

# Port of Southampton



## Southampton Maintenance Dredge Protocol and Water Framework Directive Compliance Baseline Document

Date: August 2014  
Project No: 4209/1  
Report No: R2262

Page intentionally left blank

ABP Southampton

## Southampton Maintenance Dredge Protocol and Water Framework Directive Compliance Baseline Document



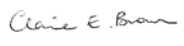
Date: August 2014

Project Ref: R/4209/1

Report No: R.2262

© ABP Marine Environmental Research Ltd

Version	Details of Change	Date
1.0	Working Draft	30.05.2014
2.0	Issue for Client Comment	11.06.2014
3.0	Issue for Client Comment	16.06.2014
4.0	Issue after Client Review	14.08.2014

Document Authorisation		Signature	Date
Project Manager:	A M Chaffey		14.08.2014
Quality Manager:	M J Smedley		14.08.2014
Project Director:	C E Brown		14.08.2014

**Disclaimer:**

- *Any 'Draft' issue of this report, and any information contained therein, may be subject to updates and clarifications on the basis of any review comments before 'Final' issue. All content should therefore be considered provisional, and should not be disclosed to third parties without seeking prior clarification from ABP Marine Environmental Research Ltd ("ABPmer") of the suitability of the information for the intended disclosure and should not be relied upon by the addressee or any other person.*
- *Unless previously agreed between the addressee and ABPmer, in writing, the 'Final' issue of this report can be relied on by the addressee only. ABPmer accepts no liability for the use by or reliance on this report or any of the results or methods presented in this report by any party that is not the addressee of the report. In the event the addressee discloses the report to any third party, the addressee shall make such third party aware that ABPmer shall not be liable to such third party in relation to the contents of the report and shall indemnify ABPmer in the event that ABPmer suffers any loss or damage as a result of the addressee failing to make such third party so aware.*
- *Sections of this report rely on data supplied by or drawn from third party sources. Unless previously agreed between the addressee and ABPmer, in writing, ABPmer accepts no liability for loss or damage suffered by the addressee or any third party as a result of any reliance on third party data contained in the report or on any conclusions drawn by ABPmer which are based on such third party data.*

## Summary

ABP Port of Southampton (ABP Southampton), the Statutory Harbour Authority (SHA) for Southampton, has commissioned ABP Marine Environmental Research Ltd (ABPmer) to compile this Maintenance Dredge Baseline document in support of the Maintenance Dredge Protocol. The aim of the protocol is to collate relevant information into a Baseline Document to assist operators and regulators seeking, or giving approval, for maintenance dredging activities that could potentially affect European designated sites. This Baseline Document provides information for the study area to:

- Provide all parties wishing to carry out maintenance dredging within the study area with the relevant baseline information ; and
- Provide the information needed to inform the preparation of Water Framework Directive (WFD) compliance assessments in accordance with the Environment Agency's 'Clearing the Waters' guidance.

ABP Southampton is located at a strategic position on the coast, in close proximity to the international shipping lanes and Continental Europe, while Southampton Water is one of the busiest waterways in the United Kingdom, with around 64,000 vessel movements in 2012. Maintaining safe port access for commercial and recreational maritime transport is an important function for Harbour Authorities. This necessitates the maintenance dredging of access channels and berth pockets to remove recently deposited sediment. Dredging in relation to capital and maintenance activities has been undertaken within the estuary for over two centuries.

At present the maintenance dredge commitment within the study area is undertaken by a number of licensed operators, which include:

- ABP Southampton who maintain the navigational fairways and its docks and berths;
- Westminster Dredging Limited who maintain the operational and navigation depths in the approaches and berths at Marchwood Sea Mounting Centre;
- Marina Development Ltd (MDL) marinas who maintain basin and approach channel depths at four marinas within the estuary; and
- Esso Petroleum Company Ltd, BP Oil UK Ltd, LaFarge Tarmac Aggregates Ltd, Oceanic Estates Ltd, Homes and Communities Agency, RWE Npower plc and European Metal Recycling Ltd, who all maintain the berth and channel depths at their respective facilities within the estuary.

The volume of material dredged within the estuary between 2005 and 2013 was around 0.5 million m<sup>3</sup> per annum. Approximately 85% of this material was dredged by ABP (approximately 405,000 m<sup>3</sup>), while the remaining 15% was dredged by non-ABP (third party) operators (approximately 72,000 m<sup>3</sup>).

Baseline Documents do not require substantial revisions unless major changes are proposed or significant new information becomes available. A number of consented schemes are ongoing within Southampton Water, particularly the Southampton Approach Channel Dredge (SACD) being facilitated by ABP Southampton. This Baseline Document summarises the current (existing) situation, with reference made to ongoing schemes such as the SACD. After developments have been completed, the Maintenance Dredge Protocol guidance identifies that the obligation for funding an update to the Baseline Document, rests with the scheme promoter.

## Acknowledgements

The authors would like to thank the contributions of data and advice made by the following representatives of companies, local authorities and agencies:

- Rebecca Faulkner Cefas;
- Mark Quilliam MDL Ltd;
- John Hamilton BP Oil UK Ltd;
- Richard Cope Westminster Dredging;
- Jayne Roughley Fawley B Power Station;
- Paul Flatt Homes and Communities Agency;
- Harry Hutchinson Oceanic Estates Ltd;
- Glenn Privett Veolia Environmental Services;
- Gary Langton LaFarge Tarmac Aggregates;
- Arthur Farmiloe LaFarge Tarmac Aggregates;
- Paul Toswell Lymington Technical Services Ltd;
- Nick White European Metal Recycling Ltd;
- Karl Reed Raymond Brown Recycling and Minerals;
- Mandy Skeates Itchen Marine (Towage) Ltd; and
- Timothy Barlow Marchwood Yacht Club.

## Abbreviations

AA	Appropriate Assessment
ABP	Associated British Ports
ABP Research	ABP Research & Consultancy Ltd
ABPmer	ABP Marine Environmental Research Ltd
AL	Action Level
AMS	Adaptive Management Strategy
AOD	Above Ordnance Survey GB 1936 Datum
As	Arsenic
AWB	Artificial Water Body
CCO	Channel Coastal Observatory
Cd	Cadmium
CD	Chart Datum
Cefas	Centre for Environment, Fisheries and Aquaculture Science
cMCZ	candidate Marine Conservation Zone
CPA	Coast Protection Act
Cr	Chromium
Cu	Copper
DAS	Disposal at Sea
DBT	Dibutyltin Compounds
DCLG	Department for Communities and Local Government
DDE	1,1-dichloro-2,2-bis(p-chlorophenyl)ethylene
DDT	Dichlorodiphenyltrichloroethane
Defra	Department for the Environment, Food and Rural Affairs
DfT	Department for Transport
DGPS	Differential Global Positioning System
EA	Environment Agency
EC	European Commission
EEC	European Economic Community
EIA	Environmental Impact Assessment
EMMP	Environmental Management and Monitoring Plan
EMS	European Marine Site
EQS	Environmental Quality Standards
ES	Environmental Statement
EU	European Union
FEPA	Food and Environment Protection Act
GEP	Good Ecological Potential
GHD	Grab Hopper Dredger
ha	Hectare
Habitats Regs	The Conservation of Habitats and Species Regulations 2010
HAT	Highest Astronomical Tide
Hg	Mercury
HMWB	Heavily Modified Water Body
HW	High Water
IGS	Infralittoral Gravelly Sand

IMS	Infralittoral Muddy Sands
IMU	Infralittoral Mud
JNCC	Joint Nature Conservation Committee
LAT	Lowest Astronomical Tide
LGS	Littoral Gravels and Sands
LMS	Littoral Muddy Sands
LMU	Littoral Muds
LMX	Littoral Mixed Sediments
LSE	Likely Significant Effect
LW	Low Water
MAFF	Ministry of Agriculture, Fisheries and Food
MBT	Monobutyltin
MCZ	Marine Conservation Zone
MDP	Maintenance Dredge Protocol
MFA	Marine and Fisheries Agency
MHWN	Mean High Water Neaps
MHWS	Mean High Water Springs
MLWN	Mean Low Water Neaps
MLWS	Mean Low Water Springs
MMO	Marine Management Organisation
MPA	Marine Protected Area
MSA	Merchant Shipping Act
MSL	Mean Sea Level
MV	Motor Vessel
N2K	Natura 2000
NDPB	Non-departmental Public Body
Ni	Nickel
nm	Nautical Mile
NPPC	National Planning Policy Framework
NTL	Normal Tidal Limit
NVC	National Vegetation Classification
ODN	Ordnance Survey Datum Newlyn
OSGB	Ordnance Survey Great Britain
OSPAR	Oslo Convention (1972) and Paris Convention (1974), unified and up-dated by the 1992 OSPAR Convention
PAH	Polyaromatic Hydrocarbons
PAH	Polycyclic Aromatic Hydrocarbons
Pb	Lead
PCB	Polychlorinated Biphenyls
POP	Persistent Organic Pollutant
ppm	parts per million
ppt	parts per trillion
PSA	Particle Size Analysis
RAF	Royal Air Force
Ramsar	The Convention on Wetlands (Ramsar, Iran, 1971)
RBMP	River Basin Management Plan
Ro/Ro	Roll-on/Roll-off



SAC	Special Areas of Conservation
SACD	Southampton Approach Channel Dredge
SCT	Southampton Container Terminals
SHA	Statutory Harbour Authority
SMC	Sea Mounting Centre
SMP	Shoreline Management Plans
SPA	Special Protection Area
spp.	Species
SSC	Suspended Sediment Concentrations
SSSI	Sites of Special Scientific Interest
STW	Sewage Treatment Works
TBT	Tributyltin (or Tributyltin Compounds)
TDE	1,1-dichloro-2,2-bis(p-chlorophenyl)ethane
THC	Total Hydrocarbons
TPH	Total petroleum hydrocarbons
TSHD	Trailer Suction Hopper Dredger
UK	United Kingdom
UKD	UK Dredging
UKHO	United Kingdom Hydrographic Office
UKTAG	United Kingdom Technical Advisory Group
USEPA	United States Environment Protection Agency
UWWTD	Urban Waste Water Treatment Directive
VHT	Vehicle Handling Terminals
VTs	Vessel Traffic Services
WeBs	Wetland Bird Survey
WFD	Water Framework Directive
WGS	World Geodetic System
WID	Water Injection Dredger
Zn	Zinc

## Nomenclature

Hs	Significant Wave Height
Tp	Peak Wave Period

Cardinal points/directions are used unless otherwise stated.

SI units are used unless otherwise stated.

# Southampton Maintenance Dredge Protocol and Water Framework Directive Compliance Baseline Document

## Contents

	Page
Summary .....	5
Acknowledgements.....	6
Abbreviations.....	7
Nomenclature .....	9
1. Introduction.....	14
1.1 Background .....	14
1.2 Objectives.....	14
1.3 Study Area.....	15
1.4 Report Structure .....	16
2. Legislation .....	17
2.1 National Legislation .....	17
2.2 Marine Navigation Dredging Under the Habitats Regulations.....	17
2.3 Marine Navigation Dredging Under the Water Framework Directive .....	18
2.4 Local Harbour Powers .....	18
3. Coastal Processes and Morphology .....	20
3.1 Estuary Form .....	20
3.1.1 Overview .....	20
3.1.2 Geological Change.....	21
3.1.3 Anthropogenic Influence .....	21
3.1.4 Estuary Morphology .....	23
3.1.5 Natural Variability .....	24
3.2 Hydrodynamic Regime .....	24
3.2.1 Overview .....	24
3.2.2 Waves .....	25
3.2.3 Tidal Levels .....	25
3.2.4 Tidal Currents.....	26
3.2.5 Freshwater Inputs .....	27
3.3 Sediment Transport Pathways and Budget .....	27
3.3.1 Overview .....	27
3.3.2 Sediments .....	27
3.3.3 Sources.....	28
3.3.4 Sinks .....	31
3.3.5 Transport Pathways .....	31
3.3.6 Budget.....	32

4.	Dredging Information .....	33
4.1	Historic Dredging .....	33
4.2	Current Dredge Practice .....	33
4.2.1	Overview .....	33
4.2.2	Beneficial Use .....	34
4.2.3	Dredging Methods .....	34
4.3	Maintenance Dredge Disposal .....	35
4.4	Dredging Activity .....	36
4.4.1	ABP Dredging .....	36
4.4.2	Non-ABP (Third Party) Dredging .....	42
5.	Sediment Quality .....	49
5.1	Sediment Quality within the Study Area .....	49
5.1.1	Metals .....	50
5.1.2	Organotins .....	50
5.1.3	Polychlorinated Biphenyls (PCBs) .....	50
5.1.4	Polyaromatic Hydrocarbons (PAHs) .....	50
5.2	Summary of Sediment Quality .....	51
6.	Licence Information .....	52
6.1	ABP Licence Information .....	52
6.1.1	Current ABP Maintenance Licence (L/2011/00233/1) .....	52
6.1.2	Recent ABP Licence History .....	52
6.2	Current Non-ABP (Third Party) Licence Information .....	53
6.2.1	BP Oil UK Ltd L/2013/00056 .....	53
6.2.2	Esso Petroleum Company Ltd L2012/00417/2 .....	54
6.2.3	Tarmac Ltd L/2012/00142 .....	54
6.2.4	Oceanic Estates Ltd L/2012/00411 .....	55
6.2.5	Marina Developments Ltd L/2012/00409/1 .....	55
6.2.6	Marina Developments Ltd L/2011/00312/1 .....	56
6.2.7	Marina Developments Ltd L/2012/00339 .....	57
6.2.8	Marina Developments Ltd L/2011/00291 .....	57
6.2.9	Homes and Communities Agency L/2013/00109/2 .....	58
6.2.10	Homes and Communities Agency L/2013/00152/1 .....	58
6.2.11	Westminster Dredging Company Limited L/2014/00051/1 .....	59
7.	Environmental Information .....	60
7.1	Conservation and Designations .....	60
7.1.1	Special Protection Areas .....	60
7.1.2	Ramsar Sites .....	60
7.1.3	Special Areas of Conservation .....	62
7.1.4	European Marine Sites .....	63
7.1.5	Compensatory Sites .....	63
7.1.6	Marine Conservation Zones (MCZ) .....	63
7.2	Regulation 35 Advice .....	66
7.2.1	SPA Sub-features .....	66
7.2.2	Ramsar Sub-features .....	66
7.2.3	SAC Sub-features .....	67
7.2.4	Favourable Condition Status .....	68

7.3	Water Framework Directive Baseline Information.....	70
7.3.1	Study Area Water Bodies.....	70
7.3.2	Current Status of Water Bodies.....	72
7.3.3	Water Quality – Bathing Waters Directive.....	73
7.3.4	Water Quality – Shellfish Waters Directive.....	74
7.3.5	Water Quality – Freshwater Fish Directive.....	75
7.3.6	Water Quality – Urban Waste Water Treatment Directive.....	76
7.3.7	Water Quality – Other Directives.....	76
7.3.8	Directive Overlap.....	76
8.	References.....	77

## Appendices

- A. Sediment Quality Data
- B. SPA Site Bird Species
- C. Favourable Conditions Status
- D. Water Body Status

## Tables

3.1	Reclamation history through Southampton Water.....	22
3.2	Historical channel deepening activities.....	22
3.3	Tidal levels for Southampton Water.....	26
3.4	Estimated intertidal erosion volume within Southampton Water and the River Test, River Itchen and River Hamble.....	29
3.5	Estimated subtidal erosion volume within Southampton Water and the River Test, River Itchen and River Hamble.....	29
3.6	Change in saltmarsh areas within Southampton Water (1946 to 1996).....	30
3.7	Summary of baseline sources and sinks for Southampton Water (x10 <sup>3</sup> m <sup>3</sup> per year).....	32
4.1	ABP Southampton dredging volumes within the study area between 1998 and 2007.....	34
4.2	Disposal sites nearby to the study area.....	35
4.3	DAS tonnage records for maintenance dredging returns at relevant disposal sites.....	36
4.4	ABP Southampton maintenance dredge material volume (m <sup>3</sup> ) from 2005 to 2013.....	37
4.5	Maintenance dredging volumes (m <sup>3</sup> ) for Marchwood SMC approaches and berths dredge areas.....	43
4.6	Maintenance dredging volumes (m <sup>3</sup> ) for MDL marina dredge areas.....	44
4.7	Maintenance dredging volumes (m <sup>3</sup> ) for Esso and berths and approaches dredge areas.....	45
4.8	Maintenance dredging volumes (m <sup>3</sup> ) for BP Jetty box and approaches dredge areas.....	45
4.9	Maintenance dredging volumes (m <sup>3</sup> ) Hythe Marine Park dredge areas.....	46
4.10	Maintenance dredging volumes (m <sup>3</sup> ) Marchwood Wharf industrial area.....	46
6.1	ABP Southampton licence history.....	52

7.1	SPAs within the study area.....	60
7.2	Ramsar sites within the study area.....	61
7.3	SACs within the study area.....	62
7.4	Features and conservation objectives for Tranche 2 cMCZs within the study area.....	64
7.5	Favourable condition status of SSSIs.....	68
7.6	Coastal and transitional water bodies within 5 km of maintenance dredging and/or disposal activities.....	71
7.7	Fluvial water bodies within 5 km of maintenance dredging and/or disposal activities.....	71
7.8	Summary of water body status.....	72
7.9	Bathing water quality classifications for 2004 to 2013.....	74
7.10	Environment Agency monitoring of Shellfish Waters for 2012.....	75

## Graphs

4.1.	ABP Maintenance Dredge Volumes (m <sup>3</sup> ) Across the SHA.....	37
4.2.	ABP Maintenance Dredge Volumes (m <sup>3</sup> ) for the Test Berths and Channels (2005-2013).....	39
4.3.	ABP Maintenance Dredge Volumes (m <sup>3</sup> ) for the Itchen Berths and Channels (2005-2013). ....	40
4.4.	ABP Maintenance Dredge Volumes (m <sup>3</sup> ) for the Southampton Water Dredge Areas (2005-2013). ....	41
4.5.	ABP Maintenance Dredge Volumes (m <sup>3</sup> ) for the Thorn Channel Dredge Areas (2005-2013).....	42

## Figures

1.1	Statutory Harbour Authority Area
1.2	Study Area with the Nab Channel
2.1	Southampton Water Bodies
3.1	Spring and Neap Tidal Curve for Southampton
4.1	Disposal Sites
4.2	ABP Dredge Areas
4.3	Southampton Indicative Main Dredge Locations in the River Test
4.4	Southampton Indicative Main Dredge Locations: Dock Head to Hythe Marine Park
4.5	Southampton Indicative Main Dredge Locations: Hythe Marine Park to Fawley Marine Terminal
4.6	Southampton Indicative Main Dredge Locations: Fawley Marine Terminal to Calshot
4.7	Southampton Indicative Main Dredge Locations: Thorn Channel and Bramble Turn
4.8	Southampton Indicative Main Dredge Locations in the River Itchen
5.1	Sediment Quality Sample Locations: River Test and River Itchen
5.2	Sediment Quality Sample Locations: Southampton Water
7.1	International Designated Sites
7.2	Sites of Special Scientific Interest
7.3	Shellfish Waters and Designated Bathing Waters

## 1. Introduction

### 1.1 Background

Southampton Water is one of the busiest waterways in the United Kingdom, with around 64,000 vessel movements in 2012. The vast majority of the estuary is open water, with navigation buoys and one light float marking the main navigable channel. The major operating port within the estuary is ABP Port of Southampton (which has been termed ABP Southampton within the Baseline Document).

ABP Southampton is located at a strategic position on the central south coast of England, in close proximity to the international shipping lanes and Continental Europe. The port also has shipping links with over 100 countries and is one of the busiest and most diverse port in the UK, with some 40 million tonnes of cargo handled per annum - more than at any time in its history - ranking it fourth by tonnage in the UK. In addition to ABP Southampton's commercial operations, Southampton Water is also home to the Exxon Mobil Esso Terminal at Fawley and BP's Hamble Jetty Terminal. Other notable port facilities exist on the River Test where the Ministry of Defence (MoD) own and operate Marchwood Sea Mounting Centre (SMC), and on the River Itchen various aggregate wharfs are operated by Tarmac, Hanson and Cemex. The estuary is also heavily used by recreational clubs and individuals for leisure activities, a large proportion of recreational vessel movements occur with scheduled yacht races and vessels cruising between the network of marinas, moorings and anchorages within the estuary and rivers.

ABP Southampton is the Statutory Harbour Authority (SHA) for Southampton Water, the River Test and River Itchen and part of the Central Solent. The River Hamble has its own Harbour Authority, which oversees the management of the river. Maintaining safe port access for commercial and recreational maritime transport is an important function for Harbour Authorities. This necessitates the maintenance dredging of access channels and berth pockets to remove recently deposited sediment. Most of the dredging occurs along the main navigation channel and berth pockets along Southampton Water and the tidal Rivers Test and Itchen.

Southampton Water is a relatively narrow and spit-enclosed meso-tidal estuary, subject to very limited wave action and draining a catchment of around 1,630 km<sup>2</sup> (ABPmer, 2007a). The estuary is constrained between Calshot and Dock Head, with the terrain rising sharply from the High Water (HW) mark to approximately 10 m below ODN. The estuary was formed by the River Test and River Itchen which flow in from the north, plus the River Hamble that flows in from the east. Dock Head marks the confluence of the Rivers Test and Itchen, from which Southampton Water commences until its junction with the Solent at Calshot, (see Figures 1.1 and 1.2).

### 1.2 Objectives

This Baseline Document has been prepared in order to comply with the requirements of the Conservation Assessment Protocol for maintenance dredging, with respect to 'The

Conservation of Habitats and Species Regulations 2010'. It is the Government's view, supported by rulings in the European Court of Justice, that maintenance dredging should be considered as a 'plan or project' for the purposes of the EC Habitats Directive (92/43/EEC), and assessed in accordance with Article 6(3) of that Directive (Defra, 2007). A requirement therefore exists to ensure that maintenance dredging operations with the potential to affect Natura 2000 (N2K) sites are considered in a wider sediment management context. The aim of the protocol is to collate relevant information into a Baseline Document to make the process of assessing the effect of maintenance dredging more explicit for all parties.

To fulfil this obligation ABP Southampton, the SHA for Southampton, has commissioned ABP Marine Environmental Research Ltd (ABPmer) to compile a Baseline Document following the guidance provided in the Department for Food and Rural Affairs (Defra) Maintenance Dredging and The Habitats Regulations 1994 'A conservation Assessment Protocol for England'. This Baseline Document aims to provide all parties wishing to carry out maintenance dredging within the study area with the relevant baseline information to inform an Appropriate Assessment.

In addition to the requirements of the Habitat Regulations, this document also addresses requirements under the EU Water Framework Directive (WFD) (2000/60/EC) and the EU Environmental Quality Standards Directive (EQS) (2008/105/EC) in respect of maintenance dredging and disposal. The lead authority for overseeing the implementation of the WFD within England is the Environment Agency.

The Baseline Document therefore provides a basis for the licensing authority to consider maintenance dredge applications. At the outset of the baseline data compilation, it was recognised that maintenance dredging has been an ongoing activity within the port and Southampton Water for the safe navigation and berthing of. Historically, dredge disposal activities have been licensed by the regulator, and where available, information from the licensing process has been considered and included. The presumption, in assessing any potential consequences of dredging activity, is that maintenance dredging will continue in line with established practice. To establish existing maintenance dredge activities, this Baseline Document has drawn on existing and readily available information, and presents the current and historical patterns of dredging in relation to the conservation status of the designated sites.

### **1.3 Study Area**

The study area considered by the baseline covers all of the Statutory Harbour area for ABP Southampton which is comprised of the Central Solent, Southampton Water, the tidal part of the River Itchen and the lower tidal part of the River Test from the Redbridge Causeway. Figure 1.1 identifies the study boundary, the precise definition of the ABP Southampton's SHA is from Stansore Point to Egypt Point in the south west, and from Old Castle Point to Hill Head in the east. The harbour area extends northwards to the navigable parts of the River Test (below Redbridge Causeway) and River Itchen (below Woodmill). In addition to the SHA, this Baseline Document also includes the Nab Channel within the context of the study area given ABP Southampton's interest in ensuring navigable depths within the approaches to the Eastern Solent (Figure 1.2). It should be noted that the Hamble Harbour Authority is a separate authority with a defined SHA with a boundary that includes part of Southampton Water around the mouth of the River Hamble. This area is not considered by this Baseline Document.

Similarly, Cowes Harbour Commissioners SHA area extends from the Medina Estuary and adjoins the ABP Southampton SHA area in the Central Solent. This area is not considered by the Baseline Document.

## 1.4 Report Structure

The maintenance dredge Baseline Document is structured into the following sections:

- Section 2: Details the legislation context behind the Maintenance Dredge Protocol (MDP) and the Marine Navigation Dredging Framework under the WFD;
- Section 3: Outlines relevant coastal, estuarine and morphological processes for the Southampton Estuary;
- Section 4: Details the history of dredging within the study area, followed by current dredging and disposal practices;
- Section 5: Contains information relating to sediment quality and presents an overall assessment of sediment quality from previous licence applications;
- Section 6: Summarises licence information and presents information from monitoring exercises;
- Section 7: Outlines the study area nature designations and the interest features from these designations, and also the WFD water bodies and their current status; and



## 2. Legislation

Marine navigation dredging (both capital and maintenance dredging) and disposal are highly regulated activities due to their potential to negatively affect the environment if they are not carefully considered and controlled. Dredging activities are primarily licensed under application to the Marine Management Organisation (MMO), an executive non-departmental public body (NDPB) established and given powers under the Marine and Coastal Access Act 2009. Also, where powers to dredge in Harbour Areas are conferred by Acts of Parliament, local works or dredge licences issued by the Harbour Authority may permit dredging (and other activities) within the scope of the special Act under which they are issued. The following section details the legislative context in which this Baseline Document has been drafted.

### 2.1 National Legislation

Dredge and disposal operations are regulated by the MMO, using powers conferred primarily through the 'Marine and Coastal Access Act' 2009. This Act has established a single Marine Licence, which came into effect on 6 April 2011. Prior to this date dredge and disposal operations were regulated by two separate Parliamentary Acts; the first being the Coast Protection Act (CPA) 1949 as amended by Section 36 of the Merchant Shipping Act 1988. The second Act regulated disposal of dredged material at sea, and was termed the 'Food and Environment Protection Act (FEPA) 1985 (as amended)'. The FEPA licence provided the basic environmental control for sea disposal of dredged material and regulated beneficial use.

### 2.2 Marine Navigation Dredging Under the Habitats Regulations

It is the Government's view, supported by rulings in the European Court of Justice, that maintenance dredging should be considered as a 'plan or project' for the purposes of the EC Habitats Directive (92/43/EEC), and assessed in accordance with Article 6(3) of that Directive (Defra, 2007).

Under Article 6(3) of the Habitats Directive, as enforced in the UK through the Habitats Regulations, an Appropriate Assessment (AA) is required where a plan or project is not directly connected with, or necessary for the management of Natura 2000 sites (also known as 'European sites') and where the possibility of a likely significant effect (LSE) on these sites cannot be excluded, either alone or in-combination with other plans or projects.

Section 4.1 of the Conservation Assessment Protocol (Defra, 2007) states that the expectation (in the absence of any conflicting evidence) is that a maintenance dredge proposal will not have a LSE on a European site when:

- The Baseline Document shows that maintenance dredging is not causing deterioration in the condition of the site, and
- There will be little or no change to the situation described in the Baseline Document.

Where this is the case it will not be necessary for the Competent Authority to require further information or to carry out a more detailed assessment for the purposes of the Habitats Regulations.

## 2.3 Marine Navigation Dredging Under the Water Framework Directive

The EU Water Framework Directive (WFD) (2000/60/EC), which came into force on 22 December 2000, is implemented in the national water regulations of the Member States. The Directive establishes a new approach to the protection, improvement and sustainable use of Europe's rivers, lakes, estuaries, coastal waters and groundwater. The Directive applies to all surface waters out to 1 nautical mile (nm) seaward of the baseline for territorial waters and to ground waters. For management purposes, surface and ground waters are divided into a number of discrete units termed 'water bodies'. Water bodies relevant to this study have been presented in Figure 2.1.

The WFD is implemented in England and Wales through the 'Water Environment (Water Framework Directive) (England and Wales) Regulations 2003' (commonly termed the Water Framework Regulations). The WFD introduces new broader ecological objectives, designed to protect and where necessary, restore the structure and function of aquatic ecosystems themselves and thereby safeguarding the sustainable use of water resources (UKTAG, 2008).

Under the Regulations, the Environment Agency is the competent authority for implementation of the Directive in England and Wales. Programmes of measures have been developed through a process of river basin management planning and are set out in a number of regionally based River Basin Management Plans (RBMPs) formally published in December 2009. To help those undertaking navigational dredging and disposal activities to comply with the requirements of the WFD in transitional (estuary) and coastal water bodies, the Environment Agency has published the 'Clearing the Waters' guidance (Environment Agency, 2012).

## 2.4 Local Harbour Powers

ABP Southampton is the SHA for study area covered by this Baseline Document, and as such, has powers to carry out maintenance dredging for the safe navigation of vessels under the 'Southampton Harbour Act' 1911. Section 3 'Power to dredge' states:

*"The Board [ABP Southampton] in addition to exercising the powers conferred upon them by the Southampton Harbour Acts 1863 to 1903 may dredge deepen widen and improve the harbour channels and approaches of the port within their jurisdiction to such extent as may in the opinion of the Board [ABP Southampton] be necessary or convenient for the purpose of admitting conveniently ships and vessels of large draught and ships and vessels of such increases draught as may be hereafter constructed and used to the docks quays wharves and other places within the port and may also similarly dredge deepen widen and improve the channel of the Solent at and near Thorn Knoll. Provided that before commencing any of the operations by this section authorised the Board [ABP Southampton] shall apply for and obtain the consent in writing of the Board of Trade [MMO] to such operations:*

*Provided also that all materials excavated or dredged under the provisions of this section if deposited below high-water mark shall be deposited in such position and under such restrictions as may be fixed by the Board of Trade [now administered by the MMO]."*

These powers enable ABP Southampton to carry out maintenance dredging in its SHA Consent is still required from the MMO in the form of a Marine Licence in order to deposit any dredging at sea.

## 3. Coastal Processes and Morphology

### 3.1 Estuary Form

The form is described by the physical layout and morphological features across the study area and the function by the physical processes, which drive the movement of water and influence the transport of sediments, and morphological development. In the description of the estuary form, parts of the Central Solent and the lower reaches of the River Test are also considered as part of the estuary due to linkages between the morphology and processes that occur.

#### 3.1.1 Overview

The environmental conditions within the harbour area and estuary change from coastal waters within the Solent through to an estuarine environment in Southampton Water and associated tributaries. Further discussion of the morphological properties is based around the four regions which encompass the estuary and its tributaries, which are the Central Solent, Southampton Water, River Test and River Itchen. This is due to the variation in the environmental conditions and morphological properties which exist.

**Central Solent:** The Central Solent within this study is taken to be region south of Calshot Spit up to the southern margin of the harbour area. The region is more exposed to wave action than the estuary and further upstream and differences in the morphology along the shoreline can largely be explained by the varying wave climate. Tidal processes and flow patterns within this region are also representative of a coastal inlet, with more estuarine conditions developing north of Calshot Spit.

**Southampton Water:** Southampton Water is a relatively narrow and spit-enclosed meso-tidal estuary, subject to very limited wave action and draining a catchment of around 1,630 km<sup>2</sup> (ABPmer, 2007a). It measures approximately 2 km wide at its entrance and 2 km wide at its upper reaches in proximity to Dock Head, with a total length of about 17 km and approximate area of 30 km<sup>2</sup>. Major tributaries into the estuary include the River Test, River Itchen and River Hamble. The estuary and associated tributaries are primarily governed by tidal processes, which bring about the erosion and deposition of material. Influence from waves are more localised to areas at the coast that are open to the dominant wave direction, in addition to the coastline within the Central Solent, immediately south of Southampton Water. The historical assessment of morphological variation indicate that on average the sub-tidal area of the Southampton Water and the lower reaches of the River Test was widening, with an associated reduction in the hydraulic depth within the estuary. However, this does not apply uniformly along the whole estuary, with local variations occurring.

**River Test:** The lower reaches of the tidal river are constrained by existing large developments including the container terminal, Western Docks and the Marchwood Military Base. The presence of these developments and the associated maintenance dredging means that the morphology along this section of the river is fairly consistent. Further upstream (i.e. upstream from the bridges at Redbridge), the river has a more natural form with the occurrence of an extensive dendritic marsh system, which extends to the north beyond the scope of this study.

The presence of the marsh indicates an accretionary environment. Monitoring observations would indicate that the marsh system is in a state of dynamic equilibrium within the estuary, as a lateral shift in the extents of the marsh, coincides with an associated increase in the vertical height of these features. Flow speeds at the lower reaches of the river are similar to those identified at Dock Head. The river is governed by tidal processes, with a small input from local wind waves.

**River Itchen:** The lower reaches of this river are also heavily modified by waterside developments, as such, the majority of the channel margins are stabilised by hard structures. This is the case for the tidal sections of the River Itchen up to the tidal limit at Woodmill, which also marks the extent of the harbour area. Further upstream of this point the river is non-tidal and has a more natural form. Similar to the River Test, the River Itchen is principally governed by tidal processes that propagate up the estuary, with some influence from waves in the lower reaches and fluvial processes. Due to the orientation of the river, there is a small potential for locally-generated wind waves from Southampton Water to propagate into the river. However, the energy from such waves would quickly dissipate with the changing channel orientations. Due to the confluences of the river with Southampton Water, a small delta is formed with the deposition material within Southampton Water. This material is removed by regular maintenance dredging.

### 3.1.2 Geological Change

The present morphology of the Solent and Southampton Water is generally considered to have evolved since the period of the last glaciations (Pleistocene) with rising sea levels drowning the former Solent River basin. As water depths increased waves have also helped develop the shoreline, but with the Isle of Wight acting to shelter the Solent. Rising sea levels during the Holocene also increased the size of Southampton Water, although its shape was determined by the morphology of the Pleistocene terraces bordering the drowned channel (Hodson and West, 1972). These terraces are important in providing a chronology of marine transgressions and fluvial down-cutting that have occurred throughout the evolution of the estuary.

### 3.1.3 Anthropogenic Influence

More recent changes to the estuary and study area have been as a result of anthropogenic factors through reclamation and dredging, mainly within Southampton Water and the River Test. Reclamation in Southampton Water has occurred since 1836 (Eastern Docks, Southampton) and extends up to the 1990s (Southampton Container Terminal (SCT) 1). Between 1928 and 1963, 125 ha were reclaimed at Fawley, most of it in 1950 to extend the refinery site. Land claims tend to constrict tidal flow and locally increase current velocities and sediment transport potential (Gifford and Partners, 1989). A summary of reclamation history within Southampton Water is set out in Table 3.1, while channel deepening activities are included in Table 3.2.

**Table 3.1 Reclamation history through Southampton Water**

Date	Development
1890-1910	Development of Eastern Docks out over the mudflats at the confluence of the Rivers Test and Itchen.
1920s	Reclamation of some 8 ha for Marchwood Power Station and the Military Port.
1927-34	Reclamation of the Western Docks between Royal Pier and Millbrook Point.
1920s-60s	Dredged Material used to reclaim approximately 80 ha of land around the Exxon Mobil Oil Refinery, the majority of which took place in the early 1960s.
1930s-70	Maintenance dredge spoil used to reclaim Dibden in four stages: Phase 1 – 1930-55; 36 ha; Phase 2 – 1956-60; 40 ha; Phase 3 – 1960-62; 36 ha; Phase 4 – 1962-70; 64 ha.
1950-51	Fawley Power Station reclamation using material from dredging off Calshot approaches to reclaim some 46 ha.
1967-68	Western Dock extension scheme, Phase 1 for Berth 201 reclaimed 6 ha.
1970-72	Phase 2 of Western Dock extension scheme created previous Berths 202-205 (now part of SCT 5 – SCT 3) by reclaiming 32 ha.
1972-75	Phase 3 for previous Berth 206 (now SCT 2) involved reclaiming 45 ha.
1995-96	Previous Berth 207 (now SCT 1) construction completed.

**Table 3.2 Historical channel deepening activities**

Date	Development
1882	Channel dredged to 7.4 m below CD in 1889 from Fawley to the docks.
1893	Dredged channel depth increased to 8.6 m below CD.
1907	Dredged channel depth increased to 9.3 m below CD to accommodate new liners. Length of dredged channel extended.
1922-27	Continuous operations to widen and deepen stretches of the channel between Fawley and the Docks and from Calshot out towards Brambles Bank.
1931	Project to widen channel to 305 m and deepen reach below Calshot to 11.1 m below CD. From Calshot to the Docks channel was dredged to 10.2 m below CD.
1951	The largest single dredging contract at the time was awarded to The Dredging and Construction Company Ltd, to remove 2,900,000 m <sup>3</sup> of material by: (i) Straightening the western channel; (ii) Restoring a portion of the Calshot channel to 11.1 m below CD; (iii) Cutting off a portion of the bend around Calshot Spit; and (iv) Restoring a depth of 10.2 m below CD throughout the main channel from Calshot to the Docks, including the middle and lower swinging grounds, and widening the channel to 610 m.
1960s	Deepening in the area of the Thorn Channel to 12.6 m below CD.
1973-78	Deepening in vicinity of the Container Port.
1996-97	Approach channel between Fawley and the container terminal deepened from 10.2 m below CD to 12.6 m below CD.
2013	Marchwood widening to 30 m and deepening to 12.6 m.
2014	Main channel deepened to 13.2 m between Fawley and the Southampton Container Terminals. Thorn Channel deepened to 13.6 m and Nab Channel deepened to 14.4 m.

Details of the historic dredging carried out within the estuary (including deepening activities) are discussed in Section 4.1, while a summary is presented here for context. Capital and maintenance dredging activities have periodically been undertaken in Southampton Water and parts of the Rivers Test and Itchen for over two centuries. However, analysis of monitoring information in relation to dredging activities (capital and maintenance) in general suggests these have little impact on the overall functioning of the estuary. Instead the dredging activity is thought to maintain a consistent estuary volume at high and low water (ABPmer, 2007a). For example, following the 1996/97 channel deepening, a comprehensive monitoring programme was put in place to identify any changes to the intertidal areas of Southampton Water. This involved surveying along a series of transects between 1996 and 2005 on an annual and, at times, quarterly basis. During the 10 years of monitoring, foreshore levels varied on the order of  $\pm 0.25$  m, with no consistent trend, as a result, the region is considered stable. Observed variations indicated that the eastern shore of Southampton Water underwent some erosion at both the shoreward and seaward ends of the profiles. In contrast, the western foreshore underwent accretion due to the saltmarsh dominance along this frontage. Overall the findings of the decadal monitoring program indicated that the erosion observed along the eastern shore of Southampton Water was more likely the result of natural weather conditions and possible other anthropogenic ongoing events and not directly related to the main channel deepening in 1996/97.

#### 3.1.4 Estuary Morphology

The contemporary morphology of the Solent shoreline is characterised by barrier spits, intertidal flats, saltmarshes, and erosional coastal cliffs, particularly along the coastline of the Isle of Wight and the Solent approaches (Velegrakis and Collins, 2000). The varied morphology is, to a degree, explained by the varying wave climate along the shoreline. Within East and West Solent, there is a low energy regime, with a limited wave fetch, which is responsible for the relative distribution of saltmarshes and mudflats in this area. Offshore, the seabed morphology is varied and consists of narrow channels, offshore sand and gravel banks, and generally modest water depths, which rarely exceed 20 m. However, there are localised deeps existing in the vicinity of the approaches to the West (e.g. Hurst Narrows) and East Solent.

Bramble Bank is located at the entrance to Southampton Water and is a feature around which the approach channel turns. It is an extensive, depositional bank, which marks the transition between the coarse sediments in the West Solent and the finer sediments in the East Solent. It also acts as a sediment sink for convergent transport pathways from the East Solent, West Solent, Southampton Water and the Medina. Bramble Bank is a relict form inherited from the former Solent River system and is largely immobile under contemporary hydrodynamic conditions. Samples in Bramble Bank demonstrate mixing of minerals originating from river catchments as well as seabed and shoreface erosion. Importantly, the erosion of the Tertiary coastal cliffs behind Bramble Bank suggests that the protective nature of this feature may not be sufficient to prevent coastal erosion from wind and waves (Velegrakis and Collins, 2000).

Southampton Water is bounded by a spit feature at its entrance (i.e. Calshot Spit), which is an area of sediment accumulation, mainly consisting of coarse-grained material (shingle). Calshot Spit is a recurved barrier spit that has remained stable over the last 100 years (Halcrow, 1997). The spit comprises a wide gravel and sand foreshore and would have been formed in response

to coastal erosion during the early to mid-Holocene sea level rise. There is some question about the origin of these sediments as this material may be eroded gravel terrace deposits originating from channel erosion, or may be due to reworking of existing shoreline sediments. The alignment of the spit is indicative of a north-eastward drift (Dyer, 1980) and the present deposits on the foreshore consist of swash bars which are indicative of onshore sediment transport. In the lee of Calshot Spit, the water is more sheltered, with the development of intertidal flats and saltmarshes (e.g. Lymington Flats).

Sedimentary processes vary significantly throughout Southampton Water (Velegrakis and Collins, 2000). Generally, the sediment transport processes are dominated by tidal currents, especially on the western coast and in the inner estuary where fine sediments have accreted. Although, the variable wave climate also influence the morphology and the material that is deposited at the shoreline. For example, the western coast of Southampton Water is almost totally sheltered from wave energy in comparison to the opposing east shore, leading to a higher dominance in saltmarsh. The east shore in the lower extents of Southampton Water is bordered by mudflats, which are backed by a series of low cliffs.

The Rivers Test and Itchen at their lower reaches are determined by engineered structures, which stabilise the channels. As such any changes in morphology occur as a result of reworking of sediments between the intertidal and sub-tidal.

Overall, the long period of monitoring within the estuary (inclusive of the Rivers Test and Itchen) indicates that it is in a state of dynamic equilibrium with dredging activities. This is because there is no net change in the estuary volume despite the input of sediment from various sources and the construction of development which constrict the estuary margins.

### 3.1.5 Natural Variability

There is evidence to suggest Southampton Water, plus the Rivers Test and Itchen are locally dynamic in their inter-tidal and sub-tidal morphology. However, in the assessment of the region as a whole, the estuary is in a state of dynamic equilibrium, as the processes which occur locally are interconnected, while there is also the dynamic linkage between anthropogenic activity, particularly maintenance dredging and the long term estuary morphology. The dominant natural influences on morphological change are tides, waves, freshwater flows, tidal surges and biological activity. These influences produce changes in suspended sediment concentrations (SSC), deposition rates, bed composition and channel configuration.

## 3.2 Hydrodynamic Regime

### 3.2.1 Overview

Tides are the primary influence on water movements and control the advection of suspended sediments. Waves tend to have their main influence at the shoreline and help to develop features such as various shingle spits evident across the Solent. The more sheltered area within Southampton Water and River Test is conducive to the development of saltmarsh, especially along the western estuary margin, which is in the lee of prevailing winds.



A description of the hydrodynamic regime and additional inputs from fluvial sources are summarised in more detail in the sections below.

### 3.2.2 Waves

The presence of swell waves in the West Solent and Southampton Water is minimal due to the protection gained from the Isle of Wight, Calshot Spit and the Bramble Bank. The West Solent provides an open fetch for the limited generation of local waves from the predominant south-westerly wind direction. The resulting waves have the greatest impact on the coastline near Lee-on-Solent, leading to coastal erosion along this coastline. The maximum significant wave height during the peak autumn and winter months is on the order of 1.2 m (Webber, 1980).

The wave regime within Southampton Water is more sheltered, with the dissipation of swell waves at lower sections and the occurrence of locally-generated wind waves at the upper sections of the estuary. Along the estuary, the eastern shore generally experiences greater wave energy dissipation as it faces the prevailing wind direction. The eastern shore is then more sheltered as it is in the lee of the prevailing winds (ABP Research, 2000a). There is generally a reduction in wave energy towards the upper extents of Southampton Water, in proximity to Dock Head and into the rivers. Evidence for the low wave regime within the estuary is the occurrence and ongoing development of saltmarsh and mudflat systems along Southampton Water and in the River Test. Studies within the estuary have shown there is significant inter-annual variability in the wind-wave climate as a result of changes in the wind climate. Discrete periods of wind data for 1984 to 1991 and 1988 to 1997 demonstrate an increase in wind generated wave energy of 17% between the two intervals, which was attributed to the increasing prevalence of easterly winds. Within Southampton Water, vessel disturbance also provides an additional, but limited source of wave energy at the shoreline.

### 3.2.3 Tidal Levels

The primary influence on water levels within the estuary is due to tides, although strong winds (especially north-easterlies) and surges can have secondary effects leading to occasional increases or decreases on the tidal effect. The tidal regime is semi-diurnal and shows a marked increase in range as the tide advances from west to east, with an increasing spring tidal range from 2 m at Hurst Point to 3.9 m at Portsmouth.

The local phasing of tidal constituents within the English Channel creates a double high water (HW), which progresses further into the Solent. This in turn results in an extended HW for Southampton Water, which lasts for up to 3 hours. Also within Southampton Water on spring tides, an added feature of the tide develops during the flood phase, around two hours after low water (LW). The phenomenon known as the "Young Flood Stand" occurs and is mainly evident as a pause in the rising tide. The profile of the tide is clearly asymmetric with the flood phase (of around 9 hours to the second HW) lasting longer than the ebb phase (of around 3 ½ hours).

Tides are currently monitored at three locations in Southampton Water and the River Test:

- Calshot Jetty at the entrance to Southampton Water;
- Dock Head (Berth 37), the Standard Port; and
- Upper Swinging Ground at Marchwood/ Southampton Container Port.

There is general consistency in the pattern of the tide both in phase and amplitude, with only a moderate increase in range moving upstream. However, on average within Southampton Water, the mean tidal ranges are 4 m and 1.9 m for the spring and neap tides respectively, and an extreme range of 5.1 m. The majority of tides fall in the range 2 to 4 m equivalent to a meso tidal range (Figure 3.1). Table 3.3 presents tidal levels for Southampton Water, referenced to Dock Head (Berth 37) which provides a level that is considered indicative for the estuary.

Table 3.3 Tidal levels for Southampton Water

Tidal Level	Tidal Level Chart Datum (m above/ below CD)
Highest Astronomical Tide	5.0
Mean High Water Spring	4.5
Mean High Water Neap	3.7
Mean Tide Level	2.6
Mean Low Water Neap	1.8
Mean Low Water Spring	0.5
Lowest Astronomical Tide	-0.1
The tidal levels relate to observations at Dock Head (Berth 37), which are considered indicative for the estuary system.	

Another important variation in the tidal range is due to the lunar nodal cycle, which operates over a period of 18.61 years. Long-term data from Portsmouth (ABPmer, 2007a) indicates that this effect alone causes variation in tidal range by of the order of 0.25 m. The trough of this cycle last occurred in about 2006/ 2007 and, therefore, tidal range can be expected to increase over the next *circa* eight years.

Analysis of long-term tidal records from Portsmouth demonstrates a present trend in mean sea level rise for the general area of 1.7 mm/year (ABP Research, 2001). Increased rates of mean sea level rise are now predicted in response to climate change concerns. Defra guidance (Defra, 2006) provides revised allowances for South East England of 4 mm per year to 2025, increasing to 8.5 mm per year for the period 2025 to 2055. The UKCP09 medium scenario however predicts a 0.37 m rise in the relative sea level within the estuary by 2055 based on the 95th percentile medium scenario.

### 3.2.4 Tidal Currents

The primary influence on flows through the Solent and Southampton Water is moderated by changing tide levels. The alignment of the flows is then determined by the shoreline, channels and banks. Winds, surges and freshwater inflows have also been shown to introduce local and secondary influences on flows within the estuary.

Given the atypical shape of the tidal curve (Figure 3.1), the resulting flows within Southampton Water are complex and give rise to important mechanisms, which are conducive to move fine sediments onto intertidal areas. The asymmetry of the tide, with a longer duration on the flood phase than ebb, creates stronger flows on the ebb. This ebb dominance can be illustrated by tidal streams at Calshot, where on a spring tide ebb flows reach 1.0 m/s, whereas on a flood tide flows reach 0.7 m/s (ABP Research, 2000a). A further unique feature occurs during the flood phase of the tide, which is evident on spring tides. The Young Flood Stand creates an

initial slack water period, which is then followed, by a further slack water period over the extended HWs.

### 3.2.5 Freshwater Inputs

Freshwater inputs to the estuary also contribute to the flow regime and lead to variations in salinity. Primary sources of freshwater are from the Rivers Test, Itchen and Hamble. Rates of freshwater input are highly variable and correlate to the scale of each river catchment and patterns of rainfall, which vary seasonally, with largest flow rates expected during the winter period. Statistically the River Test has the largest average winter freshwater, with flows at 16 m<sup>3</sup>/s compared to the Itchen at 7 m<sup>3</sup>/s and Hamble at 0.5 m<sup>3</sup>/s (National River Flow Archive). This is based on the 50 percentile exceedance value for the period during December to March. A further smaller tributary that drains into Southampton Water is Tanners Brook, which has an average winter discharge of 0.2 m<sup>3</sup>/s.

The relative contribution of freshwater input remains small when compared to the volume of water exchanged during each tide (i.e. the tidal prism defined as the difference in water volume between LW and HW). For example, the total river flow rate based on average winter conditions is 23.7 m<sup>3</sup>/s. Over a 9-hour flood phase this provides a volume of less than 0.1 million m<sup>3</sup> of freshwater input. The equivalent tidal prism for neap tides is 54 million m<sup>3</sup> and 109 million m<sup>3</sup> on spring tides.

The freshwater inputs from the main tributaries influence the magnitudes of salinity throughout Southampton Water with concentrations generally ranging from near fully marine conditions at Calshot (measured in the range of 30 to 33.5 ppt) to more estuarine levels at Town Quay. The potential remains for localised and short-term stratification may occur in the upper reaches of the River Test during periods of high freshwater discharges combined with neap tides, although the estuary is generally considered to be well-mixed overall.

## 3.3 Sediment Transport Pathways and Budget

### 3.3.1 Overview

Present day sedimentary processes vary significantly within the differing estuarine sedimentary environments throughout Southampton Water (Velegrakis and Collins, 2000). Sediment transport processes are dominated by tidal currents, especially on the western coast and in the inner estuary where fine sediments have accreted. The morphology of the estuary boundaries is reflected in the dominance of the tidal processes, and the variable wave climates. The west shore is almost totally sheltered from wave energy in comparison to the opposing east shore, leading to a higher dominance in saltmarsh. The east shore is then bordered by mudflats, which are backed by a series of low cliffs. As a result of the varying forcing controls, the sediment regime varies along the estuary.

### 3.3.2 Sediments

The sediment characteristics of the Solent, the local river channels and estuaries comprise Pleistocene gravels, which are covered by layers of Holocene sands, and gravels. The seabed

at the southeastern extent of the harbour area is characterised by buried channel infilling sediments and surficial sediments, where the buried channel deposits are predominantly coarse grained. The seabed in the West Solent at the southwestern extent is predominantly covered by gravel and sandy gravel, with mixed and varying proportions of sand-sized material.

The seabed in Southampton Water consists of geological strata that have been recently exposed by dredging in the main navigation channel. Within the estuary, the sediment varies from sandy clay near the Upper Swinging Ground to sands and gravels at Fawley. On either side of the navigation channel, clay sediments are found overlying a layer of gravel. Along the western shore, mud deposits are the predominant surface sediment.

Between Calshot and Fawley, the main navigation channel is floored by Pleistocene gravels and thin Holocene deposits of silts and clays. The gravels comprise sub-angular flint and brown sandy clay forming stable slopes. At Calshot the silts are around 13 m thick on the side slopes and intertidal areas. At the northern end of the Fawley Terminal the navigation channel consists of southward dipping glacial gravel overlain by Holocene silty clay and above that a shallow band of Solent Marine Shingle.

Further upstream from Fawley, the buried Pleistocene palaeo-channel lies closer to the surface and the navigation channel cuts through Pleistocene gravel into the laminated silts, clays and the fine to coarse sands of the Bracklesham Beds. The side slopes of the navigation channel and the intertidal areas in the upper reaches of Southampton Water comprise clays and silts with a maximum thickness of 6 m, which are underlain by gravels up to 5 m thick.

### 3.3.3 Sources

Sediment sources within the harbour area are listed below and their main properties summarised in the following sections. In general, these sources vary significantly in the amount of material they contribute into the estuary system, with the largest input coming from material held within the sub-tidal and inter-tidal areas of the estuary.

- Marine input;
- Fluvial input;
- Intertidal erosion;
- Subtidal erosion;
- Cliff erosion; and
- Saltmarsh erosion.

#### 3.3.3.1 Marine inputs

The primary input of suspended sediments to Southampton Water is from marine sources with the process of advection-diffusion drawing in the sediments from the Solent. River sediment loads are secondary and fluctuate with discharge events to create local variations at the head of the tributaries. Average measured suspended sediment concentrations in Southampton Water vary from around 25 to 40 mg/l at the mouth (peak springs about 60 mg/l), 10 to 20 mg/l at Dock Head and 5 to 10 mg/l in the vicinity of the container terminal in the River Test (ABP Research, 2000b).

### 3.3.3.2 Fluvial inputs

An estimate of the annual sediment inputs from the Rivers Test, Itchen and Hamble equates to 10,000, 6,000 and 1,000 m<sup>3</sup> per year, respectively (Bray, 2000). This estimate includes some bedload material that could be stored in the lower river channel reaches and also fine sediments on flood plains, both which may not be supplied directly to Southampton Water.

### 3.3.3.3 Intertidal erosion

The rate of intertidal erosion as assessed from monitoring and historical data is set out in Table 3.4. The results indicate the erosion of the intertidal area, leading to the landward movement of the high water mark is greatest in Southampton Water, with no significant change within the River Itchen.

Table 3.4 Estimated intertidal erosion volume within Southampton Water and the River Test, River Itchen and River Hamble

Location	Estimated Erosion Rate (x10 <sup>3</sup> m <sup>3</sup> per year)
Southampton Water	53
Test	23
Itchen	-
Hamble	3

### 3.3.3.4 Subtidal erosion

Since 1996, monitoring of the estuary has indicated that there has been a marginal reduction in the amount of subtidal erosion. The 1996 capital dredge did not directly increase the tidal prism of the estuary and, therefore, with the deepening the general flow rates decreased. These reduced flows, along with greater depths, have reduced bed shear stresses within the main channel. This linked with the exposure of denser materials at the base of the channel reduced the potential for channel erosion. In the shallow subtidal areas, flow speed reductions will have been proportionally less (compared to the dredged main channel), but the areas remained exposed to erosive forces from waves. The erosive forces in the shallow subtidal areas are not likely to have changed. Table 3.5 sets out the present day estimated subtidal erosion rate. Spatially the pattern seems to be erosion of the lower channel slopes but at a slower horizontal rate than the upper channel.

Table 3.5 Estimated subtidal erosion volume within Southampton Water and the River Test, River Itchen and River Hamble

Location	Estimated Erosion Rate (x10 <sup>3</sup> m <sup>3</sup> per year)
Southampton Water	29
Test	0
Itchen	2
Hamble	2

### 3.3.3.5 Cliff erosion

Cliffs occur only along a small section of the estuary, between the River Itchen and Hamble, at Netley. These cliffs are shallow and generally do not exceed 8 m in height and consist of sandy gravel and medium to coarse gravel sediments (Halcrow, 1997). Different sources have provided varying estimates of the annual erosion rate of these cliffs, which range within 0.1 m to 0.5 m per year (Halcrow, 1997; Posford Duvivier, 1994; 1996; 1997). It was also estimated that the annual erosion of these cliff contributes up to 50 to 100 m<sup>3</sup> of sand and gravel per year to the local beaches. A further 400 m per year of finer material is probably removed as suspended load (Posford Duvivier, 1997). Although the amount of sand and gravel supplied from the cliffs is relatively low, it appears to supply an adequate amount of sediment to the adjacent beaches (Hydraulics Research, 1987).

Historically, the cliff was eroding at a greater rate along this frontage due to natural processes. However, some parts of the cliff were partially protected through the piecemeal construction of defences with varying quality and effectiveness along the frontage. The rate of erosion is also influenced by slope destabilisation arising from the disturbance of vegetation which is caused by a combination of basal erosion and shallow slides (Bray *et al.*, 2004), weathering also probably makes an additional contribution.

### 3.3.3.6 Saltmarsh erosion

Saltmarsh erosion is primarily related to the retreat of the fronting edge of the feature. Changes to saltmarsh in Southampton Water were estimated using aerial photography between 1946 and 1996 at approximately 10-yearly intervals (ABP Research, 2000b). Due to land reclamation in the area, the changes in saltmarsh coverage are confined to the area seaward of the present day defences and walls in Southampton Water. The analysis identified that the area of saltmarsh decreased during this period at an approximate rate of 0.6 ha per year (Table 3.6). Using this value and a mean saltmarsh depth of 1 m, the sediment yield from saltmarsh erosion was estimated at 6,000 m<sup>3</sup> per year. Further inputs into Southampton Water occur as a result of saltmarsh erosion within the River Hamble, where it was estimated that approximately 6,000 m<sup>3</sup> of material is input into the estuary (CCO, 2007).

Table 3.6 Change in saltmarsh areas within Southampton Water (1946 to 1996)

Year	Fawley and Calshot (ha)	Hythe to Cadland Creek (ha)	Eling and Bury (ha)	Whole Estuary (ha)
1946	304	101	44	449
1954	239	92	41	372
1963	202	84	40	326
1976	134	83	25	242
1986	98	79	20	197
1996	98	75	18	191

(ABP Research, 2000b)

### 3.3.4 Sinks

Sediment sinks are defined as areas where siltation occurs and leads to net deposition. Siltation rates in Southampton Water tend to be low and are attributed to limited suspended sediment concentrations, natural sediment scour and transport by ebb currents, but are enhanced in quieter areas outside of the main flows. Redistribution of sediments can occur in relation to vessel movements and dredging activity.

Sediment sinks within study area occur in relation to the commercial berths, approaches and marinas, and in areas of accreting saltmarshes and intertidal areas. The highest observed sedimentation is predominately in the container berths, Bury Swinging Ground, around the berths of Dock Head and at Hythe and Ocean Village marinas. The siltation within Southampton Water tends to be more rapid to the west of the main channel, to the east, siltation rates are lower and have been measured at 0.02 to 0.04 m per year (Flood, 1981).

In terms of saltmarsh accretion, Positioning measurements using Differential Global Positioning System (DGPS) by ABPmer (2007b) between 1996 and 2005 indicate that although the fronting edge of the saltmarshes are eroding, the elevation of the saltmarshes have remained stable with respect to sea level rise, with no evidence of vertical erosion. An approximate accretion rate of 4,000 m<sup>3</sup> per year was calculated for the saltmarshes within the estuary. With respect to intertidal accretion, available evidence suggested that this only occurs within the River Itchen at an approximate rate of 2,000 m<sup>3</sup> per year (ABPmer, 2012).

### 3.3.5 Transport Pathways

Sediment transport pathways within Southampton Water differ for coarse and fine grained sediments. The asymmetric form of the tide provides stronger flows during the ebb phase, which leads to a potential net seaward transport of coarse sediments. This process will lead to natural sorting of sediments along the channel with sands eventually being lost from the estuary and a long-term trend to an overall fining of sediments within the estuary and upriver. Bramble Bank is a potential sink for the exported coarse sediment.

Fine sediments are carried in suspension with the tide. During the flood phase the fine material brought into the estuary from the Solent has extended periods to settle out before the ebb phase, especially around the HW period. A brief flow reversal also develops during the Young Flood Stand with a pattern of return flows evident across the intertidal area of Hythe Marshes, the shore between the Rivers Itchen and Hamble, on the Dibden foreshore and an area of low flow (null zone) between the main channel flow. When the flood tide resumes, the recirculation ceases and flow directions in the intertidal zone returns in an upstream direction. Ebb dominance in flow reduces in an upstream direction making areas upstream more susceptible to siltation, as evidenced by the greater dredging requirements upstream of Dock Head.

### 3.3.6 Budget

The total sediment budget for the estuary was estimated based on monitoring data prior to and post the channel deepening capital project in 1996/97. The results are summarised in Table 3.7, in general it indicates there is a balance with the estuary, whereby the inputs equate to the outputs as a result of sinks and anthropogenic activity.

Table 3.7 Summary of baseline sources and sinks for Southampton Water (x10<sup>3</sup> m<sup>3</sup> per year)

Sources of Sediment			Sinks and Removal of Sediment		
Intertidal erosion	Southampton Water	53	Intertidal siltation	Southampton Water	-
	Test	23		Test	-
	Itchen	-		Itchen	2
	Hamble	3		Hamble	-
Subtidal erosion	Southampton Water	29	Subtidal siltation	Southampton Water	-
	Test	0		Test	-
	Itchen	2		Itchen	-
	Hamble	2		Hamble	-
Cliff erosion	Southampton Water	5	Dredging	Southampton Water	201
River load	Test	10		Test	226
	Itchen	6		Itchen	7
	Hamble	1		Hamble	13
Saltmarsh		8	Saltmarsh		4
Marine import		309			
	<b>Total</b>	<b>451</b>		<b>Total</b>	<b>451</b>



## 4. Dredging Information

ABP Southampton as the SHA has a statutory duty to maintain advertised depths of water in navigable channels with its jurisdiction, in addition to its operational berthing facilities. This is achieved through regular, carefully planned maintenance dredge campaigns and additional capital dredge campaigns when required.

In addition to dredging by ABP Southampton, there are around 10 other organisations which carry out, or have carried out maintenance dredging within the last 10 years within the study area. Where available, information on third party dredge operators and activities including their locations, methods, volumes and times has also been obtained.

The following sections, therefore, describe the historic and current known dredge activities, outlining dredge quantities, dredge techniques and identifying open, closed and disused dredge disposal sites.

### 4.1 Historic Dredging

Dredging in relation to capital and maintenance activities have been undertaken in Southampton Water for over two centuries, occurring within the main channel, dock approaches and berthing areas. Key details relating to past dredging are summarised in Table 3.2. The most notable of these is the removal of 3 million m<sup>3</sup> in 1951 to restore and straighten the main access channel (Webber, 1980) and 6.6 million m<sup>3</sup> in 1996/7 to deepen the main navigation channel.

Four main sediment types are removed from the estuary by dredging and include:

- Thin veneers of recently deposited clays and silts including re-settled sediments distributed by previous dredging operations;
- Mid to Late Holocene clays and silts deposited over the past 5,000 to 6,000 years;
- Pleistocene gravels deposited as river terraces during the Devensian establishment of the 'Solent River' system; and
- Tertiary (Eocene) sands, silts and clays forming the underlying substrate.

### 4.2 Current Dredge Practice

#### 4.2.1 Overview

Maintenance dredging of the main navigation channel and ABP Southampton managed berths and approaches are undertaken roughly every six months, with a spring and an autumn campaign. In addition, maintenance dredging also occurs at a number of other facilities within the SHA by non-ABP (third party) operators. These include the Military Port Marchwood SMC, Fawley Marine Terminal, the BP Jetty, Esso Oil Refinery, Intake Channel to Fawley Power Station, marina and wharves in the Test and Itchen Rivers and along Southampton Water. The predominant sediment type removed by maintenance dredging comprises recently deposited clays and silts including re-settled sediments distributed by ship movements and previous dredging operations.

ABP Southampton maintenance dredging practice involves regular bathymetric surveys to determine the amount of material above a nominal maintained depth. The volume of material above the nominal depth is subsequently dredged and removed to the Nab Tower Deposit Ground (WI060 See Figure 4.1). Further survey work is then carried out to assess the interim changes and if required seabed bed levelling is used. The bed leveller shifts small amounts of material above a nominal maintained depth level into deeper parts mainly to smooth out drag head furrows. Monitoring data of dredge volumes has been collected biannually since 1996/7 for all ABP maintained berths and channel areas. A summary of the average maintenance dredge volumes within the study area between 1998 and 2007 is set out in Table 4.1, with an estimated volume of 201,000 m<sup>3</sup> per year.

**Table 4.1 ABP Southampton dredging volumes within the study area between 1998 and 2007**

Average Between 1998 and 2007	Bury Swinging Grounds to Dock Head (x10 <sup>3</sup> m <sup>3</sup> /year)	Dock Head to Calshot (x10 <sup>3</sup> m <sup>3</sup> / year)
Average per year	226	142
Maximum	278	262
Minimum	137	33
Range	141	229
Standard deviation	45	84

In addition to the volumes shown in Table 4.1, approximately 59,000 m<sup>3</sup> per year is dredged by third parties from the Exxon Mobil berths, the BP Jetty and Marchwood Military Port.

#### 4.2.2 Beneficial Use

In 2011, ABP Southampton wrote to organisations enquiring whether they are aware of any beneficial uses for the material collected during maintenance dredging. However, no beneficial uses were identified during the consultation exercise.

#### 4.2.3 Dredging Methods

**Trailer Suction Hopper Dredging:** TSHD uses suction to raise loosened material from the bed through a pipe connected to a centrifugal pump. Suction alone is normally sufficient for naturally loose material, such as recently deposited material within deepened areas such as the approach channel or berthing areas. TSHD is most efficient when working with fine substrates such as mud, silt, sand and loose gravel as the material can be easily held in suspension. Coarser materials can also be dredged using this method, but with a greater demand on pump power and with greater wear on pumps and pipes. Material dredged by TSHD then requires depositing either within a licensed sea or land disposal site usually by direct bottom dumping (at sea) or through pumped discharge (to a land disposal or beneficial use site).

**Backhoe Dredging:** Backhoe dredging involves a vessel which has one or more dredging cranes mounted around a receiving hopper or barge. The cranes are fitted with grabs that pick

up material from the seabed, and discharge the material into the hopper or barge. The backhoe dredger is usually held in position while working, by anchors and moorings. However, a few are fitted with spuds, or piles, which can be dropped onto the seabed whilst the dredger is operating. Once loaded, the vessel or barge moves to a disposal site to discharge material, which is normally achieved through direct placement at the site by direct bottom dumping.

**Water Injection Dredging:** WID consists of injecting large amounts of water at low pressure into surface sediments on the seabed. This generates a high density layer on the seabed, normally being a maximum of 1.0 m deep, with the highest density part of the cloud being 0.5 m above the bed. The density cloud acts as a fluid layer and flows over the bed through the action of gravity along the seabed contours. The aim of this form of dredging is not to suspend sediments within the water column, but rather to move sediments from one area to another, and thus keep the sediment within the system. Some re-suspension of fine sediment fractions often occurs locally to the WID site, or where tidal flows are higher thereby mobilising material. If the density cloud flows over a pronounced change in bed gradient, material also has the potential to be re-suspended.

**Plough Dredging (Bed Levelling):** Plough dredging utilises a tug equipped with a plough unit. The plough is lowered to a predetermined depth and is used to drag sediment along the seabed. Ploughing is typically used in confined areas due to the small size and manoeuvrability of the vessel, moving material from inaccessible areas such as dock entrances, corners or complicated areas of bathymetry to areas accessible by TSHD or WID vessels, or is used for bed-levelling purposes only. Ploughing is often used in combination with TSHD operation to smooth out/fill in drag head furrows to achieve a more even bed level. Any material above the nominal maintained level (high spots) could pose a danger to the safety of navigation. As with WID, ploughing should not typically lead to significant re-suspension of sediment in to the upper water column, but if the sediment ploughed is soft it may be sufficiently disturbed to raise smaller sediment fractions into suspension.

### 4.3 Maintenance Dredge Disposal

Within and in proximity to the SHA, there are a number of disposal sites which were or are still available for the licensed disposal of maintenance and capital dredge material.. Table 4.2 lists the nearby sites along with their current status, i.e. open, closed or disused, while their locations are illustrated in Figure 4.1.

Table 4.2 Disposal sites nearby to the study area

Disposal Site Number	Disposal Site Name	Status
WI060	Nab Tower	Open
WI075	Southampton Docks Town Quay	Closed
WI080	Hurst Fort	Open
WI085	Lymington Habitat Restoration	Open
WI090	Needles	Open
WI091	West Wight	Open

Of the disposal sites listed in Table 4.2 only the Nab Tower (WI060) is currently used for maintenance dredging purposes by ABP. Third party organisations within the SHA principally use the Nab Tower (WI060), along with Hurst Fort (WI080) and the Needles (WI090). In all cases, a Marine Licence is required for the disposal of material at these sites. Details of only this disposal sites are therefore discussed, along with the disposal returns for maintenance dredging as recorded in the Disposal at Sea (DAS) database (available from Cefas) shown in Table 4.3.

The main disposal site used by a number of operators in the harbour area is the Nab Tower licensed (WI060) disposal site, which is located in the Eastern Approaches to the Solent in approximately 40 m water depth, 12 km off the southwest coast of the Isle of Wight (Figure 4.1). This deposit site receives both capital and maintenance dredged material from nearby harbour areas including Southampton, Portsmouth, Chichester and Cowes.

The DAS disposal records for the Nab Tower, Hurst Fort and the Needles, for the period between 1986 and 2012 is included in (Table 4.3). For the Nab Tower (WI060) disposal site, the peak amount disposed at this site occurred recently in 2012. During this time, approximately 1.7 million tonnes of material was disposed, while the annual average of maintenance material disposed at the site was approximately 0.7 million tonnes. For the Hurst Fort (WI080) the peak amount disposed was 178,473 wet tonnes in 1990, since this time disposal volumes have generally reduced, with an annual average of 65,610 tonnes over the 27-year period. At the Needles (WI090) disposal site, the peak amount disposed was 44,413 tonnes in 1986, with an annual average at 5,136 tonnes.

**Table 4.3 DAS tonnage records for maintenance dredging returns at relevant disposal sites**

Site No	1986	1987	1988	1989	1990	1991	1992
WI060	467,729	586,025	675,652	440,484	644,607	632,163	550,371
WI080	106,405	150,855	133,871	129,034	178,473	126,649	114,866
WI090	44,413	14,405	8,500	12,791	550	0	0
Site No	1993	1994	1995	1996	1997	1998	1999
WI060	570,687	644,279	772,767	257,382	811,907	747,565	1,012,130
WI080	109,600	37,177	39,504	77,772	52,767	75,877	25,578
WI090	9,568	0	8,400	4,008	0	9,922	10,120
Site No	2000	2001	2002	2003	2004	2005	2006
WI060	749,962	1,097,514	746,391	949,628	1,261,388	846,528	521,022
WI080	43,981	21,315	32,176	26,634	22,648	34,084	31,573
WI090	5,350	3,000	250	2,275	4,875	0	0
Site No	2007	2008	2009	2010	2011	2012	
WI060	724,714	505,999	661,430	697,353	478,707	1,742,070	
WI080	31,929	32,836	41,126	45,848	32,026	16,871	
WI090	0	0	0	250	0	0	

## 4.4 Dredging Activity

### 4.4.1 ABP Dredging

The total volume of maintenance dredging which has taken place by ABP Southampton per year between 2005 and 2013 ranges from 283,105 m<sup>3</sup> to 458,048 m<sup>3</sup>. This is the equivalent of approximately 368,037 to 595,463 tonnes (Table 4.4). Low total dredge volumes occurred in

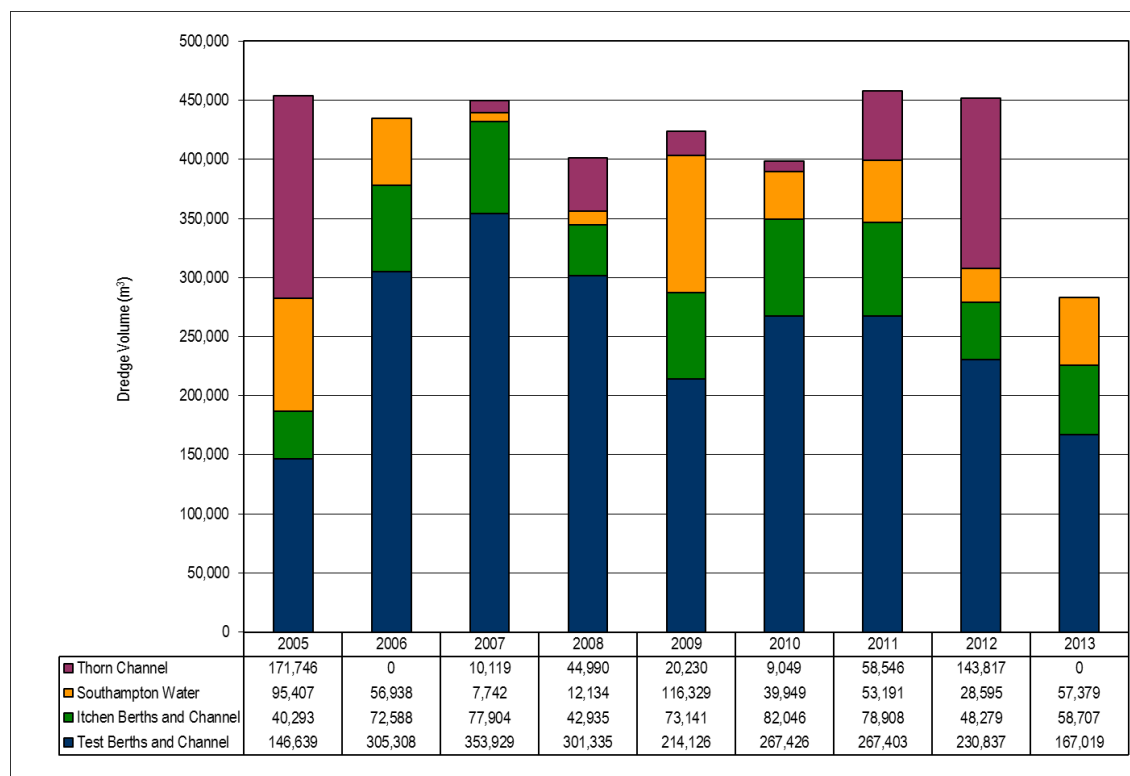
2006 as indicated by available data, while in 2013 the low volumes were due to the commencement of capital dredge works within the SHA. More detailed descriptions of the dredge locations, quantities and methodology over the 9-year period are provided below.

Table 4.4 ABP Southampton maintenance dredge material volume (m<sup>3</sup>) from 2005 to 2013

Year	Dredge Volume (m <sup>3</sup> ) Total
2005	454,085
2006	326,697
2007	449,693
2008	401,394
2009	423,826
2010	398,470
2011	458,048
2012	451,528
2013	283,105

Planning of the ABP dredging commitment is based on grouped areas authorised within the Marine Licence, which often contain multiple berths and dredge areas. The grouped areas include the Test Berths and Channels, Itchen Berths and Channels, Southampton Water and the Thorn Channel (Figure 4.2). A summary of the dredge volume within each grouped area is demonstrated in Graph 4.1 for the four areas, with a respective total volume within each area illustrated in Graph 4.2 to Graph 4.5.

Graph 4.1. ABP Maintenance Dredge Volumes (m<sup>3</sup>) Across the SHA



#### 4.4.1.1 Siltation regime

The siltation regime for the ABP dredge areas are summarised together for the whole harbour area, as it is open to tidal influence which influences the siltation regime.

Tides are the primary influence on water movements through the study area, due to the sheltering from waves by the Isle of Wight, Hurst Spit and the Bramble Bank in the Solent. The dominance of the tides thereby controls the erosion, movement and deposition of sediments. In the areas of main flows, as occurs in Southampton Water and West Solent (in relation to the Thorn Channel and Bramble Turn), siltation rates are considered to be low, due to the limited suspended sediment concentrations and natural sediment scour and transport by ebb currents (ABPmer, 2012). However, siltation rates are increased in the slower moving areas outside of the main flows. This is especially the case in the inner estuary around Dock Head and further north in the Rivers Test and Itchen. These areas are open to tidal influence, but are outside the areas of strong tidal flows to keep sediment in suspension. As a result, it is in these locations that finer sediments accrete. The ES for the SACD (ABPmer, 2012) identified that the highest observed sedimentation rates occurred in the berths along the River Test, around Dock Head and the River Itchen.

#### 4.4.1.2 Dredge approach

Maintenance dredging of the ABP berths and approaches is undertaken roughly every six months, with a spring and an autumn campaign, with each campaign lasting about 2 to 3-weeks. Not all areas are dredged during each campaign instead bathymetric surveys are carried to determine the necessary areas. As a result, maintenance dredging by ABP is usually undertaken as a two-stage process. Regular surveys are undertaken to assess the amount of material above the nominal maintained depth. Any material above the nominal depth is subsequently dredged by TSHD and removed to the Nab Deposit Ground, after which bed levelling with a plough is then used to smooth out drag head furrows. A further survey is then carried out to assess the interim changes to the seabed. This approach is principally applied across all ABP operated berths and approaches. Local variations such as berth use of quay line orientation may mean that a plough is also used to pull material to a suitable position for a TSHD to collect.

#### 4.4.1.3 Test berths and channel

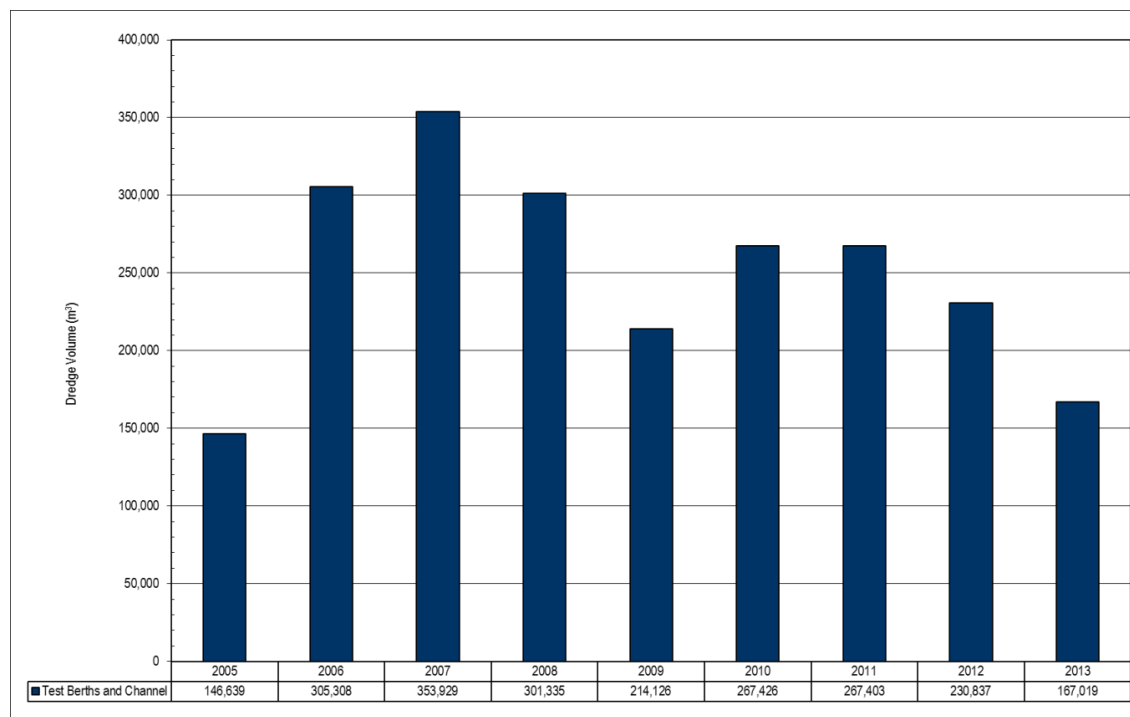
This area covers the River Test and contains a number of docks and dredge areas which are illustrated in Figure 4.3, these include:

- Southampton Container Terminals (SCT) berths and approaches;
- Western Docks and approaches;
- Dock Head berths;
- Test channel and turning areas.

The dredge depths within this region vary between 9 m and 16 m in the dock berths, and between 6 m and 13.2 m within the turning areas and navigation channel. Of note, is SCT 5 (previously named Berths 201 and 202), which have recently been deepened to 16 m below CD. This is in order to accommodate the latest generation of container ships which are typically 360 m or greater in length and up to 15.5 m draught when fully laden. A consent issued in 2013 allows the deepening of this part of the main navigation channel to 13.6 m below CD which will be the new maintenance depth post-completion of the capital dredge works. .

Maintenance dredging of the berths and the channel within this area is carried out to maintain the advertised depth and enable ongoing ABP operations. Dredging mostly occurs on an annual basis, with some berths having a longer time frame between dredging, in relation to low siltation rates. Graph 4.2 summarises the ABP maintenance dredge volumes for the Test berths and channel dredge area for the period 2005 to 2013. The material dredged from the Test berths and channel dredge area is predominantly composed of fine silts, clay and some sand. The *in situ* bed density is generally of the order of 1,300 - 1,400 kg/m<sup>3</sup>. The TSHD removes the material at approximately *in situ* density, whereas the average density at the point of disposal from the TSHD is generally between 1,150 - 1,250 kg/m<sup>3</sup>, depending on material type, when last dredged and amount of material to be dredged.

Graph 4.2. ABP Maintenance Dredge Volumes (m<sup>3</sup>) for the Test Berths and Channels (2005-2013)



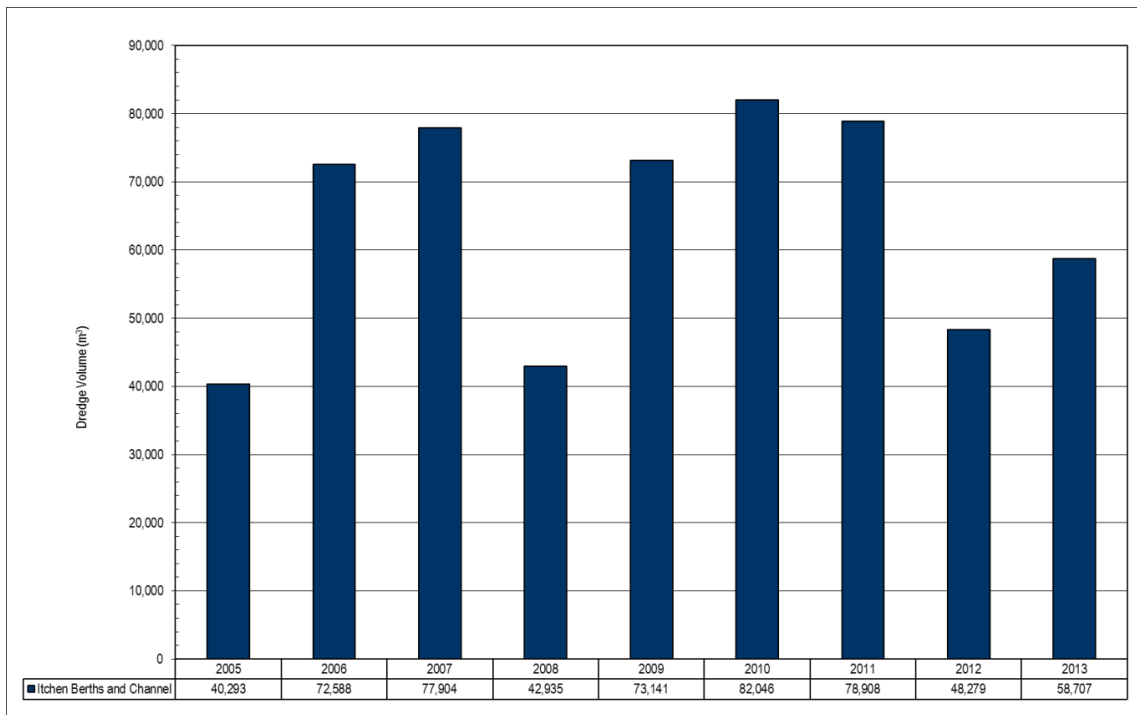
#### 4.4.1.4 Itchen berths and channel

This area covers the River Itchen and again contains a number of docks and dredge areas which are illustrated in Figure 4.3 and Figure 4.4, these include:

- Empress Dock and approaches;
- Some Dock Head berths; and
- Itchen channel.

The dredge depths within this region vary between 5.6 m and 9.9 m in the dock berths and approaches. The Itchen channel is maintained at 9.1 m. Maintenance dredging of the berths and the channel within this area is again carried out to maintain the advertised depth and enable ongoing ABP operations. Dredging mostly occurs on a bi-annual basis, with some berths having a longer time frame between dredging. Graph 4.3 summarises the ABP maintenance dredge volumes for the Itchen berths and channel dredge area for the period 2005 to 2013. The material dredged from this dredge area is again composed of fine silts, clay and some sand. The *in situ* bed density is generally of the order of 1,300 - 1,400 kg/m<sup>3</sup>.

Graph 4.3. ABP Maintenance Dredge Volumes (m<sup>3</sup>) for the Itchen Berths and Channels (2005-2013).



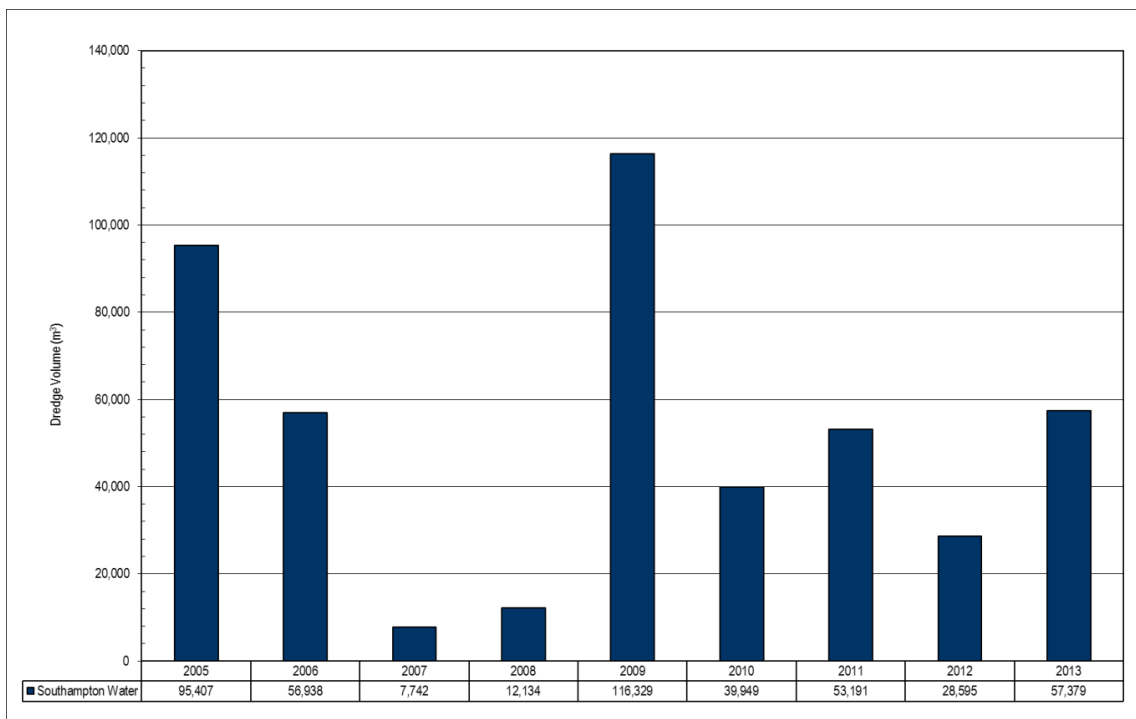


#### 4.4.1.5 Southampton Water

The Southampton Water dredge area extends from Dock Head in the north to approximately Fawley in the south (Figure 4.4 to Figure 4.6). The Main Channel within this dredge area will be maintained at 13.2 m. A consent issued in 2013 allows the deepening of the Main Channel to 13.6 m below CD which will be the new maintenance depth post-completion of the capital dredge works.

The dredge frequency within this area varies. Only the dredge pockets around Dock Head and approximately adjacent to Hythe and Netley are dredged on an annual basis. Along the rest of the Main Channel the maintenance dredge frequency is approximately every two years. The largest annual dredge volumes are obtained from the Dock Head channel south dredge area. Graph 4.4 summarises the ABP maintenance dredge volumes for the main navigation channel dredge areas for the period 2005 to 2013.

Graph 4.4. ABP Maintenance Dredge Volumes (m<sup>3</sup>) for the Southampton Water Dredge Areas (2005-2013).

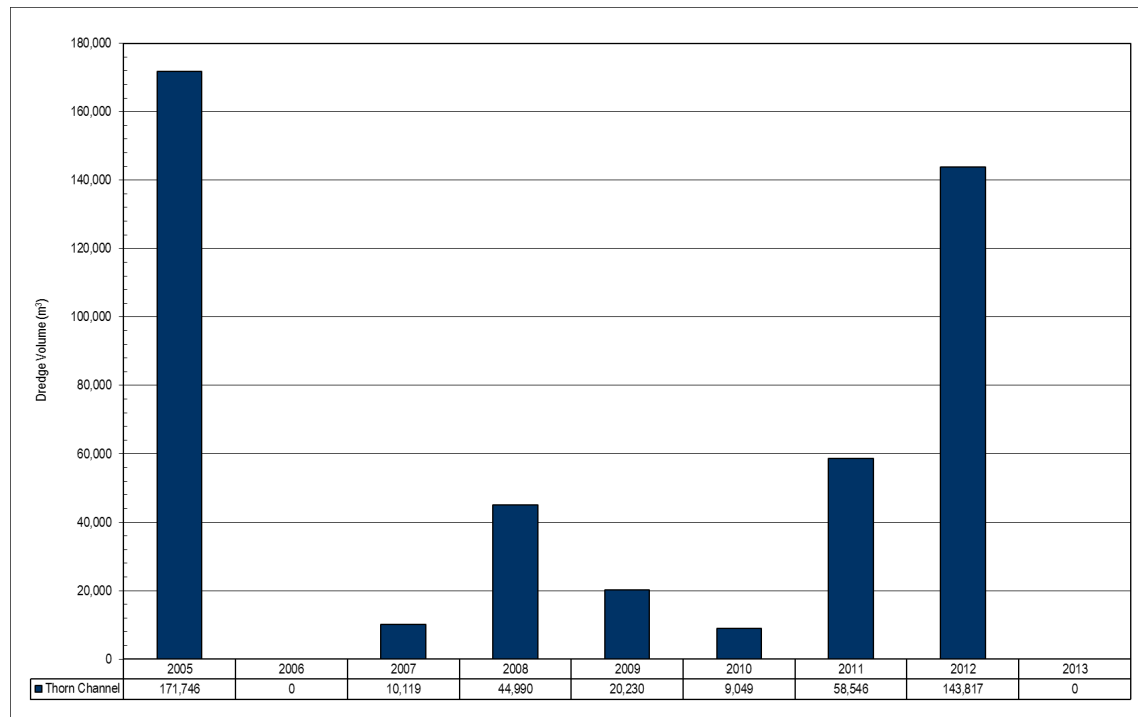


#### 4.4.1.6 Thorn Channel

The Thorn Channel dredge area covers the area between the Thorn Channel in the north, up to Bramble Turn in the south (Figure 4.7). The majority of the ABP dredging in this area is the maintenance of the main navigation channel currently to 12.6 m below CD. Due to the channel depth along with and the low sediment accretion rate, the area is dredged infrequently with relatively small dredge volumes. Graph 4.5 summarises the ABP maintenance dredge volumes

for the Thorn Channel and Bramble Turn for the period 2005 to 2013. A consent issued in 2013 allows the deepening of the Main Channel to 13.8 m below CD which will be the new maintenance depth post-completion of the capital dredge works.

Graph 4.5. ABP Maintenance Dredge Volumes (m<sup>3</sup>) for the Thorn Channel Dredge Areas (2005-2013)



#### 4.4.2 Non-ABP (Third Party) Dredging

ABP is the navigation and conservancy authority for the study area (excluding the Nab Channel, which is located outside of any SHA). Within ABP Southampton's SHA, a third party organisation wishing to carry out maintenance dredging must first seek consent from the MMO. On receipt of a Marine Licence, a Harbour Works Consent for the majority of all marine works below the high water mark is required from the SHA. This is to ensure safety of navigation and conservancy in the port will not be compromised. It is normal practice for the Harbour Master's department to consider the application and issue consent, on behalf of the Harbour Authority. Any consents can be accompanied by certain conditions which must be strictly adhered to, and normally require records to be returned to the Harbour Master's office of the location of the works, start dates, completion dates and any surveys that maybe undertaken as part of the scheme. Marine Works are actively monitored through ABP Southampton's Vessel Traffic Services (VTS) control centre and on or near the water by ABP Marine Patrol Officers.

Whilst ABP has no direct responsibility for the dredging operations of other organisations, it is through third party consents issued for navigational purposes that ABP ensures continued compliance with conservancy concerns and the safety of navigation.

Operators of non-ABP facilities contributed advice and data to this baseline document and where requested have commented on the end document. This baseline is a joint exercise between all the operators on the Estuary, and it is envisaged that all contributory companies and facility operators will continue to work together to achieve updates when requested by the lead authority. An overview of the non-ABP (third party) maintenance dredge operators in the Southampton SHA is detailed in the following sections.

#### 4.4.2.1 Marchwood Sea Mounting Centre (SMC)

Marchwood Sea Mounting Centre (SMC) is located within the River Test, opposite the ABP Western Docks, see Figure 4.3. Currently, Boskalis Westminster Dredging Ltd, carry out the maintenance dredging at the Marchwood SMC on behalf of the Ministry of Defence, who are the owners of the military port. Maintenance dredging at the port is generally carried out annually and sometimes semi-annually, with the approaches and berths being dredged at this frequency in order to maintain operational and navigation depths.

Maintenance dredging operations at Marchwood SMC are carried out by a combination of TSHD, plough and grab dredging. TSHD is the principal method with plough dredging used in isolation as bed levelling operation and in conjunction with TSHD. Backhoe dredging is used to carry out maintenance dredging in areas that are not generally accessible to a TSHD or where the material cannot be ploughed in to an accessible area. Material dredged from Marchwood SMC is disposed at the Nab Tower (WI060) disposal site. The dredge areas and maintained depths include the Mulberry jetty and approach and Berth 5, which are all maintained at 5.2 m below CD, the Boat lift jetty and Berth 6, which are both maintained at 3.3 m below CD and the Falklands jetty and approach, which is maintained at 8.5 m below CD. The Marchwood SMC dredge areas are illustrated in Figure 4.3, while the volume of material dredged from the areas for the period 2005 to 2013 is summarised in Table 4.5.

Table 4.5 Maintenance dredging volumes (m<sup>3</sup>) for Marchwood SMC approaches and berths dredge areas

Location	2004	2005	2006	2007	2008
Marchwood SMC approaches and berths	15,109	0	0	0	0
	2009	2010	2011	2012	2013
	2,736	0	0	27,415	5,215

#### 4.4.2.2 Marina Developments Limited (MDL) Marinas

Marina Developments Limited (MDL) currently own and manages four marinas within the study area, which include:

- Hythe Marina Village;
- Ocean Village Marina;
- Shamrock Quay; and
- Saxon Wharf.

Hythe Marina Village is located on the west bank of Southampton Water south of Dock Head (Figure 4.4), while Ocean Village Marina is located on the western bank of the River Itchen, north of ABP Empress Docks (Figure 4.8). Shamrock Quay and Saxon Wharf are located close to each other on the west bank of the River Itchen and downstream of the Northam Bridge, see (Figure 4.8). Maintenance dredging is generally carried out in the marina basin and entrance for Ocean Village, Shamrock Quay and Saxon Wharf. At Hythe Marina Village maintenance dredging is only carried out in the approach channel which connects the marina lock to the main Southampton fairway.

The maintenance dredge depth at each location varies. Hythe Marina Village approach is maintained at 1.5 m below CD, Ocean Village Marina is maintained between 2.1 and 4.6 m below CD, Shamrock Quay is maintained and Saxon Wharf is maintained at 2.5 m below CD. Maintenance dredging at MDL facilities is undertaken by ML (UK) Ltd using a backhoe dredger. The material removed from the locations is comprised of silt and is licensed for placement at the Nab (WI060), Needles (WI090) and Hurst Fort (WI080) disposal sites. Maintenance dredging is undertaken every two years at all the marinas, except Shamrock Quay which is usually dredged annually. At present there is an environmental condition for all the MDL marinas with respect to Salmonids and Sea Trout, restricting dredging to winter between October and March. The summary of the dredge volumes within the marinas from 2004 to 2013 is set out in Table 4.6.

Table 4.6 Maintenance dredging volumes (m<sup>3</sup>) for MDL marina dredge areas

Location	2004	2005	2006	2007	2008
Hythe Marina Village approach	0	3,430	0	2,310	0
	2009	2010	2011	2012	2013
	0	5,200	0	2,965	2,800
Ocean Village Marina	2004	2005	2006	2007	2008
	0	0	4,500	0	0
	2009	2010	2011	2012	2013
	625	0	3,732	0	6,485
Shamrock Quay	2004	2005	2006	2007	2008
	9,466	0	1,856	0	4,350
	2009	2010	2011	2012	2013
	0	0	0	4,699	0
Saxon Wharf	2004	2005	2006	2007	2008
	0	7791	0	4,205	995
	2009	2010	2011	2012	2013
	6,181	6,348	0	0	566

#### 4.4.2.3 Esso Marine Terminal

The Esso Marine Terminal is located on the western bank of Southampton Water, opposite the mouth of the River Hamble (Figure 4.6). The Esso facility is owned and operated by Exxon Mobile and is comprised of nine berths and an approach area, which are dredged at an annual frequency to a range of maintained depths from 5.9 to 15.2 m below CD. Bathymetric surveys are carried out prior to any dredging in order to inform the extent and requirement. Historically,

dredging has been carried out by Westminster Dredging Ltd, using a TSHD in combination with a ploughing vessel. The dredged material is disposed at the Nab Tower (WI060) disposal site. In 2013 the dredge contractor changed to UK Dredging, who has continued the previous method of TSHD. The volume of material dredged from the areas for the period 2004 to 2013 is summarised in Table 4.7.

Table 4.7 Maintenance dredging volumes (m<sup>3</sup>) for Esso and berths and approaches dredge areas

Location	2004	2005	2006	2007	2008
Esso and berths and approaches	74,162	49,492	56,238	53,582	0
	2009	2010	2011	2012	2013
	56,471	68,230	0	70,331	0

#### 4.4.2.4 British Petroleum (BP) Hamble Marine Terminal

The BP Hamble Marine Terminal is located immediately north of the mouth of the River Hamble on the eastern bank of Southampton Water. The dredge area for the facility is the berth and approaches associated with the BP Jetty as illustrated in Figure 4.5. The berth is maintained at a depth of 13.6 m below CD and the approaches are maintained at 11.2 m below CD. These areas are dredged by UK Dredging. The area is maintained on an annual basis by a TSHD, with additional plough dredging for bed levelling. The dredge material consists of silts and fine sand. Dredged material from this site is disposed of at the Nab Tower (WI060) disposal site. A summary of the dredge volumes from this site, for the period 2004 to 2013 is set out in Table 4.8.

Table 4.8 Maintenance dredging volumes (m<sup>3</sup>) for BP Jetty box and approaches dredge areas

Location	2004	2005	2006	2007	2008
BP Jetty box and approaches	0	2,402	5,996	5,166	0
	2009	2010	2011	2012	2013
	14,846	5,498	0	2,735	4,134

#### 4.4.2.5 Hythe Marine Park

Hythe Marine Park is currently owned and managed by the South East England Development Agency, after ownership was transferred in 2007. Prior to this time, the site was used as a US military base and UK RAF base Hythe. From 2007 onwards, the site was earmarked for development to support a marine business park, with the establishment of vessel repair and service facility. However, as of March 2014, the 12.1 acre site is up for sale (Business Magazine, 2014). The site is dredged by ML (UK) Ltd using a backhoe dredger, where the material comprises silt. Up to recently the dredging was carried out at an *ad hoc* basis, with scope for annual frequency. The dredge area for this site is illustrated in Figure 4.4, while a summary of the estimated dredge volumes for the period 2004 to 2013 is set out in Table 4.9.

Table 4.9 Maintenance dredging volumes (m<sup>3</sup>) Hythe Marine Park dredge areas

Location	2004	2005	2006	2007	2008
Hythe Marine Park	56,000	15,810	16,500	10,000	11,000
	2009	2010	2011	2012	2013
	21,000	0	10,000	0	3,000

#### 4.4.2.6 Marchwood Wharf Industrial Area

The Marchwood Wharf industrial area comprises the industrial area (previously Husbands Shipyard), Marchwood Wharf and Marchwood slipway (previously Husbands Slipway), which are illustrated in Figure 4.3. The whole site is operated by Oceanic Estates who are the land owners and who also lease out areas to other operators. For example Marchwood Wharf is divided into three berths, with a berth being leased out to Veolia (Environmental Services), Raymond Brown Recycling and Minerals and LaFarge Tarmac Aggregates. Although Oceanic Estates are the land owner, LaFarge Tarmac Aggregates is responsible for maintenance dredging as part of the lease. However, each berth operator is responsible under its lease for carrying out maintenance dredging as required, the details of which is summarised in Table 4.10 below.

Table 4.10 Maintenance dredging volumes (m<sup>3</sup>) Marchwood Wharf industrial area

Location	2004	2005	2006	2007	2008
LaFarge Tarmac Aggregates	1,200	Not known	Not known	Not known	Not known
	2009	2010	2011	2012	2013
	Not known	Not known	Not known	Not known	Not known
Veolia (Environmental Services)	2009	2010	2011	2012	2013
	Not known	1,554	0	0	0
Raymond Brown Recycling and Minerals	2009	2010	2011	2012	2013
	0	0	0	0	0
Marchwood Power Station intake	2004	2005	2006	2007	2008
	3,200	0	0	29,700	0
Combined Marchwood Wharf Area Dredging	2004	2005	2006	2007	2008
	4,400	0	0	29,700	0
	2009	2010	2011	2012	2013
	0	1,554	0	0	0

LaFarge Tarmac Aggregates and Veolia (Environmental Services) carry out maintenance dredging at their berths, with Veolia carrying out additional dredging within the intake channel for the Marchwood Power Station. The maintenance dredging along the wharf and intake channel is carried out by ML (UK) Dredging Ltd on behalf of all the operators, with the use of a backhoe dredger and disposal at the Nab Tower (WI060) disposal site. For Marchwood Wharf, dredging is carried out approximately every 5 to 8-years, with the volume of dredge material varying between 500 m<sup>3</sup> and 2,500 m<sup>3</sup> at each berth, depending on the interval between dredge campaigns. At the Veolia berth in particular, there were no dredge records prior to 2010, in which year 1,554 m<sup>3</sup> of material was removed. Since this time, no further dredging has occurred and surveys are periodically carried out to inform the dredge requirement. The last

survey was carried out in 2013, which indicated no dredge is required and the next survey is due in 2015/2016. At the Marchwood Power Station intake channel, dredging was last carried out in 2004 and 2007, where an estimated 3,200 m<sup>3</sup> of material was removed in 2004 and 29,700 m<sup>3</sup> removed in 2007. At the LaFarge Tarmac Aggregates, an estimated 1,200 m<sup>3</sup> was removed in 2004, but no further detail is available post this date.

The industrial site (previously Husbands Shipyard) has not been maintenance dredged in the last 10-years. However, the site in 2013 was granted consent for a 260-berth marina including a capital dredge, where construction is set to begin in the Autumn of 2014.

#### 4.4.2.7 Fawley Power Station

The Fawley power station is owned and operated by RWE Npower plc, and is located north of Calshot Spit. At the time of compiling this Baseline (April 2014), the facility had shut down and was waiting decommissioning. The discussion of the dredging properties is therefore based on historical activities. The dredge area for the facility was the direct cooling water intake channel, which extends from the facility across intertidal mudflats and salt marshes and into Southampton Water Figure 4.6. The channel was maintained through water injection dredging (WID), over a channel area of 69,155 m<sup>2</sup>, to a depth of 1.5 m below CD. Dredging was periodically carried out approximately every 3-years, with each campaign lasting approximately 2-weeks. Although had previously been carried out in 2004, 2007, 2009 and 2012, information is only available from 2012, where approximately 29,000 m<sup>2</sup> of mud was removed.

#### 4.4.2.8 Princes Wharf

Princes Wharf is located on the west bank of the River Itchen, immediately downstream of Northam Bridge (Figure 4.8). The facility is operated by European Metal Recycling (EMR) Ltd. Information provided indicated the facility berths were last dredged in 1997. No further information is available.

#### 4.4.2.9 Aggregate Wharves

The aggregate wharves from north to south include Belvidere, Leamouth, Britannia, Phoenix, Burnley and Sunderland Wharves (Figure 4.8). Of the above, only Burnley Wharf undergoes maintenance dredging.

LaFarge Tarmac Aggregates operates the berth at Burnley Wharf on the west bank of the River Itchen and is part of the aggregate wharves (Figure 4.8). Although Burnley Wharf is located in proximity to a number of aggregate processing wharves, available data and responses received at the time of compiling this Baseline (April 2014) indicated that maintenance dredging only occurs at Burnley Wharf. Maintenance dredging at this wharf is carried out by ML (UK) Dredging Ltd, with the use of a backhoe dredger and disposal at the Nab Tower (WI060) disposal site. The dredge frequency at this site generally varies between 3 to 6-years, with the volume of dredge material varying between 500 m<sup>3</sup> and 1,500 m<sup>3</sup>, where an estimated 1,500 m<sup>3</sup> was removed in 2006.

Belvidere and Leamouth Wharves are operated and managed by CEMEX UK. Based on the information received, no dredging has been carried out at either wharf over the last 7-years and no further information is available.

#### 4.4.2.10 Southern Water Berths

Southern Water operates three berths within the study area, which are namely Slowhill Copse on the River Test, Weston Jetty (Woolston) on the River Itchen and Portswood Sewage Treatment Works (STW) Wharf on the upper reaches of the tidal River Itchen. No volumetric information on the dredge volume and frequency was available at the time of compiling this Baseline (April 2014).



## 5. Sediment Quality

The chemical characteristics of the surface sediments within the study area are described in this section. As part of the Marine Licensing process, Cefas advise the regulator in respect of sediment quality, in terms of assessing sediment quality in relation to defined reference Action Levels (AL). In order to carry out this function, Cefas routinely analyse sediments identified for maintenance dredging. The results of geochemical analysis are used in conjunction with other assessment methods (for example bioassays) as well as historical data and expert knowledge of a site, to make a decision regarding the fate of the dredged material following disposal or disturbance. It should be noted that the Action Levels (AL) are used as part of a 'weight of evidence' approach to assessing dredged material and its suitability for disposal to sea. The reference Cefas Action Levels (AL), along with the results of sediment samples from the study area are tabulated and shown in Appendix A. The reference Action Levels (AL) is set out in Table A1, while the analysis results (of surface sediments) from the study in relation to ABP and third party dredging activity are summarised in Table A2 to A4. For ease of comparison, the tables have been coloured with the current guidance ALs (with blue for exceedance of AL 1, and red for AL 2).

Cefas do not routinely test for the whole range of contaminants, as this is determined on a case by case basis depending on a number of factors. However, the chemical characteristics of the sediments are described in terms of a range of chemical parameters, listed below:

- Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc) and other metals (aluminium, boron, iron, manganese, selenium, silver and vanadium);
- Organotins (Tributyltin (TBT) and Dibutyltin (DBT));
- Total petroleum hydrocarbons (TPH);
- Polyaromatic hydrocarbons (PAHs) (USEPA 16);
- Polychlorinated biphenyls (PCBs) including 25 congeners;
- Ammonia; and
- Sulphide.

### 5.1 Sediment Quality within the Study Area

With respect to the study area, analysis has routinely been undertaken throughout Southampton Water and the Rivers Test and Itchen in respect of capital and maintenance dredge activities. Section 5.1 provides a summary of sediment quality information, taken primarily from Cefas data records, MMO sediment quality licence information, ABP Southampton records and contributions from third party dredge organisations. It should be noted that the text presents a combined summary (i.e., it does not differentiate between different dredge operators) and includes sediment quality from both capital and maintenance projects. Where capital project samples are included, in some instances, this material will have been removed by the scheme.

Sediment quality data from a number of locations within the study area, for the period 2001 to 2013 is presented in Tables A2 to A4 (Appendix A) and illustrated in Figure 5.1 and Figure 5.2, while summary descriptions are provided below. The presented sediment quality data is based

on samples obtained from the seabed surface as opposed to those obtained from depth. Within the summary below, the most recent data is considered first, the appropriate tables in Appendix A however are listed in succession from old to new (allowing for future updates).

#### 5.1.1 Metals

Data from the study area for the period 2001 to 2013 indicate that metal concentrations within the Southampton Water, the Rivers Test and Itchen are typically below Cefas ALs or slightly above Cefas AL 1. There are two sediment samples that exceed Cefas AL 2, these occurred as a result for lead (2011, Table A3.1) and for mercury (2011, Table A3.1) both located in the River Itchen dredge area. In particular, the lead sample is located approximately mid-channel off from Princes Wharf, while the mercury sample occurs in proximity to the slipway associated with the same Wharf (Figure 5.1). Both of these were considered to be isolated instances and did not, on balance of information, preclude the issue of a Marine Licence.

#### 5.1.2 Organotins

The levels of Dibutyltin (DBT) and Tributyltin (TBT) for the period 2001 to 2013 are generally below Cefas ALs or slightly above Cefas AL 1. However, there are three sediment samples that exceed Cefas AL 2 for TBT only. Two of the samples occur in relation to the berths associated with the Southampton Container Terminal, in the River Test dredge area, from 2005 and 2011 (Figure 5.1, Table A2.1). The third sample occurs in relation to the Ro/Ro berth at the Vehicle Handling Terminal, also within the River Test dredge area (Figure 5.1). There are no occurrences of DBT above Cefas AL 2.

#### 5.1.3 Polychlorinated Biphenyls (PCBs)

PCB substances are not typically sampled within the study area. The results that are available from the period 2001 to 2013 have been presented in Table A2.2, A3.2 and A4.4 for the River Test, Itchen and Southampton dredge areas respectively. Of the sampled data, the occurrences of PCBs are predominantly below Cefas ALs, with only isolated instances above Cefas AL 1 and one occurrence above Cefas AL 2. The occurrence above Cefas AL 2 is for PCB's sum of 25 congeners (2009, Table A2.2), which is located in proximity to the jetty associated with the Husband's Ship Yard, in the River Test Dredge area (Figure 5.1).

#### 5.1.4 Polyaromatic Hydrocarbons (PAHs)

Analysis of sediment samples for PAH contamination has not been routinely carried out. The results that are available from the period 2001 to 2013 have been presented in Table A2.3, A3.3 and A4.3 for the River Test, Itchen and Southampton dredge areas respectively. Of the sampled and analysed data, many locations exceed Cefas AL 1 for a range of PAH substances. This includes Total Hydrocarbons (THC) for which nearly all samples exceed Cefas AL 1, with measures that range between 200 ppm and 2000 ppm. It should be noted that there is no AL 2 for PAHs. The results presenting the occurrences of these substances are presented in Tables A2 to A4.

## 5.2 Summary of Sediment Quality

In general, contaminant levels in dredged material below AL 1 are of no concern with respect to their potential to cause pollution, and are unlikely to influence the decision to issue a licence. Dredged material with contaminant levels above AL 2 are generally considered unsuitable for sea disposal. However, these ALs are not absolute 'pass/fail' levels, but are used as guidance in conjunction with other assessment criteria.

The sediment quality of material licensed for maintenance dredging in Southampton Water and the Rivers Test and Itchen has been routinely considered by Cefas with licences issued by the regulator (currently the MMO, and previous Government Marine Licensing bodies). A restriction based on sediment quality was previously placed on a FEPA licence (from 2004), restricting dredging activities from the King George V dry dock due to elevated levels of TBT. Other than this exclusion, no further restrictions have been placed on maintenance dredging due to contamination issues.

A review of contamination levels within samples across the rest of the SHA, including the main channel, indicate in general, the levels are typically below Cefas ALs or slightly above Cefas AL 1. Where contamination levels in sediment samples exceeded Cefas AL 1, these concentrations would have been taken into account by the licensing authority, and have been deemed acceptable for disposal to sea.

## 6. Licence Information

### 6.1 ABP Licence Information

#### 6.1.1 Current ABP Maintenance Licence (L/2011/00233/1)

On 12 March 2012, Marine Licence L/2011/00233/1 was obtained by ABP Southampton, replacing the previous licence L/2011/00233. The current licence relates to maintenance dredging of material originating from the following locations:

- River Itchen Berths and Channels;
- River Test Berths and Channels;
- Southampton Water; and
- Solent Channels.

Marine Licence L/2011/00233/1 permits ABP Southampton or any agent, contractor or sub-contractor acting on their behalf under this licence (UK Dredging and ML (UK) Ltd) to remove up to 600,000 tonnes of maintenance material per annum (1,800,000 tonnes in total) from the above locations between 12 March 2012 and 13 September 2014. The licence also permits the disposal of this maintenance material at the Nab Tower disposal site WI060 over the same period. The following specific conditions were itemised within the licence as a result of advice received from the consenting consultation process and conditions the MMO wished to add to the dredge operation.

Licence Clauses (referencing clause number):

3.2.4 The Licence Holder must ensure that at such time that the Environment Agency's Fishery Officer informs ABP's hydrographer that the Autumn salmon run has commenced, no dredging will take place North of the Dock Head for a period of three days. Subsequent to this condition, there will be no restrictions to dredging in the areas riverward of the Dock Head boundary.

#### 6.1.2 Recent ABP Licence History

Table 6.1 provides an overview of the recent ABP licence history for the Port of Southampton.

Table 6.1 ABP Southampton licence history

Licence Reference	Details
32409/04/0 Issued 18 August 2004. Valid 20 August 2004 to 19 August 2007	600,000 tonnes/year (1,800,000 tonnes in total). Maintenance dredging from Southampton (Solent, Itchen, Test boundaries defined). Deposit of dredged material at Nab Tower, WI060. Licence includes following agents or contractors: UK Dredging. Licence includes use of the following vessels: UKD Bluefin, UKD Marlin and UKD Dolphin. Area called "Upper Swinging Ground" close to the "King George V Dock" in the River Test excluded from permitted maintenance dredging area until future notification from Licensing Authority.

Licence Reference	Details
32409/04/1 Issued 21 September 2004. Valid 21 September 2004 to 19 August 2008	Replaced licence 32409/04/0. Length of licence reduced. Total dredged material reduced to 600,000 tonnes.
34003/08/0 Issued 19 August 2008. Valid 14 September 2008 to 13 September 2011	600,000 tonnes/year (1,800,000 tonnes in total). Maintenance dredging boundaries include River Itchen Berths and Channels, River Itchen Berths and Channels 2, Southampton Water and Solent Channels River Itchen. Barges 'Split 2' and 'Split 3' added to licence. Licence condition added: (9.5) The Licence Holder must ensure that at such time that the EA Fishery Officer informs ABP's hydrographer that the Autumn salmon 'run' has commenced, no dredging will take place North of the Dock Head for a period of three days. Subsequent to this condition, there will be no restrictions to dredging in the areas riverward of the Dock Head boundary
L/2011/00233 Issued 22 September 2011. Valid 14 September 2011 to 13 September 2014	Maintenance dredging boundaries include River Itchen Berths and Channels, River Test Berths and Channels, Southampton Water and Solent Channels. Dredgers 'UKD Orca' and 'Witton II' added to licence. ML (UK) Ltd added as an agent to the licence. Licence condition added: (3.2.9) The Licence Holder must submit their disposal returns on a bi-annual basis, 31 January and the 31 July each year, showing the monthly quantities of deposits at each location.
L/2011/00233/1 Issued 12 March 2012. Valid 12 March 2012 and 13 September 2014	Current Marine Licence held by ABP Southampton. Replaced licence L/2011/00233.

## 6.2 Current Non-ABP (Third Party) Licence Information

At the time of writing (April 2014), ten other organisations hold marine licences to dispose of maintenance dredged material at the Nab Tower disposal site (WIO60). RWE Npower plc previously held a marine licence for works in the vicinity of Fawley Power Station located within Southampton Water (L/2012/00028/1); however, the licence expired on 16 January 2013 and the site closed in March 2013.

### 6.2.1 BP Oil UK Ltd L/2013/00056

A Marine Licence (L/2013/00056) was obtained by BP Oil UK Ltd to maintain dredged depth for the safe transit of vessels berthing at Hamble Marine Terminal, valid from 8 February 2013 to 7 February 2016. The dredge area is confined to Hamble Jetty Box and the immediate approaches, clear of the main Southampton Channel. The methodology attached to the licence predicts that the operation will be conducted in a single campaign of one or two weeks (per year), dependant on berth occupancy. The volume of material permitted for disposed at the Nab Tower disposal site is 25,000 tonnes per year (75,000 tonnes in total). The licence includes the use of the following vessels: 'Split 2', 'Split 3', 'UKD Bluefin', 'UKD Dolphin', 'UKD Marlin', 'UKD Orca', 'UKD Sealion' and 'Witton II'. As part of the marine licence, the following specific condition was itemised within the licence as a result of advice received from the consenting consultation process and conditions the MMO wished to add to the dredge operation.

Licence Clauses (referencing clause number):

3.2.1 The Licence Holder must ensure that, during the course of disposal, material is distributed evenly over the disposal site Nab Tower (WI060).

6.2.2 Esso Petroleum Company Ltd L2012/00417/2

Esso obtained a Marine Licence for the marine disposal of maintenance dredged material from the Fawley Marine terminal berth pockets and approaches and Nab Channel. The Marine Licence is valid for the period between the 1 February 2013 and 7 November 2015, for the removal of up to 150,000 tonnes of material per year to the Nab Tower disposal site (450,000 tonnes in total). Dredge campaigns usually occur once a year, although there is scope for two campaigns in one year. For each campaign, the amount and locations of material to be removed are determined by a pre-dredge survey. A post-dredge survey is also carried to establish the quantity of material removed. The licence includes the use of the following vessels, 'UKD Bluefin', 'UKD Marlin', 'UKD Orca', 'UKD Sealion', 'UKD Seahorse' and Cherry Sand. As part of the marine licence, the following specific condition was itemised within the licence as a result of advice received from the consenting consultation process and conditions the MMO wished to add to the dredge.

Licence Clauses (referencing clause number):

3.2.1 The licence holder must ensure that any works permitted by this licence that has the potential to suspend significant amounts of sediment should be carried out during the winter months (i.e. October to April inclusive); and

3.2.3 The licence holder must ensure that during the course of disposal, material is distributed evenly over disposal site Nab Tower (WI060).

6.2.3 Tarmac Ltd L/2012/00142

To deposit dredged aggregate material received by Burnley Wharf at the Nab Tower disposal site, Tarmac Ltd obtained a Marine Licence (L/2012/00142). The licence is valid from 30 April 2012 to 29 April 2015. Burnley Wharf receives marine dredged aggregate for processing. The very fine (silt) material resulting from the separation process is stored in a storage bay on the quayside and, periodically, this material requires disposal at sea. It should be noted that no dredging activity is permitted by this licence, only disposal of dredged material. The volume of material permitted for disposal at the Nab Tower disposal site is 12,600 tonnes over the licence period. The licence includes the use of the following vessels: 'MV Storebror', 'YR49', 'Split 2' and 'Split 3'. As part of the marine licence, the following specific conditions were itemised within the licence as a result of advice received from the consenting consultation process and conditions the MMO wished to add to the dredge operation.

Licence Clauses (referencing clause number):

3.2.1 The material must be disposed of to the Nab Tower disposal site (WI060); and

3.2.2 The licence holder must ensure that during the course of disposal, material is distributed evenly over disposal site Nab Tower (WI060).

#### 6.2.4 Oceanic Estates Ltd L/2012/00411

A Marine Licence (L/2012/00411) was obtained by Oceanic Estates Ltd in relation to the Husbands Shipyard to renew an expired licence (34354/10/0). The new licence is valid from 1 November 2012 to 31 October 2015. According to the methodology described within the licence, the volume of material permitted for disposal at the Nab Tower disposal site is unknown as a plan of works has yet to be developed. However, the licence conditions state that "Material must be disposed of within disposal site Nab Tower (WI060) 67,500 tonnes". As part of the marine licence, the following specific conditions were itemised within the licence as a result of advice received from the consenting consultation process and conditions the MMO wished to add to the dredge operation.

Licence Clauses (referencing clause number):

3.1.3 The Licence Holder must ensure that if the dredging is to be undertaken between March and August that prior to the commencement of the works, an Adaptive Management Strategy (AMS) shall be submitted to and agreed in writing by the Marine Management Organisation. The works shall be carried out in accordance with the approved AMS and any subsequent amendments shall be agreed in writing with the Marine Management Organisation.

If dredging occurs outside of the March-August window the monitoring of suspended solids and dissolved oxygen will not be necessary for this dredge, however the AMS is to still cover the timing and duration of works, methodology for the dredging operations and monitoring of suspended solids and dissolved oxygen levels;

3.2.1 Material must be disposed of within disposal site Nab Tower (WI060) 67,500 tonnes;

3.2.2 The licence holder must ensure that during the course of disposal, material is distributed evenly over the disposal site Nab Tower (WI060); and

3.2.5 The Licence Holder must ensure that only backhoe and plough dredging methodologies are to be used.

#### 6.2.5 Marina Developments Ltd L/2012/00409/1

Marina Developments Ltd obtained a Marine Licence (L/2012/00409/1) to undertake maintenance dredging works to retain approach channel depths at design levels for Hythe Marina Village and approach channel. However, a detailed programme has not been determined. The licence is valid from 1 November 2012 to 31 October 2015. The dredged material is permitted for disposal primarily at Nab Tower, but also at small quantities at the Needles and Hurst Fort disposal sites (bad weather sites). Maximum disposal volumes at the Nab Tower disposal site are 7,000 tonnes per year (21,000 tonnes in total). The licence includes the use of the following vessels: 'Pug', 'Split 2', 'Split 3' and 'Witton II'. As part of the marine licence, the following specific conditions were itemised within the licence as a result of

advice received from the consenting consultation process and conditions the MMO wished to add to the dredge operation.

Licence Clauses (referencing clause number):

3.2.1 The Licence Holder must ensure that the material must be disposed of within disposal site Nab Tower (WI060) not to exceed 7,000 tonnes per annum.

Bad weather sites (10% maximum each, not to exceed 700 tonnes) are Hurst Fort (WI080) and Needles (WI090);

3.2.2 The licence holder must ensure that during the course of disposal, material is distributed evenly over the disposal site Nab Tower (WI060); and

3.2.5 The Licence Holder must ensure that the dredging only be undertaken as described in Method Statement contained in the application as follows: a backhoe dredger will load the dredged material into sealed self-propelled hoppers for off-site disposal by sea and works will be carried out during the winter months (i.e. October to April inclusive). Any subsequent variations shall be agreed in writing by the Marine Management Organisation.

#### 6.2.6 Marina Developments Ltd L/2011/00312/1

Marina Developments Ltd obtained a Marine Licence (L/2011/00312/1) to undertake maintenance dredging works to retain basin depths at design levels at the Ocean Village Marina, Southampton. A detailed programme has not been determined, although works will be undertaken annually between the months of October and April. The licence is valid from 20 December 2011 to 19 December 2014. The dredged material is permitted for disposal primarily at Nab Tower disposal site. Maximum disposal volumes are 29,250 tonnes over the licence period (9,750 tonnes per year). The licence includes the use of the following vessels: 'Pug', 'Split 2', 'Split 3' and 'Witton II'. As part of the marine licence, the following specific conditions were itemised within the licence as a result of advice received from the consenting consultation process and conditions the MMO wished to add to the dredge operation.

Licence Clauses (referencing clause number):

3.2.1 The Licence Holder must ensure that during the course of disposal, material is distributed evenly over disposal site Nab Tower (WI060);

3.2.2 The Licence Holder must ensure that material must be disposed of within disposal site Nab Tower (WI060), with a maximum of 9,750 tonnes per year;

3.2.6 The Licence Holder must ensure that disposal at Hurst Fort (WI080) is restricted to bad weather conditions only and is limited to 10% of the annual permitted tonnage; and

3.2.7 The Licence Holder may only dispose of material at Hurst Fort (WI080) within the first 4 hours of the ebb tide.



### 6.2.7 Marina Developments Ltd L/2012/00339

Marina Developments Ltd obtained a Marine Licence (L/2012/00339) to undertake maintenance dredging works to retain basin depths at design levels at Saxon Wharf. A detailed programme has not been determined, although works will be undertaken annually between the months of October and April. The licence is valid from 12 September 2012 to 11 September 2015. The dredged material is permitted for disposal primarily at Nab Tower disposal site, but also at small quantities at the Needles and Hurst Fort disposal sites (bad weather sites). The maximum disposal volume is 9,750 tonnes per year (29,250 tonnes in total). The licence includes the use of the following vessels: 'Pug', 'Split 2', 'Split 3' and 'Witton II'. As part of the marine licence, the following specific conditions were itemised within the licence as a result of advice received from the consenting consultation process and conditions the MMO wished to add to the dredge operation.

#### Licence Clauses (referencing clause number):

- 3.2.1 The Licence Holder must ensure that dredging only occurs between November & March inclusive;
- 3.2.4 The Licence Holder must ensure that material must be disposed of within Nab Tower (WI060);
- 3.2.5 The Licence Holder must ensure that during the course of disposal, material is distributed evenly over disposal site Nab Tower (WI060); and
- 3.2.7 The Licence Holder must ensure that material is disposed of within disposal site Nab Tower (WI060). In the case that this site cannot be reached due to bad weather, 10% of the annual tonnage of silt may be disposed of at the Needles (WI090) or Hurst Fort (WI080). Gravel material must not be disposed of at Hurst Fort (WI080).

### 6.2.8 Marina Developments Ltd L/2011/00291

Marina Developments Ltd obtained a Marine Licence (L/2012/00339) to undertake maintenance dredging works to retain basin depths at design levels at Shamrock Quay. A detailed programme has not been determined, although works will be undertaken annually between the months of October and April. The licence is valid from 15 November 2011 to 30 November 2014. The dredged material is permitted for disposal primarily at Nab Tower disposal site. The maximum disposal volume is 9,750 tonnes per year (29,250 tonnes in total). The licence includes the use of the following vessels: 'Pug', 'Split 2', 'Split 3' and 'Witton II'. As part of the marine licence, the following specific conditions were itemised within the licence as a result of advice received from the consenting consultation process and conditions the MMO wished to add to the dredge operation.

#### Licence Clauses (referencing clause number):

- 3.1.2 The Licence Holder should notify the UK Hydrographic Office to permit the promulgation of maritime safety information and updating of nautical charts and publications;

- 3.2.1 The Licence Holder should ensure that dredging only occurs between November and March inclusive;
- 3.2.3 The Licence Holder must ensure that during the course of disposal, material is distributed evenly over disposal site Nab Tower (WI060); and
- 3.2.4 The Licence Holder must ensure that material is disposed of within Nab Tower (WI060), with a maximum of 9,750 tonnes per year. In poor weather conditions, 10% of the annual licensed tonnage may be disposed of at the Needles (WI090) or Hurst Fort (WI080).

#### 6.2.9 Homes and Communities Agency L/2013/00109/2

A Marine Licence (L/2013/00109/2) was obtained by the Homes and Communities Agency to renew a licence (34314/09/1) held for the Hythe Marine Park site to allow for annual maintenance dredging. The new licence is valid from 21 June 2013 to 23 May 2016. Up to 49,000 tonnes per year of maintenance material dredged from the site is permitted for disposal at the Nab Tower disposal site (147,000 tonnes in total), as well as small quantities at the Needles and Hurst Fort disposal sites (bad weather sites). The licence includes the use of the following vessels: 'Pug', 'Split 2', 'Split 3', 'Witton II', 'Nab' and 'Needles'. As part of the marine licence, the following specific conditions were itemised within the licence as a result of advice received from the consenting consultation process and conditions the MMO wished to add to the dredge operation.

Licence Clauses (referencing clause number):

- 3.2.1 Maintenance dredged material from Hythe Marine Park may only be disposed of at Nab Tower (WI060) at a rate of 49,000 tonnes per annum except during instances of foul weather. Foul weather sites (no greater than 500 tonnes per annum) are Hurst Fort (WI080) and Needles (WI090);
- 3.2.2 The licence holder must ensure that during the course of disposal, material is distributed evenly over the disposal site Nab Tower (WI060); and
- 3.2.4 Only backhoe and plough dredging methodologies are to be used.

#### 6.2.10 Homes and Communities Agency L/2013/00152/1

A Marine Licence (L/2013/00152/1) was obtained by the Homes and Communities Agency to maintain the working depths on the Centenary Quay, Woolston Riverside, and River Itchen. The new licence is valid from 26 July 2013 to 14 May 2016. The methodology anticipated that in the order of 85 barge loads will be required to transport the material to the disposal site. Up to 10,000 tonnes per year of maintenance material dredged from the site is permitted for disposal at the Nab Tower disposal site (30,000 tonnes in total). The licence includes the use of the following vessels: 'Split 2', 'Split 3', 'Witton II', 'Nab' and 'Needles'. As part of the marine licence, the following specific conditions were itemised within the licence as a result of advice

received from the consenting consultation process and conditions the MMO wished to add to the dredge operation.

Licence Clauses (referencing clause number):

3.1.2 Prior to mechanical dredging operations commencing, the Licence Holder must prepare and submit a dredge noise assessment for the approval of the MMO. The dredge noise assessment should include:

- Details of the actual noise emission levels for the chosen dredgers.
- Consideration of impacts upon local residents, if any, this should include reference to British Standard 5228.
- Details of the mitigation measures, if any, proposed in response to identified impacts.

Following approval, dredging operations shall be undertaken in accordance with any mitigation measures set out in the dredge noise assessment;

3.2.4 The Licence Holder must ensure that material to be disposed of to sea may only be disposed of within disposal site Nab Tower (W1060). Such material must be distributed evenly over the disposal site.

#### 6.2.11 Westminster Dredging Company Limited L/2014/00051/1

A Marine Licence (L/2014/00051/1) was obtained by Westminster Dredging Company Limited to maintain the operational and navigation depths in the approaches and berths at SMC Marchwood. The new licence is valid from 4 March 2014 to 2 March 2017. Up to 48,000 tonnes of maintenance material dredged from the site is permitted for disposal at the Nab Tower disposal site during the licence period. The licence includes the use of a wide range of vessels, including the following: 'Admiral Day', 'Causeway', 'Coastway', 'Cork Sand', 'Crestway', 'F48', 'Freeway', 'Frigg', 'Kreeft', 'Lantic Bay', 'Long Sand', 'Michelle', 'Norma', 'Rind', 'Schorpioen', 'Shoalway', 'Shoreway', 'Sospan Dau', 'Starndway', 'UKD Bluefin', 'UKD Marlin', 'UKD Orca', 'UKD Seahorse', 'UKD Sealion', 'Westminster Dredging Mersey', 'Waterway', 'Barent Sanen' and 'Cornelis Zanen'. As part of the marine licence, the following specific conditions were itemised within the licence as a result of advice received from the consenting consultation process and conditions the MMO wished to add to the dredge operation.

Licence Clauses (referencing clause number):

3.2.2 The Licence Holder must ensure that dredging and associated activity is undertaken between the 1 October and 15 March of each year inclusive;

3.2.3 The Licence Holder must ensure that material suitable for sea disposal must be disposed of within disposal site Nab Tower (W1060); and

## 7. Environmental Information

### 7.1 Conservation and Designations

The nature conservation importance of Southampton Water and the surrounding area is recognised through a number of protected sites (Figure 7.1 and Figure 7.2). The potential environmental changes from maintenance dredge operations and disposals and the potential Likely Significant Effect (LSE) on interest features has been reviewed in detail, in Section 3 of the Habitats Regulations Test for Likely Significance (ABPmer, 2014). The following sections provide further information on the qualifying interest features of each of the relevant protected sites.

#### 7.1.1 Special Protection Areas

The EC Directive on the Conservation of Wild Birds (the Birds Directive<sup>1</sup>) requires all member states to identify areas to be given special protection for the rare or vulnerable species listed in Annex 1 of the Directive (Article 4.1), for regularly occurring migratory species (Article 4.2) and for the protection of wetlands, especially wetlands of International importance. An overview of the reasons for designating the SPAs that occur within the study area (and have been screened into the AA) is included within Table 7.1. The locations of the SPAs within the study area are illustrated in Figure 7.1.

Table 7.1 SPAs within the study area

Site	SPA Qualifying Features		
	Article 4.1	Article 4.2	Sub-Features
Solent and Southampton Water	✓	✓	Sand and shingle, saltmarsh, intertidal mudflats and sandflats, shallow coastal waters, boulder and cobble shores, mixed sediment shores.
Portsmouth Harbour	-	✓	Saltmarsh, intertidal mudflats and sandflats, shallow coastal waters.
Chichester and Langstone Harbours	✓	✓	Sand and shingle, shallow coastal waters, shingle, saltmarsh, intertidal mudflats and sandflats, mixed sediment shores.

(Source: JNCC, 2006a; 2006b; 2006c)

The bird species qualifying under the Birds Directive using the marine component of the SPA at the time of classification can be found in Appendix B.

#### 7.1.2 Ramsar Sites

Under the 1971 Ramsar Convention on Wetlands of International Importance, it is a requirement of signatory states to protect wetland sites of international importance, including those that are important waterfowl habitats. An overview of the reasons for designating the Ramsar sites that occur within the study area (and have been screened into the AA) is included within Table 7.2. The locations of the Ramsar sites within the study area are illustrated in Figure 7.1.

<sup>1</sup> Council Directive 79/409/EEC on the conservation of wild birds.

Table 7.2 Ramsar sites within the study area

Site	Ramsar Qualifying Criteria				
	Criterion 1	Criterion 2	Criterion 3	Criterion 5	Criterion 6
Solent and Southampton Water	The site is one of the few major sheltered channels between a substantial island and mainland in European waters, exhibiting an unusual strong double tidal flow and has long periods of slack water at high and low tide. It includes many wetland habitats characteristic of the biogeographic region: saline	The site supports an important assemblage of rare plants and invertebrates.	-	Waterfowl assemblages of international importance	Species/populations occurring at levels of international importance
Portsmouth Harbour SPA	-	-	The intertidal mudflat areas possess extensive beds of eelgrass <i>Zostera angustifolia</i> and <i>Zostera noltei</i> which support the grazing dark-bellied brent geese populations. The mud-snail <i>Hydrobia ulvae</i> is found at extremely high densities, which helps to support the wading bird interest of the site. Common cord-grass <i>Spartina anglica</i> dominates large areas of the saltmarsh and there are also extensive areas of green algae <i>Enteromorpha</i> spp. and sea lettuce <i>Ulva lactuca</i> . More locally the saltmarsh is dominated by sea purslane <i>Halimione portulacoides</i> which gradates to more varied communities at the higher shore levels. The site also includes a number of saline lagoons hosting nationally important species.	-	Species/populations occurring at levels of international importance
Chichester and Langstone Harbours	Two large estuarine basins linked by the channel which divides Hayling Island from the main Hampshire coastline. The site includes intertidal mudflats, saltmarsh, sand and shingle spits and sand dunes.	-	-	Waterfowl assemblages of international importance	Species/populations occurring at levels of international importance

(Source: JNCC, 2008a, b; c)

### 7.1.3 Special Areas of Conservation

The EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (the Habitats Directive<sup>2</sup>) requires the establishment of a network of important high quality conservation sites that will make a significant contribution to conserving the 169 habitat types and 623 species identified in Annexes I and II of the Habitats Directive. An overview of the reasons for designating the SACs that occur within the study area (and have been screened into the AA) is included within Error! Reference source not found.. The locations of the SACs within the study area are illustrated in Figure 7.1.

Table 7.3 SACs within the study area

Site	SAC Qualifying Features	
	Annex 1 Habitats	Annex II Species
Solent Maritime	1110 Sandbanks which are slightly covered by sea water all the time <sup>2</sup> 1130 Estuaries <sup>1</sup> 1140 Mudflats and sandflats not covered by seawater at low tide <sup>2</sup> 1150 Coastal lagoons <sup>2</sup> 1210 Annual vegetation of drift lines 1220 Perennial vegetation of stony banks <sup>2</sup> 1310 <i>Salicornia</i> and other annuals colonizing mud and sand <sup>2</sup> 1320 <i>Spartina</i> swards ( <i>Spartinion maritimae</i> ) <sup>1</sup> 1330 Atlantic salt meadows ( <i>Glaucopuccinellietalia maritimae</i> ) <sup>1</sup> 2120 Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ("white dunes") <sup>2</sup>	Desmoulin's whorl snail ( <i>Vertigo moulinsiana</i> ) <sup>2</sup>
South Wight Maritime	1170 Reefs <sup>1</sup> 1230 Vegetated sea cliffs of the Atlantic and Baltic Coasts <sup>1</sup> 8330 Submerged or partially submerged sea caves <sup>1</sup>	-
River Itchen	3260 Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation <sup>1</sup>	1044 Southern damselfly ( <i>Coenagrion mercurial</i> ) <sup>1</sup> 1092 White-clawed (or Atlantic stream) crayfish ( <i>Austropotamobius pallipes</i> ) <sup>2</sup> 1096 Brook lamprey ( <i>Lampetra planeri</i> ) <sup>2</sup> 1106 Atlantic salmon ( <i>Salmo salar</i> ) <sup>2</sup> 1163 Bullhead ( <i>Cottus gobio</i> ) <sup>1</sup> 1355 Otter ( <i>Lutra lutra</i> ) <sup>2</sup>
<sup>1</sup> Priority feature <sup>2</sup> Present as a qualifying features, but not a primary reason for selection of this site		

(Source: JNCC, 2011a, b, c)

<sup>2</sup> Council Directive 92/43/EEC on the conservation of natural habitats and wild fauna.

#### 7.1.4 European Marine Sites

European Marine Sites is the collective term for SACs and SPAs that are covered by tidal water (continuously or intermittently) and protect some of Britain's most special marine and coastal habitats and species of European importance. In accordance with Government advice in both England and Wales, Ramsar sites must be given the same consideration as European sites when considering plans and projects which might affect them (DCLG, 2012). European Marine Sites form part of the Marine Protected Area (MPA) network (Natural England, 2014a).

The following European Marine Sites and corresponding international designations which are described above are located in the study area:

- Solent European Marine Site, comprising:
  - Solent Maritime SAC;
  - Solent and Southampton Water SPA and Ramsar site;
  - Chichester and Langstone Harbours SPA and Ramsar site; and
  - Portsmouth Harbour SPA and Ramsar site.
- South Wight Maritime European Marine Site, comprising:
  - South Wight Maritime SAC

#### 7.1.5 Compensatory Sites

The March 2012 National Planning Policy Framework (NPPF), which sets out the Government's planning policies for England confirms (in Paragraph 118) that "*sites identified, or required, as compensatory measures for adverse effects on European sites*" should be given the same protection as European sites (DCLG, 2012, p28). On this basis, all completed managed realignment or recharge sites that have been created for compensatory purposes were identified. These are included on Figure 7.1 and are as follows.

- Cobnor managed realignment;
- Lymington recharge; and
- Medmerry managed realignment.

The qualifying interest features of the compensatory sites that occur in the study area are not known, however, it is considered that these will support features already designated by other European/Ramsar sites already screened into the AA (in particular coastal habitats and supporting species; and foraging and migratory birds). The assessment will therefore not include any specific further consideration of these sites.

#### 7.1.6 Marine Conservation Zones (MCZ)

The UK has signed up to international agreements that aim to establish an 'ecologically coherent network of Marine Protected Areas (MPAs)' by the end of 2012. This network will be made up of current MPAs as well as a new type of MPA called a Marine Conservation Zone .

Within the south east region, the development of recommendations for MCZ has been coordinated by the Balanced Seas Regional MCZ Project (Balanced Seas, 2011).

In November 2013 Defra designated 27 new Marine Conservation Zones (MCZs), none of which fall within the vicinity of the maintenance dredge operations. In February 2014, Defra announced that work on a second tranche of MCZs is currently underway with the aim of holding public consultation in early 2015 and designating sites by the end of that year (Defra, 2014). For the second tranche, 37 sites from the Regional MCZ Project recommendations have been identified as suitable candidates for consideration. Of these, there are five candidate MCZs (cMCZs) that could potentially be indirectly affected by the maintenance dredge operations, as a result of the disposal of maintenance dredge material at the Nab Tower Deposit Ground. Although these have not been formally designated, and the process for consideration of these sites is still under development, they have been screened into the assessment on a precautionary basis and treated as though they were fully designated sites. These sites are as follows:

- Bembridge cMCZ site 14;
- Utopia cMCZ site 13;
- Offshore Overfalls cMCZ site 12;
- Norris to Ryde cMCZ site 15; and
- Yarmouth to Cowes cMCZ site 16.

The features and draft conservation objectives that were developed by Natural England and Joint Nature Conservation Committee (JNCC) advisors (Balanced Seas, 2011) for each of the Tranche 2 cMCZs that have been screened into the assessment are outlined in Table 7.4. The draft conservation objective “maintain” means that in general the current levels of activity in the area are considered acceptable, but they will be monitored and restrictions may have to be introduced if the condition declines. “Recover” means that restrictions on certain activities causing the pressure may be necessary to allow the feature to recover to favourable condition. It does not necessarily mean that an activity will be prohibited, as other mitigation measures might be appropriate (e.g. change in fishing gear type, reduction in intensity, seasonal restrictions etc.).

Table 7.4 Features and conservation objectives for Tranche 2 cMCZs within the study area

cMCZ	Feature Type	Feature Name	Draft Conservation Objectives
Bembridge cMCZ Site 14	Broad-scale habitat	A5.2 Subtidal sand	Maintain
		A5.3 Subtidal mud	Maintain
		A5.4 Subtidal mixed sediments	Maintain
	Habitat Features of Conservation Importance (FOCI)	Maerl beds	Recover
		Mud habitats in deep water	Maintain
		Rossworm ( <i>Sabellaria spinulosa</i> ) reef	Recover
		Seagrass beds	Recover
		Native oyster ( <i>Ostrea edulis</i> ) beds	Recover
		Sea-pen and burrowing megafauna communities	Recover



cMCZ	Feature Type	Feature Name	Draft Conservation Objectives
	Species FOCI Low mobility	Tentacled lagoon worm ( <i>Alkmaria romijni</i> )	Maintain
		Lagoon sand shrimp ( <i>Gammarus insensibilis</i> )	Maintain
		Kaleidoscope stalked jellyfish ( <i>Haliclystus auricula</i> )	Maintain
		Long-snouted seahorse ( <i>Hippocampus guttulatus</i> )	Maintain
		Short-snouted seahorse ( <i>Hippocampus hippocampus</i> )	Maintain
		Starlet sea anemone ( <i>Nematostella vectensis</i> )	Maintain
		Native oyster ( <i>O. edulis</i> )	Recover
		Peacock's tail ( <i>Padina pavonica</i> )	Maintain
		Sea snail ( <i>Paludinella littorina</i> )	Maintain
Utopia cMCZ Site 13	Habitat FOCI	Fragile sponge and anthozoan communities	Recover
Offshore Overfalls cMCZ Site 12	Broad-scale habitat	A5.1 Subtidal coarse sediments	Recover
		A5.2 Subtidal sand	Recover
		A5.4 Subtidal mixed sediments	Recover
	Habitat FOCI	Rossworm ( <i>S. spinulosa</i> ) reef	Recover
		Subtidal sands and gravels	Recover
	Species FOCI	Undulate ray ( <i>Raja undulata</i> )	Maintain
Geology	English Channel outburst flood features	Maintain	
Norris to Ryde cMCZ Site 15	Broad-scale habitats	A5.3 subtidal mud	To be assessed / Maintain
	Habitat FOCI	Seagrass beds	Recover
	Species FOCI Low mobility	Tentacled Lagoon Worm ( <i>Alkmaria romijni</i> )	Maintain
Yarmouth to Cowes cMCZ Site 16	Broad-scale habitats	A2.1 Intertidal coarse sediment	To be assessed
		A1.3 Low energy intertidal rock	Maintain
		A3.2 Moderate energy infralittoral rock	Maintain / Recover
		A5.1 subtidal coarse sediment	Maintain
	Habitat FOCI	Estuarine rocky habitats	Recover
		Intertidal underboulder communities	Recover
		Native oyster beds	Maintain
		Peat and clay exposures	Recover
		Rossworm ( <i>Sabellaria spinulosa</i> ) reef	Recover
		Seagrass beds	Recover
	Species FOCI Low mobility	Lagoon Sand Shrimp ( <i>Gammarus insensibilis</i> )	Maintain
Native Oyster ( <i>Ostrea edulis</i> )		Maintain	

(Source: Balanced Seas, 2011)

Figure 7.2 shows the locations of the nearby cMCZs which have been screened into the assessment. It is important to note that at present the cMCZ locations represent recommendations made to Natural England and the JNCC by the regional project coordinators, and that the boundaries and existence of such areas will be subject to public consultation in 2015, and could potentially change.

## 7.2 Regulation 35 Advice

Natural England has statutory responsibility to advise relevant authorities as to the conservation objectives for European Marine Sites and operations, which may cause deterioration or disturbance of natural habitats and species. This advice is provided under Regulation 35 of the Conservation of Habitats and Species Regulations 2010 (referred to as the Habitats Regulations within this Baseline Document). The role of the conservation objectives is to define the nature conservation aspirations for the features of interest, thereby representing the aims and requirements of the Habitats and Birds Directives in relation to the site. The following sections summarise the relevant favourable condition attributes for which targets have been set for each of the relevant sub-features.

### 7.2.1 SPA Sub-features

The Regulation 35 advice for the Solent European Marine Site recognises that bird populations' change, therefore the advice focuses on the condition of the habitat to support birds rather than the bird numbers themselves. In this respect the ecologically important sub-features associated with the bird features have been identified (see Table 7.1). The maintenance of the favourable condition of these habitats is considered fundamental in the maintenance of the European/Ramsar sites.

The conservation objective for the relevant sub-features that have been identified within the SPAs of the Solent European Marine Site (see Section 7.1.1) is to maintain the sub-features (habitats) in favourable condition. Details of how to recognise favourable condition is summarised in the respective Regulation 35 Advice (English Nature, 2001a). The favourable condition attributes for which targets have been set for each of the relevant sub-features can be summarised as follows:

- Sand and shingle - extent and distribution of habitat, vegetation characteristics;
- Saltmarsh - extent and distribution of habitat, vegetation characteristics, food availability;
- Intertidal mudflats and sandflats - extent and distribution of habitat, food availability;
- Shallow coastal waters – food availability;
- Boulder and cobble shores - extent and distribution of habitat, food availability;
- Mixed sediment shores - extent and distribution of habitat, food availability; and
- Shingle - extent and distribution of habitat.

Birds can also be affected by disturbance, particularly changes in noise, movement and lines of sight so the Directive requires measures to avoid such forms of significant disturbance.

### 7.2.2 Ramsar Sub-features

The Regulation 35 advice focuses on the condition of the habitats that support the interest features as opposed to the features themselves. The conservation objectives for the sub-features identified within the Ramsar sites comprising the Solent European Marine Site therefore relate to the supporting habitats. The favourable condition attributes for which targets have been set for each of the relevant sub-features can be summarised as follows:

- Estuaries – extent, morphological equilibrium, water density – temperature and salinity, nutrient status;
- Saline lagoons – extent, salinity, water depth, isolating barrier – presence and nature, species composition, water clarity;
- Saltmarsh – extent and distribution of habitat, vegetation characteristics, food availability;
- Intertidal reefs – extent, water temperature and salinity, water clarity, characteristic species;
- Cordgrass swards – distribution and extent;
- Intertidal mudflats and sandflats - extent and distribution of habitat, food availability;
- Boulder and cobble shores - extent and distribution of habitat, food availability;
- Mixed sediment shores - extent and distribution of habitat, food availability;
- Sand and shingle - extent and distribution of habitat, vegetation characteristics; and
- Shallow coastal waters – food availability.

### 7.2.3 SAC Sub-features

The conservation objectives for the SAC interest features of the Solent and South Wight Maritime European Marine Sites are to maintain each in favourable condition subject to natural change. Details of how to recognise favourable condition is summarised in the respective Regulation 35 Advice (English Nature, 2001a; 2001b).

The favourable condition attributes for which targets have been set for each of the SAC interest features of the Solent and South Wight Maritime European Marine Sites are summarised as follows:

- Estuary – extent, morphological equilibrium, water density – temperature and salinity, nutrient status;
- Annual vegetation of drift lines – extent, mobility, coastal processes, substrate composition, characteristic species of annual vegetation of drift lines;
- Atlantic salt meadows – distribution and extent, species composition;
- *Salicornia* and other annuals colonising mud and sand – algal mat cover, distribution and extent of common cordgrass *Spartina anglica* community;
- Cordgrass swards – distribution and extent of small, smooth and Townsend's cordgrass communities;
- Intertidal mudflats and sandflats – extent, topography, nutrient enrichment – macroalgal mats, sediment character, range and distribution of characteristic mud biotopes (e.g. LMU), sand and gravel biotopes (e.g. LMS), mixed sediment biotopes (e.g. LMX), extent of eelgrass beds;
- Sandbanks which are slightly covered by seawater all the time – extent, sediment character, topography, range and distribution of characteristic subtidal muddy sand biotopes (e.g. IMU), gravelly sand and sand biotopes, extent of eelgrass beds; and
- Reefs – extent, absence of coastal defence, water temperature and salinity, water clarity, range and distribution of characteristic sea cave biotope complexes, rock shore communities, kelp forest communities, subtidal red algae communities, subtidal faunal turf communities, species composition of characteristic biotopes.

The River Itchen SAC does not form part of a European Marine Site and therefore there is no Natural England advice under Regulation 35 of the favourable condition targets or conservation objectives for the qualifying interest features of this site. It is assumed that the objectives of the site will be to maintain the features in favourable condition.

## 7.2.4 Favourable Condition Status

The current favourable condition status has not yet been defined specifically for the European/Ramsar sites that comprise the Solent and South Wight Maritime EMS, however, a condition assessment of the respective Sites of Special Scientific Interest (SSSIs) which cover virtually the same geographic extent as the European/Ramsar sites that have been screened into the assessment has been undertaken by Natural England (Natural England, 2014b). A detailed breakdown of the condition assessment of the respective SSSIs can be found in Appendix C and a summary of these results is presented in Table 7.5

Table 7.5 Favourable condition status of SSSIs

SSSI	% Area Meeting PSA Target <sup>3</sup>	% Area Favourable	% Area Unfavourable Recovering	% Area Unfavourable No Change	% Area Unfavourable Declining	% Area Destroyed/ Part Destroyed
Bembridge Down	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%
Bembridge School & Cliffs	92.45%	92.45%	0.00%	7.55%	0.00%	0.00%
Bonchurch Landslips	100.00%	26.39%	73.61%	0.00%	0.00%	0.00%
Bouldner & Hamstead Cliffs	0%	100.00%	0.00%	0.00%	0.00%	0.00%
Bracklesham Bay	100.00%	64.95%	35.05%	0.00%	0.00%	0.00%
Brading Marshes to St Helen's Ledges	51.41%	40.03%	11.38%	0.00%	48.59%	0.00%
Chichester Harbour	98.65%	20.98%	77.67%	0.24%	1.11%	0.00%
Compton Chine to Steephill Cove	100.00%	23.67%	76.33%	0.00%	0.00%	0.00%
Compton Down	100.00%	45.55%	54.45%	0.00%	0.00%	0.00%
Dibden Bay	98.00%	98.00%	0.00%	0.00%	2.00%	0.00%
Eling and Bury Marshes	100.00%	11.46%	88.54%	0.00%	0.00%	0.00%
Gilkicker Lagoon	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%
Headon Warren & West High Down	98.82%	95.19%	3.63%	0.00%	0.00%	1.17%

<sup>3</sup> The Government's Public Service Agreement (PSA) target to have 95% of the SSSI area in favourable or recovering condition by 2010.

SSSI	% Area Meeting PSA Target3	% Area Favourable	% Area Unfavourable Recovering	% Area Unfavourable No Change	% Area Unfavourable Declining	% Area Destroyed/ Part Destroyed
Hurst Castle & Lymington River Estuary	97.13%	27.04%	70.09%	0.00%	2.87%	0.00%
Hythe to Calshot Marshes	100.00%	0.00%	100.00%	0.00%	0.00%	0.00%
King's Quay Shore	99.79%	95.12%	4.67%	0.00%	0.00%	0.21%
Langstone Harbour	100.00%	8.96%	91.04%	0.00%	0.00%	0.00%
Lee-on-the Solent To Itchen Estuary	98.47%	82.49%	15.98%	1.53%	0.00%	0.00%
Lincegrove & Hackett's Marshes	100.00%	0.00%	100.00%	0.00%	0.00%	0.00%
Lower Test Valley	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%
Medina Estuary	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%
Newtown Harbour	99.65%	89.33%	10.32%	0.00%	0.35%	0.00%
North Solent	98.15%	63.21%	34.94%	0.93%	0.91%	0.00%
Portsmouth Harbour	99.63%	23.44%	76.19%	0.00%	0.02%	0.35%
River Itchen	63.57%	6.55%	57.02%	30.34%	5.72%	0.37%
River Test	55.47%	17.92%	37.55%	43.49%	1.03%	0.00%
Ryde Sands & Wootton Creek	100.00%	71.92%	28.08%	0.00%	0.00%	0.00%
Sinah Common	100.00%	0.00%	100.00%	0.00%	0.00%	0.00%
Sowley Pond	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%
Titchfield Haven	96.48%	0.00%	96.48%	0.00%	3.52%	0.00%
Thorness Bay	96.21%	96.21%	0.00%	0.00%	3.79%	0.00%
Warblington Meadow	100.00%	0.00%	100.00%	0.00%	0.00%	0.00%
Whitecliff Bay & Bembridge Ledges	99.07%	99.07%	0.00%	0.93%	0.00%	0.00%
Yar Estuary	100.00%	83.15%	16.85%	0.00%	0.00%	0.00%

(Source: Natural England, 2014b)

The majority of SSSI units (over 50%) are described as being in favourable condition. The main habitats in the units which were not considered to be meeting Public Service Agreement (PSA) targets include littoral sediment, supralittoral sediment, neutral grassland-lowland, broadleaved mixed and yew woodland-lowland, fen, marsh and swamp- lowland. Typical reasons for this classification included coastal squeeze, inappropriate habitat management, encroachment of vehicles, insufficient and inappropriate water level control (by tidal sluice), a lack of grazing or cutting management, build-up of litter, overshadowing of river banks and fen vegetation, and scrub encroachment.

## 7.3 Water Framework Directive Baseline Information

Under the WFD, coasts, estuaries, rivers and man-made docks and canals are divided up into a series of water bodies. The WFD sets new ecological as well as chemical targets (objectives) for each water body. These objectives are derived from pristine natural conditions. However, as other factors can affect the ability of a water body to meet its ecological targets, objectives are also set under the WFD in respect of:

- Changes in parameters such as hydrology (tidal flows) or geomorphology (bed forms), for example caused by dredging, embanking for flood defence (etc.): these are known as 'hydromorphological' objectives; and
- Changes in parameters such as dissolved oxygen, salinity or nutrients: these 'physico chemical' changes can also determine whether or not a water body can achieve 'Good Ecological Status' (or Potential).

Compliance with chemical status objectives is assessed in relation to quality standards for a specified list of 'priority' and 'priority hazardous' substances laid down by the European Union (EU) Environmental Quality Standards Directive (EQS). The Directive sets objectives, amongst other things, for the reduction or cessation of discharges, emissions and losses of these substances.

The objective for all water bodies is to reach 'Good Ecological Status' and 'Good Chemical Status' by 2015, unless alternative arrangements (i.e. exemptions) can be justified. Each water body has a hydromorphological designation which states how modified a water body is from its natural state (Environment Agency, 2009). Water bodies are either undesignated or designated as Heavily Modified Water Bodies (HMWB) or Artificial Water Bodies (AWB). HMWB are defined as bodies of water which as a result of physical alteration by human activities, such as flood protection, port/harbour use, commercial fin and shellfisheries and resource extraction, are substantially changed in character and cannot therefore meet good ecological status, whereas AWB are artificially created. The default target for HMWBs and AWB under the WFD is to achieve good ecological potential (a status which recognises the importance of their human use whilst making sure ecology is protected as far as possible) and good surface water chemical status by 2015 or 2027. The target for water bodies with no designation is as for the HMWB sites; however the bodies should also have good ecological status. Ecological potential and status are measured on a scale of high, good, moderate, poor and bad, while chemical status is measured as good or fail.

### 7.3.1 Study Area Water Bodies

The current status of water bodies in the South East River Basin District, assessed under the WFD classification, is given in the River Basin Management Plan (Environment Agency, 2009). Within the study area, a number of water bodies have the potential for a hydromorphological link with maintenance dredging and/or disposal activities. These include two coastal, five transitional and forty-two fluvial water bodies. Information on the water bodies are summarised in Table 7.6 and Table 7.7, while the coastal and transitional water bodies are illustrated in Figure 2.1.

However, many of the fluvial water bodies with a potential for a hydromorphological link can be scoped out due to the location of the Natural Tidal Limit (NTL), or the presence of weirs, sluice or tide, which limits tidal exchange. There is only one fluvial water body, where there is still the potential for tidal exchange between the transitional and fluvial water bodies, and therefore, a hydromorphological link within dredging activities, which is the River Test (lower) (Table 7.7). The fluvial water bodies that have been scoped out from the assessment are not discussed further.

**Table 7.6 Coastal and transitional water bodies within 5 km of maintenance dredging and/or disposal activities**

Water Body Name	Map Code	Water Body Reference	Water Body Type	Hydromorphological Designation
Solent	C4	GB650705150000	Coastal	HMWB
Isle of Wight East	C5	GB650705530000	Coastal	HMWB
Beaulieu River	T2	GB520704201400	Transitional	HMWB
Medina	T4	GB520710101600	Transitional	HMWB
Southampton Water	T17	GB520704202800	Transitional	HMWB
HMWB Heavily Modified Water Body; AWB Artificial Water Body				

**Table 7.7 Fluvial water bodies within 5 km of maintenance dredging and/or disposal activities**

Catchment	Map Code	Water Body Reference	Water Body Name	Scoping Relevance (Reason)	Hydromorphological Designation
New Forest	R4	GB107042011200	River Beaulieu	Out (Weir)	HMWB
	R10	GB107042011290	Stone Farm Stream	Out (NTL/Piping)	None
	R11	GB107042011310	Mopley Pond Stream	Out (NTL/Piping)	None
	R13	GB107042011330	Dark Water	Out (Piping)	HMWB
	R14	GB107042011340	Cadland Stream	Out (NTL/Piping)	None
	R15	GB107042011350	Langdown Stream	Out (NTL/Piping)	HMWB
	R18	GB107042016690	Marchwood Park Stream Tributary	Out (NTL/Piping)	HMWB
	R21	GB107042016730	Bartley Water	Out (Weir)	HMWB
	R29	GB107042011210	Beaulieu Abbey Stream	Out (NTL/Piping)	None
	R22	GB107042016740	Jacobs Gutter	Out (NTL/Piping)	None
East Hampshire	R30	GB107042016700	Magazine Lane Stream	Out (NTL/Piping)	HMWB
	R1	GB107042011920	Hamble	Out (Sluice)	None
	R13	GB107042011240	Bromwich Stream	Out (NTL/Piping)	None
	R14	GB107042011250	Hook Lake	Out (NTL/Piping)	HMWB
	R15	GB107042011370	River Alver	Out (NTL/Piping)	None
	R16	GB107042016500	Hamble	Out (Sluice)	None
	R17	GB107042016520	Hamble	Out (NTL/Piping)	HMWB
	R21	GB107042016640	River Meon	Out (Tide gates)	None
Isle of Wight	R22	GB107042016830	Hamble	Out (NTL/Piping)	HMWB
	R9	GB107101006100	Blackbridge Brook	Out (Weir)	HMWB
	R10	GB107101006120	Monktonmead Brook	Out (NTL/Piping)	HMWB
	R11	GB107101006190	Palmers Brook	Out (NTL/Piping)	None
	R16	GB107101006240	Gunard Luck	Out (NTL/Piping)	None
	R25	GB107101006110	Dodnor Creek	Out (NTL/Piping)	None
	R26	GB107101006130	Binstead Stream	Out (NTL/Piping)	HMWB
	R27	GB107101006140	Quarr Stream	Out (NTL/Piping)	HMWB
	R28	GB107101006160	Alverstone Stream (Medina)	Out (Lock gates)	HMWB
	R29	GB107101006170	Great Thorness Stream	Out (NTL/Piping)	HMWB
	R30	GB107101006180	Little Thorness Stream	Out (Weir/Sluice)	None
R31	GB107101006200	Barton Manor Stream	Out (NTL/Piping)	None	

Catchment	Map Code	Water Body Reference	Water Body Name	Scoping Relevance (Reason)	Hydromorphological Designation
Test and Itchen	R1	GB107042022580	River Itchen	Out (Weir/Sluice)	HMWB
	R5	GB107042016310	Monks Brook	Out (Weir/Sluice)	HMWB
	R7	GB107042016380	Cadnam River	Out (NTL/Piping)	None
	R8	GB107042016430	Tadburn Lake	Out (NTL/Piping)	None
	R12	GB107042016530	Butlocks Heath Stream	Out (NTL/Piping)	None
	R13	GB107042016550	Westwood Stream	Out (NTL/Piping)	None
	R28	GB107042016620	Tanner's Brook	Out (NTL/Piping)	HMWB
	R32	GB107042016800	Luzborough Lane Stream	Out (NTL/Piping)	None
	R34	GB107042016840	Test (Lower)	In	None
	R43	GB107042016220	Sholing Common Streams	Out (NTL/Piping)	HMWB
	R44	GB107042016230	Highfield Stream	Out (NTL/Piping)	HMWB
R51	GB107042016790	River Blackwater	Out (NTL/Piping)	None	
HMWB	Heavily Modified Water Body;				
NTL	Natural Tidal Limit				

### 7.3.2 Current Status of Water Bodies

The current ecological potential for the Solent and Isle of Wight East coastal water bodies are 'moderate' and 'good' respectively. All the transitional water bodies, which include Southampton Water, Beaulieu River, Black Water lagoons and the Medina, are all 'moderate (uncertain)'. The chemical status is a 'fail (uncertain)' for the Solent coastal water body based on the status of Tributyltin Compounds (TBTs) which are recorded as 'moderate' (uncertain). A 'good' chemical status is recorded for the Isle of Wight East coastal water body, with a 'good' status for Southampton Water and Medina transitional water bodies. Beaulieu River and Black Water lagoons transitional water bodies have no status as they do not require assessment (Environment Agency, 2009). Table 7.8 summarises the current overall potential and objective status of the aforementioned coastal and transitional water bodies, highlighting the WFD parameters which are currently at 'moderate' status or below. Table 7.8 also includes the current overall potential and objective status for the fluvial water bodies that are scoped in for WFD Assessment. Further information regarding the status of all relevant water bodies in the study area, together with their objectives and relevant protected area information, can be found in Appendix D.

Table 7.8 Summary of water body status

Water Body Name	Map Code	Water Body Reference	Current Overall Potential	Status Objective (Overall)	WFD Parameters Currently at 'Moderate' Status Or Below
Solent	C4	GB650705150000	Moderate Potential	Good by 2027	Tributyltin Compounds Mitigation measures for flood and coastal erosion protection
Isle of Wight East	C5	GB650705530000	Good Potential	Good by 2015	None
Beaulieu River	T2	GB520704201400	Moderate Potential	Good by 2027	Dissolved Inorganic Nitrogen
Medina	T4	GB520710101600	Moderate Potential	Good by 2027	Dissolved Inorganic Nitrogen Tidal regime - Freshwater flow
Southampton Water	T17	GB520704202800	Moderate Potential	Good by 2027	Invertebrates Dissolved Inorganic Nitrogen Mitigation measures for flood and coastal erosion protection
Test (Lower)	R34	GB107042016840	Poor	Good by 2027	Macrophytes Phytobenthos Tributyltin compounds

(Source: Environment Agency, 2009)



### 7.3.3 Water Quality – Bathing Waters Directive

The Bathing Waters Directive (76/160/EEC) establishes microbiological and physico-chemical standards to be met at identified bathing waters. The former evaluates the levels of both total and faecal coliforms, while the three physico-chemical parameters assess surface active substances, mineral oils and phenols. Cases of non-compliance with the physico-chemical parameters are extremely rare, so compliance in the UK each year is normally determined by the extent of pollution by total and faecal coliform bacteria.

To comply with these standards, bathing waters must not exceed values of 10,000 total coliforms per 100 ml and 2,000 faecal coliforms per 100 ml in 95% of samples.

The revised Bathing Water Directive (2006/7/EC) was adopted in March 2006 and the existing Directive will be repealed at the end of 2014. The revised Directive updates the way in which water quality is measured, focusing on fewer microbiological indicators, and setting different standards for inland and coastal bathing sites:

- Tighter microbiological standards - to be met by 2015;
- Two microbiological parameters - intestinal enterococci and *Escherichia coli*; and
- Water quality classification based on 3 or 4 years monitoring data, using 95 or 90 percentiles. This monitoring will begin in 2012.

Four new classification categories will be introduced:

- Excellent - approximately twice as stringent as the current guideline standard;
- Good - similar to the current guideline standard;
- Sufficient - tighter than the current mandatory standard; and
- Poor - normally non-compliant water.

Until the revised bathing water is fully adopted, bathing waters are assessed as to whether they comply with the standards of the current Bathing Water Directive (76/160/EEC):

- **Higher** means the bathing water meets the criteria for the stricter UK guideline standards of the Directive - approximately twice as stringent as the current guideline standard;
- **Minimum** means that at least 95% of the samples meet the mandatory standards of the Directive;
- **Fail** means that fewer than 95% of the samples meet the required mandatory standards of the Directive;
- **Not sampled** indicates that the bathing water was closed during the bathing season.

During the 2013 bathing season there were a total of 618 identified and monitored bathing waters across the UK. Almost all of these (98.8%) met the minimum standards required by the current European Bathing Waters Directive. Approximately 82.4% meet the stricter UK guideline standards of the Bathing Waters Directive.

There are seven designated Bathing Waters with the potential for a hydromorphological link with maintenance dredging and/or disposal activities (Figure 7.3). The sites and their water quality classifications for the period 2006 to 2013, based on the stricter UK guideline standards are listed in Table 7.9. Site locations Calshot and Lepe have a classification of 'higher' across all years (2006 to present). All other sites have at least one 'minimum' standard with Ryde recording four occurrences during this period. Assessment under the RBMP (southeast) for the period 2004 to 2008 classified six of the eight beaches as having 'excellent' bathing water. The exceptions were Cowes and Ryde, which were classified at 'good' and 'sufficient' respectively (Environment Agency, 2009).

Table 7.9 Bathing water quality classifications for 2004 to 2013

Bathing Water	2006	2007	2008	2009
Stokes Bay	Higher	Higher	Minimum	Higher
Lee-on-Solent	Higher	Higher	Minimum	Higher
Hillhead	Higher	Higher	Minimum	Higher
Calshot	Higher	Higher	Higher	Higher
Lepe	Higher	Higher	Higher	Higher
Gurnard	Higher	Higher	Minimum	Higher
Cowes	Higher	Higher	Minimum	Higher
Ryde	Higher	Minimum	Minimum	Higher
Bathing Water	2010	2011	2012	2013
Stokes Bay	Minimum	Higher	Higher	Higher
Lee-on-Solent	Higher	Higher	Higher	Higher
Hillhead	Higher	Higher	Higher	Higher
Calshot	Higher	Higher	Higher	Higher
Lepe	Higher	Higher	Higher	Higher
Gurnard	Minimum	Higher	Higher	Higher
Cowes	Higher	Minimum	Higher	Higher
Ryde	Higher	Minimum	Minimum	Higher

(Source: Environment Agency, 2013)

### 7.3.4 Water Quality – Shellfish Waters Directive

The original Shellfish Waters Directive which was adopted in October 1979, was repealed by the amended Shellfish Waters Directive (2006/113/EC), adopted on 12 December 2006. The aim of the Directive is to ensure a suitable environment for the growth of shell fisheries and to promote water of good quality to reduce the risk of food poisoning. The Directive requires mandatory compliance with imperative standards for parameters including dissolved oxygen and suspended solids. The Directive requires that dissolved oxygen, measured as the percentage of saturation, should exceed 70% (as a mean) and individual measurements may not be less than 60% unless there are no harmful consequences on the development of shellfish colonies. These standards are absolute and compliance with them is an obligation for the UK.

The Directive also requires that a discharge affecting Shellfish Waters must not cause the suspended solid content of the water to exceed by more than 30% the content of waters not so affected. In addition, the Directive has mandatory standards for metals and other contaminants. It was expected that the Shellfish Waters Directive would be repealed in 2013 under the EU

WFD. However, when this occurs, the WFD must provide at least the same level of protection to Shellfish Waters (which the WFD classifies as protected areas) as the Shellfish Waters Directive does.

In 2012, there were 98 shellfish waters within England, a total of 242 in the UK. The closest Shellfish Waters to the study area and with the potential for a hydromorphological link with maintenance dredging and/or disposal activities, are listed in Table 7.10 and shown in Figure 7.3. Compliance by these shellfish waters has been assessed by the Environment Agency using monitoring data.

The objective is to achieve 'imperative standards' and endeavouring to respect the guideline standards of the Shellfish Waters Directive. The last available information is from 2012. In 2012, all 12 shellfish waters associated with the study area passed the imperative standards showing that water quality in these areas was good. However seven of the twelve sites achieved a 'Guideline Fail'. Sites failing on coliform guideline standards usually do so because shellfish accumulate bacteria from water as they filter it to feed. Human and animal waste is generally the source of coliform; control measures to manage source inputs typically include reducing inputs from sewage treatment and better management of farm derived waste.

Table 7.10 Environment Agency monitoring of Shellfish Waters for 2012

Shellfish Water Site	Water Body	2012
Beaulieu River	Beaulieu River	Guideline Fail / Imperative pass
Southern Medina	Medina	Guideline Pass / Imperative Pass
Southampton Water Approach	Southampton Water	Guideline Fail / Imperative pass
Southampton Water	Southampton Water	Guideline Fail / Imperative pass
Central Solent	Solent	Guideline Fail / Imperative pass
Lepe Middle Bank	Solent	Guideline Pass / Imperative Pass
Newtown Bank	Solent	Guideline Pass / Imperative Pass
Ryde	Solent	Guideline Fail / Imperative pass
Spithead and Stokes Bay	Solent	Guideline Pass / Imperative Pass
Southern Cowes	Solent	Guideline Fail / Imperative pass
Lymington (includes Sowley)	Solent	Guideline Fail / Imperative pass
Stanswood Bay	Solent	Guideline Pass / Imperative Pass

(Source: Environment Agency, 2012)

### 7.3.5 Water Quality – Freshwater Fish Directive

The Freshwater Fish Directive (78/659/EEC) was adopted in 1978 and is concerned with the protection and improvement of fresh waters in order to support fish life. The Directive sets water quality standards and monitoring requirements for ensuring the protection of coarse and game fisheries, and requires the designation of appropriate rivers and lakes into two categories of water: those suitable for salmonids (i.e. mainly salmon and trout but also grayling) and those suitable for cyprinids (including carp, tench, bream, roach, chub and minnows). The Directive sets out 14 physical and chemical parameters for which 'imperative' and/or the more rigorous 'guideline' standards are given for the two categories of designation. Failures of the guidelines are typically caused by low dissolved oxygen concentrations, variations in pH and raised concentrations of total ammonia. These are typically associated with effluent discharges from waste water treatment works, low river flows, algal blooms and farm run-off.

A number of fluvial water bodies that open into Southampton Water and the Solent are designated under the Freshwater Fish Directive due to the presence of either salmonid or cyprinid species. This includes the River Test, Itchen, Meon and Beaulieu. However, the protected areas within these fluvial water bodies occur mainly at the upper reaches of the rivers, above the NTL and at some distance from the river mouths. All the protected areas have an 'Imperative Pass' but 'Guideline Fail' status as of 2008 (Environment Agency, 2009). However, since the water bodies designated under the Freshwater Fish Directive are above the NTL, they will not be discussed further.

### 7.3.6 Water Quality – Urban Waste Water Treatment Directive

The Urban Waste Water Treatment Directive (UWWTD) (91/271/EEC) aims to protect the environment from the adverse effects of the collection, treatment and discharge of urban waste water. The Directive covers statutory water and sewerage companies, since they own and operate the public sewerage system and the urban waste water treatment works. Discharges from certain industrial sectors such as food and drink processing plants can have a similar polluting effect to untreated sewage, and are also covered by the Directive.

Sensitive areas under the UWWTD are water bodies affected by eutrophication of elevated nitrate concentrations. The designation under the UWWTD then acts as an indication that action is required to prevent further pollution caused by nutrients. There are four designated sensitive eutrophic areas within 5 km of the maintenance dredging and/or disposal activities. These are the River Test, River Itchen, River Hamble and River Medina Estuaries.

### 7.3.7 Water Quality – Other Directives

There are further EU Directives that impose objectives relevant to the regulation of surface water quality, such as the Nitrates Directive (91/676/EEC). The Nitrates Directive aims to reduce water pollution by nitrate (nitrogen is one of the nutrients that can affect plant growth) from agricultural sources and to prevent such pollution occurring in the future. Surface waters have to be identified if too much nitrogen has caused a change in plant growth which affects existing plants and animals and the use of the water. There are no Nitrate Sensitive Areas within 5 km of the maintenance dredging and/or disposal activities.

### 7.3.8 Directive Overlap

The WFD makes clear that, in the case of protected areas (i.e. where the presence of a protected area introduces different targets to a particular water body), the more stringent objective applies. There is no indication from the River Basin Management Plan that any of the WFD objectives would be more stringent than those of the Birds and Habitats Directives.

## 8. References

ABP Research, 2000a. Changes in the physical environment of Southampton Water TS/ME2. ABP Southampton: Dibden Terminal, Associated British Ports, Southampton, ABP Research & Consultancy Ltd. Research Report No. R.770.

ABP Research, 2000b. The Marine Environment Impact Identification and Evaluation TS/ME7. ABP Southampton: Dibden Terminal, Associated British Ports, Southampton, ABP Research & Consultancy Ltd, Research Report No. R.782.

ABP Research, 2001. Review of Change Analysis, Dibden Terminal, Marine Environment: Changes in the physical environment of Southampton Water. ABP Research & Consultancy Ltd.

ABP Southampton, 2014. Tide Tables 2014.

ABPmer, 2007a. A Conceptual Model of Southampton Water. Prepared for the Estuary Guide as a case study supporting document by I. Townend, available online at: [http://www.estuary-guide.net/pdfs/southampton\\_water\\_case\\_study.pdf](http://www.estuary-guide.net/pdfs/southampton_water_case_study.pdf)

ABPmer, 2007b. Southampton Monitoring Annual Report 2005. Report No. R. 1292.

ABPmer, 2012. Environmental Statement for Port of Southampton: Southampton Approach Channel Dredge. Updated by Further Information. Volume 1 – Main Document. ABP Marine Environmental Research Ltd, Report No. R.2015.

ABPmer, 2014. ABP Southampton Maintenance Dredge Protocol: Habitats Regulations Test for Likely Significance. R.2262.

Balanced Seas, 2011. Balanced Seas Marine Conservation Zone Project. Final Recommendations. 7 September 2011.

Bray, M.J., 2000. Unpublished review comments on ABP Research and Consultancy, cited on SCOPAC website <http://www.scopac.org.uk/>.

Bray, M.J., Carter, D.J. and Hooke, J.M., 2004. SCOPAC Coastal sediment transport study. Report to coastal group, department of geography - University of Portsmouth.

Channel Coastal Observatory (CCO), 2007. Aerial Photography report, River Hamble, 2007. Southeast Strategic Regional Coastal Monitoring Programme. Report No. TR 17, 4 November 2007.

DCLG, Department for Communities and Local Government, 2012. National Planning Policy Framework. Available online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/6077/2116950.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf). Accessed on 31 January 2014.

Defra, 2006. Supplementary Note to Operating Authorities - Climate Change Impacts. October 2006.

Defra, 2007. Maintenance Dredging & the Habitats Regulations 1994, a Conservation Assessment Protocol for England.

Defra, 2014. Department for Environment, Food and Rural Affairs Marine Conservation Zones: Update February 2014.

Dyer, K., 1980. Sedimentation and sediment transport, NERC Publications Series C, 22.

English Nature, 2001a. Solent European Marine Site comprising: Solent Maritime candidate Special Area of Conservation, Solent and Southampton Water Special Protection Area & Ramsar Site, Chichester and Langstone Harbours Special Protection Area & Ramsar Site, Portsmouth Harbour Special Protection Area & Ramsar Site. English Nature's advice given under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994. Available online at: <http://publications.naturalengland.org.uk/publication/3194402>. Accessed on 5 March 2014.

English Nature, 2001b. South Wight Maritime European marine site. English Nature's advice given under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994. Available online at: <http://publications.naturalengland.org.uk/publication/3194758>. Accessed on 6 March 2014.

Environment Agency (2009). River Basin Management Plan (RBMP): South East River Basin District.  
<http://www.environment-agency.gov.uk/research/planning/124978.aspx>

Environment Agency (2012). Shellfish Flesh Compliance and Water Quality - England.

Environment Agency (2013). What's in your backyard? Bathing Waters  
<http://www.environment-agency.gov.uk/homeandleisure/recreation/119111.aspx>

Flood, R.D., 1981. Distribution, morphology and the origin of sedimentary furrows in cohesive sediments, Southampton Water, Sedimentology 28: 511-529.

Gifford and partners, 1989. Effects of proposed ensign marina on Southampton water, report to ABPmer.

Halcrow, 1997. Shoreline Management Plan Subcells 5F (Part), 5C & 5B (Part) Western Solent and Southampton Water – Volume 1 – Data Collation and Objective Setting – Draft report. Sir William Halcrow and Partners for New Forest District Council and the Western Solent and Southampton Water Coastal Group. Volume 2 – Strategy Document. Steering Group Draft.

Hodson, F., West, I.M., 1972. Holocene deposits of Fawley, Hampshire and the development of Southampton Water, Proceedings of Geological Association, 83(4): 421-442.

Hydraulic Research, 1987. Review of Hampshire Coastline, Volume 1 - text, Figures and plates, Report EX 1601. Report to Coastal Conservation Panel of Hampshire County Council. 93pp.

JNCC, 2006a. Chichester and Langstone Harbours SPA Citation. Available online at: <http://jncc.defra.gov.uk/pdf/SPA/UK9011011.pdf>. Accessed on 5 March 2014.

JNCC, 2006b. Portsmouth Harbour SPA Citation. Available online at: <http://jncc.defra.gov.uk/pdf/SPA/UK9011051.pdf>. Accessed on 5 March 2014.

JNCC, 2006c. Solent and Southampton Water SPA Citation. Available online at: <http://jncc.defra.gov.uk/pdf/SPA/UK9011061.pdf>. Accessed on 5 March 2014.

JNCC, 2008a. Chichester and Langstone Harbours Information Sheet on Ramsar Wetlands (RIS). Available online at: <http://jncc.defra.gov.uk/pdf/RIS/UK11013.pdf>. Accessed on 5 March 2014.

JNCC, 2008b. Portsmouth Harbour Information Sheet on Ramsar Wetlands (RIS). Available online at: <http://jncc.defra.gov.uk/pdf/RIS/UK11055.pdf>. Accessed on 5 March 2014.

JNCC, 2008c. Solent and Southampton Water Information Sheet on Ramsar Wetlands (RIS). Available online at: <http://jncc.defra.gov.uk/pdf/RIS/UK11063.pdf>. Accessed on 5 March 2014.

JNCC, 2011a. River Itchen SAC Citation. Available online at: <http://jncc.defra.gov.uk/protectedsites/sacselection/n2kforms/UK0012599.pdf>. Accessed on 5 March 2014.

JNCC, 2011b. Solent Maritime SAC Citation. Available online at: <http://jncc.defra.gov.uk/protectedsites/sacselection/n2kforms/UK0030059.pdf>. Accessed on 5 March 2014.

JNCC, 2011c. South Wight SAC Citation. Available online at: <http://jncc.defra.gov.uk/protectedsites/sacselection/n2kforms/UK0030061.pdf>. Accessed on 5 March 2014.

Natural England, 2014a. England's European Marine Sites. Available online at: <http://www.naturalengland.org.uk/ourwork/marine/protectandmanage/mpa/europeansites.aspx>. Accessed on 5 March 2014.

Natural England, 2014b. SSSI Online Search Engine. Available online at : <http://www.sssi.naturalengland.org.uk/special/sssi/search.cfm>. Accessed on 5 March 2014.

Posford Duvivier, 1994. Netley Cliff Coast Protection Feasibility Study. Preliminary Engineering Report, Report to Eastleigh Borough Council.

Posford Duvivier, 1996. Netley Cliff Coast Protection Beach Management Plan. Report to Eastleigh Borough Council.

Posford Duvivier, 1997. Sediment Inputs Research Project. Phase 2. Cliff Erosion. Report to SCOPAC, 1997.

The Business Magazine, 2014. Southampton: CBRE appointed to sell Hythe Marine Park (12/03/2014). Available online at: <http://www.businessmag.co.uk/southampton-cbre-appointed-sell-hythe-marine-park/>. Accessed on 23 April 2014.

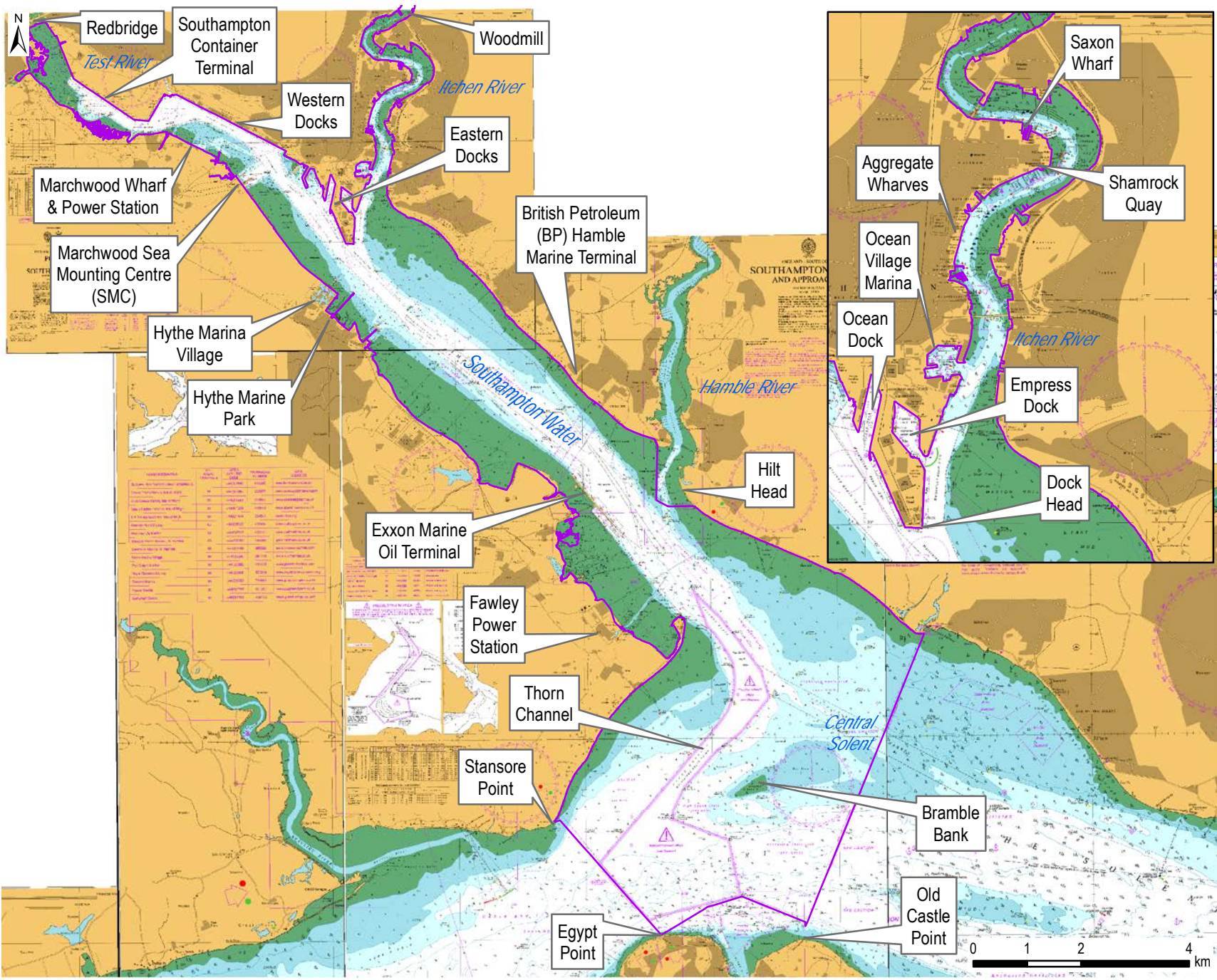
UKTAG, 2008. Proposals for Environmental Quality Standards for Annex VIII Substances. Final, January 2008.

Velegrakis, A. and Collins, M., 2000. Expert analysis model of an impacted estuary: Southampton water. Paper 16. 103 – 155. in: modelling estuary morphology and process. Emphasys consortium. Estuaries research programme, phase 1. Final report. December 2000.

Webber, N.B., 1980. Hydrology and water circulation in the Solent, In: The Solent Estuarine System, An Assessment of Present Knowledge. The Natural Environment Research Council, Publications Series C 22:25-36.



# Figures



— Statutory Harbour Authority

Date	By	Size	Version
Jul 14	NMW	A4	1
Coordinate System		British National Grid	
Projection		Transverse Mercator	
Scale		1:100,000	
QA		DLW	
4209 Fig_Base_1_1_Locations.mxd			
Produced by ABPmer			

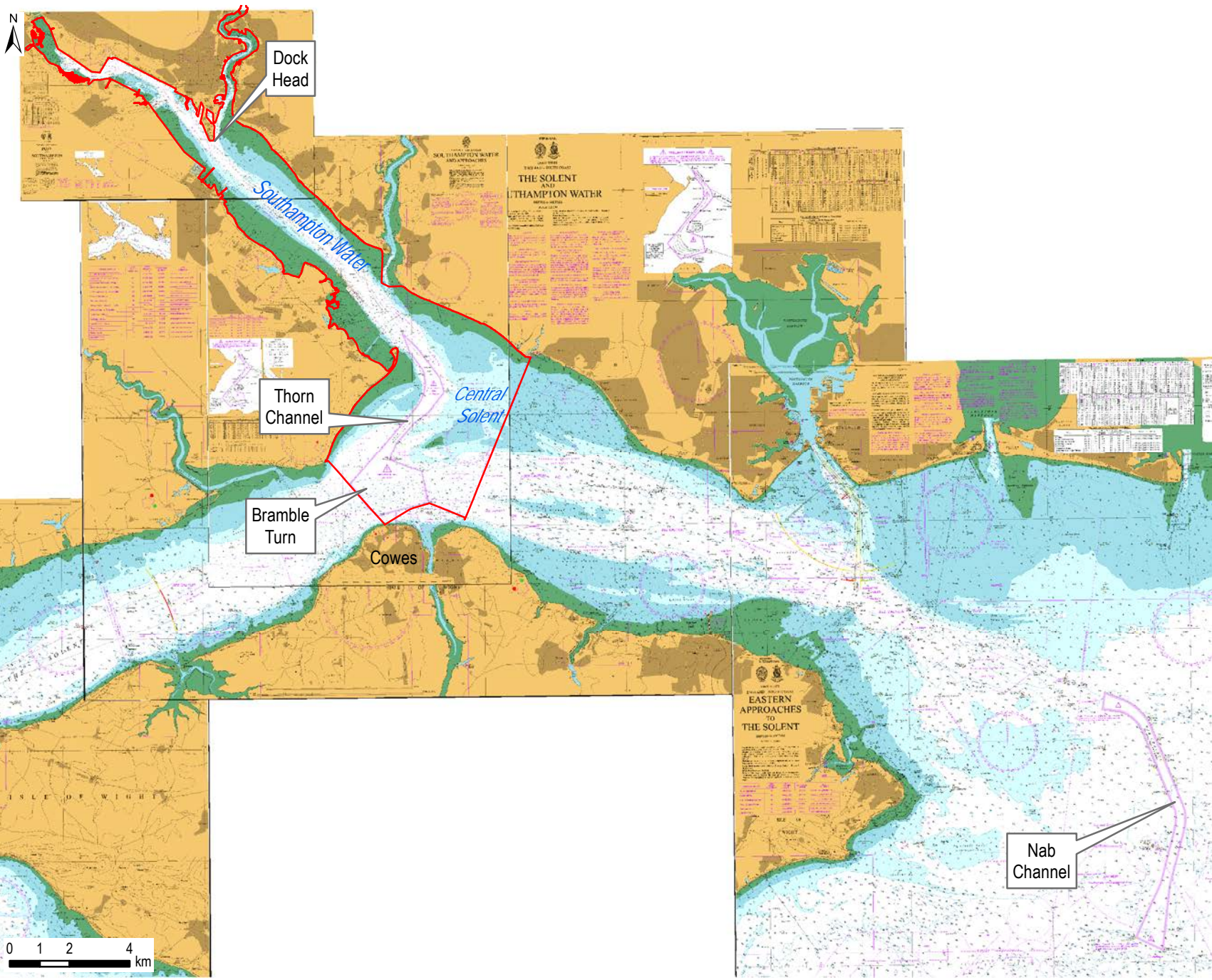


© ABPmer, All rights reserved, 2014  
 Contains UKHO data © British Crown Copyright 2014  
 NOT TO BE USED FOR NAVIGATION



Statutory Harbour Authority Area

Figure 1.1



— Statutory Harbour Authority

Date	By	Size	Version
Jul 14	NMW	A4	1
Coordinate System		British National Grid	
Projection		Transverse Mercator	
Scale		1:180,000	
QA		DLW	
4209 Fig_Base_1_2_Locations.mxd			
Produced by ABPmer			



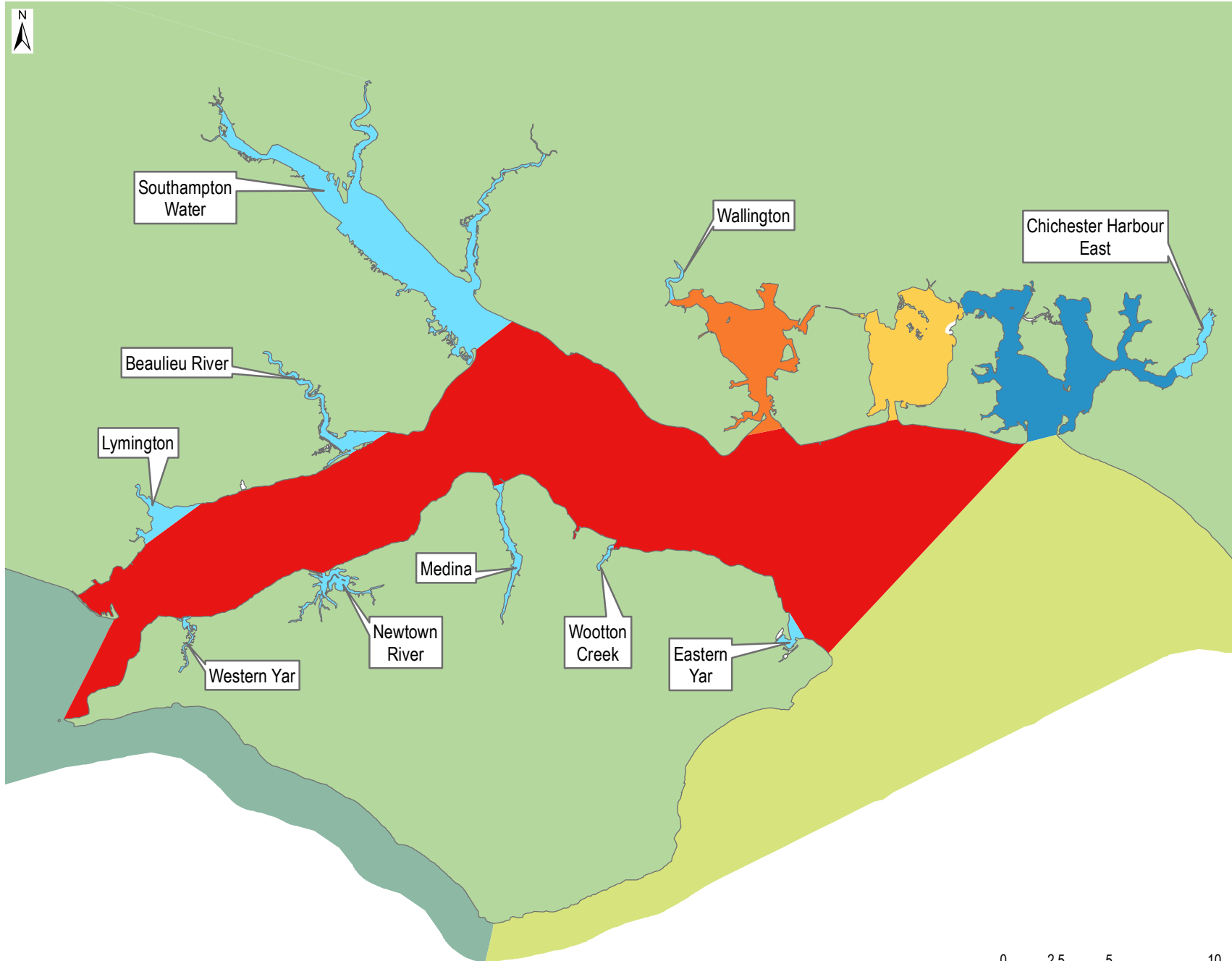
© ABPmer. All rights reserved, 2014  
 Contains UKHO data © British Crown Copyright 2014  
 NOT TO BE USED FOR NAVIGATION



Study Area with the Nab Channel

Figure 1.2





- Transitional Water Bodies
- Coastal Water Bodies
- Chichester Harbour
- Dorset / Hampshire
- Isle of Wight East
- Langstone Harbour
- Portsmouth Harbour
- Solent

Date	By	Size	Version
May 14	NMW	A4	1
Coordinate System		British National Grid	
Projection		Transverse Mercator	
Scale		1:260,000	
QA		DLW	
4209 Fig_Base_2_1_Waterbodies.mxd			
Produced by ABPmer			



© ABPmer, All rights reserved, 2014  
 Contains Ordnance Survey data © Crown copyright and database right 2013.



### Southampton Water Bodies

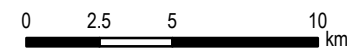
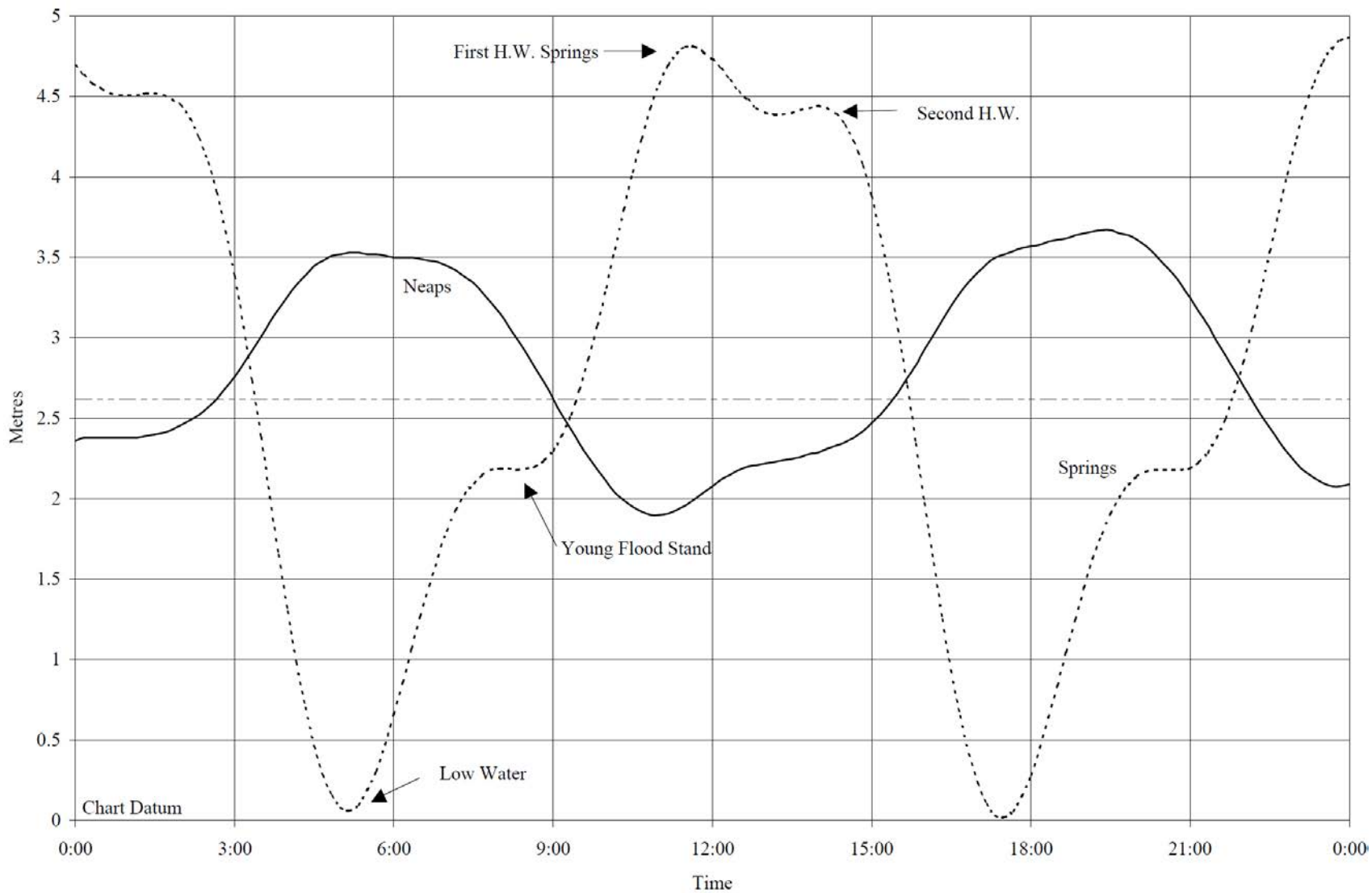


Figure 2.1



..... Dock Head Spring Tide Curve

———— Dock Head Neap Tide Curve

----- Mean Tide Level

Date	By	Size	Version
Aug 14	NMW	A4	1
Coordinate System		British National Grid	
Projection		Transverse Mercator	
Scale		1:240,000	
QA	DLW		
4209 Fig_Base_3_1_Tidal_Curve.mxd			
Produced by ABPmer			

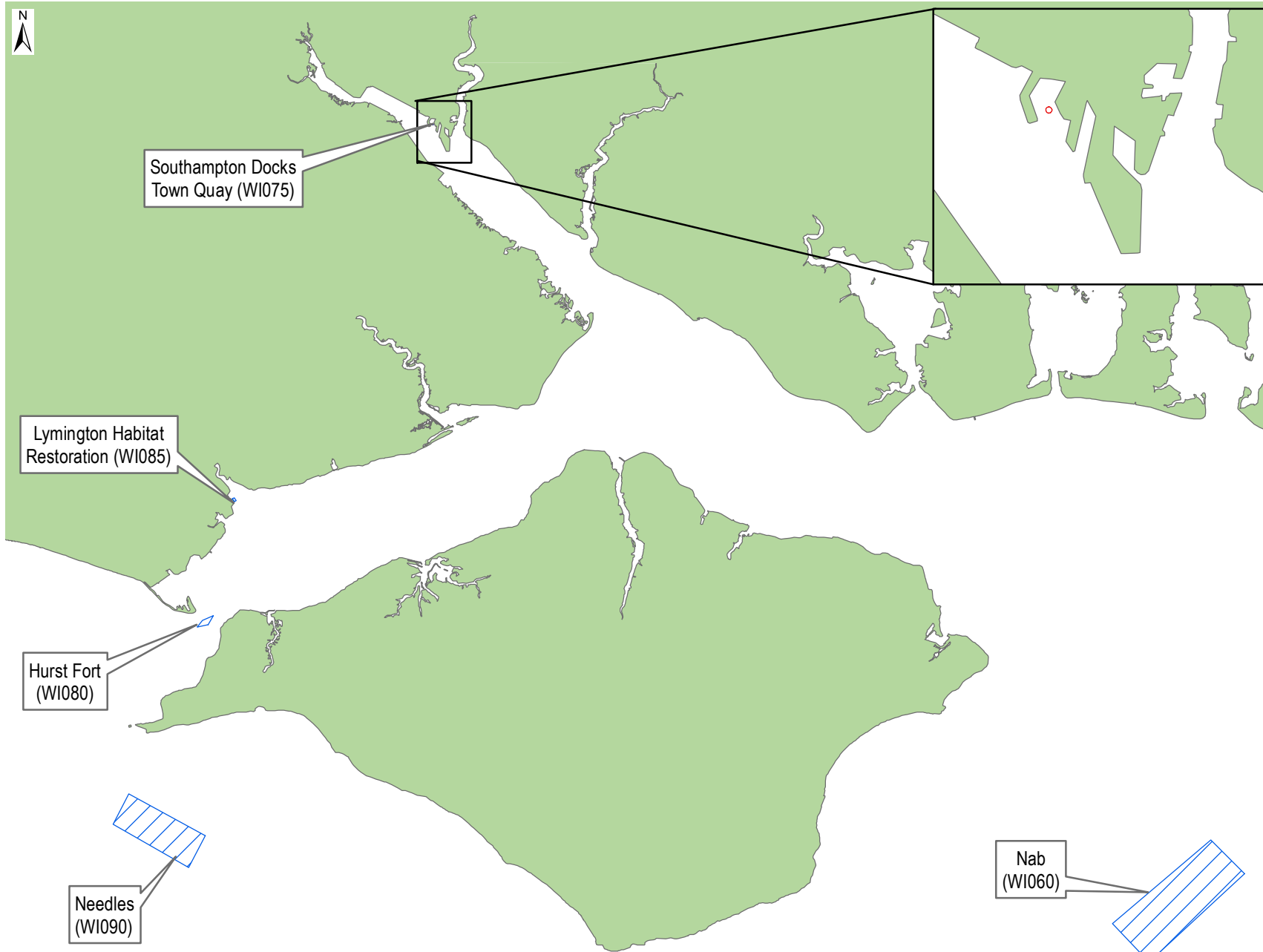




© ABPmer, All rights reserved, 2014  
 ABP Southampton, 2014  
 NOT TO BE USED FOR NAVIGATION



Spring and Neap Tidal Curve for Southampton

Figure 3.1



-  Open Disposal Sites
-  Closed Disposal Sites

Date	By	Size	Version
May 14	NMW	A4	1
Coordinate System		British National Grid	
Projection		Transverse Mercator	
Scale		1:45,000	
QA		DLW	
4209 Fig_Base_4_1_Disposals.mxd			
Produced by ABPmer			



© ABPmer, All rights reserved, 2014  
 NOT TO BE USED FOR NAVIGATION



### Disposal Sites

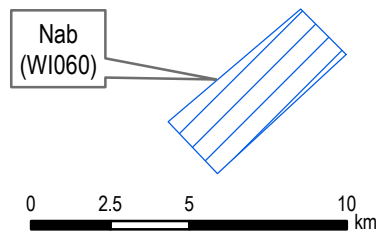
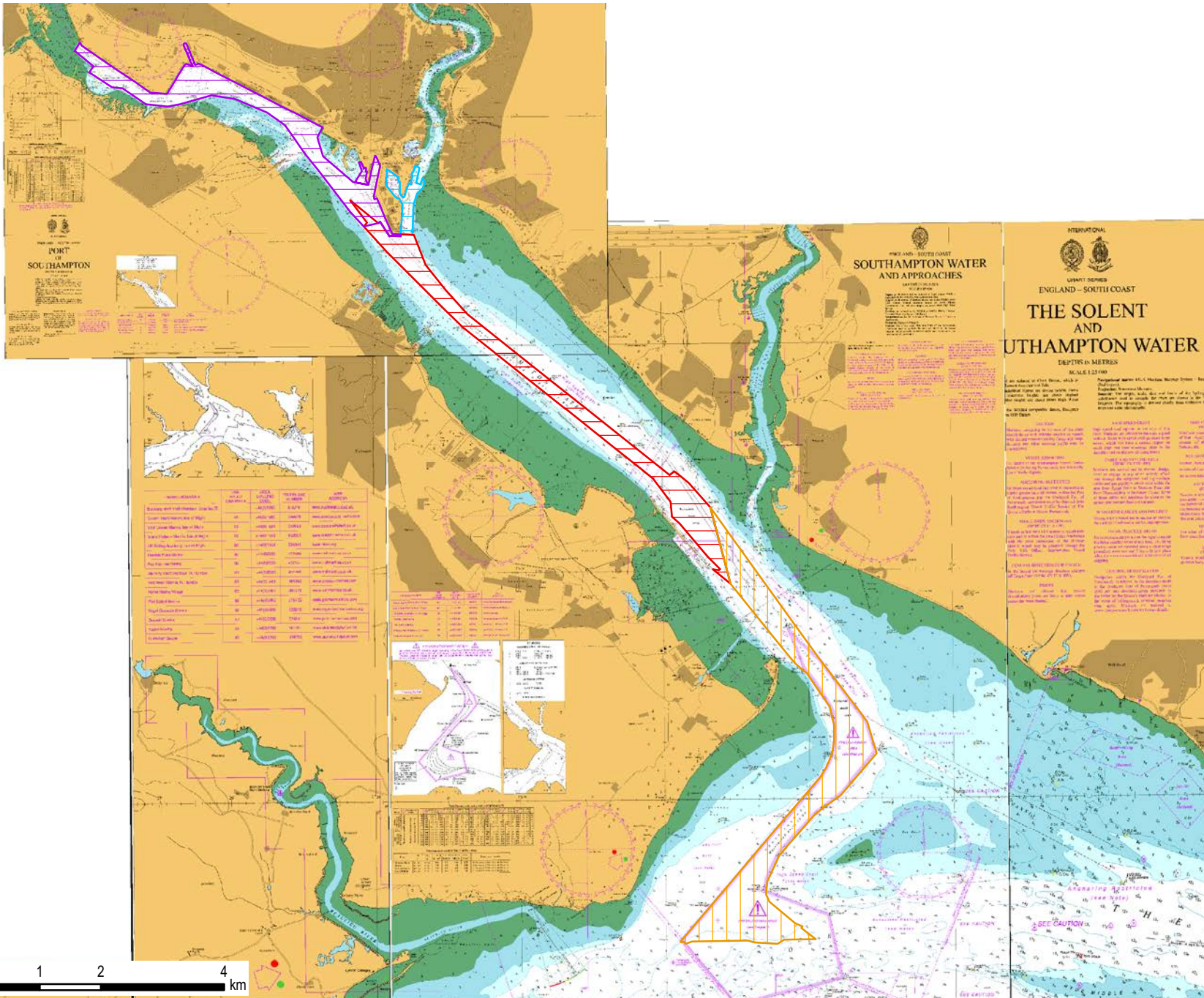


Figure 4.1



ABP Dredge Areas

- Itchen Berths and Channels
- Southampton Water
- Test Berths and Channels
- Thorn Channel

Date	By	Size	Version
May 14	NMW	A4	1
Coordinate System	British National Grid		
Projection	Transverse Mercator		
Scale	1:90,000		
QA	DLW		



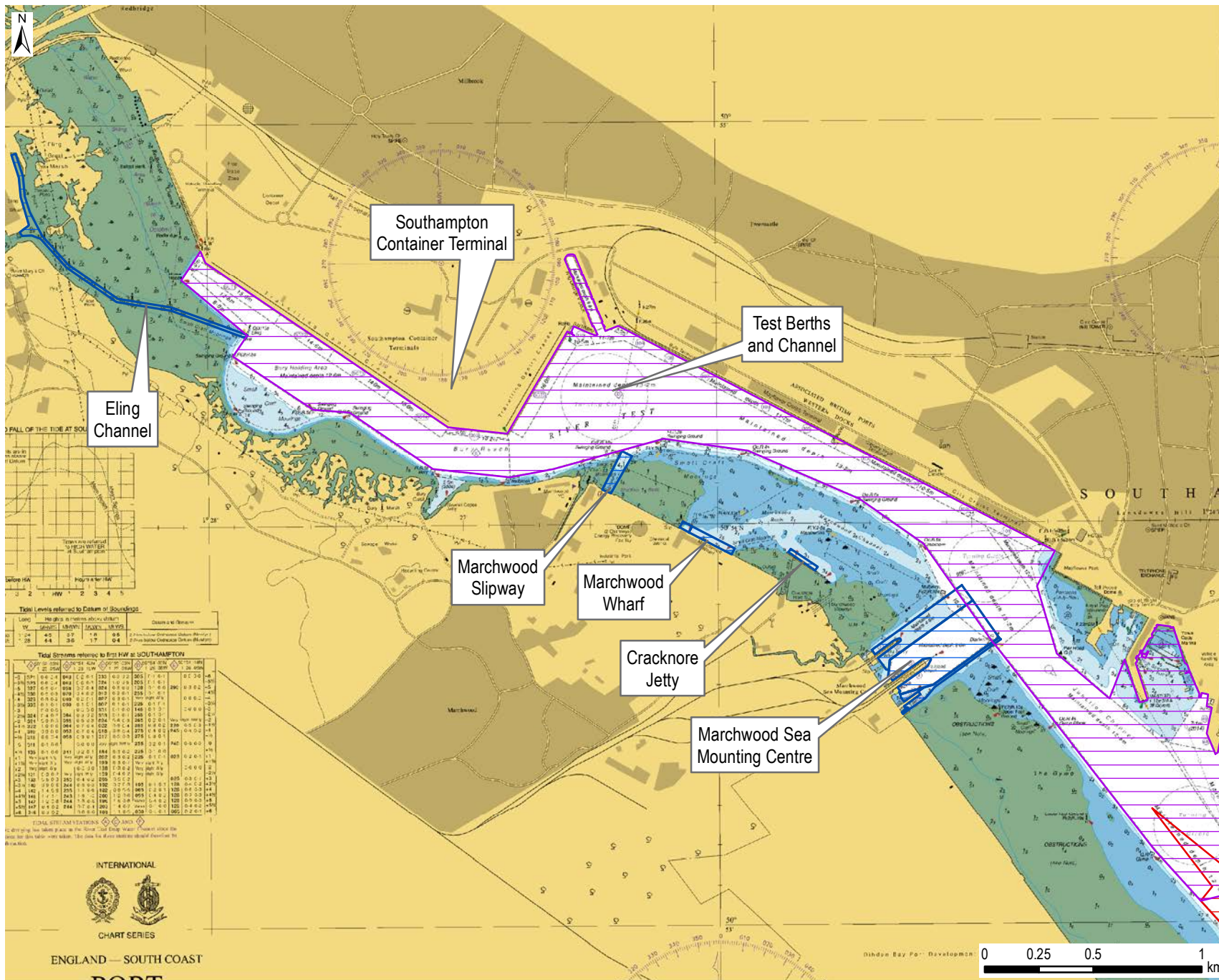
4209 Fig\_Base\_4\_2\_All\_Dredge.mxd  
Produced by ABPmer

© ABPmer, All rights reserved, 2014  
Contains UKHO data © British Crown Copyright 2014  
NOT TO BE USED FOR NAVIGATION



ABP Dredge Areas

Figure 4.2



**ABP Dredge Areas**

- Itchen Berths and Channels
- Southampton Water
- Test Berths and Channels
- Thorn Channel
- Third Party Dredge Areas

Date	By	Size	Version
Jul 14	NMW	A4	1
Coordinate System		British National Grid	
Projection		Transverse Mercator	
Scale		1:25,000	
QA		DLW	
4209 Fig_Base_4_3_Dredge.mxd			
Produced by ABPmer			



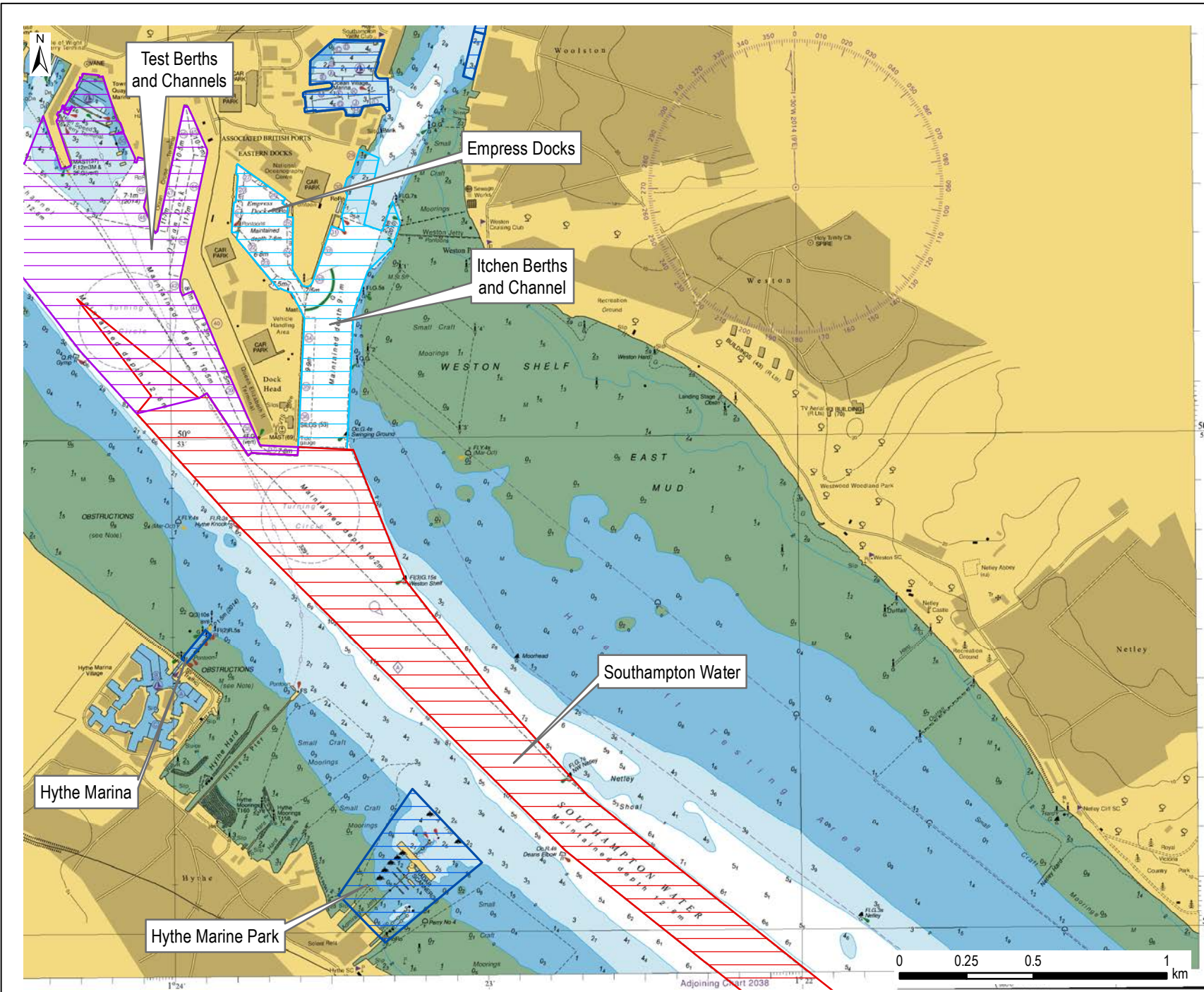
© ABPmer, All rights reserved, 2014  
 Contains UKHO data © British Crown Copyright 2014  
 NOT TO BE USED FOR NAVIGATION



**Southampton Indicative Main Dredge Locations in the River Test**

Figure 4.3





- ABP Dredge Areas**
- Itchen Berths and Channels
  - Southampton Water
  - Test Berths and Channels
  - Thorn Channel
  - Third Party Dredge Areas

Date	By	Size	Version
Jul 14	NMW	A4	1
Coordinate System		British National Grid	
Projection		Transverse Mercator	
Scale		1:20,000	
QA		DLW	
4209 Fig_Base_4_4_Dredge.mxd			
Produced by ABPmer			

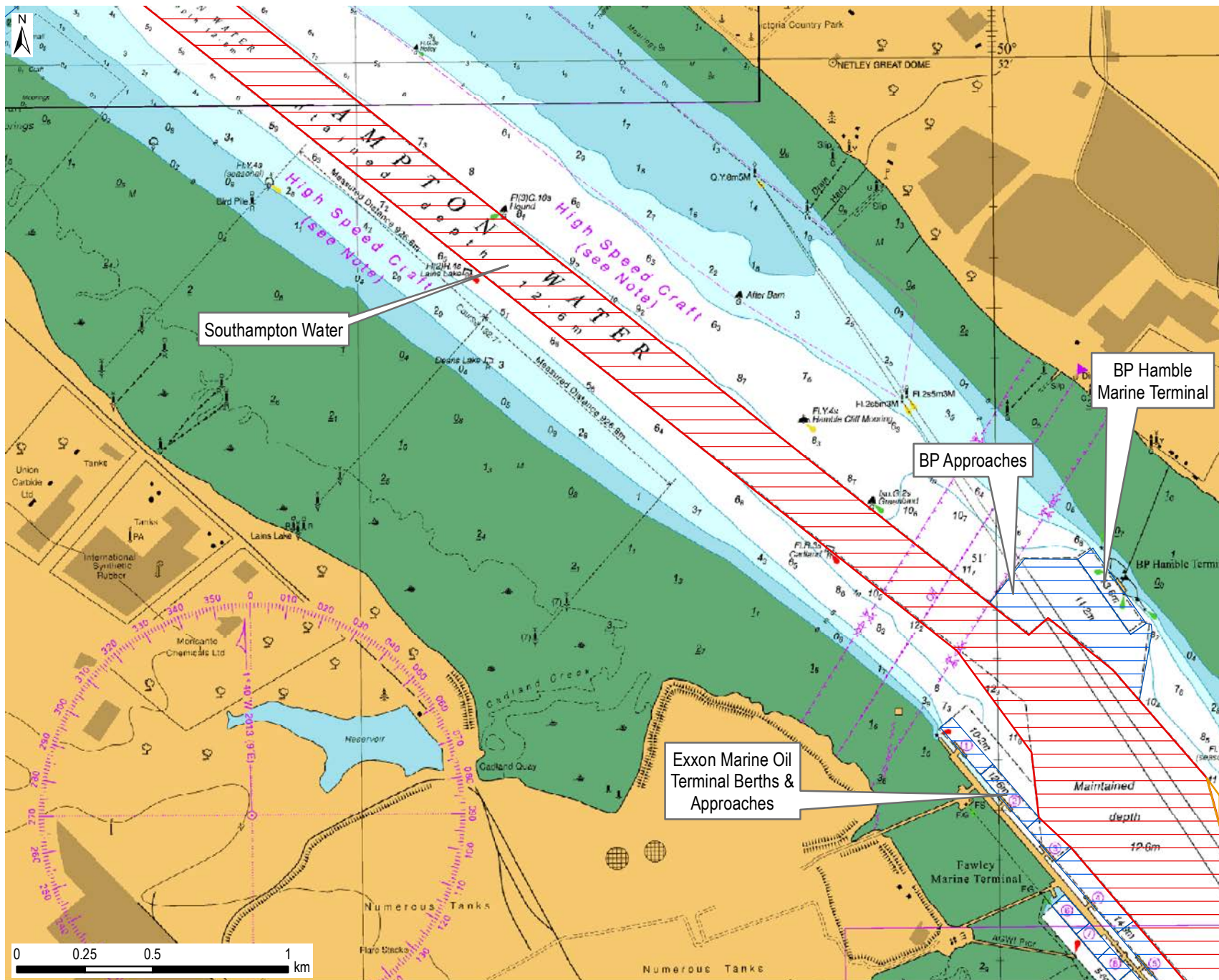


© ABPmer, All rights reserved, 2014  
 Contains UKHO data © British Crown Copyright 2014  
 NOT TO BE USED FOR NAVIGATION



Southampton Indicative Main Dredge Locations: Dock Head to Hythe Marine Park

Figure 4.4



**ABP Dredge Areas**

- Itchen Berths and Channels
- Southampton Water
- Test Berths and Channels
- Thorn Channel
- Third Party Dredge Areas

Date	By	Size	Version
Jul 14	NMW	A4	1
Coordinate System		British National Grid	
Projection		Transverse Mercator	
Scale		1:20,000	
QA		DLW	
4209 Fig_Base_4_5_Dredge.mxd			
Produced by ABPmer			

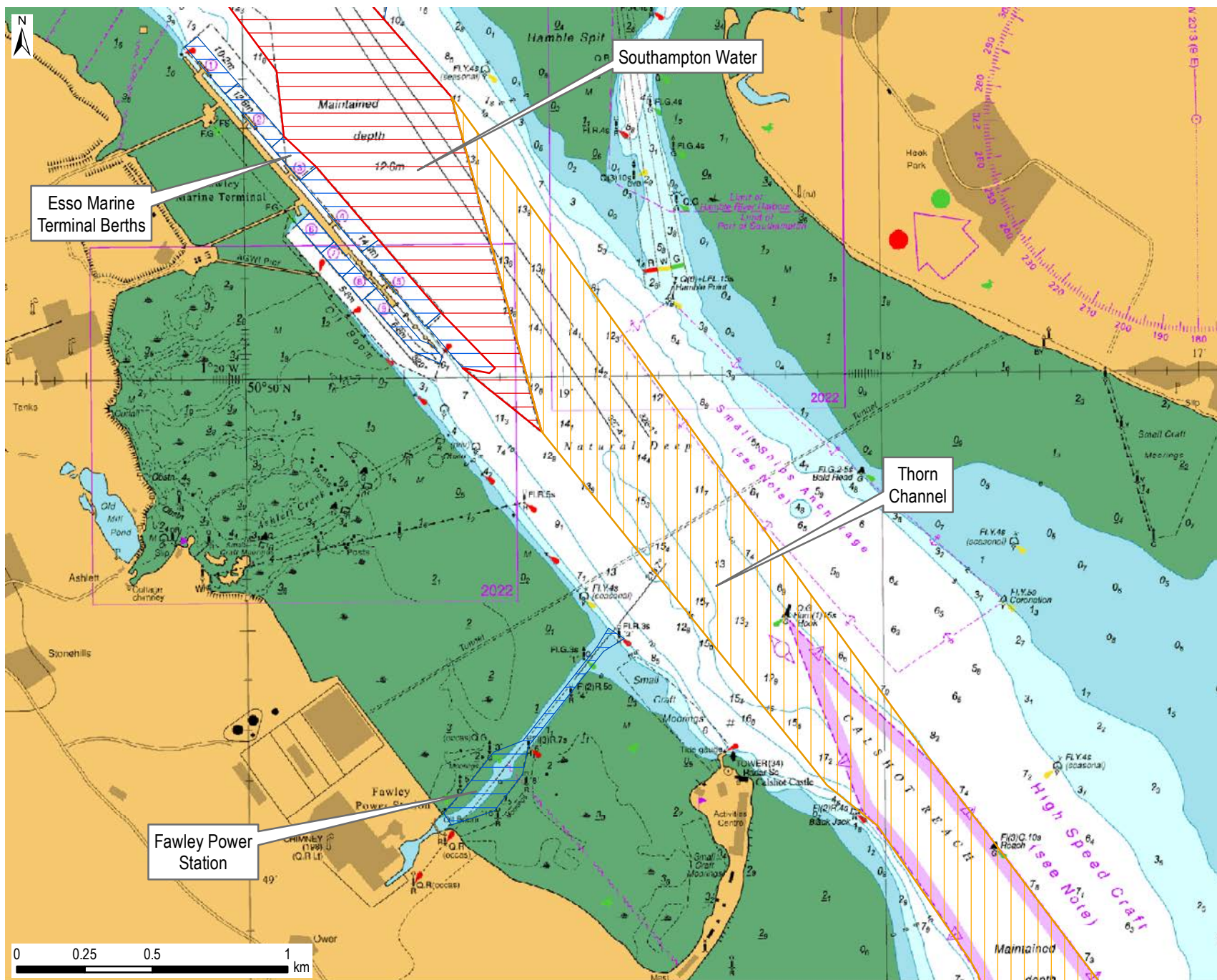


© ABPmer, All rights reserved, 2014  
 Contains UKHO data © British Crown Copyright 2014  
 NOT TO BE USED FOR NAVIGATION



Southampton Indicative Main Dredge Locations: Hythe Marine Park to Fawley Marine Terminal

Figure 4.5



**ABP Dredge Areas**

- Itchen Berths and Channels
- Southampton Water
- Test Berths and Channels
- Thorn Channel
- Third Party Dredge Areas

Date	By	Size	Version
Jun 14	NMW	A4	1
Coordinate System		British National Grid	
Projection		Transverse Mercator	
Scale		1:20,000	
QA		DLW	
4209 Fig_Base_4_6_Dredge.mxd			
Produced by ABPmer			

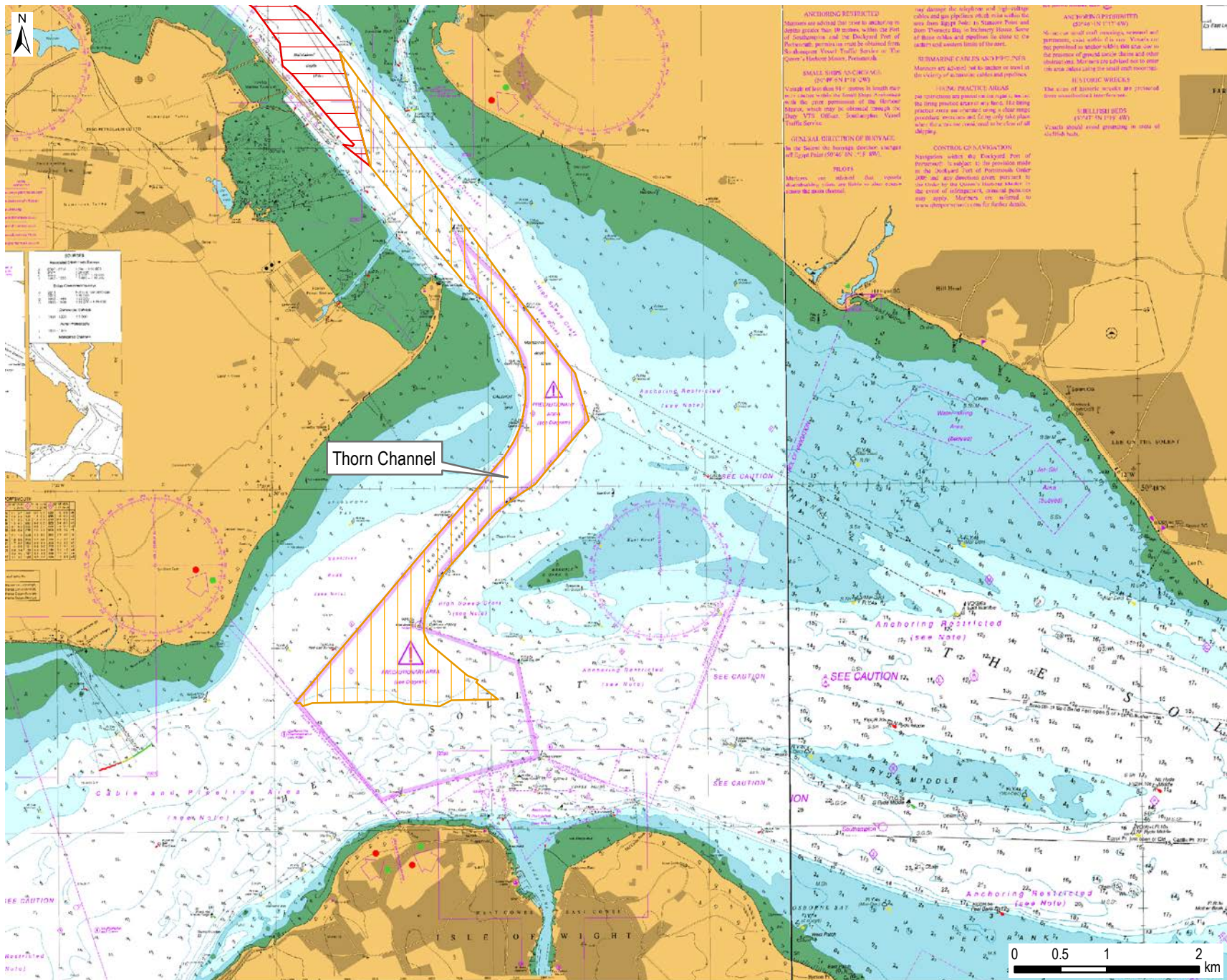


© ABPmer, All rights reserved, 2014  
 Contains UKHO data © British Crown Copyright 2014  
 NOT TO BE USED FOR NAVIGATION



Southampton Indicative Main Dredge Locations: Fawley Marine Terminal to Calshot

Figure 4.6



Thorn Channel

**ABP Dredge Areas**

- Itchen Berths and Channels
- Southampton Water
- Test Berths and Channels
- Thorn Channel

Date	By	Size	Version
Jun 14	NMW	A4	1
Coordinate System	British National Grid		
Projection	Transverse Mercator		
Scale	1:58,795		
QA	DLW		
4209 Fig_Base_4_7_Dredge.mxd			
Produced by ABPmer			

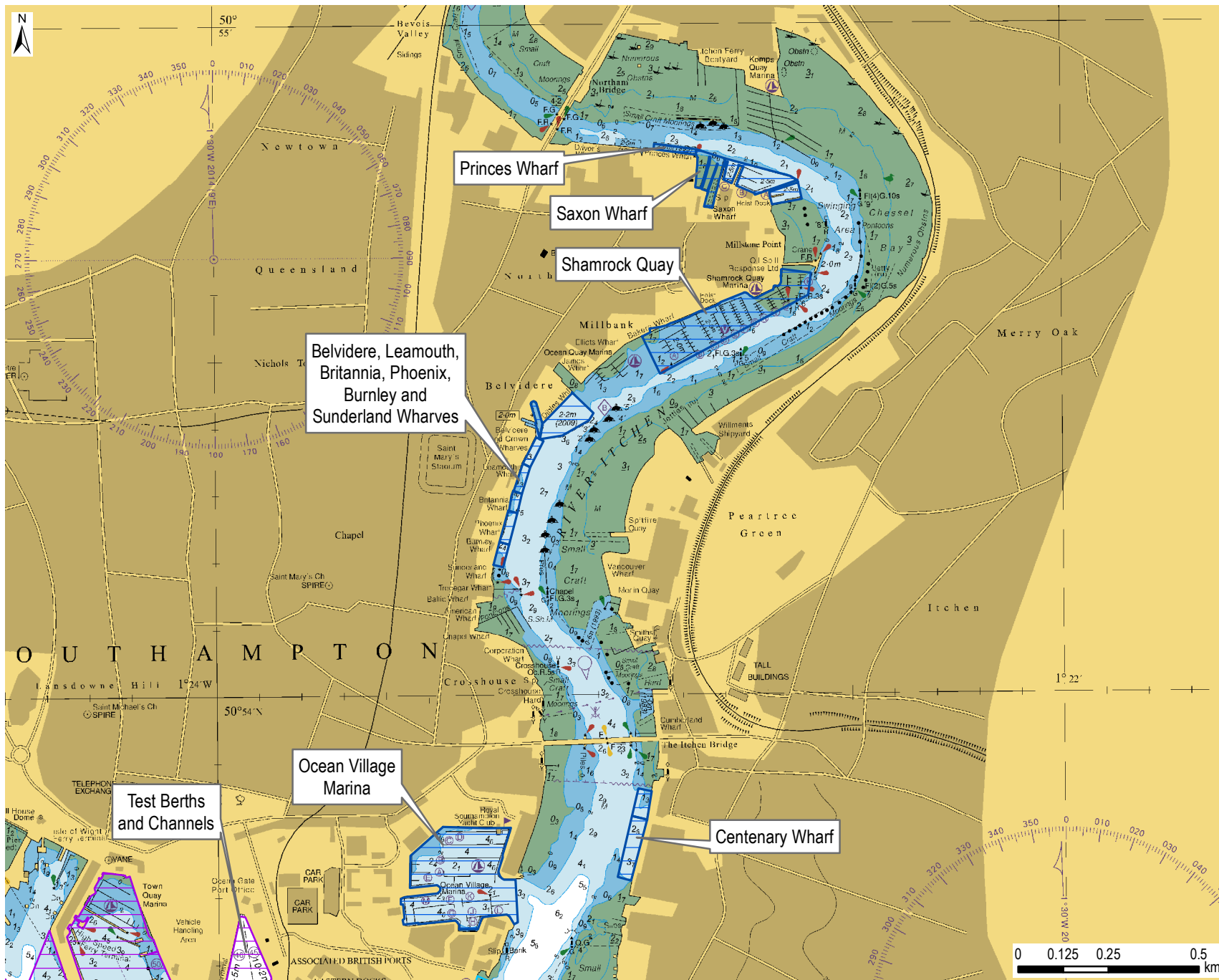


© ABPmer, All rights reserved, 2014  
 Contains UKHO data © British Crown Copyright 2014  
 NOT TO BE USED FOR NAVIGATION



Southampton Indicative Main  
 Dredge Locations: Thorn  
 Channel and Bramble Turn

Figure 4.7

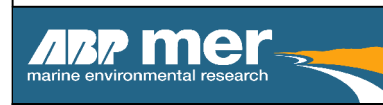


- ABP Dredge Areas**
- Itchen Berths and Channels
  - Southampton Water
  - Test Berths and Channels
  - Thorn Channel
  - Third Party Dredge Areas

Date	By	Size	Version
Aug 14	NMW	A4	1
<b>Coordinate System</b>		British National Grid	
<b>Projection</b>		Transverse Mercator	
<b>Scale</b>		1:15,000	
<b>QA</b>		DLW	
4209 Fig_Base_4_8_Dredge.mxd			
Produced by ABPmer			

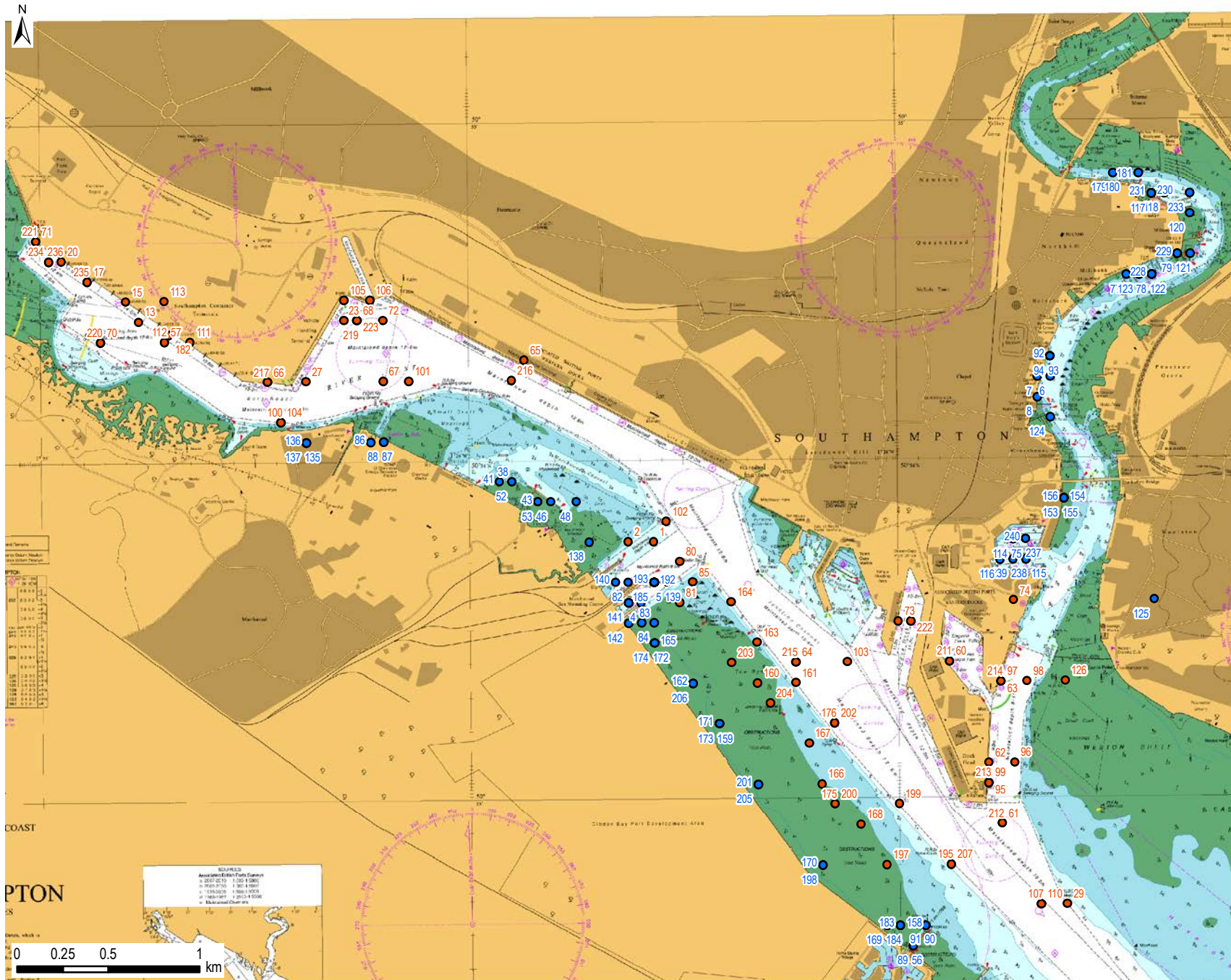


© ABPmer, All rights reserved, 2014  
 Contains UKHO data © British Crown Copyright 2014  
 NOT TO BE USED FOR NAVIGATION



**Southampton Indicative Main Dredge Locations in the River Itchen**

**Figure 4.8**



- ABP Sample Locations (ABP Sample ID)
- Third Party Sample Locations (Third Party Sample ID)

Sample ID refer to the Report Sample Number used in Tables A2 to A4

Date	By	Size	Version
Jun 14	NMW	A4	1
Coordinate System		British National Grid	
Projection		Transverse Mercator	
Scale		1:30,000	
QA		DLW	
4209 Fig_Base_5_1 Contamination.mxd			
Produced by ABPmer			

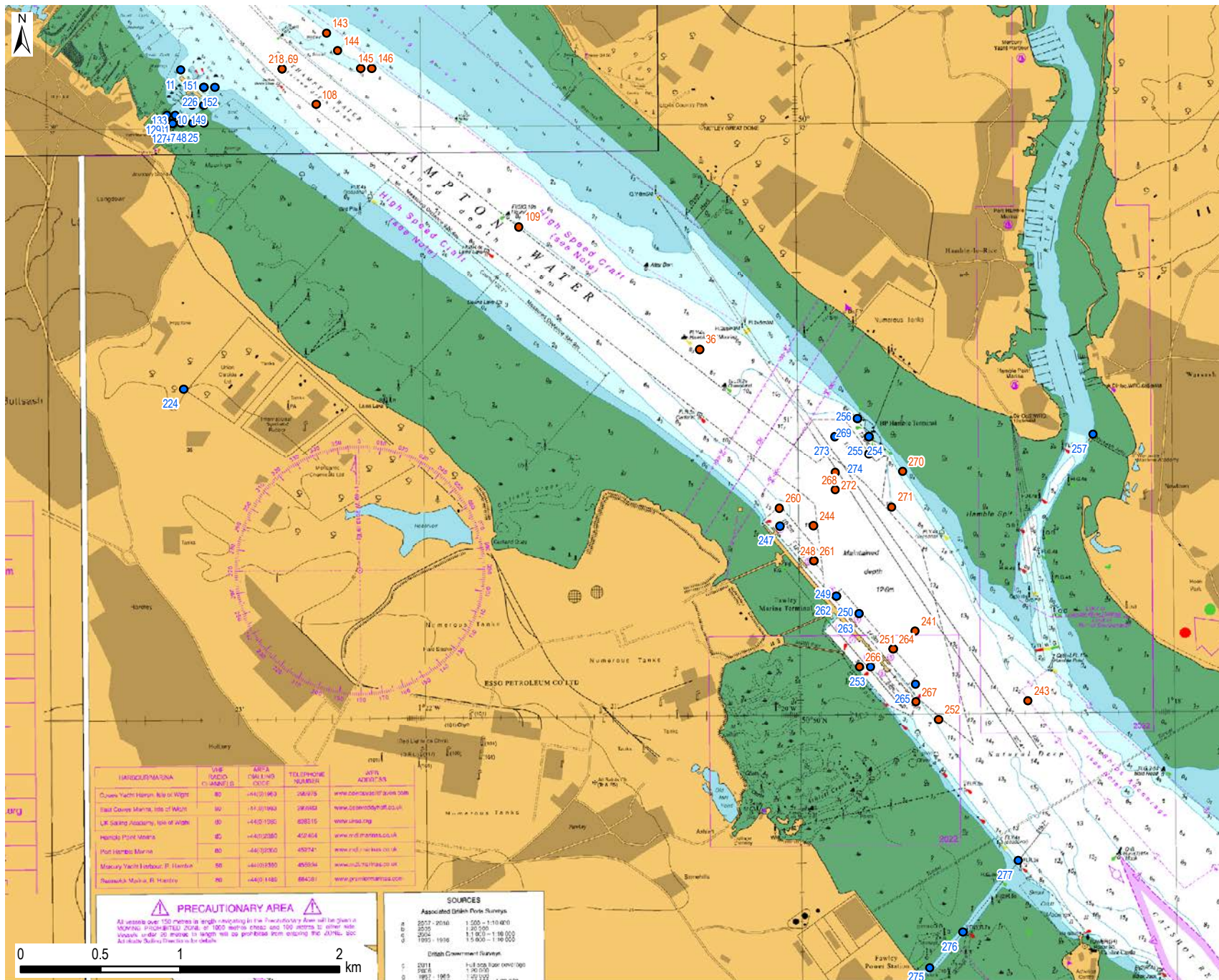


© ABPmer, All rights reserved, 2014  
 Contains UKHO data © British Crown Copyright 2014  
 NOT TO BE USED FOR NAVIGATION



### Sediment Quality Sample Locations

Figure 5.1



- ABP Sample Locations (ABP Sample ID)
- Third Party Sample Locations (Third Party Sample ID)

Sample ID refer to the Report Sample Number used in Tables A2 to A4

Date	By	Size	Version
Jun 14	NMW	A4	1
Coordinate System	British National Grid		
Projection	Transverse Mercator		
Scale	1:34,000		
QA	DLW		



4209 Fig\_Base\_5\_2 Contamination.mxd  
Produced by ABPmer

© ABPmer, All rights reserved, 2014  
Contains UKHO data © British Crown Copyright 2014  
NOT TO BE USED FOR NAVIGATION



Sediment Quality Sample Locations

Figure 5.2

HARDWARE/MASSINA	VME (VME) CHANNELS	ARC4 (ARC4) CHANNELS	TELEPHONE NUMBER	WEB ADDRESS
Crown Yacht Haven, Isle of Wight	80	+44(0)1963	246775	www.crown-yacht-haven.com
East Cowes Marina, Isle of Wight	80	+44(0)1963	246775	www.crown-yacht-haven.com
UK Sailing Academy, Isle of Wight	80	+44(0)1963	246775	www.usa.org
Hamble PSN Marina	85	+44(0)2385	452454	www.hamblepsn.co.uk
Port Hamble Marina	80	+44(0)2385	452454	www.hamblepsn.co.uk
Mercury Yacht Harbour, Port Hamble	80	+44(0)1963	452454	www.mercury-yacht-haven.com
Hamble Marina, Port Hamble	80	+44(0)1963	452454	www.hamblemarina.com

**PRECAUTIONARY AREA**

All vessels over 150 metres in length navigating in the Precautionary Area will be given a WARNING FROM-BOTTLED ZONE of 1000 metres ahead and 100 metres to either side. Vessels under 20 metres in length will be prohibited from entering the ZONE. See All-Islands Shipping Directive for details.

**SOURCES**

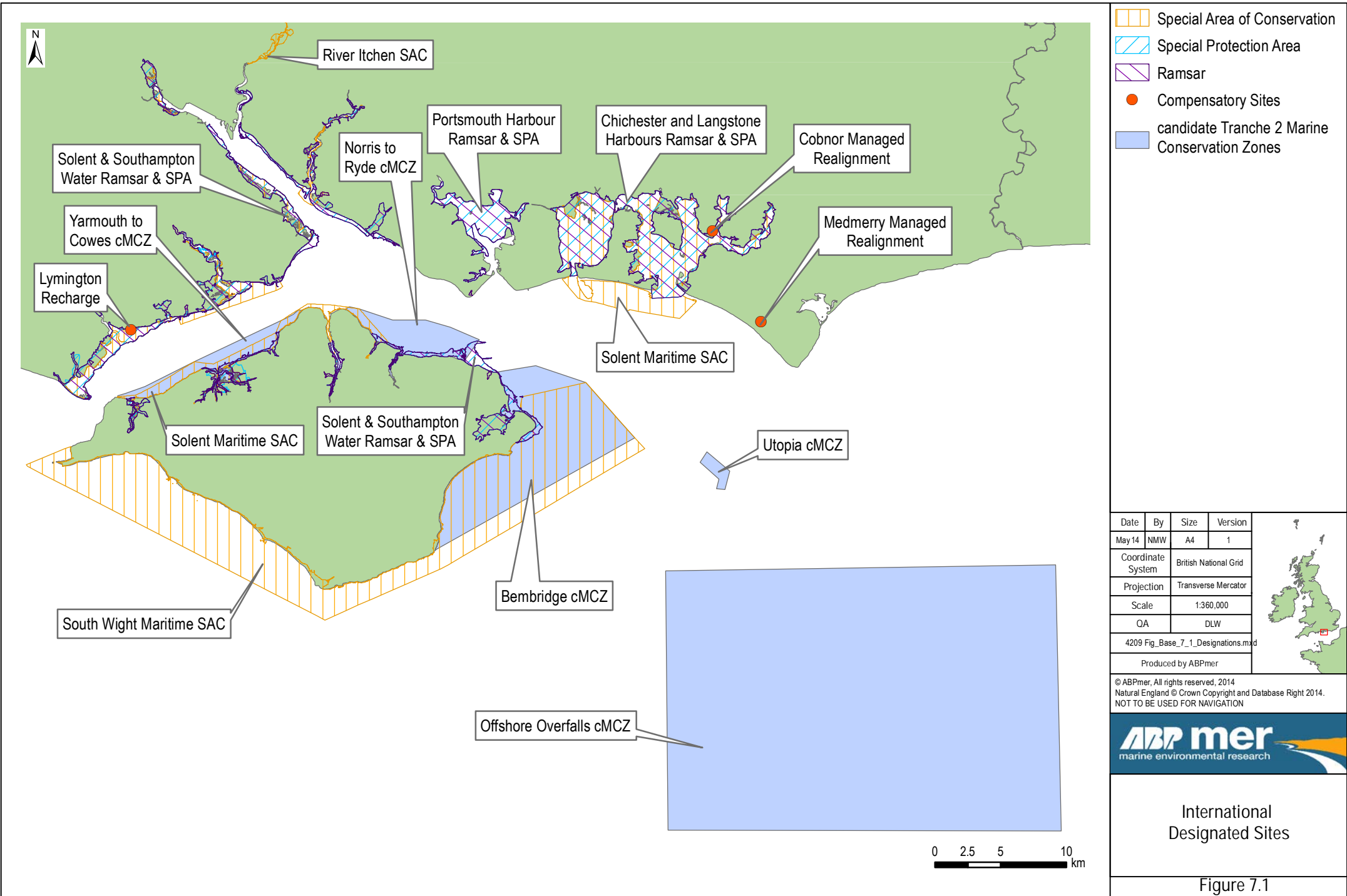
Associated British Ports Surveys

A 2013 - 2016 1:250 - 1:10,000  
 B 2013 - 2016 1:30,000  
 C 2013 - 2016 1:15,000 - 1:30,000  
 D 1995 - 1998 1:5,000 - 1:30,000

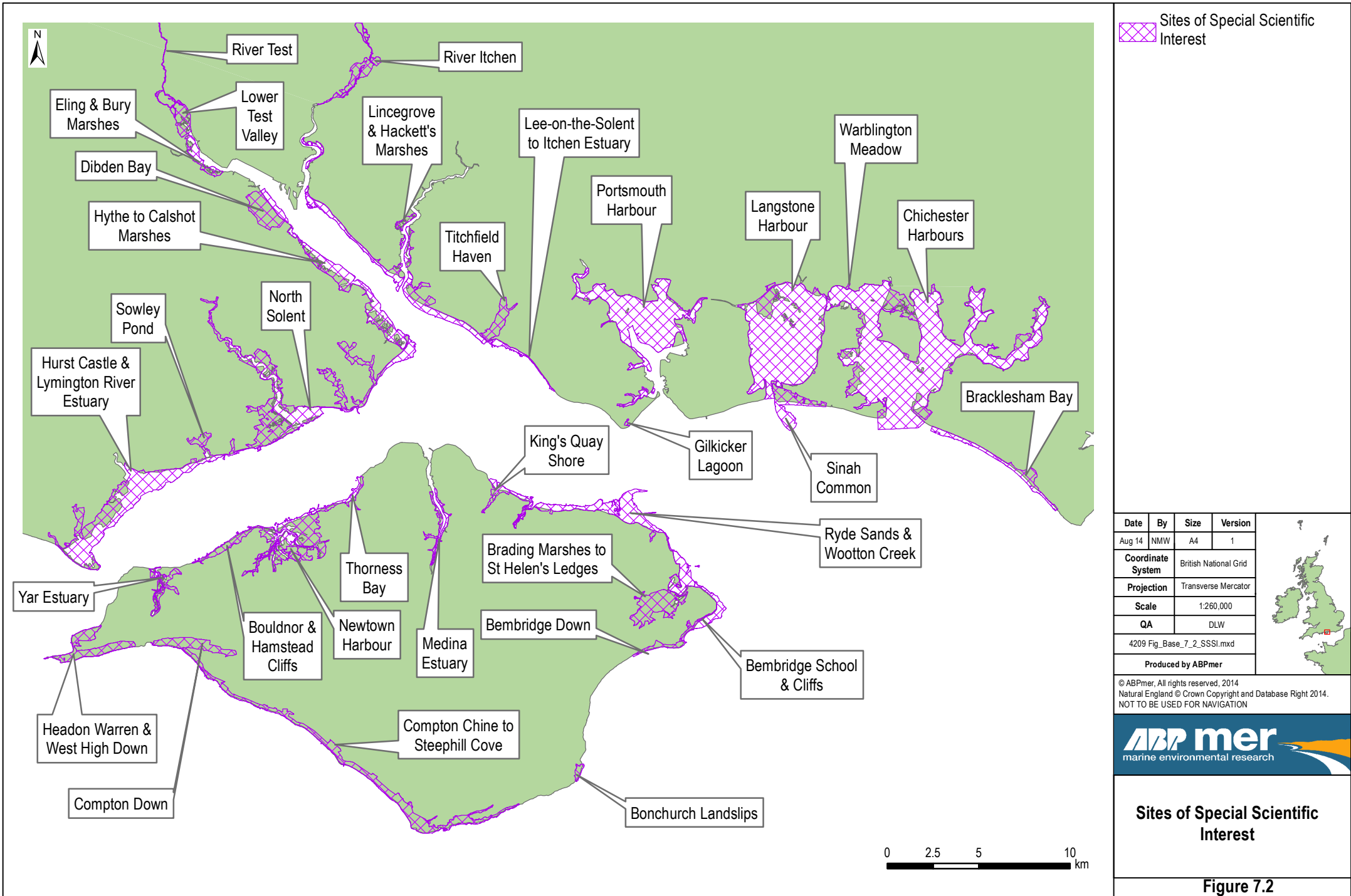
British Government Surveys

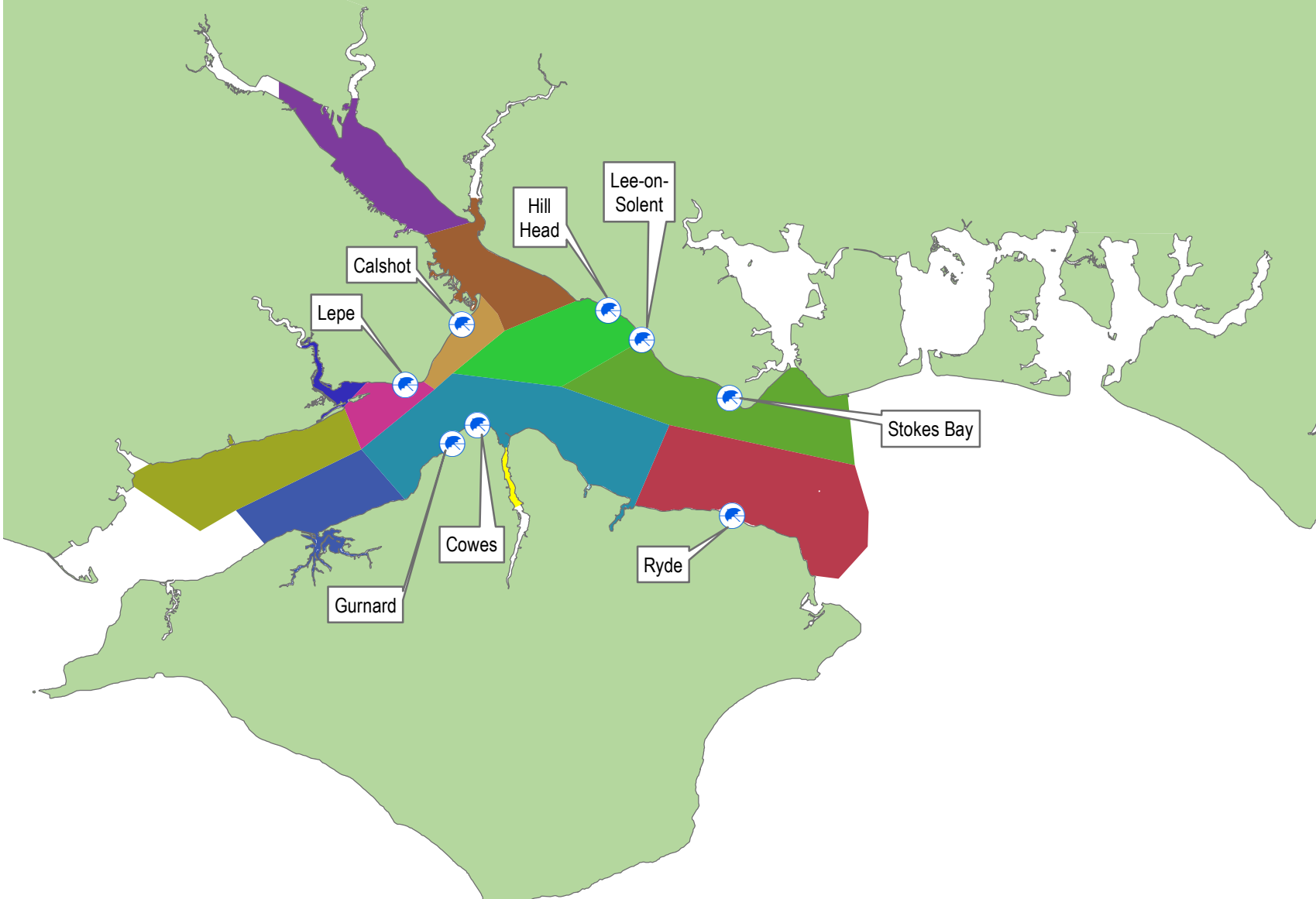
C 2011 Full depth from 0m to 100m  
 D 1985 - 1989 1:25,000 - 1:50,000  
 E 1985 - 1989 1:50,000 - 1:90,000













-  Designated Bathing Waters
- Shellfish Waters
-  Approaches to Southampton Water
-  Beaulieu River
-  Central Solent
-  Cowes
-  Lepe Middle Bank
-  Lymington and Sowley
-  Medina
-  Newtown
-  Ryde
-  Southampton Water
-  Spithead and Stokes Bay
-  Stanswood Bay

Date	By	Size	Version
May 14	NMW	A4	1
Coordinate System		British National Grid	
Projection		Transverse Mercator	
Scale		1:260,000	
QA	DLW		
4209 Fig_Base_7_3_Shellfish.mxd			
Produced by ABPmer			



© ABPmer, All rights reserved, 2014  
 Natural England © Crown Copyright and Database Right 2014.  
 NOT TO BE USED FOR NAVIGATION



### Shellfish Waters and Designated Bathing Waters

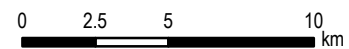


Figure 7.3

# Appendices

# Appendix A

## Sediment Quality Data

## A. Sediment Quality Data

### A.1 Reference Cefas Action Levels (AL)

Table A1.1 Reference Cefas Action Levels

Contaminant	Existing		Suggested Revision	
	Action Level 1 mg.kg <sup>-1</sup> (ppm)	Action Level 2 mg.kg <sup>-1</sup> (ppm)	Action Level 1 mg.kg <sup>-1</sup> (ppm) dry weight	Action Level 2 mg.kg <sup>-1</sup> (ppm) dry weight
Arsenic (As)	20	100	20	70
Cadmium (Cd)	0.4	5	0.4	4
Chromium (Cr)	40	400	50	370
Copper (Cu)	40	400	30	300
Mercury (Hg)	0.3	3	0.25	1.5
Nickel (Ni)	20	200	30	150
Lead (Pb)	50	500	50	400
Zinc (Zn)	130	800	130	600
Tributyltin (TBT, DBT, MBT)	0.1	1	0.1	0.5
Polychlorinated Biphenyls (PCBs)	0.02	0.2	0.02	0.18
<b>Polyaromatic Hydrocarbons (PAHs)</b>				
Acenaphthene			0.1	
Acenaphthylene			0.1	
Anthracene			0.1	
Fluorene			0.1	
Naphthalene			0.1	
Phenanthrene			0.1	
Benzo[a]anthracene			0.1	
Benzo[a]fluoranthene			0.1	
Benzo[k]fluoranthene			0.1	
Benzo[g]perylene			0.1	
Benzo[a]pyrene			0.1	
Benzo[g,h,i]perylene			0.1	
Dibenzo[a,h]anthracene			0.01	
Chrysene			0.1	
Fluoranthene			0.1	
Pyrene			0.1	
Indeno[1,2,3cd]pyrene			0.1	
Total hydrocarbons	100		100	
Booster Biocide and Brominated Flame Retardants*	-	-	-	-

\*Provisional Action Levels for these compounds are subject to further investigation

## A.2 Sediment Quality Data

### A2.1 River Test

Table A2.1  
Metals and Tin Results: River Test Berths and Channel

Report Sample Number	Operator	SampleID (LSN)	DAS	Year Sampled	AS	CD	CR	CU	PB	HG	NI	ZN	DBT	TBT
159	Third Party	2001/01384	31157/001019	2001	8.2	0.07	20	9.2	13	0.05	8.6	38	0.0120	0.0420
160	ABP	2001/01385	31157/001019	2001	7.2	0.09	26	22	22	0.16	11	63	0.0710	0.2170
161	ABP	2001/01386	31157/001019	2001	8.2	0.06	24	20	17	0.08	11	49	0.0370	0.2010
162	Third Party	2001/01387	31157/001019	2001	8	0.11	29	26	28	0.41	12	69	0.0380	0.1290
163	ABP	2001/01388	31157/001019	2001	6.8	0.06	29	18	18	0.07	12	53	0.0490	0.2370
164	ABP	2001/01389	31157/001019	2001	35	0.06	54	30	29	0.1	27	100	0.0240	0.1060
165	Third Party	2001/01390	31157/001019	2001	7.5	0.08	35	28	24	0.21	12	67	0.0470	0.2560
166	ABP	2001/01393	31157/001019	2001	6.4	0.06	22	14	15	0.09	9.7	137	0.0200	0.0620
167	ABP	2001/01394	31157/001019	2001	14	0.08	34	28	199	0.7	13	94	0.0250	0.0630
171	Third Party	2001/01399	31157/001019	2001	6.8	0.05	19	13	12	0.1	8.3	48	0.0150	0.0560
172	Third Party	2001/01401	31157/001019	2001	8.4	0.18	33	22	42	0.72	15	88	0.0060	0.0110
173	Third Party	2001/01402	31157/001019	2001	5.3	0.04	13	10	9.7	0.05	6.5	38	0.0170	0.0720
174	Third Party	2001/01403	31157/001019	2001	6.2	0.07	28	27	19	0.22	12	68	0.0540	0.3920
176	ABP	2001/01406	31157/001019	2001	6.1	0.05	27	18	13	0.08	11	49	0.0290	0.1740
182	ABP	2001/03070	31384/010919	2001	6	0.06	26	14	12	0.03	9.2	47	0.0640	0.3790
185	Third Party	2001/00350	31225/010124	2001	8.1	0.08	29	47	34	0.1	12	154	0.0010	0.2876
186	Third Party	2001/00351	31225/010124	2001	7.4	0.09	33	25	29	0.14	9.4	74	0.0370	0.2330
187	Third Party	2001/00352	31225/010124	2001	6.1	0.06	27	19	19	0.07	9.1	65	0.0370	0.2330
188	Third Party	2001/00353	31225/010124	2001	7.7	0.09	28	27	26	0.11	9.3	76	0.0990	0.6290
189	Third Party	2001/00354	31225/010124	2001	7.2	0.13	29	20	19	0.1	11	438	0.4400	0.2440
190	Third Party	2001/00355	31225/010124	2001	5.9	0.08	25	20	15	0.07	11	59	0.0260	0.5690
191	Third Party	2001/00356	31225/010124	2001	6	0.06	22	17	18	0.07	7.2	51	0.0430	0.1960
192	Third Party	2001/00357	31225/010124	2001	6.6	0.06	23	17	18	0.08	7.1	44	0.0370	0.2240
193	Third Party	2001/00358	31225/010124	2001	0	0	0	0	0	0	0	0	0.0350	0.1790
194	Third Party	2001/00359	31225/010124	2001	6.2	0.06	26	19	20	0.1	7.6	53	0.0300	0.1430
201	Third Party	2001/01382	31157/001019	2001	7.3	0.12	23	19	24	0.21	9.4	57	0.0330	0.1060
202	ABP	2001/01383	31157/001019	2001	8.5	0.06	27	18	18	0.08	12	52	0.0320	0.1880
203	ABP	2001/01391	31157/001019	2001	9.4	0.08	39	18	16	0.1	17	56	0.0350	0.1840
204	ABP	2001/01392	31157/001019	2001	26	0.04	43	29	76	0.13	18	95	0.0120	0.0200
205	Third Party	2001/01398	31157/001019	2001	7.5	0.09	29	12	26	0.38	13	53	0.0020	0.0030
206	Third Party	2001/01400	31157/001019	2001	5.6	0.06	32	6.6	9	0.02	14	41	0.0010	0.0030
135	Third Party	2004/02498	32350/040108	2004	10	0.35	23	25	25	0.56	14	76	0.0286	0.0723
136	Third Party	2004/02499	32350/040108	2004	10	0.27	24	36	26	1	14	78	0.0576	0.2172
137	Third Party	2004/02500	32350/040108	2004	11	0.37	20	23	26	0.26	14	71	0.0149	0.0446
138	ABP	2004/02522	32430/040406	2004	8	0.06	19	22	17	0.07	9.9	39	0.0481	0.1385
139	Third Party	2004/02523	32430/040406	2004	7.9	0.06	24	24	19	0.08	10	39	0.0607	0.2072
140	Third Party	2004/02524	32430/040406	2004	8	0.09	25	21	16	0.06	11	48	0.0229	0.0701
141	Third Party	2004/02525	32430/040406	2004	7.7	0.06	22	24	21	0.08	10	50	0.0453	0.1598
142	ABP	2004/02526	32430/040406	2004	9.1	0.06	19	25	22	0.12	8.7	41	0.0410	0.1074
100	ABP	2005/01400	32796/050215	2005	16	0.07	34	35	21	0.01	17	79	0.0394	0.5857
101	ABP	2005/01401	32796/050215	2005	16	0.1	30	26	19	0.03	30	73	0.0269	0.1501
102	ABP	2005/01402	32796/050215	2005	19	0.09	45	41	28	0.07	21	93	0.0312	0.0962
103	ABP	2005/01403	32796/050215	2005	15	0.06	24	26	20	0.01	15	64	0.0020	0.0432
104	ABP	2005/01404	32796/050215	2005	0	0	0	0	0	0	0	0	0.0000	0.0000
105	ABP	2005/01405	32796/050215	2005	12	0.11	27	43	22	0.01	15	85	0.1463	3.2987
106	ABP	2005/01406	32796/050215	2005	16	0.08	38	39	23	0.03	19	86	0.0313	0.2877
111	ABP	2005/01429	32826/050308	2005	17	0.06	31	20	14	0.2	16	56	0.0220	1.3898
112	ABP	2005/01430	32826/050308	2005	17	0.07	37	32	19	0.03	19	68	0.0277	0.2379

Metals and Tin Results: River Test Berths and Channel

Report Sample Number	Operator	SampleID (LSN)	DAS	Year Sampled	AS	CD	CR	CU	PB	HG	NI	ZN	DBT	TBT
113	ABP	2005/01431	32826/050308	2005	17	0.08	30	27	17	0.01	19	63	0.0216	0.1517
80	ABP	2007/02179	33662/070418	2007	21	0.12	35	40	42	0.65	22	117	0.0020	0.0427
81	ABP	2007/02180	33662/070418	2007	17	0.18	38	63	41	0.16	25	115	0.0424	0.1087
82	Third Party	2007/02181	33662/070418	2007	20	0.14	35	59	42	0.1	22	128	0.0020	0.0603
83	Third Party	2007/02182	33662/070418	2007	20	0.19	50	43	37	0.08	31	117	0.0337	0.0511
84	Third Party	2007/02183	33662/070418	2007	18	0.19	39	92	65	0.39	23	148	0.0424	0.0836
85	ABP	2007/02184	33662/070418	2007	22	0.11	44	52	38	0.06	26	113	0.0020	0.0020
86	Third Party	2007/06613	33807/070828	2007	20	0.37	48	64	45	0.16	25	134	0.0609	0.1981
87	Third Party	2007/06614	33807/070828	2007	17	0.21	46	39	33	0.2	21	107	0.0328	0.1303
88	Third Party	2007/06615	33807/070828	2007	16	0.17	37	43	32	0.15	19	107	0.0268	0.0884
57	ABP	2008/00301	33922/080116	2008	33	0.15	40	18	19	0.07	23	76	0.0030	0.1176
64	ABP	2008/01550	34003/080404	2008	18	0.1	20	34	29	0.2	15	81	0.0233	0.0504
65	ABP	2008/01551	34003/080404	2008	20	0.11	26	31	29	0.14	17	88	0.0135	0.0373
66	ABP	2008/01552	34003/080404	2008	14	0.13	18	27	23	0.08	13	74	0.0250	0.1649
67	ABP	2008/01553	34003/080404	2008	10	0.03	19	9.5	13	0.02	18	58	0.0020	0.0089
68	ABP	2008/01554	34003/080404	2008	15	0.07	16	17	15	0.05	14	61	0.0219	0.3799
70	ABP	2008/01556	34003/080404	2008	15	0.2	20	34	26	0.11	14	97	0.0203	0.0800
71	ABP	2008/01557	34003/080404	2008	13	0.28	17	25	20	0.08	13	93	0.0110	0.0451
72	ABP	2008/01558	34003/080404	2008	16	0.1	16	27	21	0.07	15	67	0.0182	0.1091
73	ABP	2008/01559	34003/080404	2008	18	0.19	21	43	33	0.21	17	102	0.0286	0.1103
13	ABP	2009/00785	34319/090127	2009	2.3	0.04	0.55	2.8	4.6	0.02	0.81	18	0.0110	0.0581
15	ABP	2009/00787	34319/090127	2009	1.8	0.04	0.42	1.2	2.3	0.02	0.52	8.7	0.0063	0.0604
17	ABP	2009/00789	34319/090127	2009	0.73	0.04	0.35	1.2	1.7	0.02	0.72	6.2	0.0063	0.0241
20	ABP	2009/00792	34319/090127	2009	2.1	0.06	0.38	2.9	4	0.02	0.61	18	0.0119	0.0954
23	ABP	2009/00797	34302/090114	2009	16	0.13	19	38	28	0.13	16	84	0.0274	0.3165
27	ABP	2009/00801	34302/090114	2009	21	0.17	28	50	38	0.18	22	110	0.0164	0.0516
38	ABP	2009/01595	34354/090305	2009	19	0.15	30	41	31	0.19	30	109	0.0246	0.0718
41	ABP	2009/01598	34354/090305	2009	16	0.14	22	40	34	0.12	19	123	0.0694	0.0895
43	ABP	2009/01600	34354/090305	2009	19	0.54	41	104	164	0.79	25	343	0.2920	0.7028
46	ABP	2009/01603	34354/090305	2009	15	0.35	35	97	77	0.67	21	244	0.2769	0.7945
48	ABP	2009/01605	34354/090305	2009	18	0.43	33	72	67	0.8	25	181	0.0518	0.1063
52	ABP	2009/01610	34354/090305	2009	0	0	0	0	0	0	0	0	0.0000	0.0000
53	ABP	2009/01611	34354/090305	2009	0	0	0	0	0	0	0	0	0.0000	0.0000
1	ABP	2010/01527	34901/100716	2010	28	0.1	55	62	49	0.21	30	150	0.0050	0.0080
2	ABP	2010/01528	34901/100716	2010	24	0.1	56	54	46	0.2	28	140	0.0050	0.0376
3	Third Party	2010/01529	34901/100716	2010	17	0.07	34	72	37	0.18	20	118	0.0000	0.0000
4	Third Party	2010/01530	34901/100716	2010	22	0.17	40	69	53	0.3	25	156	0.0060	0.0404
5	Third Party	2010/01531	34901/100716	2010	28	0.09	30	33	30	0.1	19	87	0.0050	0.0090
215	ABP	2011/01112	MLA2011/00053	2011	19	0.07	32	30	30	0.09	20	84	0.0030	0.0239
216	ABP	2011/01113	MLA2011/00053	2011	19	0.11	31	31	31	0.1	19	90	0.0030	0.0767
217	ABP	2011/01114	MLA2011/00053	2011	18	0.16	34	33	26	0.12	18	89	0.0171	0.2315
219	ABP	2011/01116	MLA2011/00053	2011	15	0.09	25	18	21	0.09	17	58	0.0078	0.0272
220	ABP	2011/01117	MLA2011/00053	2011	14	0.04	32	11	15	0.02	18	65	0.0040	0.0222
221	ABP	2011/01118	MLA2011/00053	2011	16	0.15	35	64	91	0.38	19	215	0.2472	8.4804
222	ABP	2011/01119	MLA2011/00053	2011	22	0.07	54	25	28	0.11	23	84	0.0020	0.0209
223	ABP	2011/01120	MLA2011/00053	2011	24	0.1	53	31	30	0.15	24	94	0.0030	0.0155
234	ABP	2011/02826	MLA2011/00053	2011	0	0	0	0	0	0	0	0	0.0342	0.0398
235	ABP	2011/02827	MLA2011/00053	2011	0	0	0	0	0	0	0	0	0.0098	0.0520
236	ABP	2011/02828	MLA2011/00053	2011	0	0	0	0	0	0	0	0	0.0118	0.0361

Table A2.2  
Polychlorinated Biphenyl Results: River Test Berths and Channel

Report Sample Number	Operator	SampleID (LSN)	DAS	Year Sampled	CB#101	CB#105	CB#110	CB#118	CB#128	CB#138	CB#141	CB#149	CB#151	CB#153	CB#156	CB#158
173	Third Party	2001/01402	31157/001019	2001	0.0004	0.0000	0.0006	0.0005	0.0000	0.0005	0.0000	0.0004	0.0000	0.0005	0.0000	0.0000
174	Third Party	2001/01403	31157/001019	2001	0.0013	0.0004	0.0026	0.0014	0.0003	0.0020	0.0003	0.0014	0.0004	0.0017	0.0000	0.0000
176	ABP	2001/01406	31157/001019	2001	0.0000	0.0000	0.0011	0.0006	0.0000	0.0006	0.0000	0.0005	0.0000	0.0006	0.0000	0.0000
185	Third Party	2001/00350	31225/010124	2001	0.0016	0.0010	0.0035	0.0020	0.0007	0.0030	0.0008	0.0021	0.0006	0.0029	0.0005	0.0004
186	Third Party	2001/00351	31225/010124	2001	0.0013	0.0009	0.0031	0.0017	0.0006	0.0026	0.0007	0.0019	0.0006	0.0025	0.0005	0.0004
187	Third Party	2001/00352	31225/010124	2001	0.0011	0.0008	0.0026	0.0015	0.0006	0.0023	0.0006	0.0016	0.0005	0.0022	0.0004	0.0003
188	Third Party	2001/00353	31225/010124	2001	0.0020	0.0007	0.0040	0.0020	0.0005	0.0031	0.0006	0.0021	0.0006	0.0031	0.0000	0.0003
189	Third Party	2001/00354	31225/010124	2001	0.0012	0.0000	0.0027	0.0012	0.0000	0.0017	0.0003	0.0011	0.0000	0.0016	0.0000	0.0000
190	Third Party	2001/00355	31225/010124	2001	0.0013	0.0000	0.0025	0.0011	0.0003	0.0016	0.0003	0.0010	0.0000	0.0016	0.0000	0.0000
191	Third Party	2001/00356	31225/010124	2001	0.0011	0.0000	0.0025	0.0012	0.0003	0.0017	0.0004	0.0012	0.0003	0.0018	0.0000	0.0000
192	Third Party	2001/00357	31225/010124	2001	0.0008	0.0000	0.0022	0.0010	0.0000	0.0015	0.0000	0.0009	0.0000	0.0014	0.0000	0.0000
193	Third Party	2001/00358	31225/010124	2001	0.0017	0.0006	0.0031	0.0014	0.0004	0.0021	0.0005	0.0013	0.0004	0.0020	0.0000	0.0002
194	Third Party	2001/00359	31225/010124	2001	0.0011	0.0000	0.0022	0.0010	0.0003	0.0016	0.0003	0.0010	0.0000	0.0015	0.0000	0.0000
135	Third Party	2004/02498	32350/040108	2004	0.0002	0.0015	0.0002	0.0036	0.0002	0.0002	0.0002	0.0002	0.0006	0.0002	0.0002	0.0002
136	Third Party	2004/02499	32350/040108	2004	0.0092	0.0033	0.0110	0.0086	0.0018	0.0084	0.0014	0.0053	0.0015	0.0073	0.0012	0.0011
137	Third Party	2004/02500	32350/040108	2004	0.0002	0.0012	0.0002	0.0025	0.0002	0.0002	0.0002	0.0002	0.0005	0.0002	0.0002	0.0002
138	ABP	2004/02522	32430/040406	2004	0.0006	0.0002	0.0007	0.0006	0.0002	0.0009	0.0002	0.0006	0.0002	0.0008	0.0002	0.0002
139	Third Party	2004/02523	32430/040406	2004	0.0009	0.0003	0.0010	0.0008	0.0002	0.0012	0.0002	0.0009	0.0002	0.0012	0.0002	0.0002
140	Third Party	2004/02524	32430/040406	2004	0.0007	0.0003	0.0008	0.0006	0.0002	0.0009	0.0002	0.0006	0.0002	0.0008	0.0002	0.0002
141	Third Party	2004/02525	32430/040406	2004	0.0007	0.0003	0.0008	0.0007	0.0002	0.0011	0.0002	0.0007	0.0002	0.0010	0.0002	0.0002
142	ABP	2004/02526	32430/040406	2004	0.0009	0.0004	0.0010	0.0008	0.0002	0.0013	0.0002	0.0009	0.0003	0.0012	0.0002	0.0002
80	ABP	2007/02179	33662/070418	2007	0.0005	0.0005	0.0006	0.0006	0.0003	0.0007	0.0003	0.0006	0.0003	0.0007	0.0003	0.0003
81	ABP	2007/02180	33662/070418	2007	0.0010	0.0005	0.0011	0.0009	0.0004	0.0013	0.0004	0.0011	0.0004	0.0016	0.0004	0.0003
82	Third Party	2007/02181	33662/070418	2007	0.0008	0.0005	0.0009	0.0007	0.0003	0.0010	0.0003	0.0008	0.0003	0.0011	0.0003	0.0003
83	Third Party	2007/02182	33662/070418	2007	0.0010	0.0005	0.0011	0.0009	0.0003	0.0011	0.0003	0.0009	0.0003	0.0012	0.0003	0.0003
84	Third Party	2007/02183	33662/070418	2007	0.0013	0.0006	0.0015	0.0012	0.0004	0.0017	0.0004	0.0013	0.0004	0.0018	0.0004	0.0003
85	ABP	2007/02184	33662/070418	2007	0.0006	0.0005	0.0007	0.0006	0.0003	0.0007	0.0003	0.0006	0.0003	0.0007	0.0003	0.0003
57	ABP	2008/00301	33922/080116	2008	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
70	ABP	2008/01556	34003/080404	2008	0.0064	0.0002	0.0049	0.0028	0.0019	0.0130	0.0042	0.0110	0.0035	0.0140	0.0014	0.0015
72	ABP	2008/01558	34003/080404	2008	0.0005	0.0002	0.0008	0.0006	0.0002	0.0006	0.0002	0.0004	0.0002	0.0004	0.0002	0.0002
13	ABP	2009/00785	34319/090127	2009	0.0005	0.0002	0.0005	0.0004	0.0002	0.0005	0.0002	0.0005	0.0002	0.0006	0.0002	0.0002
15	ABP	2009/00787	34319/090127	2009	0.0003	0.0002	0.0003	0.0002	0.0002	0.0003	0.0002	0.0003	0.0002	0.0003	0.0002	0.0002
17	ABP	2009/00789	34319/090127	2009	0.0004	0.0002	0.0004	0.0003	0.0002	0.0003	0.0002	0.0003	0.0002	0.0004	0.0002	0.0002
20	ABP	2009/00792	34319/090127	2009	0.0007	0.0002	0.0007	0.0006	0.0002	0.0007	0.0002	0.0005	0.0002	0.0007	0.0002	0.0002
23	ABP	2009/00797	34302/090114	2009	0.0009	0.0002	0.0009	0.0008	0.0002	0.0010	0.0002	0.0009	0.0003	0.0011	0.0002	0.0002
48	ABP	2009/01605	34354/090305	2009	0.0051	0.0009	0.0042	0.0030	0.0011	0.0092	0.0018	0.0088	0.0028	0.0100	0.0002	0.0009
52	ABP	2009/01610	34354/090305	2009	0.0022	0.0005	0.0021	0.0017	0.0005	0.0024	0.0004	0.0023	0.0006	0.0027	0.0003	0.0003
53	ABP	2009/01611	34354/090305	2009	0.0687	0.0120	0.0782	0.0495	0.0130	0.0810	0.0100	0.0731	0.0120	0.0717	0.0080	0.0066



Polychlorinated Biphenyl Results: River Test Berths and Channel

Report Sample Number	Operator	SampleID (LSN)	DAS	Year Sampled	CB#170	CB#18	CB#180	CB#183	CB#187	CB#194	CB#28	CB#31	CB#44	CB#47	CB#49	CB#52
173	Third Party	2001/01402	31157/001019	2001	0.0000	0.0000	0.0004	0.0000	0.0000	0.0000	0.0003	0.0003	0.0002	0.0000	0.0002	0.0004
174	Third Party	2001/01403	31157/001019	2001	0.0005	0.0005	0.0012	0.0003	0.0007	0.0002	0.0013	0.0007	0.0006	0.0002	0.0012	0.0010
176	ABP	2001/01406	31157/001019	2001	0.0000	0.0000	0.0004	0.0000	0.0000	0.0000	0.0004	0.0003	0.0002	0.0000	0.0003	0.0004
185	Third Party	2001/00350	31225/010124	2001	0.0013	0.0002	0.0024	0.0006	0.0011	0.0004	0.0013	0.0007	0.0007	0.0003	0.0007	0.0011
186	Third Party	2001/00351	31225/010124	2001	0.0012	0.0000	0.0020	0.0005	0.0010	0.0004	0.0010	0.0005	0.0005	0.0000	0.0006	0.0007
187	Third Party	2001/00352	31225/010124	2001	0.0010	0.0000	0.0017	0.0004	0.0008	0.0003	0.0009	0.0005	0.0004	0.0000	0.0004	0.0006
188	Third Party	2001/00353	31225/010124	2001	0.0010	0.0000	0.0021	0.0005	0.0011	0.0003	0.0010	0.0005	0.0006	0.0000	0.0050	0.0007
189	Third Party	2001/00354	31225/010124	2001	0.0003	0.0000	0.0010	0.0000	0.0005	0.0000	0.0012	0.0007	0.0006	0.0000	0.0012	0.0008
190	Third Party	2001/00355	31225/010124	2001	0.0004	0.0000	0.0010	0.0000	0.0005	0.0000	0.0008	0.0004	0.0004	0.0000	0.0004	0.0005
191	Third Party	2001/00356	31225/010124	2001	0.0005	0.0000	0.0013	0.0003	0.0007	0.0000	0.0006	0.0000	0.0004	0.0000	0.0004	0.0005
192	Third Party	2001/00357	31225/010124	2001	0.0003	0.0000	0.0010	0.0000	0.0005	0.0000	0.0009	0.0005	0.0005	0.0000	0.0000	0.0006
193	Third Party	2001/00358	31225/010124	2001	0.0006	0.0000	0.0140	0.0003	0.0007	0.0000	0.0009	0.0050	0.0006	0.0000	0.0005	0.0008
194	Third Party	2001/00359	31225/010124	2001	0.0004	0.0000	0.0010	0.0000	0.0005	0.0000	0.0009	0.0005	0.0005	0.0000	0.0006	0.0005
135	Third Party	2004/02498	32350/040108	2004	0.0002	0.0200	0.0002	0.0002	0.0002	0.0003	0.0230	0.0230	0.0100	0.0034	0.0100	0.0110
136	Third Party	2004/02499	32350/040108	2004	0.0019	0.0120	0.0036	0.0009	0.0018	0.0009	0.0180	0.0150	0.0087	0.0016	0.0096	0.0110
137	Third Party	2004/02500	32350/040108	2004	0.0002	0.0210	0.0002	0.0002	0.0002	0.0002	0.0210	0.0210	0.0002	0.0027	0.0083	0.0090
138	ABP	2004/02522	32430/040406	2004	0.0002	0.0002	0.0006	0.0002	0.0003	0.0002	0.0004	0.0002	0.0002	0.0002	0.0009	0.0003
139	Third Party	2004/02523	32430/040406	2004	0.0004	0.0002	0.0009	0.0002	0.0005	0.0002	0.0005	0.0003	0.0003	0.0002	0.0009	0.0005
140	Third Party	2004/02524	32430/040406	2004	0.0002	0.0005	0.0005	0.0002	0.0003	0.0002	0.0008	0.0006	0.0004	0.0002	0.0012	0.0006
141	Third Party	2004/02525	32430/040406	2004	0.0003	0.0002	0.0007	0.0002	0.0004	0.0002	0.0004	0.0003	0.0003	0.0002	0.0003	0.0005
142	ABP	2004/02526	32430/040406	2004	0.0003	0.0003	0.0008	0.0002	0.0004	0.0002	0.0005	0.0004	0.0004	0.0002	0.0007	0.0006
80	ABP	2007/02179	33662/070418	2007	0.0003	0.0002	0.0005	0.0002	0.0002	0.0002	0.0005	0.0004	0.0003	0.0002	0.0003	0.0003
81	ABP	2007/02180	33662/070418	2007	0.0006	0.0003	0.0012	0.0003	0.0006	0.0003	0.0007	0.0005	0.0004	0.0003	0.0005	0.0006
82	Third Party	2007/02181	33662/070418	2007	0.0004	0.0003	0.0007	0.0002	0.0004	0.0002	0.0006	0.0005	0.0004	0.0003	0.0004	0.0005
83	Third Party	2007/02182	33662/070418	2007	0.0004	0.0011	0.0007	0.0002	0.0004	0.0002	0.0013	0.0011	0.0008	0.0004	0.0011	0.0011
84	Third Party	2007/02183	33662/070418	2007	0.0006	0.0008	0.0012	0.0003	0.0007	0.0003	0.0010	0.0009	0.0007	0.0004	0.0008	0.0009
85	ABP	2007/02184	33662/070418	2007	0.0003	0.0002	0.0005	0.0002	0.0003	0.0002	0.0005	0.0005	0.0003	0.0002	0.0003	0.0003
57	ABP	2008/00301	33922/080116	2008	0.0002	0.0002	0.0002	0.0002	0.0007	0.0002	0.0003	0.0003	0.0002	0.0002	0.0002	0.0003
70	ABP	2008/01556	34003/080404	2008	0.0062	0.0006	0.0100	0.0027	0.0041	0.0013	0.0010	0.0009	0.0008	0.0003	0.0009	0.0014
72	ABP	2008/01558	34003/080404	2008	0.0002	0.0045	0.0002	0.0002	0.0002	0.0002	0.0048	0.0048	0.0019	0.0007	0.0022	0.0019
13	ABP	2009/00785	34319/090127	2009	0.0002	0.0003	0.0003	0.0002	0.0003	0.0002	0.0005	0.0004	0.0003	0.0002	0.0003	0.0004
15	ABP	2009/00787	34319/090127	2009	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0004	0.0003	0.0002	0.0002	0.0004	0.0003
17	ABP	2009/00789	34319/090127	2009	0.0002	0.0005	0.0002	0.0002	0.0002	0.0002	0.0007	0.0006	0.0003	0.0002	0.0004	0.0005
20	ABP	2009/00792	34319/090127	2009	0.0002	0.0003	0.0003	0.0002	0.0002	0.0002	0.0006	0.0005	0.0003	0.0002	0.0005	0.0005
23	ABP	2009/00797	34302/090114	2009	0.0003	0.0015	0.0007	0.0002	0.0005	0.0003	0.0023	0.0021	0.0009	0.0005	0.0012	0.0014
48	ABP	2009/01605	34354/090305	2009	0.0041	0.0016	0.0084	0.0017	0.0046	0.0019	0.0025	0.0017	0.0016	0.0008	0.0021	0.0028
52	ABP	2009/01610	34354/090305	2009	0.0009	0.0015	0.0017	0.0003	0.0010	0.0005	0.0022	0.0014	0.0012	0.0006	0.0015	0.0017
53	ABP	2009/01611	34354/090305	2009	0.0130	0.0029	0.0331	0.0053	0.0130	0.0051	0.0052	0.0040	0.0099	0.0043	0.0190	0.0475

Polychlorinated Biphenyl Results: River Test Berths and Channel

Report Sample Number	Operator	SampleID (LSN)	DAS	Year Sampled	CB#66	TOT25CBS	TOTICES7	AHCH	GHCH	HCB	DIELDRIN	PPDDE	PPDDT	PPTDE
173	Third Party	2001/01402	31157/001019	2001	0.0005	0.0000	0.0030	0.0003	0.0003	0.0000	0.0015	0.0000	0.0035	0.0010
174	Third Party	2001/01403	31157/001019	2001	0.0015	0.0218	0.0099	0.0000	0.0003	0.0005	0.0009	0.0007	0.0044	0.0012
176	ABP	2001/01406	31157/001019	2001	0.0004	0.0057	0.0029	0.0000	0.0004	0.0002	0.0016	0.0004	0.0000	0.0009
185	Third Party	2001/00350	31225/010124	2001	0.0014	0.0313	0.0143	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
186	Third Party	2001/00351	31225/010124	2001	0.0012	0.0262	0.0118	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
187	Third Party	2001/00352	31225/010124	2001	0.0010	0.0224	0.0103	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
188	Third Party	2001/00353	31225/010124	2001	0.0015	0.0333	0.0140	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
189	Third Party	2001/00354	31225/010124	2001	0.0010	0.0170	0.0087	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
190	Third Party	2001/00355	31225/010124	2001	0.0010	0.0151	0.0079	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
191	Third Party	2001/00356	31225/010124	2001	0.0009	0.0161	0.0082	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
192	Third Party	2001/00357	31225/010124	2001	0.0008	0.0129	0.0072	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
193	Third Party	2001/00358	31225/010124	2001	0.0012	0.0381	0.0228	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
194	Third Party	2001/00359	31225/010124	2001	0.0008	0.0146	0.0076	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
135	Third Party	2004/02498	32350/040108	2004	0.0002	0.1063	0.0376	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
136	Third Party	2004/02499	32350/040108	2004	0.0110	0.1561	0.0661	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
137	Third Party	2004/02500	32350/040108	2004	0.0002	0.0872	0.0325	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
138	ABP	2004/02522	32430/040406	2004	0.0004	0.0080	0.0042	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
139	Third Party	2004/02523	32430/040406	2004	0.0005	0.0111	0.0058	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
140	Third Party	2004/02524	32430/040406	2004	0.0005	0.0103	0.0050	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
141	Third Party	2004/02525	32430/040406	2004	0.0005	0.0089	0.0051	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
142	ABP	2004/02526	32430/040406	2004	0.0006	0.0118	0.0062	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
80	ABP	2007/02179	33662/070418	2007	0.0005	0.0091	0.0037	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
81	ABP	2007/02180	33662/070418	2007	0.0007	0.0163	0.0072	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
82	Third Party	2007/02181	33662/070418	2007	0.0005	0.0125	0.0054	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
83	Third Party	2007/02182	33662/070418	2007	0.0009	0.0177	0.0073	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
84	Third Party	2007/02183	33662/070418	2007	0.0009	0.0207	0.0091	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
85	ABP	2007/02184	33662/070418	2007	0.0005	0.0096	0.0039	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
57	ABP	2008/00301	33922/080116	2008	0.0002	0.0018	0.0009	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
70	ABP	2008/01556	34003/080404	2008	0.0002	0.0947	0.0486	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
72	ABP	2008/01558	34003/080404	2008	0.0013	0.0259	0.0091	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	ABP	2009/00785	34319/090127	2009	0.0003	0.0059	0.0031	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15	ABP	2009/00787	34319/090127	2009	0.0003	0.0038	0.0018	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	ABP	2009/00789	34319/090127	2009	0.0003	0.0056	0.0025	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
20	ABP	2009/00792	34319/090127	2009	0.0004	0.0077	0.0040	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
23	ABP	2009/00797	34302/090114	2009	0.0006	0.0184	0.0081	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
48	ABP	2009/01605	34354/090305	2009	0.0027	0.0843	0.0410	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
52	ABP	2009/01610	34354/090305	2009	0.0012	0.0315	0.0146	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
53	ABP	2009/01611	34354/090305	2009	0.0389	0.6849	0.3566	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A2.3  
Polycyclic Aromatic Hydrocarbon Results: River Test Berths and Channel

Report Sample Number	Operator	SampleID (LSN)	DAS	Year Sampled	23BA	ACENAPH	ACENAPT	ANTHRAC	BAA	BAP	BBF	BENZGHI	BEP	BKF	C1N	C1PHEN
173	Third Party	2001/01402	31157/001019	2001	0.0001	0.0001	0.0001	0.0100	0.0940	0.1580	0.1700	0.0730	0.1140	0.0890	0.0320	0.1060
174	Third Party	2001/01403	31157/001019	2001	0.0001	0.0001	0.0001	0.0720	0.3450	0.4230	0.4670	0.1640	0.3070	0.3750	0.0860	0.3630
176	ABP	2001/01406	31157/001019	2001	0.0001	0.0001	0.0001	0.0130	0.1040	0.1840	0.2180	0.1130	0.1570	0.1090	0.0310	0.0960
135	Third Party	2004/02498	32350/040108	2004	0.0000	0.0820	0.0750	0.4760	0.8880	1.8340	2.8850	0.6280	1.3820	1.1080	0.0860	0.8330
136	Third Party	2004/02499	32350/040108	2004	0.0000	0.0440	0.0470	0.2920	0.6680	1.2130	1.9670	0.4810	0.9980	0.7980	0.0560	0.5020
137	Third Party	2004/02500	32350/040108	2004	0.0000	0.0640	0.0630	0.3670	0.6530	1.6940	2.6080	0.5920	1.2830	1.0660	0.0720	0.5710
138	ABP	2004/02522	32430/040406	2004	0.0000	0.0062	0.0053	0.0210	0.0670	0.1690	0.3610	0.1020	0.1890	0.1250	0.0230	0.0910
139	Third Party	2004/02523	32430/040406	2004	0.0000	0.0100	0.0120	0.0270	0.1720	0.3090	0.5910	0.2810	0.2430	0.1940	0.0550	0.1400
140	Third Party	2004/02524	32430/040406	2004	0.0000	0.0050	0.0190	0.0220	0.0700	0.1850	0.3070	0.0091	0.1830	0.1110	0.0350	0.0770
141	Third Party	2004/02525	32430/040406	2004	0.0000	0.0046	0.0110	0.0280	0.1190	0.2730	0.4310	0.1340	0.2650	0.1570	0.0400	0.1200
142	ABP	2004/02526	32430/040406	2004	0.0000	0.0085	0.0120	0.0700	0.1670	0.3770	0.5770	0.1680	0.3500	0.2210	0.0700	0.2230
104	ABP	2005/01404	32796/050215	2005	0.0000	0.0033	0.0049	0.0240	0.0930	0.1540	0.2790	0.0970	0.1200	0.0900	0.0190	0.0920
80	ABP	2007/02179	33662/070418	2007	0.0000	0.0044	0.0087	0.0210	0.0680	0.1580	0.3120	0.0850	0.1360	0.1050	0.0250	0.0940
81	ABP	2007/02180	33662/070418	2007	0.0000	0.0085	0.0110	0.0390	0.1000	0.3050	0.5450	0.1490	0.2190	0.1860	0.0270	0.1220
82	Third Party	2007/02181	33662/070418	2007	0.0000	0.0040	0.0059	0.0230	0.1130	0.1800	0.3240	0.0980	0.1240	0.1140	0.0170	0.0810
83	Third Party	2007/02182	33662/070418	2007	0.0000	0.0066	0.0043	0.0200	0.0780	0.1660	0.2980	0.0840	0.1110	0.0960	0.0110	0.0510
84	Third Party	2007/02183	33662/070418	2007	0.0000	0.0110	0.0170	0.0840	0.3360	0.5110	0.7630	0.2130	0.2800	0.2900	0.0540	0.2430
85	ABP	2007/02184	33662/070418	2007	0.0000	0.0035	0.0030	0.0220	0.0860	0.1530	0.2560	0.0770	0.1000	0.0900	0.0170	0.0710
57	ABP	2008/00301	33922/080116	2008	0.0000	0.0019	0.0054	0.0150	0.0390	0.0730	0.1300	0.0430	0.0570	0.0420	0.0130	0.0420
64	ABP	2008/01550	34003/080404	2008	0.0000	0.0045	0.0063	0.0280	0.0530	0.1030	0.2010	0.0880	0.0850	0.0690	0.0250	0.0990
65	ABP	2008/01551	34003/080404	2008	0.0000	0.0048	0.0083	0.0240	0.0700	0.1290	0.2250	0.0970	0.1010	0.0820	0.0270	0.1170
66	ABP	2008/01552	34003/080404	2008	0.0000	0.0034	0.0060	0.0220	0.0770	0.1460	0.1390	0.0950	0.0690	0.0510	0.0053	0.0460
67	ABP	2008/01553	34003/080404	2008	0.0000	0.0001	0.0004	0.0006	0.0018	0.0027	0.0036	0.0045	0.0011	0.0016	0.0003	0.0028
68	ABP	2008/01554	34003/080404	2008	0.0000	0.0014	0.0057	0.0100	0.0440	0.0660	0.0640	0.0410	0.0310	0.0250	0.0025	0.0300
70	ABP	2008/01556	34003/080404	2008	0.0000	0.0080	0.0200	0.0360	0.1730	0.2670	0.2500	0.0680	0.1250	0.0960	0.0069	0.0770
71	ABP	2008/01557	34003/080404	2008	0.0000	0.0041	0.0360	0.0480	0.1310	0.1640	0.1600	0.0930	0.0760	0.0590	0.0086	0.1000
72	ABP	2008/01558	34003/080404	2008	0.0000	0.0026	0.0046	0.0150	0.0690	0.1310	0.1130	0.0730	0.0570	0.0450	0.0035	0.0490
73	ABP	2008/01559	34003/080404	2008	0.0000	0.0043	0.0110	0.0220	0.0910	0.1370	0.1460	0.0910	0.0700	0.0580	0.0079	0.0610
13	ABP	2009/00785	34319/090127	2009	0.0000	0.0112	0.0354	0.1582	0.2915	0.2750	0.2363	0.2343	0.1717	0.1933	0.0556	0.3664
15	ABP	2009/00787	34319/090127	2009	0.0000	0.0100	0.0062	0.0478	0.1485	0.1611	0.1495	0.1384	0.1062	0.1069	0.0063	0.1360
17	ABP	2009/00789	34319/090127	2009	0.0000	0.0086	0.0046	0.0200	0.0187	0.0608	0.0624	0.0388	0.0387	0.0531	0.0085	0.0377
20	ABP	2009/00792	34319/090127	2009	0.0000	0.0145	0.0204	0.0462	0.1052	0.1602	0.1255	0.1570	0.1208	0.1453	0.0266	0.1161
23	ABP	2009/00797	34302/090114	2009	0.0000	0.0091	0.0071	0.0391	0.0928	0.1393	0.1053	0.1505	0.1182	0.1033	0.0196	0.1632
27	ABP	2009/00801	34302/090114	2009	0.0000	0.0142	0.0123	0.0480	0.0888	0.1504	0.1858	0.1277	0.1148	0.1075	0.0350	0.1571
43	ABP	2009/01600	34354/090305	2009	0.0000	0.0975	0.3247	0.6547	1.5204	1.3276	1.7972	0.6327	0.7870	0.7622	0.2075	2.2305
46	ABP	2009/01603	34354/090305	2009	0.0000	0.0265	0.1878	0.3677	1.3586	1.5971	2.2785	0.9222	1.0598	0.9416	0.1130	0.9186
48	ABP	2009/01605	34354/090305	2009	0.0000	0.0546	1.4346	0.7500	1.7285	2.0809	3.0014	1.0293	1.4045	1.2045	1.0983	2.3016
52	ABP	2009/01610	34354/090305	2009	0.0000	0.0087	0.0284	0.0460	0.1369	0.2813	0.3587	0.1714	0.1883	0.1238	0.0383	0.1774
1	ABP	2010/01527	34901/100716	2010	0.0000	0.0001	0.0001	0.0291	0.0980	0.1374	0.2271	0.1044	0.1097	0.0940	0.0001	0.1141
2	ABP	2010/01528	34901/100716	2010	0.0000	0.0001	0.0086	0.0282	0.1027	0.1304	0.2347	0.1005	0.1134	0.1007	0.0260	0.1035
3	Third Party	2010/01529	34901/100716	2010	0.0000	0.0001	0.0122	0.0378	0.1399	0.1733	0.2699	0.1051	0.1274	0.1260	0.0001	0.1243
4	Third Party	2010/01530	34901/100716	2010	0.0000	0.0001	0.0145	0.0492	0.1746	0.2315	0.3570	0.1424	0.1571	0.1389	0.0001	0.1425
5	Third Party	2010/01531	34901/100716	2010	0.0000	0.0001	0.0001	0.0237	0.1039	0.1216	0.1881	0.0887	0.0920	0.0726	0.0001	0.1277
215	ABP	2011/01112	MLA2011/00053	2011	0.0000	0.0055	0.0053	0.0214	0.0667	0.0931	0.1495	0.0885	0.0811	0.0711	0.0256	0.0916
216	ABP	2011/01113	MLA2011/00053	2011	0.0000	0.0060	0.0060	0.0162	0.0773	0.1050	0.1655	0.1025	0.0904	0.0778	0.0268	0.0963
217	ABP	2011/01114	MLA2011/00053	2011	0.0000	0.0058	0.0083	0.0179	0.0882	0.1301	0.1809	0.1167	0.1009	0.0920	0.0231	0.0903
219	ABP	2011/01116	MLA2011/00053	2011	0.0000	0.0033	0.0048	0.0135	0.0445	0.0653	0.0868	0.0595	0.0558	0.0455	0.0192	0.0629
220	ABP	2011/01117	MLA2011/00053	2011	0.0000	0.0004	0.0014	0.0022	0.0153	0.0088	0.0136	0.0130	0.0069	0.0077	0.0016	0.0159
221	ABP	2011/01118	MLA2011/00053	2011	0.0000	0.0114	0.0249	0.0443	0.1787	0.2786	0.3397	0.2198	0.1949	0.1850	0.0318	0.1753
222	ABP	2011/01119	MLA2011/00053	2011	0.0000	0.0036	0.0038	0.0128	0.0539	0.0755	0.1157	0.0745	0.0659	0.0563	0.0233	0.0754
223	ABP	2011/01120	MLA2011/00053	2011	0.0000	0.0042	0.0035	0.0137	0.0572	0.0775	0.1255	0.0734	0.0652	0.0568	0.0257	0.0980

Polycyclic Aromatic Hydrocarbon Results: River Test Berths and Channel

Report Sample Number	Operator	SampleID (LSN)	DAS	Year Sampled	C2N	C3N	CHRYSN	DBENZAH	FLUORAN	FLUOREN	INDPYR	NAPTH	PERYLEN	PHENANT	PYRENE	THC
173	Third Party	2001/01402	31157/001019	2001	0.0570	0.1230	0.0830	0.0170	0.1560	0.0001	0.0920	0.0120	0.0690	0.0420	0.1940	0
174	Third Party	2001/01403	31157/001019	2001	0.1120	0.2140	0.3180	0.0730	0.6340	0.0001	0.1470	0.0450	0.1420	0.1350	0.5890	0
176	ABP	2001/01406	31157/001019	2001	0.0420	0.0860	0.1140	0.0270	0.2030	0.0001	0.1350	0.0140	0.1720	0.0310	0.2710	0
135	Third Party	2004/02498	32350/040108	2004	0.1440	0.1100	1.0350	0.1590	1.4000	0.1210	0.6480	0.0960	0.6060	0.3580	9.1420	2003
136	Third Party	2004/02499	32350/040108	2004	0.1090	0.3760	0.7410	0.1080	1.1800	0.0840	0.4750	0.0640	0.4310	0.3360	5.1170	1358
137	Third Party	2004/02500	32350/040108	2004	0.1160	0.3980	0.8460	0.1440	1.2070	0.0950	0.5850	0.0750	0.5830	0.3480	7.0520	1727
138	ABP	2004/02522	32430/040406	2004	0.0480	0.1190	0.0780	0.0200	0.1390	0.0087	0.0960	0.0130	0.1340	0.0430	0.2390	231
139	Third Party	2004/02523	32430/040406	2004	0.0890	0.1890	0.1110	0.0620	0.2220	0.0130	0.3460	0.0300	0.2040	0.0630	0.3290	532
140	Third Party	2004/02524	32430/040406	2004	0.0420	0.0780	0.0790	0.0026	0.1700	0.0140	0.0110	0.0150	0.1240	0.0580	0.2860	493
141	Third Party	2004/02525	32430/040406	2004	0.0560	0.1100	0.1260	0.0450	0.2660	0.0130	0.1700	0.0150	0.1850	0.0720	0.3510	424
142	ABP	2004/02526	32430/040406	2004	0.0910	0.2180	0.1830	0.0570	0.4220	0.0160	0.2060	0.0240	0.2230	0.1030	0.5250	516
104	ABP	2005/01404	32796/050215	2005	0.0400	0.0980	0.1170	0.0280	0.1880	0.0073	0.1210	0.0120	0.1450	0.0460	0.3950	255
80	ABP	2007/02179	33662/070418	2007	0.0490	0.0990	0.0840	0.0260	0.1540	0.0110	0.0920	0.0150	0.1720	0.0490	0.2090	212
81	ABP	2007/02180	33662/070418	2007	0.0630	0.0880	0.0930	0.0430	0.2170	0.0130	0.1820	0.0200	0.2040	0.0730	0.4130	288
82	Third Party	2007/02181	33662/070418	2007	0.0280	0.0750	0.1040	0.0250	0.3150	0.0110	0.1240	0.0140	0.1630	0.0480	0.0470	282
83	Third Party	2007/02182	33662/070418	2007	0.0230	0.0440	0.0430	0.0240	0.1800	0.0096	0.1080	0.0120	0.1260	0.0320	0.3870	292
84	Third Party	2007/02183	33662/070418	2007	0.0940	0.1640	0.2580	0.0580	0.9260	0.0300	0.2650	0.0360	0.2750	0.1850	0.0640	489
85	ABP	2007/02184	33662/070418	2007	0.0240	0.0760	0.0680	0.0230	0.2320	0.0055	0.1020	0.0120	0.1340	0.0360	0.2250	242
57	ABP	2008/00301	33922/080116	2008	0.0310	0.0790	0.0320	0.0100	0.1020	0.0066	0.0450	0.0069	0.0540	0.0300	0.1330	99
64	ABP	2008/01550	34003/080404	2008	0.0640	0.0980	0.0440	0.0220	0.1500	0.0098	0.0950	0.0150	0.1510	0.0490	0.1940	260
65	ABP	2008/01551	34003/080404	2008	0.0680	0.1290	0.0620	0.0180	0.1860	0.0100	0.1050	0.0150	0.1160	0.0620	0.2110	211
66	ABP	2008/01552	34003/080404	2008	0.0290	0.0620	0.0620	0.0220	0.1930	0.0065	0.0940	0.0100	0.1210	0.0340	0.2030	226
67	ABP	2008/01553	34003/080404	2008	0.0019	0.0075	0.0032	0.0006	0.0051	0.0006	0.0055	0.0010	0.0210	0.0013	0.0088	88
68	ABP	2008/01554	34003/080404	2008	0.0087	0.0320	0.0450	0.0097	0.1020	0.0039	0.0490	0.0048	0.0600	0.0230	0.1210	170
70	ABP	2008/01556	34003/080404	2008	0.0330	0.1250	0.1630	0.0410	0.3740	0.0230	0.1780	0.0250	0.1740	0.0710	0.3750	374
71	ABP	2008/01557	34003/080404	2008	0.0410	0.0990	0.1270	0.0220	0.3420	0.0260	0.0920	0.0270	0.1390	0.1050	0.3190	426
72	ABP	2008/01558	34003/080404	2008	0.0180	0.0690	0.0630	0.0180	0.1520	0.0068	0.0770	0.0087	0.1030	0.0310	0.1760	223
73	ABP	2008/01559	34003/080404	2008	0.0270	0.1440	0.0710	0.0240	0.1890	0.0150	0.0940	0.0200	0.1710	0.0330	0.2500	358
13	ABP	2009/00785	34319/090127	2009	0.1410	0.4041	0.3091	0.0511	0.6413	0.0342	0.2899	0.0263	0.1381	0.2641	0.5685	467
15	ABP	2009/00787	34319/090127	2009	0.0302	0.1100	0.1523	0.0247	0.3669	0.0069	0.1540	0.0078	0.0679	0.0478	0.3634	295
17	ABP	2009/00789	34319/090127	2009	0.0162	0.0307	0.0266	0.0111	0.0412	0.0039	0.0526	0.0069	0.0387	0.0118	0.2321	194
20	ABP	2009/00792	34319/090127	2009	0.0501	0.0821	0.1170	0.0524	0.2440	0.0095	0.2229	0.0203	0.1241	0.0596	0.2564	347
23	ABP	2009/00797	34302/090114	2009	0.0598	0.0693	0.1078	0.0482	0.1442	0.0092	0.1666	0.0192	0.1395	0.0610	0.1828	313
27	ABP	2009/00801	34302/090114	2009	0.1120	0.1662	0.0928	0.0350	0.1831	0.0145	0.1558	0.0157	0.1490	0.0435	0.2211	344
43	ABP	2009/01600	34354/090305	2009	2.2882	5.0406	1.5368	0.2802	3.6797	0.2560	0.8375	0.2130	0.5911	1.5747	4.2708	1792
46	ABP	2009/01603	34354/090305	2009	0.2401	0.5324	1.0794	0.3312	2.7184	0.1683	1.1456	0.0892	0.5220	1.0875	3.4767	1325
48	ABP	2009/01605	34354/090305	2009	1.5813	1.7568	1.6874	0.3031	7.0507	1.6750	1.2258	0.2694	0.5597	6.7036	7.0251	1802
52	ABP	2009/01610	34354/090305	2009	0.1283	0.2409	0.1321	0.0530	0.3612	0.0321	0.1839	0.0304	0.3069	0.1686	0.7383	423
1	ABP	2010/01527	34901/100716	2010	0.0001	0.0001	0.0800	0.0198	0.2216	0.0001	0.1082	0.0001	0.1334	0.0620	0.2782	384
2	ABP	2010/01528	34901/100716	2010	0.0001	0.0001	0.0530	0.0225	0.2331	0.0001	0.1155	0.0140	0.1479	0.0671	0.2852	408
3	Third Party	2010/01529	34901/100716	2010	0.0001	0.0001	0.0880	0.0250	0.2547	0.0001	0.1230	0.0001	0.1611	0.0743	0.3339	417
4	Third Party	2010/01530	34901/100716	2010	0.0001	0.0001	0.0913	0.0411	0.3045	0.0001	0.1736	0.0001	0.1757	0.0978	0.4447	484
5	Third Party	2010/01531	34901/100716	2010	0.0001	0.0001	0.0733	0.0198	0.2023	0.0001	0.1125	0.0001	0.1323	0.0634	0.2490	453
215	ABP	2011/01112	MLA2011/00053	2011	0.0487	0.0947	0.0431	0.0151	0.1522	0.0072	0.1042	0.0142	0.1311	0.0325	0.1623	307
216	ABP	2011/01113	MLA2011/00053	2011	0.0550	0.1079	0.0538	0.0163	0.1678	0.0086	0.1163	0.0143	0.1198	0.0380	0.1798	308
217	ABP	2011/01114	MLA2011/00053	2011	0.0511	0.0867	0.0670	0.0195	0.2134	0.0091	0.1348	0.0149	0.1225	0.0473	0.1983	306
219	ABP	2011/01116	MLA2011/00053	2011	0.0378	0.0721	0.0272	0.0097	0.0887	0.0059	0.0704	0.0105	0.1525	0.0255	0.1556	252
220	ABP	2011/01117	MLA2011/00053	2011	0.0047	0.0166	0.0041	0.0012	0.0249	0.0013	0.0160	0.0013	0.0209	0.0049	0.0346	81
221	ABP	2011/01118	MLA2011/00053	2011	0.0594	0.1286	0.1368	0.0392	0.4065	0.0248	0.2510	0.0208	0.1439	0.1042	0.4057	422
222	ABP	2011/01119	MLA2011/00053	2011	0.0535	0.1174	0.0338	0.0121	0.1107	0.0063	0.0877	0.0105	0.1192	0.0239	0.1209	278
223	ABP	2011/01120	MLA2011/00053	2011	0.0490	0.1276	0.0396	0.0115	0.1079	0.0059	0.0880	0.0117	0.1296	0.0254	0.1180	280

## A2.2 River Itchen

Table A3.1  
Metals and Tin Results: River Itchen Berths and Channel

Report Sample Number	Operator	SampleID (LSN)	DAS	Year Sampled	AS	CD	CR	CU	PB	HG	NI	ZN	DBT	TBT
153	Third Party	2001/00033	30144/001127	2001	5.1	0.04	11	8.5	8.9	0.04	6.4	23	0.0470	0.0770
154	Third Party	2001/00034	30144/001127	2001	8.4	0.06	17	12	11	0.06	11	32	0.0420	0.1440
155	Third Party	2001/00035	30144/001127	2001	6.1	0.04	10	8.8	8.8	0.04	5.3	24	0.0340	0.0960
156	Third Party	2001/00036	30144/001127	2001	8.9	0.05	13	11	11	0.05	6.9	31	0.0370	0.1230
157	Third Party	2001/00037	30144/001127	2001	4.3	0.05	14	13	12	0.05	7	33	0.0360	0.1190
177	Third Party	2001/01596	30962/010212	2001	0	0	0	0	0	0	0	0	0.0440	0.1530
178	Third Party	2001/01598	30962/010212	2001	0	0	0	0	0	0	0	0	0.0510	0.2040
208	Third Party	2001/01594	30962/010212	2001	0	0	0	0	0	0	0	0	0.0010	0.0010
209	Third Party	2001/01595	30962/010212	2001	0	0	0	0	0	0	0	0	0.0700	0.2070
210	Third Party	2001/01597	30962/010212	2001	0	0	0	0	0	0	0	0	0.0380	0.1210
125	Third Party	2004/02232	32345/040106	2004	0	0	0	0	0	0	0	0	0.0685	0.0196
126	ABP	2004/02233	32345/040106	2004	7.6	0.05	20	20	18	0.07	9.8	47	0.0653	0.1828
92	Third Party	2005/00983	32791/050207	2005	27	0.09	32	7.9	14	0.04	20	47	0.0020	0.0020
93	Third Party	2005/00985	32791/050207	2005	33	0.1	37	9.3	16	0.07	23	51	0.0020	0.0020
94	Third Party	2005/00986	32791/050207	2005	19	0.11	21	7	11	0.01	17	46	0.0020	0.0020
95	ABP	2005/01395	32796/050215	2005	21	0.12	48	49	37	0.16	24	116	0.0228	0.0791
96	ABP	2005/01396	32796/050215	2005	20	0.11	39	42	31	0.16	20	97	0.0237	0.0517
97	ABP	2005/01397	32796/050215	2005	30	0.12	67	60	49	0.11	32	150	0.0241	0.0588
98	ABP	2005/01398	32796/050215	2005	24	0.14	56	55	44	0.13	27	128	0.0306	0.0733
99	ABP	2005/01399	32796/050215	2005	0	0	0	0	0	0	0	0	0.0000	0.0000
114	Third Party	2005/05728	33073/050922	2005	30	0.12	32	77	55	0.06	29	168	0.0480	0.0769
115	Third Party	2005/05729	33073/050922	2005	24	0.15	28	75	52	0.03	26	165	0.0593	0.0853
116	Third Party	2005/05730	33073/050922	2005	24	0.16	31	73	55	0.11	25	155	0.0656	0.0935
117	Third Party	2005/05732	33022/050804	2005	22	0.44	27	131	107	0.54	34	372	0.1947	0.2196
118	Third Party	2005/05733	33022/050804	2005	24	0.46	27	107	95	0.31	34	323	0.2364	0.1493
119	Third Party	2005/05734	33022/050804	2005	18	0.52	30	109	104	0.12	30	282	0.2994	0.1638
120	Third Party	2005/05735	33022/050804	2005	19	0.51	30	110	100	0.29	30	287	0.3280	0.2339
121	Third Party	2005/05737	33072/050922	2005	14	0.23	20	62	73	0.36	21	179	0.0832	0.1482
122	Third Party	2005/05738	33072/050922	2005	19	0.39	32	101	92	0.94	28	249	0.1886	0.2042
123	Third Party	2005/05739	33072/050922	2005	17	0.5	23	108	100	0.31	25	267	0.2455	0.2462
124	Third Party	2005/05015	33050/050902	2005	28	0.12	31	9.4	15	0.01	19	55	0.0000	0.0000
60	ABP	2008/01546	34003/080404	2008	18	0.16	30	47	38	0.2	18	119	0.0325	0.0668
62	ABP	2008/01548	34003/080404	2008	19	0.11	22	28	30	0.18	16	79	0.0117	0.0409
63	ABP	2008/01549	34003/080404	2008	19	0.13	22	43	37	0.24	16	97	0.0272	0.0509
74	ABP	2008/01677	34067/080603	2008	23	0.06	44	56	45	0.24	26	136	0.0261	0.0735
75	Third Party	2008/01678	34067/080603	2008	23	0.05	36	62	49	0.26	25	138	0.0569	0.0664
76	Third Party	2008/01679	34067/080603	2008	24	0.06	44	60	49	0.4	28	144	0.0364	0.0434
77	Third Party	2008/01808	34063/080530	2008	21	0.43	45	78	151	0.78	26	195	0.0452	0.0873
78	Third Party	2008/01809	34063/080530	2008	19	0.58	42	142	127	1	24	232	0.0612	0.1746
79	Third Party	2008/01810	34063/080530	2008	19	0.53	38	82	80	0.54	22	206	0.0812	0.0919
6	Third Party	2009/00235	34254/081119	2009	26	0.08	18	7.1	13	0.05	14	40	0.0060	0.1060
7	Third Party	2009/00236	34254/081119	2009	24	0.07	15	6.4	12	0.03	13	34	0.0020	0.0030
8	Third Party	2009/00237	34254/081119	2009	26	0.14	17	6.6	12	0.02	13	39	0.0010	0.0010
179	Third Party	2011/00168	35038/101224	2011	11	0.31	47	75	86	2.6	18	221	0.0733	0.0984
180	Third Party	2011/00169	35038/101224	2011	12	0.35	36	103	867	0.76	22	225	0.0548	0.0983
181	Third Party	2011/00170	35038/101224	2011	8.2	0.27	35	119	315	0.41	28	122	0.0462	0.0554
211	ABP	2011/01108	MLA2011/00053	2011	21	0.16	37	69	40	0.18	22	127	0.0220	0.0410
213	ABP	2011/01110	MLA2011/00053	2011	20	0.12	37	31	53	0.16	21	100	0.0020	0.0319
214	ABP	2011/01111	MLA2011/00053	2011	20	0.11	31	37	36	0.2	19	98	0.0217	0.0416
227	Third Party	2011/02730	MLA2011/00172	2011	16	0.41	43	74	72	0.28	25	192	0.0631	0.0770
228	Third Party	2011/02731	MLA2011/00172	2011	14	0.31	37	80	68	0.46	23	213	0.0751	0.0761
229	Third Party	2011/02732	MLA2011/00172	2011	16	0.64	44	95	104	1	26	242	0.0751	0.2503
230	Third Party	2011/02733	MLA2011/00171	2011	17	0.55	48	164	100	0.52	29	409	0.1019	0.1411
231	Third Party	2011/02734	MLA2011/00171	2011	14	0.28	31	106	178	3.4	21	212	0.0517	0.0954
232	Third Party	2011/02735	MLA2011/00171	2011	15	0.37	42	103	80	0.37	27	243	0.1154	0.1886
233	Third Party	2011/02736	MLA2011/00171	2011	13	0.35	41	171	483	0.63	26	367	0.0795	0.5465
237	Third Party	2011/03026	MLA2011/00173	2011	25	0.21	44	68	47	0.26	26	142	0.0000	0.0000
238	Third Party	2011/03027	MLA2011/00173	2011	20	0.18	41	64	46	0.24	24	137	0.0000	0.0000
239	Third Party	2011/03028	MLA2011/00173	2011	26	0.2	39	74	49	0.53	24	148	0.0000	0.0000
240	Third Party	2011/03029	MLA2011/00173	2011	0	0	0	0	0	0	0	0	0.0282	0.0535

Table A3.2  
Polychlorinated Biphenyl Results: River Itchen Berths and Channel

Report Sample Number	Operator	SampleID (LSN)	DAS	Year Sampled	CB#101	CB#105	CB#110	CB#118	CB#128	CB#138	CB#141	CB#149	CB#151	CB#153	CB#156	CB#158
63	ABP	2008/01549	34003/080404	2008	0.0005	0.0003	0.0009	0.0008	0.0002	0.0009	0.0002	0.0006	0.0002	0.0008	0.0002	0.0002
179	Third Party	2011/00168	35038/101224	2011	0.0024	0.0010	0.0026	0.0024	0.0006	0.0028	0.0004	0.0019	0.0005	0.0025	0.0004	0.0003
180	Third Party	2011/00169	35038/101224	2011	0.0020	0.0009	0.0022	0.0020	0.0005	0.0025	0.0004	0.0018	0.0005	0.0022	0.0003	0.0003
181	Third Party	2011/00170	35038/101224	2011	0.0019	0.0009	0.0020	0.0019	0.0005	0.0021	0.0003	0.0014	0.0004	0.0019	0.0003	0.0002

Report Sample Number	Operator	SampleID (LSN)	DAS	Year Sampled	CB#170	CB#18	CB#180	CB#183	CB#187	CB#194	CB#28	CB#31	CB#44	CB#47	CB#49	CB#52
63	ABP	2008/01549	34003/080404	2008	0.0003	0.0003	0.0005	0.0002	0.0003	0.0002	0.0005	0.0004	0.0004	0.0002	0.0005	0.0004
179	Third Party	2011/00168	35038/101224	2011	0.0006	0.0022	0.0012	0.0002	0.0005	0.0003	0.0035	0.0026	0.0015	0.0005	0.0014	0.0022
180	Third Party	2011/00169	35038/101224	2011	0.0006	0.0013	0.0011	0.0002	0.0004	0.0003	0.0022	0.0017	0.0010	0.0002	0.0009	0.0018
181	Third Party	2011/00170	35038/101224	2011	0.0005	0.0012	0.0009	0.0002	0.0004	0.0002	0.0019	0.0015	0.0010	0.0004	0.0009	0.0015

Report Sample Number	Operator	SampleID (LSN)	DAS	Year Sampled	CB#66	TOT25CBS	TOTICES7	AHCH	GHCH	HCB	DIELDRIN	PPDDE	PPDDT	PPTDE
63	ABP	2008/01549	34003/080404	2008	0.0004	0.0091	0.0044	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
179	Third Party	2011/00168	35038/101224	2011	0.0019	0.0360	0.0170	0.0000	0.0000	0.0003	0.0000	0.0012	0.0000	0.0000
180	Third Party	2011/00169	35038/101224	2011	0.0012	0.0279	0.0138	0.0000	0.0000	0.0002	0.0000	0.0009	0.0000	0.0000
181	Third Party	2011/00170	35038/101224	2011	0.0013	0.0252	0.0121	0.0000	0.0000	0.0002	0.0000	0.0008	0.0000	0.0000

Table A3.3  
Polycyclic Aromatic Hydrocarbon Results: River Itchen Berths and Channel

Report Sample Number	Operator	SampleID (LSN)	DAS	Year Sampled	23BA	ACENAPH	ACENAPT	ANTHRAC	BAA	BAP	BBF	BENZGHI	BEP	BKF	C1N	C1PHEN
125	Third Party	2004/02232	32345/040106	2004	0.0000	0.0230	0.0220	0.1480	1.2730	1.6840	1.7020	0.5740	1.0950	0.7470	0.0100	0.3000
126	ABP	2004/02233	32345/040106	2004	0.0000	0.0100	0.0110	0.0530	0.3170	0.5210	0.5660	0.1930	0.3720	0.2290	0.0420	0.1900
99	ABP	2005/01399	32796/050215	2005	0.0000	0.0053	0.0280	0.0380	0.1520	0.2190	0.3550	0.1210	0.1710	0.1170	0.0330	0.1540
60	ABP	2008/01546	34003/080404	2008	0.0000	0.0062	0.0270	0.0600	0.1270	0.2350	0.3320	0.1330	0.1520	0.1340	0.0440	0.0180
62	ABP	2008/01548	34003/080404	2008	0.0000	0.0069	0.0180	0.0540	0.0990	0.1560	0.2820	0.1010	0.1150	0.0880	0.0600	0.2170
63	ABP	2008/01549	34003/080404	2008	0.0000	0.0078	0.0140	0.0830	0.1210	0.2090	0.3460	0.1240	0.1640	0.1190	0.0430	0.1490
179	Third Party	2011/00168	35038/101224	2011	0.0000	0.0370	0.0529	0.3029	0.9725	1.0425	1.2489	0.7364	0.6380	0.5858	0.1363	0.7434
180	Third Party	2011/00169	35038/101224	2011	0.0000	0.0504	0.0775	0.3973	1.9250	2.2201	2.1224	1.2783	1.2801	1.1540	0.5601	1.5829
181	Third Party	2011/00170	35038/101224	2011	0.0000	0.0131	0.0404	0.0797	0.4021	0.4554	0.5781	0.3593	0.3150	0.2779	0.0692	0.3079
211	ABP	2011/01108	MLA2011/00053	2011	0.0000	0.0099	0.0107	0.0264	0.1183	0.1947	0.2674	0.1815	0.1530	0.1368	0.0395	0.1333
213	ABP	2011/01110	MLA2011/00053	2011	0.0000	0.0116	0.0104	0.0301	0.1349	0.2138	0.2227	0.1558	0.1428	0.1269	0.0388	0.1464
214	ABP	2011/01111	MLA2011/00053	2011	0.0000	0.0083	0.0079	0.0297	0.1252	0.1803	0.2736	0.1549	0.1412	0.1247	0.0338	0.1505

Report Sample Number	Operator	SampleID (LSN)	DAS	Year Sampled	C2N	C3N	CHRYSEN	DBENZAH	FLUORAN	FLUOREN	INDPYR	NAPTH	PERYLEN	PHENANT	PYRENE	THC
125	Third Party	2004/02232	32345/040106	2004	0.0680	0.5150	1.2260	0.1320	2.1860	0.1730	0.6400	0.0560	0.4890	0.3480	1.8200	805
126	ABP	2004/02233	32345/040106	2004	0.0600	0.1630	0.3110	0.0400	0.6020	0.0210	0.2100	0.0360	0.2860	0.1270	0.7030	459
99	ABP	2005/01399	32796/050215	2005	0.0590	0.1620	0.1670	0.0370	0.2960	0.0110	0.1490	0.0180	0.1850	0.0730	0.3290	368
60	ABP	2008/01546	34003/080404	2008	0.0860	0.2020	0.1430	0.0420	0.3070	0.0290	0.1400	0.0530	0.1360	0.1150	0.3980	371
62	ABP	2008/01548	34003/080404	2008	0.1260	0.2520	0.0860	0.0280	0.2220	0.0200	0.1000	0.0340	0.1400	0.0990	0.2590	254
63	ABP	2008/01549	34003/080404	2008	0.0830	0.1620	0.1220	0.0310	0.2950	0.0170	0.1410	0.0270	0.2020	0.1120	0.3170	321
179	Third Party	2011/00168	35038/101224	2011	0.2515	0.4913	0.7630	0.1590	2.0721	0.0866	0.8248	0.1226	0.3795	0.7143	1.6809	769
180	Third Party	2011/00169	35038/101224	2011	1.1173	1.6476	1.6077	0.3309	4.0976	0.1402	1.5507	0.2222	0.6824	1.2107	3.6592	1282
181	Third Party	2011/00170	35038/101224	2011	0.1901	0.3639	0.3341	0.0745	0.7970	0.0420	0.3953	0.0424	0.1914	0.2841	0.7000	466
211	ABP	2011/01108	MLA2011/00053	2011	0.0752	0.1355	0.0777	0.0288	0.2513	0.0134	0.2099	0.0225	0.1902	0.0560	0.3023	501
213	ABP	2011/01110	MLA2011/00053	2011	0.0664	0.1533	0.1033	0.0271	0.2608	0.0130	0.1852	0.0256	0.1663	0.0479	0.2726	419
214	ABP	2011/01111	MLA2011/00053	2011	0.0657	0.1459	0.0835	0.0272	0.2608	0.0109	0.1855	0.0186	0.1770	0.0508	0.2571	441

## A2.3 Southampton Water

Table A4.1  
Metals and Tin Results: Southampton Water

Report Sample Number	Operator	SampleID (LSN)	DAS	Year Sampled	AS	CD	CR	CU	PB	HG	NI	ZN	DBT	TBT
9	Third Party	2009/00467	34314/090123	2009	21	0.17	22	42	25	0.13	18	83	0.0077	0.0121
10	Third Party	2009/00468	34314/090123	2009	24	0.13	26	46	29	0.11	21	102	0.0040	0.0070
11	Third Party	2009/00469	34314/090123	2009	25	0.13	32	41	32	0.14	22	99	0.0107	0.0262
12	Third Party	2009/00470	34314/090123	2009	0	0	0	0	0	0	0	0	0.0000	0.0000
29	ABP	2009/00803	34302/090114	2009	16	0.1	21	33	26	0.12	15	91	0.0116	0.0261
36	ABP	2009/00811	34302/090114	2009	52	0.14	13	8.9	51	0.26	9.3	171	0.0020	0.0289
56	ABP	2009/03859	34523/090722	2009	22	0.19	59	59	46	0.35	28	133	0.0186	0.0376
61	ABP	2008/01547	34003/080404	2008	17	0.08	21	23	24	0.12	14	70	0.0100	0.0943
69	ABP	2008/01555	34003/080404	2008	15	0.12	16	25	23	0.34	13	67	0.0113	0.0207
89	ABP	2006/04322	33428/060731	2006	19	0.14	34	63	49	0.49	19	145	0.0030	0.0030
90	Third Party	2006/04323	33428/060731	2006	14	0.05	30	48	38	0.29	16	111	0.0030	0.0030
91	Third Party	2006/04324	33428/060731	2006	16	0.04	30	45	41	0.27	17	115	0.0030	0.0030
107	ABP	2005/01407	32796/050215	2005	17	0.09	35	33	24	0.05	19	85	0.0020	0.0591
108	ABP	2005/01408	32796/050215	2005	18	0.09	33	40	25	0.03	19	86	0.0207	0.0704
109	ABP	2005/01409	32796/050215	2005	18	0.09	34	33	24	0.03	19	83	0.0020	0.0481
110	ABP	2005/01411	32796/050215	2005	0	0	0	0	0	0	0	0	0.0000	0.0000
127	Third Party	2004/09750	32560/040729	2004	18	0.19	35	124	56	0.29	20	140	0.0615	0.1260
129	Third Party	2004/09752	32560/040729	2004	18	0.22	31	178	74	0.61	21	207	0.0604	0.0983
131	Third Party	2004/09754	32560/040729	2004	17	0.19	27	73	39	0.29	19	99	0.0428	0.0994
133	Third Party	2004/09756	32560/040729	2004	0	0	0	0	0	0	0	0	0.0000	0.0000
143	ABP	2004/02527	32430/040406	2004	8	0.06	20	17	17	0.07	8.6	38	0.0213	0.0638
144	ABP	2004/02528	32430/040406	2004	10	0.06	20	16	16	0.06	9.5	38	0.0023	0.0452
145	ABP	2004/02529	32430/040406	2004	9.5	0.05	21	17	16	0.06	9.4	36	0.0204	0.0553
146	ABP	2004/02530	32430/040406	2004	9.2	0.06	17	17	19	0.08	8.6	43	0.0197	0.0443
147	Third Party	2004/11695	32557/040726	2004	25	0.19	55	88	49	0.42	29	126	0.0434	0.1041
148	Third Party	2004/11696	32557/040726	2004	22	0.15	54	82	44	0.19	27	118	0.0387	0.1069
149	Third Party	2004/11697	32557/040726	2004	24	0.18	57	88	47	0.08	28	129	0.0526	0.1143
150	Third Party	2004/11698	32557/040726	2004	22	0.14	54	84	46	0.06	27	120	0.0466	0.1220
151	Third Party	2004/11699	32557/040726	2004	23	0.16	49	82	46	0.03	26	124	0.0438	0.1126
152	Third Party	2004/11700	32557/040726	2004	21	0.15	43	78	44	0.02	24	115	0.0356	0.1044
158	Third Party	2001/00040	30862/001127	2001	4.6	0.03	13	19	13	0.08	7.8	46	0.0470	0.1740
168	ABP	2001/01395	31157/001019	2001	18	0.04	26	15	35	1.1	7.1	61	0.0130	0.0450
169	Third Party	2001/01396	31157/001019	2001	15	0.14	54	47	58	0.26	23	120	0.0020	0.0050
170	Third Party	2001/01397	31157/001019	2001	28	0.17	65	71	68	0.33	26	145	0.0010	0.0020
175	ABP	2001/01404	31157/001019	2001	5.3	0.07	22	17	14	0.15	9.2	48	0.0240	0.0510
183	Third Party	2001/00038	30862/001127	2001	15	0.08	21	28	19	0.18	10	54	0.0520	0.1690
184	Third Party	2001/00039	30862/001127	2001	19	0.22	28	56	49	0.36	14	75	0.0280	0.0580
195	ABP	2001/01376	31157/001019	2001	8.2	0.07	29	13	13	0.05	13	43	0.0240	0.1630
196	Third Party	2001/01377	31157/001019	2001	7.5	0.08	23	19	16	2.8	7.6	46	0.0160	0.0510
197	ABP	2001/01378	31157/001019	2001	5.5	0.05	16	8.2	13	0.15	5.3	33	0.0110	0.0550



Metals and Tin Results: Southampton Water

Report Sample Number	Operator	SampleID (LSN)	DAS	Year Sampled	AS	CD	CR	CU	PB	HG	NI	ZN	DBT	TBT
198	Third Party	2001/01379	31157/001019	2001	8	0.12	21	26	13	0.17	9.3	57	0.0280	0.0670
199	ABP	2001/01380	31157/001019	2001	7.9	0.07	30	17	16	0.07	13	51	0.0350	0.1490
200	ABP	2001/01381	31157/001019	2001	6.9	0.09	23	16	17	0.1	8.4	54	0.0190	0.0580
207	ABP	2001/01405	31157/001019	2001	5.8	0.05	29	14	10	0.06	12	45	0.0250	0.1180
212	ABP	2011/01109	MLA2011/00053	2011	19	0.14	35	33	31	0.12	21	96	0.0030	0.0521
218	ABP	2011/01115	MLA2011/00053	2011	17	0.13	29	33	27	0.12	19	97	0.0030	0.1735
224	Third Party	2001/03627	31422/011116	2001	7.3	0.11	25	78	32	0.15	12	97	0.0660	0.1520
225	Third Party	2001/03628	31422/011116	2001	7.5	0.07	25	31	20	0.13	11	56	0.0510	0.1530
226	Third Party	2001/03629	31422/011116	2001	6.2	0.06	20	27	16	0.09	8.8	47	0.0430	0.1120
241	ABP	2009/00795	34302/090114	2009	44	0.12	17	15	19	0.05	16	91	0.0101	0.0551
243	ABP	2009/00805	34302/090114	2009	20	0.12	20	26	27	0.13	15	97	0.0229	0.0341
244	ABP	2009/00813	34302/090114	2009	15	0.11	17	28	21	0.1	13	70	0.0095	0.0313
247	Third Party	2009/01196	34401/090417	2009	18	0.16	25	35	22	0.13	14	69	0.0099	0.0209
248	ABP	2009/01197	34401/090417	2009	13	0.12	29	19	17	0.07	16	61	0.0020	0.0132
249	Third Party	2009/01198	34401/090417	2009	15	0.15	24	27	20	0.11	14	65	0.0020	0.0224
250	Third Party	2009/01199	34401/090417	2009	19	0.18	23	35	23	0.37	18	74	0.0132	0.0519
251	ABP	2009/01200	34401/090417	2009	11	0.11	31	19	16	0.05	16	74	0.0078	0.3226
252	ABP	2009/01201	34401/090417	2009	19	0.13	26	27	23	0.09	14	151	0.0319	0.9876
253	Third Party	2009/01202	34401/090417	2009	17	0.14	36	29	23	0.12	18	73	0.0080	0.0210
254	Third Party	2009/03991	34512/090710	2009	21	0.05	43	25	29	0.1	22	86	0.0040	0.0070
255	Third Party	2009/03992	34512/090710	2009	20	0.05	37	24	31	0.16	20	92	0.0050	0.0100
256	Third Party	2009/03993	34512/090710	2009	27	0.06	53	31	32	0.23	26	94	0.0050	0.0110
260	ABP	2006/01264	33292/060322	2006	16	0.12	31	51	25	0.16	17	75	0.0168	0.0416
261	ABP	2006/01265	33292/060322	2006	15	0.08	18	32	19	0.09	11	59	0.0030	0.0263
262	Third Party	2006/01266	33292/060322	2006	16	0.12	26	45	24	0.12	17	88	0.0030	0.0431
263	Third Party	2006/01267	33292/060322	2006	16	0.1	27	37	25	0.1	16	74	0.0030	0.0397
264	ABP	2006/01268	33292/060322	2006	10	0.08	23	76	30	0.06	22	188	0.0030	0.0842
265	Third Party	2006/01269	33292/060322	2006	15	0.11	23	35	23	0.22	17	81	0.0030	0.0546
266	ABP	2006/01270	33292/060322	2006	18	0.07	30	25	23	0.04	17	73	0.0030	0.0208
267	ABP	2006/01271	33292/060322	2006	15	0.11	30	41	26	0.13	20	82	0.0303	0.1995
268	ABP	2005/01410	32796/050215	2005	18	0.06	25	21	19	0.01	14	68	0.0020	0.0234
269	Third Party	2005/03724	32797/050215	2005	23	0.09	30	30	29	0.13	22	78	0.0010	0.0344
270	ABP	2005/03725	32797/050215	2005	24	0.09	29	30	30	0.24	21	74	0.0020	0.0275
271	ABP	2005/03726	32797/050215	2005	21	0.08	26	28	28	0.11	20	72	0.0020	0.0406
272	ABP	2005/03727	32797/050215	2005	23	0.09	33	30	28	0.11	21	77	0.0020	0.0342
273	Third Party	2005/03728	32797/050215	2005	21	0.1	23	28	27	0.13	19	70	0.0020	0.0312
274	Third Party	2005/03729	32797/050215	2005	22	0.11	24	30	27	0.14	20	73	0.0020	0.0300
275	Third Party	2011/03277	MLA2011/00247	2011	29	0.14	70	37	33	0.08	34	129	0.0020	0.0150
276	Third Party	2011/03278	MLA2011/00247	2011	26	0.1	60	27	30	0.07	28	96	0.0020	0.0020
277	Third Party	2011/03279	MLA2011/00247	2011	15	0.047	33	14	19	0.04	15	53	0.0010	0.0020

Table A4.2  
Polychlorinated Biphenyl Results: Southampton Water

Report Sample Number	Operator	SampleID (LSN)	DAS	Year Sampled	CB#101	CB#105	CB#110	CB#118	CB#128	CB#138	CB#141	CB#149	CB#151	CB#153	CB#156	CB#158
175	ABP	2001/01404	31157/001019	2001	0.0021	0.0008	0.0050	0.0026	0.0005	0.0029	0.0004	0.0020	0.0005	0.0022	0.0004	0.0003
207	ABP	2001/01405	31157/001019	2001	0.0003	0.0000	0.0012	0.0006	0.0000	0.0005	0.0000	0.0004	0.0000	0.0005	0.0000	0.0000
133	Third Party	2004/09756	32560/040729	2004	0.0011	0.0004	0.0013	0.0011	0.0002	0.0014	0.0003	0.0008	0.0002	0.0012	0.0002	0.0002
143	ABP	2004/02527	32430/040406	2004	0.0003	0.0002	0.0004	0.0003	0.0002	0.0004	0.0002	0.0003	0.0002	0.0004	0.0002	0.0002
144	ABP	2004/02528	32430/040406	2004	0.0003	0.0002	0.0004	0.0004	0.0002	0.0005	0.0002	0.0003	0.0002	0.0004	0.0002	0.0002
145	ABP	2004/02529	32430/040406	2004	0.0003	0.0002	0.0004	0.0004	0.0002	0.0005	0.0002	0.0003	0.0002	0.0004	0.0002	0.0002
146	ABP	2004/02530	32430/040406	2004	0.0003	0.0002	0.0004	0.0003	0.0002	0.0004	0.0002	0.0003	0.0002	0.0004	0.0002	0.0002
90	Third Party	2006/04323	33428/060731	2006	0.0010	0.0004	0.0012	0.0009	0.0003	0.0014	0.0002	0.0010	0.0002	0.0012	0.0002	0.0002
260	ABP	2006/01264	33292/060322	2006	0.0005	0.0003	0.0006	0.0006	0.0002	0.0008	0.0002	0.0005	0.0002	0.0006	0.0002	0.0002
261	ABP	2006/01265	33292/060322	2006	0.0002	0.0002	0.0003	0.0003	0.0002	0.0005	0.0002	0.0002	0.0002	0.0004	0.0002	0.0002
262	Third Party	2006/01266	33292/060322	2006	0.0004	0.0003	0.0005	0.0004	0.0002	0.0005	0.0002	0.0003	0.0002	0.0004	0.0002	0.0002
263	Third Party	2006/01267	33292/060322	2006	0.0003	0.0003	0.0005	0.0004	0.0002	0.0006	0.0002	0.0003	0.0002	0.0004	0.0002	0.0002
264	ABP	2006/01268	33292/060322	2006	0.0002	0.0002	0.0003	0.0003	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
265	Third Party	2006/01269	33292/060322	2006	0.0004	0.0003	0.0005	0.0005	0.0002	0.0006	0.0002	0.0003	0.0002	0.0005	0.0002	0.0002
266	ABP	2006/01270	33292/060322	2006	0.0002	0.0002	0.0003	0.0004	0.0002	0.0004	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
267	ABP	2006/01271	33292/060322	2006	0.0007	0.0003	0.0009	0.0008	0.0002	0.0008	0.0002	0.0006	0.0002	0.0008	0.0003	0.0002
69	ABP	2008/01555	34003/080404	2008	0.0003	0.0002	0.0004	0.0004	0.0002	0.0005	0.0002	0.0003	0.0002	0.0004	0.0002	0.0002
12	Third Party	2009/00470	34314/090123	2009	0.0005	0.0002	0.0005	0.0005	0.0002	0.0006	0.0002	0.0005	0.0002	0.0006	0.0002	0.0002
29	ABP	2009/00803	34302/090114	2009	0.0004	0.0002	0.0004	0.0004	0.0002	0.0004	0.0002	0.0003	0.0002	0.0005	0.0002	0.0002
247	Third Party	2009/01196	34401/090417	2009	0.0005	0.0002	0.0005	0.0005	0.0002	0.0005	0.0002	0.0005	0.0002	0.0006	0.0002	0.0002
248	ABP	2009/01197	34401/090417	2009	0.0010	0.0003	0.0009	0.0010	0.0003	0.0014	0.0002	0.0009	0.0002	0.0012	0.0002	0.0002
249	Third Party	2009/01198	34401/090417	2009	0.0005	0.0002	0.0004	0.0004	0.0002	0.0005	0.0002	0.0004	0.0002	0.0005	0.0002	0.0002
250	Third Party	2009/01199	34401/090417	2009	0.0006	0.0002	0.0005	0.0005	0.0002	0.0005	0.0002	0.0004	0.0002	0.0006	0.0002	0.0002
251	ABP	2009/01200	34401/090417	2009	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
252	ABP	2009/01201	34401/090417	2009	0.0003	0.0002	0.0003	0.0003	0.0002	0.0004	0.0002	0.0003	0.0002	0.0004	0.0002	0.0002
253	Third Party	2009/01202	34401/090417	2009	0.0004	0.0002	0.0004	0.0004	0.0002	0.0006	0.0002	0.0005	0.0002	0.0007	0.0002	0.0002

Polychlorinated Biphenyl Results: Southampton Water

Report Sample Number	Operator	SampleID (LSN)	DAS	Year Sampled	CB#170	CB#18	CB#180	CB#183	CB#187	CB#194	CB#28	CB#31	CB#44	CB#47	CB#49	CB#52
175	ABP	2001/01404	31157/001019	2001	0.0007	0.0004	0.0015	0.0002	0.0006	0.0003	0.0012	0.0007	0.0009	0.0003	0.0010	0.0014
207	ABP	2001/01405	31157/001019	2001	0.0000	0.0004	0.0003	0.0000	0.0000	0.0000	0.0009	0.0005	0.0004	0.0000	0.0005	0.0006
133	Third Party	2004/09756	32560/040729	2004	0.0003	0.0003	0.0007	0.0002	0.0003	0.0002	0.0006	0.0004	0.0004	0.0002	0.0006	0.0006
143	ABP	2004/02527	32430/040406	2004	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0013	0.0002
144	ABP	2004/02528	32430/040406	2004	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0006	0.0002
145	ABP	2004/02529	32430/040406	2004	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0007	0.0002
146	ABP	2004/02530	32430/040406	2004	0.0002	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0009	0.0002
90	Third Party	2006/04323	33428/060731	2006	0.0003	0.0003	0.0009	0.0002	0.0005	0.0002	0.0006	0.0004	0.0003	0.0002	0.0005	0.0005
260	ABP	2006/01264	33292/060322	2006	0.0003	0.0002	0.0006	0.0002	0.0002	0.0002	0.0004	0.0003	0.0002	0.0002	0.0003	0.0002
261	ABP	2006/01265	33292/060322	2006	0.0002	0.0002	0.0004	0.0002	0.0002	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002
262	Third Party	2006/01266	33292/060322	2006	0.0002	0.0002	0.0004	0.0002	0.0002	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002
263	Third Party	2006/01267	33292/060322	2006	0.0002	0.0002	0.0004	0.0002	0.0002	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002
264	ABP	2006/01268	33292/060322	2006	0.0002	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
265	Third Party	2006/01269	33292/060322	2006	0.0002	0.0002	0.0004	0.0002	0.0002	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002
266	ABP	2006/01270	33292/060322	2006	0.0002	0.0002	0.0003	0.0002	0.0002	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002
267	ABP	2006/01271	33292/060322	2006	0.0003	0.0002	0.0005	0.0002	0.0002	0.0002	0.0005	0.0004	0.0003	0.0002	0.0005	0.0004
69	ABP	2008/01555	34003/080404	2008	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0002	0.0002	0.0002	0.0003	0.0002
12	Third Party	2009/00470	34314/090123	2009	0.0002	0.0002	0.0003	0.0002	0.0002	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0003
29	ABP	2009/00803	34302/090114	2009	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
247	Third Party	2009/01196	34401/090417	2009	0.0002	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003
248	ABP	2009/01197	34401/090417	2009	0.0002	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003
249	Third Party	2009/01198	34401/090417	2009	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003
250	Third Party	2009/01199	34401/090417	2009	0.0002	0.0002	0.0003	0.0002	0.0002	0.0002	0.0003	0.0002	0.0002	0.0002	0.0003	0.0004
251	ABP	2009/01200	34401/090417	2009	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
252	ABP	2009/01201	34401/090417	2009	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
253	Third Party	2009/01202	34401/090417	2009	0.0002	0.0002	0.0005	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0003

Polychlorinated Biphenyl Results: Southampton Water

Report Sample Number	Operator	SampleID (LSN)	DAS	Year Sampled	CB#66	TOT25CBS	TOTICES7	AHCH	GHCH	HCB	DIELDRIN	PPDDE	PPDDT	PPTDE
175	ABP	2001/01404	31157/001019	2001	0.0022	0.0310	0.0139	0.0000	0.0002	0.0000	0.0012	0.0003	0.0051	0.0012
207	ABP	2001/01405	31157/001019	2001	0.0006	0.0076	0.0036	0.0000	0.0004	0.0000	0.0011	0.0003	0.0049	0.0011
133	Third Party	2004/09756	32560/040729	2004	0.0002	0.0121	0.0068	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
143	ABP	2004/02527	32430/040406	2004	0.0002	0.0036	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
144	ABP	2004/02528	32430/040406	2004	0.0002	0.0031	0.0018	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
145	ABP	2004/02529	32430/040406	2004	0.0002	0.0034	0.0018	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
146	ABP	2004/02530	32430/040406	2004	0.0002	0.0031	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
90	Third Party	2006/04323	33428/060731	2006	0.0006	0.0132	0.0064	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
260	ABP	2006/01264	33292/060322	2006	0.0006	0.0069	0.0036	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
261	ABP	2006/01265	33292/060322	2006	0.0004	0.0033	0.0020	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
262	Third Party	2006/01266	33292/060322	2006	0.0003	0.0043	0.0024	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
263	Third Party	2006/01267	33292/060322	2006	0.0005	0.0047	0.0024	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
264	ABP	2006/01268	33292/060322	2006	0.0003	0.0021	0.0013	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
265	Third Party	2006/01269	33292/060322	2006	0.0004	0.0049	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
266	ABP	2006/01270	33292/060322	2006	0.0004	0.0030	0.0017	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
267	ABP	2006/01271	33292/060322	2006	0.0008	0.0090	0.0045	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
69	ABP	2008/01555	34003/080404	2008	0.0003	0.0038	0.0020	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12	Third Party	2009/00470	34314/090123	2009	0.0003	0.0048	0.0030	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
29	ABP	2009/00803	34302/090114	2009	0.0002	0.0032	0.0022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
247	Third Party	2009/01196	34401/090417	2009	0.0002	0.0046	0.0029	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
248	ABP	2009/01197	34401/090417	2009	0.0003	0.0088	0.0052	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
249	Third Party	2009/01198	34401/090417	2009	0.0002	0.0039	0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
250	Third Party	2009/01199	34401/090417	2009	0.0003	0.0050	0.0031	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
251	ABP	2009/01200	34401/090417	2009	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
252	ABP	2009/01201	34401/090417	2009	0.0002	0.0019	0.0013	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
253	Third Party	2009/01202	34401/090417	2009	0.0002	0.0046	0.0030	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Table A4.3  
Polycyclic Aromatic Hydrocarbon Results: Southampton Water

Report Sample Number	Operator	SampleID (LSN)	DAS	Year Sampled	23BA	ACENAPH	ACENAPT	ANTHRAC	BAA	BAP	BBF	BENZGHI	BEP	BKF	C1N	C1PHEN
175	ABP	2001/01404	31157/001019	2001	0.0001	0.0001	0.0001	0.0460	0.3080	0.4860	0.4540	0.2080	0.3190	0.2360	0.0420	0.1990
207	ABP	2001/01405	31157/001019	2001	0.0001	0.0001	0.0001	0.0081	0.0570	0.1310	0.1510	0.0760	0.1080	0.0660	0.0190	0.0490
133	Third Party	2004/09756	32560/040729	2004	0	0.0037	0.0100	0.0280	0.6370	0.1740	0.2630	0.0940	0.1400	0.0820	0.0460	0.1140
143	ABP	2004/02527	32430/040406	2004	0	0.0025	0.0032	0.0170	0.0610	0.1370	0.2230	0.0690	0.1380	0.0730	0.0280	0.0950
144	ABP	2004/02528	32430/040406	2004	0	0.0038	0.0041	0.0130	0.0690	0.1260	0.2150	0.0700	0.1430	0.0780	0.0290	0.1010
145	ABP	2004/02529	32430/040406	2004	0	0.0036	0.0044	0.0160	0.0760	0.1450	0.2440	0.0760	0.1500	0.0900	0.0290	0.1040
146	ABP	2004/02530	32430/040406	2004	0	0.0066	0.0048	0.0170	0.0470	0.1080	0.1830	0.0560	0.1200	0.0670	0.0310	0.0740
110	ABP	2005/01411	32796/050215	2005	0	0.0041	0.0030	0.0220	0.0790	0.1180	0.2060	0.0700	0.0950	0.0670	0.0250	0.0960
269	Third Party	2005/03724	32797/050215	2005	0	0.0039	0.0030	0.0140	0.0780	0.0770	0.1540	0.0410	0.0550	0.0450	0.0400	0.0690
270	ABP	2005/03725	32797/050215	2005	0	0.0038	0.0030	0.0170	0.0670	0.0690	0.1490	0.0410	0.0530	0.0450	0.0470	0.0760
271	ABP	2005/03726	32797/050215	2005	0	0.0023	0.0040	0.0230	0.0720	0.0840	0.1750	0.0370	0.0600	0.0520	0.0310	0.0750
272	ABP	2005/03727	32797/050215	2005	0	0.0026	0.0020	0.0150	0.0620	0.0580	0.1290	0.0370	0.0470	0.0360	0.0290	0.0610
273	Third Party	2005/03728	32797/050215	2005	0	0.0055	0.0030	0.0130	0.0720	0.0740	0.1370	0.0370	0.0530	0.0480	0.0330	0.0520
274	Third Party	2005/03729	32797/050215	2005	0	0.0058	0.0035	0.0120	0.0580	0.0720	0.1360	0.0360	0.0500	0.0480	0.0300	0.0590
90	Third Party	2006/04323	33428/060731	2006	0	0.0130	0.0110	0.0440	0.1920	0.2860	0.4530	0.1730	0.2060	0.1510	0.0460	0.1870
260	ABP	2006/01264	33292/060322	2006	0	0.0046	0.0320	0.0700	0.1090	0.1070	0.1850	0.0740	0.0840	0.0720	0.0420	0.3940
261	ABP	2006/01265	33292/060322	2006	0	0.0130	0.0056	0.5730	0.7690	0.6470	1.0120	0.2160	0.3850	0.3250	0.0450	0.3620
262	Third Party	2006/01266	33292/060322	2006	0	0.0050	0.0073	0.0340	0.0510	0.0850	0.1660	0.0510	0.0800	0.0580	0.0280	0.1500
263	Third Party	2006/01267	33292/060322	2006	0	0.0043	0.0042	0.0350	0.0630	0.0770	0.1520	0.0450	0.0590	0.0550	0.0280	0.1700
264	ABP	2006/01268	33292/060322	2006	0	0.0014	0.0008	0.0130	0.0190	0.0310	0.0730	0.0210	0.0300	0.0260	0.0088	0.0610
265	Third Party	2006/01269	33292/060322	2006	0	0.0025	0.0027	0.0260	0.0440	0.0590	0.1360	0.0430	0.0550	0.0380	0.0300	0.1310
266	ABP	2006/01270	33292/060322	2006	0	0.0017	0.0031	0.0170	0.0480	0.0570	0.1290	0.0370	0.0490	0.0370	0.0220	0.1150
267	ABP	2006/01271	33292/060322	2006	0	0.0015	0.0043	0.0310	0.0480	0.0760	0.1960	0.0490	0.0720	0.0540	0.0200	0.1250
61	ABP	2008/01547	34003/080404	2008	0	0.0027	0.0047	0.0190	0.0500	0.0790	0.1140	0.0510	0.0590	0.0480	0.0200	0.0830
69	ABP	2008/01555	34003/080404	2008	0	0.0025	0.0044	0.0160	0.0450	0.0820	0.0710	0.0540	0.0450	0.0300	0.0058	0.0460
12	Third Party	2009/00470	34314/090123	2009	0	0.0196	0.0475	0.0809	0.1483	0.0983	0.1851	0.0912	0.0862	0.0633	0.0929	0.3817
29	ABP	2009/00803	34302/090114	2009	0	0.0088	0.0090	0.0353	0.0557	0.0867	0.1138	0.0998	0.0768	0.0654	0.0328	0.1515
36	ABP	2009/00811	34302/090114	2009	0	0.0028	0.0018	0.0092	0.0107	0.0290	0.0278	0.0236	0.0211	0.0220	0.0122	0.0239
244	ABP	2009/00813	34302/090114	2009	0	0.0103	0.0101	0.0412	0.0226	0.0592	0.0636	0.0575	0.0446	0.0419	0.0310	0.2072
247	Third Party	2009/01196	34401/090417	2009	0	0.0099	0.0127	0.0574	0.1301	0.1263	0.1773	0.0841	0.1005	0.0856	0.0543	0.3819
248	ABP	2009/01197	34401/090417	2009	0	0.0060	0.0189	0.0505	0.1810	0.1811	0.2151	0.0772	0.1198	0.1253	0.0438	0.1828
249	Third Party	2009/01198	34401/090417	2009	0	0.0100	0.0130	0.0244	0.0786	0.0914	0.0993	0.0603	0.0855	0.0626	0.0615	0.1736
250	Third Party	2009/01199	34401/090417	2009	0	0.0076	0.0048	0.0268	0.0591	0.0780	0.1143	0.0537	0.0611	0.0579	0.0355	0.1692
251	ABP	2009/01200	34401/090417	2009	0	0.0012	0.0017	0.0068	0.0177	0.0183	0.0288	0.0104	0.0144	0.0134	0.0116	0.0533
252	ABP	2009/01201	34401/090417	2009	0	0.0034	0.0021	0.0211	0.0384	0.0479	0.0734	0.0330	0.0397	0.0333	0.0209	0.0807
253	Third Party	2009/01202	34401/090417	2009	0	0.0050	0.0052	0.0310	0.0674	0.0706	0.1127	0.0538	0.0637	0.0376	0.0453	0.1911
254	Third Party	2009/03991	34512/090710	2009	0	0.0029	0.0078	0.0161	0.0436	0.0541	0.0981	0.0510	0.0465	0.0338	0.0274	0.0936
255	Third Party	2009/03992	34512/090710	2009	0	0.0035	0.0055	0.0170	0.0470	0.0651	0.1084	0.0561	0.0573	0.0405	0.0329	0.0988
256	Third Party	2009/03993	34512/090710	2009	0	0.0040	0.0053	0.0160	0.0506	0.0811	0.1259	0.0604	0.0605	0.0420	0.0308	0.1017
212	ABP	2011/01109	MLA2011/00053	2011	0	0.0093	0.0114	0.0302	0.1629	0.2240	0.2892	0.1857	0.1646	0.1505	0.0273	0.1528
218	ABP	2011/01115	MLA2011/00053	2011	0	0.0078	0.0148	0.0261	0.1025	0.1422	0.2021	0.1302	0.1225	0.1012	0.0307	0.1163
275	Third Party	2011/03277	MLA2011/00247	2011	0	0.0028	0.0026	0.0093	0.0360	0.0406	0.0555	0.0415	0.0358	0.0273	0.0166	0.0659
276	Third Party	2011/03278	MLA2011/00247	2011	0	0.0018	0.0014	0.0058	0.0238	0.0275	0.0393	0.0274	0.0244	0.0175	0.0122	0.0447
277	Third Party	2011/03279	MLA2011/00247	2011	0	0.0042	0.0039	0.0142	0.0548	0.0614	0.0902	0.0556	0.0483	0.0373	0.0241	0.0873

Polycyclic Aromatic Hydrocarbon Results: Southampton Water

Report Sample Number	Operator	SampleID (LSN)	DAS	Year Sampled	C2N	C3N	CHRYSEN	DBENZAH	FLUORAN	FLUOREN	INDPYR	NAPTH	PERYLEN	PHENANT	PYRENE	THC
175	ABP	2001/01404	31157/001019	2001	0.0720	0.1500	0.2480	0.0600	0.5980	0.0001	0.2530	0.0420	0.1820	0.0970	0.8530	0
207	ABP	2001/01405	31157/001019	2001	0.0280	0.0620	0.0280	0.0190	0.1010	0.0001	0.0910	0.0100	0.1090	0.0210	0.2480	0
133	Third Party	2004/09756	32560/040729	2004	0.1390	0.1270	0.1060	0.0220	0.2770	0.0160	0.0900	0.0300	0.2140	0.0600	0.4570	745
143	ABP	2004/02527	32430/040406	2004	0.0440	0.0990	0.0810	0.0190	0.1270	0.0070	0.0880	0.0089	0.1380	0.0320	0.1750	344
144	ABP	2004/02528	32430/040406	2004	0.0530	0.1270	0.0870	0.0170	0.1270	0.0049	0.0780	0.0140	0.1440	0.0360	0.1680	279
145	ABP	2004/02529	32430/040406	2004	0.0510	0.1220	0.0930	0.0180	0.1470	0.0061	0.0920	0.0130	0.1580	0.0410	0.1920	352
146	ABP	2004/02530	32430/040406	2004	0.0440	0.1010	0.0540	0.0140	0.0850	0.0076	0.0700	0.0220	0.1280	0.0290	0.1870	282
110	ABP	2005/01411	32796/050215	2005	0.0440	0.1220	0.0920	0.0210	0.1360	0.0055	0.0790	0.0160	0.1410	0.0330	0.1830	245
269	Third Party	2005/03724	32797/050215	2005	0.0520	0.1020	0.0450	0.0086	0.1020	0.0052	0.0560	0.0140	0.1060	0.0330	0.1140	201
270	ABP	2005/03725	32797/050215	2005	0.0640	0.1170	0.0360	0.0067	0.1100	0.0045	0.0570	0.0170	0.0960	0.0400	0.1160	198
271	ABP	2005/03726	32797/050215	2005	0.0620	0.1120	0.0430	0.0080	0.1600	0.0069	0.0580	0.0110	0.0920	0.0390	0.1510	191
272	ABP	2005/03727	32797/050215	2005	0.0500	0.1280	0.0220	0.0077	0.0830	0.0039	0.0510	0.0087	0.0910	0.0300	0.1000	175
273	Third Party	2005/03728	32797/050215	2005	0.0530	0.0830	0.0520	0.0110	0.0800	0.0046	0.0560	0.0150	0.0940	0.0270	0.0890	158
274	Third Party	2005/03729	32797/050215	2005	0.0420	0.1000	0.0430	0.0120	0.0850	0.0063	0.0520	0.0150	0.0910	0.0340	0.1000	171
90	Third Party	2006/04323	33428/060731	2006	0.1000	0.1720	0.1470	0.0460	0.3380	0.0160	0.2290	0.0310	0.1910	0.0820	0.4870	562
260	ABP	2006/01264	33292/060322	2006	0.1660	0.4710	0.1050	0.0290	0.3720	0.0410	0.0710	0.0200	0.1210	0.2700	0.3370	604
261	ABP	2006/01265	33292/060322	2006	0.0800	0.2830	0.8220	0.0970	1.5560	0.0190	0.2780	0.0510	0.2350	0.2050	1.5650	458
262	Third Party	2006/01266	33292/060322	2006	0.0650	0.1670	0.0470	0.0190	0.1130	0.0110	0.0740	0.0130	0.1280	0.0490	0.1700	445
263	Third Party	2006/01267	33292/060322	2006	0.0760	0.2040	0.0780	0.0220	0.1320	0.0071	0.0560	0.0110	0.1110	0.0480	0.1580	374
264	ABP	2006/01268	33292/060322	2006	0.0270	0.0530	0.0150	0.0071	0.0370	0.0024	0.0280	0.0038	0.0890	0.0150	0.0770	215
265	Third Party	2006/01269	33292/060322	2006	0.0750	0.1640	0.0630	0.0140	0.0900	0.0062	0.0500	0.0096	0.0980	0.0340	0.1280	336
266	ABP	2006/01270	33292/060322	2006	0.0550	0.1460	0.0680	0.0120	0.1140	0.0047	0.0470	0.0100	0.0900	0.0470	0.1200	172
267	ABP	2006/01271	33292/060322	2006	0.0500	0.1090	0.0650	0.0200	0.1100	0.0067	0.0710	0.0074	0.0980	0.0430	0.1660	422
61	ABP	2008/01547	34003/080404	2008	0.0430	0.1240	0.0500	0.0190	0.1030	0.0066	0.0510	0.0140	0.0810	0.0340	0.1430	178
69	ABP	2008/01555	34003/080404	2008	0.0320	0.1600	0.0390	0.0110	0.0880	0.0078	0.0530	0.0076	0.1380	0.0190	0.1420	291
12	Third Party	2009/00470	34314/090123	2009	0.2572	0.8190	0.1731	0.0454	0.3044	0.0516	0.0925	0.0360	0.1400	0.1392	0.3801	504
29	ABP	2009/00803	34302/090114	2009	0.0881	0.1620	0.0731	0.0217	0.1017	0.0107	0.1073	0.0174	0.1410	0.0278	0.1367	320
36	ABP	2009/00811	34302/090114	2009	0.0147	0.0268	0.0137	0.0057	0.0189	0.0019	0.0291	0.0081	0.0147	0.0099	0.0326	54
244	ABP	2009/00813	34302/090114	2009	0.0820	0.2159	0.0337	0.0133	0.0604	0.0094	0.0620	0.0141	0.0947	0.0308	0.1116	278
247	Third Party	2009/01196	34401/090417	2009	0.1786	0.8220	0.1230	0.0475	0.1883	0.0168	0.1197	0.0281	0.1164	0.0485	0.2795	803
248	ABP	2009/01197	34401/090417	2009	0.1073	0.4070	0.1872	0.0318	0.2329	0.0142	0.1068	0.0336	0.4156	0.1248	0.2631	310
249	Third Party	2009/01198	34401/090417	2009	0.1585	0.5370	0.0803	0.0202	0.1110	0.0224	0.0745	0.0376	0.1167	0.0609	0.1913	494
250	Third Party	2009/01199	34401/090417	2009	0.0933	0.2863	0.0649	0.0210	0.1016	0.0125	0.0613	0.0172	0.2538	0.0381	0.1705	472
251	ABP	2009/01200	34401/090417	2009	0.0258	0.0894	0.0132	0.0057	0.0269	0.0033	0.0153	0.0044	0.1016	0.0099	0.0371	90
252	ABP	2009/01201	34401/090417	2009	0.0417	0.0959	0.0389	0.0151	0.0492	0.0081	0.0484	0.0107	0.0664	0.0220	0.0964	271
253	Third Party	2009/01202	34401/090417	2009	0.1026	0.4616	0.0611	0.0171	0.0976	0.0129	0.0619	0.0173	0.0970	0.0397	0.1560	443
254	Third Party	2009/03991	34512/090710	2009	0.0552	0.1317	0.0403	0.0130	0.1208	0.0068	0.0592	0.0153	0.0800	0.0372	0.1291	184
255	Third Party	2009/03992	34512/090710	2009	0.0703	0.1517	0.0444	0.0157	0.1394	0.0060	0.0728	0.0184	0.0885	0.0463	0.1375	205
256	Third Party	2009/03993	34512/090710	2009	0.0665	0.1637	0.0493	0.0148	0.1382	0.0062	0.0778	0.0156	0.1028	0.0429	0.1503	206
212	ABP	2011/01109	MLA2011/00053	2011	0.0592	0.1237	0.1284	0.0315	0.3408	0.0132	0.2148	0.0191	0.1739	0.0616	0.3024	419
218	ABP	2011/01115	MLA2011/00053	2011	0.0682	0.1275	0.0705	0.0230	0.2408	0.0149	0.1469	0.0175	0.1371	0.0586	0.2232	363
275	Third Party	2011/03277	MLA2011/00247	2011	0.0381	0.0830	0.0202	0.0083	0.0577	0.0040	0.0512	0.0079	0.1018	0.0181	0.0671	176
276	Third Party	2011/03278	MLA2011/00247	2011	0.0243	0.0552	0.0134	0.0053	0.0396	0.0027	0.0347	0.0056	0.0833	0.0121	0.0455	119
277	Third Party	2011/03279	MLA2011/00247	2011	0.0482	0.1090	0.0322	0.0107	0.0993	0.0056	0.0676	0.0096	0.1122	0.0294	0.1077	203

# Appendix B

SPA Site Bird Species

## B. SPA Site Bird Species

Table B1. Bird species qualifying under the Birds Directive using the marine component of the Solent and Southampton Water SPA at the time of classification

Solent and Southampton Water SPA				
Article 4.1				
Mediterranean Gull	<i>Larus melanocephalus</i>	Breeding		
Little Tern	<i>Sterna albifrons</i>	Breeding		
Roseate Tern	<i>Sterna dougallii</i>	Breeding		
Common Tern	<i>Sterna hirundo</i>	Breeding		
Sandwich Tern	<i>Sterna sandvicensis</i>	Breeding		
Article 4.2				
Black-tailed Godwit	<i>Limosa limosa islandica</i>		Overwintering	
Dark-bellied Brent Goose	<i>Branta bernicla bernicla</i>		Overwintering	
Ringed Plover	<i>Charadrius hiaticula</i>		Overwintering	
Teal	<i>Anas crecca</i>		Overwintering	
Internationally important assemblage: 51,361 waterfowl				

(Source: JNCC, 2006c)

Table B2. Bird species qualifying under the birds directive using the marine component of the Portsmouth Harbour SPA at the time of classification

Portsmouth Harbour SPA				
Article 4.2				
Black-tailed Godwit	<i>Limosa limosa islandica</i>		Overwintering	
Dark-bellied Brent Goose	<i>Branta bernicla bernicla</i>		Overwintering	
Dunlin	<i>Calidris alpina alpina</i>		Overwintering	
Red-breasted Merganser	<i>Mergus serrator</i>		Overwintering	

(Source: JNCC, 2006b)



Table B3. Bird species qualifying under the Birds Directive using the marine component of the Chichester and Langstone Harbours SPA at the time of classification

Chichester and Langstone Harbours SPA				
Article 4.1				
Little Tern	<i>Sterna albifrons</i>	Breeding		
Common Tern	<i>Sterna hirundo</i>	Breeding		
Sandwich Tern	<i>Sterna sandvicensis</i>	Breeding		
Bar-tailed Godwit	<i>Limosa lapponica</i>		Overwintering	
Article 4.2				
Black-tailed Godwit	<i>Limosa limosa islandica</i>		Overwintering	
Dark-bellied Brent Goose	<i>Branta bernicla bernicla</i>		Overwintering	
Dunlin	<i>Calidris alpina alpina</i>		Overwintering	
Eurasian Curlew	<i>Numenius arquata</i>		Overwintering	
Eurasian Wigeon	<i>Anas penelope</i>		Overwintering	
Grey Plover	<i>Pluvialis squatarola</i>		Overwintering	
Northern Pintail	<i>Anas acuta</i>		Overwintering	
Northern Shoveler	<i>Anas clypeata</i>		Overwintering	
Red-breasted Merganser	<i>Mergus serrator</i>		Overwintering	
Redshank	<i>Tringa totanus</i>		Overwintering	
Ringed Plover	<i>Charadrius hiaticula</i>		Overwintering	
Ruddy Turnstone	<i>Arenaria interpres</i>		Overwintering	
Sanderling	<i>Calidris alba</i>		Overwintering	
Shelduck	<i>Tadorna tadorna</i>		Overwintering	
Teal	<i>Anas crecca</i>		Overwintering	
Internationally important assemblage: 93,230 waterfowl				

(Source: JNCC, 2006a)

# Appendix C

Favourable Conditions Status

## C. Favourable Conditions Status

References within Appendix C have been transcribed from Natural England's conditions of SSSI units: Website accessed on 6 March 2014: <http://www.sssi.naturalengland.org.uk>

SSSI	Date Notified	Area (Ha)	Key Interests	Condition of Units
Bembridge Down	1980 (Under 1949 Act)  1984 (Under 1981 Act)	56	<ul style="list-style-type: none"> <li>A geologically important, continuous succession from the Wealden Beds to the Upper Greensand occurs in the cliff section.</li> <li>The chalk cliffs support a breeding colony of Herring Gulls <i>Larus argentatus</i> and a small number of breeding shags <i>Phalacrocorax aristofelis</i>.</li> <li>The terrestrial, cliff top grassland is composed mainly of species-rich chalk grassland, with some neutral grassland and dry sandy grassland in areas.</li> </ul>	10 Favourable
Bembridge School & Cliffs	1999 (Under 1981 Act)	13	<ul style="list-style-type: none"> <li>Beds of Quaternary age at Bembridge School consist of fossiliferous deposits known as the Steyne Wood Clays.</li> <li>On the coast a raised shingle beach is present rising from sea level in the east to 20 metres above Ordnance Datum in the west.</li> </ul>	3 Favourable 3 Unfavourable, no change
Bonchurch Landslips	1977 (Under 1949 Act)  1984 (Under 1981 Act)	28	<ul style="list-style-type: none"> <li>The site comprises ash <i>Fraxinus excelsior</i> woodland on Gault clay landslips immediately below the Upper Greensand escarpment. The landslips descend steeply eastward to soft, eroding cliffs.</li> <li>The lower slopes of the landslips support a complex mosaic of species-rich acidic and calcareous plant communities on unstable clays and sands.</li> <li>Geomorphologically, the site is of great interest for its complex of mass-movement features, including the Undercliff itself and the coastal landslips and mud flows beneath it.</li> </ul>	6 Favourable 2 Unfavourable, recovering
Bouldnor & Hamstead Cliffs	1951 (Under 1949 Act)  1987 (Under 1981 Act)	96	<ul style="list-style-type: none"> <li>Bouldnor and Hamstead Cliffs are of great importance of geology because of the complete succession which they provide. The cliffs are also of importance because of the rich flora and fauna fossils.</li> <li>Ecologically the cliffs display a wide range of habitat types ranging from broad-leaved woodland through a variety of scrub communities to a variety of early pioneer plant communities.</li> </ul>	8 Favourable 1 Unfavourable, declining
Bracklesham Bay	1980 (Under 1949 Act)  1986 (Under 1981 Act)	202	<ul style="list-style-type: none"> <li>Site consists of a long stretch of coastal with some rough unimproved grazing pastures which are important for the bird populations they support.</li> <li>Coastal habitats include a small area of saltmarsh, shingle bank, the rifes (wide flowing ditches) and associated reed beds, together with intertidal exposures of high geological interest.</li> </ul>	1 Favourable 3 Unfavourable, recovering

SSSI	Date Notified	Area (Ha)	Key Interests	Condition of Units
Brading Marshes to St Helen's Ledges	1951-1977 (Under 1949 Act)  1984-1988 (Under 1981 Act)	488	<ul style="list-style-type: none"> <li>Brading Marshes comprises an extensive area of neutral and acid grassland, saline and freshwater lagoons and pools, botanically rich ditches, reedbeds, and areas of ancient woodland.</li> <li>Bembridge Harbour consists of intertidal mudflats and sandflats, sand dunes and shingle spits, rocky outcrops, shingle, limestone reefs and ledges forming St Helen's Ledges.</li> <li>This combination of hard and soft coastal features supports a rich flora and marine invertebrate fauna.</li> </ul>	27 Favourable 11 Unfavourable, recovering 20 Unfavourable, declining
Chichester Harbour	1970 (Under 1949 Act)  1984 (Under 1981 Act)	3695	<ul style="list-style-type: none"> <li>Site is of significance for wintering wildfowl and waders and also breeding birds.</li> <li>Site comprises wide range of habitats, including extensive mudflats, saltmarsh and shingle, with associated important plant communities.</li> <li>Along with neighbouring Langstone and Portsmouth Harbours, the site is unusual in providing a large volume of sheltered saline water fed by a few streams of only low volume.</li> </ul>	20 Favourable 21 Unfavourable, recovering 1 Unfavourable, no change 1 Unfavourable, declining
Compton Chine to Steephill Cove	2003 (Under 1981 Act)	629	<ul style="list-style-type: none"> <li>The site is notified for its vegetated maritime cliffs and slopes, species-rich unimproved chalk grassland, nationally rare plant species, an assemblage of nationally scarce plants, an outstanding assemblage of nationally rare and scarce invertebrates, exposed and moderately exposed rocky shores (littoral rock) and nationally important coastal geomorphology.</li> <li>In addition the cliffs and foreshore between Hanover Point to St Catherine's Point are a nationally important geological site for successions of the Wealden Group and the overlying Lower Greensand Group.</li> </ul>	10 Favourable 28 Unfavourable, recovering
Compton Down	1951 (Under 1949 Act)  1984 (Under 1981 Act)	196	<ul style="list-style-type: none"> <li>The site occupies 4.5 km of the east-west chalk anticline of the Isle of Wight and includes both the south and north facing slopes and crest of the ridge. It is probably the best example in Britain of chalk grassland under maritime influence.</li> <li>The entire downland complex is of great entomological importance, notably for its very large populations of chalk grassland butterflies.</li> <li>The coastline of the SSSI is a key stratigraphic site for the Isle of Wight Chalk, providing a reference section from the excellently exposed Glauconitic Marl of the Lower Chalk through the Middle Chalk of the lower Upper Chalk.</li> </ul>	9 Favourable 4 Unfavourable, recovering
Dibden Bay	2001 (Under 1981 Act)  2002 (Last revision)	229	<ul style="list-style-type: none"> <li>Nationally important assemblage of invertebrates (including beetles, bees, wasps and flies).</li> <li>Notified for breeding lapwing (<i>Vanellus vanellus</i>).</li> </ul>	1 Favourable 1 Unfavourable, declining

SSSI	Date Notified	Area (Ha)	Key Interests	Condition of Units
Eling and Bury Marshes	1979 (Under 1949 Act)  1986 (Under 1981 Act)	110	<ul style="list-style-type: none"> <li>The site comprises two dissimilar saltmarshes with intervening intertidal mudflats.</li> <li>The habitats support autumn and winter populations of feeding and roosting waders, ducks and grey herons.</li> </ul>	2 Favourable 2 Unfavourable, recovering
Gilkicker Lagoon	1984 (Under 1981 Act)	4	<ul style="list-style-type: none"> <li>Rare habitat in Britain, where there are relatively few saline lagoons.</li> <li>Supports a specialised flora and fauna. The assemblage is relatively rich and includes 5 national rarities.</li> </ul>	1 Favourable
Headon Warren and West High Down	1951 (Under 1949 Act)  1984 (Under 1981 Act)	276	<ul style="list-style-type: none"> <li>This site comprises parallel Tertiary and chalk ridges. The former, Headon Warren, supports mainly acid, heath vegetation, and the latter species-rich chalk grassland.</li> <li>The cliffs of Main Bench, Highdown Cliffs, Scratchell's Bay and The Needles support colonies of Herring Gulls <i>Larus argentatus</i>, Cormorants <i>Phalacrocorax carbo</i>, Fulmars <i>Fulmarus glacialis</i>, Kittiwakes <i>Rissa tridactyla</i>, Shags <i>Phalacrocorax aristotelis</i> and small populations of Guillemots <i>Uria aalge</i>, Razorbills <i>Alca torda</i> and Puffins <i>Fratercula arctica</i>. Peregrine falcons <i>Falco peregrinus</i> recolonised the cliffs in the 1980's.</li> </ul>	24 Favourable 1 Unfavourable, recovering 1 Part destroyed
Hurst Castle and Lymington River Estuary	1961 (Under 1949 Act)  1986 (Under 1981 Act)  2005 (Last revision)	1110	<ul style="list-style-type: none"> <li>The site comprises the estuaries of three substantial streams, intertidal muds, cord-grass <i>Spartina anglica</i> marshes, high level mixed saltmarsh, fresh and brackish marsh, including a series of fresh to saline lagoons.</li> <li>Nesting sites for nationally important breeding populations of terns and black-headed gulls.</li> <li>Site supports internationally important over-wintering populations of wildfowl and waders.</li> <li>Rich invertebrate fauna, including 8 nationally rare and 13 nationally notable species.</li> </ul>	21 Favourable 10 Unfavourable, recovering 3 Unfavourable, declining
Hythe to Calshot Marshes	1979 (Under 1949 Act)  1984 (Under 1981 Act)	683	<ul style="list-style-type: none"> <li>The site includes the most extensive areas of saltmarsh and mudflats in Southampton Water.</li> <li>The site provides a large proportion of the feeding and roosting grounds for birds in Southampton Water.</li> </ul>	6 Unfavourable, recovering

SSSI	Date Notified	Area (Ha)	Key Interests	Condition of Units
King's Quay Shore	1951 (Under 1949 Act)  1987 (Under 1981 Act)	97	<ul style="list-style-type: none"> <li>▪ Kings Quay Shore Site of Special Scientific Interest comprises the estuary of a small stream known as Palmers Brook, with flanking low cliffs and ancient woodland, together with the intertidal zone extending east and west from the estuary mouth.</li> <li>▪ Ecologically the site is of considerable importance in displaying a great diversity of estuarine habitats ranging from freshwater swamp, brackish reedbeds, saltmarshes, shingle spits and intertidal mudflats all in close proximity.</li> <li>▪ The intertidal muds are feeding grounds for modest numbers of wading birds,</li> <li>▪ herons and Brent geese <i>Branta bernicla</i>. Eelgrass beds occur on the lower shore.</li> </ul>	25 Favourable 4 Unfavourable, recovering 1 Part destroyed
Langstone Harbour	1958 (Under 1949 Act)  1985 (Under 1981 Act)	2069	<ul style="list-style-type: none"> <li>▪ Site includes one of the largest areas of mixed saltmarsh on the south coast.</li> <li>▪ Site supports high densities of intertidal invertebrates and large populations of migrant and overwintering waders and wildfowl, dependent upon them and upon the extensive beds of eelgrass.</li> </ul>	6 Favourable 7 Unfavourable, recovering
Lee-on-the Solent to Itchen Estuary	Aug 1992 (Under 1981 Act)  1993 (Last revision)	632	<ul style="list-style-type: none"> <li>▪ The site comprises extensive intertidal muds with a littoral fringe of vegetated shingle, saltmarsh, reedbed, marshy grasslands and deciduous woodland.</li> <li>▪ The site supports and outstanding assemblage of nationally scarce coastal plants.</li> <li>▪ Supports important numbers of feeding and roosting birds.</li> </ul>	22 Favourable 4 Unfavourable, recovering 1 Unfavourable, no change
Lincegrove and Hackett's Marshes	1978 (Under 1949 Act)  1984 (Under 1981 Act)	37	<ul style="list-style-type: none"> <li>▪ Site comprises mature saltmarsh on the west bank of the River Hamble estuary.</li> <li>▪ Structurally the marshes are one of the best examples of mature saltmarsh on the south coast.</li> </ul>	3 Unfavourable, recovering
Lower Test Valley	1971 (Under 1949 Act)  1986 (Under 1981 Act)	139	<ul style="list-style-type: none"> <li>▪ The site comprises one of the most extensive reed <i>Phragmites</i> beds on the south coast.</li> <li>▪ The site is important for wetland breeding birds and as a wader and duck feeding and roosting ground.</li> </ul>	8 Favourable
Medina Estuary	1977 (Under 1949 Act)  1985 (Under 1981 Act)	101	<ul style="list-style-type: none"> <li>▪ The Medina Estuary SSSI comprises a relatively narrow tidal channel, 4.5 km long, flanked by intertidal mudflats and saltmarsh in close association with a variety of brackish, freshwater and terrestrial habitats.</li> <li>▪ The site is an important component of the Solent estuarine system which supports internationally important over-wintering migratory populations of wildfowl and wading birds, and importance breeding populations of waders, gulls and terns.</li> </ul>	12 Favourable

SSSI	Date Notified	Area (Ha)	Key Interests	Condition of Units
Newtown Harbour	1951 (Under 1949 Act)  1984 (Under 1981 Act)	619	<ul style="list-style-type: none"> <li>▪ The site includes extensive areas of estuarine mudflats and saltmarsh, areas of unimproved grassland, woodland and scrub, interspersed with ponds and hedgerows, rapidly eroding vegetated cliffs, sand and shingle spits, beaches and large areas of intertidal mud, sand, and shingle which are important geomorphological features.</li> <li>▪ The harbour includes a saline lagoon which supports a specialised invertebrate community including a nationally rare species.</li> <li>▪ The estuary and peripheral land is a very important component of The Solent estuarine system which supports internationally important overwintering populations of wildfowl and waders, and important breeding populations of waders, gulls and terns.</li> </ul>	69 Favourable 8 Unfavourable, recovering 1 Unfavourable, declining
North Solent	1951 (Under 1949 Act)  1990 (Under 1981 Act)	1188	<ul style="list-style-type: none"> <li>▪ Habitats range from coastal mudflats and saltmarshes, shingle beaches and spits, fresh and brackish marshland and pools, maritime grassland, species rich neutral and acidic grassland, valley mire, heathland and a range of ancient semi-natural woodlands.</li> <li>▪ The site is of international importance for its populations of over-wintering and migratory wildfowl and wading birds and is of national importance for its populations of breeding gulls, terns and waders.</li> </ul>	63 Favourable 31 Unfavourable, recovering 2 Unfavourable, no change 2 Unfavourable, declining
Portsmouth Harbour	1974 (Under 1949 Act)  1985 (Under 1981 Act)	1266	<ul style="list-style-type: none"> <li>▪ Mudflats support an abundant fauna of benthic marine animals, providing valuable food source for shorebirds.</li> <li>▪ Mud surfaces support extensive beds of eelgrasses and algae.</li> <li>▪ Cord-grass marshes occur on mudflats in the upper part of the tidal range.</li> <li>▪ Site supports high numbers of wetland birds, particularly waders and wildfowl.</li> </ul>	4 Favourable 17 Unfavourable, recovering 1 Unfavourable, declining 1 Destroyed
River Itchen	2001 (Under 1981 Act)	748	<ul style="list-style-type: none"> <li>▪ Site is notified for classic chalk stream and river, fen meadow, flood pasture and swamp habitats</li> <li>▪ Site comprises significant population of nationally rare species and assemblages of freshwater and riparian invertebrates.</li> <li>▪ Supports migratory Atlantic salmon.</li> <li>▪ Notified for supporting range of breeding birds.</li> </ul>	15 Favourable 55 Unfavourable, recovering 30 Unfavourable, no change 14 Unfavourable, declining 2 Destroyed
River Test	1996 (Under 1981 Act)	443	<ul style="list-style-type: none"> <li>▪ The River Test is a classic chalk stream. It is one of the most species-rich lowland rivers in England. The bulk of the system drains Cretaceous Chalk, with the lowermost reaches passing over a variety of geological strata.</li> <li>▪ The Test supports a high diversity of invertebrate species, and is especially rich in aquatic molluscs.</li> </ul>	38 Favourable 36 Unfavourable, recovering 16 Unfavourable, no change 1 Unfavourable, declining

SSSI	Date Notified	Area (Ha)	Key Interests	Condition of Units
Ryde Sands & Wootton Creek	1993 (Under 1949 Act)  1995 (Under 1981 Act)	424	<ul style="list-style-type: none"> <li>▪ At low water a particularly wide range of intertidal sediments are exposed over this stretch of coastline, grading from the fine estuarine muds of Wootton Creek, through cobbles and boulders at Pelhamfield to the extensive sandflats at Ryde. These sandflats are the most extensive in the Solent and support the richest assemblage of sandy shore marine flora and fauna on the central south coast of Britain.</li> <li>▪ The intertidal area is an important component of the Solent estuarine system which supports internationally important over-wintering populations of wildfowl and waders, and important breeding populations of waders, gulls and terns.</li> <li>▪ The SSSI also includes ancient semi-natural woodland, shingle banks, marshy grasslands and brackish lagoons.</li> </ul>	6 Favourable 11 Unfavourable, recovering
Selsey, East Beach	1988 (Under 1981 Act)	2	<ul style="list-style-type: none"> <li>▪ Together with Selsey West Beach, the site forms a key Quaternary site for a sequence of freshwater and estuarine deposits of Ipswichian Interglacial age.</li> <li>▪ Deposits are of unique importance in providing Pleistocene vertebrate faunas.</li> </ul>	1 Favourable
Sinah Common	2000 (Under 1981 Act)	242	<ul style="list-style-type: none"> <li>▪ Site comprises pioneer shingle vegetation, maritime shingle grassland, mobile dune, semi-fixed dune, dune heath and an associated small area of saltmarsh.</li> <li>▪ Site supports endangered and nationally rare assemblage of plants.</li> </ul>	2 Unfavourable, recovering
Sowley Pond	1971 (Under 1949 Act)  1984 (Under 1981 Act)	48	<ul style="list-style-type: none"> <li>▪ Site is an important refuge for surface feeding and diving ducks.</li> <li>▪ Site is surrounded by mature oak <i>Quercus</i> and Scots pine <i>Pinus sylvestris</i> woodland, which supports the largest Hampshire heronry.</li> </ul>	2 Favourable
Titchfield Haven	1959 (Under 1949 Act)  1983 (Under 1981 Act)	131	<ul style="list-style-type: none"> <li>▪ Tidal river is excluded by one-way tidal valves and the former estuary is an extensive freshmarsh, the river being flanked successively by large reed beds (<i>Phragmites australis</i>) and wet, unimproved meadows dissected by drainage ditches and further diversified by pools, 'flashes' and patches of fen.</li> <li>▪ The area is important for surface-feeding ducks and a rich wetland breeding bird community.</li> </ul>	7 Unfavourable, recovering 1 Unfavourable, declining
Thorness Bay	1966 (Under 1949 Act)  1987 (Under 1981 Act)	86	<ul style="list-style-type: none"> <li>▪ It comprises considerable areas of soft maritime cliffs with large expanses of intertidal sand and shingle interspersed with rocky outcrops or ledges composed of Bembridge Limestone. Two small areas of brackish marsh known as Thorness Marshes lie adjacent to the shore.</li> <li>▪ The invertebrate fauna and flora of Thorness Marshes and the sea shore support large numbers of overwintering wildfowl and waders which. Thorness Marshes is also an important site for breeding waterfowl.</li> </ul>	12 Favourable 2 Unfavourable, declining



SSSI	Date Notified	Area (Ha)	Key Interests	Condition of Units
Warblington Meadow	1986 (Under 1981 Act)	4	<ul style="list-style-type: none"> <li>The site is an unimproved grazing marsh adjoining Chichester Harbour and is of special interest for its gradation from freshwater, base-rich marsh to old reclaimed saltmarsh, and for its rich associated flora.</li> </ul>	1 Unfavourable, recovering
Whitecliff Bay and Bembridge Ledges	1955 (Under 1949 Act)  1986 (Under 1981 Act)	132	<ul style="list-style-type: none"> <li>The site comprises extensive areas of intertidal sand, rock and shingle, and includes a series of actively eroding cliffs.</li> <li>The ledges provide the best examples of rock shore fauna on the south coast, east of Poole.</li> </ul>	7 Favourable 1 Unfavourable, no change
Yar Estuary	1977 (Under 1949 Act)  1995 (Under 1981 Act)	-	<ul style="list-style-type: none"> <li>The site supports a wide range of estuarine and coastal habitats. The extensive mixed saltmarshes, which are known to have developed only during the nineteenth century, are of particular significance.</li> <li>The Yar is an important component of The Solent estuarine system which supports nationally important overwintering populations of wildfowl and waders, and important breeding populations of waders, gulls and terns.</li> </ul>	25 Favourable 5 Unfavourable, recovering

# Appendix D

Water Body Status

## D. Water Body Status

Relevant tables extracted from Environment Agency: River Basin Management Plan (RBMP) - South East River Basin District - Annex B: Water Body Status Objectives, 2009:

- Solent (C4);
- Isle of Wight East (C5);
- Beaulieu River (T2);
- Medina (T4);
- Southampton Water (T17); and
- River Test (Lower) (R34).

<b>Waterbody Category and Map Code.:</b>	Coastal - C4	<b>Surveillance site:</b> Yes
<b>Waterbody ID and Name:</b>	<a href="#">GB650705150000</a>	Solent
<b>National Grid Reference:</b>	SZ 62536 94364	
<b>Current Overall Potential</b>	Moderate	
<b>Status Objective (Overall):</b>	Good by 2027	(For Protected Area Objectives see Annex D)
<b>Status Objective(s):</b>	Good Ecological Potential by 2027, Good Chemical Status by 2027	
<b>Justification if overall objective is not good status by 2015:</b>	Technically infeasible	
<b>Protected Area Designation:</b>	Bathing Water Directive, Natura 2000 (Habitats and/or Birds Directive), Nitrates Directive, Shellfish Water Directive, Urban Waste Water Treatment Directive	
<b>SSSI (Non-N2K) related:</b>	No	
<b>Hydromorphological Designation:</b>	Heavily Modified	
<b>Reason for Designation:</b>	Coastal Protection, Flood Protection	
<b>Downstream Waterbody ID:</b>		

**Ecological Potential**

**Current Status (and certainty that status is less than good)** Moderate

**Biological elements**

Element	Current status (and certainty of less than good)	Predicted Status by 2015	Justification for not achieving good status by 2015
Invertebrates	Good	Good	
Phytoplankton	High	High	

**Supporting elements**

Element	Current status (and certainty of less than good)	Predicted Status by 2015	Justification for not achieving good status by 2015
Dissolved Inorganic Nitrogen	Good	Good	
Dissolved Oxygen	High	High	
2,4-dichlorophenol	High	High	
2,4-dichlorophenoxyacetic acid	High	High	
Arsenic	High	High	
Copper	High	High	
Dimethoate	High	High	
Iron	High	High	
Linuron	High	High	
Mecoprop	High	High	
Permethrin	High	High	
Toluene	High	High	
Zinc	High	High	

**Ecological Potential Assessment**

Element	Current status	Predicted Status by 2015	Justification for not achieving good status by 2015
Mitigation Measures Assessment	Moderate	Moderate	Technically infeasible (M3f)

**Mitigation Measures that have defined Ecological Potential**

Mitigation Measure	Status
Manage disturbance	In Place
Site selection (dredged material disposal) (e.g. avoid sensitive sites)	In Place
Sediment management	In Place
Indirect / offsite mitigation (offsetting measures)	Not In Place
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	Not In Place
Managed realignment of flood defence	Not In Place
Removal of hard bank reinforcement / revetment, or replacement with soft engineering solution	Not In Place

**Chemical Status**

**Current Status (and certainty that status is less than good)** Fail (Uncertain)

**Chemical elements**

Element	Current status (and certainty of less than good)	Predicted Status by 2015	Justification for not achieving good status by 2015
1,2-dichloroethane	High	High	
Atrazine	High	High	
Benzene	High	High	
Cadmium And Its Compounds	High	High	
Hexachlorobenzene	High	High	
Hexachlorobutadiene	High	High	
Hexachlorocyclohexane	High	High	
Lead And Its Compounds	High	High	
Mercury And Its Compounds	High	High	
Napthalene	High	High	
Nickel And Its Compounds	High	High	
Pentachlorophenol	High	High	
Simazine	High	High	
Tributyltin Compounds	Moderate (Uncertain)	Moderate	Technically infeasible (C2a)
Trichlorobenzenes	High	High	
Trichloromethane	High	High	
Trifluralin	High	High	
Aldrin, Dieldrin, Endrin & Isodrin	High	High	
Carbon Tetrachloride	High	High	
para - para DDT	High	High	
Tetrachloroethylene	High	High	
Trichloroethylene	High	High	

<b>Waterbody Category and Map Code.:</b>	Coastal - C5	<b>Surveillance site:</b> No
<b>Waterbody ID and Name:</b>	<a href="#">GB650705530000</a>	Isle of Wight East
<b>National Grid Reference:</b>	SZ 70788 85933	
<b>Current Overall Potential</b>	Good	
<b>Status Objective (Overall):</b>	Good by 2015	(For Protected Area Objectives see Annex D)
<b>Status Objective(s):</b>	Good Ecological Potential by 2015, Good Chemical Status by 2015	
<b>Justification if overall objective is not good status by 2015:</b>		
<b>Protected Area Designation:</b>	Bathing Water Directive, Natura 2000 (Habitats and/or Birds Directive), Nitrates Directive, Shellfish Water Directive, Urban Waste Water Treatment Directive	
<b>SSSI (Non-N2K) related:</b>	No	
<b>Hydromorphological Designation:</b>	Heavily Modified	
<b>Reason for Designation:</b>	Coastal Protection, Flood Protection	
<b>Downstream Waterbody ID:</b>		

**Ecological Potential**

**Current Status (and certainty that status is less than good)**      Good

**Biological elements**

Element	Current status (and certainty of less than good)	Predicted Status by 2015	Justification for not achieving good status by 2015
Invertebrates	Good	Good	
Macroalgae	High	High	
Phytoplankton	High	High	

**Supporting elements**

Element	Current status (and certainty of less than good)	Predicted Status by 2015	Justification for not achieving good status by 2015
Dissolved Inorganic Nitrogen	Good	Good	
Dissolved Oxygen	High	High	
Copper	High	High	
Iron	High	High	

**Ecological Potential Assessment**

Element	Current status	Predicted Status by 2015	Justification for not achieving good status by 2015
Mitigation Measures Assessment	Good	Good	

**Mitigation Measures that have defined Ecological Potential**

Mitigation Measure	Status
Manage disturbance	In Place
Site selection (dredged material disposal) (e.g. avoid sensitive sites)	In Place
Sediment management	In Place
Bank rehabilitation / reprofiling	In Place
Remove obsolete structure	In Place

**Chemical Status**

**Current Status (and certainty that status is less than good)**                      Good

**Chemical elements**

<b>Element</b>	<b>Current status (and certainty of less than good)</b>	<b>Predicted Status by 2015</b>	<b>Justification for not achieving good status by 2015</b>
Cadmium And Its Compounds	High	High	
Lead And Its Compounds	High	High	
Mercury And Its Compounds	High	High	
Nickel And Its Compounds	High	High	

<b>Waterbody Category and Map Code.:</b>	Transitional - T2	<b>Surveillance site:</b> Yes
<b>Waterbody ID and Name:</b>	<a href="#">GB520704201400</a>	Beaulieu River
<b>National Grid Reference:</b>	SZ 41745 98952	
<b>Current Overall Potential</b>	Moderate	
<b>Status Objective (Overall):</b>	Good by 2027	(For Protected Area Objectives see Annex D)
<b>Status Objective(s):</b>	Good Ecological Potential by 2027	
<b>Justification if overall objective is not good status by 2015:</b>	Disproportionately expensive	
<b>Protected Area Designation:</b>	Natura 2000 (Habitats and/or Birds Directive), Shellfish Water Directive	
<b>SSSI (Non-N2K) related:</b>	No	
<b>Hydromorphological Designation:</b>	Heavily Modified	
<b>Reason for Designation:</b>	Coastal Protection, Flood Protection, Structure	
<b>Downstream Waterbody ID:</b>	GB650705150000	

**Ecological Potential**

**Current Status (and certainty that status is less than good)** Moderate (Uncertain)

**Supporting elements**

Element	Current status (and certainty of less than good)	Predicted Status by 2015	Justification for not achieving good status by 2015
Dissolved Inorganic Nitrogen	Moderate (Uncertain)	Moderate	Disproportionately expensive (N1c)
Dissolved Oxygen	High	High	

**Supporting conditions**

Element	Current status (and certainty of less than good)	Predicted Status by 2015	Justification for not achieving good status by 2015
Tidal Regime - Freshwater Flow	Supports Good	Supports Good	

**Ecological Potential Assessment**

Element	Current status	Predicted Status by 2015	Justification for not achieving good status by 2015
Mitigation Measures Assessment	Good	Good	

**Mitigation Measures that have defined Ecological Potential**

Mitigation Measure	Status
Operational and structural changes to locks, sluices, weirs, beach control, etc	In Place

**Chemical Status**

**Current Status (and certainty that status is less than good)** Does not require assessment



<b>Waterbody Category and Map Code.:</b>	Transitional - T4	<b>Surveillance site:</b> No
<b>Waterbody ID and Name:</b>	<a href="#">GB520710101600</a> Medina	
<b>National Grid Reference:</b>	SZ 50423 93612	
<b>Current Overall Potential</b>	Moderate	
<b>Status Objective (Overall):</b>	Good by 2027	(For Protected Area Objectives see Annex D)
<b>Status Objective(s):</b>	Good Ecological Potential by 2027, Good Chemical Status by 2015	
<b>Justification if overall objective is not good status by 2015:</b>	Disproportionately expensive	
<b>Protected Area Designation:</b>	Freshwater Fish Directive, Natura 2000 (Habitats and/or Birds Directive), Nitrates Directive, Shellfish Water Directive, Urban Waste Water Treatment Directive	
<b>SSSI (Non-N2K) related:</b>	No	
<b>Hydromorphological Designation:</b>	Heavily Modified	
<b>Reason for Designation:</b>	Navigation	
<b>Downstream Waterbody ID:</b>	GB650705150000	

**Ecological Potential**

**Current Status (and certainty that status is less than good)** Moderate (Uncertain)

**Biological elements**

Element	Current status (and certainty of less than good)	Predicted Status by 2015	Justification for not achieving good status by 2015
Macroalgae	Good	Good	

**Supporting elements**

Element	Current status (and certainty of less than good)	Predicted Status by 2015	Justification for not achieving good status by 2015
Dissolved Inorganic Nitrogen	Moderate (Uncertain)	Moderate	Disproportionately expensive (N1c)
Dissolved Oxygen	High	High	
Copper	High	High	
Iron	High	High	

**Supporting conditions**

Element	Current status (and certainty of less than good)	Predicted Status by 2015	Justification for not achieving good status by 2015
Tidal Regime - Freshwater Flow	Does not Support Good (Uncertain)	Does not Support Good	Disproportionately expensive (HT1a)

**Ecological Potential Assessment**

Element	Current status	Predicted Status by 2015	Justification for not achieving good status by 2015
Mitigation Measures Assessment	Good	Good	

### Mitigation Measures that have defined Ecological Potential

Mitigation Measure	Status
Reduce impact of dredging	In Place
Prepare a dredging / disposal strategy	In Place
Avoid the need to dredge (e.g. minimise under-keel clearance; use fluid mud navigation; flow manipulation or training works)	In Place

### Chemical Status

**Current Status (and certainty that status is less than good)** Good

### Chemical elements

Element	Current status (and certainty of less than good)	Predicted Status by 2015	Justification for not achieving good status by 2015
Cadmium And Its Compounds	High	High	
Lead And Its Compounds	High	High	
Mercury And Its Compounds	High	High	
Nickel And Its Compounds	High	High	

<b>Waterbody Category and Map Code.:</b>	Transitional - T17	<b>Surveillance site:</b> Yes
<b>Waterbody ID and Name:</b>	<a href="#">GB520704202800</a>	Southampton Water
<b>National Grid Reference:</b>	SU 44355 07905	
<b>Current Overall Potential</b>	Moderate	
<b>Status Objective (Overall):</b>	Good by 2027	(For Protected Area Objectives see Annex D)
<b>Status Objective(s):</b>	Good Ecological Potential by 2027, Good Chemical Status by 2015	
<b>Justification if overall objective is not good status by 2015:</b>	Disproportionately expensive, Technically infeasible	
<b>Protected Area Designation:</b>	Freshwater Fish Directive, Natura 2000 (Habitats and/or Birds Directive), Nitrates Directive, Shellfish Water Directive, Urban Waste Water Treatment Directive	
<b>SSSI (Non-N2K) related:</b>	No	
<b>Hydromorphological Designation:</b>	Heavily Modified	
<b>Reason for Designation:</b>	Coastal Protection, Flood Protection, Navigation, Quayline	
<b>Downstream Waterbody ID:</b>	GB650705150000	

**Ecological Potential**

**Current Status (and certainty that status is less than good)** Moderate (Uncertain)

**Biological elements**

Element	Current status (and certainty of less than good)	Predicted Status by 2015	Justification for not achieving good status by 2015
Fish	Good	Good	
Invertebrates	Moderate (Uncertain)	Moderate	Not Required (MS)
Macroalgae	Good	Good	

**Supporting elements**

Element	Current status (and certainty of less than good)	Predicted Status by 2015	Justification for not achieving good status by 2015
Dissolved Inorganic Nitrogen	Moderate (Uncertain)	Moderate	Disproportionately expensive (N1c)
Dissolved Oxygen	High	High	
2,4-dichlorophenol	High	High	
2,4-dichlorophenoxyacetic acid	High	High	
Arsenic	High	High	
Copper	High	High	
Dimethoate	High	High	
Iron	High	High	
Linuron	High	High	
Mecoprop	High	High	
Permethrin	High	High	
Toluene	High	High	
Zinc	High	High	

**Supporting conditions**

Element	Current status (and certainty of less than good)	Predicted Status by 2015	Justification for not achieving good status by 2015
Tidal Regime - Freshwater Flow	Supports Good	Supports Good	

**Ecological Potential Assessment**

Element	Current status	Predicted Status by 2015	Justification for not achieving good status by 2015
Mitigation Measures Assessment	Moderate	Moderate	Technically infeasible (M3f)

**Mitigation Measures that have defined Ecological Potential**

Mitigation Measure	Status
Alter timing of dredging / disposal	In Place
Reduce sediment resuspension	In Place
Reduce impact of dredging	In Place
Prepare a dredging / disposal strategy	In Place
Avoid the need to dredge (e.g. minimise under-keel clearance; use fluid mud navigation; flow manipulation or training works)	In Place
Structures or other mechanisms in place and managed to enable fish to access waters upstream and downstream of the impounding works.	In Place
Indirect / offsite mitigation (offsetting measures)	Not In Place
Operational and structural changes to locks, sluices, weirs, beach control, etc	Not In Place
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	Not In Place

**Chemical Status**

Current Status (and certainty that status is less than good)	Good
--	------

Chemical elements			
Element	Current status (and certainty of less than good)	Predicted Status by 2015	Justification for not achieving good status by 2015
1,2-dichloroethane	High	High	
Atrazine	High	High	
Benzene	High	High	
Cadmium And Its Compounds	High	High	
Hexachlorobenzene	High	High	
Hexachlorobutadiene	High	High	
Hexachlorocyclohexane	High	High	
Lead And Its Compounds	High	High	
Mercury And Its Compounds	High	High	
Nickel And Its Compounds	High	High	
Pentachlorophenol	High	High	
Simazine	High	High	
Tributyltin Compounds	High	High	
Trichlorobenzenes	High	High	
Trichloromethane	High	High	
Trifluralin	High	High	
Aldrin, Dieldrin, Endrin & Isodrin	High	High	
Carbon Tetrachloride	High	High	
para - para DDT	High	High	
Tetrachloroethylene	High	High	
Trichloroethylene	High	High	

<b>Waterbody Category and Map Code.:</b>	River - R34	<b>Surveillance site:</b> Yes
<b>Waterbody ID and Name:</b>	<a href="#">GB107042016840</a>	Test (Lower)
<b>National Grid Reference:</b>	SU 35521 17625	
<b>Current Overall Status</b>	Poor	
<b>Status Objective (Overall):</b>	Good by 2027	(For Protected Area Objectives see Annex D)
<b>Status Objective(s):</b>	Good Ecological Status by 2027, Good Chemical Status by 2027	
<b>Justification if overall objective is not good status by 2015:</b>	Disproportionately expensive, Technically infeasible	
<b>Protected Area Designation:</b>	Drinking Water Protected Area, Freshwater Fish Directive, Natura 2000 (Habitats and/or Birds Directive), Nitrates Directive, Urban Waste Water Treatment Directive	
<b>SSSI (Non-N2K) related:</b>	No	
<b>Hydromorphological Designation:</b>	Not Designated A/HMWB	
<b>Reason for Designation:</b>		
<b>Downstream Waterbody ID:</b>	GB520704202800	

**Ecological Status**

**Current Status (and certainty that status is less than good)** Poor (Quite Certain - WoE)

**Biological elements**

Element	Current status (and certainty of less than good)	Predicted Status by 2015	Justification for not achieving good status by 2015
Fish	Good	Good	
Invertebrates	High	High	
Macrophytes	Moderate (Quite Certain)	Moderate	Disproportionately expensive (B1a)
Phytobenthos	Poor (Very Certain)	Poor	Disproportionately expensive (B1a)

**Supporting elements**

<b>Element</b>	<b>Current status (and certainty of less than good)</b>	<b>Predicted Status by 2015</b>	<b>Justification for not achieving good status by 2015</b>
Ammonia (Phys-Chem)	High	High	
Dissolved Oxygen	Good	Good	
pH	High	High	
Phosphate	Good	Good	
Temperature	High	High	
2,4-dichlorophenol	High	High	
2,4-dichlorophenoxyacetic acid	High	High	
Arsenic	High	High	
Copper	High	High	
Cypermethrin	High	High	
Dimethoate	High	High	
Iron	High	High	
Linuron	High	High	
Mecoprop	High	High	
Permethrin	High	High	
Phenol	High	High	
Toluene	High	High	
Zinc	High	High	
Ammonia (Annex 8)	High	High	

**Supporting conditions**

<b>Element</b>	<b>Current status (and certainty of less than good)</b>	<b>Predicted Status by 2015</b>	<b>Justification for not achieving good status by 2015</b>
Quantity and Dynamics of Flow	Does not Support Good (Uncertain)	Does not Support Good	Disproportionately expensive (HR2a)
Morphology	Supports Good	Supports Good	

**Chemical Status**

**Current Status (and certainty that status is less than good)**      Fail (Quite Certain)

Chemical elements			
-------------------	--	--	--

Element	Current status (and certainty of less than good)	Predicted Status by 2015	Justification for not achieving good status by 2015
1,2-dichloroethane	High	High	
Atrazine	High	High	
Benzene	High	High	
Benzo (a) and (k) fluoranthene	High	High	
Benzo (ghi) perelyene and indeno (123-cd) pyrene	High	High	
Benzo(a)pyrene	High	High	
Cadmium And Its Compounds	High	High	
Diuron	High	High	
Fluoranthene	High	High	
Hexachlorobenzene	High	High	
Hexachlorobutadiene	High	High	
Hexachlorocyclohexane	High	High	
Lead And Its Compounds	High	High	
Mercury And Its Compounds	High	High	
Napthalene	High	High	
Nickel And Its Compounds	High	High	
Pentachlorophenol	High	High	
Simazine	High	High	
Tributyltin Compounds	Moderate (Quite Certain)	Moderate	Technically infeasible (C2a)
Trichlorobenzenes	High	High	
Trichloromethane	High	High	
Trifluralin	High	High	
Aldrin, Dieldrin, Endrin & Isodrin	High	High	
Carbon Tetrachloride	High	High	
para - para DDT	High	High	
Tetrachloroethylene	High	High	
Trichloroethylene	High	High	



