiff clay with occasional claystone bedding, gravelly sand and some well-cemented claystone / sandstone
North Threshold	Stiff to very stiff clay, some sand and some claystone

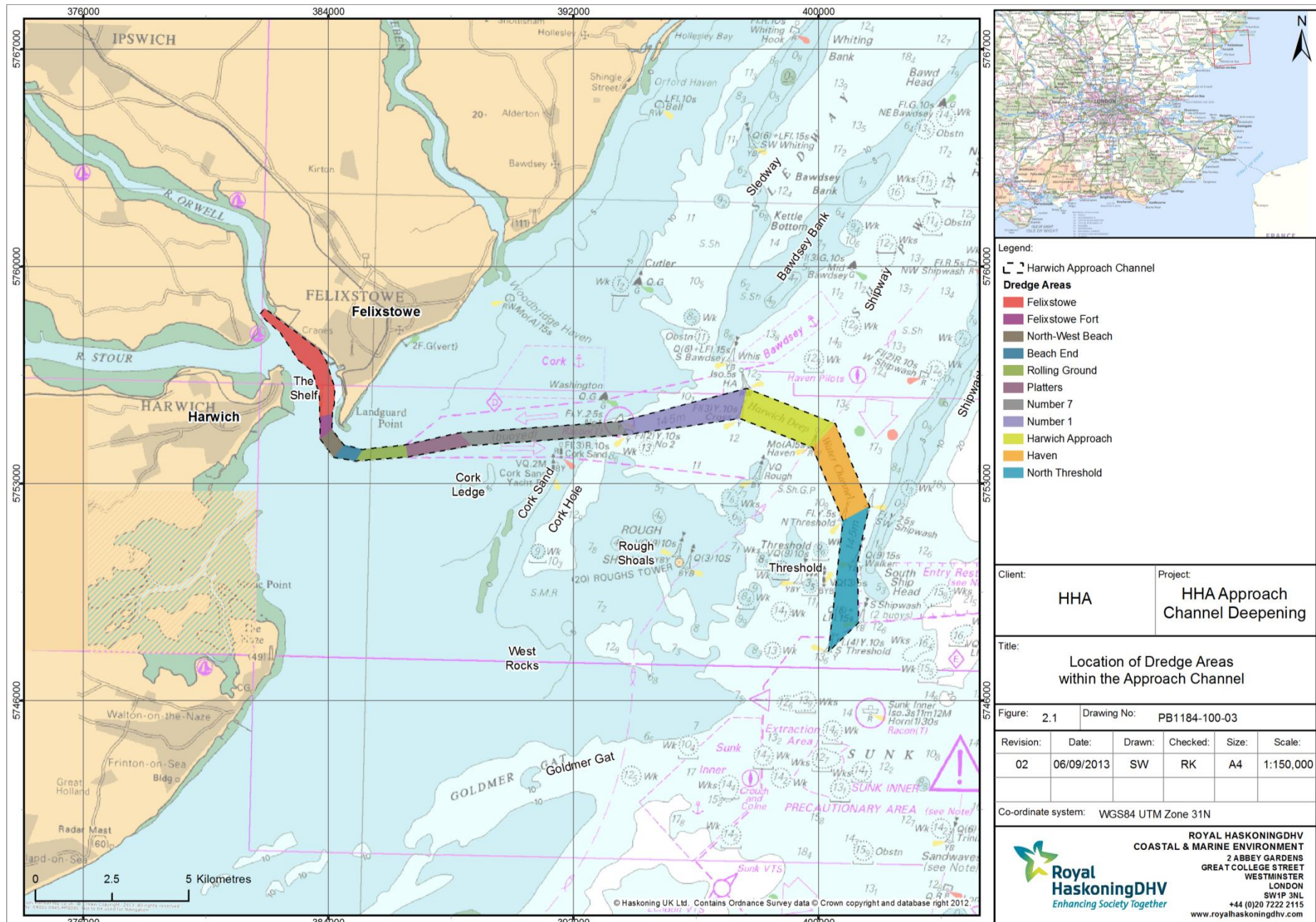
The material described in 1997 was removed during the 1998 to 2000 capital dredge campaign. However, the information provides a general indication of the material likely to be encountered when deepening the channel from -14.5 mCD to either -15.5 mCD or -16 mCD.

A further site investigation took place in August 2013 and geotechnical samples were again gathered via trial pitting. The samples will be analysed and up to date geotechnical information will be provided for use within the EIA.

#### *Dredging methodology*

The dredging is proposed to be undertaken by trailing suction hopper dredge (TSHD) with a hopper volume typically of 10,000 to 17,000m<sup>3</sup> although larger hopper dredgers may be used, and present expectations are that either two TSHDs would be used at any one time or one TSHD plus one back-hoe dredger with associated barges.

It is anticipated that the dredging would be undertaken over one to two years depending on the combination of dredging plant used.



### 2.1.2 Disposal of dredged material

The disposal of dredged material at sea can pose a threat to marine life if not properly controlled and this is currently regulated through the Marine and Coastal Access Act (MCAA) licensing system (Marine Management Organisation (MMO), 2011a). There is a requirement on HHA to follow the waste hierarchy as set out in the MMO guidance note (MMO, 2011a) with regard to the use or disposal of the dredged arisings.

At present HHA uses two licensed disposal sites. In previous capital dredging operations material has been disposed at the Inner Gabbard East (IGE); while on-going maintenance material is currently disposed at the Inner Gabbard (IG) (see **Figure 2.2**). In addition, under controlled circumstances, silty capital material has been allowed to be disposed at the IG site.

Any options for the potential re-use of the capital dredged material and/or its disposal to sea will be discussed with the MMO and Cefas as well as other relevant stakeholders. The ES will explore and detail appropriate options to be considered for disposal at sea in conjunction with an assessment of the preferred options. It is anticipated that the capital dredged material from the channel deepening will be deposited at the IGE licensed disposal site, should no alternative uses or solutions arise, and that any silty capital material may be deposited at the IG.

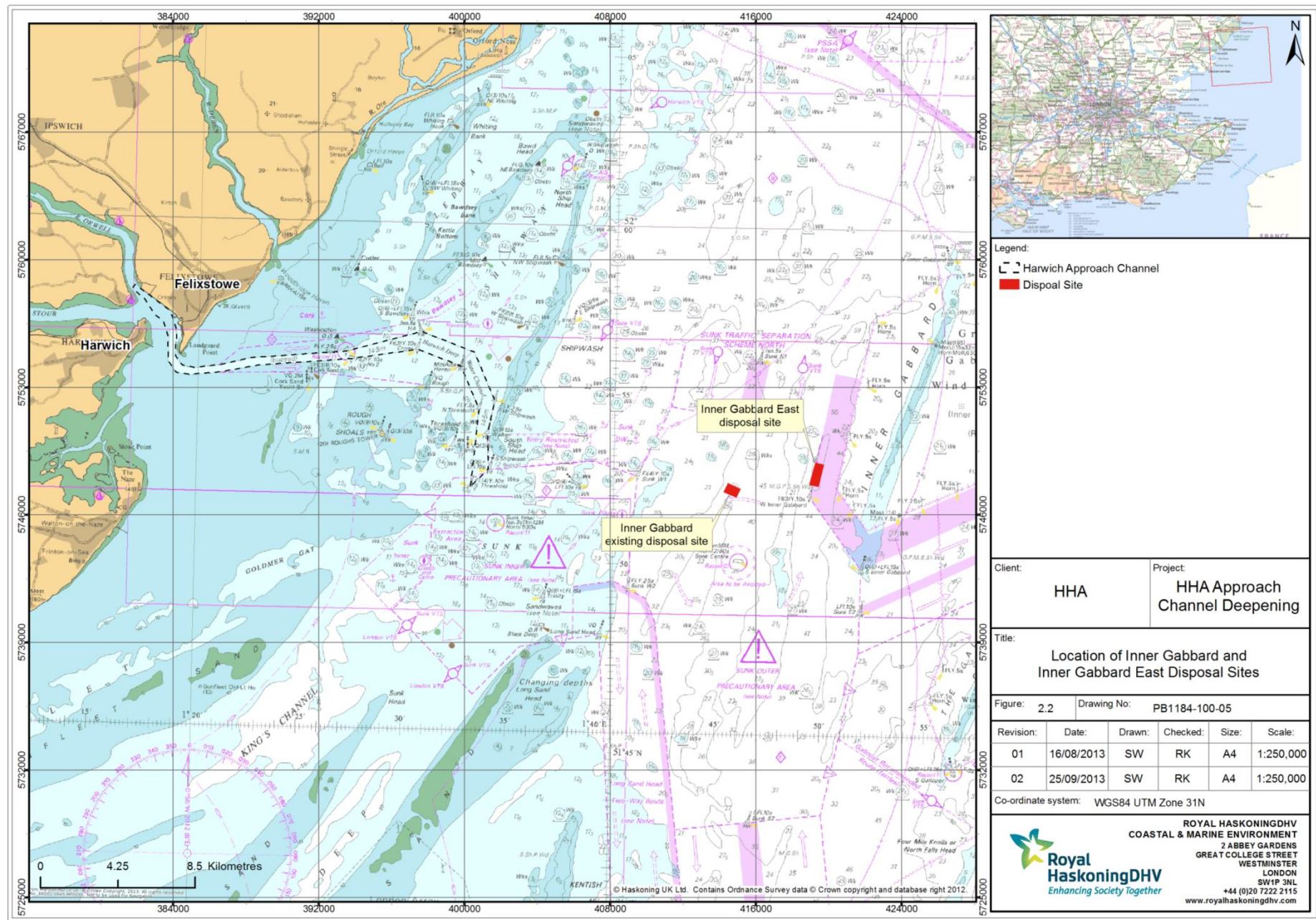
### 2.1.3 Opportunities for use of the dredged material

In accordance with MMO Marine Licence Guidance note number 3 on 'Dredging, Disposal and Aggregate Dredging' (April 2011), alternative use of the dredged material will need to be considered within the ES. Disposal at sea should be the last resort where no other viable options are available.

There is a history of using both capital and maintenance dredged material in a beneficial way in the Stour and Orwell estuarine system. The main options for use of dredged material include:

- use as engineering fill for other construction or reclamation projects in the region;
- sediment replacement; and
- habitat creation and enhancement.

Opportunities for the re-use of the material will be investigated as part of the EIA process and the ES will demonstrate how such investigations have occurred and their outcome.



## 2.2 Operational Phase

### 2.2.1 Maintenance dredging

During the operational phase, it is anticipated that maintenance dredging would continue to be undertaken periodically in the approach channel to ensure that the minimum maintained depth (MMD) of the navigation channel is sustained.

Currently, HHA undertake maintenance dredging using ploughs and TSHDs. The areas around Harwich International Port, Harwich Navyard, Trinity House Pier, Navigation House Jetty and some sections of the deep water channel are maintained by plough dredging, which relocates material using a frame or beam suspended from a tug or similar vessel. The beam is held at a specific level and is pulled by the vessel, moving bed material from one area into deeper water, where it drops the beam. There are also small, shallow areas which are dredged using water-injection dredging, for example at the Haven launch jetty, Shotley Marina channel, Halfpenny Pier and Mistley.

Dredging of the Port of Felixstowe berths and approaches is carried out by HHA at approximately 10 to 12 week intervals, as part of a regular maintenance dredging regime. The maintained areas are largely dredged by TSHD using either two hoppers of 6,000 to 8,000m<sup>3</sup> capacity or one of up to 16,000m<sup>3</sup>, with disposal at the IG site. The trailers are assisted by a plough dredger which moves material from the berths and inaccessible areas to areas where the trailer can load it.

**Table 2.3** below provides a summary of the previous maintenance dredging activities and disposal at sea of dredged material carried out by HHA.

Although HHA currently uses the IG for the offshore disposal of maintenance dredged material, due to the high cost associated with disposal operations at IG HHA is looking to move its licensed maintenance dredging disposal site 8.0km closer to shore. This would significantly reduce the cost of maintenance dredging as well as carbon output by 1,000 tonnes annually (Port Strategy, 2012). A characterisation report has been prepared by HHA to identify a new disposal site to receive maintenance dredged material from the Harbour and was submitted to the MMO in January 2014.

**Table 2.3 Summary of volumes dredged and disposed of (wet tonnes) (HHA, 2013a)**

Period	Volume dredged and disposed (wet tonnes)
2012	3,074,062
2011	3,540,087
2010	3,196,811
2009	3,082,773
2008	3,720,025
2007	3,553,779

## 2.2.2 Onshore activities

During the operational phase larger ships would be able to gain access to the Haven Ports – the Port of Felixstowe, Harwich International Port and the Port of Ipswich – due to the increased depth of the approach channel. Although these larger ships could hold a greater number of containers per ship, the capacity of the cranes, container yards and lorries at the ports to unload the containers and transport them away would remain the same, i.e. within the existing consented (and conditioned) capacity. Hence an impact on the road and rail network associated with a deeper approach channel is not predicted, as the conditions on road and rail capacity act to control the contributions to the network of the Haven Ports (and no changes are proposed in this regard).

With specific regard to the Port of Felixstowe, a Transport Assessment (TA) has recently been undertaken in support of the proposed Port of Felixstowe Berth 9 Quay Extension in 2013 (Royal HaskoningDHV, 2013a). The purpose of this assessment was to assess the specific transport demand arising from both the construction and operational phases of an extension to Berth 9 and to consider this in the context of the findings of the 2006 planning permission for the wider Felixstowe South Reconfiguration (FSR).

The planning application for FSR was the subject of a public inquiry and, as a consequence of the inquiry and the associated assessment work, the ability of the transport network to carry the freight associated with FSR in the case of road traffic, and the port as a whole in the case of rail freight, was established and capacity thresholds were identified.

For the proposed Berth 9 Extension, an assessment of the potential impact of projected freight throughput was undertaken in order to determine if the increase in the berth size could be delivered within the capacity constraints of the existing road and rail networks. The assessment drew on the most recent freight forecasts for the years 2015 and 2023, together with observed data from existing operations at FSR (FSR Phase 1, Berths 8 and 9).

The TA concluded that the construction and operation of the Berth 9 Quay Extension would not lead to an exceedance of the forecast FSR transport demand which was debated and agreed at the public inquiry and captured in subsequent consents. Consequently the assessment demonstrated that the additional freight movements – as well as the freight movements associated with FSR Phase 2, Berth 10 – would be accommodated within the existing transport network capacity.

It was concluded that there were no reasons for precluding the extension of Berth 9 or any requirements to provide additional transport infrastructure as a consequence of the effect of the development on transport. This conclusion was supported by Suffolk Coastal District Council (SCDC), the County Council and Highways Agency. That is, SCDC had no concerns from a transport perspective with the extension of Berth 9 when considered in conjunction with the existing throughput controls in place for the FSR project.

The forecast for 2023 freight demonstrated that the predicted demand at this point could also be accommodated within the consented envelope for FSR (Royal HaskoningDHV, 2013a).

Alongside this, the expansion of Harwich International Port has been consented through the planning permission for a container terminal at Bathside Bay (following a public inquiry). In 2010 a Supplementary Traffic Assessment (STA) was undertaken in support of an application for a new time limit (to 2021) in respect of Planning Permission 03/00600/FUL (the “Container Terminal Permission”). This considered the traffic elements relating to the proposal (Royal Haskoning, 2010).

Given the history of the proposals for the site, traffic and transport matters were fully considered in relation to the implementation of the development in conjunction with the Highways Agency as Strategic Highway Authority and Essex County Council as local highway authority. In particular, the level of traffic associated with the proposals and its implications were agreed.

As a result a number of planning conditions were attached to the Container Terminal Permission in relation to highway matters, particularly in relation to works to ensure the operation of key junctions and elements of the highway network. These require that a number of highway improvement schemes be provided so that adequate operational capacity is shown to be achieved for a period of 15 years from the anticipated date of commencement of operation of the development.

Traffic surveys were undertaken in 2008 at a number of locations along the A120 corridor in order to obtain up to date traffic flow information. A comparison was made in respect of peak hour traffic flow with the data used for assessment purposes in respect of the Container Terminal Permission (using TEMPRO growth rates). The original traffic flows, when factored to 2008, were shown to be generally higher than those recorded in 2008.

Given this and the fact that highway-related conditions require that the performance of key elements of the highway network need to be determined for a period of 15 years from the anticipated commencement of operation, it is considered that there are sufficient measures in place to ensure that satisfactory highways infrastructure will be in place in order to support the Bathside Bay development and a deepened approach channel.

The deepened channel would not substantively alter access arrangements to the Port of Ipswich, located further north on the River Orwell. However, the Suffolk Structure Plan 2001 (Suffolk County Council, 2001) acknowledges the strategic importance of the port and that Suffolk County Council will encourage provision of improved access to, within and around the port.

Therefore, whilst the proposed dredging would enable larger ships to access the Port of Felixstowe and Harwich International Port/Bathside Bay Container Terminal, the capacity of the ports themselves would remain unchanged. Operational traffic levels resulting from the proposed dredging, therefore, would also be unchanged. Further information on the traffic levels is provided in **Section 16**.

### **3 CONSULTATION**

#### **3.1 Previous Consultation**

##### **3.1.1 Site investigation**

In May 2013 HHA applied for a Marine Licence from the MMO (Application No. MLA/2/2013/00172) in order to carry out a site investigation in the form of excavating a number of trial pits within the Harwich Haven Approach Channel by backhoe dredger.

The site investigation, undertaken in August 2013, will inform the project design and the environmental assessment process for the Marine Licence for the proposed capital dredge. The investigation will also serve to inform considerations under the Waste Framework Hierarchy in terms of beneficial uses for the material that would be dredged as well as options for disposal at sea.

Consultation was undertaken with the MMO and English Heritage regarding the methodology for the site investigation to ensure that, should any archaeological finds or any evidence of palaeochannels be discovered, appropriate action would be taken. A Written Scheme of Investigation (WSI) for the site investigation was prepared by Royal HaskoningDHV in July 2013 and approved by English Heritage and the MMO prior to the Marine Licence for the site investigation works being issued in August 2013.

Cefas was also consulted with regard to a sediment sampling strategy associated with the trial pitting. A strategy was agreed with Cefas in order to ensure that the sample selection was suitable for the EIA. The samples were collected as per the strategy and sent to Cefas for particle size and chemical analysis. Samples were collected from the surface and at depth.

##### **3.1.2 Project introduction meeting with the MMO**

A project introduction meeting was held between the MMO, HHA and Royal HaskoningDHV in Newcastle on 6<sup>th</sup> August 2013. The aim of the meeting was to introduce the project to the MMO in terms of the potential works, need for the project and to describe the preparatory work already carried out by HHA (as detailed in **Section 2.1.1**).

The site investigation work was discussed at the meeting and the MMO was advised that a sampling strategy had been agreed with Cefas. The MMO confirmed that as long as the existing conditions within the approach channel did not change significantly between August 2013 and the point when the Marine Licence application was submitted (i.e. as long as no disturbance of the material at depth occurs) then the MMO would agree that no further depth samples would be necessary in support of the Marine Licence application (Royal HaskoningDHV, 2013b).

##### **3.1.3 Consenting route meeting with the MMO**

A further meeting was held between the MMO, HHA and Royal HaskoningDHV on 18<sup>th</sup> December 2013. This meeting was arranged in order to confirm the regulatory approach for the project. HHA has powers to deepen the navigation channel within its limits of jurisdiction. The powers cover maintenance and capital dredging. However,

given the scale and profile of the project HHA has chosen to apply for a Marine Licence to cover the whole project – i.e. the dredging and disposal activities.

Navigation dredging, that is not part of a wider project, is not considered EIA development under the Marine Works (EIA) Regulations 2007. However, in accordance with part 2 section 5 of the regulations the MMO and HHA agreed that the channel deepening project should be subject to statutory EIA.

## **3.2 Current Consultation**

### **3.2.1 Approach**

Following the initial consultation with the MMO, and with English Heritage and Cefas with regards to the site investigation (refer to **Section 3.1**), consultation will continue with all relevant stakeholders following submission of this Scoping Report and throughout the pre-application process.

### **3.2.2 Screening and scoping**

As confirmed at the December 2013 meeting with the MMO, although navigation dredging is not considered EIA development under the Marine Works (EIA) Regulations 2007, it was agreed with the MMO that HHA would submit an EIA for the project in accordance with part 2 section 5 of the regulations.

Therefore this Scoping Report has been submitted as part of a formal pre-application request to the MMO for a screening/scoping opinion.

As part of their statutory advice the MMO (through consultation with Natural England) will also comment on whether the project is anticipated to have a 'likely significant effect' in the context of the requirements of the Habitats Regulations 2010 (see **Section 4.2.4** below).

## **3.3 Harwich Regulators Group**

Outside of this project HHA has been and continues to be an active member of the Harwich Regulators Group. There is an annual meeting held with the Stour and Orwell Steering Group to discuss the previous year of monitoring undertaken in the Stour and Orwell estuaries. The Steering Group is comprised of MMO, HHA, Cefas, Natural England, the Environment Agency, Kent and Essex and Eastern IFCAs, Local Wildlife Trusts, RSPB, Suffolk Coasts and Heaths Area of Outstanding Natural Beauty (AONB) Unit, and various consultants. The last meeting was held in March 2013 with another planned for March 2014. This project will be raised at the meeting in March 2014.

## **4 LEGISLATIVE FRAMEWORK**

### **4.1 Required Licences and Consents**

#### **4.1.1 Marine Licence**

The MMO is the regulatory authority for marine licensing in English inshore and offshore waters. A Marine Licence is required for the following activities associated with the proposed scheme (a single licence is issued where possible to cover all licensable activities):

- dredging associated with the deepening of the approach channel to the Haven Ports; and
- disposal of dredged material to a licensed offshore disposal site (or use of the material below Mean High Water Spring (MHWS) tides).

This Scoping Report is submitted in support of the pre-application process for a Marine Licence from the MMO, which would authorise the above activities.

#### **4.1.2 Water Resources Act 1991 and Flood Defence Consent**

The Water Resources Act 1991 defines the Environment Agency's role in water pollution, water resource management, flood defence, fisheries and navigation. It covers discharges to surface and ground waters, estuaries and coastal waters, and controls the abstraction and impounding of water.

Under the terms of the Water Resources Act 1991 and associated byelaws, prior written consent from the Environment Agency is normally required for any works in, under, over or near (within 8m) the bank of a main river. This consent is known as 'Flood Defence Consent' (FDC) and the Environment Agency will be consulted as to whether an FDC is required in this case. Given that the end of the approach channel lies near to but not within the main river channel, it is not entirely clear if a FDC is required, so the opinions of the Environment Agency will be sought.

#### **4.1.3 Crown Estate Consent**

The Crown Estate owns the majority of the foreshore and subtidal seabed around the UK. It is, therefore, always necessary to determine the ownership of the foreshore and river bed, and gain the consent of The Crown Estate (or other land owner) where required, prior to the commencement of any works. HHA will enter into discussions with The Crown Estate in this regard.

### **4.2 Current Legislation**

The proposed channel deepening in the Harwich Haven Approach Channel will be subject to a number of legislative requirements which are outlined below.

#### **4.2.1 Marine and Coastal Access Act 2009**

Part 4 of The Marine and Coastal Access Act (MCAA) 2009 provides a framework for the marine licensing system for works below the level of MHWS tides. The current

marine licensing system has been in force since 6 April 2011 and consolidates and replaces previous statutory controls, including:

- Licences under Part 2 of the Food and Environment Protection Act (FEPA) 1985.
- Consents under Section 34 of the Coast Protection Act 1949 (CPA).
- Consents under Paragraph 11 of Schedule 2 to the Telecommunications Act 1984.
- Licences under the Environmental Impact Assessment and Natural Habitats (Extraction of Minerals by Marine Dredging) Regulations 2007.

As outlined above, HHA will be seeking a Marine Licence from the MMO to undertake capital dredging and the disposal of material offshore.

#### 4.2.2 The Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended)

The Marine Works (Environmental Impact Assessment) Regulations 2007 (2007 Regulations), as amended by The Marine Works (Environmental Impact Assessment) (Amendment) Regulations 2011, transpose the EIA Directive into English and Welsh law in relation to the following activities:

- Harbour works which require approval or consent pursuant to a local Act or an order made under Section 14 or 16 of the Harbours Act 1964.
- Activities which are regulated under the MCAA (i.e. those activities which require a marine licence).

The regulations apply to Marine Licences issued by the MMO and implement a legal requirement on the MMO that an EIA be undertaken for certain types of development before consent is granted. HHA has agreed with the MMO that the project will fall under the requirements of the 2007 Regulations (as amended) and, as such, a statutory EIA will be required. The Regulations are pursuant to the EIA Directive.

#### 4.2.3 The Harbours Act 1964

The Harbours Act 1964 gives powers to make Harbour Orders, amend existing harbour legislation or introduce new harbour legislation. HHA has existing powers as a Harbour Authority to undertake certain works, including the power to dredge the seabed in order to maintain and improve navigation, within the port jurisdiction.

Although HHA is authorised to undertake the proposed dredging of the approach channel, HHA is applying for a Marine Licence for the works as it also has a responsibility under the Harbours Act to consider/assess the implications of any of its actions that could have a significant effect on the environment. Further to this any potential for likely significant effects upon a designated European site, either alone or in combination with other plans and projects, also have to be considered. As such, an assessment of the potential for the proposals to have an adverse effect upon the integrity of the Stour and Orwell Estuaries Special Protection Area (SPA) and Ramsar site will need to be undertaken and the results presented within the ES (see **Section 4.2.4**).

#### 4.2.4 The Conservation of Species and Habitats Regulations 2010

The Conservation of Species and Habitats Regulations 2010 (the Habitats Regulations) implement EC Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna (the Habitats Directive) in the UK. In accordance with Section 61 of the Habitats Regulations, an Appropriate Assessment (AA) is required for any plan or project, not connected with the management of a European site, which is likely to have a significant effect on the site either alone or in combination with other plans and projects. European sites comprise SPAs, as designated under Council Directive 79/409/EEC (the Wild Birds Directive), or Special Areas of Conservation (SACs), as designated under the Habitats Directive. An AA is also required as a matter of government policy for potential SPAs, candidate SACs and listed Ramsar sites for the purpose of considering development proposals affecting them (ODPM, 2005).

Should the works, either alone or in combination with other plans or projects, be deemed to have a Likely Significant Effect (LSE) on any European sites (or it cannot be determined that there would not be a significant effect), then AA must be undertaken by the competent authorities of the potential implications of the proposed scheme in view of the conservation objectives of the sites, in accordance with Article 6 of the Habitats Directive and with advice from Natural England. This now takes the form of a Habitats Regulations Assessment (HRA) (which would firstly encompass the LSE test and then, should an LSE be determined, provide information for AA).

It is highly likely that an HRA would be required to be undertaken for this project. However, this decision will be taken by the MMO as part of the formal Scoping Opinion and following advice from Natural England.

The lead competent authority in this case is expected to be the MMO and the applicant is required to provide information to inform this process. Further details on the information for HRA to be provided by HHA are included in **Section 24**.

#### 4.2.5 Wildlife and Countryside Act 1981 (as amended)

Under the terms of Section 28(4)b of the Wildlife and Countryside Act 1981 as amended by Schedule 9 to the Countryside and Rights Of Way Act (CROW) 2000, any operations within, or adjacent to, a Site of Special Scientific Interest (SSSI) require consent from Natural England. Approval under Section 28 of the Wildlife and Countryside Act 1981 (as amended by the CROW Act 2000) is normally included in Natural England's overall advice regarding the requirement (or otherwise) for an Appropriate Assessment (AA) under the Habitats Regulations (see below).

#### 4.2.6 Water Framework Directive

The Water Framework Directive (WFD) (2000/60/EC) establishes a legal framework to protect and restore clean water across Europe to ensure its long-term, sustainable use. It applies to waters out to one nautical mile from the baseline from which territorial waters are drawn. One of the aims of the WFD is to ensure that all European water bodies are of Good Ecological Status/Potential by 2015. It aims to achieve this through the setting of Environmental Quality Objectives (EQOs) for water chemistry and ecological and hydromorphological quality parameters. The WFD is transposed into English and Welsh law through The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003.

The WFD is implemented into law in England and Wales through the Water Environment (Water Framework Directive) Regulations 2003. These regulations require the regulator (the MMO) to have regard to the requirement of measures set out in the relevant River Basin Management Plan(s) (RBMP). In the case of dredging and disposal activities the RBMPs include a measure to carry out a WFD compliance assessment. The Environment Agency has provided guidance on how to carry out these assessments. The MMO is likely to consult the EA for their advice on whether a project complies with the WFD (see **Section 8**).

#### 4.2.7 Bathing Water Directive

The Bathing Water Directive (76/160/EEC) was adopted to improve bathing water quality in the EU by setting Water Quality Standards (WQS) for popular bathing waters and inland bathing sites. A revised Directive was adopted in 2006 (2006/7/EC) which will repeal the original Directive in 2015. The key features of the revised Directive include more stringent WQS and increased provision of public information. Compliance will be measured using the classes: poor, sufficient, good and excellent. The revised Directive requires all bathing waters to be classed as 'sufficient' and changes the receptors measured to assess water quality. Two microbiological parameters, *Escherichia coli* (e-coli) and intestinal enterococci will be measured and there will be an overall reduction in the number of parameters monitored. The original compliance system will remain in place until 2015. In 2012 the Environment Agency began monitoring for a four year classification to be made in 2015 (Environment Agency, 2012). Bathing waters are also protected under the WFD (refer to **Section 8**).

#### 4.2.8 The Waste Framework Directive

The Waste Framework Directive (2008/98/EC) consolidates earlier EU legislation regarding waste. A key objective of the Directive is to provide measures to protect the environment and human health by preventing or reducing the adverse impacts of the generation and management of waste and by reducing overall impacts of resource use and improving the efficiency of such use. The Directive also requires Member States to take appropriate measures to encourage, firstly, the prevention or reduction of waste production and its harmfulness and, secondly, the recovery of waste by means of recycling, re-use or reclamation or any other process with a view to extracting secondary raw materials, or the use of waste as a source of energy. The Directive's overarching requirements are supplemented by other directives for specific waste streams. Disposal (to landfill or at sea) is the least favoured option in the waste hierarchy.

Consideration of the Waste Framework Directive will be undertaken for this project as part of the Marine Licence application, specifically with regard to the identification of any potential uses for the dredged material. However, it should be noted that disposal of non-hazardous material to sea is now excluded from the Waste Framework Directive.

### 4.3 Planning policy context

#### 4.3.1 National policies

The main national and regional policies applicable to the project are:

- National Policy Statement (NPS) for Ports;

- UK Marine Policy Statement (MPS);
- Marine Plans; and
- The East of England Plan.

The relevance of the policies are summarised in **Table 4.1**.

#### 4.3.2 Other plans

The proposed works are located off the coast of Harwich and Felixstowe on the Essex/Suffolk border. The main local strategies and plans relevant to the projects are outlined below (EES, 2013).

##### *Essex Estuaries Coastal Habitat Management Plan (CHaMP), 2002*

The Essex CHaMP (Living with the Sea, 2002) provides a long-term strategic view on how the balance of losses and gains to habitats and species of European interest (particularly intertidal and freshwater habitats in the coastal zone) can be maintained in the light of rising sea levels, and the flood defence response to it. The CHaMP concluded that the estuaries cannot be maintained in their present form. Maintaining the present levels of flood defences will lead to the loss of significant areas of saltmarsh by 2050. It was recognised that ecological change is inevitable due to changes in the distribution and extent of habitats under a sea level rise scenario.

##### *Essex and South Suffolk Shoreline Management Plan 2, 2010*

The Shoreline Management Plan (SMP) describes the proposed management strategy for the shoreline of Essex and South Suffolk to achieve the best possible balance of all the interests around the coast, for the next 100 years. The development of SMPs follows the principles and processes set out in the SMP guidance issued by Defra in March 2006 (Defra, 2006). This strategy aims to reduce the threat of flooding and erosion to people and their property, and to enhance the environment, society and the economy as far as possible (Royal Haskoning, 2010b).

**Table 4.1**      **Applicable national and regional policies**

Site	Objective	Relevance to the project
National Policy Statement for Ports, October 2011	The NPS is part of the planning system established under the Planning Act 2008 to deal with nationally significant infrastructure projects (NSIP) and provides the framework for decisions on proposals for new port development. It aims to encourage sustainable port development and ensuring that all proposed developments satisfy the relevant legal, environmental and social constraints.	The proposed scheme is required to allow the Haven Ports to remain competitive into the future and to encourage larger vessels to use the ports and therefore maintain the local economies.
UK MPS, March 2011	The MPS facilitates and supports the formulation of marine plans, aiming to ensure that marine resources are used in a sustainable way in line with high-level marine objectives (i.e. promoting sustainable economic development, enabling the UK to move towards a low-carbon economy and preserving healthy, functioning marine ecosystems and protecting marine habitats). Overall projects should contribute to the societal benefits of the marine area.	This Scoping Report has been developed to identify the potential impacts of the proposed scheme on marine environment, which will then be considered further in the ES.
Marine Plans	<p>In England, inshore and offshore waters have been split into 11 marine plan areas. The aim is to ensure a sustainable future for UK coastal and offshore waters through managing and balancing the many activities, resources and assets in the UK marine environment.</p> <p>The MMO has a duty to take decisions on proposed developments in the marine plan area in accordance with the MPS and published marine plans, unless relevant considerations indicate otherwise.</p>	<p>The dredge footprint lies within two marine plan areas, namely the East Inshore Marine Plan area and the South East Inshore Marine Plan area.</p> <p>Consultation on the draft East Inshore Marine Plan started on 16<sup>th</sup> July 2013 and will run for 12 weeks until 8<sup>th</sup> October 2013. The MMO are currently working with the stakeholders in the South East area to gather evidence and data to support the future plan (MMO, 2013a).</p>

Site	Objective	Relevance to the project
East of England Plan	<p>The East of England Plan supersedes an initial Regional Spatial Strategy prepared by the East of England Regional Assembly in 2004.</p> <p>The Plan covers the period to 2021 but sets a vision, objectives and core strategy for the longer term. In particular it seeks to reduce the region's impact on, and exposure to, the effects of climate change and to put in place a development strategy with the potential to support continued sustainable growth beyond 2021.</p>	<p>The proposed works would impact ports in both Suffolk and Essex which are covered by the Plan. The ES will look at the proposed project in terms of the impacts to flood defences and any cumulative impacts in the context of climate change on the surrounding coastline.</p>

## **5 NATURE CONSERVATION DESIGNATIONS**

### **5.1 Introduction**

The Stour and Orwell estuaries are an area of ecological and nature conservation importance. This is reflected by the designation of a number of sites through national and international legislation for the species and habitats that they support.

### **5.2 Internationally Protected Sites**

The Stour and Orwell estuaries and the Outer Thames Estuary are protected by a number of international designations, including SPAs, Ramsar sites and SACs (see **Figure 5.1** and **Figure 5.2**).

The proposed dredging area lies approximately 0.1km to the south and to the east of the Stour and Orwell Estuaries SPA and Ramsar site and 3.1km north-east of Hamford Water SPA and Ramsar site. The Deben Estuary (located 6.4km to the north) is designated as an SPA and Ramsar. The Outer Thames Estuary SPA lies both to the north and south of the proposed works and the closest point is 0.1km away from the dredge area, 9.4km from IG and 12.1km from IGE disposal site.

There are no designated SACs within the Stour and Orwell estuaries or the footprint of the works. The nearest SACs are the Alde, Ore and Butley Estuaries SAC (situated 10.8km north of the proposed dredging area) and the Margate and Long Sands SAC (located approximately 7.7km south-east of the approach channel, 6.0km from IG and 10.2km from the IGE disposal site).

Details of all these sites are provided in **Table 5.1** and their locations are outlined in **Figure 5.1**.

Given their proximity and nature, the construction and operational activities that form part of this dredge campaign may have implications for protected habitat and species features within some of these sites. The SPAs, SACs and Ramsar sites within the study area will be subject to the provisions of the Habitats Regulations (see **Section 4.2.4**). Given this, for the purpose of scoping, a Likely Significant Effect (LSE) is assumed.

For the purpose of the Scoping Report a 15.0km radius around the dredge area and disposal sites has been adopted for the zone of impact which relates to the anticipated dispersion area of the sediment plume. This is based on modelling which was carried out previously for the IGE with regard to sediment plumes (although not for the volume of material that may be generated by the proposed capital dredge). The previous modelling indicated a sediment plume of approximately 15.0km within a linear ellipsoid area south-south-west to north-north-east across the IGE offshore area (Posford Haskoning, 2003a and 2003b). Once project-specific modelling has been completed for the ES this zone of influence can be updated accordingly.

However, in the meantime any sites more than 15.0km from the proposed dredge or disposal areas will be scoped out from further consideration, as it is anticipated that any impacts from the proposed works would be more localised and would not extend to beyond 15.0km. The potential for any proximate sites with an ornithological interest to be impacted by the works will, however, be re-examined as part of the screening process for the HRA.

**Table 5.1 International and European protected sites**

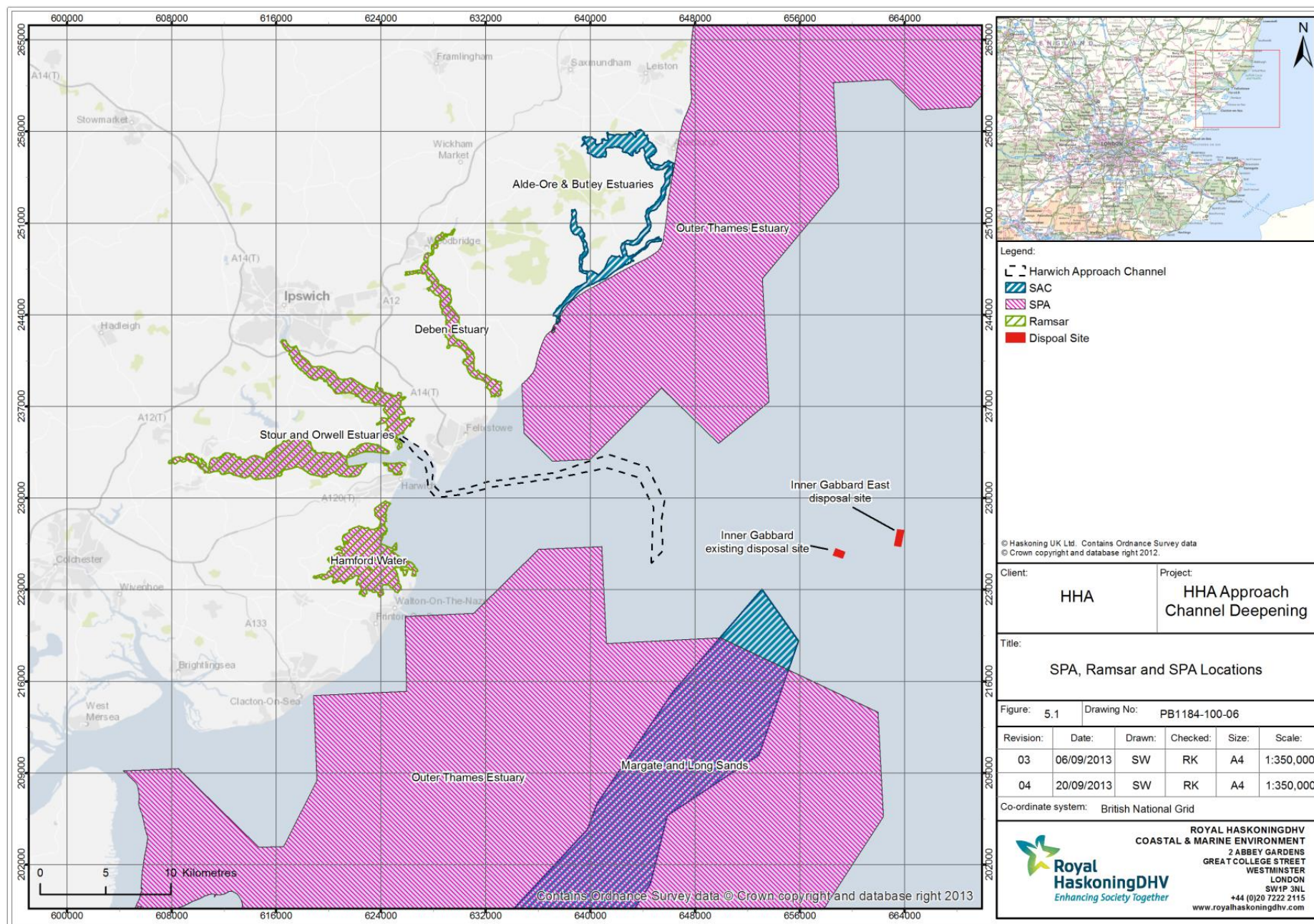
Site	Habitat Feature	Species Feature	Distance from proposed works	Potential for impact?	Scoped out?
Stour and Orwell Estuaries Ramsar (Ramsar & Wetlands International, 2013)	<p>The habitat features include:</p> <ul style="list-style-type: none"> <li>- extensive mudflats;</li> <li>- low cliffs;</li> <li>- saltmarsh;</li> <li>- grazing marsh; and</li> <li>- areas of vegetated shingle on the lower river reaches.</li> </ul> <p>Human activities include tourism, bait collection, livestock grazing, and hunting.</p>	The site supports internationally and nationally important numbers of numerous species of wintering wildfowl and waders. Several nationally scarce plants and invertebrates occur	0.1km	Yes	No
Stour and Orwell Estuaries SPA (English Nature, 2001a, Natural England, 2014)	Supporting habitats to the designated bird populations of the SPA. The estuaries include extensive mudflats, low cliffs, saltmarsh, grazing marsh and small areas of vegetated shingle on the lower reaches.	<p>The site qualifies under Article 4.1 of the Birds Directive for the following Annex I species:</p> <ul style="list-style-type: none"> <li>- <b>During the breeding season:</b> Pied avocet <i>Recurvirostra avosetta</i></li> </ul> <p>This site also qualifies under Article 4.2 of the Birds Directive for:</p> <ul style="list-style-type: none"> <li>- <b>Over winter:</b> black-tailed godwit <i>Limosa limosa islandica</i>, Dark-bellied brent goose <i>Branta bernicla bernicla</i>, dunlin <i>Calidris alpina alpina</i>, grey plover <i>Pluvialis squatarola</i>, northern pintail <i>Anas acuta</i>, redshank <i>Tringa tetanus</i>, Red knot <i>Calidris canutus</i>,</li> <li>- <b>Autumn passage:</b> redshank <i>Tringa totanus</i></li> </ul> <p>The area regularly supports 63,017 individual waterfowl (5 year</p>	0.1km	Yes	No

Site	Habitat Feature	Species Feature	Distance from proposed works	Potential for impact?	Scoped out?
		<p>peak mean 1991/2 - 1995/6) in the non-breeding season including: cormorant <i>Phalacrocorax carbo</i>, pintail <i>Anas acuta</i>, ringed plover <i>Charadrius hiaticula</i>, grey plover <i>Pluvialis squatarola</i>, dunlin <i>Calidris alpina alpina</i>, black-tailed godwit <i>Limosa limosa islandica</i>, redshank <i>Tringa totanus</i>, shelduck <i>Tadorna tadorna</i>, great crested grebe <i>Podiceps cristatus</i>, curlew <i>Numenius arquata</i>, dark-bellied Brent goose <i>Branta bernicla bernicla</i>, wigeon <i>Anas penelope</i>, goldeneye <i>Bucephala clangula</i>, Lapwing <i>Vanellus vanellus</i>, knot <i>Calidris canutus islandica</i>, Turnstone <i>Arenaria interpres</i>, and gadwall <i>Anas strepera</i>.</p> <p>Additional qualifying features as identified by the 2001 UK SPA review include: shelduck <i>Tadorna tadorna</i>, hen harrier <i>Circus cyaneus</i>, ringed plover <i>Charadrius hiaticula</i>, and ruddy turnstone <i>Arenaria interpres</i>.</p>			
Hamford Water Ramsar (Ramsar & Wetlands International, 2013)	<p>The habitat features include:</p> <ul style="list-style-type: none"> <li>- extensive network of tidal creeks;</li> <li>- scattered islands;</li> <li>- substantial intertidal sandflats;</li> <li>- mudflats supporting <i>Zostera</i> spp. beds, and associated saltmarsh.</li> </ul>	The site is important for nationally and internationally important numbers of wintering and nesting waterbirds, and serves as a winter refuge for migratory waterbirds displaced by severe weather.	3.1km	Yes	No

Site	Habitat Feature	Species Feature	Distance from proposed works	Potential for impact?	Scoped out?
Hamford Water SPA (English Nature, 2001b)	Hamford Water is a wetland of international importance including a large, shallow estuarine basin comprising tidal creeks and islands, intertidal mud and sand-flats, and saltmarsh.	<p>This site supports the following species listed on Annex I of the Birds Directive:</p> <ul style="list-style-type: none"> <li>- <b>During the breeding season:</b> little tern <i>Sterna albifrons</i>.</li> <li>- <b>Over winter:</b> avocet <i>Recurvirostra avosetta</i>, golden plover <i>Pluvialis apricaria</i>, ruff <i>Philomachus pugnax</i>.</li> </ul> <p>This site also qualifies under Article 4.2 of the Birds Directive</p> <ul style="list-style-type: none"> <li>- <b>On passage:</b> ringed plover <i>Charadrius hiaticula</i>;</li> <li>- <b>Over winter:</b> black-tailed godwit <i>Limosa limosa islandica</i>, dark-bellied Brent goose <i>Branta bernicla bernicla</i>, grey plover <i>Pluvialis squatarola</i>, ringed plover <i>Charadrius hiaticula</i>, Eurasian teal <i>Anas crecca</i>, common shelduck <i>Tadorna tadorna</i>, common redshank <i>Tringa tetanus</i>, ruff <i>Philomachus pugnax</i></li> </ul> <p>The area supports at least 20,000 waterfowl, including: redshank <i>Tringa totanus</i>, dunlin <i>Calidris alpina alpina</i>, lapwing <i>Vanellus vanellus</i>, wigeon <i>Anas penelope</i>, shelduck <i>Tadorna tadorna</i>, black-tailed godwit <i>Limosa limosa islandica</i>, grey plover <i>Pluvialis squatarola</i>, ringed plover <i>Charadrius hiaticula</i>, teal <i>Anas crecca</i>, dark-bellied Brent goose <i>Branta bernicla bernicla</i>, ruff <i>Philomachus pugnax</i>, golden plover <i>Pluvialis apricaria</i>, avocet <i>Recurvirostra avosetta</i>.</p>	3.1km	Yes	No
Deben Estuary	The Deben estuary supports saltmarsh and intertidal mud-flats that occupy the	The site supports:	6.4km	Yes	No

Site	Habitat Feature	Species Feature	Distance from proposed works	Potential for impact?	Scoped out?
Ramsar	majority of the site. These habitats display the most complete range of saltmarsh community types in Suffolk. A number of swamp vegetation communities are also present.	<ul style="list-style-type: none"> <li>- Dark-bellied Brent goose, <i>Branta bernicla bernicla</i> - 1953 individuals, representing an average of 1.9% of the GB population (5 year peak mean 1998/9-2002/3)</li> </ul> <p>The site also supports a population of the mollusc <i>Vertigo angustior</i> (Habitats Directive Annex II (S1014); British Red Data Book Endangered).</p>			
Deben Estuary SPA	The Deben Estuary extends south-eastwards for over 12.0km from the town of Woodbridge to the sea just north of Felixstowe. It is relatively narrow and sheltered. The saltmarsh and intertidal mud-flats that occupy the majority of the site, however, display the most complete range of saltmarsh community types in Suffolk.	<p>This site supports the following species listed on Annex I of the Directive</p> <ul style="list-style-type: none"> <li>- <b>Over winter:</b> avocet <i>Recurvirostra avosetta</i>, dark-bellied Brent goose <i>Branta bernicla bernicla</i>,</li> </ul>	6.4km	Yes	No
Outer Thames Estuary SPA (JNCC, 2011)	The Outer Thames Estuary SPA consists of shallow coastal waters and large areas of mud, silt and gravelly sediments form the deeper water channels (Natural England, 2010).	The site regularly supports more than 38% of the GB population of red-throated diver <i>Gavia stellata</i> listed in Annex 1 of the EC Birds Directive.	0.1km	Yes	No
Alde, Ore and Butley Estuaries SAC (JNCC, 2013a)	<p>This estuary, made up of three rivers, is the only bar-built estuary in the UK with a shingle bar.</p> <p>The habitat features include (JNCC,</p>	<p>This site supports the following internationally important breeding populations species:</p> <ul style="list-style-type: none"> <li>- Marsh harrier <i>Circus aeruginosus</i>; and</li> <li>- Lesser black-backed gull <i>Larus fuscus graellsii</i>.</li> </ul>	10.8km	Yes	No

Site	Habitat Feature	Species Feature	Distance from proposed works	Potential for impact?	Scoped out?
	<p>2013a):</p> <ul style="list-style-type: none"> <li>- 70% of the area comprises tidal rivers, estuaries with mudflats and sand flats, lagoons (including saltwork basins);</li> <li>- 25% is covered by salt marshes and pastures, salt steppes;</li> <li>- 5% consists of shingle, sea cliffs and islets.</li> </ul>	<p>Flora:</p> <ul style="list-style-type: none"> <li>- Atlantic salt meadows <i>Glauco-Puccinellietalia maritima</i>.</li> </ul>			
Margate and Long Sands SAC (JNCC, 2013b)	<p>This site is designated for the Annex I habitat of sandbanks which are slightly covered by sea water all of the time for which this is considered to be one of the best areas in the UK. The sandbanks are composed of well-sorted sandy sediments, with muddier and more gravelly sediments in the troughs between banks, and the upper crests of some of the larger banks dry out at low tide.</p>	<p>No designated (Annex II) species features.</p> <p>The fauna of the bank crests is characteristic of species-poor, mobile sand environments, and is dominated by polychaete worms and amphipods. Within the troughs and on the bank slopes a higher diversity of polychaetes, crustacea, molluscs and echinoderms are found. Mobile epifauna includes crabs and brown shrimp, along with squid and commercially important fish species such as sole and herring.</p> <p>The site may at times also support a significant amount of the reef-forming ross worm (<i>Sabellaria spinulosa</i>), which when formed as a reef qualifies as an Annex I habitat (biogenic reef).</p>	7.7km	Yes	No



### 5.3 International Bird Areas

The Important Bird Areas (IBA) Programme of BirdLife International is a worldwide initiative aimed at identifying and protecting a network of sites considered to be critical for the conservation of the world's birds.

Around the Harwich Haven Approach Channel there are two main IBAs: the Stour and Orwell Estuaries IBA and the Hamford Water IBA. The Stour and Orwell Estuaries IBA supports important numbers of wintering waders and wildfowl and both estuaries have extensive mudflats and saltmarshes (BirdLife International, 2013a).

Hamford Water IBA is described as a large, shallow estuarine basin comprising tidal creeks and islands, sand dunes and extensive areas of saltmarsh. The IBA is important for wintering waders and wildfowl and breeding terns (BirdLife International, 2013b).

### 5.4 Nationally Protected Sites

The proposed dredging work does not lie within the boundary of any nationally protected sites. However, there are a number of national designations within the vicinity of the proposed works.

The sub-sections below provide further information on these sites. **Table 5.2** provides a summary of the national sites within the area of influence of the proposed works and the sites are illustrated in **Figure 5.2**.

#### 5.4.1 Sites of Special Scientific Interest

SSSIs are designated under Section 28 of the Wildlife and Countryside Act 1981. SSSIs are the UK's outstanding wildlife and geological sites, including coastal and marine habitats such as beaches and intertidal habitats.

Although the proposed scheme is not located within a SSSI, the following designated sites are located within a radius of 5.0km from the dredge footprint:

- Landguard Common SSSI, which is situated south of Felixstowe on Landguard Peninsula at the mouth of Harwich Harbour (less than 0.2km from the proposed scheme);
- Harwich Foreshore SSSI (0.8km), which is situated on the eastern coastline of Harwich Peninsula;
- Stour Estuary SSSI which is located 1.1km west of the proposed dredge area;
- Orwell Estuary SSSI which is located 0.1km north-west from the proposed work; and
- Hamford Water SSSI, which is situated 3.1km south-west of the planned dredge footprint.

#### 5.4.2 Area of Outstanding Natural Beauty

An AONB is a designation for sites with distinctive character and natural beauty. The purpose of the AONB designation is to conserve and enhance their high qualities in terms of flora, fauna, historical and cultural associations as well as scenic views. To

achieve these aims, AONBs rely on planning controls and practical countryside management by Natural England. The AONBs are regulated through the National Parks and Access to the Countryside Act of 1949. The Countryside and Rights of Way Act 2000 (the CROW Act) added further regulation and protection to these sites, by ensuring the future of AONBs as important national resources. The western area of the dredge footprint is situated within the Suffolk Coast and Heaths AONB and comprises coastal and marine habitats.

#### 5.4.3 National Nature Reserves

The nearest NNR is Hamford Water NNR located 3.1km south-west from Harwich, known for its overwintering populations of waders and waterfowl.

### 5.5 Marine Conservation Zones

The MCAA (2009) created a new type of Marine Protected Area (MPA), known as Marine Conservation Zones (MCZs) which will protect nationally important marine wildlife, habitats, geology and geomorphology. The development of proposals for MCZs has taken place over the past four years through four regional MCZ projects. The regional teams recommended 127 sites (rMCZs), including 65 recommended reference areas (rRAs), to the Statutory Nature Conservation Bodies (SNCBs), Natural England and the Joint Nature Conservation Committee (JNCC) in September 2011. Public consultation on the proposals was launched on 13<sup>th</sup> December 2012 and closed on 31<sup>st</sup> March 2013.

Ministers examined all of the advice and evidence and proposed that up to 31 sites would be suitable for designation in the first tranche in 2013, however, no rRAs were taken forward. The Stour and Orwell Estuaries rMCZ was included within this list of 31 proposed sites.

In November 2013, 27 of these 31 sites were designated within the Defra marine area as new MCZs. The Stour and Orwell Estuaries rMCZ was not included within the 27 sites, and will therefore not be designated at this time. Whilst it is important to consider the key features of the Stour and Orwell estuaries within the ES, it will not be necessary to undertake any kind of assessment relating to impacts on the rMCZ, and therefore the potential impact on MCZs will not be considered further..

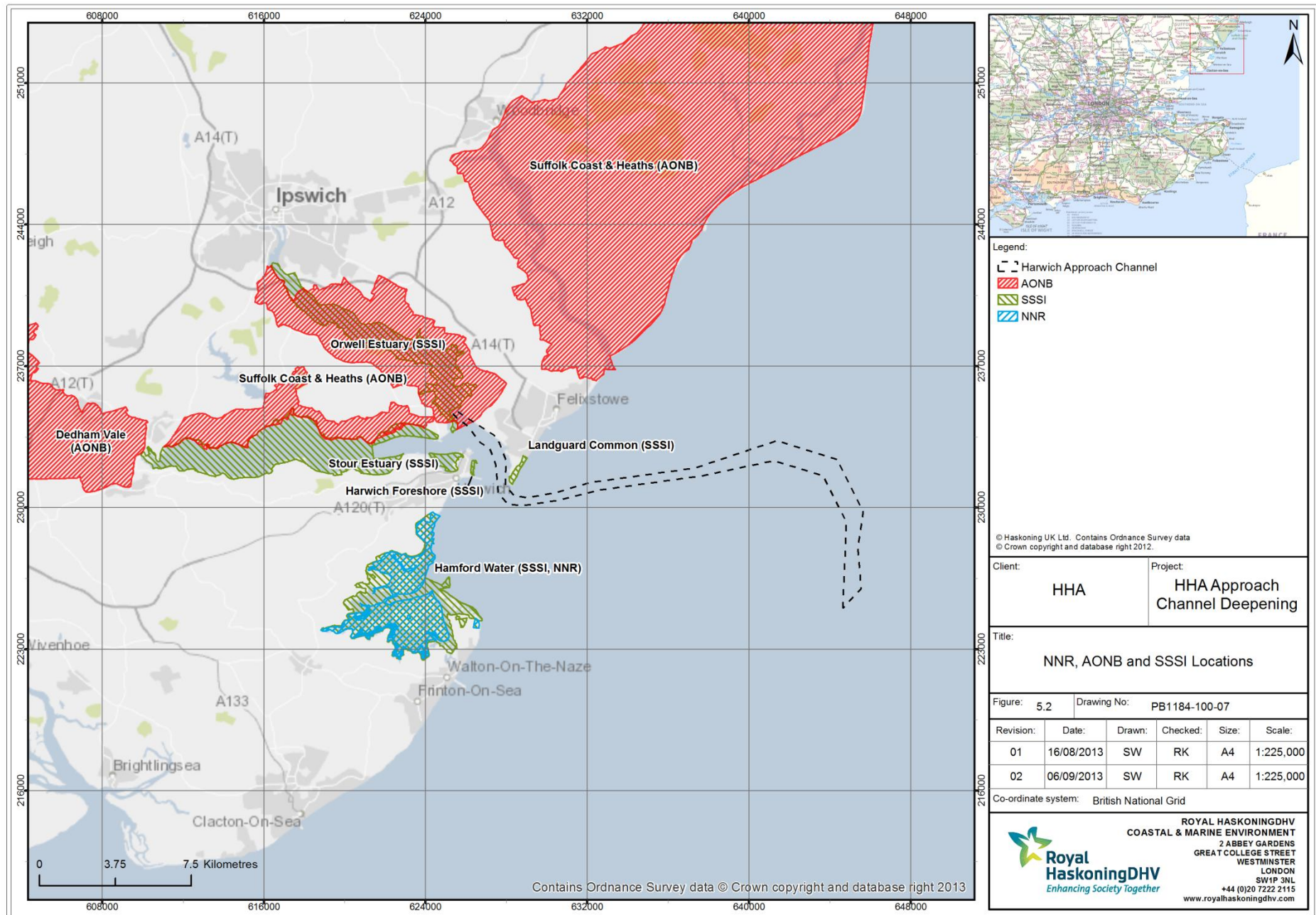
**Table 5.2**      **Nationally protected sites**

Site	Habitat Feature	Species Feature	Distance from proposed works	Potential for impact?	Scoped out?
Landguard Common SSSI (Natural England, 2013a)	<p>The habitat features which support the SSSI include:</p> <ul style="list-style-type: none"> <li>- loose shingle foreshore;</li> <li>- vegetated beach;</li> <li>- earth banks and scrub.</li> </ul> <p>Pioneer shingle plants and vegetated shingle beaches are fragile and a nationally scarce habitat type. The site is also of some ornithological interest as a landfall site for passage migrants and for breeding shorebirds.</p>	<p>The north part of the foreshore includes a large population of sea kale <i>Crambe maritima</i> as well as sea pea <i>Lathyrus japonicus</i>, yellow-horned poppy <i>Glaucium flavum</i>, sea sandwort <i>Honckenia peploides</i> and sea campion <i>Silene uniflora</i>. The bare shingle is also used by nesting little tern <i>Sterna albifrons</i> and ringed plover <i>Charadrius hiaticula</i>.</p>	0.2km	Yes	No
Harwich Foreshore SSSI (Natural England, 2013b)	<p>This site yields the only fossil flora attributable to the lowest division of the Eocene London Clay. A recently discovered site with great research potential.</p>	<p>Its composition is typical of the formation and specimens are abundant. Association of the plants with ash bands within the clay may aid correlations elsewhere in the basin since they form useful marker horizons.</p>	0.8km	Yes	No
Stour Estuary SSSI (Natural England, 2013c)	<p>The habitat features which support the SSSI include:</p> <ul style="list-style-type: none"> <li>- coastal saltmarsh;</li> <li>- sheltered muddy shores.</li> </ul> <p>The Stour Estuary includes three nationally important geological sites. These provide</p>	<p>The Stour Estuary is nationally important for 13 species of wintering waterfowl and three species on autumn passage.</p> <p>It has also two scarce marine invertebrates and a vascular scarce plant assemblage. The main species are outlined below.</p> <p>Flora:</p>	1.1km (Unit 6 & 9)	Yes	No

Site	Habitat Feature	Species Feature	Distance from proposed works	Potential for impact?	Scoped out?
	exposures of early Eocene sediments containing the volcanic ash formations between Harwich and Wrabness.	<ul style="list-style-type: none"> <li>- lax-flowered sea-lavender <i>Limonium humile</i>;</li> <li>- dwarf eelgrass <i>Zostera noltii</i>;</li> <li>- golden-samphire <i>Inula crithmoides</i>;</li> <li>- hoary mullein <i>Verbascum pulverulentum</i>;</li> <li>- curved hard-grass <i>Parapholis incurve</i>;</li> <li>- sea barley <i>Hordeum marinum</i>;</li> <li>- divided sedge <i>Carex divisa</i>;</li> <li>- marsh-mallow <i>Althaea officinalis</i>;</li> <li>- dittander <i>Lepidium latifolium</i>; and</li> <li>- perennial glasswort <i>Sarcocornia perennis</i>.</li> </ul> <p>Invertebrates:</p> <ul style="list-style-type: none"> <li>- starlet sea anemone <i>Nematostella vectensis</i>;</li> <li>- tentacled lagoon worm <i>Alkmaria romijni</i>.</li> </ul> <p>Of the ten closest estuaries to the Stour and Orwell, the Stour is the only one to contain <i>N. vectensis</i>. Both species are listed in Schedule 5 of the Wildlife &amp; Countryside Act 1981, as amended.</p>			
Orwell Estuary SSSI (Natural England, 2013d)	<p>The habitat features which support the SSSI include:</p> <ul style="list-style-type: none"> <li>- extensive mudflats;</li> <li>- saltmarsh;</li> <li>- shingle;</li> <li>- coastal grazing marsh habitats.</li> </ul>	<p>The flora species which are a key feature of the site are:</p> <ul style="list-style-type: none"> <li>- eelgrass, dwarf eelgrass;</li> <li>- slender hare's-ear <i>Bupleurum tenuissimum</i>;</li> <li>- golden-samphire <i>Inula crithmoides</i>;</li> <li>- lax-flowered sea-lavender <i>Limonium humile</i>;</li> <li>- shrubby sea-blite <i>Suaeda vera</i>;</li> <li>- small cord-grass <i>Spartina maritima</i>;</li> <li>- perennial glasswort <i>Sarcocornia perennis</i>; and</li> <li>- divided sedge <i>Carex divisa</i>.</li> </ul>	0.1km	Yes	No

Site	Habitat Feature	Species Feature	Distance from proposed works	Potential for impact?	Scoped out?
		<p>The Orwell Estuary is of national importance for breeding avocet <i>Recurvirostra avosetta</i> and also supports a nationally important assemblage of breeding birds characteristic of open waters which is concentrated in three main areas: Trimley Marshes, Shotley Marshes, and Loompit Lake.</p> <p>The estuary regularly supports an important assemblage of more than 20,000 non-breeding waterfowl. These regularly attain nationally important numbers in winter.</p> <p>In addition, the Orwell Estuary supports an inland nesting colony of cormorants at their only site in Suffolk.</p>			
Hamford Water SSSI (Natural England, 2013e)	<p>The habitat features which support the SSSI include:</p> <ul style="list-style-type: none"> <li>- estuarine basin with tidal creeks;</li> <li>- intertidal mud and sand flats;</li> <li>- saltmarshes;</li> <li>- islands;</li> <li>- beaches; and</li> <li>- marsh grassland.</li> </ul>	<p>The site is of importance for breeding little terns <i>Sterna albifrons</i> and wintering dark-bellied Brent goose <i>Branta bernicla bernicla</i>, wildfowl and waders and of national importance for many other bird species. It supports communities of coastal plants which are rare or extremely local in Britain including Hog's fennel <i>Peucedanum officinale</i>.</p>	3.1km	Yes	No
Suffolk Coast and Heaths AONB (Natural England, 2013f)	<p>The landscape features which support the AONB include:</p> <ul style="list-style-type: none"> <li>- mix of shingle beaches</li> <li>- crumbling cliffs;</li> <li>- marshes;</li> <li>- estuaries;</li> </ul>	<p>Rare birds such as the woodlark <i>Lullula arborea</i>, nightjar <i>Caprimulgus europaeus</i> and Dartford warbler <i>Sylvia undata</i> are key features of the site.</p>	0.0km	Yes	No

Site	Habitat Feature	Species Feature	Distance from proposed works	Potential for impact?	Scoped out?
	<ul style="list-style-type: none"> <li>- heathland;</li> <li>- forests; and</li> <li>- farmland.</li> </ul>				
Hamford Water NNR (Natural England, 2013g)	<p>The main habitats associated with this site are:</p> <ul style="list-style-type: none"> <li>- saltmarsh;</li> <li>- intertidal mudflats;</li> <li>- coastal;</li> <li>- grazing marsh;</li> <li>- sands;</li> <li>- shingle; and</li> <li>- small freshwater ponds and ditches.</li> </ul>	<p>This site is known for its overwintering populations of waders and wildfowl including dark-bellied Brent geese <i>Branta bernicla bernicla</i>, black tailed godwits <i>Limosa limosa</i>, redshank <i>Tringa totanus</i>, ringed plover <i>Charadrius hiaticula</i>, grey plover <i>Pluvialis squatarola</i> and shelduck <i>Tadorna tadorna</i>. There are a number of birds which breed on the site including nationally important colonies of little tern <i>Sterna albifrons</i> and avocet <i>Recurvirostra avosetta</i>.</p>	3.1km	Yes	No



## 5.6 Locally Protected Sites

The area surrounding the proposed dredging footprint comprises a couple of locally protected sites (see **Figure 5.3**), including Landguard Common Local Nature Reserve (LNR) and the Stour Estuary RSPB Reserve.

The sub-sections below outline the main habitats features and species of importance for these local sites to be considered in the context of the proposed scheme.

### 5.6.1 Landguard Common LNR

A LNR is a statutory designation which is made under Section 21 of the National Parks and Access to the Countryside Act 1949, and amended by Schedule 11 of the Natural Environment and Rural Communities Act 2006, by principal local authorities. To qualify for LNR status, a site must be of importance for wildlife, geology, education or public enjoyment. Some LNR sites are also nationally important SSSI's.

On the coastal area of Landguard Peninsula, 24ha are classified as LNR. The point and land bordered by Landguard Common LNR is owned by HHA. The Landguard Common LNR is also designated as a SSSI (see **Section 5.5.2**).

The site comprises shingle beaches which are habitat to oraches (*Atriplex sp*), an annual species adapted to the conditions, and also sea kale *Crambe maritima*, yellow-horned poppy *Glaucium flavum*, curled dock *Rumex crispus* and sea pea *Lathyrus japonicus* which are located in thin layer of soil forms from detritus. Stabilised shingle presents a more complex community including bryophytes, lichens, grasses, hawthorn (*Crataegus sp*) and other vascular plants. These are the rarest communities, often taking a long time to develop.

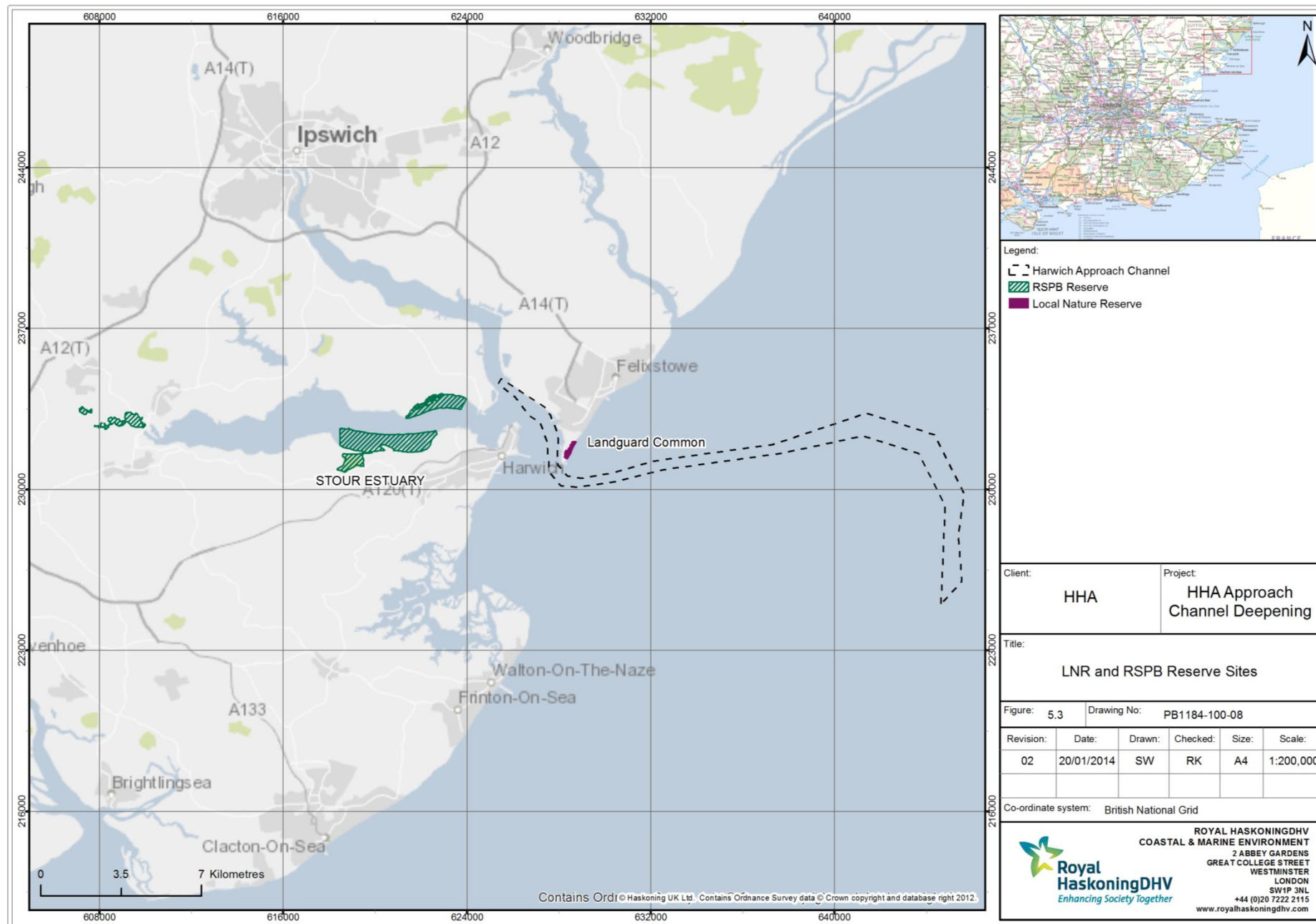
Landguard Common LNR is also an important breeding site for birds such as linnets *Carduelis cannabina* and house sparrows *Passer domesticus* which are known to regularly breed on the reserve, as well as the ringed plover *Charadrius hiaticula* (Landguard Partnership, 2011). The Landguard Common LNR is located 0.3km east of the proposed dredge footprint.

### 5.6.2 The Stour Estuary RSPB Reserve

The Stour Estuary is one of the most important estuaries in Britain for wintering birds, with internationally important numbers of Brent goose *Branta bernicla*, dunlin *Calidris alpina*, knot *Calidris canutus* and nightingale *Luscinia megarhynchos*, but most significantly for the numbers of black-tailed godwit *Limosa limosa*.

Within the estuary, Copperas Bay supports a number of wading birds and wildfowl during the winter months (September to March) (RSPB, 2012).

The Stour Estuary RSPB Reserve is located 1.6km west of the proposed dredge area.



## **5.7 Identification of Key Issues**

The proposed dredging activities have the potential to affect protected habitats and species within the adjacent nature conservation sites.

The marine ecology and ornithological interests of the Stour and Orwell estuaries are based on a number of inter-related biological, chemical and physical parameters, such as food availability, water quality and the supply of sediment. Consequently any development activities that could lead to changes in these parameters could have an impact on sensitive marine and ornithological receptors.

As any issues relating to nature conservation designations are highly interdependent, they are not dealt with here but alongside their respective features in the following sections. Each section provides an outline of the potential impacts that could arise due to the proposed scheme on each relevant environmental parameter. Further to this, the legal requirements under the Habitats Regulations are examined in **Section 24**.

## **6 COASTAL PROCESSES**

### **6.1 Introduction**

This section considers the coastal processes (hydrodynamics and sediment transport) in the vicinity of the Harwich Haven Approach Channel, including the South Suffolk and Essex coastline, the Stour and Orwell estuaries, and the wider Outer Thames Estuary.

### **6.2 Baseline Conditions**

#### **6.2.1 Geology of the Outer Thames Estuary**

The low lying parts of the Essex and Suffolk coastline comprise a series of estuaries and tidal inlets containing muddy intertidal flats and saltmarshes. The underlying geology of the coastline is London Clay, formed in the Lower Eocene, 56 to 49 million years ago (Cameron et al., 1992). London Clay is exposed in the low lying cliffs along the Essex and South Suffolk coast, including the Naze, Stour and Orwell.

The London Clay is overlain by a sequence of Pleistocene (2.5 million to 10,000 years ago) sands and gravels (Cameron et al., 1992). During the Pleistocene, a series of sea-level changes, driven by glacial and interglacial phases, were partly responsible for shaping the Essex and South Suffolk coastline as it appears today. The estuaries in the region were formed during repeated ice advances causing sea level falls, when the London Clay was eroded by fluvial channels (Royal Haskoning, 2010b). The Stour and Orwell estuaries were incised as part of the Proto-Thames Estuary, which was forced south to its present day location by the advancing ice sheet of the last glacial period (Royal Haskoning, 2010b).

#### **6.2.2 The Stour and Orwell estuarine system**

The Stour and Orwell estuaries contain extensive mudflats, low cliffs, saltmarsh and areas of vegetated shingle. The Orwell Estuary has steeply rising slopes on its northern banks and high ground on its southern banks, constraining the estuary's development. The Stour Estuary is long and straight with a more classic funnel shape. The Stour channel is less constrained and has a series of sheltered bays, where the mudflat and saltmarsh habitats are located. Evolution of these intertidal habitats will be strongly connected with future sea level rise; areas of the intertidal habitat will be permanently submerged by the rising water levels.

The Stour River channel is orientated west to east and at low water is slightly narrower than the Orwell. The Orwell River channel is orientated north-west to south-east, resulting in a higher susceptibility to waves generated offshore (Royal Haskoning, 2010b). Both the Stour and Orwell estuaries are ebb dominant systems, with the ebb tide stronger than the flood. Sediment composition within the estuaries differs slightly; towards the mouth, the Stour is sandier whereas throughout its length, the Orwell, is characterised by muddy substrates (Royal Haskoning, 2010b). The intertidal areas within the estuaries are comprised mostly of mud, but contain high percentages of sands, shells and gravel (Royal Haskoning, 1998). The greatest sediment supply to the Stour is from offshore sources, which pass through the harbour on the flood tide; these are subsequently removed or redistributed in the estuary by the ebb tides (Royal Haskoning, 1998).

### 6.2.3 Tidal regime

The shape of the coastline between Felixstowe and the Naze in conjunction with the flows in and out of the Stour and Orwell estuaries contribute to a complicated pattern of tidal currents within the harbour vicinity, in contrast to the linear tidal ellipse further offshore (Royal Haskoning, 1998). Tidal current speeds offshore from Harwich Haven are approximately 1m/s and the fastest flood currents near the harbour mouth are approximately 0.7m/s, both during mean spring tide (Royal Haskoning, 1998). Tidal currents in the southern North Sea, in the vicinity of Harwich Haven, are directed south-south-west on the flood tide and north-north-east on the ebb tide. Although, the duration of the flood tide is longer than the ebb, the system is ebb dominant with higher ebb current velocities (Posford Haskoning, 2003a). Current velocities within the Outer Thames Estuary region are greater closer to the coast, with flow directions influenced by the local bathymetry (MALSF, 2007).

The tidal range at Harwich is approximately 3.6m on mean spring tides and 2.3m on mean neap tides. The highest astronomical tide is 4.4m above CD and the lowest astronomical tide is 0.2m below CD (Posford Haskoning, 2003a). Storm surges in the southern North Sea are predominantly caused by coastally trapped waves which propagate parallel to the shore but transfer energy onshore. Storm surges in the southern North Sea can also be created by low atmospheric pressure which causes a rise in water levels, combined with northerly winds which drive water south resulting in a mass of water in the southern North Sea (MALSF, 2007). Storm surges in the Harwich Haven vicinity result in larger than normal currents and higher waves, which, combined with high water levels, expose normally dry areas of coast (beach and soft cliff) to erosion (HR Wallingford, 2002).

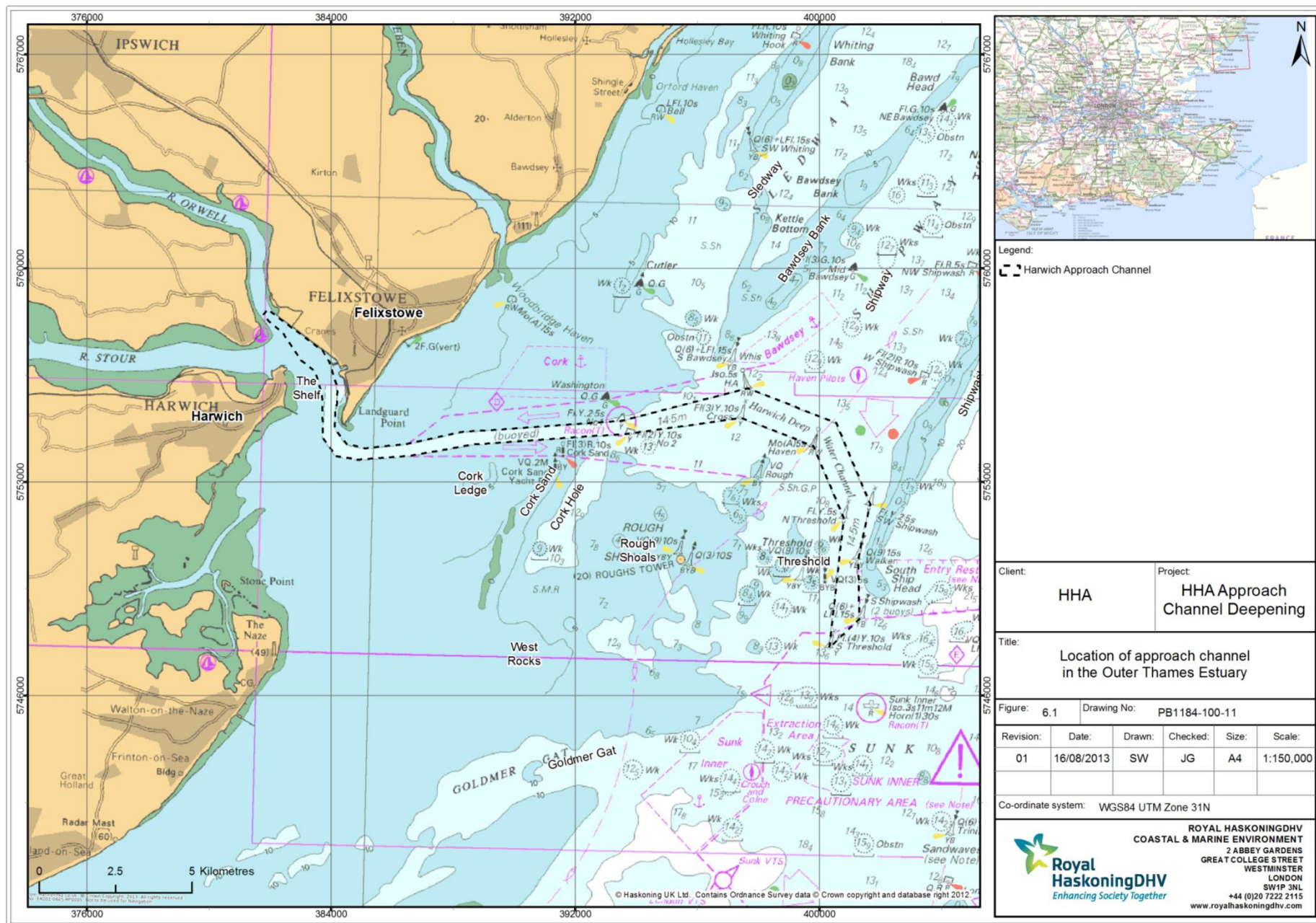
### 6.2.4 Waves

In the Outer Thames Estuary region, waves are predominantly generated by south-westerly and north-easterly winds (MALSF, 2007). Short period waves are generated by the prevailing south-westerly winds, whereas, due to greater fetch and propagation of swell waves from the North Sea and the Atlantic Ocean, longer period waves are generated by north-easterly winds. In the centre of the North Sea the highest percentage of waves recorded throughout the year were between 0.5-1m, with a maximum wave height of between 6-6.5m recorded in the month of February (MALSF, 2007).

In the area surrounding the Harwich Haven Approach Channel, the greatest proportion of waves originates from the west-south-west, whereas the largest waves originate from the north-north-east, with a hindcast significant wave height of 7m (although though this is a very rare occurrence) (Posford Haskoning, 2003a).

### 6.2.5 Bathymetry

The seabed in the immediate area around the approach channel is shallow, with depths less than 10m (MALSF, 2007). Approximately 20.0km off the coast of Harwich Haven the sea floor deepens to between 20 and 30m (see **Figure 6.1**). The bathymetry in the Outer Thames Estuary is marked by a series of large sand banks which lie parallel with the coast in a north-east/south-west orientation and can be dry at low water. In between these sand banks the seafloor deepens to a maximum of approximately 25m.



#### 6.2.6 Seabed sediment distribution

The coastline in the vicinity of the Harwich Haven Approach Channel is characterised by mudflats and saltmarshes, estuaries, shallow creeks, low eroding cliffs and shingle banks (MALSF, 2007). Within the study area, different parts of the system are responding to the physical forces acting upon them in different ways. The dominant geomorphological process within the Harbour is deposition. In 2011 subtidal accretion was estimated at approximately 0.27m in a five year period (Royal Haskoning, 2012). However the intertidal areas within the Stour and Orwell estuaries are being eroded by a combination of wave energy, sea level rise and tidal currents. Erosion is also occurring at the Suffolk clay cliffs and the clay cliffs at the Naze (Posford Haskoning, 2003a).

The Outer Thames Estuary is characterised by a diverse mix of sediment and exposed bedrock. The bed of the approach channel consists mainly of stiff clays with areas of sand, gravel and occasional sandstone pieces in association with old fluvial channels (see **Figure 6.1**) (Posford Haskoning, 2003a). The sediments found offshore of Shipwash Bank are mainly coarse sand and gravel and are relatively immobile, except during severe storms. In the wider Outer Thames Estuary the seabed surrounding the approach channel is dominated by a series of large sandbanks. The sandbanks are composed of well sorted, fine to medium grained sands, originating from erosion of ancient fluvial deposits, London Clay and glacio-fluvial outwash, and reworked by tidal currents. In deeper areas, between the sand banks, the seabed is relatively smooth and sediments are characterised by mud (Posford Haskoning, 2003a).

#### 6.2.7 Bedload sediment transport

At the coast, to the north of the Harwich Haven Approach Channel, the beaches are composed mainly of shingle with the proportion of shingle increasing towards Landguard Point (Posford Haskoning, 2003a). Longshore sediment transport is to the south until it meets the strong ebb currents emerging from the Stour and Orwell estuaries (Royal Haskoning, 2010b). Some shingle is transported around Landguard Point, and during severe storms, wave action drives this sediment into the Harbour (Posford Haskoning, 2003a, HR Wallingford, 2002).

It is believed that sediment is transported along the seabed from Landguard Point to Cork Sands, where quantities of sediment are either temporarily stored before being transported further offshore in a north-easterly direction or caught up in the clockwise circulation system around Cork Sands (HR Wallingford, 2002, Posford Haskoning, 2003a, Royal Haskoning, 2010b).

#### 6.2.8 Suspended sediment transport

Present day fluvial contribution to the sediment budget of the Outer Thames Estuary area is very small (MALSF, 2007). The sources of fine sediment in the Outer Thames Estuary include erosion of cliff sediments in Essex and Suffolk, erosion of the nearshore clay substrate, intertidal erosion of the Deben, Stour and Orwell estuaries and suspended sediment in the southern North Sea (Royal Haskoning, 1998, MALSF, 2007).

Suspended sediments in the North Sea are in a constant state of flux being modified by wave and current action. The concentrations of suspended sediment are higher in the estuaries than further offshore; nearshore concentrations range from 0.2 – 977 mg l<sup>-1</sup> whereas offshore concentrations range from 1.7 – 219 mg l<sup>-1</sup> (MALSF, 2007). During

spring tidal currents, suspension and transportation of mud occurs across the majority of the region (MALSF, 2007).

Every year the River Thames discharges up to 700,000 tonnes of fine suspended sediment at the mouth of the Thames Estuary (HR Wallingford, 2002). Suspended sediment concentrations in the Outer Thames Estuary double in winter, the reasons for this are currently unknown (MALSF, 2007).

### 6.3 Potential Changes

The assessment methodology adopted to understand potential changes to the physical environment caused by the deepening of the approach channel is different to that adopted in other sections of this Scoping Report. This is because the deepening of the approach channel could have effects on the hydrodynamic and sedimentary process regimes, but these effects in themselves are not considered to be impacts; where the impacts would manifest upon other receptors, such as marine ecology and fish. Hence, the assessment in this section focuses on describing the predicted changes/effects rather than defining a potential impact.

The potential effects on coastal processes associated with the deepening of the approach channel and the operational phase of the approach channel are set out in **Table 6.1** below.

**Table 6.1 Potential effects of the proposed scheme on the coastal processes within the study area**

Potential Effects	
Construction	Morphological change to subtidal and intertidal areas through removal of material and settlement of fine sediment from the dredging plume
	Short term increases in suspended sediment concentrations and sedimentation through creation of sediment plumes at the dredging site
	Short term increases in suspended sediment concentrations and sedimentation through creation of a sediment plume and bed load through disposal activities at the disposal site
Operation	Change in the hydrodynamic regime (including wave heights) along the coast, within Harwich Harbour and the wider Outer Thames Estuary due to the deepened approach channel
	Effects on the sediment budget and sediment transport within the Stour and Orwell estuaries and along the Essex and South Suffolk coast due to the influence of deepened areas
	Changes to the sediment type exposed on the seabed within the dredged areas, and corresponding changes to sediment transport within the Outer Thames Estuary
	Changes to the tidal prism of Harwich Harbour and the tidal range along the adjacent Essex coast
	Changes in offshore and coastal morphology due to alteration of the hydrodynamic regime and its influence on sediment accretion/erosion
	Changes in the exposure of intertidal and foreshore habitats to hydrodynamic forces

Potential Effects	
	Effects of continual maintenance dredging on coastal processes

## 6.4 EIA Investigations

The following section outlines the existing information which would be referred to in the EIA, and the proposed modelling which would be undertaken.

### 6.4.1 Existing information

There is currently a large amount of existing information available for the Harwich Haven Approach Channel and surrounding area. This information includes the following:

- Characterisation of a new offshore disposal site: Characterisation Report (HR Wallingford, 2013a);
- Harwich Harbour Strategic Studies: Impact of options to deepen the approach channel on flows, waves, sediment transport and estuary morphology (HR Wallingford, 2012);
- Harwich Haven Authority Annual Review 2012 (Royal HaskoningDHV, 2013c);
- Felixstowe Berth 9 Quay Extension ES (Royal HaskoningDHV, 2013d);
- Maintenance Dredging Protocol Baseline Document: Stour and Orwell Estuaries, Harwich/Felixstowe Harbour and Deep Water Channel (Harwich Haven Authority & Royal Haskoning DHV, 2012);
- Monitoring of Disposal of Maintenance Material in River Orwell (ABP, 2010);
- Essex and South Suffolk SMP2 (Royal Haskoning, 2010b);
- The Outer Thames Estuary Regional Environmental Characterisation (MALSF, 2007);
- Felixstowe South Reconfiguration ES (Posford Haskoning, 2003a);
- Bathside Bay Container Terminal ES (Posford Haskoning, 2003b);
- Southern North Sea Sediment Transport Study (HR Wallingford, 2002);
- Trinity III Terminal Phase 2 ES (Posford Haskoning, 2001);
- Harwich Haven Approach Channel Deepening Environmental Statement (HR Wallingford, 1998); and
- Harwich Navigation Channel Dinopotes site investigation: Geotechnical Report (Alluvial Mining Limited, 1997).

### 6.4.2 Modelling

In order to investigate the potential implications that the proposed works could have on the coastal processes of the study area, in conjunction with information in the above documents, a number of further modelling studies are planned. The proposed scope of the modelling studies is outlined below.

### *Sediment release from dredging and disposal*

Fine sediment plume modelling will be undertaken to show the potential effect of fine sediment released into suspension from the proposed capital dredge and disposal operations. Consideration of dredging at different locations in the channel and in different material types will be included. In-combination effects of the capital works with maintenance dredging, including disposal, will require assessment. The results of these predictions will be considered against the available data relating to measured suspended sediment concentrations in Harwich Harbour and the offshore area. A number of representative dredging scenarios will be developed using representative information about dredging plant and the soils information from the trial pit sampling undertaken by HHA in 2013. In addition to the fine sediment plume modelling the fate of the different types of material planned to be disposed at the proposed disposal site will also be assessed.

### *Flow modelling*

The computational flow model will look at the changes in flow as a result of the proposed channel deepening. The model extent is from Clacton to Aldeburgh. This model has been calibrated against detailed ADCP current data in Harwich Harbour and against a variety of sources in the coastal areas. The flow modelling will be undertaken for the -15.5 mCD and -16.0 mCD channel depths, but for extreme events the modelling will also allow for any over-dredge in the channel and will be modelled to -16.3 mCD as a worst case. The flow model will include sensitivity testing for the predicted effects of climate change including:

- sensitivity to a rise in mean sea level using latest UKCIP guidance to simulate the tide in 50 years' time;
- sensitivity to the propagation of a surge, for present mean sea level and for the case in 50 years' time; and
- sensitivity to the most recent storm events occurring around the UK.

The surge will be chosen to align with the surge propagation studies carried out in the Thames Estuary to inform the Environment Agency's TE2100 flood risk management programme.

The flow modelling has commenced and will form the basis of the rest of the modelling, the scope of which will be discussed with the regulators.

### *Wave modelling*

A wave model of the approaches to Harwich is proposed to include the full length of the approach channel and extending in to the lowest reaches of the Stour and Orwell. This will include:

- changes in wave shoaling;
- wave refraction;
- depth-induced breaking, bottom friction and white-capping;
- wave growth due to the wind;
- wave-wave interactions; and

- wave reflections off structures and far-field diffraction.

The model bathymetry will be based on the same bathymetry dataset as use for the flow modelling. Initially the existing bathymetry, including the existing dredge channel depths will be represented. It is proposed to compare the wave model results against wave conditions measured at two locations by the Environment Agency from August 2003 to August 2004 and from October 2006 to October 2007. Whilst the wave conditions from the two wave buoys were measured for only a limited time period and so do not contain the full range of wave conditions occurring in this area, they do provide good data to validate the wave modelling. A set of 10 times a year and annual waves will be used to show the effect of the deepened channel. To support the EIA the following studies are required:

- validate the wave model to measure wave buoy data now available in the area;
- run the model for a set of baseline representative typical and annual wave conditions chosen from a representative offshore wave climate extracted from the UK Met Office European wave model; and
- run the same set of representative conditions for the -15.5 mCD and -16.0 mCD deepened channels.

To complete the assessment the following runs of the wave model will be undertaken to include sensitivity testing for extreme waves and the predicted effects of climate change:

- run the wave model for extreme cases in support of flood risk assessment - likely to be 1 in 200 year case to be consistent with the recent aggregate dredging studies in the region;
- run a sensitivity test case for the extreme scenario including mean sea level rise; and
- run a sensitivity test for the extreme scenario including changes to waves at the model boundary from climate change effects.

These sensitivity runs will be undertaken for the -16.3 mCD channel only to provide a precautionary view of the effect of the dredge on waves.

#### *Sediment transport modelling - mud*

Deepening the channel may alter the pattern of sediment transport and allow material to deposit including in operational areas, leading to requirements for maintenance dredging.

The methodology for mud transport modelling was developed based on observed concentrations to schematise the process of import of fine sediment from the coastal zone and export of sediment re-suspended by waves in the estuary system. This methodology was able to predict infill rates in the dredged areas that corresponded well with observed volumes and has allowed prediction of infill for the various port developments. This methodology has avoided the need for a detailed understanding of the offshore source of fine sediments and the means by which it is generated and subsequently enters the Harbour.

Whilst the general approach remains useful in understanding the impacts of channel deepening, the present data on infill rates and intertidal change indicates that there has been significantly less erosion in the estuaries than previously predicted and the situation is considered sufficiently different to require the methodology to be updated. This update has been developed as part of strategic studies for HHA by comparison with recent dredging and intertidal morphology data.

The updated understanding of the sediment regime of the Stour Orwell was focussed on amending the existing methodology to reflect the new data on infill rates and intertidal changes and so did not address the main uncertainty in understanding mud transport in the area which is the means of sediment supply to the Stour-Orwell system. It is proposed to address this uncertainty as part of the channel deepening studies via a set of sensitivity tests to show the implications of variation in sediment supply from offshore.

The updated methodology and sensitivity testing will be applied to the flow modelling results and so demonstrate the predicted infill rate before the channel deepening and the effects of the channel at -16.3 mCD. It should be noted that the depths of -15.5 mCD and -16.0 mCD were modelled for the options study.

#### *Sediment transport modelling – sand*

Hitherto sand transport and deposition has not been a major issue for development studies in and around Harwich Haven and little sandy deposition is experienced in the approach channel, insufficient to require frequent maintenance dredging. There is a risk that further deepening of the channel may lead to a requirement for maintenance dredging of sandy material which would represent a change to the current maintenance dredging regime if the quantities involved are significant.

To investigate risk the results from the flow and wave modelling will be used to drive a model of sand transport. The bathymetry suggests that some wave breaking may occur in the areas surrounding the channel. In this case wave driven currents would be generated in some locally shallow areas, modifying the tidal flows, with the potential to significantly increase sand transport rates. A suitable set of wave conditions will be generated from the wave modelling to drive sand transport predictions for the different channel layouts. It is considered that because of variations in the tide range and bathymetry of the area it will be necessary to undertake these simulations using wave fields predicted at various water levels through the tide.

The amount of sand infill in the proposed dredged channels is anticipated to be the largest source of uncertainty in the EIA assessment. The source of this uncertainty is the limited knowledge of the availability of mobile sand in the areas in and adjacent to the parts of the channel to be deepened which are not dredged presently.

To support the EIA it is proposed to reduce the uncertainty to give a better estimate of the amount of sand infill which will be required to be removed (and disposed of) during maintenance dredging by a review of the recent trial pit sampling by HHA and detailed bathymetric information.

The refined understanding of bed composition will be used to predict infill, firstly to hind-cast the baseline case and then to model the situation with the channel at -15.5 mCD and -16.0 mCD.

### *Geomorphological processes*

A reappraisal of the link between the infill in the harbour and intertidal area change has been undertaken and reported on as part of strategic studies for HHA including a recalibration of the geomorphological assessment methodology.

As for the case of mud transport the same uncertainty in offshore supply of fine sediment exists in understanding the variability of intertidal response to sediment supply. Any sensitivity due to variation in the supply of material from offshore will be investigated using the results of the mud transport sensitivity tests. The applied methodology will demonstrate the implications of the channel at -16.3 mCD on the rate of change of intertidal area and volume. It should be noted that the depths of -15.5 mCD and -16.0 mCD were modelled for the options study.

### *Coastal impact modelling*

The implications for wave height and direction changes associated with the proposed channel deepening for effects on littoral transport will be investigated. A methodology has been applied for recent studies on the Felixstowe frontage for the Environment Agency, based on longshore drift calculations at several sections. It is proposed to improve this methodology by running a whole climate of wave tests through the same SWAN model as used for the representative waves. By these means wave information will be available throughout the model area allowing much more detail of variability in longshore drift to be calculated giving an improved understanding of the impact of the channel on littoral sediment transport. These studies will be performed for the channel at -16.3 mCD to provide a precautionary view of the implications of the deepened channel on littoral transport. Existing work will be referred to for the -15.5 mCD and -16.0 mCD depths.

## **7 MARINE WATER AND SEDIMENT QUALITY**

### **7.1 Introduction**

This section presents the current baseline conditions within the study area with regard to marine sediment and water quality.

The study area has been identified as:

- the Stour and Orwell rivers;
- the Stour and Orwell estuaries;
- the coastline between Clacton to the south and Aldeburgh to the north that could be influenced by the sediment plume;
- the area offshore that could be influenced by the sediment plume; and
- the area surrounding the IGE and IG disposal grounds that could be influenced by the sediment plume

To a large extent the area of influence identified by the hydrodynamic and sediment plume modelling will define the study area limits. This modelling has yet to be carried out in full and, therefore, the study area may vary slightly between scoping and the EIA stages. However the study area above has been based on the area of influence of the hydrodynamic changes and sediment plume that was modelled as part of the 1998 Approach Channel Deepening studies (HR Wallingford, 1998) and is, therefore, anticipated to be a reasonable guide at the scoping stage.

At present a disposal ground for the capital works has not been confirmed but potentially could be the IGE. Modelling has been carried out previously for the IGE with regard to sediment plumes but not for the volume of material that may be generated by the proposed capital dredge. However, the present guide for this area of influence is taken as approximately 15.0km within a linear ellipsoid area south-south-west to north-north-east across the IGE offshore area. This area is based on modelling work undertaken previously (Posford Haskoning, 2003a and 2003b).

### **7.2 Baseline Conditions**

#### **7.2.1 Sediment quality**

##### *Sediment quality standards*

In the absence of any UK quantified EQSs for in situ sediment quality, during assessments any data tends to be compared to two sets of guidelines:

- Cefas guideline Action Levels for the disposal of dredged material; and
- the Canadian Sediment Quality Guidelines for the protection of aquatic life.

Cefas' guideline Action Levels are not statutory contaminant concentrations but are used as part of a weight of evidence approach to decision making on the disposal of dredged material to sea. If concentrations are below Action level 1 (AL1), then refusal of disposal at sea on grounds of contamination is unlikely. If concentrations fall below

Action Level 2 (AL2), then further assessment may be required. If concentrations exceed AL2 then dredged material may not be deemed acceptable for disposal at sea.

The Canadian Sediment Guidelines provide scientific benchmarks, or reference points, for evaluating the potential for observing adverse biological effects in aquatic systems. The guidelines have been derived from available toxicological information, reflecting the relationships between sediment concentrations of chemicals and any adverse biological effects resulting from exposure to these chemicals. In the absence of UK sediment quality guidelines, the Canadian guidelines provide one of the most comprehensive sets of sediment quality data available.

The guidelines comprise two assessment levels. The lower level is referred to as the threshold effects level (TELs) and represents a concentration below which adverse biological effects are expected to occur rarely. The higher level, known as the probable effect level (PEL), defines a concentration above which adverse effects are expected to occur more frequently.

#### *Overview of sediment quality data*

There are a number of sediment quality data sets available for the study area and these are generally associated with developments where applications for FEPA licences (prior to April 2011) or Marine Licences in respect of the MCAA (post April 2011) have been made.

In 2012 a baseline document under the Maintenance Dredging Protocol (MDP) was produced (HHA and Royal HaskoningDHV, 2012) in order to assist in the licensing of HHA's future maintenance dredging campaigns. As part of that document, all existing information collected for licensing was collated.

Royal HaskoningDHV is also aware of further sediment analysis data that is available as a result of the recent Marine Licence application for the extension of Berth 9 at Felixstowe (Royal HaskoningDHV, 2013d).

Further recent site investigation works have also taken place and new sediment analysis data will be provided as a result of this investigation.

Information on the MDP Baseline Document and the recent site investigation works is provided below.

#### *The Maintenance Dredging Protocol Baseline Document*

The MDP Baseline Document described the maintenance material as largely silt sized with a variable clay fraction, with the exception of the predominantly 100 micron fine sand which is occasionally dredged from the approach channel at the South Shipwash Buoy.

The clay content (< 2 micron) varies from up to 30% in the lower harbour to about 10% or less further up the estuaries. The typical material generally has less than 5% fine sand or any coarser material. Recently deposited material is dredged at a density of about 1.25 T/m<sup>3</sup> whilst older material can reach a density of 1.35 T/m<sup>3</sup>.

**Figure 7.1** shows locations from which samples have historically been taken for analysis of sediment quality. Results obtained from Cefas for HHA and Associated British Ports

(ABP) Ipswich maintenance licences indicate that there have been a few samples showing results above the Cefas AL1 figures but these have been significantly less than AL2 and Cefas has taken the view that these materials are acceptable for disposal at sea. Past EIA's (such as for the 2000 Channel Deepening, Bathside Bay and the 2010 Felixstowe South project) have concluded that dredging of these materials does not present a risk of contaminant release, and as such would be exempt from the Waste Framework Directive (refer to **Section 4.2.7**).

#### *Site investigations 2013*

As part of the early stages of work for this proposed capital dredge HHA carried out a geotechnical site investigation survey of the approach channel in August 2013 in order to establish the type of material that would be removed and a suitable disposal method and sites (including re-use/beneficial use of the material).

A Marine Licence for the works was issued by the MMO in August 2013. The survey entailed the excavation of approximately 120 trial pits along the length of the approach channel. As set out above a sediment quality sampling strategy has been agreed with Cefas. Sediment samples, therefore, have been taken from a selected number of trial pits and sent to Cefas for chemical analysis and particle size analysis. The chemical and physical analysis data will be used at the EIA stage to provide information in terms of potential impacts on water and sediment quality and will also directly assist the WFD compliance assessment (see **Section 8**).

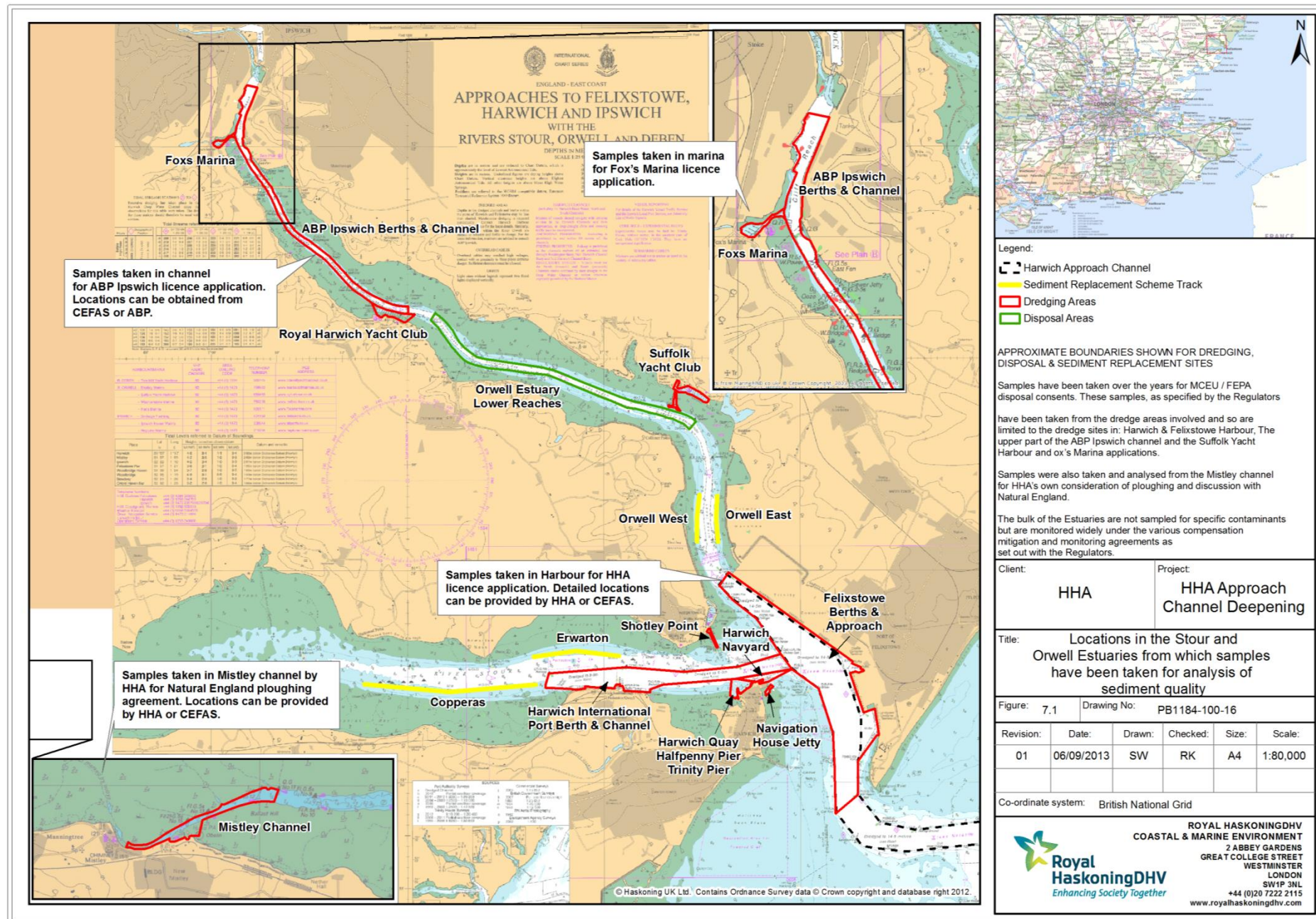
#### 7.2.2 Water quality

Water quality is regulated according to the following EC Directives, which set standards for water quality and impose monitoring requirements. The relevant standards and Directives are discussed below.

##### *Water Framework Directive*

As described in **Section 4.2.5** the requirement for compliance with the WFD (2006/60/EC) needs to be considered in the planning of all new activities in the water environment.

The Environment Agency through the River Basin Districts' Typology, Standards and Groundwater threshold values (WFD) (England and Wales) Directions 2009 provide EQSs for a number of 'specific pollutants' and 'other pollutants' within rivers and freshwater lakes, and transitional and coastal waters.



The Directive came into force in December 2000 and became part of UK law in December 2003 under the Water Environment (Water Framework Directive) (England and Wales) Regulations, 2003. The Directive seeks to protect and enhance the quality of:

- surface freshwater (including lakes, streams and rivers);
- groundwaters;
- groundwater dependant ecosystems;
- estuaries; and
- coastal waters out to one mile from low-water.

For further details regarding the WFD please refer to **Section 8**.

#### *Priority Substances Directive*

The Priority Substances Directive (PSD) (2008/105/EC) is a 'Daughter' Directive of the WFD which sets out a European 'priority list' of substances which pose a threat to the aquatic environment. The PSD establishes environmental quality standards (EQSs) in the field of water policy. It establishes quality standards for 33 priority substances and certain other pollutants within surface waters and requires Member States to apply the EQSs for priority substances and certain other pollutants.

#### *Shellfish Waters Directive*

The Shellfish Waters Directive has now been subsumed by the WFD. All previously designated shellfish waters have been placed on the Protected Areas register under WFD, as they are deemed to be areas designated for the protection of an "economically significant aquatic species". Following the repeal of the SWD at the end of 2013, there is an ongoing requirement to manage designated shellfish waters to ensure no deterioration in water quality. Under WFD there is a requirement to ensure that as Directives are subsumed, levels of protection are not relaxed. Therefore, existing shellfish waters must at least maintain their current FSA classification and the environmental objective under WFD for the wider water body in which they are located.

Under the River Basin Management Plan process, all protected waters, including shellfish growing waters, are required to meet environmental standards specific to their designated purpose, in addition to the general Water Framework Directive objective of 'good status'. The default objective within shellfish water protected areas is Good Status by 2015.

The water quality standards established under the previous Shellfish Water Directive have been transposed under the WFD and remain unchanged.

These parameters include suspended solids, salinity, dissolved oxygen (DO), organo-halogenated substances (e.g. PCBs, organochlorine pesticides), metals and guideline values for coliforms in shellfish flesh. For each substance, the Directive specifies the minimum number of samples to be taken, the water quality standards to be met and the percentage of samples that must meet these standards. The standards are either a numeric limit or a descriptive standard (see **Table 7.1**). The water quality standards

have been met if the following percentage of the samples analysed do not exceed the limit values:

- 100% for metals and organo-halogen compounds;
- 95% for salinity and DO;
- 75% for other substances; and
- no evidence of harm to the shellfish from organo-halogenated compounds.

**Table 7.1 Selected imperative standards for shellfish waters**

Parameter	Units	Standard
Suspended solids	mg/l	A discharge affecting shellfish waters must not cause the suspended solid content of the waters to exceed by more than 30% the content of waters not affected
Salinity	Parts per thousand (i.e. g/l)	≤40 parts per thousand A discharge affecting shellfish waters must not cause the salinity to exceed by more than 10% the salinity of the waters not affected
Dissolved oxygen	% saturation	Average of individual values >70% and an individual measurement may not indicate a value lower than 60% unless there are no harmful consequences for the development of shellfish colonies
Organo-halogenated substances	-	The concentration of each substance in the shellfish waters or in the shellfish flesh must not reach or exceed a level, which has harmful effects on the shellfish and their larvae
Metals (Ag, As, Cd, Cr, Cu, Hg, Ni, Pb, Zn)	mg/l	The concentration of each substance in the shellfish waters or in the shellfish flesh must not reach or exceed a level, which has harmful effects on the shellfish and their larvae. The synergic effects of these metals must be taken into consideration

There are two designated shellfish Protected Areas within the study area (see **Figure 7.2**). They are:

- Walton Backwater - designated for *Crassostrea gigas* (Pacific oyster) and *Ostrea edulis* (Native oyster); and
- Butley River – designated for *C.gigas*.

The Shellfish Hygiene Directive (2004/854/EC), although not a directive directly protecting water quality, stipulates the level of treatment required depending on numbers of bacteria in the shellfish flesh. This Directive is designed to protect human health. Since shellfish are grown in the natural environment and feed using a filtering mechanism, it is a commonly held view that the concentration of bacteria in the flesh relates to the quality of the surrounding water in which they grow. The monitoring undertaken as a consequence of this directive can therefore be used as an indicator of water quality.

Under the Shellfish Hygiene Directive, standards are set in terms of concentrations of coliform bacteria and salmonella. Shellfish are classed in categories 'A', 'B', 'C' and 'P'

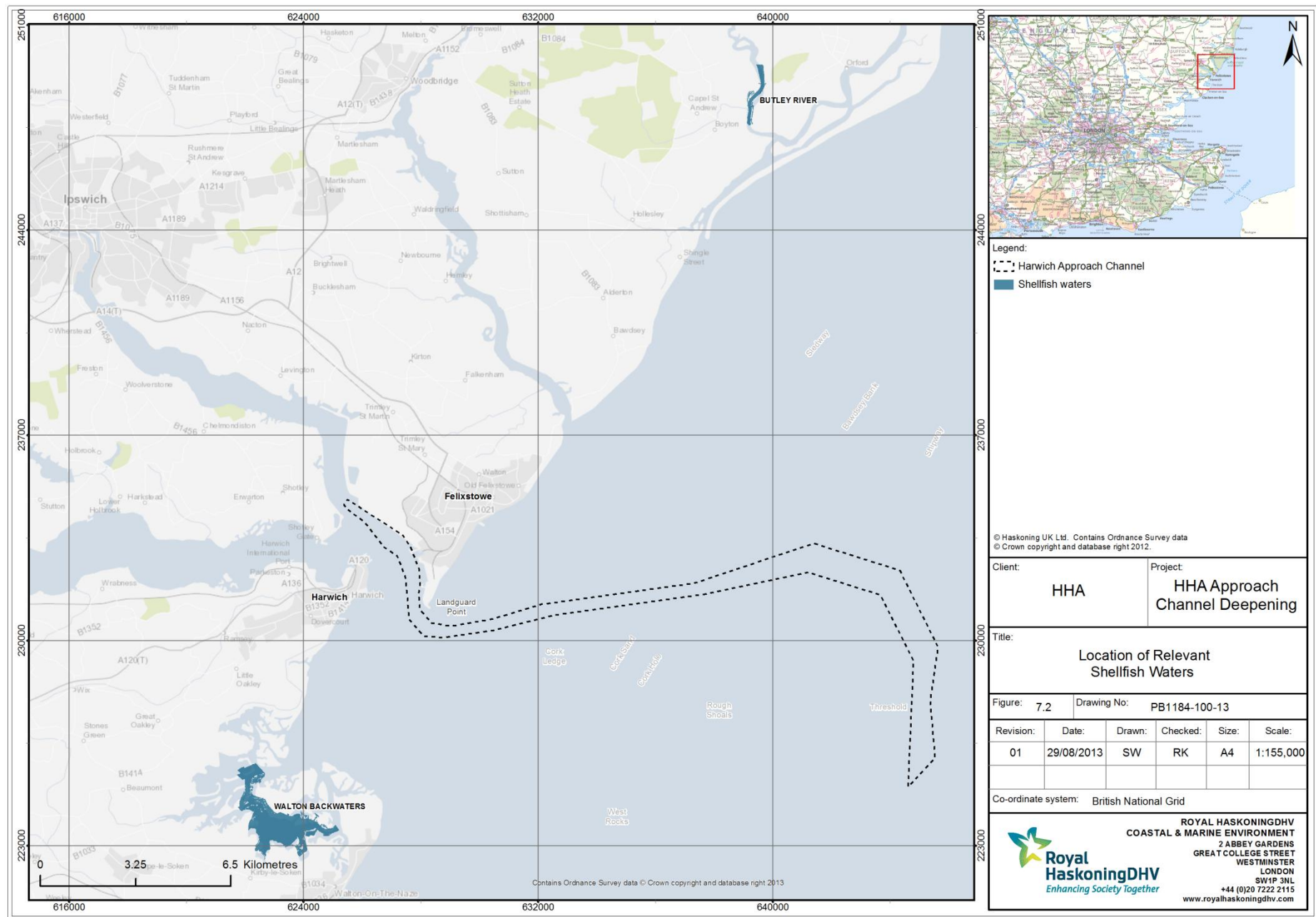
where 'A' is the highest quality and can be collected direct for human consumption. 'P' is the poorest quality and shellfish are prohibited from collection.

Monitoring for the Shellfish Hygiene Directive is carried out by the local authorities and the data is collated by the Food Standards Agency. **Table 7.2** lists the designated bivalve mollusc production areas and their classifications in the study area. The areas are also shown on **Figure 7.2**. Defra has committed to improving water quality to a level where all designated shellfish waters can sustain at least category B shellfish products.

**Table 7.2 Classifications for shellfish production areas in Portsmouth Harbour and adjacent areas to the Study Area for 2012 (Food Standards Agency, 2013)**

Production Area	Bed Name	Species	Class
Walton Backwater	Twizzle, and Mill Lane, Kirby Creek and the Wade-West	<i>C. gigas</i> <i>O. edulis</i>	B
River Deben	Girlings Hard	<i>C. gigas</i> <i>O. edulis</i> <i>Mytilus spp</i> (mussels)	B
	Spinny Marsh	<i>C. gigas</i>	B
	Stonner Point	<i>Mytilus spp</i> <i>C. gigas</i>	B
	Shottisham Creek	<i>C. gigas</i> <i>Mytilus spp</i>	B
Butley River	Creek	<i>C.gigas</i>	B

The Shellfish Hygiene Directive also requires monitoring for the presence of toxin producing phytoplankton in production and relaying areas and for biotoxins in bivalve molluscs in shellfish harvesting areas. There are action limits for water samples and maximum permitted limits for shellfish samples. If water samples yield results in excess of the action levels, then shellfish flesh samples are taken from within the same harvesting area for biotoxin testing. If the shellfish flesh samples yield results in excess of the maximum permitted levels for biotoxins, then the harvesting area has to be closed.



### *Bathing Waters Directive*

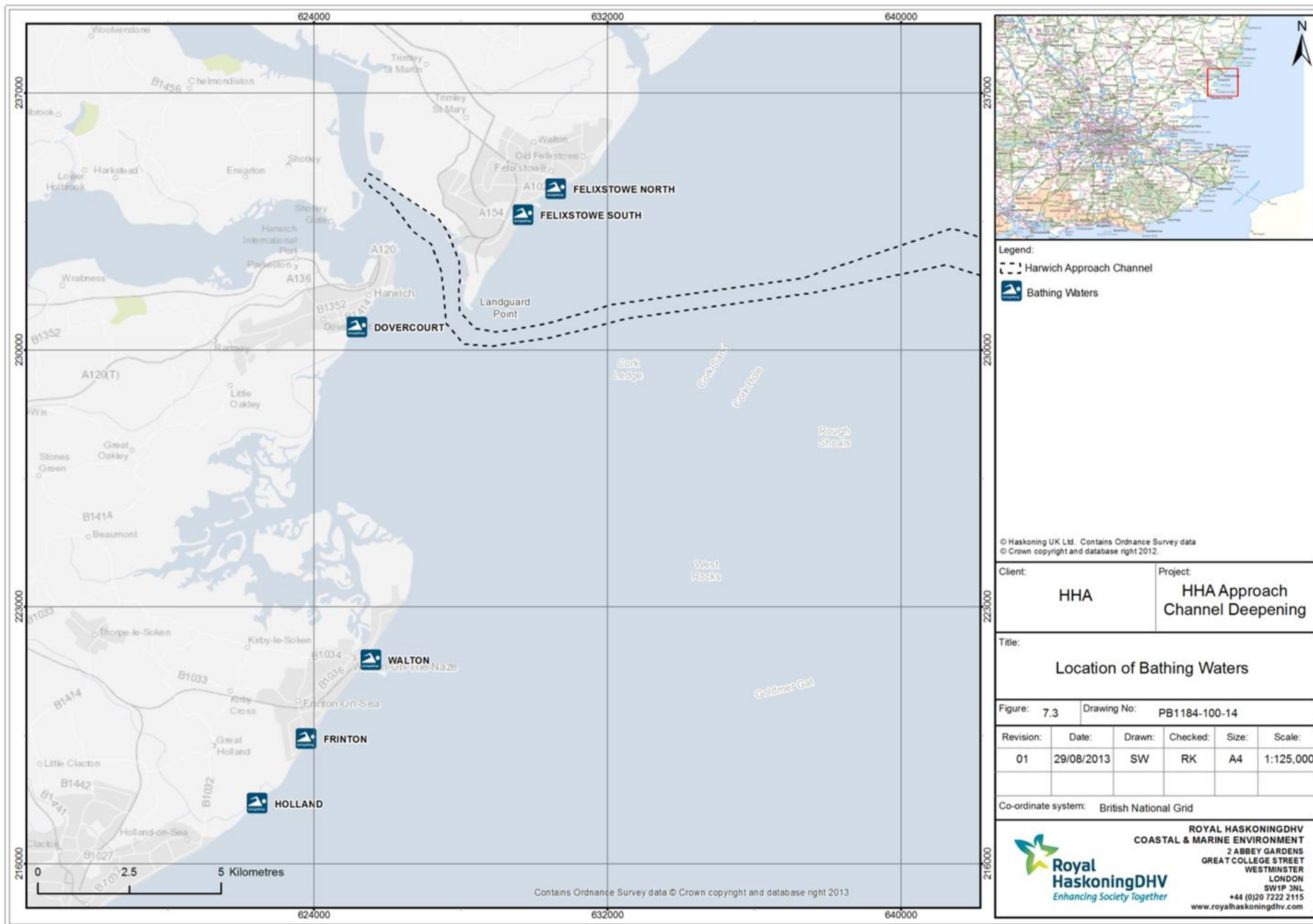
The quality of bathing waters in England and Wales is monitored by the Environment Agency against standards laid down in the Bathing Water Regulations 1991, which give effect to the EC Bathing Water Directive (76/160/EEC). Compliance with the Directive is monitored against microbiological and physico-chemical standards. Water samples are taken from designated bathing waters during the bathing season (20 samples from May to September) and analysed for parameters including faecal coliforms and total coliforms.

There are a number of bathing water designations within the study area and these are shown in **Figure 7.3**. The bathing water quality of those designations is presented in **Table 7.3**.

### *Dangerous Substances Directive*

The Dangerous Substances Directive (DSD) (76/464/EEC) was repealed by the Water Framework Directive at the end of 2013. The DSD and its 'daughter' directives were established to control the level of discharges that may contain dangerous substances that may reach inland, coastal and territorial waters. The Directive identifies substances for which limit values and Environmental Quality Standards were established at European Level (list 1). Some of these EQS have now been superseded by no less stringent standards established by no less stringent standards established by the Priority Substances Directive for substances identified in Annex X of the WFD. Where this is not the case, limit values and environmental quality standards set by the DSD 'daughter' directives listed in Annex IX of the WFD remain in force.

The DSD also defined substances where standards were to be set by the Member State (List II). For marine water these were implemented by the Surface Waters (Dangerous Substances) Regulations 1997. Some of these standards have already been superseded by standards set by Member States for specific pollutants defined in Annex VIII of the WFD.



**Table 7.3** Relevant bathing water designations within the study area

Name and description	Classification	Issues with phytoplankton blooms?	Issues with macro-algae	Storm or emergency outfalls onto the beach?	Surface drainage outfalls onto the beach?	Freshwater flows onto the beach?
<p><b>Felixstowe North:</b> Felixstowe is a resort town and is also home to the country's largest container port on the Orwell Estuary. Felixstowe North is a sand and shingle beach which gently slopes to the sea and is surrounded by a sheltered bay. There is sand at low tide. The beach is backed by a promenade and gardens.</p> <p>The River Deben is 5.0km to the north and drains a large mixed catchment. The Orwell and Stour estuary is 4.0km to the south and drains a large catchment containing some industry and the Port of Felixstowe.</p>	Higher	No	No	Yes	Yes	No
<p><b>Felixstowe South:</b> As for Felixstowe North.</p>	Higher	No	No	Yes	Yes	No
<p><b>Dovercourt:</b> Dovercourt is a quiet family resort with a shelving sand and shingle beach. It is backed by a promenade and sea wall. The promenade extends to Harwich Town. From the beach there are panoramic views of the approaches to the ports of Felixstowe and Harwich, Walton, and Hamford Water National Nature Reserve.</p> <p>The Orwell and Stour estuary is 1.0km to the north and this drains a large catchment with some industry but due to tidal currents this has minimal impact upon the beach. There are also urban areas close to the beach.</p>	Higher	No	No	No	Yes	No
<p><b>Walton:</b> Walton is a popular resort with the second longest pier in Britain. The beach is sandy and backed by the promenade which is lined partly by beach huts and cafés.</p> <p>The town is in the north-east of the Tendring peninsular. The land is generally flat and there are no rivers or streams close to the beach. Behind the town is Hamford Water, which is a renowned site for over-wintering wildfowl. Further to the north there is the Stour and Orwell estuary but this has no impact on bathing water quality. The Naze cliffs are famous for fossils and attract many day trippers. To the south-east is the resort town of Frinton.</p> <p>Walton Sewage Treatment Works discharges to the sea 4.0km to the north of the town. The bathing water may be affected</p>	2008 to 2009 - Minimum 2010 to 2012 - Higher	No	No	Yes	Yes	No

Name and description	Classification	Issues with phytoplankton blooms?	Issues with macro-algae	Storm or emergency outfalls onto the beach?	Surface drainage outfalls onto the beach?	Freshwater flows onto the beach?
by a discharge from the town's main pumping station that occurs when heavy rainfall overwhelms the sewerage system and causes diluted sewage to overflow into the sea. After periods of rainfall this discharge could affect bathing water quality.						
<p><b>Frinton:</b> Frinton is a quiet family resort. The beach is gently shelving and sandy. The beach is backed by the promenade and sloping cliffs, and the sea front still lined by many Victorian style beach huts. It is close to the town centre.</p> <p>Kirby and Holland brooks are 3.0km to the south, both draining rural catchments. There are urban areas nearby.</p> <p>Clacton (Holland Haven) Sewage Treatment Works discharges via a 1.0km long sea outfall to the sea 4.0km to the southwest of Frinton beach. Two sewer discharges, one either side of the bathing water, may operate when heavy rainfall overwhelms the sewerage system and could cause a temporary reduction in bathing water quality.</p>	Higher	No	No	Yes	Yes	No
<p><b>Holland:</b> Holland-on-Sea has a small quiet sandy beach and picnic areas. It is backed by a sea wall in a rural setting.</p> <p>The Kirby and Holland brooks flow through rural catchments and enter the sea close to this bathing water. This is mainly an arable catchment but a small number of livestock are also present. A small amount of urban drainage also enters a tributary of the Holland Brook.</p> <p>The Holland Brook enters the sea close to the beach and may be a source of reduced water quality following heavy rainfall. During dry weather there is minimal flow from the brook via the sluice.</p> <p>Clacton discharges to the North Sea via a 1.0km long sea outfall next to the beach.</p> <p>There is a short storm and emergency sewer outfall to south west of the beach which may operate in exceptionally heavy rainfall or under emergency conditions.</p>	2008 to 2011 – Higher 2012 - Minimum	No	No	Yes	Yes	Yes

Source: Environment Agency, 2013a

### 7.3 Potential Impacts

The information above highlights that the water quality of the area surrounding the proposed works is generally good and it is important that it remains good if it is to maintain its designations for Bathing Waters and Shellfish Waters.

Sediment quality varies although no major concerns have been raised in the past with regard to sediment quality and both capital and maintenance dredged material has been allowed to go to sea for disposal (or used in various beneficial re-use schemes) (MDP Baseline Document, 2012).

Potential impacts on water and sediment quality during dredging (both within and outside the dredging area) and disposal are highlighted in **Table 7.4**.

**Table 7.4 Potential impacts on sediment and water quality**

Potential Impacts	
Construction	Dispersion and deposition of suspended sediments during capital dredging and disposal activities
	Remobilisation and dispersion and redistribution of potentially contaminated sediment during capital dredging and disposal activities
	Influence of dredging operations on dissolved oxygen concentrations and consequently water quality
Operation	Potential remobilisation of sediment by localised erosion (scour) resulting from changes in tidal flows or wave action
	Periodic increases in suspended sediment concentrations and increased turbidity during maintenance dredging

In terms of the assessment of potential environmental effects, as mentioned above, there are currently no available guidelines in the UK to determine whether concentrations of contaminants in dredged sediments may give rise to adverse biological effects. In undertaking EIA it has become common practice to use guidelines developed overseas. It is therefore proposed that the Canadian Sediment Quality Guidelines are applied in this instance to enable assessment of any potential impact on marine ecology.

With regard to water quality the findings of the numerical flow modelling studies (see **Section 6**) will be particularly important and will feed directly into the assessment. Results from the sediment quality survey in August 2013 will also form an important part of the water quality assessment, as dredging and disposal will release sediments into the water column. This could have an impact in terms of increasing the turbidity of the water column and resuspension of potential contamination.

Impacts related to working practices during construction and operational phases will also be considered and, where available, the requirement to adhere to best practices and working guidelines will be identified (for example Pollution Prevention Guidance; PPG).

It is anticipated that once the key impacts on water quality have been identified and quantified, should they be necessary, suitable mitigation measures will be recommended and discussed with the relevant regulatory bodies, including the Environment Agency, Natural England, Suffolk Coastal District Council and Cefas.

## **7.4 EIA Investigations**

### **7.4.1 Sediment quality**

Further information will become available once the site investigation sediment analysis results are received from Cefas in the autumn 2013. This data will provide the most up to date and therefore most representative information on sediment quality in the approach channel and will be reviewed in the context of other relevant historical data to identify any trends.

**Figure 7.4** indicates the locations of the sediment survey agreed with Cefas in July 2013.

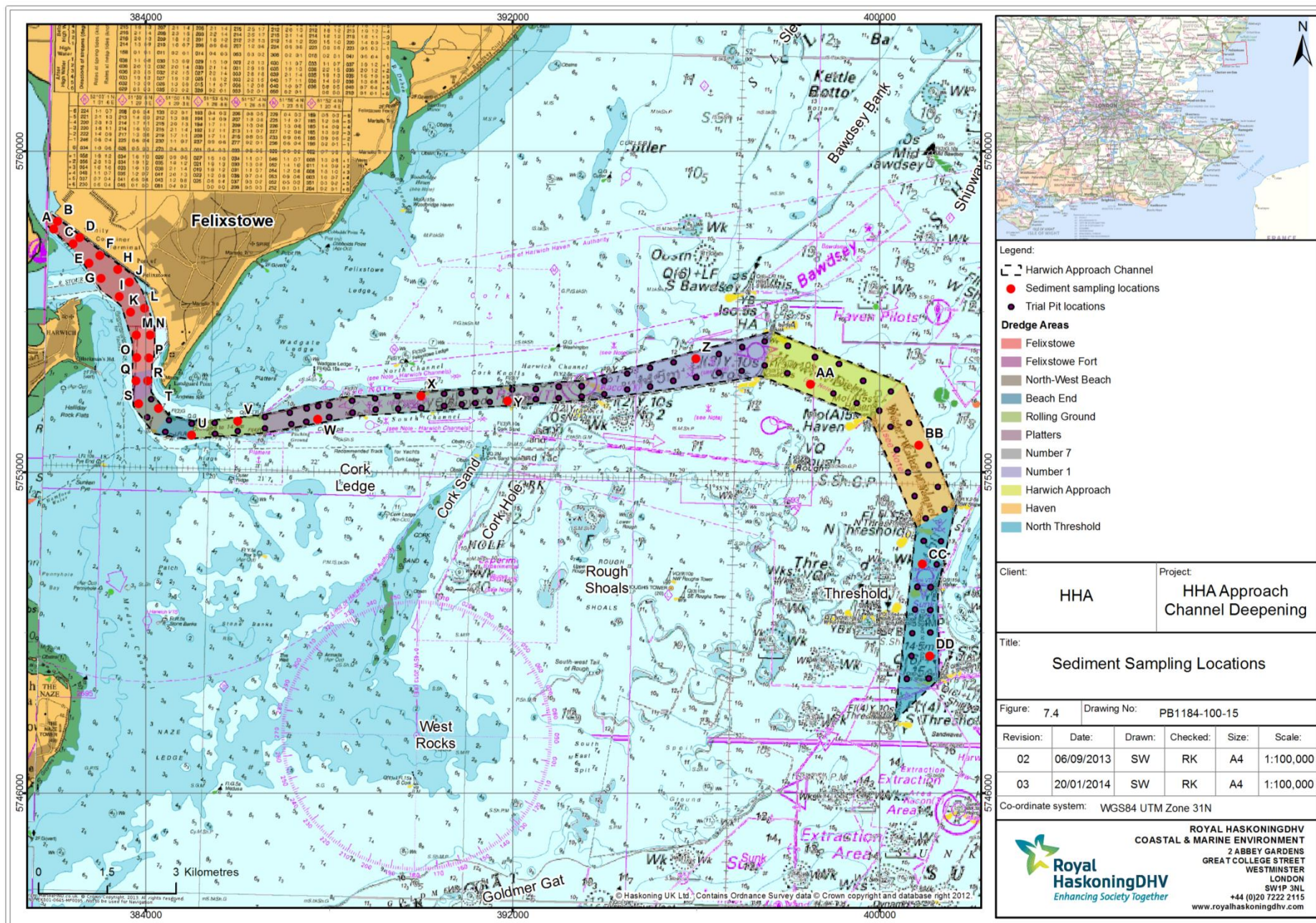
The particle size of the material arising and the depth from which they were taken may influence the analysis that Cefas decide is needed for the samples. However, it is expected that the samples will be analysed for a combination of the following:

- particle size;
- metals;
- organotins;
- total hydrocarbons;
- Polyaromatic Hydrocarbons (PAHs); and
- Polychlorinated biphenyls (PCBs).

This up to date project specific data will be supplemented by relatively new sediment quality data obtained in support of the Berth 9 Quay Extension Marine Licence application.

### **7.4.2 Water quality**

As part of the EIA process, water quality data collected through the Environment Agency's monitoring programme will be obtained and information already collated, updated. This will enable the baseline conditions for the study area to be established. The potential impacts of the proposed scheme during the construction and operational phases on water quality will then be assessed. This will predominantly rely on assessing compliance with EQSs set by EC legislation and determining potential change in background levels in the study area.



## **8 WATER FRAMEWORK DIRECTIVE COMPLIANCE ASSESSMENT**

### **8.1 Introduction**

The WFD Regulations (2003) provide for the implementation of the WFD in England and Wales, starting with the designation of all surface waters (rivers, lakes, transitional (estuarine) waters, coastal waters and ground waters) as water bodies and aiming to achieve good ecological status by 2015 for those water bodies.

Unlike the Birds Directive (2009/147/EC) and Habitats Directive (92/43/EEC), which apply only to designated sites, the WFD applies to all water bodies, including those that are man-made. The assessment of dredging proposals under the WFD, therefore, will apply not only to the water body within which dredging and disposal will take place but also to other water bodies that have the potential to be impacted by the dredging and disposal operations.

Classification schemes for both estuarine and coastal waters out to one nautical mile have been developed by the Environment Agency in response to the WFD. The WFD specifies the factors - referred to as quality elements - that must be used in determining the Ecological Status or Ecological Potential and the chemical status of a surface water body. The lists of quality elements for each surface water category are divided into three groups of elements:

- biological elements;
- hydromorphological elements; and
- chemical and physico-chemical elements.

### **8.2 Requirement for WFD Compliance Assessment**

As part of the Marine Licensing process the MMO will require an assessment to be carried out with regard to the WFD in respect of the proposed capital dredging works in the Harwich Haven Approach Channel and the use or disposal of that capital material. It is proposed that the assessment to be undertaken will follow the Environment Agency's guidance document 'Clearing the Waters' (Environment Agency, 2012).

### **8.3 The WFD Assessment Process**

The guidance document – Clearing the Waters – identifies four stages within the assessment process. They are:

- Stage 1 - Screening (this only applies to pre-existing maintenance dredges and associated disposal activities so does not apply to this project);
- Stage 2 - New dredging and disposal project process (this applies to all new dredging and disposal projects (and any from Stage 1 that have been screened into the process for further assessment) and so applies to this project);
- Stage 3 – Assessment; and
- Stage 4 – Identification and Evaluation of Measures.

Stage 1 - Screening only applies to pre-existing activities (activities which started or were on-going during the period 2006-2008) and therefore is not required for the proposed capital dredge of the approach channel. However, initial screening information is necessary as part of the scoping stage and, therefore, this stage is still often completed in practice in order to inform Stage 2.

Stage 2 - The new dredging and disposal process involves two steps:

1. Identification of all the WFD parameters that could potentially be affected at water body level by the proposed dredging or disposal activity.
2. For each quality element identified, its current status should be recorded and the level of confidence in the assessment leading to this conclusion recorded. The objective (status) for the water body in 2015 also needs to be considered as this will indicate whether the RBMP already includes measures designed to improve the current status of the water body.

Stage 3 - The assessment stage will be reached with regards to this project if Stage 2 has highlighted that:

- The water body is not at good quality (status or ecological potential) and dredging or disposal is noted in the River Basin Management Plan as being a contributing factor;

and/or

- The new dredging and disposal project has exceeded one or more of the trigger thresholds as set out in the Clearing the Waters guidance.

The scope of the assessment will therefore be defined prior to arriving at this point as covering potential effects on some or all of the following:

- ecological status parameters (biological quality elements, hydromorphological or physicochemical supporting elements);
- navigation related mitigation measures required to meet good ecological potential that are not yet in place;
- chemical status;
- protected area characteristics

For New Dredging and Disposal Projects only the assessment should include:

- Consideration of whether the activity will compromise the achievement of measures set out in the RBMP programme of measures; and/or
- Cumulative effects.

In addition, for all projects where the water body is not at good status or potential, consider whether it is possible to contribute to the WFD 'aim to improve' objective.

Stage 4 – Identification and Evaluation of Measures. If it is established that an activity is likely to affect water status at water body level (that is, by causing deterioration or

preventing the achievement of the WFD objective), or that an opportunity may exist to contribute to improving status at water body level, potential measures to achieve either of these must be investigated.

Measures comprise actions that can be taken to change the nature of a dredging or disposal activity, to remove or reduce the environmental impact to an acceptable level or to exploit opportunities for environmental improvement. Measures may be required to:

1. Mitigate the impacts of dredging and disposal on the specified WFD parameter(s) such as quality elements, specific pollutants, priority substances, or protected area characteristics. They will prevent deterioration or ensure that the water body can reach its WFD objective; or
2. Restore or enhance (and thus improve) the ecological or chemical status of certain failing parameters in a water body.

#### 8.3.1 Proceeding through the assessment

Using the guidance, the WFD compliance assessment will progress through the relevant stages and assess whether there could be deterioration in the status of any of the relevant water bodies identified, or whether their stated 2015 EQOs could be affected by the dredging and disposal of the material.

Within this scoping report the assessment has been taken to the end of Stage 2 with a view to gaining agreement with the MMO and the Environment Agency that the approach taken and the scope of the assessment that will be taken forward to Stage 3 is suitable.

### 8.4 Stage 1 – Screening Information

As already stated as this project is a new capital dredging project Stage 1 is not actually necessary. However, the information necessary for Stage 2 is gathered together in Stage 1 and is therefore set out below.

#### 8.4.1 Dredging and disposal information

**Table 8.1** sets out the basic information about the proposed dredge and disposal operations.

**Table 8.1** Information on proposed dredging and disposal operation (adapted from Environment Agency, 2012)

Information required	Dredging	Disposal
<p>Location of proposed dredging or disposal activity:</p> <ul style="list-style-type: none"> <li>Describe location(s) or provide grid reference or other coordinates;</li> <li>Dredge footprint (m<sup>2</sup>);</li> <li>Dredge depth (m);</li> <li>Dredge timing and duration (proposed);</li> <li>Dredge methodology; and</li> <li>Dredge/disposal volume (m<sup>3</sup>).</li> </ul>	<p>Capital dredging of the existing approach channel to Harwich Haven. The proposed channel deepening area is displayed in <b>Figure 8.2</b> and in greater detail in <b>Figure 2.1</b>.</p> <p>Dredging depth would be either -15.5 mCD or -16 mCD. It is proposed that the entire approach channel would be dredged to the same depth.</p> <p>For a dredge depth of -15.5 mCD (plus allowing for a 0.3m deep over-dredge) the dredge footprint would be approximately 14,069,000m<sup>2</sup>. For a dredge depth of -16 mCD (plus allowing for a 0.3m deep over-dredge) the dredge footprint would be approximately 16,571,000m<sup>2</sup>. For more information see <b>Section 2.1.1</b>.</p> <p>For a dredge depth of -15.5 mCD (allowing for a 0.3m deep over-dredge) the dredge volume would be approximately 16 million m<sup>3</sup>. For a dredge depth of -16 mCD (allowing for a 0.3m deep over-dredge) the dredge volume would be approximately 23.5 million m<sup>3</sup>. For more information see <b>Section 2.1.1</b>.</p> <p>It is anticipated that the dredging would be undertaken over a one to two year period. The exact date for the proposed dredging has not yet been established.</p> <p>Dredging is proposed to be undertaken mostly by TSHD. Present expectations are that either two TSHDs would be used or one TSHD plus one back-hoe dredger with associated barge.</p>	<p>At present a disposal ground has not been identified but dredge material potentially could be disposed of at the IGE licensed disposal ground. The IGE is displayed on <b>Figure 2.2</b>.</p> <p>For a dredge depth of -15.5 mCD (plus a 0.3m deep over-dredge) the disposal volume would be approximately 16 million m<sup>3</sup>. For a dredge depth of -16 mCD (plus a 0.3m deep over-dredge) the disposal volume would be approximately 23.5 million m<sup>3</sup>. For more information see <b>Section 2.1.1</b>.</p>
<p>Protected areas in or close to the activity</p> <p>Detailed information on these sites is provided in <b>Section 5</b>.</p>	<ul style="list-style-type: none"> <li>Hamford Water Ramsar Site and SPA</li> <li>Stour &amp; Orwell Estuaries Ramsar Site &amp; SPA</li> <li>Outer Thames Estuary SPA</li> <li>Alde, Ore and Butley Estuaries SAC</li> <li>Margate and Long Sands SAC</li> <li>Landguard Common SSSI</li> <li>Harwich Foreshore SSSI</li> <li>Orwell Estuary SSSI</li> <li>Stour Estuary SSSI</li> <li>Hamford Water SSSI</li> <li>Suffolk Coast and Heaths AONB</li> <li>Hamford Water NNR and Stour and Orwell rMCZ</li> </ul>	<p>The closest protected areas to IGE are the Margate and Long Sands SAC and the Outer Thames Estuary SPA.</p> <p>Detailed information on these sites is provided in <b>Section 5</b>.</p>

#### 8.4.2 Relevant water bodies in the Harwich Haven area

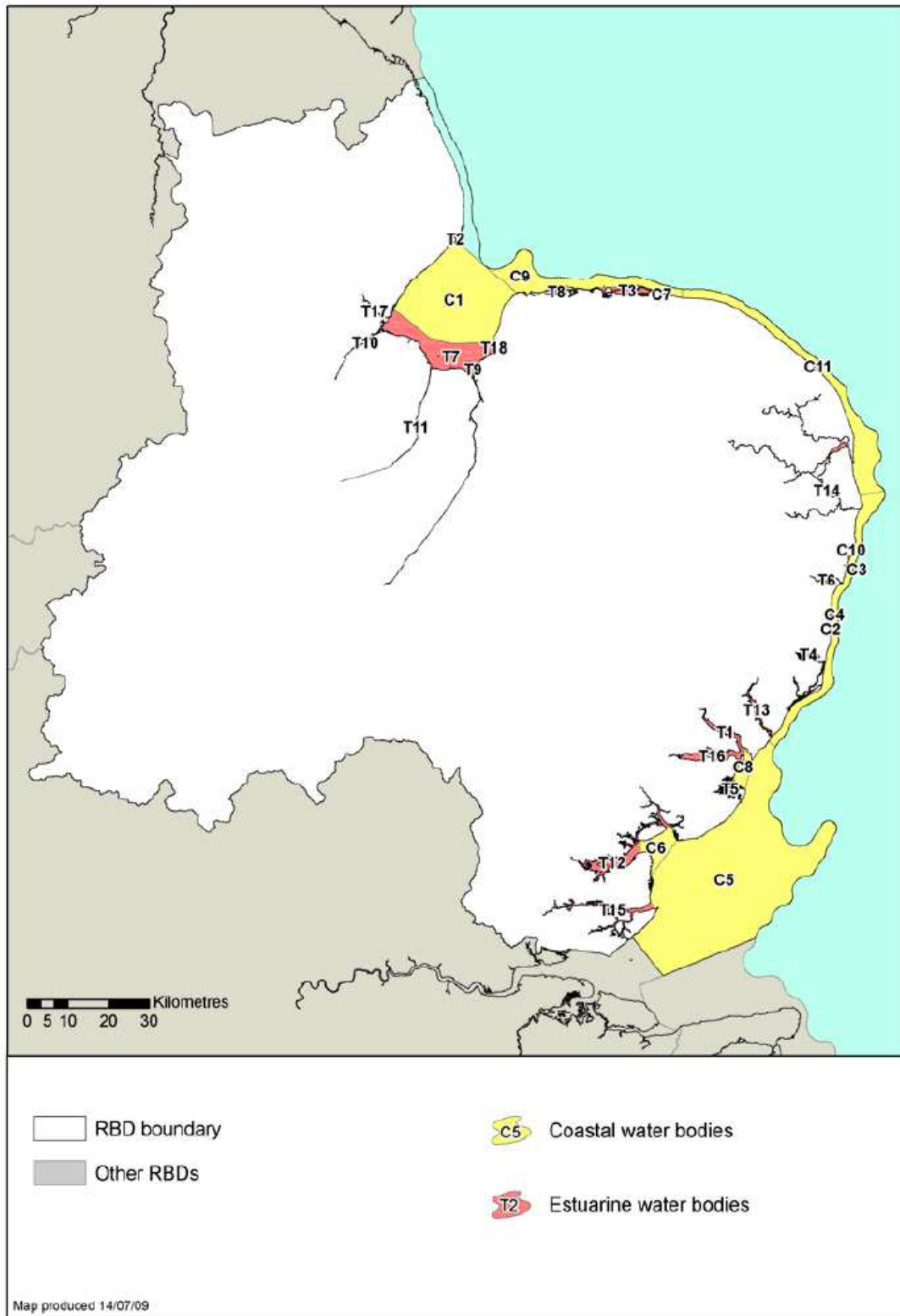
In order to assess whether any water bodies could be affected by the dredging and disposal operations, the water bodies themselves need to be identified.

There are a number of river, transitional and coastal water bodies within the Anglian River Basin District which are in the vicinity of Harwich Haven and the approach channel to the Haven Ports. Coastal and transitional water bodies within the Anglian River Basin District are displayed in **Figure 8.1**. Ground water bodies have not been included in this assessment as this capital dredging project is not anticipated to affect these in anyway.

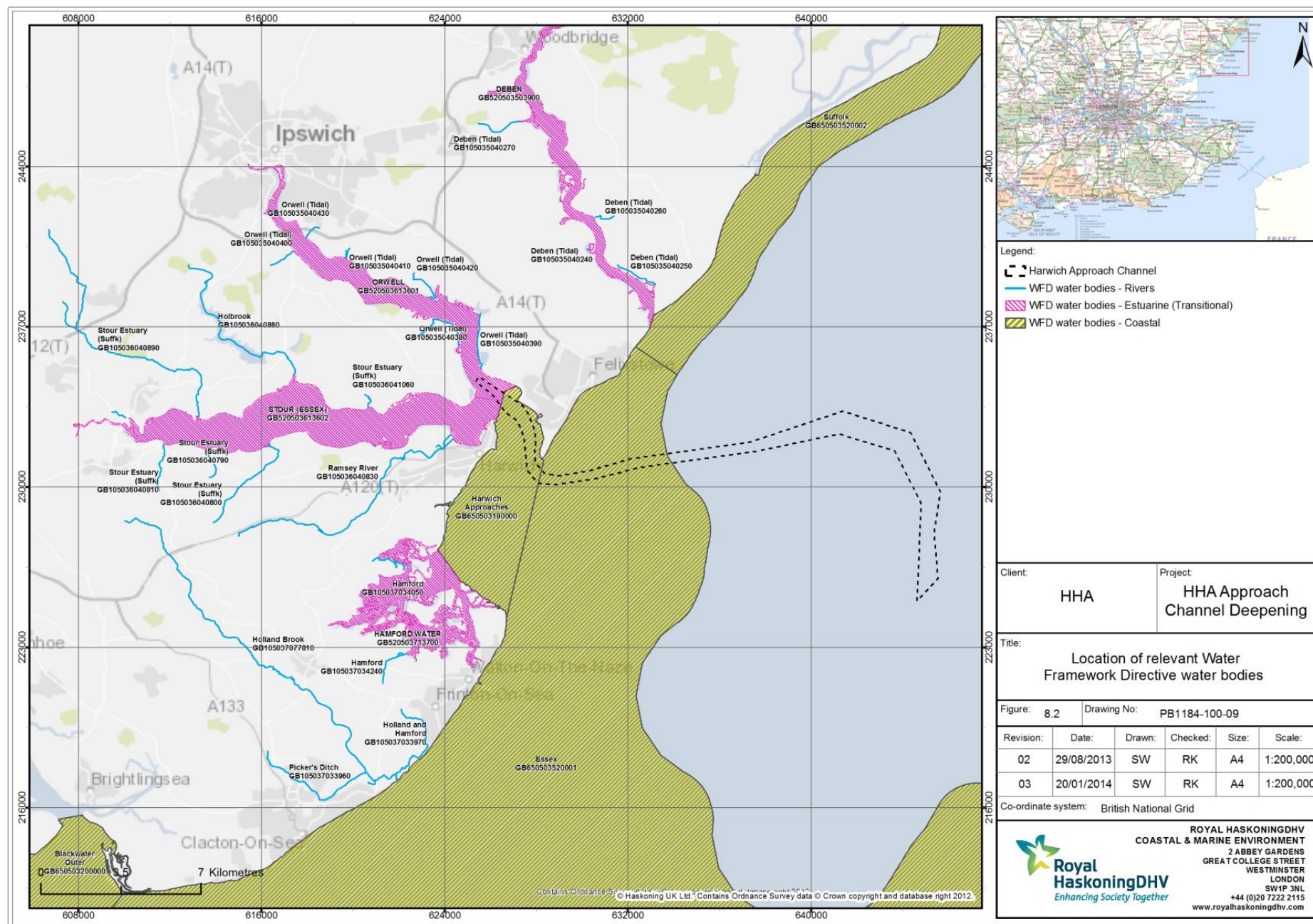
The River Stour and River Orwell confluence and estuaries join the Outer Thames Estuary at Harwich and are fed by a number of smaller tributaries and brooks upstream from the estuary. Transitional water bodies with the potential to be affected by the proposed dredging and disposal are the transitional sections of the Orwell and Stour and Hamford Water. Coastal water bodies with the potential to be affected by the proposed works are the Harwich Approaches, which extends from the estuary mouth south to Pennyhole Bay, the Blackwater Outer water body in Essex (to the south west of the proposed dredge area) and the Sussex and Essex water bodies which extend east into the North Sea from the coastline of these counties.

Water bodies identified as potentially relevant, in geographical terms, to take through the WFD assessment process with respect to the proposed capital dredge project are presented in **Figure 8.2**. **Table 8.2** summarises the information available regarding the status and objectives of these water bodies. All other water bodies have been scoped out on the basis that an impact (either direct or indirect) is unlikely.

**Figure 8.1 Coastal and transitional water bodies within the Anglian River Basin District**



Source: © Environment Agency copyright and / or database right 2009. All rights reserved. This map includes data supplied under licence from: © Crown Copyright and database right 2009. All rights reserved. Ordnance Survey licence number 100026380. Some river features of this map are based on digital spatial data licensed from the Centre for Ecology and Hydrology, © CEH. Licence number 198 version 2



**Table 8.2 Information on status and objectives of WFD water bodies relevant to the proposed scheme**

Water body name and reference	Area (km <sup>2</sup> )	Length (km)	Current status	Record objective	If not at good status record all WFD parameters at moderate status or below	Is the water body designated as heavily modified or artificial? If so record reason
<b>Transitional</b>						
Orwell (T1) GB520503613601	12.5	NA	Moderate	Good by 2027 Good Ecological Potential by 2027 Good Chemical Status by 2015	<ul style="list-style-type: none"> <li>Ecological Potential Moderate (uncertain)</li> <li>Invertebrates Moderate (uncertain)</li> </ul>	Heavily modified - Flood Protection, Navigation
Stour (Essex) (T16) GB520503613602	25.5	NA	Moderate	Good by 2027 Good Ecological Potential by 2027 Good Chemical Status by 2015	<ul style="list-style-type: none"> <li>Ecological Potential Moderate (uncertain)</li> <li>Invertebrates Moderate (uncertain)</li> </ul>	Heavily modified - Flood Protection, Navigation
Hamford Water (T5) GB520503713700	11.2	NA	Moderate	Good by 2027 Good Ecological Status by 2027 Good Chemical Status by 2015	<ul style="list-style-type: none"> <li>Ecological Status Moderate (Uncertain)</li> <li>Invertebrates Moderate (Uncertain)</li> </ul>	Not designated
<b>Coastal</b>						
Suffolk (C4) GB650503520002	146.5	NA	Moderate	Good by 2027 Good Ecological Potential by 2027 Good Chemical Status by 2015	<ul style="list-style-type: none"> <li>Ecological Potential Moderate (Uncertain)</li> </ul>	Heavily modified - Coastal Protection, Flood Protection
Essex (C5) GB650503520001	1195.9	NA	Moderate	Good by 2027 Good Ecological Potential by 2027 Good Chemical Status by 2015	<ul style="list-style-type: none"> <li>Ecological Potential (Moderate)</li> </ul>	Heavily Modified - Coastal Protection, Flood Protection
Harwich Approaches (C8) GB650503190000	24.4	NA	Good	Good by 2015 Good Ecological Potential by 2015	<ul style="list-style-type: none"> <li>Not Applicable</li> </ul>	Heavily Modified - Coastal Protection, Dredge Disposal, Navigation
Blackwater Outer (C6) GB650503200000	48.6	NA	Good	Good by 2015	<ul style="list-style-type: none"> <li>Not Applicable</li> </ul>	Heavily Modified - Flood Protection

Water body name and reference	Area (km <sup>2</sup> )	Length (km)	Current status	Record objective	If not at good status record all WFD parameters at moderate status or below	Is the water body designated as heavily modified or artificial? If so record reason
				Good Ecological Potential by 2015		
• River (Orwell)						
Orwell (Tidal) (R52) GB105035040390	NA	2.5	Moderate	Good by 2027 Good Ecological Potential by 2027	• Ecological Potential (Moderate)	Heavily Modified - Land Drainage
Orwell (Tidal) (R15) GB105035040380	NA	3.4	Good	Good by 2015 Good Ecological Potential by 2015	• Not Applicable	Heavily Modified - Land Drainage
Orwell (Tidal) (R18) GB105035040420	NA	2.0	Moderate	Good by 2027 Good Ecological Status by 2027	• Ecological Status (Moderate) (Uncertain)	Not Designated
Orwell (Tidal) (R19) GB105035040430	NA	0.8	Good	Good by 2015 Good Ecological Potential by 2015	• Not Applicable	Heavily Modified - Urbanisation
Orwell (Tidal) (R17) GB105035040410	NA	0.8	Moderate	Good by 2027 Good Ecological Status by 2027	• Ecological Status (Moderate) (Uncertain)	Not Designated
Orwell (Tidal) (R16) GB105035040400	NA	1.2	Moderate	Good by 2027 Good Ecological Status by 2027	• Ecological Status (Moderate) (Uncertain)	Not Designated
<b>River (Stour)</b>						
Stour Estuary (Suffk) (R45) GB105036041060	NA	0.8	Moderate	Good by 2027 Good Ecological Status by 2027	• Ecological Status (Moderate) (uncertain)	Not Designated
Stour Estuary (Suffk) (R30) GB105036040800	NA	5.2	Moderate	Good by 2027 Good Ecological Potential by 2027	• Ecological Potential (Moderate)	Heavily Modified - Flood Protection
Stour Estuary (Suffk) (R92) GB105036040790	NA	1.5	Moderate	Good by 2027 Good Ecological Status by 2027	• Ecological Status (Moderate) (uncertain)	Not Designated

Water body name and reference	Area (km <sup>2</sup> )	Length (km)	Current status	Record objective	If not at good status record all WFD parameters at moderate status or below	Is the water body designated as heavily modified or artificial? If so record reason
Stour Estuary (Suffk) (R31) GB105036040810	NA	2.3	Moderate	Good by 2027 Good Ecological Potential by 2027	<ul style="list-style-type: none"> <li>Ecological Potential (Moderate)</li> </ul>	Heavily Modified – Land Drainage
Stutton Brook (R113) GB105036040890	NA	16.2	Moderate	Good by 2027 Good Ecological Status by 2027 Good Chemical Status by 2015	<ul style="list-style-type: none"> <li>Ecological Status (Moderate) (Quite Certain)</li> <li>Fish (Moderate) (Quite certain)</li> </ul>	Not Designated
Ramsey River (R32) GB105036040830	NA	14.7	Moderate	Good by 2027 Good Ecological Potential by 2027	<ul style="list-style-type: none"> <li>Ecological Potential (Moderate) (Quite certain)</li> <li>Fish (Moderate) (Uncertain)</li> <li>Invertebrates (Moderate) (Quite certain)</li> </ul>	Heavily Modified - Flood Protection
Holbrook (R35) GB105036040880	NA	9.3	Moderate	Good by 2027 Good Ecological Potential by 2027	<ul style="list-style-type: none"> <li>Ecological Potential (Moderate) (Quite certain)</li> <li>Fish (Poor) (Very certain)</li> <li>Invertebrates (Poor) (Very certain)</li> </ul>	Heavily Modified - Water Storage -non-specific
<b>River (other)</b>						
Hamford (R103) GB105037034050	NA	2.2	Moderate	Good by 2027 Good Ecological Status by 2027	<ul style="list-style-type: none"> <li>Ecological Status (Moderate) (Uncertain)</li> </ul>	Not Designated
Hamford (R105) GB105037034240	NA	2.5	Moderate	Good by 2027 Good Ecological Potential by 2027	<ul style="list-style-type: none"> <li>Ecological Potential (Moderate)</li> </ul>	Heavily Modified – Flood Protection
Holland and Hamford (R7) GB105037033970	NA	5.9	Moderate	Good by 2027 Good Ecological Potential by 2027	<ul style="list-style-type: none"> <li>Ecological Potential (Moderate)</li> </ul>	Heavily Modified – Flood Protection
Holland Brook (R97) GB105037077810	NA	19.6	Moderate	Good by 2027 Good Ecological Potential by 2027	<ul style="list-style-type: none"> <li>Ecological Potential (Moderate) (Very certain)</li> <li>Fish (Poor) (Very certain)</li> </ul>	Heavily Modified - Flood Protection

Water body name and reference	Area (km <sup>2</sup> )	Length (km)	Current status	Record objective	If not at good status record all WFD parameters at moderate status or below	Is the water body designated as heavily modified or artificial? If so record reason
					<ul style="list-style-type: none"> <li>Invertebrates (Moderate) (Uncertain)</li> </ul>	
Picker's Ditch (R6) GB105037033960	NA	6.0	Moderate	Good by 2027 Good Ecological Potential by 2027	<ul style="list-style-type: none"> <li>Ecological Potential (Moderate) (Uncertain)</li> </ul>	Heavily Modified – Flood Protection

## **8.5 Recording the Outcome of the WFD Assessment**

The WFD compliance assessment will be recorded as a separate section of the ES using a series of tables, as detailed within the Environment Agency's guidance document - *Clearing the Waters* (Environment Agency, 2012), supplemented with detailed discussion where relevant.

## **9 MARINE ECOLOGY**

### **9.1 Introduction**

This section considers the marine ecology in the study area, namely benthic invertebrates. Fish and shellfish are considered within **Section 10**, marine mammals within **Section 11** and coastal vegetation is considered within **Section 13**.

The study area for marine ecology comprises the following:

- the dredge footprint;
- the near-shore intertidal and subtidal communities of the Stour and Orwell estuaries; and
- the subtidal communities of the approach channel area and the wider Outer Thames Estuary.

### **9.2 Baseline Conditions**

#### **9.2.1 Data sources**

Baseline description of the Stour and Orwell estuaries has been based on the results from the following surveys and reports:

- estuary-wide monitoring surveys undertaken annually from 2008 to 2012 (Royal HaskoningDHV, 2013d);
- marine ecological surveys carried out to inform the 2003 ES for the Felixstowe South Reconfiguration (FSR) (Royal HaskoningDHV, 2013d);
- marine ecological surveys carried out to inform the 2013 ES for the proposed Berth 9 Quay Extension (Royal HaskoningDHV, 2013d); and
- review of data on biotope distribution in the Stour, Orwell and Harwich approaches (Worsfold, 2005).

The information has been separated into intertidal and subtidal interests in the Stour and Orwell as a whole (**Section 9.2.2**), and the interests specifically around Felixstowe in relation to FSR and Berth 9 (**Section 9.2.3**).

The information provided on the intertidal and subtidal communities in the Outer Thames Estuary is based on the review of the following reports:

- marine ecological surveys carried out to inform the 2003 ES for the Felixstowe South Reconfiguration (which include details of the disposal sites);
- marine ecological surveys carried out to inform the 2013 ES for the proposed Berth 9 Quay Extension (which include details of the disposal sites);
- the HR Wallingford report on the 'Characterisation of a new offshore disposal site in the outer Thames Estuary' (HR Wallingford, 2013b). A benthic grab survey was undertaken in August 2012 to report on the sediment characteristics and benthic faunal community in the area of the proposed disposal site;

- the Outer Thames Estuary Regional Environmental Characterisation (REC) (MALSF, 2009). A benthic grab and trawl survey was carried in 2007 to inform this report and it also includes the results from the Outer Thames Marine Aggregate Regional Environmental Assessment (MAREA) benthic grab and trawl survey conducted in August 2008 to refine the boundaries of habitats and biotope complexes within this region; and
- the Unicomarine report on the review of biotope distribution in the Stour, Orwell and Harwich approaches (Worsfold, 2005).

This information is provided as a general overview of the Outer Thames Estuary (**Section 9.2.4**) and the results from the disposal site characterisation report (**Section 9.2.5**).

## 9.2.2 Intertidal and subtidal interests within the Stour and Orwell estuaries

### Overview

Both the Stour and Orwell estuaries are designated as SSSIs (see **Section 5.5.1**) due to their subtidal and intertidal habitats which provide important feeding areas for birds (see **Section 12**).

The Orwell Estuary is a long and relatively narrow estuary with extensive mudflats along the border of the channel and supports large patches of eelgrass *Zostera marina*, and dwarf eelgrass *Z. noltii*. The estuary also supports an example of a nationally important tide swept algae community with sponges, ascidians and red algae. Other estuarine plants found in the Orwell River include slender hare's-ear *Bupleurum tenuissimum*, golden-samphire *Inula crithmoides*, lax-flowered sea-lavender *Limonium humile*, shrubby sea-blite *Suaeda vera*, small cord-grass, perennial glasswort *Sarcocornia perennis* and divided sedge *Carex divisa*. There are small areas of vegetated shingle on the foreshore of the lower reaches at the entrance of the estuary towards the Trinity Container Terminal (Natural England, 2013d).

The Stour Estuary is a larger estuary with a sequencing of small creeks composed of coastal saltmarsh and sheltered muddy shores. These habitat features support nationally important communities of plants (Natural England, 2013c).

The estuaries mudflats are rich in invertebrates, particularly ross worm *Sabellaria spinulosa* reef, honeycomb worm *Sabellaria alveolata* reef biotope, tentacled lagoon worm *Alkmaria romijni* and starlet sea anemone *Nematostella vectensis*. The starlet sea anemone occurs near the head of the Stour and both the starlet sea anemone and the tentacle lagoon worm are protected by the Stour Estuary SSSI (Royal HaskoningDHV, 2013c).

Both the Stour and Orwell estuaries contain shellfish species including wild and unharvested native oyster beds *Ostrea edulis* as well as extensive blue mussel beds *Mytilus edulis*. The area is also thought to be an important nursery area for various fish species and parts of the site have been identified as having high benthic species and biotope richness (see **Section 10**) (Royal HaskoningDHV, 2013c).

*Results from the Stour and Orwell Monitoring Programme (Royal HaskoningDHV, 2013c)*

The subtidal benthos of the Stour and Orwell estuaries is currently the subject of a wide-scale benthic survey programme. Initially the monitoring was undertaken every five years following its introduction in 1997 and then from 2008 it was decided by the Stour and Orwell Regulator Group to undertake the surveys annually. It was determined that it would be more beneficial to monitor annually in order to provide more valuable data as changes in results are difficult to interpret with the five year interval.

The last intertidal surveys carried out in 2012 showed noticeable changes in the biotopes in the estuaries, particularly in the subtidal stations. The new biotopes recorded may suggest erosion of softer sediments to reveal coarser substrata beneath, other changes may be due to natural fluctuations in the estuarine ecosystem.

The sediment grain size at the majority of stations was dominated by high proportions of silt and clay; however, some monitoring stations had equal or greater proportions of pebbles or a mix of sand fractions.

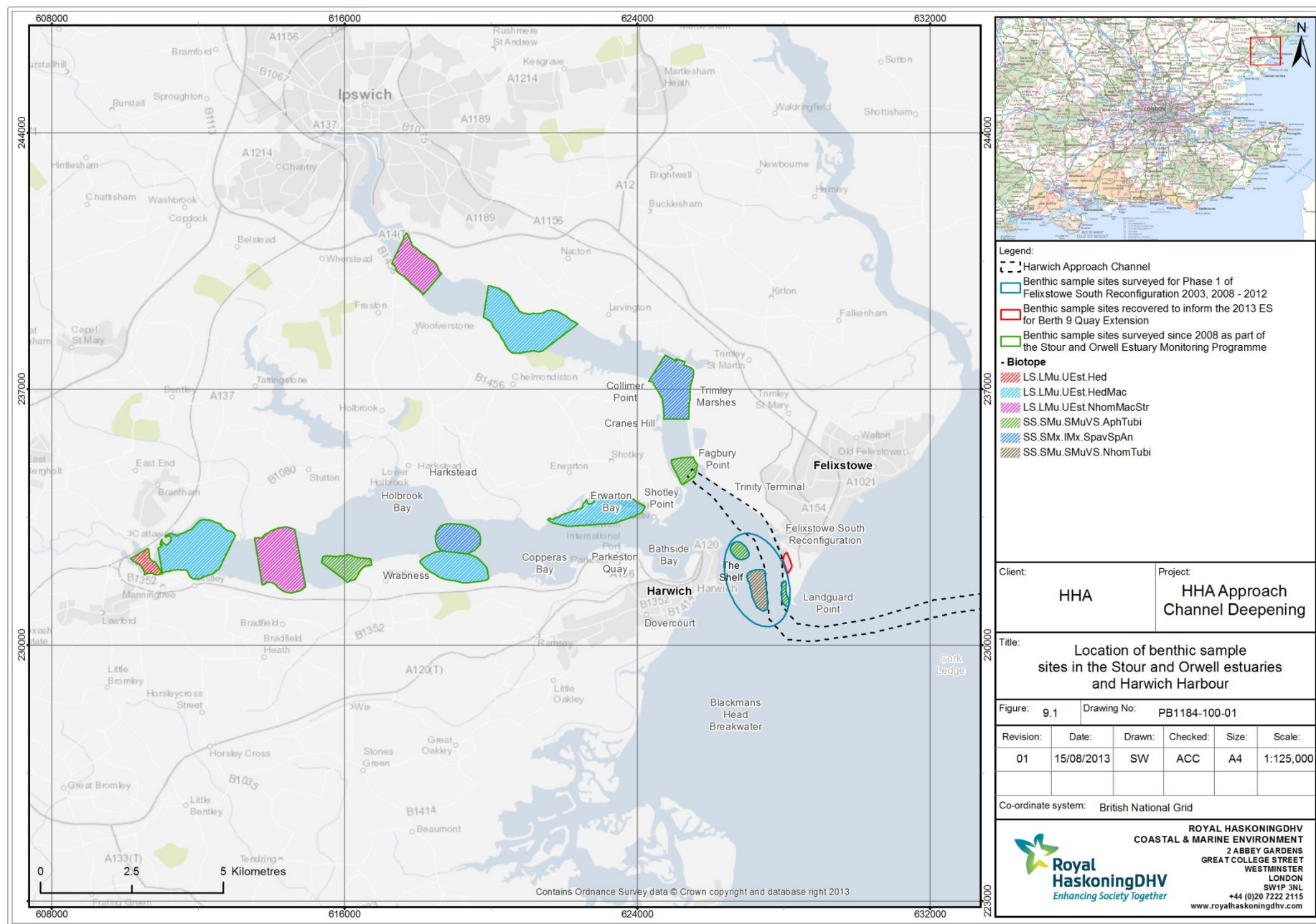
The groups of biotopes present in a 2.0km radius from the proposed dredge footprint are:

- SS.SMx.IMx.SpavSpAn: *Sabella pavonina* with sponges and anemones on infralittoral mixed sediment;
- SS.SMu.SMuVS.AphTubi: *Aphelochaeta marioni* and *Tubificoides* spp. in variable salinity infralittoral mud; and
- LS.LMu.MEst.HedMac: *Hediste diversicolor* and *Macoma balthica* in littoral sandy mud.

The distribution of these biotopes is illustrated on **Figure 9.1**.

In 2012 the majority of the benthic fauna was represented by mud-dominated communities. The highest number of taxa was recorded in the subtidal samples targeted as biotope SS.SMx.IMx.SpavSpAn (*Sabella pavonina* with sponges and anemones on infralittoral mixed sediment). This biotope is present near Harkstead Point in the Stour River (6.0km from Harwich Harbour) and toward Trimley Marshes in the Orwell River (2.0km north of the dredge footprint) (refer to **Figure 9.1**). The lowest number of taxa were recovered from subtidal habitats targeted as biotope SS.SMu.SMuVS.AphTubi (*Aphelochaeta marioni* and *Tubificoides* spp. in variable salinity infralittoral mud) adjacent to Trinity Terminal at the entrance of the Orwell River and further upstream in the Stour River (near Wrabness Point). This biotope is directly within the footprint of the proposed dredging (refer to **Figure 9.1**).

Abundance was greatest in the intertidal and the lowest in the subtidal groups in the two most seaward sites in the River Orwell.



*Data from the review of biotope distribution report (Worsfold, 2005)*

This report aimed to summarise work carried out in the Stour and Orwell estuaries and the deep water approach channel (refer to **Section 9.2.4**), present the results of a macrofaunal survey of the area conducted in summer 2003, and create an updated biotope map of the area.

In July and August 2003 samples were taken in the Stour and Orwell estuaries using a 0.04m<sup>2</sup> Shipek grab. The survey design reflected the sample stations from previous surveys undertaken in the Stour and Orwell estuaries in 1997 (Dyer, 2000). In total, 164 macrofaunal samples were collected from the estuaries.

Results from the 2003 survey indicated that numbers of individual taxa were often high (up to 64 per sample) and were highest in the mid-Stour region and lowest in the lower Stour Estuary. Many species were most common in the upper estuary regions, such as ragworm *Hediste diversicolor* and the oligochaete *Tubificoides benedii*. The small sedentary polychaete *Streblospio shrubsolii* had a similar distribution but also extended outside the estuaries in lower numbers and showed a slight population centre in Harwich Harbour. Cockles *Cerastoderma edule* reached a peak of abundance in the upper Orwell and were common throughout the estuaries. The isopod crustacean *Cyathura carinata* was almost restricted to the upper Stour, with occasional high populations in the mid Stour. Another estuarine species most common on the upper Stour was the bivalve *Abra tenuis* which was otherwise generally distributed within the estuaries (Worsfold, 2005). The sedentary worm *Aphelocheata marioni* was abundant throughout the estuaries, though mainly at the lower shore and subtidal sites, and the American piddock *Petricola pholadiformis* was present in the lower and mid reaches of the Orwell. Shells of the snail *Rossoa membranacea* were numerous in the Stour Estuary, particularly in Holbrook Bay.

Some species showed a preference for the channels in the mid estuaries, often with a preference for the Stour, e.g. the small polychaete *Syllidia armata* and the amphipod crustacean *Microprotopus maculatus*. The sea spider *Achelia echinata* also had a mid-channel distribution in the estuaries, as did the slipper limpet *Crepidula fornicata*. The bivalve *Abra alba* was present in low numbers in the lower reaches of both estuaries in the mid-channels.

Both intertidal and subtidal areas within the Stour and Orwell estuaries were dominated by soft sediments, and mud and sandy mud biotopes (such as SS.SMu.SMuVS.AphTubi) dominated the estuaries. A small number of extensive biotopes occupied most of the area, although a wide variety of others occurred on hard, soft and mixed substrata in both estuaries. Most of the biotopes recorded occupied only small areas, as was the case for nationally rare or scarce biotopes. It was noted that there has been a decline in the seagrass biotopes.

The distribution of biotopes in the Stour and Orwell estuaries, taken from the Unicomarine report (Worsfold, 2005), is illustrated in **Figure 9.2**. The legend to accompany the figure is provided in **Figure 9.3**.

**Figure 9.2** Biotopes in the Stour and Orwell estuaries taken from the 2005 Unicomarine report (Worsfold, 2005)

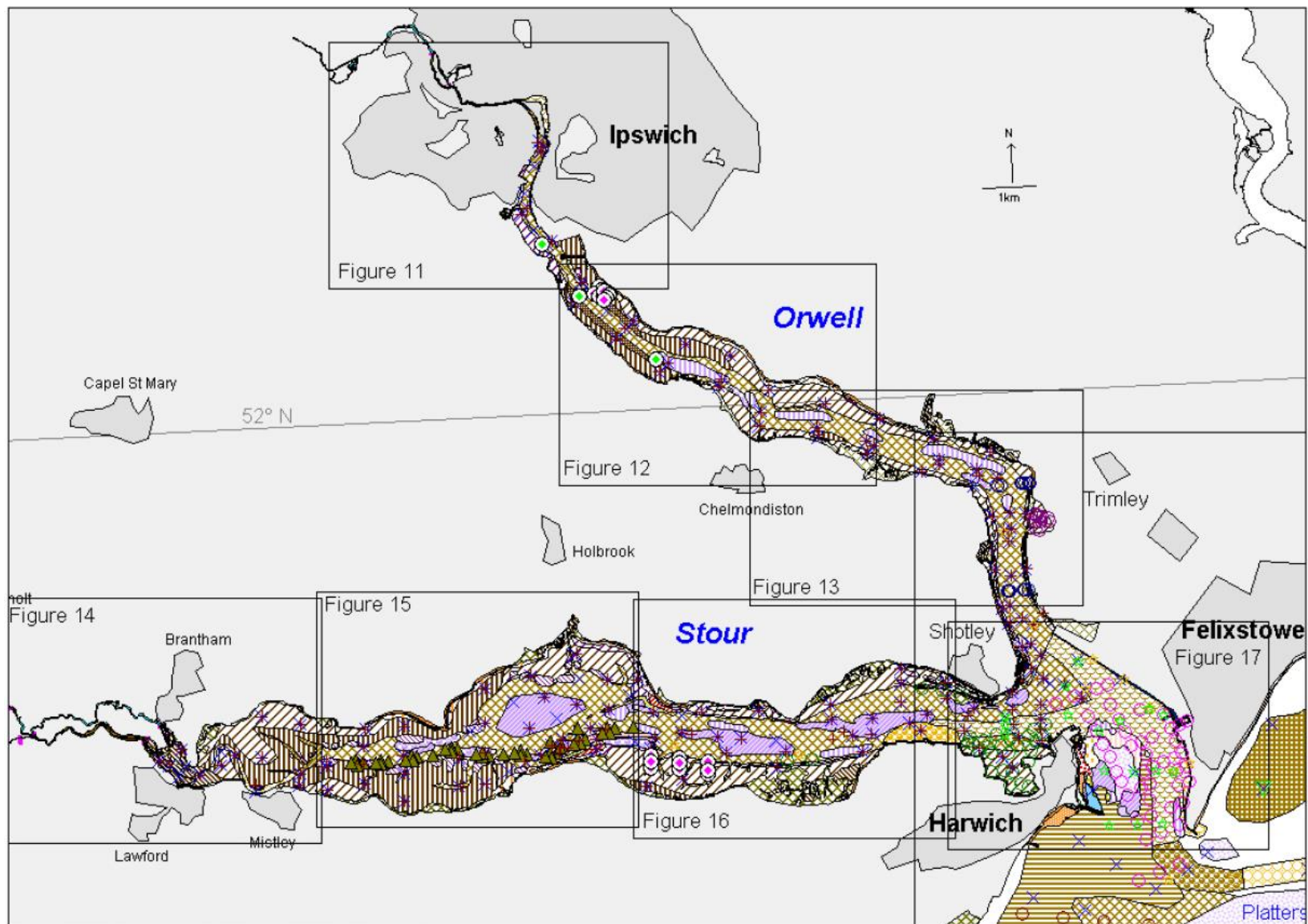
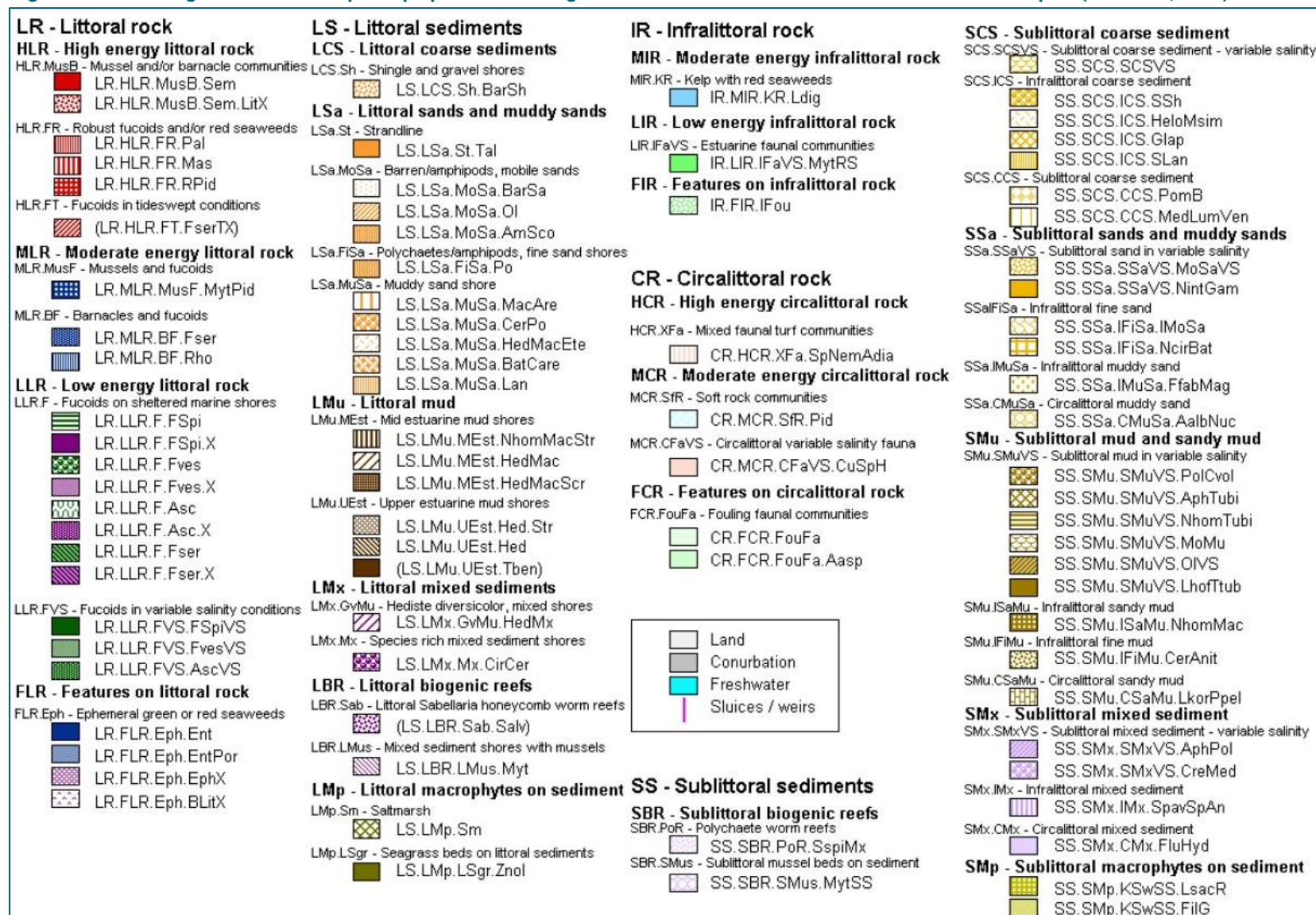


Figure 9.3 Legend for the biotope maps presented in Figure 9.2 and 9.5 taken from the 2005 Unicomarine report (Worsfold, 2005)



### 9.2.3 Overview of the intertidal and subtidal interests around Felixstowe

Marine ecological studies undertaken around Felixstowe in the past include those undertaken for the FSR project (completed in 2010) and Berth 9 Quay Extension (for which a Marine Licence application is currently being considered). The surveys concentrated on comprehensive sampling (benthic fauna and epibenthic fauna) in the approach channel to Felixstowe and near the proposed Berth 9 Quay Extension (facing Landguard Container Terminal).

*Results from subtidal marine ecology surveys undertaken between 2008 and 2012 in the approach channel (Royal HaskoningDHV, 2013c)*

Recent monitoring results from marine ecological surveys performed as part of the Felixstowe South Reconfiguration project between 2008 and 2012 (see survey area illustrated in **Figure 9.1**) show that the area adjacent to the approach channel contains biotope SS.SMu.SMuVS.NhomTubi (*Nephtys hombergii* and *Tubificoides spp.* in variable salinity infralittoral soft mud). This biotope is found in relatively deep water off Stone Pier, on the Shelf, to the west of the dredged channel. There may be a small amount of overlap of this biotope with the footprint of the proposed dredge. The biota is associated with high infaunal abundance, greater depth and high silt/clay dominance in the sediment.

Another biotope was also identified, namely SS.SMu.SMuVS.AphTubi (*Aphelochaeta marioni* and *Tubificoides spp.*). This biotope is located on the eastern side of the dredged channel toward Landguard Point (see the area referred as “The Shelf” in **Figure 9.1**) and also to the west of the dredged channel. This biotope, associated with mixed sediment in shallower water, appears to represent an infaunal component common to several biotopes in the area. Overlap with epifaunal biotopes is suggested by the presence of fanworms *Sabella pavonina* and ross worm *Sabellaria spinulosa* on The Shelf; these species characterise their own biotopes. *Sabellaria spinulosa* was reported by HR Wallingford (1998) as one of the most vulnerable species found in the approach channel. This species is a polychaete (marine worm) which builds reefs out of particles of sand and these reefs then provide habitat for several other species to shelter in and search for food. *Sabellaria spinulosa* is a Biodiversity Action Plan (BAP) habitat in the UK and when in the reef form, is classified as an Annex I habitat under the Conservation of Habitats Regulations 2010. The Stour and Orwell MCZ mapping illustrates that an area of reef is present within the western side of the approach channel (Royal HaskoningDHV, 2013d).

The Stour and Orwell is also only one of two sites where the honeycomb worm *Sabellaria alveolata* reef biotope has been recorded in the region, and the mapping undertaken for the original MCZ proposals indicate that the species is generally found on exposed shores where there is sufficient sand supply for tube building (Royal HaskoningDHV, 2013d). This species is a BAP priority species.

The data recovered from the 2008 to 2012 trawl surveys showed abundance of sessile organisms, such as algae, hydroids and bryozoans. The most common large invertebrates identified were shore crabs *Carcinus maenus* and brown shrimp *Crangon crangon* (which are mainly epibenthic), and sea gooseberries *Pleurobranchus pileus* (which are pelagic). There was a tendency for echinoderms (*Echinocardium* and *Ophiura spp.*) to be most abundant in the samples recovered furthest from the estuary. Dover sole *Solea solea* were the most common fish species caught throughout the

years, with the exception of 2009, when gobies (*Pomatoschistus*) outnumbered other fish.

*Results from subtidal marine ecology surveys undertaken in 2013 near Landguard Container Terminal (Royal HaskoningDHV, 2013d)*

The sediment samples recovered during the 2013 benthic survey (Royal HaskoningDHV, 2013d) from the subtidal area adjacent to the proposed Berth 9 Quay Extension were characterized by a mud and “sandy mud” texture. A total of 28 different subtidal invertebrate fauna was recorded (see surveyed area in **Figure 9.1**). The most abundant species were white furrow shell *Abra alba* and mussel *Mytilus edulis*. Very low abundances of polychaete worms characteristic of estuarine muddy sediments were present. Overall, the enumerated species were classified as greater than ‘Present’ according to the SACFOR scale (Connor *et al*, 2004), albeit species were in very low numbers at all stations.

With regards to the epibenthic fauna, a total of 27 different species were identified within the trawl catch results from 2013. The most abundant species were the brown shrimp *Crangon crangon*, the littoral crab *Carcinus maenas*, bivalves *Abra spp.* individuals and individuals of European sprat *Sprattus sprattus*.

#### 9.2.4 Overview of the subtidal interests within the Outer Thames Estuary

For the purposes of the Outer Thames Estuary regional characterisation, datasets were collected in 2007 and 2008, and then compared, to characterise the benthic environment (see **Figure 9.4**).

The results from the marine ecology surveys conducted in 2007 in the Outer Thames Estuary (MALSF, 2009) indicated lower species diversity in samples collected from shallow inshore waters adjacent to the Essex and Suffolk coastlines. Further offshore, results revealed that mixed and coarse sediments support larger numbers of encrusting and attaching epifauna and particularly high population densities correlate with areas of coarse sandy gravel and cobbles onto which these types of animals can attach. Such areas were characterised by higher dominance and/or lower evenness values indicating the numerical superiority of these epifaunal species where they occur.

With regards to the distribution of habitat complexes, infralittoral and circalittoral coarse sediment forms the main habitat complex within the south of the mouth of the Stour and Orwell estuaries and off the coast of Felixstowe up to Deben River. The biotope SS.SCS.ICS.SLan (dense *Lanice conchilega* and other polychaetes in tide swept infralittoral sand and mixed gravelly sand) is found north of the convoluted coastline of Hamford Water. The dominant epifaunal biotope at this location is sparse sponges, *Nemertesia spp.* and *Alcyonidium diaphanum* on circalittoral mixed substrata (CR.HCR.XFa.SpNemAdia).

The other main biotope, namely SS.SMu.SMuVS.AphTubi (*Aphelochaeta marioni* and *Tubificoides spp.* in variable salinity infralittoral mud), is found near Shipwash Bank. The dominant epifaunal biotope is *Molgula manhattensis* with a hydroid and bryozoan turf (CR.HCR.XFa.Mol). This biotope comprises circalittoral rock and is exposed to waves (MALSF, 2009).

*Data from the review of biotope distribution report (Worsfold, 2005)*

This report aimed to summarise previous work carried out in the Stour and Orwell estuaries (refer to **Section 9.2.2**) and the deep water approach channel, and create an updated biotope map of the area.

In July and August 2003, 103 samples were taken from the deep water approaches to Harwich using a 0.04m<sup>2</sup> Shipek grab. The survey design reflected the sample stations from previous surveys undertaken around the deep water approach channel in 1996 (Unicomarine, 1998).

Results from the 2003 survey indicated that numbers of taxa in the outer estuary were high, as within the estuaries, but were lower in some of the areas of mobile sediment, and on some of the ross worm *Sabellaria spinulosa* reefs. A number of the species which were noted to be abundant in the estuaries were rare in the Outer Thames Estuary, such as ragworms *Hediste diversicolor* and the oligochaete *Tubificoides benedii*. *Streblospio shrubsolii* was present in small numbers around the approach channel, as were *Cerastoderma edule*. The catworm *Nephtys hombergii* was present throughout the deeper water and the American piddock was also present but in a more disjointed distribution. Shells of the snail *Rissoa membranacea* were common in certain areas only in the outer estuaries area (Worsfold, 2005).

*Sabellaria spinulosa* was more common outside of the estuaries, as was the polychaete *Glycera lapidum* agg. The white catworm *Nephtys cirrosa* was most common in mobile sediment areas. The sedentary polychaete *Spiophanes bombyx* was widespread outside the estuaries, particularly to the north and west of the area. The bivalve *Albra alba* was widely and generally distributed. The sea spider was common around the Naze Ledge.

The area outside the estuaries comprised a variety of habitats mainly on sandy or muddy sediments or mixed substrata, including extensive areas of *Sabellaria* crusts. There was a general pattern of muddy sediments in the inshore waters of Pennyhole Bay and the disturbed approach channel, while stable *Sabellaria spinulosa* beds (SS.SBR.PoR.SspiMx) could be found on the shelf and ledge regions further out and the outermost banks having more mobile coarse sediments.

The locations of the biotopes from the 2003 survey are illustrated in **Figure 9.5**. It should be noted that the sampling intensity is unlikely to have been enough to identify accurately the distribution of biotopes as most are based on fairly small numbers of scattered samples, however, some idea of the probable complexity of the area can be seen (Worsfold, 2005).

#### 9.2.5 Results from the disposal site characterisation report

HHA is undertaking the characterisation of a new disposal site in the Outer Thames Estuary in order to dispose of maintenance dredge material from the Harbour. The area around the new disposal site was surveyed in August 2012 and the results were collated in the Characterisation Report (HR Wallingford, 2013b).

A total 59 stations were sampled using a 0.1m<sup>2</sup> mini-Hamon grab. A cluster of 21 stations were positioned within the proposed disposal site in a rectangular pattern, as shown on **Figure 9.2**. The number of taxa per sample varied between 0 and 68 (overall

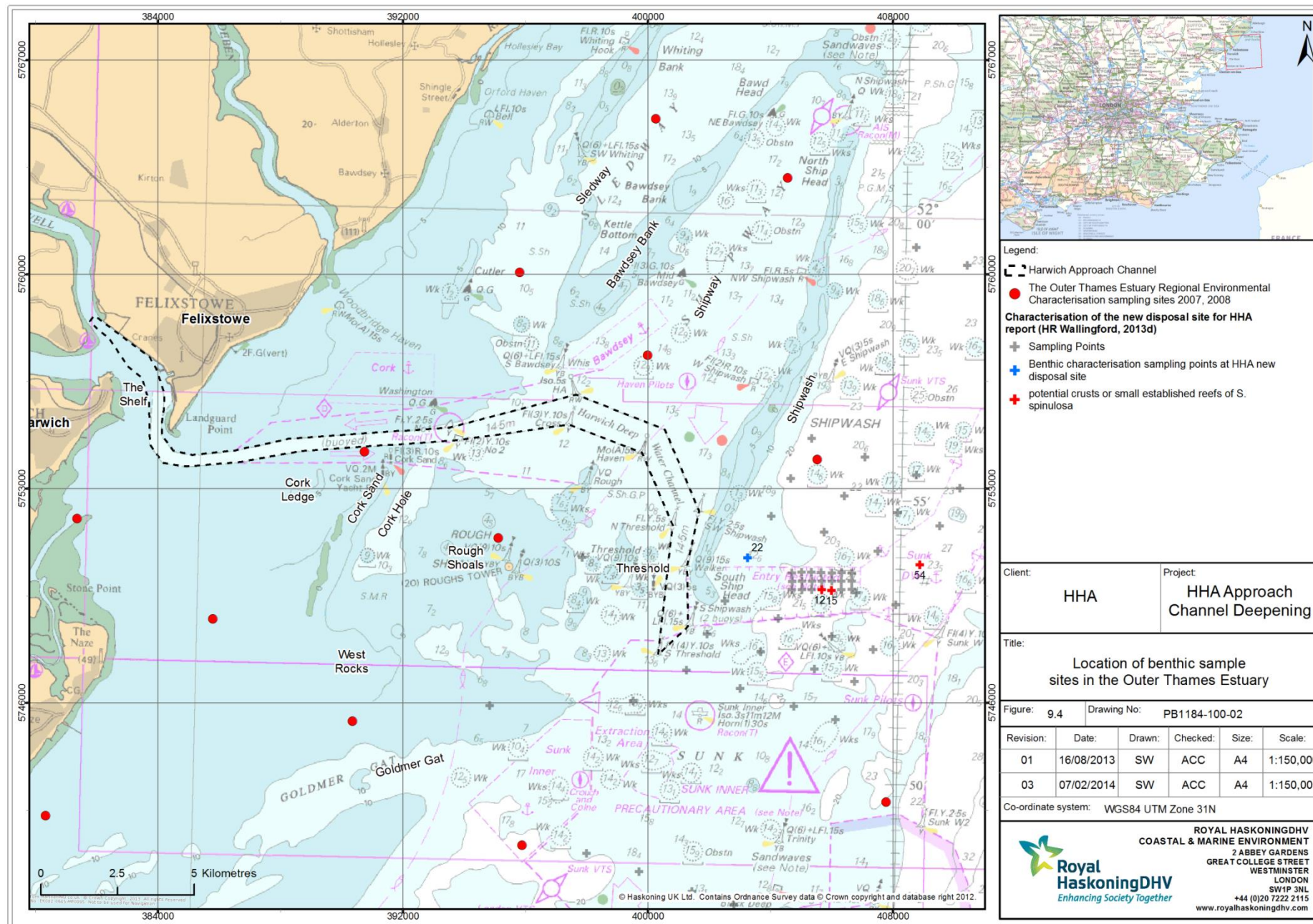
mean: 17.62). The number of individuals per m<sup>2</sup> varied between 0 and 16,030 (overall mean: 760.84).

The survey identified a range of benthic organisms including polychaete worms ranging from deposit and filter feeders to highly mobile predators, crustaceans (amphipods, shrimp and crabs) and molluscs. The biological samples also had several sea spider (pycnogonid) species and numerous colonial species of bryozoa and hydrozoa. The two most common species of polychaetes were the tube builders *Sabellaria spinulosa* and *Lagis koreni*.

The subtidal environment was mainly found to be composed of mixed coarse sandy sediments which contain some muds and silts. It also comprised bivalve species common in muddy sands and gravels, such as *Abra alba*, *Kurtiella bidentata* and *Nucula spp*, however, the bivalves were dominated by the common mussel *Mytilus edulis*. High abundance of *Mytilus edulis* was recorded at a station adjacent to Shipwash Bank (see **Figure 9.2**). This may indicate the presence of the UK BAP priority habitat Blue Mussel Beds on Sublittoral Sands and Gravel, however, very few of the other indicative species of this habitat were present and the mussels recorded were mostly juveniles (below 5 mm shell length).

The biotopes within the study area are primarily associated with sublittoral biogenic reefs, sublittoral coarse sediments, sands and muddy sands. The dominant biotope is white furrow shell *Abra alba* and bivalve *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment (SS.SSa.CMuSa.AalbNuc), and marine polychaete *Sabellaria spinulosa* on stable circalittoral mixed sediment (SS.SBR.PoR.SspiMx). The latter is typical of the Outer Thames Estuary and is well known for its reef-forming ability when *S. spinulosa* occurs in very large numbers in subtidal areas. *S. spinulosa* was recorded within the study site, but in low numbers with the exception of three stations where abundance was above 100 individuals. Two of these three station were located within the proposed new disposal site and the third site was located to the north east (refer to **Figure 9.2**). In relation to the proposed dredge area, these sites were 0.7km away. Using assessment criteria outlined by Hendrick and Foster-Smith (2006), these three sites were classified having as medium potential for a reef to be present and could indicate the presence of thin crusts or small established reefs. Such features constitute a 'Biogenic Reef' as listed under Annex I of the EC Habitats Directive.

With regards to shellfish, there are records of both edible crab *Cancer pagurus* and common lobster *Homarus gammarus* in the vicinity of the proposed new disposal site (Sturt and Dix 2009, Ellis *et al.*, 2012).





### 9.3 Potential Impacts

Capital dredging works can affect the way in which the tide propagates into estuaries and along the coast. Morphological changes associated with dredging activities can also change the nature of the flow and wave climate in the area of the works. Any hydrodynamic change resulting from dredging may alter the pattern of sediment accretion and erosion, which in turn can affect substrate conditions for infaunal and epibenthic organisms. Dredging works can also lead to increased suspended sediment concentrations within the water column. The settlement of this material onto intertidal and subtidal areas may affect the structure of the communities present and impact on filter-feeding organisms whilst the sediment is in suspension.

During the construction phase, the proposed dredging work would have a direct impact on intertidal and subtidal communities present in the mouth of the Orwell and Stour estuaries (Harwich Harbour) and the approach channel; including the loss and/or smothering of the seabed habitats and associated species within the footprint of the dredged area. Indirect impacts would include smothering as sediment deposits onto the seabed areas in the immediate vicinity of the works. Burial or significant smothering can result in the immediate mortality of benthic species and/or non-mobile epibenthic species. Following less significant smothering, the benthic community may be able to recover or readjust.

The potential also exists for marine ecological impacts to arise due to the use or disposal of the dredged material.

The impacts that may arise for marine ecology due to the capital dredging and disposal are listed below in **Table 9.1**. These impacts may be either direct (i.e. they would arise within the footprint of the works) or indirect (e.g. they could arise as a consequence of potential changes to the hydrodynamic and sedimentary regime, as outlined in **Section 6**).

**Table 9.1 Potential impacts of the proposed scheme on the marine ecology within the study area**

Potential Impacts	
Construction	Direct loss of benthic and epibenthic species and habitats within the footprint of the dredge
	Smothering of benthos from suspended sediment settling out of the sediment plume during dredging
	Increased suspended sediment concentrations due to the sediment plume impacting on filter-feeding organisms and algal populations
	Underwater noise and vibration impacts on benthos from the dredging activities
	Potential impacts on BAP habitats
	Increased suspended sediments resulting from the disposal of sediment at the disposal site
	Smothering of benthic invertebrates from suspended sediments settling out of the sediment plume during disposal of sediment at the disposal site

Potential Impacts	
Operation	Potential for changes in macrobenthic productivity during re-colonisation and recovery
	Changes to the benthic community due to the exposure of different substrata
	Implications of any hydrodynamic change on patterns of sediment movement (erosion and/or accretion) and the influence on benthic communities
	Potential impact on benthic community structure due to change in the maintenance dredging regime
	Potential changes in exposure of intertidal areas due to the effect on tidal propagation

## 9.4 EIA Investigations

To determine the impact that the proposed scheme could have on the marine ecology of the study area, it is necessary to characterise the marine communities currently within, and immediately adjacent to, the proposed dredge area and the proposed disposal site. A full desk-based study will be undertaken to look at all survey work undertaken to date, including those surveys outlined above, in order to fully characterise the baseline environment.

It is not anticipated that any further data collection will be required given the extent of information available for the study area, however, meetings with relevant authorities (Environment Agency, Natural England and Cefas) during the EIA phase will confirm this or establish the work required.

## 10 FISH AND COMMERCIAL FISHERIES

### 10.1 Introduction

This section considers the fish and shellfish resources in the vicinity of the Harwich Haven Approach Channel, including the South Suffolk and Essex coastline and the Stour and Orwell estuaries. The fish and shellfish species in the region are characterised by those of commercial and conservation importance and other species which play an important part in the marine and estuarine ecology of the study area.

#### 10.1.1 The study area

The Harwich Haven Approach Channel deepening project would cover an area which extends from Harwich at the mouth of the Stour and Orwell estuaries to 24.0km seawards in an easterly direction. The study area therefore covers subtidal and intertidal areas which could be affected by the proposed dredging activities and resultant sediment plume. It is identified as the Stour and Orwell estuarine system, the approach channel and the surrounding area and the offshore area in which the capital dredge material may be disposed.

In relation to the marine fisheries of this area the project corresponds to the International Council for the Exploration of the Sea (ICES) fisheries' rectangle 32F1. Landings data of fish and shellfish species from ICES rectangle 32F1 from 2010 to 2012 have been used to provide an indication not only of the economic importance of various species but also of the presence, absence and abundance of species within the area. **Figure 10.1** shows the ICES rectangle in relation to the study area.

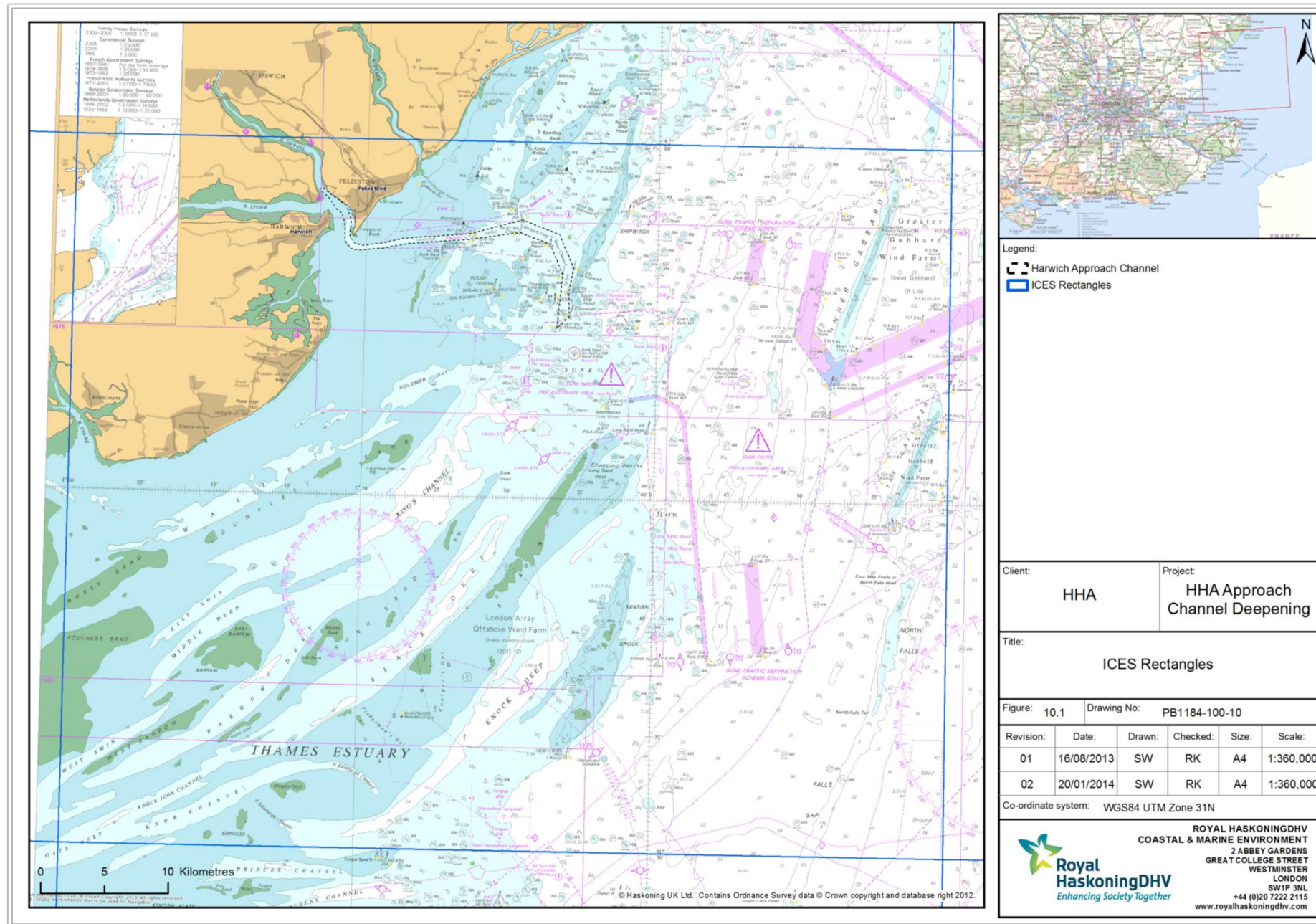
Previous survey data from HHA surveys undertaken between 2002 and 2008 describe the general species composition for the estuarine system, and fish maps produced by the Eastern Inshore Fisheries Conservation Authority (EIFCA) provide an indication of the main fishing areas for species landed commercially. In addition, a study undertaken by HR Wallingford into the characterisation of a new offshore disposal site (HR Wallingford, 2013b) provides Vessel Monitoring System (VMS) data for UK-registered vessels 15m and over operating in the study area for 2010 and 2011.

### 10.2 Baseline Conditions

#### 10.2.1 Nursery areas within the Stour and Orwell estuaries

The Orwell Estuary is a nursery area for sand-smelt *Atherina presbyter* and is known as one of the most important areas in the UK for juvenile bass *Dicentrarchus labrax*. In contrast to other areas, bass nurseries remain at various sites within the Orwell Estuary for the whole year (Colclough, 2010).

The seaward areas of the Stour Estuary are known to be important areas for juvenile flounder *Platyichthys flesus*, sprat *Sprattus sprattus* and spawning sole *Solea solea*. The estuary is not designated for any particular fish species, the area is thought to be an important nursery area for various fish. Saltmarsh is also found in several places along the Stour Estuary and there is growing evidence that restored saltmarshes are an important feeding and nursery area for commercial and non-commercial species of fish (Colclough, 2010).



### 10.2.2 Fish species within the Outer Thames Estuary

There are several species of demersal and pelagic fish found offshore of Shipwash Bank according to HHA Characterisation Report (HR Wallingford, 2013b). These include herring, cod, sea bass, sole, plaice, dab, flounder, skate and rays some of which use the nearby Stour and Orwell estuaries as nursery areas (Sturt and Dix 2009, Ellis *et al.*, 2012).

The herring *Clupea harengus* are of particular interest as they may be part of the distinct genetic group known to spawn in the area around Eagle Bank off the coast of the Blackwater and Colne estuaries from February to April. Once the herring eggs have hatched the juveniles move into areas of the Blackwater and Colne estuaries and remain there until late spring when they move out of the nursery areas into the open sea. Although only the Blackwater Estuary has been studied in detail for juvenile Blackwater Herring they have also been sampled from the mouth of the Colne Estuary (Fox *et al.*, 1999, Fox, 2001) and it is possible that they are also present further into the Colne Estuary.

### 10.2.3 Fish species within the Stour and Orwell estuaries

Between 2002 and 2008 HHA carried out an intertidal beam trawl survey of the Stour and Orwell estuaries which recorded 208 species, of which 30 were fish. 26 of the species of fish caught were commercially important, the most abundant of these being bass (Brackenreed-Johnston *et al.*, 2009). A total of nine species of shrimp were caught and the rest were invertebrate taxa (Royal Haskoning, 2009). Sand gobies *Pomatoschistus* spp. and brown shrimp *Crangon crangon* were the most abundant species caught, although other species of fish were found to be common to the intertidal area including Dover sole *Solea solea*, dab *Limanda limanda*, flounder and whiting *Merlangius merlangus*. There were also a total of ten non-native species identified although these were caught in low numbers.

In a previous survey of Harwich Harbour and the Stour and Orwell estuaries a total of 32 species of crustacean and shrimp were identified, of which two were non-native; the prawn *Palaemon macrodactylus* and the Chinese mitten crab *Eriocheir sinensis* (Ashelby, 2007). This study also found that the most abundant species were brown shrimp and the shore crab *Carcinus maenas*.

Within the Stour and Orwell estuaries a similar numbers of species were found in each estuary in the beam surveys, although the Orwell showed a greater abundance of shrimp in the downstream areas compared to the Stour by a factor of six. This may be related to the presence of muddier substrate found in the Orwell which is a more favourable environment for both shrimp and sand gobies.

Pelagic trawl surveys carried out during the same period showed that there was a greater abundance of fish and shellfish as well as a greater diversity towards the mouth of the estuaries (Royal Haskoning, 2010c). The presence of sprat *Sprattus sprattus* and herring *Clupea harengus* was found to decrease during the summer months, as did the size of individuals, which suggests that the estuaries may be an important spawning area and that larger individuals move into the estuary before winter.

#### 10.2.4 Harwich Haven and sea fisheries data

The study area is located within potential fishing areas and commercial vessels are known to operate out of Harwich Pier, Felixstowe Ferry and Shotley Marina. As set out above the area is within ICES rectangle 32F1 and landings data from 2012 show that, although the fishery is mixed, throughout the year the main fish species targeted include bass, cod, herring, sole and thornback ray. Sole is caught by demersal trawls during the spring and summer whilst other gear, such as drift or trammel nets, are targeting bass and to a smaller extent mullet. Important shellfish species such as lobster and crab caught with parlour pots over the summer months is a more local inshore fishery. The most important shellfish (by weight and value) include Pacific oysters *Crassostrea gigas*, native oysters *Ostrea edulis* (a UK BAP species), lobster *Homarus homarus*, cockles *Cerastoderma edule* and whelk *Buccinum undatum*. During the winter cod is the main target using trawls nets and longlines. There are also points between the Stour and Orwell estuary systems which are important places for shore angling.

In early 2013 an epibenthic beam trawl carried out as part of the proposed Berth 9 Quay Extension project (Royal HaskoningDHV, 2013d) found a number species within the mouth of the estuary (**Table 10.1**).

**Table 10.1 Species of fish caught in the epibenthic beam trawl survey January 2013**

Common name	Scientific name
European sprat	<i>Sprattus sprattus</i>
Goby	<i>Pomatoschistus</i>
Short spined sea scorpion	<i>Myoxocephalus scorpius</i>
Brown shrimp	<i>Crangon crangon</i>
Atlantic herring	<i>Harengus clupea</i>
European flounder	<i>Platichthys flesus</i>
Five bearded rockling	<i>Ciliata mustela</i>
European plaice	<i>Pleuronectes platessa</i>
Pink shrimp	<i>Pandalus montagui</i>
Common dragonet	<i>Callionymus lyra</i>
Dover sole	<i>Solea solea</i>
Common dab	<i>Limanda limanda</i>

Source : Royal HaskoningDHV (2013d)

None of the species listed are on the OSPAR list of threatened or declining species. This study was only carried out in the winter (January) but it supported other studies in finding that, of all the species present, brown shrimp represented the most important by number compared to any of the other species. In comparison, landings data for the period 2009 to 2012 for the ICES rectangle associated with the study area (32F1) showed that sole were by far the most valuable species caught followed by cockles (refer to **Table 10.2**).

#### 10.2.5 Migratory species of fish and species of conservation interest

Common to most of the estuaries of South East England are migratory species such as sea trout *Salmo trutta*, salmon *Salmo salar* and European eel *Anguilla anguilla*. During the studies cited in this document no OSPAR species under threat or in decline were caught (apart from cod), nor were the migratory species noted above.

#### 10.2.6 Commercial fishing vessel data

VMS data is available from the MMO for UK-registered vessels over 15m and provides information on fishing effort (number of minutes of activity and kilowatt/hours) by vessels within each numbered ICES rectangle, and the value and volume of landings areas associated with the fishing effort recorded in each rectangle.

Fishing effort and landings data caught within ICES rectangle 32F1 is summarised in **Table 10.3** as part of a wider study into potential new disposal sites. In 2011 the total value obtained from this area by UK vessels sized 15m and over amounted to £246 compared to £5,258 in 2010. This equates to an approximate unit price of landed fish caught by the 15m and over fleet segment of 5.9 £/kg in 2010 and 6.2 £/kg in 2011 (HR Wallingford, 2013b).

**Table 10.3 VMS data for ICES rectangle number 32F 1-m3**

	2010	2011
Total landed value (GBP)	5,258	246
Total landed volume (tonnes)	0.886	0.04
Total fishing time (minutes)	3,862	115
Total fishing effort (Kw/H)	n/a	422

Source: HR Wallingford (2013b)

It should be noted that data from the MMO for commercial fishing activity is subject to constraints that limit its completeness as the MMO data is for vessels over 15m whereas the majority of the vessels active in the study area are vessels of 10m and under. These smaller vessels are not legally required to submit landings records under existing national or European legislation. However, sales' notes are required to be submitted by buyers of fish from fishing vessels so availability of data has increased in recent years albeit with inherent weaknesses. In addition, there is a policy of protecting data provided to the MMO by the fishing industry which leads to aggregation and suppression of data where a record relates to less than five vessels (HR Wallingford, 2013a). Therefore, there are some discrepancies between the information provided in **Table 10.2** and **10.3** but this information has been sourced from the available sources and is as accurate as possible.

**Table 10.2 Landings data of main fish and shellfish species from ICES rectangle 32F1 2009-2012**

Fish Species	2012		2011		2010		2009	
	Value (£)	Weight (tonnes)	Value (£)	Weight (tonnes)	Value (£)	Weight (tonnes)	Value (£)	Weight (tonnes)
Bass	248,399.91	27.56	187,726.32	22.00	273,411	40.0	101,391	15
Cod	112,771.26	45.5	80,758.55	44.78	156,941	88.2	128,757	101
Herring	27,749.96	61.44	5,095.24	5.96	9,595	9.7	12,003	25
Sole	1,025,562.87	149.34	1,117,559.96	142.91	1,010,421	139.4	876,190	138
Thornback ray	146,998.59	89.56	163,098.17	98.29	136,673	83.3	79,705	59
Plaice	18,049.75	11.47	17,067.39	11.67	3,681	3.4	6,129	4
Brown shrimp	24,158.50	8.15	1,699.91	1.14	11,397	6.4	-	-
Crab spp.	3,459.35	1.73	1,769.79	1.10	1,884	1.2	17	0
Cockles	689,372.00	998.44	-	-	-	-	3,098,008	728
Pacific oysters	51,791.82	50.21	63,337.98	59.02	-	-	-	-
Native oyster	5,322.00	3.11	18,762.65	31.56	44,645	12.8	38,051	10
Lobster	114,864.42	10.66	94,057.59	8.33	75,808	6.8	84,826	8
Whelk	124,605.04	182.76	15,594.52	23.18	1,961	2.9	589	0

### 10.3 Potential Impacts

The potential impacts associated with fish and commercial fisheries are outlined in **Table 10.4**. The proposed dredging operation and resulting sediment plume would potentially increase the level of suspended sediments within the water column and cause increased deposition of fine sediment in the subtidal and intertidal areas. There is potential for such sediment suspension and deposition to impact fish and shellfish species, including commercially exploited species.

There may also be changes in the hydrodynamic regime which could influence the sediment accretion and erosion patterns both within the Stour and Orwell estuaries and the wider area.

At the proposed disposal sites (IGE and IG) there may be temporary increases in the suspended sediment concentration and bedload which could impact on the fish and shellfish species in the vicinity, including commercially exploited species.

The operation of dredgers has the potential to damage any static fishing gear within the dredging and disposal areas, such as set nets and pots.

Potential impacts to commercial fishing vessel navigation are discussed in **Section 15**.

**Table 10.4 Potential impacts of the proposed scheme on fish and commercial fisheries within the study area**

Potential Impacts	
Construction	Reduced water quality due to an increase in suspended solid concentration affecting fish and shellfish, including commercially exploited species (e.g. through re-suspension of contaminants, lower dissolved oxygen)
	Impacts to sensitive species (including BAP species) through reduced water quality and smothering
	Temporary increase in suspended sediment and sedimentation affecting fish and shellfish spawning or nursery sites, including those of commercially exploited species
	Loss of habitat and food resources within the footprint of the dredged area
	Increased sediments at the disposal site affecting local habitats
	Disturbance of seabed and direct uptake of fish, shellfish and eggs
Operation	Smothering of fish and shellfish resources from suspended sediment and deposition due to maintenance dredging, including commercially exploited species
	Changes in fish habitats and the effect on spawning and nursery areas due to maintenance dredging

### 10.4 EIA Investigations

To inform the EIA process a review of existing literature will be used to define the baseline conditions based on, for example, the following sources of information:

- Stour and Orwell Management Strategy (Suffolk Coasts and Heaths Unit, 2010);

- EIFCA Fish and Shellfish Mapping (EIFCA, 2013a);
- Cefas literature on spawning and nursery sites;
- Characterisation of a new offshore disposal site (HR Wallingford, 2013a);
- Intertidal beam trawl survey results (May 2002 to February 2008);
- Pelagic trawl survey results (April 2002 to February 2008);
- Beam trawl survey results from other developments within Harwich Haven; and
- Commercial fish landings (MMO).

It is not anticipated that any further data collection will be required given the extent of information available for the study area, however, meetings with relevant authorities (Environment Agency, Natural England, EIFCA and Cefas) during the EIA phase will confirm this or establish the work required.

With respect to the potential effects on fish and shellfish it will be important to define the sphere of influence of the dredging plume and any potential increase in suspended sediment concentration and deposition. This will be assessed in relation to the areas affected and their relative importance as feeding, breeding or nursery areas. It will be important to determine if migratory species are a relevant receptor and, if so, to establish migratory routes in consultation with the Environment Agency and to determine the potential impact of increased suspended sediment on migratory patterns.

## 11 MARINE MAMMALS

### 11.1 Introduction

This section of the Scoping Report considers the marine mammals present in the Stour and Orwell estuaries and the Outer Thames Estuary. The offshore area considered for the presence of marine mammals is from Orford down to Frinton-on-Sea and extends eastward to the Shipwash Bank. Due to the highly mobile nature of marine mammals and the need for seals to haul out at coastal sites, published information covering a wider area (including the South-East and East Coast of England) has also been considered.

The description of the baseline environment has been drawn from existing literature and studies.

### 11.2 Baseline Conditions

#### 11.2.1 Introduction

Marine mammals occurring in UK waters comprise cetaceans (whales, dolphins and porpoises) and pinnipeds (true seals and eared seals).

The distribution of marine mammals throughout the southern North Sea, including off the Essex and Suffolk coast, includes eight marine mammal species that occur regularly over large areas of the North Sea:

- Mysticetes (baleen whales): Minke whale *Balaenoptera acutorostrata*.
- Odontocetes (toothed whales): Harbour porpoise *Phocoena phocoena*; bottlenose dolphin *Tursiops truncatus*, white-beaked dolphin *Lagenorhynchus albirostris*, Atlantic white-sided dolphin *Lagenorhynchus actus* and killer whale *Orcinus orca*.
- Pinnipeds: Grey seal *Halichoerus grypus* and harbour seal *Phoca vitulina*.

Other occasional visitors to the southern North Sea include sperm whale *Physeter macrocephalus*, longfinned, pilot whale *Globicephala melas* and short-beaked common dolphin *Delphinus delphis*.

To provide an overview of the marine mammals occurring in the southern North Sea and utilising the Outer Thames Estuary study area, data compiled in the Outer Thames Estuary REC Report (MALSF, 2009) has been used.

Based on data provided by Reid *et al.* (2003) and site specific surveys, the more common visitors and the species most likely to be encountered within the wider study area are the harbour porpoise, bottlenose dolphin, harbour seal and the grey seal.

A brief description of the distribution of these species is provided in the paragraphs below.

### 11.2.2 Cetacean distribution in the Outer Thames Estuary

The harbour porpoise and bottlenose dolphins are the two species of cetacean (out of a UK total of 27) present throughout the year or recorded annually within the Outer Thames Estuary REC study area (Evans, 1998).

#### *Harbour Porpoise*

The harbour porpoise is the smallest and most numerous marine mammal in north-western European shelf waters making it the most frequently sighted cetacean species in the North Sea and the most common cetacean sighted in the Outer Thames Estuary. Although species are occasionally sighted offshore, individuals are more common near the coast particularly in late summer/autumn (Reid *et al.*, 2003). It has been reported that the diet of the harbour porpoise comprises a wide variety of small fish species including small gadoids, sandeels and gobies (Hammond *et al.*, 2002).

Harbour porpoise were by far the most commonly encountered marine mammal during the Greater Gabbard Wind Farm surveys undertaken in the period April 2004 – July 2005, with 166 individuals encountered in total (GGOWL, 2005). The vast majority of harbour porpoise sightings were of single individuals; however, up to six individuals were seen at any one time, on occasions. It was noted that the average group size was 1.39 harbour porpoise and the average encounter rate (unadjusted for sea state) was 0.04 harbour porpoise individuals per km of survey.

#### *Bottlenose dolphins*

Bottlenose dolphins are observed occasionally on all coasts of the UK. The bottlenose dolphin is the only other cetacean sighted in site specific surveys in the Outer Thames Estuary area, but has been reported historically near shore in most months, particularly between April and August (Evans, 1998). The bottlenose is known to feed on a wide variety of benthic and pelagic fish (both solitary and schooling species) in addition to cephalopods and shellfish (Reid *et al.*, 2003).

Other cetaceans encountered within the Outer Thames Estuary include the white-beaked dolphin which is an occasional visitor (Canning *et al.*, 2008), and the northern bottlenose whale *Hyperoodon ampullatus*. This species entered the Outer Thames Estuary for three days during January 2006 before dying. A variety of other cetacean species (including bottlenose whale, sperm whale, Atlantic white-sided dolphin, minke whale, fin whale) occasionally strand along the English southern North Sea coast, suggesting that this species may also occasionally occur within the study area (MALSF, 2009).

### 11.2.3 Pinnipeds Distribution in the Outer Thames Estuary

Grey and harbour seals are two resident species of seal in British coastal waters.

Both species are known to occur in the Hamford Water NNR located 7.0km south of Harwich Harbour. The harbour seal breeds during the summer season in Hamford Water and grey seal can be occasionally spotted in the embayment (Natural England, 2013e).

The harbour seal is the smaller of the two pinniped species and feeds on a wide variety of prey, including sandeels, whitefish, herring, flatfish, octopus and squid, with their diet

varying seasonally from region to region (Jones *et al.*, 2004). The largest group of harbour seals along the Essex coast can be found on the haul out site located on Foulness Sands and Buxey Sands (Duck, 1998), located 40.0km south of the dredge footprint at the mouth of the River Crouch.

Grey seals do not regularly breed or haul out in the Outer Thames Estuary. They generally prefer rocky coastlines and remote islands, but they also use sandy beaches if they are suitable (ERM, 2012). Grey seal diet also varies seasonally and from region to region, but consists of sandeels, gadoids and flatfish, in that order of importance (Jones *et al.*, 2004). A very small number are occasionally seen and the closest regular haul-out sites to the proposed scheme are located on the north-east coast of Norfolk at Horsey, Scroby Sands, Norfolk and St. Margaret's at Cliffe, Kent (Duck, 1998; SCOS, 2007).

#### 11.2.4 Cetacean and pinniped distribution within the Stour and Orwell estuaries

The shallow waters of the Stour and Orwell estuaries with their extensive intertidal mud banks can be suitable habitat for seals. Previous studies (HR Wallingford, 2013b) indicated that there are no known haul out sites for seals in the Stour and Orwell estuaries. Seals occur in the estuaries (Suffolk Coast and Heaths Unit, 2009), however large numbers have not been reported (HR Wallingford, 2013b).

Small cetaceans may be found within the estuaries as harbour porpoise and bottlenose dolphins are known to frequent relatively shallow estuaries and tidal channels (IUCN, 2014). Visual sightings of harbour porpoises are reported in the Stour and Orwell estuaries as well as Harwich Harbour (Sea Watch Foundation, 2013).

### 11.3 Potential Impacts

Dredging activities have the potential to cause a number of impacts on marine mammals. These potential impacts are listed in **Table 11.1** and generally relate to the noise and vibration levels that would be generated by the dredging activities, and any impacts the scheme may have on the food resources for these species.

It is anticipated that a TSHD would be used for the proposed dredging works. The vessel is expected to generate underwater noise during dredging activities, but the sound would be limited to the period of active dredging only, and not when the TSHD departs the dredging site for the disposal site. CEDA Position Paper (CEDA, 2011), indicates that TSHDs can emit sound levels at frequencies below 500Hz which is similar to a cargo ship travelling at a modest speed. The sound frequencies produced by larger vessels (<1kHz) can overlap with the frequencies used by cetaceans, particularly dolphins and porpoises, when cavitation of the propeller occurs. Cetaceans respond by avoiding the vessel or increasing their diving times (Evans *et al.*, 1992, 1994 in EMU, 1999). The CEDA Position Paper (CEDA, 2011) stated that it is very unlikely that underwater sound from dredging operations can cause injury.

It is considered that the main potential impacts associated with noise on marine mammals would arise from the dredging vessels during the construction phase.

**Table 11.1 Potential impacts of the proposed scheme on marine mammals**

Potential Impacts	
Construction	Displacement/interruption of natural behaviour of marine mammals as a result of

Potential Impacts	
	underwater noise from the dredgers
	Increased risk of collision due to the presence of dredgers
	Impacts on habitat/prey species caused by the indirect effect of construction activities, e.g. re-suspension of sediment which may reduce the number of fish in Harwich Harbour or the offshore area
Operation	Disturbance through increased vessel activity associated with maintenance dredging

## 11.4 EIA Investigations

As part of any EIA process baseline data will be collected from a number of publicly available sources, including that collected during previous coastal and marine projects in the region (e.g. boat based surveys undertaken for offshore wind farms), and consultation will be undertaken with statutory and non-statutory consultees (including the JNCC, Natural England, the Wildlife Trusts, Cefas and the Seawatch Foundation).

The impact assessment will be undertaken using baseline data on distribution and abundance and species-specific information on marine mammal sensitivities, behaviour and habitats, an assessment will be made of the potential impact of the construction activities on marine mammals. The assessment will focus particularly on the harbour porpoise which is known to occur in the Stour and Orwell, as well as the grey and harbour seals which are regularly sighted in Hamford Water. Possible secondary impacts on marine mammals (e.g. alteration of distribution/abundance of prey species) will also be considered.

## 12 ORNITHOLOGY

### 12.1 Introduction

This section details the existing baseline for ornithology in the immediate vicinity of the proposed scheme and the surrounding area and identifies the potential impacts which may affect bird species as a result of both the construction and operation phases of the works.

### 12.2 Baseline Conditions

#### 12.2.1 Designated sites

The area of works is located approximately 0.1km from the Stour and Orwell Estuaries SPA and Ramsar site, and the Orwell Estuary SSSI. This area is internationally designated for its overwintering wildfowl and wader species, including black-tailed godwit, dunlin, grey plover, redshank, pintail, shelduck, ringed plover and turnstone. The site is also designated as an SPA for its overwintering population of hen harrier. Further detail on these designations is presented in **Section 5**.

Hamford Water SPA, Ramsar site and SSSI are located approximately 3.1km from the area of works. This site supports breeding little tern and overwintering bird species such as golden plover, avocet, ruff, black-tailed godwit, dark bellied Brent goose, grey plover, ringed plover and teal. Further information is provided in **Section 5**.

The Outer Thames Estuary SPA is located approximately 0.1km from the area of the proposed dredging works, 9.4km from the IG disposal site and 12.1km from the IGE disposal site. This site is internationally designated due to the number of red throated diver it supports.

Landguard Common SSSI, located under 1.0km from the area of works supports nationally significant numbers of breeding little tern and ringed plover. The site is also a Local Nature Reserve (see **Section 5.7.1**) due to the presence of migrating birds such as wheatear, purple sandpiper and snow bunting.

The Stour Estuary is also partly an RSPB Reserve due to the waterfowl species the estuary supports, as well as the passerine species present in the surrounding woods.

#### 12.2.2 SPA high water counts

High water counts are undertaken on the Stour and Orwell estuaries as part of the Wetland Bird Survey (WeBS)<sup>1</sup>. The scheme has a long-running data set, with the most recent information available for surveys undertaken in 2010/11. The number of birds recorded on the Stour has been increasing since 2006/07, with almost 20,000 more birds recorded in 2009/10 than in 2005/06. However, the number of birds shows a sharp decline from the winter of 2009/10 to 2010/11. It should be noted that there is some uncertainty regarding how the 2009/10 data has been calculated by the BTO. This was discussed at the 2012 Regulator Group annual meeting and it was felt that the waterbird population could have been significantly overestimated for 2009/10.

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<sup>1</sup> WeBS is a scheme run by the British Trust for Ornithology (BTO), The Wildfowl & Wetlands Trust, the Royal Society for the Protection of Birds and the Joint Nature Conservation Committee

The trend in the Orwell Estuary seems to be relatively stable with little fluctuation between years. The number of birds recorded in 2010/11 was lower than that recorded in the previous four winters (although very similar to the winter of 2007/08).

### 12.2.3 WeBS Alerts

The WeBS Alerts System was developed to provide a standardised method of identifying the direction and magnitude of changes in bird population numbers. Species that have undergone significant changes in numbers can then be flagged by issuing an alert. The alerts are reviewed every three years. The last evaluation period for the Stour and Orwell estuaries was 2007/08. Discussion with the BTO has confirmed that the new WeBS Alerts data was published in March 2013 (Chas Holt, BTO, *pers. comm.*). This data will be purchased from the BTO for the EIA.

In the 2007/2008 evaluation period the only alerts triggered for the short-term period were for 3 species – goldeneye, grey plover and black-tailed godwit. In addition, two species (cormorant and dunlin) were considered to have natural fluctuations which would have, under normal circumstances, led to an alert. Alerts were recorded for 10 species in total over the medium term (10 years). In the longer term (25 years) only 2 alerts have been triggered (cormorant and dunlin), and many species have shown medium or high increases over this period (see **Table 12.1**).

**Table 12.1 Wetland Bird Survey Alerts (to winter 2007/08 inclusive) (BTO)**

Species	Alert status for SPA suite GB			Alert status for Stour and Orwell SPA			
	Short term (5yr)	Medium term (10yr)	Long term (25yr)	Short term (5yr)	Medium term (10yr)	Long term (25yr)	Since design. 1994
Dark bellied Brent goose	o	o	+	o	o	++	o
Shelduck	o	o	o	o	-	o	-
Wigeon	o	o	+	o	o	+	-
Pintail	o	o	o	o	(-)	(+)	(-)
Goldeneye	o	-	o	-	-	+	-
Great crested grebe	o	o	+	o	-	+	-
Cormorant	o	o	+	(-)	-	--	-
Oystercatcher	o	o	o	o	o	++	o
Ringed plover	o	-	o	(+)	o	o	-
Grey plover	o	-	+	-	-	++	-
Lapwing	o	o	++	o	-	++	--
Knot	o	o	o	o	+	++	+
Dunlin	o	-	-	(-)	--	-	--

Species	Alert status for SPA suite GB			Alert status for Stour and Orwell SPA			
	Short term (5yr)	Medium term (10yr)	Long term (25yr)	Short term (5yr)	Medium term (10yr)	Long term (25yr)	Since design. 1994
Black-tailed godwit	o	+	++	-	---	++	-
Curlew	o	o	+	o	o	+	o
Redshank	o	o	o	o	-	o	-
Turnstone	o	o	o	o	o	+	o

Key: - medium alert, -- high alert, + medium increase, ++ high increase, o no substantial change, ( ) indicate species prone to natural fluctuations in numbers

#### 12.2.4 Low water counts

**Table 12.2** summarises the increases and decreases in the mean and peak numbers of waterbird species on the Orwell, Stour and for the whole SPA for the period 1999/2000 to 2011/2012.

**Table 12.2** Increases (+) or decreases (-) in the mean and peak numbers of species on the Orwell, Stour and SPA 1999/2000 to 2011/2012 (Significant trends are shown by + (increase) or - (decrease) where + / - P = 0.05-0.01 indicating a weak change in trend, ++/ -- P = 0.01-0.001 indicating a strong change in trend, and +++/ --- P < 0.001 indicating a very strong change in trend)<sup>2</sup> (SWT, 2012)

	Mean numbers			Peak numbers		
	Orwell	Stour	SPA	Orwell	Stour	SPA
Brent goose		+				
Shelduck	++			+		
Wigeon	-			-		
Pintail		-	-		-	--
Oystercatcher						
Ringed plover	-		-	--		--
Grey plover		-	-			-
Lapwing						
Knot						
Dunlin		++	+			
Black-tailed godwit	+	--	-	+	-	-
Curlew	-		-	-		-

<sup>2</sup> The number of + and - indicates the strength (consistency) of the trend rather than the magnitude of the increase or decrease in mean and peak numbers

	Mean numbers			Peak numbers		
	Orwell	Stour	SPA	Orwell	Stour	SPA
Redshank		--	---	-	-	---
Turnstone		+				

Six species now show significant declines in the SPA since 1999/2000. These declines are evident in both the mean and peak numbers of all six species. The other eight species show no significant trend (i.e. there is relative stability in numbers).

### 12.3 Potential Impacts

The proposed works have the potential to impact on the bird species using the surrounding area in a variety of ways. There is the potential for direct disturbance due to increased noise and vessel movement during both construction and operation, and the potential for indirect impacts as a result of the possible effects of hydrodynamic changes associated with the dredging on food resources. The potential impacts on bird species are listed below in **Table 12.3**.

**Table 12.3 Potential impacts of the proposed scheme on ornithology within the study area**

Potential Impacts	
Construction	Disturbance to birds through noisy activities
	Disturbance to birds through increased /vessel movements
	Changes to intertidal food resources due to impacts on intertidal fauna and flora as a result of sediment release during dredging
Operation	Potential changes in exposure of intertidal areas due to the effect on tidal propagation
	Potential changes in sediment transport and erosion/accretion patterns, with potential implications for the food resource
	Disturbance through increased vessel activity associated with maintenance dredging

### 12.4 EIA Investigations

There is currently a large amount of information available on the bird species which use the Stour and Orwell estuaries and Hamford Water, including WeBS and low water count data. In addition, information is available on the Outer Thames Estuary SAC and the key bird species relating to this site.

Further consultation with key conservation bodies such as the BTO, Natural England and RSPB will be undertaken to gather additional information on the area of works. The existing data together with any further data gathered in consultation will be used to provide a comprehensive baseline data set for the assessment any potential impacts on the ornithological interest of the study area.

## **13 TERRESTRIAL ECOLOGY**

### **13.1 Introduction**

This section of the Scoping Report considers the potential impacts of the proposed works on terrestrial ecology. This section does not cover ornithology as this has been considered in **Section 12** and marine ecology has been considered in **Section 9**.

As described in **Sections 1** and **2**, the works would entail the capital dredging of the approach channel to Harwich Haven and disposal of the material offshore (if no suitable use for the material can be found). No work would take place in the intertidal or terrestrial environment.

The dredgers would arrive by sea with a full complement of crew. Some use of shore-side facilities may be required for the crew but this would be extremely limited and would be fully expected to be limited to the existing built up environment surrounding Harwich and Felixstowe (including existing roads and car parking).

Hence this assessment has focused on the nature conservation sites described in **Section 5** that have terrestrial ecological interest.

### **13.2 Baseline Conditions**

There are a number of international and national statutory and non-statutory nature conservation designations in the vicinity of the works. These have been described in **Section 5**.

### **13.3 Potential Impacts**

The capital dredging works would take place in the subtidal within the Harwich Haven Approach Channel and disposal would be to an offshore disposal site. No terrestrial uses are currently foreseen. None of the works would take place in the terrestrial or intertidal environment, therefore, no direct impacts upon any terrestrial habitats or species during the capital dredging and disposal activities are anticipated (excepting birds which are covered separately).

The potential exists for the dredger crews to use shore-side facilities during the dredging operations but it is anticipated that only existing facilities would be used and the amount of increased activity would be so low as to be unnoticeable in comparison to normal background levels of activity in busy port areas such as Felixstowe and Harwich. Facilities such as bed and breakfast accommodation, car-parking and road usage would be within already built up areas or along established road networks. No indirect impacts on terrestrial habitats or species are therefore anticipated.

Any future maintenance dredging requirements would also take place in the subtidal environment and therefore no impacts on the terrestrial environment are anticipated during the operational phase of the project.

**Table 13.1**      **Potential impacts of the proposed works on terrestrial ecology within the study area**

Potential Impacts	
Construction	No impacts identified
Operation	No impacts identified

## 13.4 EIA Investigations

No significant potential impacts have been identified during the construction or operation phases. No further terrestrial surveys or studies are considered necessary and it is proposed that terrestrial ecology is scoped out of any further assessment.

## **14 LANDSCAPE AND VISUAL ENVIRONMENT**

### **14.1 Introduction**

This section considers the landscape and visual impacts associated with the proposed scheme. The study area for the assessment of landscape and visual aspects includes the Stour and Orwell estuaries, the coastline around Harwich and Felixstowe and the adjacent seascape.

### **14.2 Baseline Conditions**

#### **14.2.1 Waterfront of Harwich and Felixstowe**

The landscape character of the mouth of the Orwell and Stour estuaries is mostly industrial with the presence of quays, dockyards and a container terminal built on the eastern side of the channel adjacent to Felixstowe Docks. Felixstowe is the largest container port in the country.

The local landscape around Harwich town is predominantly built up and consists of the coast of Harwich beach, breakwaters, parks and vegetated areas such as Beacon Hill, the Maritime Museum and the coastal footpath of Harwich with the lighthouse.

Overall, the built environment in the immediate vicinity of the proposed works is dominated by maritime use. The land around the study area is relatively low lying and flat. Harwich Town frontage and Shotley Point have a direct line of sight to the cranes of Felixstowe Dock and the Trinity Container Terminal.

Landguard Point, formerly a military site, is also a relatively low lying and flat peninsula with shingle beach and associated flora and fauna. However, this part of the study area has primarily an urban landscape typology (Suffolk County Council, 2013).

The landscape character along the Stour and Orwell estuaries is largely rural agricultural and land interspersed with farm building and small areas of residential dwellings.

Overall, the main visual receptors that could be impacted by the proposed works are as follows:

- residential areas;
- public and private recreational open space (including tourists);
- business users (including ports, docks and container terminals); and
- recreational and commercial (and waterborne) users of the harbour.

#### **14.2.2 Landscape designations**

The banks of the River Orwell and the north side of the River Stour lie within the Suffolk Coast and Heaths AONB, designated in 1970 (see **Section 5.5.2**). The landscape importance of AONBs is on a par with National Parks (Suffolk Coastal and Heath Units, 2003).

The proposed scheme is located within the AONB, which comprises coastal and marine habitats at the mouth the Stour and Orwell estuaries.

### 14.3 Potential Impacts

The construction and operational phases of the project have the potential to have an impact on the landscape character of the mouth of the Stour and Orwell estuaries and visual receptors along the coastline, as set out below in **Table 14.1**. However, it is anticipated that impacts would be temporary and localised.

**Table 14.1 Potential impacts of the proposed scheme on landscape and visual receptors within the study area**

Potential Impacts	
Construction	Disturbance due to the dredger on visual receptors along the coastline
Operation	Disturbance to receptors during maintenance dredging

### 14.4 EIA Investigations

The dredging activities would be conducted in the approach channel, which is a busy shipping area where dredging vessels are a regular occurrence. It is not therefore considered that a landscape and visual assessment is necessary and it is proposed that this topic is scoped out of any further assessment.

## 15 COMMERCIAL AND RECREATIONAL NAVIGATION

### 15.1 Introduction

This section describes commercial and recreational navigation within the vicinity of the proposed dredge area and the wider Harwich Haven and identifies the potential impacts of the dredge on navigation during the construction and operational phases of the proposed scheme.

The study area for navigation includes the dredge footprint and surrounding area, including the mouth of the River Orwell, Harwich Harbour and the coastal and offshore waters in the vicinity of the approach channel and the proposed disposal ground.

### 15.2 Baseline Conditions

#### 15.2.1 Commercial navigation

Harwich Harbour is a naturally formed harbour located at the confluence of the River Orwell and the River Stour and sheltered by the Landguard Peninsula. The ports' industry at Harwich and Felixstowe is of great regional and national importance and the harbour and its approach channel are important areas for commercial navigation.

The Haven handles over 40% of the UK's deep sea container traffic and a substantial volume of cruise, ferry and roll-on roll-off (RoRo) freight business (HHA, 2013b). Vessel traffic in the Harwich Haven includes some of the world's largest container ships.

**Table 15.1** provides annual vessel arrival and departure numbers for Harwich Haven during the period 2008-2012. These figures illustrate the high shipping densities within Harwich Haven and the approach channel. During the period 2008-2012 traffic levels peaked in 2009, with over 9500 vessel arrivals.

**Table 15.1 Annual vessel arrivals and departures to and from Harwich Haven 2008-2012**

Year	Arrivals	Departures
2008	8006	7925
2009	9691	9584
2010	9416	9311
2011	7425	7361
2012	7092	7048

Source: HHA, 2013c

Currently, HHA undertakes maintenance dredging of the harbour and approach channel using ploughs and TSHDs. The areas around Harwich International Port, Harwich Navyard, Trinity House Pier, Navigation House Jetty and some sections of the deep water channel are maintained by plough dredging. Dredging at the Port of Felixstowe is carried out by HHA at approximately 10 to 12 week intervals, as part of the regular major dredging sessions, with the main areas dredged by TSHD.

### 15.2.2 The Port of Felixstowe

The Port of Felixstowe is Britain's busiest container port and one of the largest in Europe. There are 33 shipping lines operating through the port, providing 90 services a week across all continents. The port handles more than 3.4 million TEUs and over 4,000 vessels per year (Port of Felixstowe, 2013).

The Port of Felixstowe's container operations are split between Trinity Terminal, which operates Berths 1-7, and Berths 8 and 9 which can accommodate the world's largest container vessels. Felixstowe also operates Ro-Ro cargo operations which are centred on Berths 3 and 4.

### 15.2.3 Harwich International Port

Harwich International Port (HIP) is located on the southern shore of the Stour estuary. The port operates 24 hours a day, seven days a week, and its main markets are passenger and freight ferry. Stena Line operates daily passenger services between HIP and the Hook of Holland and DFDS Seaways make three to four weekly crossings from HIP to Esbjerg, Denmark (HIP, 2013a).

Other activities at the port include;

- RoRo - with over 35 weekly connections to the Netherlands and Denmark;
- cruise ship port with destinations including Scandinavia, the Baltic, the Mediterranean and the United States;
- container/general cargo – two ship-to-shore cranes serve the container/general cargo berth, which can accommodate vessels up to 320m in length and a maximum draft of 9.5m;
- liquid bulk – Petrochem Carless Ltd operate a refinery adjacent to HIP and import feedstock from around the world to refine at the site; and
- dry bulk – HIP handles dry bulk including grain, cement and animal feedstuffs.

The port is also involved in the offshore renewables sector, having acted as an installation base for the Gunfleet Sands offshore wind farm and hosting the Greater Gabbard offshore wind project (HIP, 2013b).

### 15.2.4 ABP Ipswich

The Port of Ipswich is located at the head of the River Orwell, 19.3km from the open sea. ABP Ipswich handles approximately 3 million tonnes of aggregates, grain, animal feed, fertilisers, and cement each year and covers a total area of 275 acres (ABP, 2014).

Other activities at the port include;

- Forest products: Ipswich handles around 200,000 cu m per annum of various timber products from Scandinavia and the Baltic States;
- General cargo;

- The port offers three sailings per month to and from the Caribbean, and a monthly sailing to Famagusta (Cyprus); and
- RoRo: The port's RoRo facilities are located at the West Bank Terminal.

#### 15.2.5 Port of Mistley

The Port of Mistley is located on the south bank of the River Stour, approximately 10 miles from Harwich. The port handles a wide range of cargoes, including; bulk products (grain, fertiliser and agri-products, aggregates, industrial minerals, and recyclables), forest products, granite, steel products, metals, and various bagged, palletised and unitised cargoes (TWL, 2014). The port provides links to Europe, the Baltic and Scandinavia as well as to London, the Midlands and the North.

#### 15.2.6 Trinity House Berths

The Trinity House Depot has been in Harwich since 1812 and has been the operational headquarters for England and Wales since 1940. Trinity House is responsible for lights and buoys. The current buildings were constructed in 2005 at the same time as the new Buoy Yard was constructed in George Street. Lightships are frequently moored in the harbour whilst they are being serviced by the depot.

#### 15.2.7 Harwich Harbour Foot Ferry

A small ferry service for foot passengers runs between Harwich, Felixstowe and Shotley. The ferry operates daily services during Easter then weekends only between Easter and 5<sup>th</sup> May. Daily services then run from 6<sup>th</sup> May to 9<sup>th</sup> September before reverting to weekend services only from 14<sup>th</sup> September to 29<sup>th</sup> September (Harwich Harbour Foot Ferry, 2013). The ferry can carry a maximum of 12 passengers.

#### 15.2.8 Commercial fisheries

The MMO's UK commercial fishing vessel records list 32 vessels in the <10m length class with a home port of Harwich or Felixstowe. One vessel over 10m in length is listed at Harwich (MMO, 2013b). The rivers Deben, Stour and Orwell are fished for shrimps, sole and eels (EIFCA, 2013b). The EIFCA reports that the hamlet of Felixstowe Ferry, located at the mouth of the River Deben to the north-east of Harwich, has an active fishing fleet (EIFCA, 2013b). The EIFCA Fisheries Mapping Project shows that there are fishing grounds for numerous commercially exploited species which overlap, or are in close proximity to the proposed dredge area (EIFCA, 2013c).

#### 15.2.9 Recreational navigation

Recreational navigation is popular within the Stour and Orwell estuaries. A number of marinas are located in the Orwell estuary, providing berthing opportunities and other facilities for recreational vessels.

Shotley Marina is located at the confluence of the Rivers Orwell and Stour. It has 350 berths and offers sea-based Royal Yachting Association (RYA) courses and yacht charters. Suffolk Yacht Harbour, located on the River Orwell approximately 4.0km upstream from Harwich Harbour has 550 berths and additional swinging moorings. A number of smaller marinas are located on the River Orwell upstream towards, and within Ipswich, including Woolverstone, Neptune, Fox's and Ipswich Haven Marinas.

#### 15.2.10 Angling vessels

Charter angling is an important local industry in the study area (refer to **Section 20**) with a number of charter angling businesses operating in the vicinity of the Shipwash Bank including those originating from Felixstowe Ferry, Levington Marina (Suffolk Harbour Yacht Club), Shotley Marina, and to a lesser extent Clacton (HR Wallingford, 2013b). Discussions undertaken as part of the characterisation of the disposal ground indicated that up to 14 charter angling businesses are likely to frequent fishing grounds in the area surrounding the proposed disposal site (HR Wallingford, 2013b), i.e. to the west of the existing IG disposal site. The fishing grounds are used year-round and present good catches for cod, bass and skate. The peak angling season runs from April to August/September (HR Wallingford, 2013b).

Recreational anglers typically use personal boats under 5m in length or undertake beach angling (HR Wallingford, 2013b). Most operate rod and line gear with bait and there are a number of recreational sea angling clubs in the area including the Felixstowe Sea Angling Society, Suffolk Beach Anglers, and Colchester Sea Angling Club. Refer to **Section 20** on tourism and recreation.

#### 15.2.11 Anchorage areas

Within the study area there are a number of anchorages used by commercial vessels. These areas are indicated in **Table 15.2** and the locations are illustrated in **Figure 23.1**.

**Table 15.2 Anchorage areas located within the vicinity of the study area**

Anchorage areas	Distance from dredge area (km)	Distance from closest disposal site (km)	Scoped in?
Cork	0.8	22.7	Yes
Sunk DW	5.5	4.5	Yes
Sunk Inner	3.0	16.1	Yes
Bawdsey	0.8	17.4	Yes

### 15.3 Potential Impacts

The potential impacts on commercial and recreational navigation are listed in **Table 15.3**.

Harwich Haven and its approach channel are in constant use and are among the busiest shipping areas in Europe. Due to the high shipping densities within the area there is potential for interaction and conflict between dredgers and commercial vessels during the construction phase. Interactions and conflicts between dredgers and other vessels have the potential to result in commercial losses to local businesses, including the ports and marinas.

There is also potential for the dredging activities to disrupt the Harwich Harbour Foot Ferry Service as it runs between Harwich, Felixstowe and Shotley and potential for conflict between the dredgers and recreational users of the harbour. HHA is responsible for managing navigation issues, therefore any potential conflicts regarding navigation would be managed through standard procedures.

Commercial fishing vessels operate from the ports of Harwich and Felixstowe and from Felixstowe Ferry. There is potential for interactions and conflicts between dredgers and fishing vessels and disruption to fishing activity. These interactions could include interference with established trawling lanes, reduced access to fishing grounds, reduction in catches and income, and increased fishing pressure on areas adjacent to the dredging area. There is also potential for the dredging activity to expose bedrock features, which may snag trawls, and to change sea-bed topography resulting in the loss of fishing 'marks'.

There is also the beneficial impact for commercial shipping due to the increased accessibility to the berths due to the deepened approach channel.

During the operational phase there is potential for impacts to commercial and recreational navigation through changes to current speeds and possible conflicts due to changes to the existing maintenance dredging regime (should changes be required).

**Table 15.3 Potential impacts of the proposed scheme on commercial and recreational navigation within the study area**

Potential Impacts	
Construction	Conflict with commercial and recreational navigation due to dredging and disposal operations
	Disruption to Harwich Harbour Foot Ferry Service
	Dredger vessel operations could cause interference with established trawl lanes, and fishing vessel operation
	Reduction in catches and resultant incomes (on UK and International fishermen)
	Potential 'squeeze effect' on adjacent areas (increased fishing pressures)
	Exposure of bedrock features (fasteners) which may snag trawl gear
	Changes to sea-bed topography (loss of fishing 'marks')
	Presence of dredgers in the approach channel, in transit to and from the disposal site and at the disposal site with regard to use of anchorage area.
Operation	Possible effects on navigation through changes to current speeds, particularly in harbour entrance
	Possible conflict due to change in the maintenance dredging regime
	Changes to maintenance dredging operations could interfere with established trawl lanes, and fishing vessel operations

## 15.4 EIA Investigations

In order to limit the potential for the proposed works to conflict with the existing heavy navigational use of Harwich Haven and the approach channel, it will be vital to maintain discussions with the relevant bodies, in particular with the Port of Felixstowe, HIP, ABP Ipswich, Port of Mistley, Trinity House and the local Harwich Harbour Foot Ferry Operator. In addition to these organisations there are several other groups that have an

interest in commercial navigation issues, including the commercial fishing industry which is considered in **Section 10**.

In terms of recreational navigation, it will be important to identify the key organisations that are likely to be affected by the proposals and to undertake consultation to identify the main issues and to suggest possible mitigation.

To identify the scale of any impact on commercial and recreational navigation it will be necessary to define:

- the programme for the capital dredging works in the harbour and the approach channel;
- the potential locations for use or offshore disposal of dredged material;
- the methods by which details of the proposed works can be communicated to harbour and approach channel users to maintain navigational safety.

As HHA already manages and undertakes maintenance dredging of the approach channel and Harwich Harbour, it is expected that any conflicts between the users of the River Orwell, Harwich Harbour and the approach channel should be able to be resolved through targeted consultation and careful planning.

## **16 TRAFFIC AND ACCESS**

### **16.1 Introduction**

This section describes the proposed methodology to assess the effects of the project on traffic and access. This section considers the predicted traffic and access implications of the proposed scheme and the requirement for Transport Assessment.

### **16.2 Baseline Conditions**

A review of the study area has been undertaken; including consideration of the following desk based information sources:

- Department for Transport - <http://www.dft.gov.uk/traffic-counts>;
- Harwich International Port - <http://www.harwich.co.uk>;
- Port of Felixstowe - <http://www.portoffelixstowe.co.uk>;
- Sustrans - <http://www.sustrans.org.uk>;
- Suffolk County Council - <http://www.suffolk.gov.uk>; and
- Essex County Council - <http://www.essex.gov.uk>.

For the purpose of this section the proposed study area encompasses the following identified routes and the associated transport users and immediate community:

- A14 from its terminus with the A154 at Felixstowe Dock Gate 1 to its junction with the A12 east of Ipswich;
- A154 (Walton Avenue/Trinity Avenue) from its junction with Felixstowe Dock Gate 1 to its junction with A14;
- A120 from Harwich to its junction with the A133;
- A136 Station Road from its junction with the A120 to Harwich International; and
- Rail links from Ipswich and Manningtree to Harwich and Felixstowe.

The River Stour and River Orwell form a natural divide between Felixstowe (including the Port of Felixstowe) to the north and Harwich (including Harwich International Port, Harwich Navyard and Trinity House) to the south.

The main roads serving Harwich and Felixstowe are the A120 and A14 respectively. These roads play an important national function in the movement of freight and passengers between the respective ports and the wider highway network.

The A14 Port of Felixstowe Road is a dual carriageway road subject to the national speed limit with Annual Average Daily Traffic (AADT) flows of 17,164<sup>3</sup> vehicles, of which almost a quarter (23.7%) are HGV movements.

The A154 Walton Avenue which carries up to 7,303<sup>4</sup> vehicles AADT meets the A14 at the Dock Gate 1 roundabout and links to the A154 Trinity Avenue at the Dock Gate 2

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<sup>3</sup> Data sourced from the DfT matrix website for the latest year (2012), count point ID: 36496

<sup>4</sup> Data sourced from the DfT matrix website for the latest year (2012), count point ID: 80990

roundabout as well as providing access to the majority of the storage yards for containers outside of the terminals.

The A14 Port of Felixstowe Road links to the wider highway network at the Dock Spur junction. The Dock Spur junction provides links to the A14 to the west and the A154 Candlet Road to the east, which is the main link to the town of Felixstowe.

The major junctions from Dock Spur junction to the Copdock interchange are all separated depending on the grade of the road. Capacity and safety improvements at both the Copdock and Dock Spur junctions were completed in November 2011.

In the immediate vicinity of Harwich, the A120 is a single carriageway road subject to the national speed limit until its intersection with the A133 where it becomes a dual carriageway. The A120 immediately to the east of Harwich experiences traffic flows of 7,368<sup>5</sup> AADT of which 13.7% are HGV movements.

The major junctions on the A120 within the study area are predominantly at grade roundabouts.

The A136 Station Road meets the A120 at the St Nicolas Roundabout and carries 3,379<sup>6</sup> vehicles AADT. The A136 provides access to the Port of Harwich and the majority of the storage yards for containers outside of the terminal.

Both Felixstowe and Harwich have an extensive bus network connecting the ports and towns to the local and wider area and are on 'National Cycle Route 51' which connects the towns and port areas.

Felixstowe and Harwich have branch rail lines from Ipswich and Manningtree respectively, serving both the towns and ports. Felixstowe station has an hourly service to Ipswich whilst Harwich (Harwich Town, Dovercourt and Harwich International stations) has an hourly service to Manningtree. From Ipswich and Manningtree passengers can make connections to the wider rail network.

With the opening of the new 'North Rail Terminal' in June the Port of Felixstowe has three rail freight terminals whilst the Port of Harwich benefits from a dedicated passenger station (Harwich International) and an intermodal rail head.

## **16.3 Potential Impacts**

### **16.3.1 Introduction**

The principle guidelines for the assessment of the environmental impacts of road traffic associated with new developments are the 'Guidelines for the Environmental Assessment of Road Traffic' (GEART) published by the Institute of Environmental Assessment in January 1993. The guidance provides a framework for the assessment of traffic borne environmental impacts, such as pedestrian severance and amenity, driver delay, accidents and safety; and noise, vibration and air quality.

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<sup>5</sup> Data sourced from the DfT matrix website for the latest year (2012), count point ID: 47951

<sup>6</sup> Data sourced from the DfT matrix website for the latest year (2012), count point ID: 17869

GEART suggests the following rules to define the extent and scale of the assessment required:

- Rule 1: Include highway links where traffic flows are predicted to increase by more than 30% (or where the number of HGVs is predicted to increase by more than 30%).
- Rule 2: Include any other specifically sensitive areas where traffic flows are predicted to increase by 10% or more.

In addition to GEART the 'Guidance on Transport Assessment' (GTA) published by the Department for Transport in March 2007 provides more detailed guidance for the assessment of some impacts (e.g. driver delay and accidents and safety). Appendix B of the GTA provides indicative thresholds for where formal Transport Assessment (a Transport Statement) may be required, namely:

- any development generating 30 or more two-way vehicle movements in any hour; and
- any development generating 100 or more two-way vehicle movement per day.

#### 16.3.2 Traffic demand - construction phase

**Section 2.1** outlines that the construction phase of the proposed scheme would comprise the dredging of the approach channel and the associated disposal of the dredged material. The dredging activity is likely to be undertaken by means of a TSHD and take place for approximately one to two years. At this stage it is considered that the dredged material would either be disposed of at sea or used elsewhere.

It is not envisaged that a dredging company would be appointed until after determination of the Marine Licence application and, as such, at this stage it is not known where the dredging ship and crew would come from. However, it is likely that the ship's crew would either live on board or in temporary accommodation close to the associated port. Consequently the traffic impact would be indiscernible.

It is considered that the option to dispose of dredged material at sea would have no onshore traffic and access impact. However, the use of dredged material for onshore construction activities or, say, habitat enhancement could have a traffic impact. To offload the dredged material for onward transportation or use at the coast could require specialist port facilities or material transfer. However such activities would be either covered by existing permissions or would need to be consented through a separate application.

#### 16.3.3 Traffic demand - operation phase

**Section 2.2** outlines that, upon completion of the construction phase, there would be a requirement for continued maintenance dredging to maintain the depth of the navigational channel. Currently HHA undertakes maintenance dredging activities at 10 to 12 week intervals, with dredged material being disposed of at sea. Following completion of the construction phase it is not envisaged that the frequency of dredging activities would increase above that currently being undertaken. There are no traffic implications associated with maintenance dredging.

The deepening of the channel would permit larger ships to enter the Haven Ports on a wider range of tidal heights as a consequence of the increased channel depth. These ships are likely to be able to hold more containers per ship, however, the size of the quayside and handling capacity of the Haven Ports would remain unchanged (beyond their existing consented extent).

Therefore, whilst the ports would be able to accommodate larger ships the throughput transferring onto the surrounding road and rail network would not increase above the permitted throughput for each port. Therefore it is likely that, upon completion of the project, there would be fewer ships visiting each port but each of the ships would be able to carry more, within the consented capacity of the Haven Ports.

#### **16.4 EIA Investigations**

The peak volume of construction traffic would be significantly less than the GEART screening thresholds and GTA indicative thresholds for Transport Assessment, whilst operational traffic would not increase above that currently permitted. No Transport Assessment is therefore proposed.

In addition, traffic borne environmental impacts as detailed by GEART (noise, vibration and air quality) have been scoped out of the EIA. Confirmation that the MMO are in agreement with this approach is now sought.

Further information on traffic elements is provided in **Section 2.2.2**

## **17 AIR QUALITY**

### **17.1 Introduction**

This section of the scoping report characterises the existing air quality in the study area, describes the potential impacts of the proposed approach channel deepening works on local air quality, and outlines the issues which will need to be considered within the ES.

The National Planning Policy Framework (Department for Communities and Local Government (DCLG), 2012) refers to the Local Air Quality Management (LAQM) process and recognises that “...planning policies should sustain compliance with and contribute towards EU limit values or national Objectives for pollutants, taking into account the presence of Air Quality Management Areas (AQMA) and the cumulative impacts on air quality from individual sites in local areas.”

The National Planning Policy Framework identifies that planning departments of local planning authorities should maintain consistency within the LAQM process and states that, “...planning decisions should ensure that any new development in AQMA is consistent with the local air quality action plan.”

### **17.2 Baseline Conditions**

#### **17.2.1 Sensitive receptors**

There are a number of designated sites in close proximity to the proposed channel deepening area which may be considered sensitive because of their ecological importance, and which may be affected by gaseous and particulate pollutants and by the deposition of those pollutants onto surfaces. These designated sites are detailed in **Table 5.1**.

There are a number of human receptors in residential developments located along the Harwich peninsula and in close proximity to the Port of Felixstowe.

#### **17.2.2 Local Air Quality Management**

The study area is located within the jurisdictions of SCDC and Tendring District Council (TDC). The local authorities have a statutory duty (under the Environment Act 1995) to periodically review air quality in their respective areas.

Within the study area there is one AQMA designated by SCDC due to exceedances of the UK Government’s prescribed objectives for annual mean Nitrogen Dioxide (NO<sub>2</sub>). The AQMA covers an area immediately surrounding the Dooley Inn, along Ferry Lane, Felixstowe.

A review of the 2012 Updating and Screening Assessment (USA) published by SCDC concluded that the respective air quality objectives were likely to be achieved within the Council area in respect of all pollutants except nitrogen dioxide (NO<sub>2</sub>) (which continues to exceed the annual mean objective within its designated AQMA). 2011 monitoring results from diffusion tubes situated in Felixstowe are presented in **Table 17.1**.

**Table 17.1      2011 Annual mean NO<sub>2</sub> diffusion tube monitoring results from sites in Felixstowe**

Diffusion Tube ID	NO <sub>2</sub> Annual Mean (µg.m <sup>-3</sup> )
	2011
FLX 26a,b,c	40
FLX 27a,b,c	36
FLX 32a,b,c	37
FLX 33	66
FLX 34	51
FLX 35	48
FLX 36	41
FLX 37	48
FLX 38	39

A review of the 2012 USA published by TDC concluded that the respective air quality objectives were likely to be achieved within the Council area in respect of all pollutants.

### 17.2.3 Existing sources of atmospheric pollution

Existing sources of air pollution in the study area include marine vessels, road transport and rail transport. The main pollutants of concern from these emission sources are likely to be those relating to fuel combustion, such as NO<sub>2</sub>, Sulphur Dioxide (SO<sub>2</sub>), Carbon Monoxide (CO) and Particulate Matter (PM<sub>10</sub>).

The majority of larger particulates and dust in the study area are likely to be formed through mechanical generation, for example from wear of vehicle tyres and brakes, and re-suspension of settled materials due to road transport. In coastal locations a proportion of airborne particles are typically from sea salt.

## 17.3 Potential Impacts

### 17.3.1 Potential impacts during construction

As part of the channel deepening works, capital dredging is likely to be undertaken by two TSHDs, each with a hopper capacity of 10,000m<sup>3</sup> to 17,000 m<sup>3</sup>. Capital dredging is anticipated to be undertaken 24 hours per day, over a period of up to two years. However, the proposed dredging timetable has not yet been finalised.

Engine exhaust emissions from marine vessels involved in capital dredging works have the potential to affect local air quality; sources include both propulsion engines and auxiliary power which is particularly significant for dredging vessels. The main pollutants of concern from these emissions are likely to be those relating to fuel combustion (such as NO<sub>2</sub>, SO<sub>2</sub>, CO and PM<sub>10</sub>).

The decomposition of biological material in an anaerobic environment, such as the seabed, can produce odorous gases such as hydrogen sulphide. Dredging activities

can release these gases and produce odorous emissions. These emissions may cause concern at local residences should the emissions be sufficiently close to land for the odours to be detectable.

Fugitive particulate and aerosol emissions may occur from construction activities, for example during disposal/placement of dredged material. These emissions have the potential to cause nuisance to, and soiling of, sensitive receptors. The potential for sensitive receptors to be impacted would vary depending on where the activity takes place, the nature of the activity and controls, and meteorological dispersion conditions.

#### 17.3.2 Potential impacts during operation

It is likely that the dredging required in order to maintain the deepened approach channel would be undertaken by HHA as part of its regular maintenance dredging campaigns as described in **Section 2.2.1**. The volume of maintenance dredging to be undertaken is likely to increase, however, it is not anticipated that additional maintenance dredging vessels would be required. Engine exhaust emissions from vessels associated with maintenance dredging of the deepened approach channel are therefore unlikely to affect local air quality.

The deepening of the channel would permit larger ships to enter the ports as a consequence of the increased channel depth. These ships are likely to be able to hold more containers per ship, however, the size of the quayside and handling capacity of the ports would remain unchanged (refer to **Section 2.2.2**).

Therefore, whilst the ports would be able to accommodate larger ships the throughput transferring onto the surrounding road and rail network would not increase above the permitted throughput for each port. More information on this is provided in **Section 16**.

It is anticipated that during the operational phase any potential for air pollutant emissions would be engine exhaust releases from vessels calling at the Haven Ports as a result of the deepened approach channel.

### 17.4 EIA Investigations

The scope of the assessment will be agreed with SCDC and TDC, including such considerations as sensitive receptor locations and background air quality.

The assessment will consider potential air quality impacts associated with capital dredging during the construction phase (including dust, odour and capital dredging exhaust emissions), and exhaust emissions from larger vessels accessing the Port of Felixstowe during the operational phase.

A qualitative approach to the assessment of construction and operational phase emissions will be undertaken. Construction activity information and schedules will be correlated with local meteorological data and sensitive receptor locations to assess the potential impacts of dust and exhaust emissions.

If emissions from marine vessels are identified as significant (and sufficient data are available) modelling of marine vessel emissions would be undertaken in accordance with US EPA guidance 'Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories' (2009).

If potentially significant adverse air quality effects are identified, appropriate mitigation measures will be recommended which reflect the severity and extent of the predicted impact.

## **18 NOISE AND VIBRATION**

### **18.1 Introduction**

This section examines the potential environmental noise and vibration impact arising from the proposals described in **Section 2**. It does not examine occupational noise and vibration issues.

The study area encompasses the Haven Ports and the surrounding area, including the local road network and potentially noise and vibration sensitive receptors (i.e. residential properties, hospitals, care homes, places of worship etc.).

### **18.2 Baseline Conditions**

The setting of the proposed scheme is adjacent to existing commercial port areas and sea front leisure areas and is overlooked by residential properties. As such, it is anticipated that ambient noise levels in the area are, potentially, relatively high. Existing ground-borne vibration may also be present alongside the main access roads to the town centres and ports, associated with the movements of heavy vehicles.

The main noise sensitive receptors that could be affected by the proposed dredging activity are listed below:

- Residential properties close to or overlooking the channel.
- Other noise sensitive receivers, such as hospitals, care homes, places of worship, educational establishments and commercial facilities whose operations might be particularly affected by excess noise or vibration. Additional vibration sensitive receptors may include ancient buildings and monuments.

#### **18.2.1 Policy, legislation and guidance in relation to onshore noise**

The following policy, legislation and guidance will be applicable with regard to any assessment of noise in terms of the potential for onshore impacts.

- The Control of Pollution Act, 1974 (COPA)  
Section 60 of the Act provides powers to local planning authority officers to serve an abatement notice in respect of noise nuisance from construction works.
- Environmental Protection Act, 1990 (EPA)  
Section 79 of the Act defines statutory nuisance with regard to noise and determines that local planning authorities have a duty to detect such nuisances in their area
- National Planning Policy Framework  
The National Planning Policy Framework states that planning policies and decisions should aim to:
  - avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
  - mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;

- recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and
- identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.
- Noise Policy Statement for England (NPSE)  
This document was published by DEFRA in 2010 and has three policy aims with regard to management of noise:
  - avoid significant adverse impacts on health and quality of life;
  - mitigate and minimise adverse impacts on health and quality of life; and
  - where possible, contribute to the improvement of health and quality of life.
- Guidance  
The assessment will make reference to the following UK guidance:
  - BS7445:2003 - Parts 1 and 2;
  - BS8233:1999;
  - BS5228:2009 - Part 1;
  - WHO Guidelines for community noise;
  - BS6472-1:2008 - Part 1;
  - BS4866:2010; and
  - BS7445:2003 – Parts 1 and 2.

### 18.3 Potential Impacts

**Section 2.1** outlines that the construction phase of the proposed scheme would comprise the dredging of the approach channel and the associated disposal of the dredged material. The dredging activity is likely to be undertaken by means of a TSHD and take place for approximately one year.

It is considered that the option to dispose of dredged material at sea would have no onshore noise impact. However, the use of dredged material for onshore construction activities or, say, habitat enhancement could have a noise impact. To offload the dredged material for onward transportation or use at the coast could require specialist port facilities or material transfer. However such activities would be either covered by existing permissions or would need to be consented through a separate application.

The use of a TSHD would create potential marine based noise emission sources. The potential noise and vibration impacts during the construction phase could include disturbance to marine species (i.e. dredging noise) and disturbance to birds (increased human activity and dredging noise) but these have been covered where relevant in **Sections 9, 10, 11 and 12**. The noise emissions from the proposed TSHD activities are

unlikely to be audible over existing baseline noise levels at onshore receptors. **Table 18.1** outlines the potential noise and vibration impacts from the proposed scheme.

**Table 18.1**      **Potential noise and vibration impacts of the proposed scheme within the study area**

Potential Impacts	
Construction	Noise from dredging causing a nuisance impact at onshore residential receptors
Operation	Noise from dredging causing a nuisance impact at onshore residential receptors.

## 18.4 EIA Investigations

Any potential for disturbance to marine species or birds due to noise or vibration will be dealt with where relevant within the appropriate separate sections of the Environmental Statement.

**Section 18.3** has concluded that any noise or vibration during the construction phase would be unlikely to be audible over existing baseline noise levels at onshore receptors. Any maintenance dredging during the operational phase would be no greater than that carried out presently and is also unlikely to be audible over existing baseline noise levels. On this basis any further impact assessment on noise and vibration has been scoped out of the EIA. Confirmation that the MMO are in agreement with this approach is now sought.

## 19 MARINE ARCHAEOLOGY AND HISTORIC ENVIRONMENT

### 19.1 Introduction

This section looks at the archaeological and historic environment in and around the area of the proposed works. Given that the proposed works are located offshore, this section focuses on the marine and intertidal archaeological and historic features located within the proposed dredge area, the potential disposal sites and the surrounding marine environment. Terrestrial archaeology is not considered as there are not anticipated to be any impacts to terrestrial features arising as a result of the proposed works.

### 19.2 Baseline Conditions

#### 19.2.1 Data sources

The key information sources that have been consulted relating to the known cultural heritage of the Harwich Haven Approach Channel are as follows:

- England's Historic Seascapes. Marine HLC Pilot Study: Southwold-to-Clacton. Final Project Report (Isaksen *et al.*, 2007);
- EU wreck sites ([www.wrecksite.eu](http://www.wrecksite.eu));
- Harwich Haven Approach Channel Deepening Environmental Statement (HR Wallingford, 1998);
- Historic Seascape Characterisation for Newport to Clacton and Adjacent Waters (Archaeological Data Service, 2011);
- Historic Environment Regional Research Frameworks (Austin, 1997; Medlycott, 2011);
- Outer Thames Estuary Regional Environmental Characterisation Report (MALSF, 2009);
- Rapid Coastal Zone Survey Reports (Essex and Suffolk) (Heppell and Brown, 2008; Everett *et al.*, 2003);
- Tendring Historic Environment Characterisation Report (Essex County Council, 2008); and
- The National Heritage List for England (<http://www.english-heritage.org.uk/professional/protection/process/national-heritage-list-for-england/>).

#### 19.2.2 Planning, legislation, policy and guidance

##### *Marine and Coastal Access Act 2009*

Section 69 of the MCCA 2009 details how the MMO must have regard in determining an application to “the need to protect the marine environment”. This is defined in section 115(2) as being inclusive of “any site (including and site comprising, or comprising the remains of, any vessel, aircraft or marine structure) which is of historic or archaeological interest”. In order to facilitate this English Heritage act as the primary advisor to the MMO for all marine works requiring consent that may affect the marine historic environment. The involvement of English Heritage in this way builds upon the provisions of the National Heritage Act 2002, whereby English Heritage had assumed

responsibility for archaeological remains below mean low water within UK territorial waters adjacent to England. As part of this process the definition of an ancient monument was also amended to include any site comprising, or comprising the remains of, any vehicle, vessel, aircraft or other movable structure or part thereof.

#### *Ancient Monuments and Archaeological Areas Act 1979 (as amended)*

This Act is primarily land based, but in recent years has been used to provide some protection for underwater sites. The Act is currently administered by English Heritage on behalf of the Department of Culture, Media and Sport. Under the provisions of the Act Scheduled Monuments and Areas of Archaeological Importance are afforded statutory protection by the Secretary of State and Scheduled Monument Consent is required for any works affecting a scheduled monument above or below ground, including impacts on the setting of the monument. It is an offence to disturb a scheduled monument by carrying out works without consent, cause reckless or deliberate damage to a monument, use a metal detector or remove an object found at one without a licence from English Heritage.

#### *Protection of Wrecks Act (1973)*

This Act was passed as a direct consequence of the looting of wrecks of historical interest and allows the Secretary of State to designate as a restricted area the site of a vessel of historical, archaeological or artistic importance lying wrecked in or on the seabed. Within a restricted area it is an offence to tamper with, damage or remove any object or part of the vessel or to carry out any diving or salvage operation. Other operations within the restricted area are controlled by the issuing of licences, authorising only certain specified activities.

#### *Protection of Military Remains Act 1986*

The primary reason for designation of a site under this Act is to protect as a war grave the last resting place of UK servicemen (or other nationals); however the act does not require the loss of the vessel to have occurred during war. Under the Act the wreckage of all military aircraft (UK or other nations) that crashed in the UK, in UK territorial waters or in UK controlled waters are automatically protected regardless of whether there was loss of life or whether the loss occurred during peacetime or in combat. Maritime vessels lost during military service are not automatically protected, although the Ministry of Defence (MoD) has powers to protect any vessel that was in military service when lost through designation as either a 'controlled site' or 'protected place'. Designation as a protected place applies only to vessels that sank after 4 August 1914 and the Act makes it an offence to interfere with a protected place, to disturb the site or to remove anything from the site. Controlled sites must be specifically designated by location, where the site contains the remains of an aircraft or a vessel that crashed, sank or was stranded within the last two hundred years. The Act makes it illegal to conduct any operations, including any diving or excavation, within the controlled site that might disturb the remains unless licensed to do so by the MoD.

#### *National Planning Policy Framework*

Section 12 (paragraphs 126 – 141) of the National Planning Policy Framework (Conserving and enhancing the historic environment) outlines policies relating to the historic environment and the key role it plays in the Government's definition of sustainable development, the principle which underpins the document.

The Framework recognises that ‘heritage assets are an irreplaceable resource’ and should be conserved ‘in a manner appropriate to their significance’ and requires that planning applicants should ‘describe the significance of any heritage assets affected’ by their application, ‘including any contribution made by their setting’.

Although the Framework replaces Planning Policy Statement 5, Planning for the Historic Environment, which previously dealt with the historic environment within the planning process, the Historic Environment Planning Practice Guide (issued in March 2010) which accompanied that document, remains in force for the time being to assist in the interpretation of National Planning Policy Framework policies relating to the historic environment.

### 19.2.3 Pleistocene geology – regional context

The Harwich Haven Approach Channel lies within what is now the Outer Thames Estuary, however, the estuary of today has developed over millennia through natural changes and, in later periods, through human adaptation and transformation. Thus the estuary contains wide ranging evidence for landscape change, including geological deposits, palaeoenvironmental and archaeological remains, which are an important resource for research into early occupation of the British Isles and past environmental and climate change.

Extensive studies carried out as part of the Outer Thames REC (MALSF, 2009) have identified a number of morphological features of this drowned palaeo-landscape, including a west – east channel system which starts with the linear section of the Harwich Deep Channel (**Figure 19.1**).

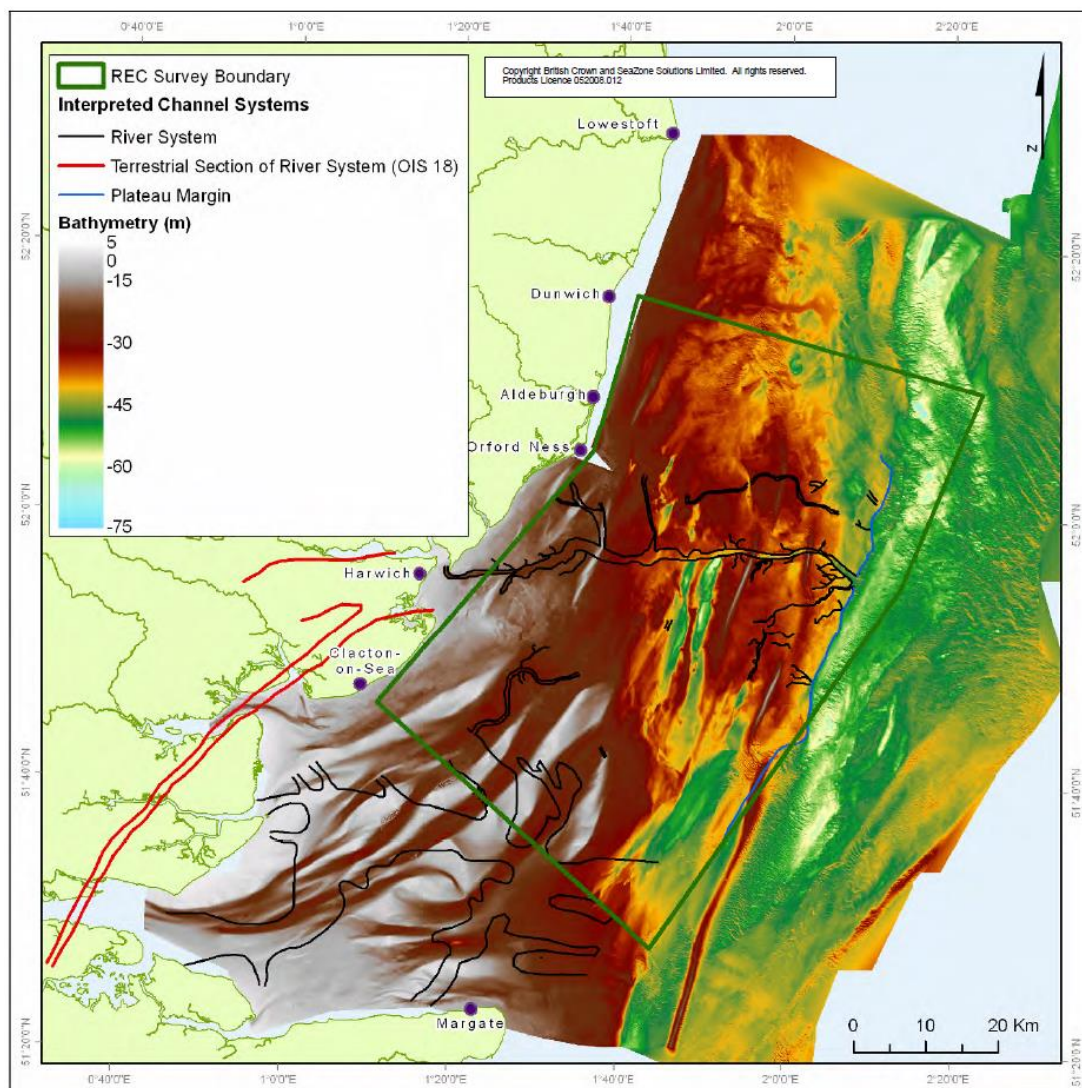
Recent deposits in the offshore area comprise northwest to southeast trending sandbanks which are derived from the reworking of earlier fluvially deposited material, erosional material from clay cliff sediments along the Suffolk coast and at The Naze, and some glacio-fluvial outwash (MALSF, 2009).

### 19.2.4 Archaeological background

Following the inundation of the southern North Sea basin by rising sea levels in the post-Devension the approach channel would have been submerged and thus the cultural heritage assets in the vicinity of the channel are likely to be maritime in character. The Outer Thames REC noted a high density of wrecks in their study area, 1838 in total, ranging in date from the medieval wreck of La Trinitie (NMR 1445730) to a 2005 wreck of the Persistent Whisperer (MALSF, 2009).

As set out in earlier sections, Harwich is one of the Haven Ports (which historically has included the Harwich Navyyard, Harwich International, Felixstowe, Ipswich and Mistley) and is of maritime significance as the only safe anchorage between the Thames and Humber. Thus it has been an important port for centuries, with a naval base being established there in 1657.

**Figure 19.1** Interpreted channel systems of the Outer Thames Estuary including the early Cromerian Thames-Medway river system, the terrestrial section of the system (after Bridgeland, 2006), the eastern plateau margin and the later Quaternary Thames-Medway system (based on BGS 1:250,000)



Source: MALSF (2009)

### 19.2.5 Scheduled Monuments

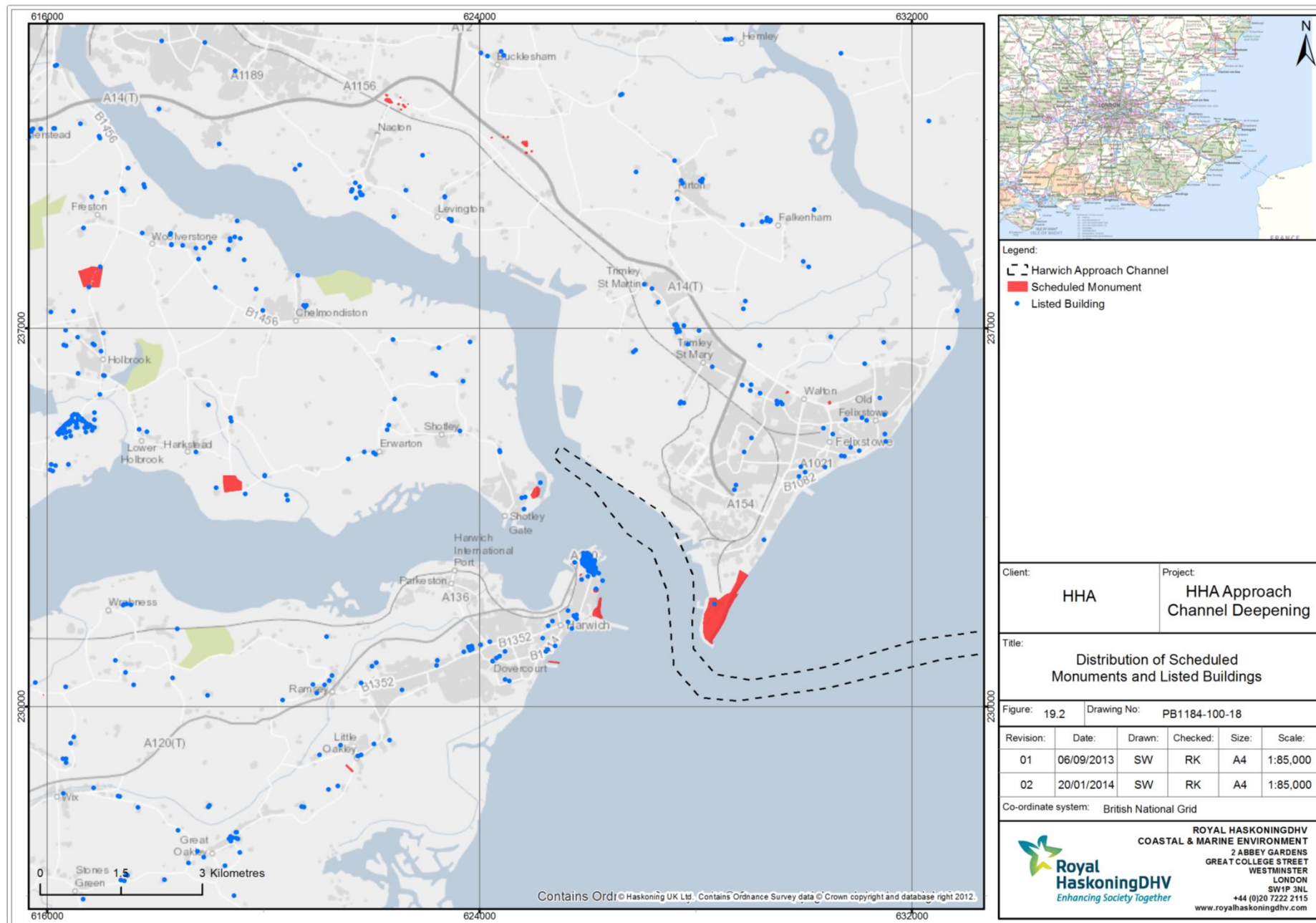
There are 11 Scheduled Monuments in the vicinity of the Stour and Orwell estuaries and along the coast (their distribution is shown on **Figure 19.2**). All are post-medieval in date and the majority relate to the defence of Harwich. These Scheduled Monuments are outlined in **Table 19.1**.

**Table 19.1** Scheduled Monuments around the proposed dredge area

Name	Number	Description
Landguard Fort and associated fieldworks	SM 1030415	The monument includes Landguard Fort, built in the 18th century and extensively remodelled in the 1870s, with associated remains of batteries and other adjacent installations and fieldworks of

Name	Number	Description
		varying dates up to and including World War II. It is thought that buried remains of an earlier, 17 <sup>th</sup> century fort also survive beneath and to the east of the 18th century fort;
The Harwich Redoubt	SM 1017205	Fortified gun tower, which is Listed Grade II*, built between 1807 and 1809
Beacon Hill Fort, Harwich	SM 1018958	A late 19th and 20th century coastal artillery fortification
Harwich Low Lighthouse	SM 1019326	The Low Lighthouse, a Grade II Listed Building, was constructed in 1818 as one of a pair providing leading lights for the safe approach to Harwich Harbour
Harwich High Lighthouse	SM 1017201	The High Lighthouse, a Listed Building Grade II*, was constructed in 1818 as one of a pair of leading lights signalling the safe approach to Harwich Harbour
The Harwich Treadwheel Crane	SM 1017202	The monument includes a 17th century harbour crane, relocated in 1932 and now situated near the eastern shore of the Harwich peninsula, towards the northern edge of Harwich Green
Dovercourt lighthouse and causeway	SM 1017200	The monument includes two iron framed lighthouses set about 200m apart at either end of a stone causeway which projects into Dovercourt Bay from the sea wall opposite the Phoenix Hotel on Marine Parade
Napoleonic Coastal Battery at Bath Side	SM 1018957	Costal battery of Napoleonic date in Harwich
Shotley Batter	SM 1021290	The remains of a mid-19th century battery on Shotley Point
Martello Tower (L), Shotley	SM 1005993	No detailed list entry description available
Martello Tower (M), Shotley	SM 1005994	No detailed list entry description available

There are a number of Listed Buildings in the Harwich/Felixstowe area and along the coastline (**Figure 19.2**); however, these would not be affected by the proposed channel dredge and associated disposal and so it is proposed to not consider these further.



## 19.2.6 Non-designated heritage assets - marine

Examination of the website [www.wrecksite.eu](http://www.wrecksite.eu), which uses information provided by the UK Hydrographic Office, indicates that there are 22 wreck sites recorded within the approach channel; however, all of these are flagged as either “dead” or “lifted”, having been removed as a shipping hazard (**Table 19.2** below). A further 10 sites are recorded within 250m to either side of the approach channel, comprising a mixture of recorded seabed obstructions, including material such as abandoned steel cable, wrecks and areas of foul ground (**Table 19.2** below – wreck number suffixed B). Of these 10 sites only two are recorded as “live”, comprising an unidentified obstruction (14796 B) and an area of foul ground (14801 B).

**Table 19.2 Wreck Sites within Harwich Deep Water Channel and 250m buffer zone (B)**

Wreck Number	Name	Type	Status
14699	Not known	Small obstruction projecting 3ft above riverbed	Dead
70185	Not known	Obstruction	Dead
69996	Thuroklint		Lifted
69999	Jess		Lifted
14676 B	HMS Marsa		Dead
14673	Not known	Obstruction	Dead
14671	Not known	Obstruction	Dead
70044 B	Surprise		Dead
69997	Not known	Dumb Barge	Lifted
70037 B	Not known	Stranded Wreck	Dead
14814 B	Not known	Obstructions	Dead
14659	Not known	Obstruction	Dead
14652	Not known	Obstruction (rock)	Dead
14653	HMS Gypsy		Lifted
14648	Not known	Obstruction	Dead
14647	Not known	Obstruction (rock)	Dead
14646	Not known	Obstruction (rock)	Dead
14642	Not known	Obstruction (rock)	Dead
14638	Not known	Obstruction	Dead
14634	Not known	Obstruction	Dead
79636	Not known	Obstruction	Dead
14631	Not known	Obstruction	Dead
14633 B	Not known	Not known	Dead

Wreck Number	Name	Type	Status
14629 B	Not known	Obstruction	Dead
14796 B	Not known	Obstruction	Live
61914	HMS Gipsy (aft part)		Lifted
70045 B	Nore		Lifted
70084	Swynfleet		Lifted
14618 B	HMS Refundo		Dead
14617	Not known	Not known	Dead
14619	Not known	Obstruction	Dead
14801 B	Not known	Foul Ground	Live

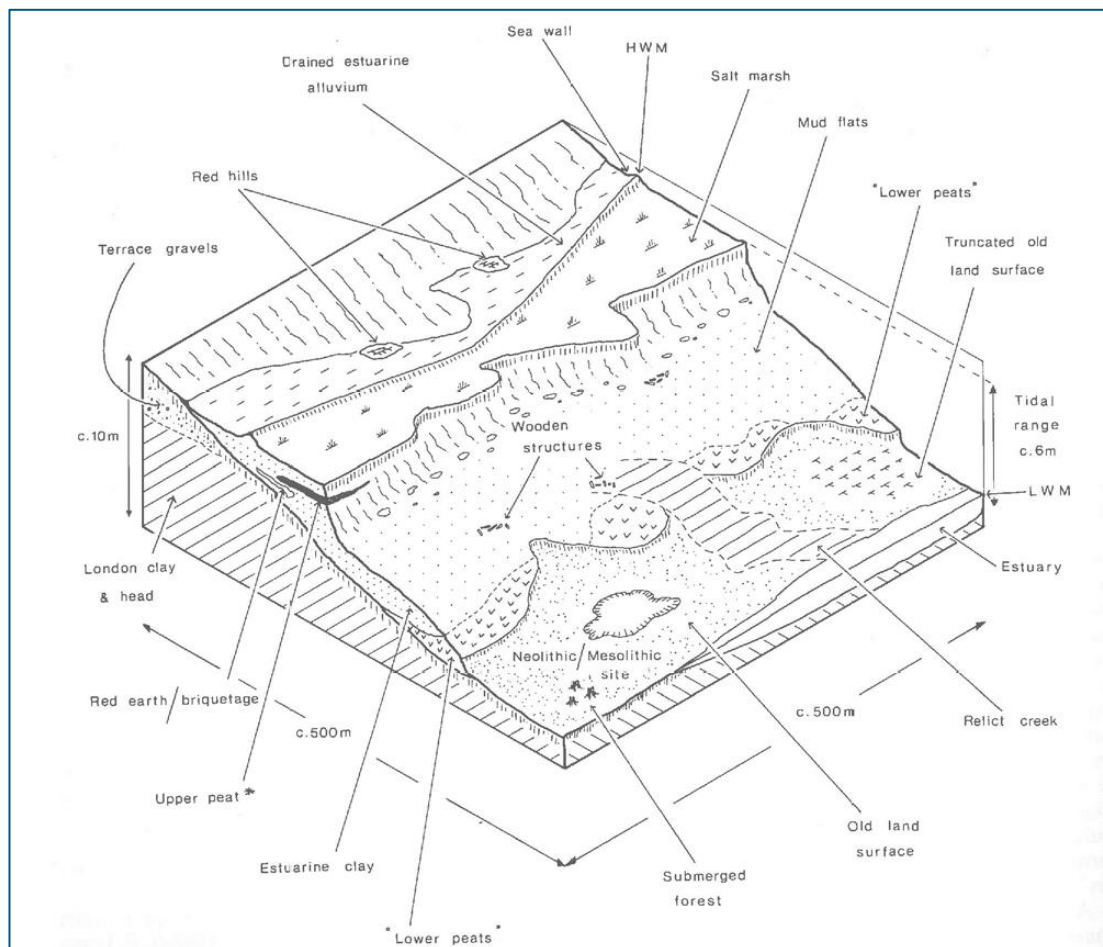
There are no records of any archaeological or palaeoenvironmental discoveries from within the approach channel itself or either of the potential disposal sites at the IG and IGE.

#### 19.2.7 Non-designated heritage assets - intertidal

Although the proposed works are to take place offshore and thus any direct impacts on the cultural heritage resource are likely to arise offshore, as set out in **Section 6**, indirect effects on the sediment budget and transport within the Stour and Orwell estuaries and along the Essex and South Suffolk coast could arise due to the influence of deepened areas.

Studies of the English coast in general (e.g. Fulford *et al*, 1997) and the Essex Coast in particular (Wilkinson and Murphy, 1995; Heppell and Brown, 2008) have demonstrated that there is an impressive range of cultural heritage assets to be found in what is now the intertidal zone (see **Figure 19.3**); palaeo-landsurfaces (sometimes with associated archaeological features and artefact scatters), submerged forests, peat beds, timber fishtraps, salterns, pottery production sites, remains of the oyster industry, landings and boat remains. These remains exist in a dynamic environment on the fringes of estuaries where they are vulnerable to a wide range of threats such as coastal erosion, rising sea-level, coastal squeeze and our attempts to manage the shoreline in response to these issues.

**Figure 19.3** Block diagram of a section of an Essex estuary showing representative positions of archaeological sites and structures



Source: Wilkinson and Murphy (1995)

### 19.2.8 Consultation with English Heritage

In May 2013 HHA applied for a Marine Licence from the MMO (Application no. MLA/2/2013/00172) in order to carry out site investigation works in the form of excavating a number of trial pits within the Harwich Haven Approach Channel by backhoe dredger (refer to **Figure 7.4**). As part of this process Royal HaskoningDHV entered into negotiations with English Heritage on the archaeological potential of the approach channel and the likely scope of any archaeological works that may be required in connection with the proposed site investigation. As part of these discussions it was noted that while no wrecks were anticipated in the approach channel, as the vast majority of the channel had been dredged previously and the hard clay underlying the superficial gravels and sands would make it difficult for wrecks to embed, there is some palaeoenvironmental/archaeological potential in the form of palaeochannels arising at Harwich and travelling out along the existing approach channel. It was agreed that this would be assessed within the ES for the proposed capital dredging project.

In response, English Heritage confirmed that they were content with the information provided within by Royal HaskoningDHV and that no further assessment was required prior to the site investigations taking place.

### 19.3 Potential Impacts

Potential effects on archaeology and the historic environment due to the works are listed in **Table 19.3**. Due to the number of known and potential sites of archaeological and historical importance within the area, it is possible that the proposed work could have an impact on archaeological resources. It is also possible there are other archaeological sites that are not yet recorded along the route of the approach channel. In addition to the impact of dredging, any changes to the hydrodynamic regime of the area as a result of the works could lead to the uncovering of other archaeological resources and exposure to damage through increased erosion.

**Table 19.3 Potential impacts of the proposed scheme on archaeology and historic environment**

Potential Impacts	
Construction	Damage or loss of known and unknown submerged archaeological material redistributed by dredging activity
	Damage or loss of submerged landscapes
Operation	Indirect effect on known and unknown submerged archaeological remains located outside the work area due to potential changes to hydrodynamics and sedimentation/erosion patterns that might result
	Potential impacts to historic landmarks from increased wave attack

### 19.4 EIA Investigations

As part of the EIA, the baseline information will be updated via consultation/data searches with various heritage bodies and incorporation of the results of the site investigation works and proposed coastal process modelling. Data sources for further consultation will include:

- National Monuments Record – sites and areas of archaeological/palaeoenvironmental interest;
- Essex Historic Environment Record – sites and areas of archaeological/palaeoenvironmental interest, particularly on the foreshore/ in the intertidal zone;
- Suffolk Historic Environment Record – sites and areas of archaeological/palaeoenvironmental interest, particularly on the foreshore/in the intertidal zone; and
- map regression (utilising both terrestrial mapping and charts).

Maritime remains, including wrecks, crashed aircraft and cultural material, are highly unlikely to be present within the area of channel dredge itself, as the vast majority of the channel has been extensively disturbed in the past by capital deepening projects and also by maintenance dredging works. There are also no records of any archaeological or palaeoenvironmental discoveries or wreck/crash sites at either of the potential disposal sites. However, maritime remains may be present in the intertidal zones and the enhancement of the baseline information will allow the presence/absence of such assets and their significance to be better understood.

The enhancement of the baseline information with regard to the intertidal cultural heritage resource will, likewise, enable the presence/absence of assets and areas of potential/significance to be better determined. Although these assets/potential assets lie outside the area of direct impact, there is the potential for indirect impacts to arise as a result of changing coastal processes. Accordingly this will need to be considered in the ES.

Following the enhancement of the baseline information this data will be collated and analysed to identify areas of known or potential heritage resources and their significance. The proposals for the capital dredge, including both construction and operation, can then be examined against the fully updated dataset in order to identify possible impacts on the cultural heritage resource and inform the development of appropriate mitigation strategies.

## **20 TOURISM AND RECREATION**

### **20.1 Introduction**

This section considers the tourism and recreational interests of the Stour and Orwell estuaries in relation to the proposed scheme. Details of recreational navigation are covered in **Section 15**.

The study area considered for this section includes the coastline of Harwich and Felixstowe, and the Stour and Orwell estuaries, and also extends to the bathing waters considered in **Section 7** from Felixstowe North down along the coast to Holland-on-Sea in the south (refer to **Figure 7.3**).

### **20.2 Baseline Conditions**

#### **20.2.1 Data sources**

The baseline description is based on a review of the following available information:

- Essential Harwich, a visitor's guide to Harwich and Dovercourt (<http://www.harwich.net/essenhar.htm>);
- Harwich Haven Approach Channel Deepening Environmental Statement (HR Wallingford, 1998).
- Landguard Nature Reserve Website (<http://www.landguardpartnership.org.uk/>);
- Suffolk Coastal District Council's tourist information website (<http://www.suffolkcoastal.gov.uk/tourism/>);
- The Stour and Orwell Estuaries Management Scheme (Suffolk Coasts and Heaths Unit, 2003); and
- Tendring District Council beaches and seafronts website (<http://www.tendringdc.gov.uk/leisure/seafront-and-beaches/our-beaches-and-seafronts>).

#### **20.2.2 Felixstowe estuary waterfront**

The northern part of the dredge footprint is adjacent to the Port of Felixstowe's quays and facilities. Whilst not an obvious focus of tourist interest the viewing area at Manor Terrace car park near Landguard Point is one of the most well visited by ship spotters as the vessels and docks are a point of interest.

**Plate 20.1** Aerial view of Felixstowe Dock and Container Terminals (Royal HaskoningDHV, 2013d)



### 20.2.3 Felixstowe seaward facing waterfront

The Edwardian seaside town of Felixstowe, with a 7km stretch of south-east facing beach, is a popular tourist attraction. The seaward facing waterfront hosts various tourist attractions, including:

- Ocean Boulevard Amusement Area;
- Manings Amusement Park;
- The Promenade;
- The Edwardian gardens;
- Languard Fort and museum; and
- Numerous waterfront cafes and restaurants.

### 20.2.4 Landguard Peninsula

Landguard Peninsula is a tourist attraction, with its Nature Reserve and the complex of historic buildings on the western boundary of Landguard Point. A management plan has been developed to ensure that Landguard Peninsula is managed in a sustainable manner, contributing to the nationally important environmental conservation, cultural heritage, educational resources and economic prosperity of the area and adding to the quality of life and enjoyment of the local community and visitors (Landguard Partnership, 2011).

The main sites of interest include the Landguard Bird Observatory (LBO), Landguard Fort, the viewing area, visitor centre and café, and the Felixstowe History and Museum Society. Both the Fort and Museum are open to the public from Easter to November. The LBO runs as an observatory - ringing and recording all year round, but is closed to the public.

Other activities on Landguard Peninsula include fishing, walks around the 'Point' with views of the estuary mouth, cycling along Route 51 (part of the National Cycle Network), and recreation (play and picnic) on the sands and around the ponds.

The western coast of the Landguard Peninsula has direct sight to the Felixstowe Docks. The approach channel runs around the Point, out of the Harbour then north-west out to sea. To the north of the Reserve is a mobile home park, mainly occupied in holiday season, and Manor Terrace Car Park, running on to the southern part of the Port of Felixstowe.

#### 20.2.5 Waterfront of Harwich and Shotley Point

Harwich has a rich history with a number of sites of interest. It has been identified as one of the Priority Areas for Economic Regeneration as part of South East Regional Plan. The TDC vision is to create in Old Harwich a vibrant and creative new quarter that will become the focus of new employment, housing, tourism, commercial and leisure activities.

The bay and estuary provide good wind-surfing and dinghy sailing conditions and there are many facilities in the area for visiting yachtsman. The Harwich Town Sailing Club is situated on the southern side of Harwich Harbour, adjacent to the breakwater.

Access to the Old Town for visiting yachtsmen has been facilitated by the completion of the overnight moorings facilities at the Ha'penny Pier, which is situated on Harwich's old quay. Alternative moorings can be found on the other side of the river at Shotley or Levington. A foot ferry operates between Harwich, Felixstowe and Shotley.

The main tourist attraction on Shotley Point is Shotley Marina. The marina is located at the confluence of the Rivers Orwell and Stour and provides mooring facilities (350 fully serviced modern berths) for sailors cruising in the Rivers Stour, Orwell and to the open sea.

#### 20.2.6 Stour and Orwell estuaries

The baseline description included herein is derived from information provided in the Stour and Orwell Estuaries Management Scheme (Suffolk Coasts and Heaths Unit, 2003).

The Stour and Orwell estuaries are important to local people for recreation and relaxation. Popular with sailors and walkers they offer sheltered waters and unrivalled views, and are easily accessible with good transport links to the neighbouring counties. Footpaths, foreshore and permissive paths are used all year around in the estuaries. Other land-based recreational activities include hiking, walking, dog-walking, cycling, bird-watching and horse-riding.

The main inshore/recreational fishing activities in the estuaries include hand gathering of shellfish, bait digging, shore-based angling (both rivers) and recreational boat angling (further detail of recreational angling is provided in **Section 15**). The bait diggers are attracted by the expanses of mudflats, which provide a plentiful supply of worms, especially in the Orwell River. Sea angling activities are situated mainly in the coastal areas of Felixstowe and south of the mouth of the estuaries (in the Hamford Water embayment and the Walton Channel).

The area is also popular for water-based recreational activities such as water skiing (near Levington on the Orwell) and the use of personal watercraft, which is only permitted between Levington and Trimley in the Orwell. Windsurfing is a popular activity in the Stour near Wrabness and can be occasionally seen off Harwich and canoeing occurs at Manningtree upstream the Stour River.

Other popular water-based facilities include swing moorings and intertidal moorings (including half-tide moorings). The estuaries are dotted with numerous sailing clubs and marinas. The area represents the second most important sailing area in the country and there has been a significant expansion of facilities and activity in recent years, including a significant growth in motor yachts.

The marinas are popular ports of call for yachts cruising down the East Coast, and many locals have boats in the estuaries, moored at the marinas or on moorings mainly in the River Orwell. Shotley Point Marina is the only marina in the Stour. The marinas attract people to the area (visitor and permanent residents) and contribute further to the local economy.

#### 20.2.7 Bathing Waters

There are a number of bathing water designations within the study area; including:

- Felixstowe North;
- Felixstowe South;
- Dovercourt;
- Walton;
- Frinton; and
- Holland-on-Sea.

These designations are all discussed in detail in **Section 7** and their locations outlined on **Figure 7.3**. Felixstowe North and Felixstowe South, managed by SCDC, are recognised for having excellent quality bathing water as measured by the Marine Conservation Society's (MCS) Good Beach Guide (MCS, 2013).

Dovercourt, Walton, Frinton and Holland (Clacton) are all managed by TDC. Dovercourt is a Blue Flag beach and Walton, Frinton and Holland have the Quality Coast Award which indicates their status as some of the best beaches in England (Tendring District Council, 2013). They are also all recognised as MSC Recommended beaches (MSC, 2013).

## 20.3 Potential Impacts

The potential impacts of the scheme on tourism and recreation would largely depend upon the effects of the project on air quality and noise levels, as well as any potential impacts on water quality as a result of the sediment plume and sedimentation that would occur during the dredging in relation to bathing waters and public beaches. The presence of the dredgers could have a potential impact on sites directly overlooking the approach channel which are regularly visited by tourists and/or local resident.

Given the existing maritime activities undertaken in the Haven Ports, the impact of the project on land-based recreational users in the Stour and Orwell estuaries are expected to be limited in scale and short term. However potential impacts on water quality may affect local bathing waters – although any effect would also be expected to be temporary.

Key potential impacts on tourism and recreation during the construction and operational phases of the proposed scheme are listed in **Table 20.1**.

**Table 20.1**      **Potential impacts of the proposed scheme on tourism and recreation within the study area**

Potential Impacts	
Construction	Water quality effects may impact on local bathing waters
	Visual intrusion of the dredger, although it may also be a point of interest
	Effects on air quality, noise and vibration and implications for tourism and recreation
Operation	Increased disruption during maintenance dredging to leisure activities within the study area

## 20.4 EIA Investigations

The main potential impacts of the scheme on tourism and recreation relate to issues that will be investigated elsewhere within the EIA (e.g. potential impacts on bathing waters, noise and air quality, and on commercial and recreational navigation). It is not therefore envisaged that any additional detailed assessment will be required with respect to effects on tourism and recreation, and it is proposed that this topic is scoped out of any further assessment. However it will be important to identify the key organisations that are likely to be affected by the proposals and to undertake consultation to identify the main issues and to suggest possible mitigation.

The impact to tourism and recreation as a result of any changes to the bathing water quality would need to be assessed in line with the impacts identified in **Section 7**.

## 21 SOCIO-ECONOMICS

### 21.1 Introduction

This section considers the socio-economic context of the area surrounding the Stour and Orwell estuaries and any potential impacts which may arise as a result of the proposed scheme.

### 21.2 Baseline Conditions

#### 21.2.1 Data sources

The baseline description is based on a review of the following available information:

- the ES for the Harwich Haven Approach Channel Deepening (HR Wallingford, 1998);
- the ES for the Felixstowe South Reconfiguration (Posford Haskoning, 2003a);
- the ES for the Berth 9 Quay Extension (Royal Haskoning, 2013d);
- Tendring District Council Website (<http://www.tendringdc.gov.uk/>); and
- Suffolk Coastal District Council Website (<http://www.suffolkcoastal.gov.uk/>).

The study area falls within the administrative districts of two district councils, TDC in the south (incorporating Harwich) and SCDC in the north (incorporating Felixstowe and the north bank of the River Stour).

#### 21.2.2 Tendring District Council

Under the latest EU review, the majority of Tendring District is currently classified as an area eligible for Enterprise Grants under EU Tier 3 arrangements. The policy gives priority to investments, infrastructure and allocations that facilitate widely based economic regeneration and renewal in order to reduce disparities in economic success across Essex. As discussed in **Section 20**, Regional Planning Guidance for the South East Region identifies Harwich as one of the Priority Areas for Economic Regeneration (Tendring District Council, 2007).

The Harwich Master Plan, dated 2005, sets out plans for long-term regeneration, involving commercial, residential and leisure developments, which are intended to bring new life to the town while reflecting on its long maritime heritage (Tendring District Council, 2005).

With regard to Harwich International Port, the Council has also set out a positive vision in the Draft Local Plan (Tendring District Council, 2012a):

*“In 2021, Harwich will be established as a major gateway to Europe having exploited and made the most of opportunities presented by the emerging renewable energy sector and the planned container port benefitting from improvements to the A120 and rail freight infrastructure. The port and associated off-site port-centric logistics, distribution facilities and services on development sites with good access to the A120 have provided many jobs for local people including skilled and higher-paid employment opportunities.”*

The economy of the Harwich area is heavily dependent upon the port and its associated industries and services. Key economic indicators for Harwich are reported below:

- The employment rate in the Tendring District for those aged from 16 to 64 was 64.3% (Tendring District Council, 2012b) and the employment rate in Harwich for those aged from 16 to 74 was approximately 63.1% (ONS, 2001a).
- The unemployment rate was approximately 4% of the economically active population in Harwich. There were 479 unemployed people in November 2001 (ONS, 2001a). The unemployment rate of Tendring District in December 2012 was 8.7% (Tendring District Council, 2012b).
- The inactivity rate in Harwich for those aged from 16 to 74 was 36.9% which is lower than the inactivity rate of 40.8% in Tendring Non-Metropolitan District in November 2004 (ONS, 2001a).

The employment levels in Harwich by broad industry group are provided in **Table 21.1**.

**Table 21.1 Employment in Harwich by broad industry group (ONS, 2001b)**

Sector	Total	% Total <sup>1</sup>
Agriculture; hunting; forestry	65	0.9%
Fishing	10	0.1%
Mining & quarrying	25	0.4%
Manufacturing	950	13.5%
Electricity; gas and water supply	21	0.3%
Construction	426	6.0%
Wholesale & retail trade; repair of motor vehicles	1,143	16.2%
Hotels and catering	407	5.8%
Transport storage and communication	1,357	19.2%
Financial intermediation	244	3.5%
Real estate; renting and business activities	525	7.4%
Public administration and defence	393	5.6%
Education	382	5.4%
Health and social work	830	11.8%
Other	277	3.9%
<b>Total employee estimate</b>	<b>7,055</b>	<b>100%</b>

<sup>1</sup> Value derived by aggregating data supplied using the Neighbourhood Statistics Geography Hierarchy

### 21.2.3 Suffolk Coastal District Council

The East of England is one of the fastest growing regional economies in the UK. Within it, the Haven Gateway is currently a designated Growth Point and between 2008 and 2011, the Haven Gateway (a partnership created in 2001 by a group of partners across

North Essex and South Suffolk in order to promote the area as a distinct economic sub region based upon its strong links with the Haven Ports of Felixstowe and Harwich) was responsible for the allocation of over £15 million of funding from the Government under the Growth Point investment programme. (Haven Gateway Partnership, 2013)

SCDC developed a Core Strategy (SCDC, 2013) as part of the new Local Development Framework (LDF) which will guide the future development of the district to 2027. The Council is planning to support the retention, expansion and consolidation of a number of areas, subject to conformity with the Core Strategy.

With regard to the Port of Felixstowe, in addition to the construction of Berths 8 and 9 and consent for Berth 10, the strategy includes provision of additional sites for necessary supporting port-related uses.

The economy of the district is generally sound and social deprivation not prominent; however there are areas where the Council considers regeneration to be a priority, including the resort of Felixstowe.

Key economic indicators for Felixstowe are reported in **Table 21.2**. The employment levels in Felixstowe by broad industry group are provided in **Table 21.3**.

**Table 21.2 Key Economic Indicators for Felixstowe (ONS, 2011a)**

Parameter	Felixstowe (total) <sup>2</sup>	Felixstowe (%)
All Usual Residents Aged 16 to 74 <sup>1</sup>	16,674	100
Economically Active; Total (Persons) <sup>1</sup>	11,193	67
Economically Active; Unemployed <sup>1</sup>	653	4
Economically Inactive; Total (Persons) <sup>1</sup>	5,481	33

<sup>1</sup> National Statistics

<sup>2</sup> Value derived by aggregating data supplied using the Neighbourhood Statistics Geography Hierarchy

**Table 21.3 Employment in Felixstowe by broad industry group (ONS, 2011b)**

Sector	Total <sup>1</sup>	% Total
Agriculture, Forestry and Fishing	44	0.4%
Mining and Quarrying	4	0.0%
Manufacturing	509	4.9%
Electricity, Gas	51	0.5%
Water Supply; Sewerage, Waste Management and Remediation Activities	35	0.3%
Construction	446	4.3%
Wholesale and Retail Trade; Repair of Motor Vehicles and Motor Cycles	1,569	15.0%
Transport and Storage	2,505	23.9%
Accommodation and Food Service Activities	594	5.7%
Information and Communication	364	3.5%

Sector	Total <sup>1</sup>	% Total
Financial and Insurance Activities	248	2.4%
Real Estate Activities	118	1.1%
Professional, Scientific and Technical Activities	358	3.4%
Administrative and Support Service Activities	440	4.2%
Public Administration and Defence; Compulsory Social Security	491	4.7%
Education	848	8.1%
Human Health and Social Work Activities	1,272	12.2%
Arts	553	5.3%
Activities of Households as Employers; Undifferentiated Goods - and Services - Producing Activities of Households for Own Use	8	0.1%
Activities of Extraterritorial Organisations and Bodies	5	0.0%
<b>All usual residents aged 16 to 74 in employment</b>	<b>10,462</b>	<b>100%</b>

<sup>1</sup> Value derived by aggregating data supplied using the Neighbourhood Statistics Geography Hierarchy

### 21.3 Potential Impacts

The proposed scheme has the potential to impact on socio-economic factors in the surrounding area. **Table 21.4** outlines the main potential impacts predicted, including those which are addressed in more detail elsewhere within this report. It is anticipated that the impacts would be very small scale and highly localised.

**Table 21.4 Potential impacts of the proposed scheme on socio-economics within the study area**

Potential Impacts	
Construction	Temporary beneficial effects on hotels, restaurants, etc. due to contractors requiring local facilities
	Disturbance to commercial fishing operations (see <b>Section 10</b> )
	Disturbance to tourism and recreation (see <b>Section 20</b> )
Operation	Maintenance of the Haven Ports' competitive position thereby safeguarding the local economy and jobs in the area

### 21.4 EIA Investigations

The socio-economic impacts of the proposed approach channel deepening would centre on the effects to local businesses, tourism and commercial fisheries. No significant adverse socio-economic impacts are predicted, therefore, it is not envisaged that a full socio-economic study would be required (outside of the assessment of effects on tourism and commercial fisheries).

Given this it is proposed that socio-economics is scoped out from further consideration in the EIA. Aside from small beneficial effects to local business during the construction

phase and a significant contribution to the competitive position of the Haven Port's in the operational phase, other key concerns will be addressed separately, as detailed in:

- Fish and commercial fisheries (**Section 10**);
- Tourism and recreation (**Section 20**).

## 22 COASTAL AND FLOOD DEFENCE

### 22.1 Introduction

This section of the Scoping Report considers the potential impacts of the proposed scheme on the flood and coastal defences within the study area. The project study area is the approach channel to the Stour and Orwell estuaries and the coastline surrounding this channel. The direct footprint of the proposed works is shown in **Figure 2.1**. As a result of the proposed works there may be indirect effects on the coastal and flood defences in the local area, particularly around Felixstowe, Shotley Gate and Harwich.

### 22.2 Baseline Conditions

#### 22.2.1 Flood management

The Environment Agency flood map (Environment Agency, 2013b and **Figure 22.1**) indicates that much of the Port of Felixstowe is located within either Flood Zones 2 or 3. These zones are defined by the National Planning Policy Framework as follows: Flood Zone 2 has an annual probability of flooding of between 1 in 200 years (0.5%) and 1 in 1,000 years (0.1%) (indicated as light blue on **Figure 22.1**), and Flood Zone 3 has an annual probability of flooding of 1 in 200 years (0.5%) or greater (indicated in dark blue on **Figure 22.1**).

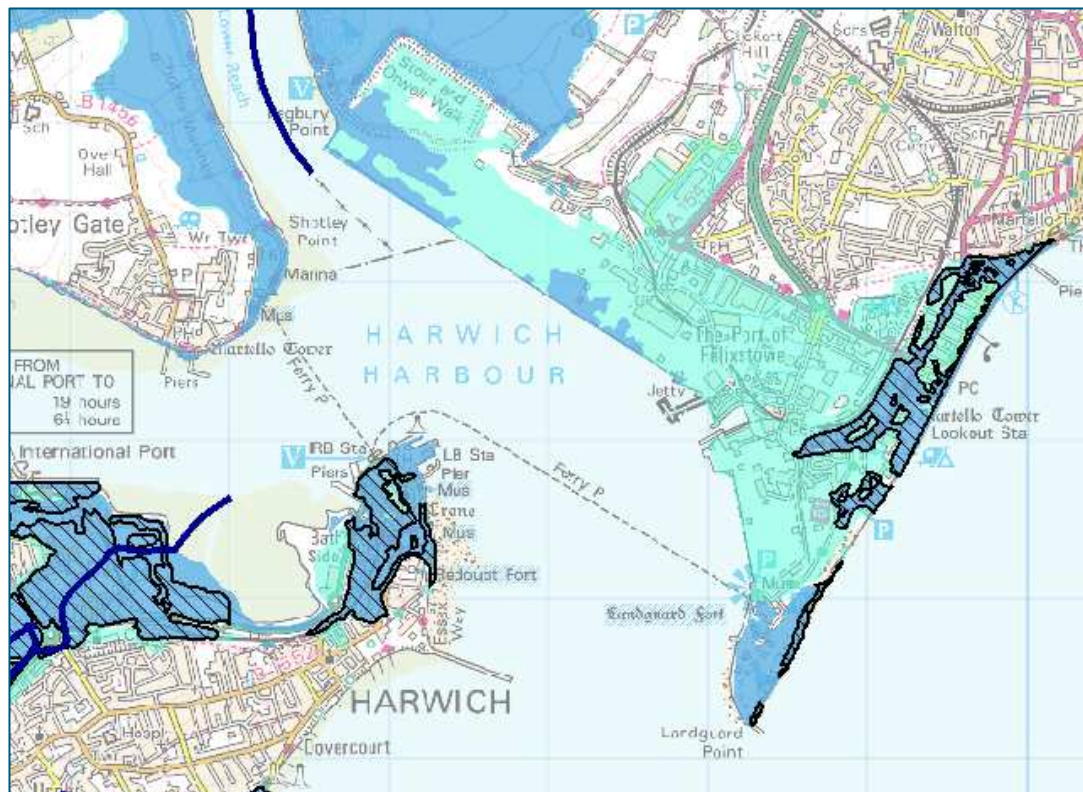
**Figure 22.1** shows that the port areas would flood without the presence of any defences. Some of the areas in Flood Zones 2 and 3 benefit from the presence of flood defence, as shown in the black hatched areas.

The various structural flood defences along the Felixstowe dock – the dock structures themselves – mostly provide a standard of protection in excess of 1 in 200 year event (0.5%). Discussion with the Environment Agency has indicated that the defences along Felixstowe docks are managed by the Port Authority. Other coastal flood defences in the area are managed by the Environment Agency, SCDC and TDC.

The Essex and South Suffolk SMP2 (Royal Haskoning, 2010b) indicates that the policy for the shorelines in the Ports of Felixstowe and Harwich will 'Advance the Line' and either maintain or improve the standard of protection.

Disturbance to the flood and coastal defences as a result of the proposed dredging activities during the operational phase is considered unlikely.

**Figure 22.1** Extract of the EA flood map showing predicted 1 in 200 year flood extent. Note: dark blue = Flood Zone 3, 1 in 200 year flood extents or greater, light blue = Flood Zone 2, 1 in 200 years to 1 in 1,000 year flood extents



Source: Environment Agency, 2013b

## 22.2.2 Early investigations

In 2012 HR Wallingford undertook initial wave and flow modelling to identify the potential impact of the proposed capital dredging on Harwich Harbour using monitoring data obtained since 2000 (HR Wallingford, 2012). This study used various numerical models to investigate the implications of deepening the approach channel and the outputs will be used to inform further modelling and the EIA.

The wave and flow modelling was undertaken to consider the effects of the deepened approach channel in the immediate area of the deepened channel. The results indicate that deepening the channel would have a modest effect on the hydrodynamics of the area (HR Wallingford, 2012).

The HR Wallingford (2012) wave modelling shows a pattern of wave energy reflection due to the deepened approach channel leading to changes in the distribution of wave energies approaching the coastline. These changes would result in very small changes in the wave height. Tidal currents were predicted to reduce within the estuary area (between the Felixstowe and Beach End areas of the channel) and at the bend in the outer reaches of the channel (between the Harwich Approach and Haven areas of the channel). The deeper channel is shown to alter the ebb tide eddy structure at Landguard Point, resulting in a small area of current increases up 0.08m/s (HR Wallingford, 2012). This may have an impact on the flood and coastal defences.

The geomorphological assessment, based on a sediment budget model, showed small changes in the predicted deposition of sediment within the estuaries, however, the trends of sediment erosion and accretion in the Stour and Orwell estuaries are not predicted to be affected as a result of the proposed deepening (HR Wallingford, 2012).

## 22.3 Potential Impacts

The proposed dredging works are to use a similar method to the current maintenance dredging activities in the Port of Felixstowe undertaken every 10 to 12 weeks. Therefore, direct impacts on the coastal and flood defences at Port of Felixstowe are considered unlikely to occur.

The potential impacts on flood and coastal defences associated with the construction and operation phases of the proposed scheme are set out in **Table 22.1** below. The potential impacts identified in the following table are anticipated to have a negligible effect on the flood and coastal defences.

**Table 22.1**      **Potential impacts of the proposed scheme on flood and coastal defence within the study area**

Potential Impacts	
Construction	No impacts identified
Operation	Potential for a small long term changes in water levels within the Stour and Orwell estuaries that could reduce the flood and coastal defences' standard of protection.
	Potential for small long term change in the wave heights and the pattern of wave energy reflection approaching the coastline that could alter the performance of the flood and coastal defences.

## 22.4 EIA Investigations

It is anticipated that the proposed scheme is likely to have a minimal impact on coastal and flood defences during construction and operation. However, the coastal and flood defence levels within the Stour and Orwell estuaries require further review to confirm there is sufficient freeboard (the difference between the design flood water level and the top of the flood defence structure) in the design to accommodate any changes to the tidal and wave climate that may arise due to the proposed scheme. Hence a more detailed review of flood risk will be undertaken.

During the EIA process consultation will be undertaken with the Environment Agency and SCDC to agree a suitable and proportionate approach to the assessment of flood risk.

## 23 OTHER HUMAN ACTIVITIES

### 23.1 Introduction

This section considers the other users of the seabed around the proposed dredge area and disposal sites, and identifies any potential conflicts which may arise. The other users considered includes offshore wind, offshore wave and tidal, oil and gas, aggregate extraction, other dredge disposal sites, subsea cables and pipelines, anchorage areas, and military practice and/or exclusion zones.

The study area has been identified as:

- the footprint of the proposed dredge area;
- the area offshore that could be influenced by the sediment plume from the dredging; and
- the area surrounding the IGE and IG disposal grounds that could be influenced by the sediment plume.

As outlined in **Section 7**, the hydrodynamic and sediment plume modelling which will be undertaken for the ES will determine the study area limits. For this report, the extent of the sediment plume has been based on the area of influence of the hydrodynamic changes and sediment plume that was modelled as part of the 1998 Approach Channel Deepening studies (HR Wallingford, 1998). The disposal site for the capital dredging has not been confirmed but could potentially be IGE where previous modelling has indicated an area of influence from the disposal of approximately 15.0km within a linear ellipsoid area south-south-west to north-north-east across the IGE offshore area (Posford Haskoning, 2003a and 2003b). Therefore, the study area encompasses a 15.0km radius around the dredge area and disposal sites to cover the anticipated area of influence of the sediment plumes.

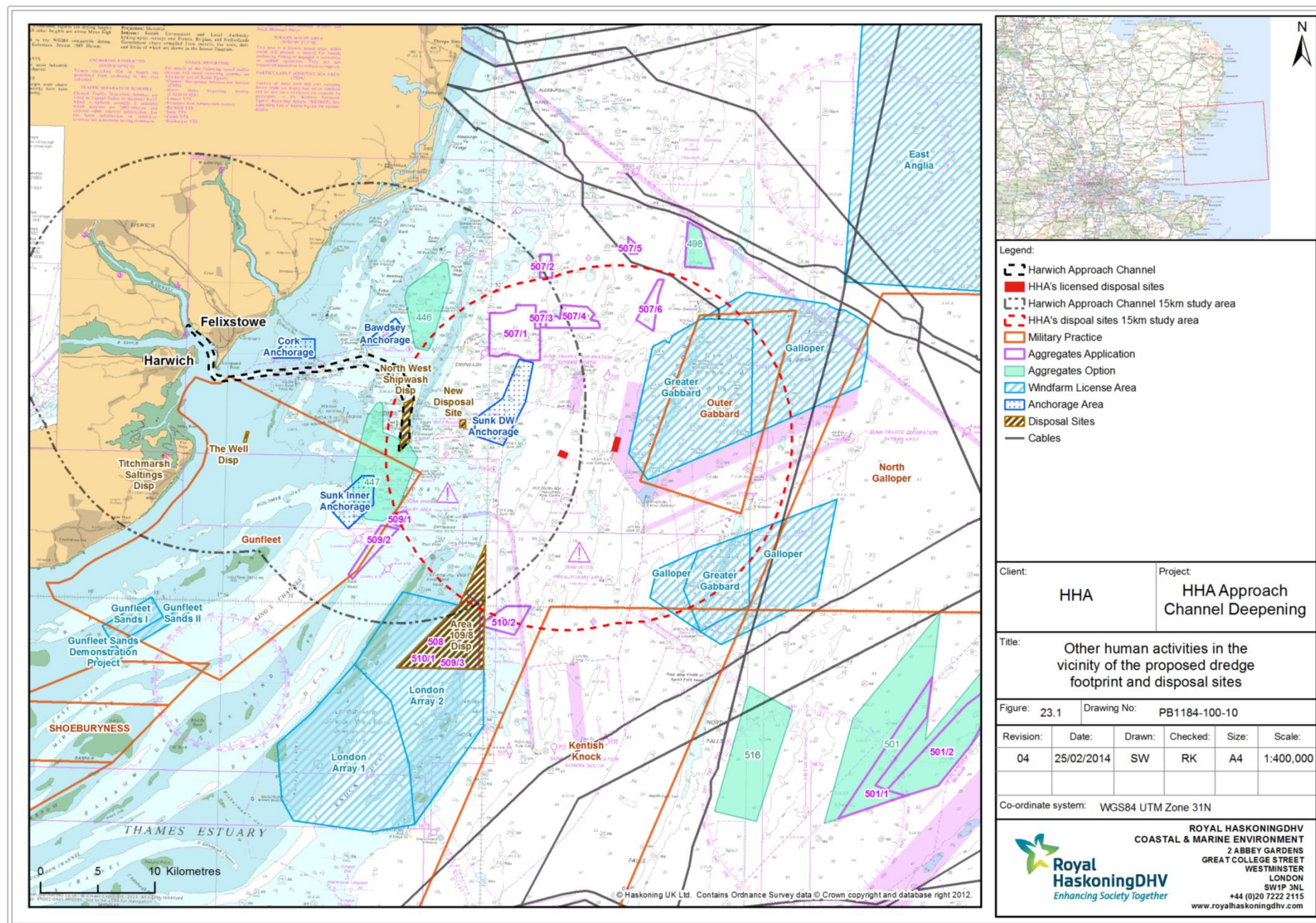
### 23.2 Baseline Conditions

#### 23.2.1 Offshore wind farms

There are a number of offshore wind farms which are either in operation or planned within the Outer Thames Estuary, however, there are only three that are within the study area (refer to **Figure 23.1**), which are Greater Gabbard, Galloper and London Array Offshore Wind Farms. Details of the wind farms are provided in **Table 23.1**.

**Table 23.1 Offshore wind farms in the vicinity of the proposed works**

Wind farm	Status	Distance from dredge channel (km)	Distance from closest disposal site (km)	Scoped in?
Greater Gabbard	Operational	19.2	1.1	Yes
Galloper	Pre-construction	28.3	10.9	Yes
London Array	Operational	12.3	15.7	Yes
Gunfleet Sands	Operational	19.6	34.6	No
East Anglia	Consenting	39.0	23.9	No



### 23.2.2 Offshore wave and tidal

There are no wave and tidal developments within the study area or in the vicinity of the proposed works.

### 23.2.3 Oil and gas

The study area lies within a Round 24 licence block administered by the Department of Energy and Climate Change. However, there is no oil or gas extraction activity occurring within the study area or within the immediate vicinity.

### 23.2.4 Aggregate extraction

There are a number of licensed aggregate extraction sites in the vicinity of the study area as outlined in **Figure 23.1** and **Table 23.2**. Only two of these sites are currently licensed with the majority of sites at the application stage.

**Table 23.2 Aggregate extraction sites in the vicinity of the study area**

Area Number	Licence Holder	Status	Distance from dredge area (km)	Distance from closest disposal site (km)	Scoped in?
108/3	Britannia Aggregate Ltd	Licensed	14.2	14.6	Yes
446	Hanson Aggregates Marine Ltd	Option	2.1	14.4	Yes
447	Resource Management Association (RMA)	Licensed / option	0.0	12.1	Yes
498	Volker Dredging Ltd / Britannia Aggregate Ltd	Application / Option	26.3	16.0	No
501	Westminster Gravels Ltd	Extended option	45.7	30.7	No
501/1	Westminster Gravels Ltd	Application	49.5	33.9	No
501/2	Westminster Gravels Ltd	Application	51.7	37.4	No
507/1	CEMEX UK Marine Ltd	Application	7.5	7.9	Yes
507/2	CEMEX UK Marine Ltd	Application	14.4	14.8	Yes
507/3	CEMEX UK Marine Ltd	Application	12.6	10.7	Yes
507/4	CEMEX UK Marine Ltd	Application	13.0	9.5	Yes
507/5	CEMEX UK Marine Ltd	Application	22.3	16.1	No
507/6	CEMEX UK Marine Ltd	Application	20.6	9.8	Yes
508	Britannia Aggregate Ltd	Application	13.6	14.4	Yes

Area Number	Licence Holder	Status	Distance from dredge area (km)	Distance from closest disposal site (km)	Scoped in?
509/1	Tarmac Marine Dredging Ltd	Application	5.3	14.0	Yes
509/2	Tarmac Marine Dredging Ltd	Application	6.6	15.3	Yes
510/1	CEMEX UK Marine Ltd	Application	13.6	14.4	Yes
510/2	CEMEX UK Marine Ltd	Application	16.5	13.3	Yes
516	Aggregate Industries UK Ltd	Option	36.6	23.5	No

Source: HR Wallingford (2013a)

### 23.2.5 Dredge disposal sites

A review of the disposal sites in the study area indicated that in addition to IGE and IG disposal sites where the proposed capital dredge material may be disposed, there are a number of other disposal sites to be considered. The location of these disposal sites in relation to the proposed dredge area and IG and IGE disposal sites are outlined in **Table 23.3** and **Figure 23.1**.

**Table 23.3 Disposal sites within the vicinity of the study area**

Disposal sites	Distance from dredge area (km)	Distance from closest disposal site (km)	Scoped in?
Titchmarsh Saltings	7.9	34.3	Yes
The Well	4.6	27.0	Yes
Area 109/8	11.2	10.0	Yes
North-west Shipwash	0.0	12.9	Yes
HHA's new disposal site	4.3	8.3	Yes

### 23.2.6 Subsea cables and pipelines

There is one set of subsea cables running across the seabed within the study area. This is the cable route from the Greater Gabbard Offshore Wind Farm as shown in **Figure 23.1**. Only a small amount of the cable is within the 15km radius from the disposal sites.

### 23.2.7 Military practice and/or exclusion zones

Within the study area and its vicinity there are five different military practice areas. Details of these military practice areas and exclusion zones are provided in **Table 23.4** and the locations are outlined in **Figure 23.1**.

**Table 23.4 Military practice/exclusion zones within the vicinity of the study area**

Military practice/exclusion zones	Distance from dredge area (km)	Distance from closest disposal site (km)	Scoped in?
North Galloper	33.0	16.1	No
Outer Gabbard	20.5	2.9	Yes
Gunfleet	0.0	12.0	Yes
Kentish Knock	19.0	13.0	Yes
Shoeburyness	24.7	35.4	No

### 23.3 Potential Impacts

The potential impacts associated with other human activities and uses of the seabed are related to sediment deposition arising from the dredging and disposal plumes, and the presence of dredging vessels in the dredge area, the disposal sites and in transit between these areas.

Sediment plume modelling will be undertaken as part of the ES and this will indicate the level of likely impacts associated with each activity.

A list of the potential impacts which may arise during the construction and operation phases of the proposed works are provided in **Table 23.5**.

**Table 23.5 Potential impacts of the proposed scheme on other human activities within the study area**

Potential Impacts	
Construction	Deposition of suspended sediments from dredging and/or disposal on aggregate extraction sites
Operation	Increased scour on offshore wind farm monopile foundations resulting from changes to hydrodynamic processes.
	Changes to disposal sites due to changes in hydrodynamic processes.

### 23.4 EIA Investigations

The following parameters will be scoped out of further assessment in the ES due to the lack of proximity of the features to the study area:

- Offshore wave and tidal;
- Oil and gas; and
- Military practice zones.

It is also assumed unlikely that the subsea cables associated with Greater Gabbard Offshore Wind Farm would be affected by the proposed works, and subsea cables and pipelines have therefore been discounted from further consideration.

A desk-based study of the offshore wind farms, aggregate extraction sites, and dredge disposal sites will be undertaken as part of the ES. Further detail on these activities will be provided and the potential impacts will be assessed. Further consultation with relevant stakeholders will be undertaken as part of the ES process, as required or deemed necessary through the scoping phase.

## **24 INFORMATION FOR HABITATS REGULATIONS ASSESSMENT**

### **24.1 Introduction**

This section of the Scoping Report provides information intended to enable the competent authorities to determine the likely implications of the proposed works for designated European nature conservation interests and the need for Appropriate Assessment of the proposed scheme.

The information is structured so as to present a view as to whether the proposed works would (either alone or in-combination with other plans or projects) be likely to have a significant effect on relevant designated European nature conservation interests and the conservation objectives that apply to these interests. The assessment process is explained below but, in summary, the following is provided:

- an overview of the HRA process and methodology for assessment;
- information on the environmental baseline relevant to HRA requirements;
- screening of the project to determine likely significant effect in respect of relevant European sites and features; and
- a summary and brief discussion of the next steps.

### **24.2 HRA Process and Methodology**

The Habitats Directive (92/43/EEC) protects habitats and species of European nature conservation importance. Together with the Birds Directive (2009/147/EC), the Habitats Directive establishes a network of internationally important sites designated for their ecological status; Natura 2000. SACs and Sites of Community Importance (SCIs) are designated under the Habitats Directive and promote the protection of flora, fauna and habitats. SPAs are designated under the Birds Directive in order to protect rare, vulnerable and migratory birds.

The Habitats Regulations 2010 incorporate all SPAs into the definition of European sites and, consequently, the protections afforded to European sites under the Habitats Directive apply to SPAs designated under the Birds Directive. In addition to sites designated under European nature conservation legislation, UK Government policy (ODPM Circular 06/2005) states that internationally important wetlands designated under the Ramsar Convention 1971 (Ramsar sites) are afforded the same protection as SPAs and SACs for the purpose of considering development proposals that may affect them.

Regulation 61 of the Habitats Regulations defines the procedure for the assessment of the implications of plans or projects on European sites. Under this Regulation, if a proposed development is unconnected with site management and is likely to significantly affect the designated site, the competent authority must undertake an 'appropriate assessment' (Regulation 61(1)).

Typically a staged process to undertaking assessment under the Habitats Regulations is practiced, as follows:

- Screening (Step 1): The process of identifying potentially relevant European sites and the likely impacts of a project upon the designated features of a European site, either alone or in combination with other plans and projects, and considering whether the impacts are likely to be significant.
- Appropriate Assessment (Step 2): Assessment of the impacts, taking into account proposed mitigation measures, on the integrity of the European site, either alone or in combination with other plans and projects, with regard to the site's structure and function and its conservation objectives. If it cannot be concluded beyond reasonable scientific doubt that the project would not adversely affect site integrity then development consent cannot be issued unless the steps set out in Stages 3 and 4 are successfully concluded.
- Assessment of Alternative Solutions (Step 3): Examining alternative ways of achieving the objectives of the project, to establish whether there are solutions that would avoid an adverse effect on the integrity of a European site(s).
- Assessment of IROPI (Step 4): If it is shown that there are no alternative solutions then the project can receive development consent only if it can also be demonstrated that it should proceed for imperative reasons of overriding public interest (IROPI). Where IROPI can be shown then compensatory measures required to maintain the overall coherence of the site or integrity of the European site network will need to be identified and secured.

In respect of Step 2, guidance on what constitutes the integrity of a European site has been provided by the European Commission (EC, 2000). In this guidance, integrity is defined as: *"the coherence of the site's ecological structure and function, across its whole area, which enables it to sustain the habitat, complex of habitats and/or populations of species for which the site has been designated"*.

All four stages of the process are referred to cumulatively as the HRA, in order to clearly distinguish the whole process from the step within it referred to as the Appropriate Assessment (AA).

In respect of scoping the implications of the proposed approach channel deepening, the HRA process reported here is confined to Step 1, i.e. consideration of likely significant effect (referred to as LSE).

#### 24.2.1 Implications of the scheme in combination with other plans or projects

When assessing the implications of a plan or project in light of the conservation objectives for a European site (i.e. assessing the potential for LSE and ascertaining the potential for an effect on site integrity), it is necessary to consider the potential for in-combination effects on the designated interest features of the site.

Natural England's Habitats Regulations Guidance Note 4 (English Nature, 2001a) provides guidance on in-combination effects and, at paragraph 2.3, states that other plans or projects should include:

- approved but as yet uncompleted plans or projects;
- permitted on-going activities such as discharge consents or abstraction licenses; and
- plans and projects for which an application has been made and which are currently under consideration but not yet approved by competent authorities.

In undertaking an in-combination assessment it is important to consider the potential for each plan or project to influence the site. In order for an in-combination effect to arise, the nature of two effects does not necessarily have to be the same. The in-combination effects assessment, therefore, focuses on the overall implications for the site conservation objectives regardless of the type of effect.

The proposed approach to the Cumulative Impact Assessment (CIA) in the EIA is outlined in **Section 24**. The list of potential plans and projects considered to have the potential to cause an environmental effect in-combination or cumulatively with the proposed channel deepening are provided in **Table 25.1**.

## 24.3 Screening of European Sites and Likely Significant Effect

### 24.3.1 Introduction

The screening process is based on an examination of the capacity of the likely effects of the proposed dredging and disposal to influence the designated ecological features of the relevant European sites, such that a LSE could arise.

There is no specific definition of what constitutes a LSE, however, guidance produced by Natural England (English Nature, 1999) provides information on the determination process and the criteria that can be applied in reaching a decision.

The guidance states: *“Likely significant effect is, in this context, any effect that may reasonably be predicted as a consequence of a plan or project that may affect the conservation objectives of the features for which the site was designated, but excluding trivial or inconsequential effects. Proposals having no, or de minimis, effects can be progressed without further consideration under the Habitats Regulations (i.e. there is no requirement to undertake appropriate assessment) although reasons for reaching this decision must be justified and recorded”*. The following criteria are cited as potential types of effects that are likely to be significant:

- causing change to the coherence of the site or to the Natura 2000 series (e.g. presenting a barrier between isolated fragments, or reducing the ability of the site to act as a source of new colonisers);
- causing reduction in the area of habitat or of the site;
- causing direct or indirect change to the physical quality of the environment (including the hydrology) or habitat within the site;
- causing on-going disturbance to species or habitats for which the site is notified;
- altering community structure (species composition);
- causing direct or indirect damage to the size, characteristics or reproductive ability of populations on the site;

- altering the vulnerability of populations etc. to other impacts;
- causing a reduction in the resilience of the feature against external change (for example its ability to respond to extremes of environmental conditions); and
- affecting restoration of a feature where this is a conservation objective.

The types of effects associated with a project, particularly their spatial extent and duration, are of particular importance in identifying the European sites and constituent designated features that may be influenced.

In terms of the criteria listed above and taking into account the types of effects and potential impacts that have been identified in the preceding sections of this Scoping Report, the impact pathways listed in **Table 24.1** have the potential capacity to alter physical and biological conditions such that an effect on designated habitats and / or species populations could arise.

**Table 24.1 Potential effects of the proposed scheme and impact on receptors/features that may be significant in the context of designated European sites**

Potential Effects During Construction	Receptor – Impact
Morphological change to subtidal and intertidal areas through removal of material and settlement of fine sediment from the dredging plume	Direct loss of subtidal habitat. Smothering of benthos (subtidal and intertidal) due to settlement of sediment from the dredging plume. Alteration of composition of benthic communities due to sediment deposition that may influence the prey resource availability to birds using intertidal areas.
Short term increases in suspended sediment concentrations through the creation of sediment plumes at dredging site	Impact of increased suspended sediment concentrations on organisms in the water column (e.g. fish) and on the seabed. Potential short term consequences of any changes on ecological function, including prey availability for birds (e.g. fish for red-throated diver in the Outer Thames Estuary SPA).
Short term increases in suspended sediment concentrations and bed load through disposal activities	As above.
Generation of underwater noise during dredging and disposal	Increased noise levels may generate behavioural responses in some organisms (e.g. many species of fish), leading to displacement from affected areas. In turn this may affect prey availability for some species of birds (e.g. divers, seabirds).
General construction related disturbance effects as a result of increased activity	Birds may be displaced from existing foraging areas if potential disturbance effects are significant (e.g. increase in vessel traffic above typical baseline levels).
Potential Effects During Operation	Receptor – Impact
Change in the hydrodynamic regime at the coast, within Harwich Harbour and the wider Outer Thames Estuary due to the deepened approach channel	Changes in the hydrodynamic regime may locally alter physical conditions such that threshold values in some parameters (e.g. current velocity / wave height) may exceed those values that some organisms / communities are adapted to, leading

Potential Effects During Construction	Receptor – Impact
	to possible changes in community composition.
Effects on the sediment budget and sediment transport in the Stour and Orwell estuaries and along the Essex and South Suffolk coast due to the influence of deepened areas	Sediment supply to intertidal and subtidal habitats may be altered to the extent that existing patterns of deposition and erosion may be affected, in turn, leading to changes in the extent of habitats.
Changes to the tidal prism of Harwich Harbour	The exposure regime of the intertidal area within the Stour and Orwell estuaries and along the Essex coast may be altered, leading to potential changes in both intertidal invertebrate/plant communities and the availability of intertidal area as a resource for feeding waterbirds.
Effects of continual maintenance dredging on coastal processes	Potential for intermittent but long-term generation of high concentrations of suspended sediment and the influence that this may have on organisms in the water column and via re-deposition on benthic communities.
Disturbance effects generated during maintenance dredging activities (including disposal)	Birds may be displaced from existing foraging areas if potential disturbance effects are significant (e.g. increase in vessel traffic above typical baseline levels).

#### 24.3.2 Relevant designations

Without detailed assessment work, particularly in respect of analysis of the effects that the works may have on hydrodynamics and the transport of suspended sediment, an initial assumption has been made that the effects of the proposed works would be confined to an area within 10.0km of the footprint of the works (including the disposal site for the capital dredge material). European sites that are located within this 10.0km zone, or that could be influenced by the effects of the project within this area, will be included in the HRA process. These include:

- Stour and Orwell Estuaries Ramsar and SPA;
- Hamford Water Ramsar and SPA;
- Deben Estuary Ramsar and SPA;
- Outer Thames Estuary SPA; and
- Margate and Long Sands SAC.

Full details of these sites are provided in **Table 5.1** and the location of the sites in relation to the project area is shown in **Figure 5.1**.

The proposed approach channel deepening is located adjacent to the Stour and Orwell Estuaries SPA and Ramsar site (0.1km away), within 3.1km of the Hamford Water SPA and Ramsar site, 6.4km away from the Deben Estuary SPA and Ramsar, 0.1km of the Outer Thames Estuary SPA, and 7.7km from the Margate and Long Sands SAC (see **Figure 5.1**). Should it become apparent through the assessment process that the effects of the project could manifest at a spatial extent greater than the initial 10.0km

zone then further consideration will be given to screening other European Sites and their designated features into the HRA process.

#### **24.4 Initial Consideration of LSE and Next Steps**

The location of the proposed works adjacent to the designated boundary of the Stour and Orwell Estuaries SPA and Ramsar site, together with the types of effects likely to manifest, indicate that there is the potential for the designated features of a number of European sites to be affected by the proposed capital dredging and disposal.

Both the short-term (construction) and longer term (operation) effects of the scheme on water quality and coastal processes have the potential to influence habitats that support the designated waterbird populations of SPAs and / or form the designated interests of a number of Ramsar sites in the wider area. Short term water quality effects linked to increased suspended sediment concentrations and subsequent re-deposition of fine sediment could affect the composition and function of benthic communities within designated sites and also influence populations of potential prey species of birds. While disturbance effects and impacts on organisms are likely to be limited, particularly when viewed in the context of existing activities and vessel movements in the area, dredging operations may still lead to localised disturbance that may be significant under some circumstances.

Based on the location of the works and the types of effects likely to arise, the initial conclusion is that the proposed approach channel deepening and disposal of dredged material could give rise to LSE with respect to a number of internationally designated sites and their interest features. If as a result of the information provided in this Scoping Report and consultation with relevant bodies it is determined that LSE could arise then the required information to define the full extent of LSE in respect of relevant designated sites and their features would be provided in the ES and a report to inform the HRA process (the HRA Report). Depending on the outcome of the LSE determination, information would also be presented in the HRA Report to enable the competent authority to undertake an AA of the implications of the works on the designated features of the relevant European and Ramsar sites.

## 25 CUMULATIVE IMPACTS

### 25.1 Introduction

The ES to be prepared in support of the application for consent for the proposed scheme will include a cumulative impact assessment (CIA). That is, the assessment of the potential effects of the works when combined with the potential effects of other relevant plans and projects in the study area (i.e. the area of influence of the works or the area in which receptors potentially affected by the works are present).

In line with agreed practice, this assessment will be limited to plans and projects where there is sufficient information to allow consideration of the potential for a cumulative or in-combination effect to arise. In the absence of publicly available information (usually in the form of a planning application) or a defined 'scheme', it is not possible to undertake a proper consideration of cumulative effects (i.e. if proposals are speculative or where assumptions regarding potential impacts may be contentious).

### 25.2 Projects Identified

There are a limited number of projects which have been identified to date as having the potential to have an environmental impact in-combination or cumulatively with the proposed Harwich Haven channel deepening. These projects are outlined in **Table 25.1**. Relevant searches will also be undertaken with the Local Planning Authorities and the MMO to identify any other relevant projects.

**Table 25.1 Plans and Projects to be considered in the CIA**

Plans and projects to be considered for cumulative impacts
Aggregate extraction sites in the vicinity of the dredge area and disposal sites
Bathside Bay Container Terminal
Felixstowe Berth 9 Quay Extension
Felixstowe Berth 10 (Phase 2 of the Felixstowe South Reconfiguration)
HHA ongoing maintenance dredging campaigns
HHA's potential new dredging disposal site in the Outer Thames Estuary
Ipswich Environment Agency flood barrier
Shoreline Management Plan 7: Lowestoft Ness to Felixstowe Landguard Point
Shoreline Management Plan 8: Essex and South Suffolk (Landguard Point to Two Tree Island, Thames Estuary)

### 25.3 CIA Investigations

European Commission (1999) and IEMA (2004) standard guidance will be used for the CIA, with the first step being to determine the likely spatial and temporal overlaps of the plans and projects screened into the assessment in order to determine where interactions could arise; the next being to determine the effects of the proposed scheme that have the potential to affect receptors in-combination with other proposed activities; and the final step being to determine the significance of any potential interactions/effects

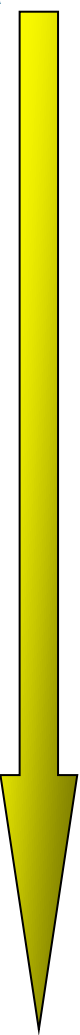
identified (as well as relevant mitigation). The scope of the CIA will be discussed and agreed through the consultation to be carried out throughout the EIA process.

## 26 NEXT STEPS AND THE ENVIRONMENTAL STATEMENT

### 26.1 EIA Methodology

Relevant EIA legislation (the Marine Works (EIA) (Amendment) Regulations 2011) and good practice guidelines (IEMA, 2004) recommend that EIA proceeds in a number of steps, as summarised in **Table 26.1**.

**Table 26.1 Methodology for EIA**

Stage	Task	Aim/Objective	Work/Output (Examples)
EIA 	Consultation – throughout EIA process	Consult with statutory and non-statutory organisations with an interest in the area and scheme	Local knowledge and information
	Primary Data Collection	To identify the baseline/ambient/background/ existing environment	Background data including existing literature and specialist studies
	Specialist Studies	To further investigate those environmental parameters which may be subject to potentially significant effects	Specialist reports (e.g. hydrodynamic modelling and archaeological assessment)
	Impact Assessment	To evaluate the baseline environment in terms of sensitivity To evaluate and predict the impact (i.e. magnitude) upon the baseline To assess the resultant effects of the above impacts (i.e. determine significance)	Series of significant adverse and beneficial impacts
	Mitigation Measures	To identify appropriate and practicable mitigation measures and enhancement measures	The provision of solutions to adverse impacts (e.g. sensitive scheduling to avoid noise and traffic impacts) Feedback into the design process, as applicable
	ES	Production of the ES in accordance with EIA guidance	ES

### 26.2 Consultation Process

Consultation with all relevant organisations, both statutory and non-statutory, whose interests might be affected by the construction and operation phases of the proposed scheme will continue throughout the EIA process.

## 26.3 Investigations for the EIA

In summary, the surveys/studies which have already been undertaken or are planned as part of the EIA are outlined in **Table 26.2**.

**Table 26.2 Surveys and studies which have been undertaken or are planned for the EIA**

Surveys and Studies
<b>Undertaken</b>
Initial hydrodynamic modelling
Site investigations – including archaeological investigations
Sediment quality sampling
<b>Planned</b>
Further hydrodynamic modelling based on review of existing information
Purchase of WeBS data and collation of other existing bird surveys
Flood Risk Assessment
Provision of information for HRA
WFD compliance assessment

### 26.3.1 Consideration of alternatives

Details will be provided of the alternatives that have been and are to be considered for the scheme. However, given the scope of the works proposed, the options relating to the dredging itself are limited. The main alternatives which will be discussed in the ES will relate to the options for the use and / or disposal of the capital dredged material.

### 26.3.2 Habitats Regulations Assessment

It is intended that the ES will contain the information that is needed for the relevant competent authorities to undertake HRA. An important aspect of this will be the assessment of potential in-combination impacts arising from other plans or projects. The European sites that will be assessed include:

- Stour and Orwell Estuaries SPA and Ramsar site;
- Hamford Water SPA and Ramsar site;
- Deben Estuary SPA and Ramsar site;
- Outer Thames Estuary SPA; and
- Margate and Long Sands SAC.

The impact of the scheme on BAP priority habitats and species (national and local) will also be investigated and any environmental enhancement opportunities identified.

### 26.3.3 Water Framework Directive compliance assessment

A WFD compliance assessment will be undertaken as outlined in **Section 8**.

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