Port of London Authority – Maintenance Dredge Protocol

Baseline Document Update

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Port of London Authority, Hydrographic Service,
Royal Pier Road, Gravesend
Kent. DA12 2BG
Tel: +44 (0) 1474 562206
Fax: +44 (0) 1474 562314

Summary

This report, commissioned by the Port of London Authority (PLA) and compiled by ABPmer, provides an update to the Maintenance Dredge Protocol (MDP) Baseline Document (PLA, 2014). It provides an updated summary of maintenance dredging activities and sediment contamination analysis undertaken between January 2014 and April 2018 within the Thames Estuary, for which the PLA is the Harbour Authority, and reviews the information required to inform an appropriate assessment with regards to potential effects to designated sites. In addition to the requirements of the Habitats Regulations 2017, this document also updates information presented in the MDP Baseline Document (PLA, 2014) to address requirements under the Water Framework Directive (WFD). This report is intended to supplement and, where required, update the information presented within the MDP Baseline Document (PLA, 2014), signposting to the original document to avoid replication where appropriate.

Maintenance dredging within the Thames Estuary (up to the normal tidal limit (NTL) at Teddington) is carried out under the management and direction of the PLA, which has a responsibility to maintain depths within navigation channels. However, maintenance dredging of non-harbour authority berths and approaches is the responsibility of third party organisations under the regulation of the PLA. The majority of dredging within the Thames, by volume and frequency, is undertaken using water injection dredging (WID), although other dredging techniques are also used to a lesser extent (e.g. trailer suction hopper dredging (TSHD), plough (bed levelling) and backhoe).

The Thames Estuary and surrounding area continues to be of high nature conservation importance, with large areas of the estuary and the adjacent coastline having been designated as nationally and internationally protected sites. These sites include Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Ramsar sites and Marine Conservation Zones (MCZs), namely:

- Margate and Long Sands SAC;
- Essex Estuaries SAC;
- Southern North Sea SAC;
- Outer Thames Estuary SPA;
- Foulness (Mid-Essex Coast Phase 5) SPA and Ramsar;
- Benfleet and Southend Marshes SPA and Ramsar;
- Medway Estuary and Marshes SPA and Ramsar;
- Thames Estuary and Marshes SPA and Ramsar;
- Medway Estuary MCZ
- The Swale Estuary MCZ; and
- Swanscombe recommended MCZ (rMCZ) *[It is noted that this site was designated as an MCZ during the review period for this update in May 2019]*.

This update report provides a summary that is applicable at the time of publication; the MDP guidance (Department for Food and Rural Affairs (Defra), 2007) identifies that Baseline Documents should not require substantial revisions unless major changes are proposed, or significant new information becomes available.

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1. Introduction

1.1 Background

In order to comply with the requirements of the Conservation Assessment Protocol (Department for Environment, Food and Rural Affairs (Defra), 2007) for maintenance dredging with respect to 'The Conservation of Habitats and Species Regulations 2010' (since consolidated by the Habitats Regulations 2017), the Port of London Authority (PLA) commissioned a Maintenance Dredge Protocol (MDP) Baseline Document incorporating historic data up to the end of 2013. The MDP Baseline Document (PLA, 2014) was developed to assist operators and regulators seeking, or giving approval, for maintenance dredging activities that could potentially affect European nature conservation designated sites. Specifically, the MDP Baseline Document (PLA, 2014) provides for:

- Third parties wishing to carry out maintenance dredging within the study area with relevant baseline information;
- Information needed to inform the preparation of Water Framework Directive (WFD; 2000/60EC) assessments in accordance with relevant guidance; and
- Information to assist competent authorities in identifying 'likely significant effect' in respect of future maintenance dredging applications or proposals.

The MDP Baseline Document (PLA, 2014) included a summary of dredging activities that were applicable at the time of publication (up to the end of 2013). It identified a number of proposed and consented schemes which were anticipated within the Thames Estuary, assessed the effects of maintenance dredging on designated sites as per the requirements of the Conservation Assessment Protocol and provided for expected updates required as navigational dredging continued within the Thames Estuary.

Since the start of 2014, there have been sufficient changes to both the designated sites and dredging practices to warrant a revision of the MDP Baseline Document. There have been several new developments within the PLA Harbour Authority boundary which require incorporating within the MDP Baseline Document, such as works associated with the Grays Terminal, Tilbury2, DP World London Gateway and Thames Tideway Tunnel, among other ongoing dredging works.

1.2 Future Application

This report, commissioned by the PLA and compiled by ABPmer, provides an update to the MDP Baseline Document (PLA, 2014). It provides an updated summary of maintenance dredging activities and sediment contamination analysis undertaken between January 2014 and April 2018 within the Thames Estuary, for which the PLA is the Harbour Authority, and reviews the information required to inform an appropriate assessment with regards to potential effects to designated sites. In addition to the requirements of the Habitats Regulations 2017, this document also updates information presented in the MDP Baseline Document (PLA, 2014) to address requirements under the WFD.

This report is intended to supplement and, where required, update the information presented within the previous MDP Baseline Document for the Thames Estuary (PLA, 2014). It is not, however, the purpose or intention of this report to replicate the information presented within the MDP Baseline Document (PLA, 2014), and will only do so where it provides additional context to the information or assessment contained herein. For instance, a detailed description of the coastal and estuarine processes and morphology can be found in Section 5 of the MDP Baseline Document (PLA, 2014), including the past evolution of the Thames Estuary, tidal levels, currents, waves, salinity and the sediment regime. Such baseline

information remains valid at this update stage and reference should be made to the original text where necessary. Referencing is provided throughout to signpost where additional data can be sourced within the MDP Baseline Document (PLA, 2014).

It should be noted that the MDP recommends that as dredge sites and operations change over time, whether as a result of natural or anthropogenic change, the Baseline Document will need to evolve. As such, it is expected that future baseline update documentation will be produced as more information becomes available and if circumstances and requirements change. Since the MDP Baseline Document (PLA, 2014) was published, DP World London Gateway is now fully operational, construction works for the Thames Tideway Tunnel project are ongoing and the Development Consent Order (DCO) for the Tilbury2 port development was granted in February 2019. In September 2014, the review of the proposed Inner Thames Estuary Airport concluded that the scheme would not be shortlisted for further consideration due to obstacles to delivery, high costs and uncertain benefits (Airport Commission, 2014). Similarly, the Garden Bridge project has been abandoned and the previously approved Enderby Wharf cruise terminal cancelled.

1.3 Study Area

The PLA Harbour Authority boundary remains the same as considered in the MDP Baseline Document (PLA, 2014), described under the Port of London Act 1968 (as amended). In summary, the PLA is the Harbour Authority for the Thames Estuary from the seaward approaches in the Outer Thames to the normal tidal limit (NTL) at Teddington, and the study area is commensurate with the extremities of the PLA's Statutory Harbour Authority Area (see Figure 1).

The study area includes the approach channel to the Medway Estuary; however, whilst referenced and identified within this report, historical and current maintenance dredging has been described in an MDP Baseline Document specific to the Medway Approaches, Medway Estuary and The Swale (Peel Ports, 2012) and hence is not described in detail here. It is recognised that an update to the Medway Approaches, Medway Estuary and The Swale MDP Baseline Document (Peel Ports, 2012) is also currently underway.

1.4 Report Structure

This report is structured as follows:

Section 1: Introduction (this section);
Section 2: Details changes in legislation relevant to the provision of an MDP Baseline Document and consideration of the WFD;
Section 3: Details dredging and disposal activities undertaken within the Thames Estuary between January 2014 and April 2018;
Section 4: Contains information relating to sediment contamination and presents an overall assessment of sediment quality in the Thames Estuary, based on samples collected between January 2014 and April 2018;
Section 5: Outlines the nature conservation designations (and features) within the study area, as well as WFD water bodies and their current status; and
Section 6: Summarises data gaps identified during the data collation stages of this update and makes recommendations relating to information for future iterations of the MDP Baseline Document.

In addition, further information is provided in two appendices, specifically:

Appendix A: Information for an Appropriate Assessment; and
Appendix B: Sediment Quality Data.

2. Legislative Context

Marine navigational dredging (both capital and maintenance) 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) in England. Also, where powers to dredge in Harbour Areas are conferred by Acts of Parliament, local works or dredge licences issued by the relevant Harbour Authority may permit dredging (and other activities) within the scope of the special Act under which they are issued.

A full description of the legislative context is contained in Section 2 of the MDP Baseline Document (PLA, 2014), including the powers held by the PLA as the Statutory Harbour Authority on the River Thames. However, there have been some updates to legislation and guidance since the start of 2014 as summarised in Table 1 below.

MDP Baseline Document (PLA, 2014)	Update	Impact Statement
The Conservation of Habitats and Species Regulations 2010	The Conservation of Habitats and Species Regulations 2017	The revocation and replacement of the Habitats Regulations 2010 acted to consolidate all subsequent amendments, incorporate minor amendments to improve cross reference to other legislation and rectify minor errors in drafting. There are no substantive changes to existing policies or procedures that will require implementation of changes for dredging applications and processes.
The Marine Works (Environmental Impact Assessment) Regulations 2007	The Marine Works (Environmental Impact Assessment) (Amendment) Regulations 2017	The amendment of the Marine Works Regulations in 2017 incorporated the amendments to the Environmental Impact Assessment (EIA) Directive (2014/52/EU). These amendments are intended to reduce the administrative burden of the legislation.
The Water Environment (WFD) (England and Wales) Regulations 2003	The Water Environment (WFD) (England and Wales) Regulations 2017	The revocation and replacement of the Water Environment (WFD) Regulations 2003 acted to consolidate all subsequent amendments, and expand upon some aspects to increase clarity without changing any of the policy or procedures required by the legislation.
'Clearing the Waters' (Environment Agency, 2012) – WFD guidance for dredging and disposal activities in transitional and coastal waters.	'Clearing the Waters for All' – WFD guidance for any activity in transitional and coastal waters, available online at: https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters (Accessed March 2019)	The Environment Agency's guidance for WFD assessments has been moved into an online format, providing an improved process to consider compliance of an activity against the objectives of the WFD. This includes a scoping template and a water body summary table (which details the extent of low and high sensitivity habitats within each water body, among other features).
Freshwater Fish Directive (78/659/EEC)	Incorporated into WFD	The Freshwater Fish Directive has been incorporated within the WFD and, therefore, has been revoked.

Shellfish Waters Directive (2006/113/EC)	Incorporated into WFD	The Shellfish Waters Directive was repealed in December 2013 and subsumed within the WFD. Shellfish Water Protected Areas have been designated in England by the Water Environment (WFD) (England and Wales) Regulations 2017.
Bathing Waters Directive (2006/7/EC)	Reporting against the updated assessment criteria	The Bathing Water Directive (76/160/EEC) was repealed at the end of 2014 and monitoring of bathing water quality has been reported against revised Bathing Water Directive (2006/7/EC) indicators since 2015. The new classification system considers all samples obtained during the previous four years and, therefore, data has been collected for revised Bathing Water Directive indicators since 2012.

Table 1. Changes to key legislation and guidance

General licence and monitoring information is provided in Section 3 of the MDP Baseline Document (PLA, 2014), including requirements prior to commencement and on completion of a dredging campaign (e.g. notification), requirements of how the dredge is to be undertaken, typical licence conditions and sediment sampling requirements.

3. Dredging Information

The Thames has historically been dredged in order to maintain the navigability of the channel and to maintain berthing pockets. Historic dredging data (2004 – 2013) has been collated in Section 6 of the MDP Baseline Document (PLA, 2014), including dredge quantities, dredge techniques, dredge timings and the status of existing dredge disposal sites.

This report describes dredging and disposal activities, as well as sediment sampling, undertaken in the Thames Estuary between January 2014 and April 2018, including data from dredge sites identified in the MDP Baseline Document (PLA, 2014) and additional dredge sites.

3.1 Current Dredge Practice

3.1.1 *Overview*

Maintenance dredging within the Thames Estuary (up to the NTL at Teddington) is carried out under the management and direction of the PLA, which has a responsibility to maintain depths within the navigation channels. A Maintenance Dredge Framework, established by the PLA in partnership with members of the Dredging Liaison Group (a Thames Estuary Partnership Action Group), provides for the coordinated management of dredging operations on the tidal Thames; refer to Section 4 of the MDP Baseline Document (PLA, 2014) for further details. Berth operators are responsible for the maintenance of their respective berths and approaches under the regulation of the PLA and in accordance with the Maintenance Dredging Framework.

The following sections of this report cover the maintenance dredging carried out by the PLA, who have powers to carry out maintenance dredging for navigational purposes under Section 73 of the 'Port of London Act 1968', but also dredging undertaken within the Thames Estuary by third party (non-PLA) operators. Data and information on dredging operations in the Thames Estuary were obtained through consultation with the PLA.

Descriptions of various dredging techniques are captured in the MDP Baseline Document (PLA, 2014), including water injection dredging (WID), hydro-dynamic, trailer suction hopper dredging (TSHD), plough (bed levelling) and backhoe. As shown in Table 2, the majority of dredging undertaken within the Thames Estuary between January 2014 and April 2018 was through the use of WID (greater than 80%), with moderate volumes dredged by TSHD and backhoe (approximately 10% and 5%, respectively), and minor volumes using grab and plough dredging (less than 1% combined). In total, 1,032,930 m^3 of material was dredged within the Thames Estuary during this period; significantly less compared to the period 2004 to 2013 where over 35,208,841 m^3 of material was dredged (PLA, 2014), albeit this was primarily associated with the London Gateway capital dredge (approximately 31 million m^3).

Dredging Technique	Dredge Volume (m^3)
Water Injection Dredging (WID)	868,135
Trailer Suction Hopper Dredging (THSD)	105,332
Backhoe	51,490
Grab	6,308
Plough	1,665

Table 2. Total dredge volumes per dredging technique for the Thames Estuary between January 2014 and April 2018

3.1.2 *Disposal Sites*

As shown in Table 2, maintenance dredging within the Thames Estuary is predominantly achieved through WID. Therefore, as a result of this technique, the dredged sediments do not require disposal to licensed marine or land disposal sites. Dredged sediments are dispersed locally in the water column (largely at the bed as a dense plume), promoting relocation of material in the immediate vicinity of the dredge site.

Where dredge material is collected and subsequently removed from dredge locations in the study area, such as through TSHD or backhoe dredging, there are a number of marine and land disposal sites within the Thames Estuary, specifically (see Figure 2 for locations):

- Marine disposal sites:
  - South Falls (TH060);
  - Inner Gabbard (TH052); and
  - North Edinburgh Channel (TH080).

- Land disposal sites:
  - Rainham Silt Lagoons;
  - Cliffe Pools; and
  - Goshem's.

3.2 Current Dredge Operations

3.2.1 *The PLA Dredging*

Maintenance dredging activities by the PLA are undertaken using a variety of techniques, largely depending on the location of the dredge area (e.g. accessibility and water depth) and the material type requiring dredging. Table 3 provides a summary of the PLA dredge campaigns and a record of the PLA maintenance dredge volumes for the period between January 2014 and April 2018. During this period, Hookness Shoal, Royal Terrace Pier and West Oaze were each dredged for a single campaign, with the total volume dredged from these three sites 5,976 m^3; this equates to less than 1% of the total dredge volume within the Thames Estuary. Refer to Section 6 of the MDP Baseline Document (PLA, 2014) for a summary of the PLA dredge campaigns between 2004 and 2013.

Dredge Site	Dredge Technique	Maximum Dredge Depth	Sediment Type	Dredge Volume (m^3)					Sediment Quality Data (2014 – 2018)
				2014	2015	2016	2017	2018*	
Hookness Shoal	Plough	5.8 m below CD	Sand/Gravel	1,665	0	0	0	0	Yes
Royal Terrace Pier	WID	2.3 m below CD	Silt	0	0	0	1,512	0	Yes
West Oaze	WID	14.8 m below CD	Sand	0	0	2,799	0	0	Yes
Knock John**	TSHD/WID	15.3 m below CD	Sand	0	0	0	0	0	Yes

* Data available up to the end of April 2018. ** Note, Knock John was not dredged between January 2014 and April 2018, although samples were collected for sediment quality analysis (see Appendix B). CD – chart datum; WID – water injection dredging; TSHD – trailer suction hopper dredging.

Table 3. Summary of the PLA dredging within the Thames Estuary between January 2014 and April 2018

3.2.2 *Third Party Dredging*

The Thames Estuary provides numerous docks, wharves, jetties, pontoons and slipways which are used by a range of commercial and recreational estuary users. Many of these facilities require regular maintenance dredging to remove recently deposited material to ensure safe navigation and appropriate access. Whilst the PLA has a responsibility to maintain the main navigational fairways, the maintenance dredging of non-harbour authority berths and approaches is the responsibility of third parties (under the regulation of the PLA), thus referred to as 'third party dredging' in the MDP Baseline Document (PLA, 2014) and this update report.

The following sections detail the activities of organisations that have been identified as undertaking third party dredging within the Thames Estuary during the period January 2014 to April 2018. A summary of all known third party dredging activity is provided (Table 4), with locations shown in Figures 3 to 9. Additional detail regarding individual third party dredging activities has been provided for large scale projects undertaken in the Thames Estuary, specifically dredging works to support the Thames Tideway Tunnel project (Table 5 and Table 6), Oikos Terminal including approaches (Table 7), Grays Terminal (Table 8) and London Gateway berths (Table 9). In addition, details of licensed third party dredging which is yet to be completed are provided (Table 10).

3.2.2.1 Summary of Third Party Dredging

Maintenance dredging activities by third parties have been undertaken at a number of locations using a variety of techniques (based on the sediment type). In total, 995,323 m^3 was dredged by third parties during the period January 2014 to April 2018 (Table 4).

The Medway Approach Channel is located within the PLA Statutory Harbour boundary, but it is under the administration of the Medway Ports Authority. Whilst dredging of the Medway Approach Channel is licensed by PLA, details and assessment of these specific dredging and disposal works is covered separately in 'The Medway Approaches, Medway Estuary and The Swale MDP and WFD Baseline Document' (Peel Ports, 2012) and other related documentation. For context, however, maintenance dredging is required to provide safe navigation along the approach channel into the Medway Estuary and maintenance dredging during the period January 2014 to April 2018 is included in Table 4.

Dredge Site	Dredge Technique	Maximum Dredge Depth	Sediment Type	Dredge Volume (m^3)					Sediment Quality Data (2014 – 2018)
				2014	2015	2016	2017	2018*	
Alpha Jetty	Plough	6 m below CD	-	0	500	0	0	0	No
Bell Lane Creek	Backhoe	Area 1, 2 and 5: 1 m above CD Area 3: 0.6 m above CD Area 4: 1.8 m above CD Area 6: 1.6 m above CD Area 7: 2 m above CD	Sandy gravel	0	0	3,789	0	0	Yes
Civil and Marine	Backhoe	6.7 m below CD	Muddy sandy gravel, organic fragments	0	0	2,619	0	0	Yes
Customs Jetty (Pier)	WID	Riverside: 3 m below CD Shoreside: 2.5 m below CD	-	7,992	9,251	8,320	10,384	0	Yes
Grays Terminal	Backhoe	13.3 m below CD	Clay/chalk overlain by muddy sandy gravel	0	0	0	9,651	0	Yes
Jurgens Jetty	WID	Outer: 9.6 m below CD Inner: 3.6 m below CD	Silt	0	8,533	11,125	0	6,290	Yes
King George V Lock	WID	4 m below CD	Silt	7,937	24,133	13,620	22,785	0	Yes
London Gateway	WID	17 m below CD	Silt/sand	0	0	0	9,647	0	Yes
Medway Approach Channel	THSD	12 m below CD	Silt/sand	0	0	0	105,332	0	Yes
Middleton Jetty (Wharf)	WID	Outer: 5 m below CD Inner: 3.6 m below CD	Silt	7,491	17,425	16,569	6,711	0	Yes
Murphy's Wharf Jetty	Backhoe	0.3 m below CD	Silt/sand with clay	0	0	390	0	0	No
Northfleet Hope Container Terminal	WID	13.8 m below CD	Silt, high gravel/ sand content	2,490	0	0	0	0	Yes
Northfleet Wharf Jetty	Grab	3.4 m below CD	Sandy gravel, organic material	0	0	6,308	0	0	Yes

Dredge Site	Dredge Technique	Maximum Dredge Depth	Sediment Type	Dredge Volume (m^3)					Sediment Quality Data (2014 – 2018)
				2014	2015	2016	2017	2018*	
Oikos Terminal (including capital approaches)	WID	Berth box: 14 m below CD Rear berth: 4 m below CD Clearance channel: 14.5 m below CD Approach area: 9 m below CD	Silt/fine sand	31,050	71,693	145,140	94,323	20,051	Yes
Plantation Wharf Pier	Backhoe	2 m below CD	-	0	2,790	0	0	0	No
Purfleet Deep Wharf	WID	Upper and lower berth: 8 m below CD Lower berth additional area:7.8 m below CD Inner area: 1 m below CD Pontoon: 3 m below CD	Silt/very coarse sand	11,038	9,123	12,968	12,410	729	Yes
Robins Wharf	WID	3 m below CD	Silt	0	2,205	1,497	0	0	Yes
S Jetty	WID	16 m below CD	Mud with gravel and sand	7,596	0	0	0	0	Yes
Thames Oilport	WID	Jetty 3: 13.4 m below CD Jetty 4: 14 m below CD Jetty 5: 13.1 m below CD Coryton Patch: 11 m below CD	Silt and fine/ medium sand	34,255	5,241	0	11,079	0	Yes
Thames Refinery	WID	10 m below CD	Silt	6,104	4,521	4,914	0	4,937	Yes
Thunderer Jetty	WID	11 m below CD	Muddy sand	0	2,025	0	0	0	Yes
Tilbury Dock Entrance (Bellmouth)	WID	Tilbury Dock Entrance: 8.5 m below CD (7 m below CD in restricted area) Tilbury Landing Stage: 10 m below CD	Silt	4,080	42,925	26,992	9,075	5,766	Yes
Vopak London Terminal	WID	Jetty 1 & 2: 10.5 m below CD Jetty 3: 7.9 m below CD	Very gravelly, very silty sand	4,588	11,497	7,293	10,245	0	Yes
Walbrook Wharf	Excavator	2 m above CD	-	120	0	0	0	0	No

Dredge Site	Dredge Technique	Maximum Dredge Depth	Sediment Type	Dredge Volume (m^3)					Sediment Quality Data (2014 – 2018)
				2014	2015	2016	2017	2018*	
West India Dock (Lock Entrance)	WID	4.7 m below CD	Slightly sandy/ clayey silt	8,491	17,856	16,500	6,198	6,307	Yes
White Mountain Jetty	WID	1 m above CD	-	0	0	2,409	0	0	Yes
* Data available up to the end of April 2018. CD – chart datum; WID – water injection dredging; TSHD – trailer suction hopper dredging.									

Table 4. Summary of third party dredging (excluding Thames Tideway Tunnel) within the Thames Estuary between January 2014 and April 2018

3.2.2.2 Thames Tideway Tunnel

Organisation	Thames Water
Dredge Location	See Figure 9
Current Maximum Dredge Depth	Various (see Table 6)
Dredging Technique	A closed bucket backhoe methodology has been used for the majority of works, with material disposed to land. Some levelling of material using backhoe for berth formation. Also, some pile line clearance using backhoe with material reinstated (at low tide where possible).

Table 5. Thames Tideway Tunnel

Description: The Thames Tideway Tunnel, with construction starting in 2016 for a seven-year period, is a tunnel running mostly under the River Thames through central London. The tunnel is intended to provide storage and conveyance of combined raw sewage and rainwater discharges that currently overflow into the river.

The scheme involves construction of a tunnel running from Acton in the west of London through to Abbey Mills in the east, controlling 34 of the most polluting combined sewers overflows via transfer tunnels along the way or system modifications. The captured sewage will then be transferred to Beckton Sewage Treatment Works (currently being upgraded to increase capacity) via the Lee Tunnel (already under construction) for treatment before being released. On completion, the main tunnel will be approximately 25 km (16 miles) in length and have an internal diameter of 7.2 m. It will run through the centre of London, at a depth of approximately 30 m in the west through to 70 m in the east.

As part of the Thames Tideway Tunnel project, various sites along the Thames have required dredging activities, thus far involving the removal of 32,251 m³ of sediment. A summary of the depth and volume of sediment dredged or approved by the PLA to be dredged under the DCO at each site is provided in Table 6 below. It should be recognised that the Thames Tideway Tunnel third party dredging activities are outside of any marine nature conservation designations.

Dredge Site	Maximum Dredge Depth	Dredge Volume (m³)	Sediment Quality Data (2014 – 2018)
Albert Embankment Foreshore	1.7 m below CD	718	No
Blackfriars Bridge Foreshore	3.8 m below CD	6,140	Yes
Carnwath Road Riverside	0.0 m below CD	7,515	Yes
Chambers Wharf	4.5 m below CD	6,650	Yes
Chelsea Embankment Foreshore	0.345 m above CD	1,627	Yes
Cremone Wharf Depot	3.0m above CD	200	No
Heathwall Pumping Station	2.13 m below CD	678	No
King Edward Memorial Park Foreshore	2.5 m below CD	2,649	Yes
Kirtling Street	3.51 m below CD	999	No
Putney Embankment Foreshore	2.77 m below CD	3,375	Yes
Victoria Embankment Foreshore	2.8 m below CD	1,700	No
CD – chart datum.			

Table 6. Summary of Thames Tideway Tunnel dredging activities (completed or approved by the PLA) since 2016

3.2.2.3 Oikos Terminal

Organisation	Oikos
Dredge Location	See Figure 4
Current Maximum Dredge Depth	12.5 m below CD (main berth box) 4 m below CD (behind jetty) 13.5 m below CD (escape channel)
Material Type	Silt/fine sand
Dredging Technique	WID

Table 7. Oikos Terminal

Description: The Oikos jetty has been dredged regularly since construction in order to permit all tide operations. In addition to the maintenance dredging reported in the MDP Baseline Document (PLA, 2014), a programme of capital dredging was undertaken in 2016 on the approaches to the Oikos Terminal. From January 2014 to April 2018, a total volume of 362,257 m³ was dredged (using WID) from Oikos Terminal and Approaches. This equates to a slight increase in annual average dredge volumes from 43,303 m³ between 2004 and 2013 (PLA, 2014), to 72,451 m³ for the period January 2014 to April 2018 (noting further dredging may have occurred in 2018 post-April); however, the capital dredging in 2016 (145,140 m³) significantly contributed to this uplift in volume.

3.2.2.4 Grays Terminal

Organisation	NuStar
Dredge Location	See Figure 5
Current Maximum Dredge Depth	13.3 m below CD
Material Type	Clay/chalk overlain by muddy sandy gravel
Dredging Technique	Backhoe

Table 8. Grays Terminal

As part of a strategic investment by NuStar for liquid bulk transportation at the Grays Terminal, a dredging programme has been undertaken to deepen the berth to accommodate larger vessels with drafts of up to 12.8 m. During development in 2017, 9,651 m³ of sediment was dredged using a backhoe.

3.2.2.5 London Gateway

Organisation	DP World
Dredge Location	See Figure 4
Current Maximum Dredge Depth	17.0 m below CD (Berths 1, 2 and 3) 14.5 m below CD (manoeuvring area, Yantlet Channel and future berth) 16.5 m below CD (majority of outer navigation channel) 15.0 m below CD (Knock John Channel).
Material Type	Silt/sand
Dredging Technique	WID/TSHD

Table 9. London Gateway

Description: Construction works at the London Gateway began in February 2010, comprising the reclamation of approximately 92 hectares of land from the river and raising of around 80 hectares of existing land. In total, the capital dredge (undertaken pre-2014) amounted to approximately 31.35 Mm^3, of which around 2.5 Mm^3 was disposed at the licensed South Falls (TH070) disposal ground. The remainder of the dredge material was used in land works (i.e. the construction of the reclamation) or for beneficial use (PLA, 2014).

Since 2014, a limited amount of dredging has been required to maintain the London Gateway berth depths and remove any build-up of sediment. In total, 9,647 m³ of sediment has been dredged from the London Gateway Berths, all of which was undertaken in 2017.

3.2.2.6 Further Licensed Third Party Dredging

Table 10 presents licensed third party dredging (approved between January 2014 and April 2018) which is, as yet, is to be completed. The majority of the licensed third party dredging activities yet to be completed is '*de minimis*', with the exception of the RMC Dagenham Jetty capital dredge (14,000 m^3).

Dredge Site	Dredge Technique	Maximum Dredge Depth	Maximum Dredge Volume (m^3)
Alpha Jetty	Grab Dredger	6.0 m below CD	500
Battersea Power Station Jetty	Excavator	Current surface level	500
Bay Wharf	Backhoe	-	21
Coal Jetty	Mini Excavator	1.35 m above CD	60
Denton Wharf	WID	5.5 m below CD	460
Dove Pier	Fork and Rake	1.1 m below CD	30
Downings Road	Mini Excavator	2.5 m below CD	40
Downings Road	Mini Excavator	2.5 m below CD	40
Enderby Wharf	Box Anchor Dredge	0.1 m below CD	1
Fulham Wharf	Excavator	-	2
Garden Bridge Trust	Backhoe	4.6 m below CD (N); 2.3 m below CD (S)	700
Goshem's Farm	Backhoe	2.0 m above CD	210
Great Breach Sluice	Backhoe via Pontoon	-	40
HQS Wellington	Backhoe	2.93 m below CD	1,750
Murphy's Wharf	Backhoe	4.0 m below CD	400
Oyster Pier	Backhoe	-	10
RMC Dagenham Jetty	Long Reach Backhoe	5.5 m below CD	14,000
Savoy Pier/ Woods Quay	Backhoe	D1: 1.1 m below CD; D2: 2.0 m below CD	2,240 (D1); 1,100 (D2)
St George's Wharf	Backhoe and Grab	1.0 m below CD	1,000
Wandsworth Riverside Quarter Berthing Pontoon	Plough	1.5 m below CD	200

Table 10. Licensed third party dredging which has not been completed

4. Sediment Quality

4.1 Overview

This section describes the chemical characteristics of sediments within the study area. Data on sediment quality within the Thames Estuary has been obtained from a number of sites between January 2014 and April 2018, including both the PLA and third party dredge areas. These data typically included concentrations of the following contaminants:

- Metals: arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc;
- Organotins: dibutyltin (DBT) and tributyltin (TBT);
- Polychlorinated biphenyls (PCBs) – ICES 7 congeners: PCB28, PCB52, PCB101, PCB118, PCB138 PCB153 and PCB180;
- Polycyclic aromatic hydrocarbons (PAHs) – USEPA suite of 16: acenaphthene, acenaphthylene, anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(b) fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h) anthracene, fluoranthene, fluorene, indeno(123-c,d)pyrene, naphthalene, phenanthrene and pyrene; and
- Total hydrocarbon content (THC).

Unlike water quality, there are no formal quantitative environmental quality standards (EQS) for the concentration of contaminants in sediments, although the WFD has introduced optional standards for a small number of priority and priority hazardous substances. The Centre for Environment, Fisheries and Aquaculture Science (Cefas) has prepared a series of Guideline Action Levels to assist in the assessment of dredged material (and its suitability for disposal to sea). In general, contaminant levels in dredged material below Action Level 1 (AL1) are of no concern and are unlikely to influence the licensing decision. However, dredged material with contaminant levels above Action Level 2 (AL2) is generally considered unsuitable for disposal at sea. Dredged material with contaminant levels between AL1 and AL2 requires further consideration (and may require testing) before a decision can be made.

The Cefas Guideline Action Levels should not be viewed as pass/fail thresholds. However, these guidelines provide an appropriate context for consideration of contaminant levels in sediments and are used as part of a 'weight of evidence' approach to assessing dredged material. There has been no change to the Cefas Guideline Action Levels since the publication of the MDP Baseline Document (PLA, 2014).

4.2 Sediment Quality within the Study Area

Sediment quality data collected between January 2014 and April 2018 from both the PLA and third party dredge areas within the Thames Estuary are provided in Appendix B. Additional datasets are included for areas which have not been dredged during this period, but have been sampled. A summary of sediment quality in the Thames Estuary, compared against the respective Cefas Guideline Action Levels, is provided below.

4.2.1 *Metals*

The data collated indicates that the majority of metal concentrations are below AL1 including both the PLA and third party dredge locations. However, there were a number of samples where at least one metal was reported above AL1, and some samples where AL2 was exceeded. Where AL2 was exceeded, this predominantly related to mercury and/or lead concentrations, although the data highlights considerable variability in metal concentrations both between separate dredge areas and between samples taken from the same dredge area.

4.2.2 *Organotins*

The vast majority of samples collected between January 2014 and April 2018 reported concentrations of TBT and DBT as below AL1. However, organotin concentrations at four locations were reported above AL1 and, at two dredge areas, there were occurrences of organotin concentrations above AL2.

4.2.3 *Polychlorinated Biphenyls*

The vast majority of sediment samples analysed in the Thames Estuary from both the PLA and third party dredge areas reported PCB concentrations below the analytical limit of detection (LOD). As such, the sum of the ICES 7 congeners was typically below AL1. In instances where AL1 was exceeded (there is no AL2 for the sum of ICES 7 congeners), this was typically due to the accumulation of each LOD value reported by the laboratory.

4.2.4 *Polycyclic Aromatic Hydrocarbons and Total Hydrocarbons*

In general, the majority of PAH concentrations were below AL1 in samples analysed from both the PLA and third party dredge areas. However, there was significant variation in PAH concentrations between dredge areas, with the majority of samples reporting one or more PAHs above AL1 (there is no AL2 for PAHs). The specific PAH above AL1 varied between locations, with no clear spatial trend, and the concentrations varied significantly, with some values up to two orders of magnitude above AL1. Large variations in THC concentration were observed, although there is currently no Cefas Guideline Action Level for this parameter.

4.2.5 *Summary*

Sediment quality results throughout the study area exhibit a varied degree of contamination for those parameters analysed. The available sediment quality data indicates that contaminant concentrations are typically below AL1; however, there are numerous instances where concentrations are above AL1, with a small number of concentrations observed above AL2. There is significant variation both between and within sites. In general, there are no clear and consistent trends in sediment quality (positive or negative) when comparing sample results from the period January 2014 to April 2018 (i.e. this update document) and those included in the MDP Baseline Document (PLA, 2014). Therefore, it is not thought that sediment quality would have any significant implications for dredging in the Thames Estuary beyond current practices and regulation.

5. Environmental Information

This section provides information regarding nature conservation designated sites in the Thames Estuary, including the latest conservation advice, as well as data relevant to the objectives of the WFD. This section provides an update to the MDP Baseline Document (PLA, 2014). The main updates captured in this update include the following:

- Margate and Long Sands Site of Community Importance (SCI) approved as a Special Area of Conservation (SAC);
- Designation of the Southern North Sea SAC;
- Change in extent and qualifying features of the Outer Thames Estuary Special Protection Area (SPA);
- Swale Estuary recommended Marine Conservation Zone (rMCZ) approved as a Marine Conservation Zone (MCZ);
- Thames Estuary rMCZ not taken forward for consideration; and
- Swanscombe rMCZ included for consideration in the third tranche of MCZs *[It is noted that this site was designated as an MCZ during the review period for this update in May 2019]*.

5.1 Conservation and Designation Status

Article 3 of the Habitats Directive (92/43/EEC, as amended) requires the establishment of a European network of important high-quality conservation sites known as SACs that will contribute to conserving habitats and species identified in Annexes I and II of the Directive. The listed habitat types and species are those considered to be most in need of conservation at a European level (excluding birds). In accordance with Article 4 of the Birds Directive (2009/147/EC), SPAs are strictly protected sites classified for rare and vulnerable birds (Annex I of the Directive), and for regularly occurring migratory species. Ramsar sites are wetlands of international importance designated under the Ramsar Convention (adopted in 1971 and came into force in 1975), providing a framework for the conservation and wise use of wetlands and their resources. The Marine and Coastal Access Act 2009 enabled the designation of MCZs in the territorial waters adjacent to England and Wales (and UK offshore waters) to conserve vulnerable marine flora or fauna, marine habitats or types of marine habitat and features of geological or geomorphological interest.

The nature conservation importance of the Thames Estuary and the surrounding area is recognised through a number of protected sites as shown in Figure 2, Figure 10 and Figure 11; it should be noted that the Figure 2 and Figure 10 do not show the full seaward/northern extent of the Outer Thames Estuary SPA, the Margate and Long Sands SAC and Southern North Sea SAC (included due to overlap with licensed marine disposal sites). The following sections provide further information on designated sites including SACs, SPAs, Ramsar sites and MCZs/rMCZs identified within this report.

5.1.1 *Special Areas of Conservation*

Since publication of the MDP Baseline Document (PLA, 2014), there have been no changes to the Essex Estuaries SAC. However, the Margate and Long Sands SCI was formally adopted by the UK Government in 2017 as an SAC for 'Sandbanks which are slightly covered by sea water all the time'. In addition, the Southern North Sea SAC was formally adopted by the UK Government in early 2019, designated for Harbour porpoise (*Phocoena phocoena*). It should be recognised that while the Southern North Sea SAC is located outside the PLA Harbour Authority boundary, it overlaps licensed disposal sites used by the PLA.

5.1.2 *Special Protection Areas*

Since publication of the MDP Baseline Document (PLA, 2014), there have been no changes to the Foulness (Mid-Essex Coast Phase 5) SPA, Benfleet and Southend Marshes SPA and Thames Estuary and Marshes SPA. However, the extent of the Outer Thames Estuary SPA was amended in October 2017 to include boundaries of two new qualifying features, specifically breeding Little tern (*Sternula albifrons*) and Common tern (*Sterna hirundo*) (both Article 4.1 species). The site is still designated for overwintering Red-throated diver (*Gavia stellata*).

In updating the MDP Baseline Document (PLA, 2014), it was noted that a number of qualifying features for Medway Estuary and Marshes SPA were previously omitted (or have since been designated). For completeness, the site is currently designated for the following qualifying features (Standard Data Form last updated in December 2015):

- Article 4.1:
  - Breeding: Pied avocet (*Recurvirostra avosetta*), Little tern (*Sterna albifrons*), Common tern (*Sterna hirundo*); and
  - Overwintering: Hen harrier (*Circus cyaneus*), Tundra swan (*Cygnus columbianus bewickii*), Merlin (*Falco columbarius*), Red-throated diver (*Gavia stellata*), Pied avocet (*Recurvirostra avosetta*).
- Article 4.2:
  - Overwintering: Northern pintail (*Anas acuta*), Northern shoveler (*Anas clypeata*), Teal (*Anas crecca*), Mallard (*Anas platyrhynchos*), Wigeon (*Anas penelope*), Ruddy turnstone (*Arenaria interpres*), Pochard (*Aythya ferina*), Dark-bellied brent goose (*Branta bernicla bernicla*), Dunlin (*Calidris alpina alpina*), Red knot (*Calidris canutus*), Ringed plover (*Charadrius hiaticula*), Oystercatcher (*Haematopus ostralegus*), Black-tailed godwit (*Limosa limosa islandica*), Curlew (*Numenius arquata*), Grey plover (*Pluvialis squatarola*), Shelduck (*Tadorna tadorna*), Greenshank (*Tringa nebularia*), Redshank (*Tringa totanus*); and
  - Internationally important assemblage of birds.

5.1.3 *Ramsar Sites*

Since publication of the MDP Baseline Document (PLA, 2014), there have been no changes to the Foulness (Mid-Essex Coast Phase 5) Ramsar, Benfleet and Southend Marshes Ramsar, Medway Estuary and Marshes Ramsar and Thames Estuary and Marshes Ramsar.

5.1.4 *Compensation Sites*

The National Planning Policy Framework (Ministry of Housing, Communities and Local Government, 2018) sets out the Government's planning policies for England and confirms (in Paragraph 176) that 'sites identified, or required, as compensatory measures for adverse effects on habitats sites, potential SPAs (pSPA), possible Special Areas of Conservation (pSACs), and listed or proposed Ramsar sites' should be given the same protection as habitats sites. On this basis, all completed managed realignment or recharge sites that have been created for compensatory purposes were identified in the MDP Baseline Document (PLA, 2014) and updated here. These sites are included in Figure 10 and are as follows:

- London Gateway Wildlife Reserve (Stanford-le-Hope Wharf);
- Salt Fleet Flats Reserve (previously Site X);
- Barking Creek – Barking Barrier;
- Barking Creek – A13; and
- Millennium Terraces.

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 (in particular coastal habitats and supporting species and foraging and migratory birds). For clarity, these compensation sites have been reported here as they effectively form an extension to European/Ramsar site boundaries and should be afforded the same level of protection.

5.1.5 *Marine Conservation Zones*

The Medway Estuary MCZ and The Swale Estuary MCZ are located in the vicinity of maintenance dredging activities in the Thames Estuary (see Figure 11). The Medway Estuary MCZ was designated in November 2013 under the first tranche of sites, while The Swale Estuary MCZ was included in the second tranche and designated in January 2016, thus, since publication of the MDP Baseline Document (PLA, 2014). Table 11 presents the features and conservation objectives for these two MCZ. It should be noted that the Thames Estuary rMCZ, as reported in the MDP Baseline Document (PLA, 2014), was not taken forward into the third tranche and, as such, is understood to be removed from further consideration at this time. However, the Swanscombe rMCZ, located between West Thurrock and Greenhithe on the Thames (see Figure 11), was included in consultation on sites proposed for designation in the third tranche of MCZs (Defra, 2018*) [It is noted that this site was designated as an MCZ during the review period for this update in May 2019]*.

MCZ/rMCZ	MCZ/rMCZ Features	Conservation Objectives
Medway Estuary MCZ	Estuarine rocky habitats Intertidal mixed sediments (A2.4) Intertidal sand and muddy sand (A2.2) Low energy intertidal rock (A1.3) Peat and clay exposures Subtidal coarse sediment (A5.1) Subtidal mud (A5.3) Subtidal sand (A5.2)	The conservation objective of the zone is that the protected features: 1. are maintained in favourable condition if they are already in favourable condition; and 2. be brought into favourable condition if they are not already in favourable condition. For each protected feature favourable condition means that, within a zone: 1. its extent is stable or increasing 2. its structure and function, its quality and the composition of its characteristic biological communities (including the diversity and abundance of the species forming part of or inhabiting the habitat) are sufficient to ensure that its condition remains healthy and does not deteriorate
	Tentacled lagoon worm (*Alkmaria romijni*)	For each species of marine fauna, favourable condition means that the population within a zone is supported in numbers which enable it to thrive, by maintaining: 1. the quality and quantity of its habitat; and 2. the number, age and sex ratio of its population.
	[It is noted that Smelt (Osmerus eperlanus) was added as a protected feature for this site during the review period for this update in May 2019]	

MCZ/rMCZ	MCZ/rMCZ Features	Conservation Objectives
The Swale Estuary MCZ	Estuarine rocky habitats Intertidal mixed sediment (A2.4) Intertidal coarse sediment (A2.1) Intertidal sand and muddy sand (A2.2) Low energy intertidal rock (A1.3) Subtidal coarse sediment (A5.1) Subtidal mixed sediment (A5.4) Subtidal mud (A5.3) Subtidal sand (A5.2)	The conservation objective of the zone is that the protected features: 1. are maintained in favourable condition if they are already in favourable condition; and 2. be brought into favourable condition if they are not already in favourable condition. For each protected feature favourable condition means that, within a zone: 1. its extent is stable or increasing; and 2. its structure and function, its quality and the composition of its characteristic biological communities (including the diversity and abundance of the species forming part of or inhabiting the habitat) are sufficient to ensure that its condition remains healthy and does not deteriorate.
Swanscombe rMCZ	Intertidal mud Tentacled lagoon worm (*Alkmaria romijni*)	Maintain in favourable condition *[It is noted that this site was designated as an MCZ during the review period for this update in May 2019].*

Table 11. Features and conservation objectives for MCZs in the study area

5.1.6 *Location of maintenance dredge and disposal sites*

Table 12 and Table 13 identify all the PLA and third party dredge and disposal locations which are situated less than 10 km from their nearest European/Ramsar site and MCZ, respectively. Consideration of any potential direct or indirect impacts of maintenance dredge and disposal activities within the PLA Harbour Authority boundary on the features of the designated sites is provided in Appendix A (Information for an Appropriate Assessment).

Dredge Location	Nearest European/Ramsar Site	Distance (km)
The PLA Dredge Sites		
Black Deep	Outer Thames Estuary SPA	Within
Knock John	Outer Thames Estuary SPA	Within
Oaze Deep	Outer Thames Estuary SPA	Within
West Oaze	Outer Thames Estuary SPA	Within
Holehaven Shoal	Thames Estuary and Marshes SPA, Ramsar	0.9
Lower Hope Shoal	Thames Estuary and Marshes SPA, Ramsar	0.3
Coalhouse Shoal	Thames Estuary and Marshes SPA, Ramsar	0.4
Diver Shoal	Thames Estuary and Marshes SPA, Ramsar	0.4
Royal Terrace Pier	Thames Estuary and Marshes SPA, Ramsar	2.9
Tilburyness Shoal	Thames Estuary and Marshes SPA, Ramsar	4.7
Broadness Shoal	Thames Estuary and Marshes SPA, Ramsar	8.1
Third Party Dredge Sites		
London Gateway	Outer Thames Estuary SPA	Within

Dredge Location	Nearest European/Ramsar Site	Distance (km)
Medway Approach Channel	Outer Thames Estuary SPA	Within
Smallgains Creek	Benfleet and Southend Marshes SPA	Within
Calor Gas (Canvey)	Thames Estuary and Marshes SPA, Ramsar	1.2
Oikos Terminal (Holehaven Jetty)	Thames Estuary and Marshes SPA, Ramsar	1.4
Thames Oilport	Thames Estuary and Marshes SPA, Ramsar	1.4
Coryton Construction Jetty	Thames Estuary and Marshes SPA, Ramsar	1.4
Pitsea Reclamation Jetty	Thames Estuary and Marshes SPA, Ramsar	5.2
S Jetty Shellhaven	Thames Estuary and Marshes SPA, Ramsar	1.4
Mucking Jetty	Thames Estuary and Marshes SPA, Ramsar	Within
Alpha Jetty	Thames Estuary and Marshes SPA, Ramsar	0.03
Denton Jetty	Thames Estuary and Marshes SPA, Ramsar	1.4
Tilbury Power Station	Thames Estuary and Marshes SPA, Ramsar	2.0
Customs Pier	Thames Estuary and Marshes SPA, Ramsar	2.8
Tilbury Landing Stage	Thames Estuary and Marshes SPA, Ramsar	5.8
Tilbury Bellmouth	Thames Estuary and Marshes SPA, Ramsar	5.8
Robins Wharf (Northfleet)	Thames Estuary and Marshes SPA, Ramsar	6.2
Northfleet Hope Container Terminal	Thames Estuary and Marshes SPA, Ramsar	6.1
Northfleet Wharf Jetty	Thames Estuary and Marshes SPA, Ramsar	6.8
Grays Terminal	Thames Estuary and Marshes SPA, Ramsar	8.2
Marine Disposal Sites		
Inner Gabbard	Southern North Sea SAC	Within
South Falls	Southern North Sea SAC	Within
North Edinburgh Channel	Outer Thames Estuary SPA; Margate and Long Sands SAC	Within

Table 12. Distance between the PLA and third party dredge locations, marine disposal sites and European/Ramsar sites

Dredge Location	Nearest MCZ/rMCZ	Distance (km)
The PLA Dredge Sites		
Broadness Shoal	Swanscombe rMCZ	Within
Tilburyness Shoal	Swanscombe rMCZ	2.7
Crayfordness Shoal	Swanscombe rMCZ	4.7
Royal Terrace Pier	Swanscombe rMCZ	4.9
Diver Shoal	Swanscombe rMCZ	5.4
Coalhouse Shoal	Swanscombe rMCZ	7.5
West Oaze	Medway Estuary MCZ	8.2
Jenningtree Shoal	Swanscombe rMCZ	8.9
Lower Hope Shoal	Swanscombe rMCZ	9.4

Dredge Location	Nearest MCZ/rMCZ	Distance (km)
Third Party Dredge Sites		
Medway Approach Channel	Medway Estuary MCZ	Within
Grays Terminal	Swanscombe rMCZ	Within
Vopak London Terminal	Swanscombe rMCZ	0.5
Northfleet Wharf Jetty	Swanscombe rMCZ	1.0
Northfleet Hope Container Terminal	Swanscombe rMCZ	1.4
Civil and Marine	Swanscombe rMCZ	1.5
Jurgens Jetty	Swanscombe rMCZ	1.8
Purfleet Deep Wharf	Swanscombe rMCZ	2.0
Tilbury Dock Entrance (Bellmouth)	Swanscombe rMCZ	2.0
London Gateway	Medway Estuary MCZ	3.1
Customs Pier	Swanscombe rMCZ	5.0
Tilbury Power Station	Swanscombe rMCZ	5.3
Denton Jetty	Swanscombe rMCZ	6.3
Mucking Jetty	Swanscombe rMCZ	9.7
Middleton Wharf	Swanscombe rMCZ	9.8
Alpha Jetty	Swanscombe rMCZ	9.9
[It is noted that the Swanscombe rMCZ was designated as an MCZ during the review period for this update in May 2019 – a monitoring programme is currently underway as part of the Nustar/Gray Terminal development]		

Table 13. Distance between the PLA and third party dredge locations and MCZs/ rMCZs

5.2 Regulation 37 Advice

Natural England has a statutory responsibility to advise relevant authorities as to the conservation objectives for EMS and operations which may cause deterioration or disturbance of natural habitats and species. Natural England is producing updated conservation advice for MPAs under Regulation 37 of the Habitats Regulations 2017 (formerly Regulation 35 of the Habitats Regulations 2010) and the Marine and Coastal Access Act 2009. Conservation advice for MPAs covers SACs, SPAs, Ramsar sites (high level conservation objectives only) and MCZs. The latest advice is available on Natural England's Designated Sites View (https://designatedsites.naturalengland.org.uk). 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 and the Marine and Coastal Access Act 2009 in relation to the respective sites.

Favourable condition status has not yet been defined specifically for all the European/Ramsar sites; however, condition assessments of the respective SSSIs (see Figure 11) which cover virtually the same geographic extent as the European/Ramsar sites (Figure 10) have been undertaken by Natural England (refer to Natural England's Designated Sites View (https://designatedsites.naturalengland.org.uk) for latest condition assessment). Advice on Operations has also been prepared by Natural England for SACs, SPAs and MCZs to identify pressures associated with the most commonly occurring marine activities to designated features and subfeatures, including the potential impact of

maintenance dredging. It provides a detailed assessment of sensitivity for each feature/ subfeature or supporting habitat to these pressures. The assessment of marine activities and pressures and any supporting evidence is available on Natural England's Designated Sites View (https://designatedsites.naturalengland.org.uk).

5.3 Water Framework Directive (WFD)

5.3.1 *Overview*

The Water Framework Directive (WFD) (2000/60/EC) came into force in 2000 and establishes a framework for the management and protection of Europe's water resources. It was implemented in England and Wales through the Water Environment (WFD) (England and Wales) Regulations 2003 (the Water Framework Regulations). These Regulations were revoked in April 2017 by the Water Environment (WFD) (England and Wales) Regulations 2017. The overall objective of the WFD is to achieve good status (GS) in all inland, transitional, coastal and ground waters by 2015, unless alternative objectives are set and there are appropriate reasons for time limited derogation (currently working towards objectives for 2021).

River Basin Management Plans (RBMPs) are a requirement of the WFD, setting out measures for each river basin district to maintain and improve quality in surface and groundwater water bodies where necessary. In 2009, the Environment Agency published the first cycle (2009 to 2015) of RBMPs for England and Wales, reporting the status and objectives of each individual water body. The Environment Agency subsequently published updated RBMPs for England as part of the second cycle (2015 to 2021), as well as providing water body classification results from 2015 (as well as 2016 Cycle 2 interim classifications) via the Catchment Data Explorer (http://environment.data.gov.uk/catchment-planning). The study area is located within the Thames River Basin District which is reported in the Thames RBMP (Environment Agency, 2015).

5.3.2 *Water Body Status*

Within the study area (see Section 1.3), a number of transitional and coastal water bodies are considered to have a potential hydromorphological link with maintenance dredging activities, namely (see Figure 12 for locations):

- Transitional water bodies:
  - Thames Upper;
  - Thames Middle;
  - Thames Lower;
  - Swale;
  - Medway;
  - Crouch; and
  - West Thurrock Lagoon.

- Coastal water bodies:
  - Essex;
  - Kent North;
  - Thames Coastal South;
  - Thames Coastal North; and
  - Whitstable Bay.

Since the publication of the MDP Baseline Document (PLA, 2014), the River Lee Navigation (tidal section) canal water body (ID: GB70610068) has been incorporated within the Thames

Middle transitional water body and, therefore, has not been reported here. It should also be noted that a number of other water bodies (particularly rivers) are located in relatively close proximity to identified maintenance dredging activities within the Thames Estuary; however, it is considered that there is no potential for hydromorphological interaction (or such interaction is significantly restricted) between these water bodies and maintenance dredging activities. This assumption is based upon the presence of a normal tidal limit (NTL), existing man-made structures (e.g. sluices, weirs, culverts and flapped gravity outfalls) which will restrict tidal interaction, or the dredging methodology adopted is unlikely to lead to a direct interaction (i.e. WID on the ebb tide away from an upstream water body). Similarly, there are a number of groundwater water bodies that underlay the Thames River Basin District; however, these are not been reported here as they are considered unlikely to be influenced by maintenance dredging activities.

The latest classifications, including the current overall, ecological and chemical status of relevant water bodies, are available via the Environment Agency's Catchment Data Explorer (http://environment.data.gov.uk/catchment-planning). In preparing WFD compliance assessments, reference should be made to the Environment Agency's 'Clearing the Waters for All' guidance (https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters). This guidance, published since the MDP Baseline Document (PLA, 2014) was prepared, outlines how to assess the impact(s) of activities in transitional and coastal waters in relation to WFD objectives.

5.3.3 *Water Quality*

5.3.3.1 Bathing Waters

The revised Bathing Water Directive (2006/7/EC) was adopted in 2006, updating the microbiological and physico-chemical standards set by the original Bathing Water Directive (76/160/EEC) and the process used to measure/monitor water quality at identified bathing waters. The revised Bathing Water Directive focuses on fewer microbiological indicators, whilst setting higher standards, compared to those of the original Bathing Water Directive. Bathing waters under the revised Bathing Water Directive are classified as excellent, good, sufficient or poor according to the levels of certain types of bacteria (intestinal enterococci and *Escherichia coli*) in samples obtained during the bathing season (May to September).

As highlighted in Section 2, the original Bathing Water Directive was repealed at the end of 2014 and monitoring of bathing water quality has been reported against revised Bathing Water Directive indicators since 2015. The new classification system considers all samples obtained during the previous four years and, therefore, data has been collected for revised Bathing Water Directive indicators since 2012.

There are currently ten designated bathing waters located within the PLA Harbour Authority boundary (Figure 13). The latest bathing waters classifications for these can be found via the Environment Agency's Bathing Water Quality website (https://environment.data.gov.uk/bwq/profiles).

5.3.3.2 Shellfish Water Protected Areas

As highlighted in Section 2, the Shellfish Waters Directive was repealed in December 2013 and subsumed within the WFD. However, the Shellfish Water Protected Areas (England and Wales) Directions 2016 require the Environment Agency (in England) to endeavour to observe a microbial standard in all 'shellfish water protected areas'. The microbial standard is 300 or fewer colony forming units of *E. coli* per 100 ml of shellfish flesh and intravalvular liquid. The Directions also requires the Environment Agency to assess compliance against

this standard to monitor microbial pollution (75% of samples taken within any period of 12 months below the microbial standard and sampling/analysis in accordance with the Directions).

There are six Shellfish Water Protected Areas which overlap the PLA Harbour Authority boundary, namely Foulness, Southend, Outer Thames, Sheppey, Swalecliffe and Margate as described in Defra (2016) and shown in Figure 13. However, it should be noted that the Swalecliffe and Margate Shellfish Water Protected Areas are not in the vicinity of any ongoing or planned maintenance dredging sites considered as part of this report. The latest shellfish classification results from the Thames Estuary, Swale, North Kent Coast and Blackwater bivalve mollusc production areas which include classifications zones within, or close to, the PLA Harbour Authority boundary are available via the Food Standards Agency (FSA) Shellfish Classification website (https://www.food.gov.uk/business-guidance/shellfish-classification). Classification zones can range from Class A to Class C, or can be designated as prohibited areas, as reported by the FSA.

5.3.3.3 Other Directives

The Nitrates Directive (91/676/EEC) aims to reduce water pollution from agricultural sources and to prevent such pollution occurring in the future (nitrogen is one of the nutrients that can affect plant growth). Under the Nitrates Directive, surface waters are identified if too much nitrogen has caused a change in plant growth which affects existing plants and animals and the use of the water body. Thames Upper, Thames Middle, Thames Lower, Medway and Crouch transitional water bodies are designated under the Nitrates Directive. There are surface water nitrate vulnerable zones (NVZs) along the north bank of the Thames between Rainham and Purfleet and along the south bank at the London Wetland Centre as well as from Gravesend to the Isle of Grain at the approaches to the River Medway.

The Urban Waste Water Treatment Directive (91/271/EEC) aims to protect the environment from the adverse effects of the collection, treatment and discharge of urban waste water. It sets treatment levels on the basis of sizes of sewage discharges and the sensitivity of waters receiving the discharges. In general, the Urban Waste Water Treatment Directive requires that collected waste water is treated to at least secondary treatment standards for significant discharges. Secondary treatment is a biological treatment process where bacteria are used to break down the biodegradable matter (already much reduced by primary treatment) in waste water.

Sensitive areas under the Urban Waste Water Treatment Directive are water bodies affected by eutrophication of elevated nitrate concentrations and act as an indication that action is required to prevent further pollution caused by nutrients. The River Wandle, which discharges to the Thames at Wandsworth is designated as a 'Sensitive Area (Eutrophic)' (Defra, 2012). However, this river is located above a weir and sluice suggesting it would not be influenced by maintenance dredging activities in the Thames.

6. Summary of Data Gaps and Recommendations

The following data gaps/limitations were identified during the update of the MDP Baseline Document (PLA, 2014):

- There is uncertainty in the depths of some sediment samples. In some cases, the water depth is recorded as opposed to the depth into the sediment. It is likely that the majority of samples have been obtained from the surface. While this is unlikely to have a significant influence on future assessments, the depth into the sediment should be explicitly recorded in sediment quality data collection going forward.
- In this update, dredge records and sediment quality results have been reviewed from between January 2014 to April 2018 only. It is possible that additional historic data (i.e. pre-2014) may now be available due to improved record keeping through use of the Dredging Spatial Information System (DSIS), but this would not have been captured here. However, it is recognised that the DSIS is currently not functioning and it is unlikely that new data would have been added to the system in the past year or longer.
- The Tilbury2 port development was granted a DCO in February 2019. The project will involve the extension of existing jetty facilities and the dredging of berth pockets at the development site and will need to be incorporated in future updates.
- Condition assessments have not been published for European/Ramsar sites (reference has continued to be made to relevant SSSI condition assessments); however, detailed conservation advice and attributes is available on Natural England's Designated Sites View (https://designatedsites.naturalengland.org.uk).
- It is worth noting that there is an improved provision of water and sediment quality data through the Environment Agency's Water Quality Data Archive (http://environment.data.gov.uk/water-quality/index.html). The archive provides open datasets on water and sediment quality measurements (dating from 2000) which can be explored using a map function.

As described in Section 1.1, the MDP Baseline Document (PLA, 2014) will need to evolve over time to account for natural or anthropogenic changes in the study area. This evolution should incorporate new information as it becomes available and to assess the maintenance dredging regime against the latest guidance. Separately, it is acknowledged that the Medway Approaches, Medway Estuary and The Swale MDP Baseline Document (Peel Ports, 2012) is also currently being updated.

In conclusion, this update to the MDP Baseline Document (PLA, 2014) provides contemporary details regarding dredging activity (by the PLA and third parties), sediment quality of dredge material and environmental information (e.g. nature conservation designated sites). This update document should be referred to in conjunction with the MDP Baseline Document (PLA, 2014) and, where relevant, supersedes the previous document.

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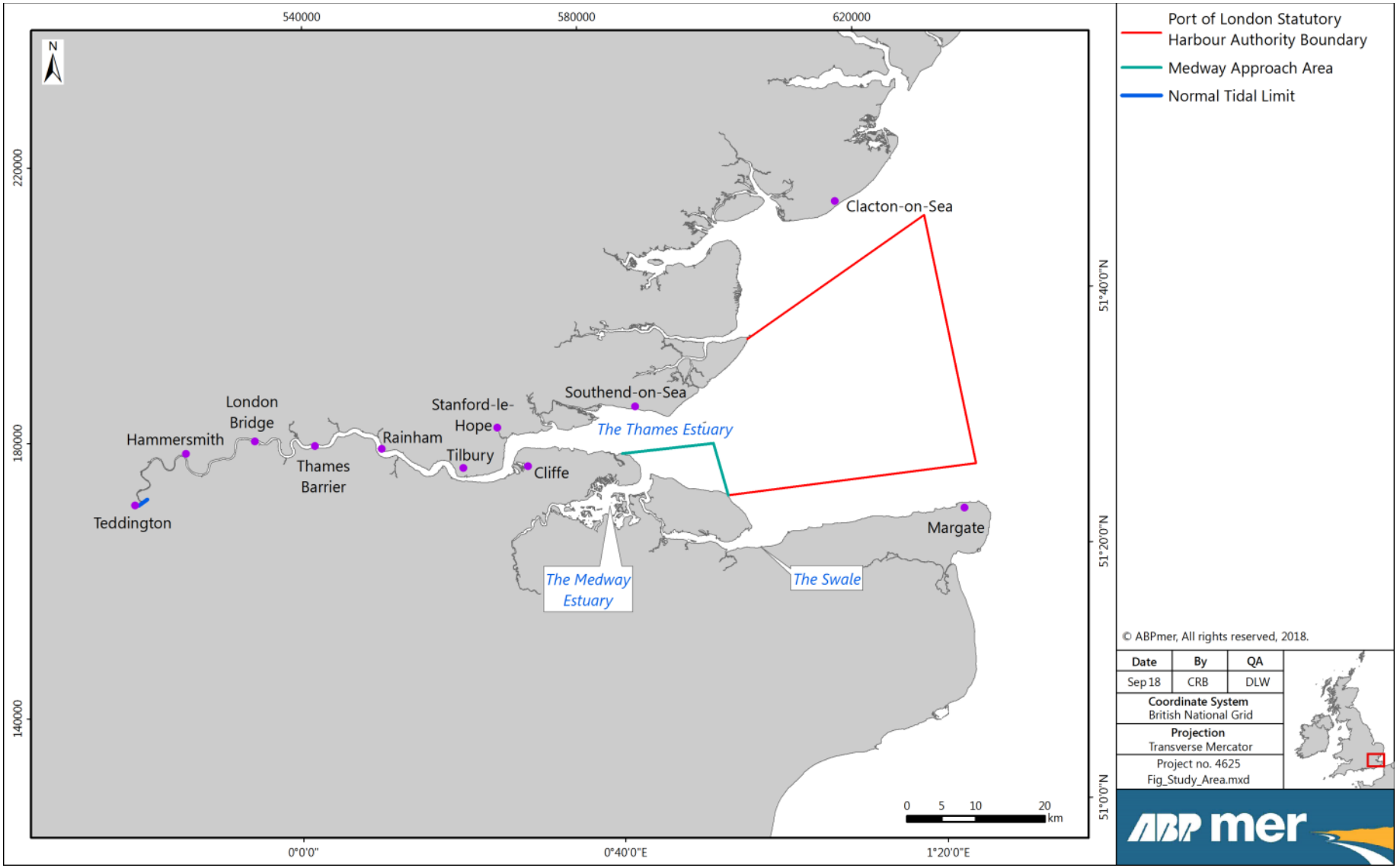

Figure 1. The PLA Harbour Authority boundary and study area

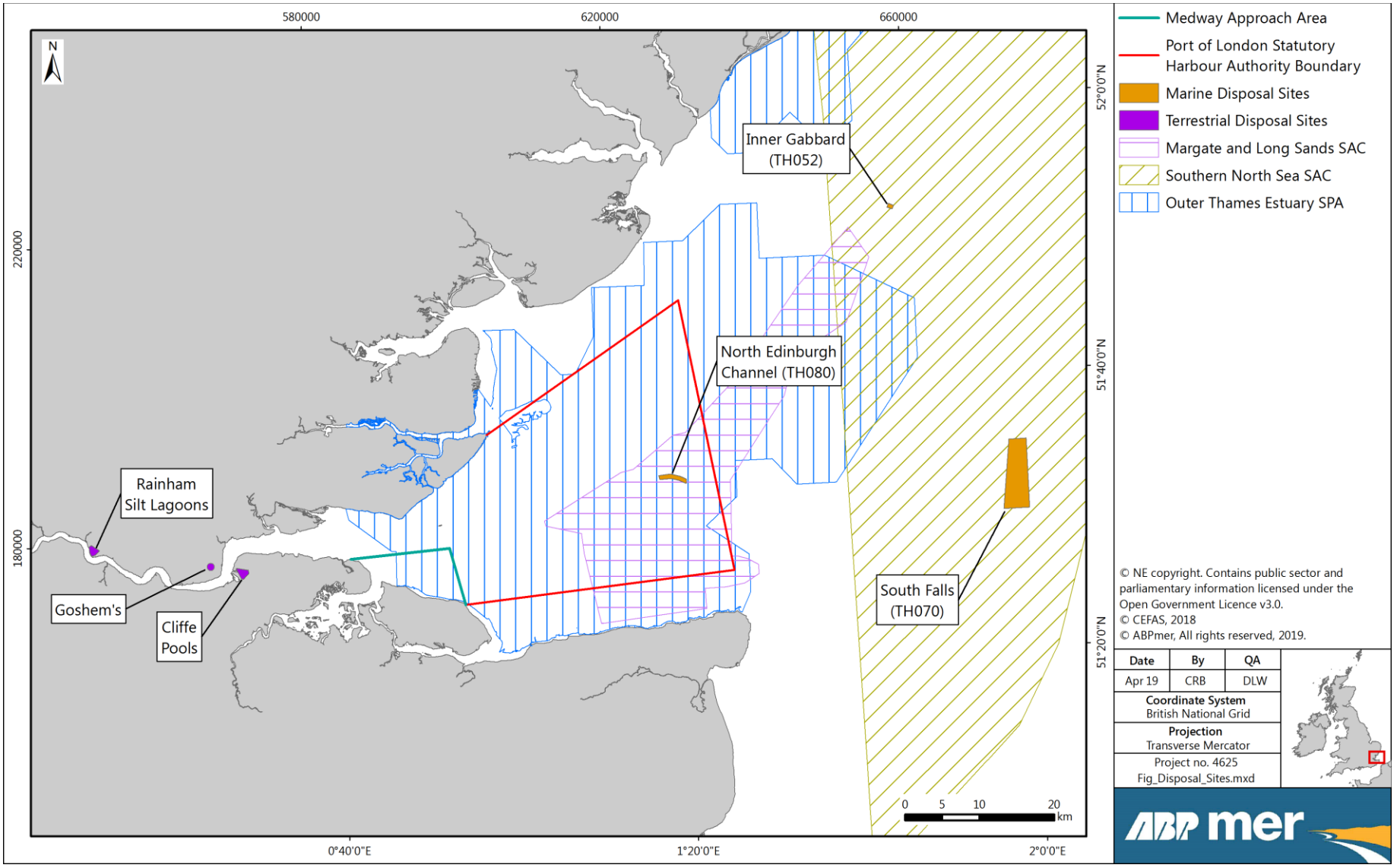

Figure 2. Marine and land (terrestrial) disposal sites used by the PLA and third parties

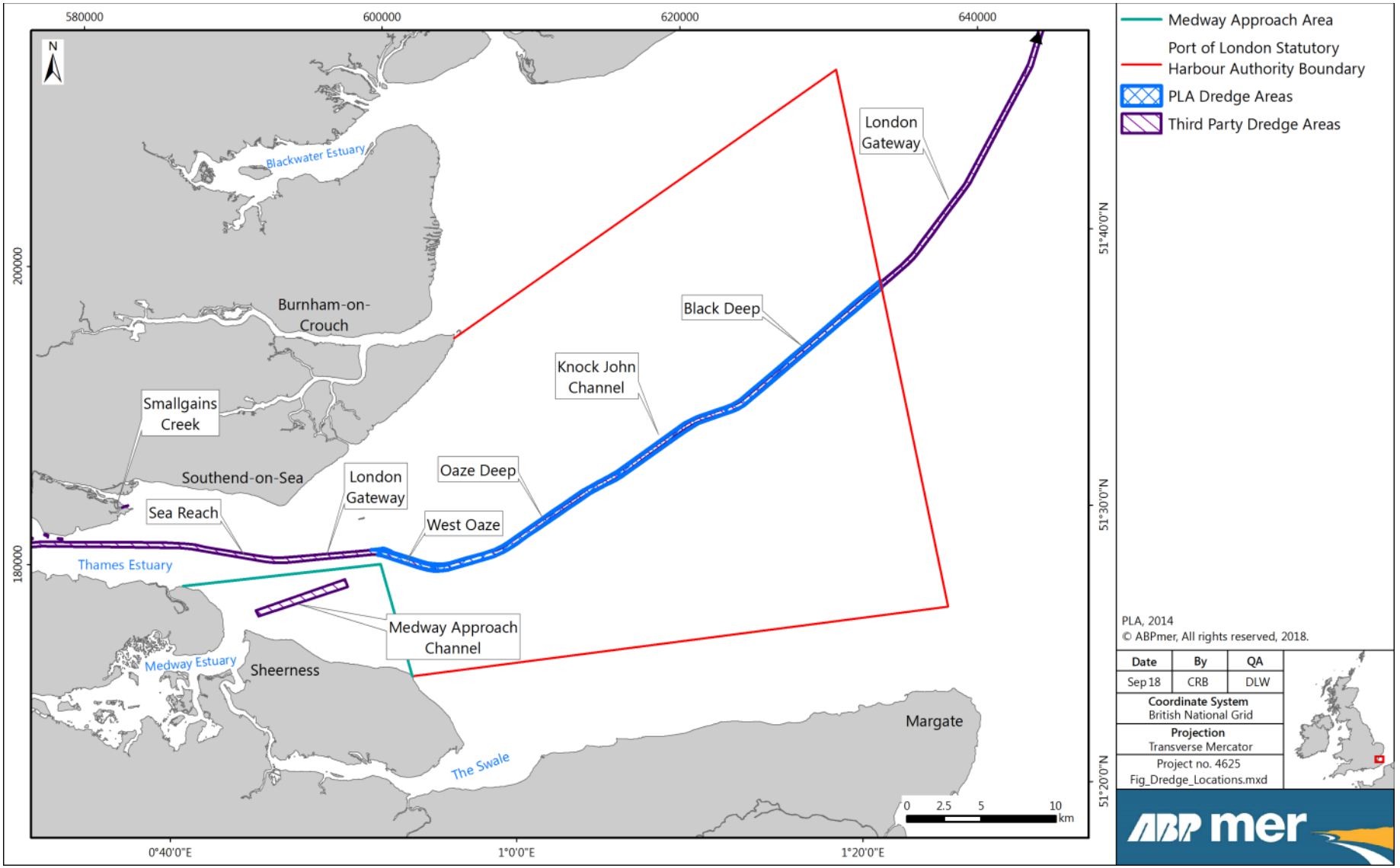

Figure 3. Dredge locations (1)

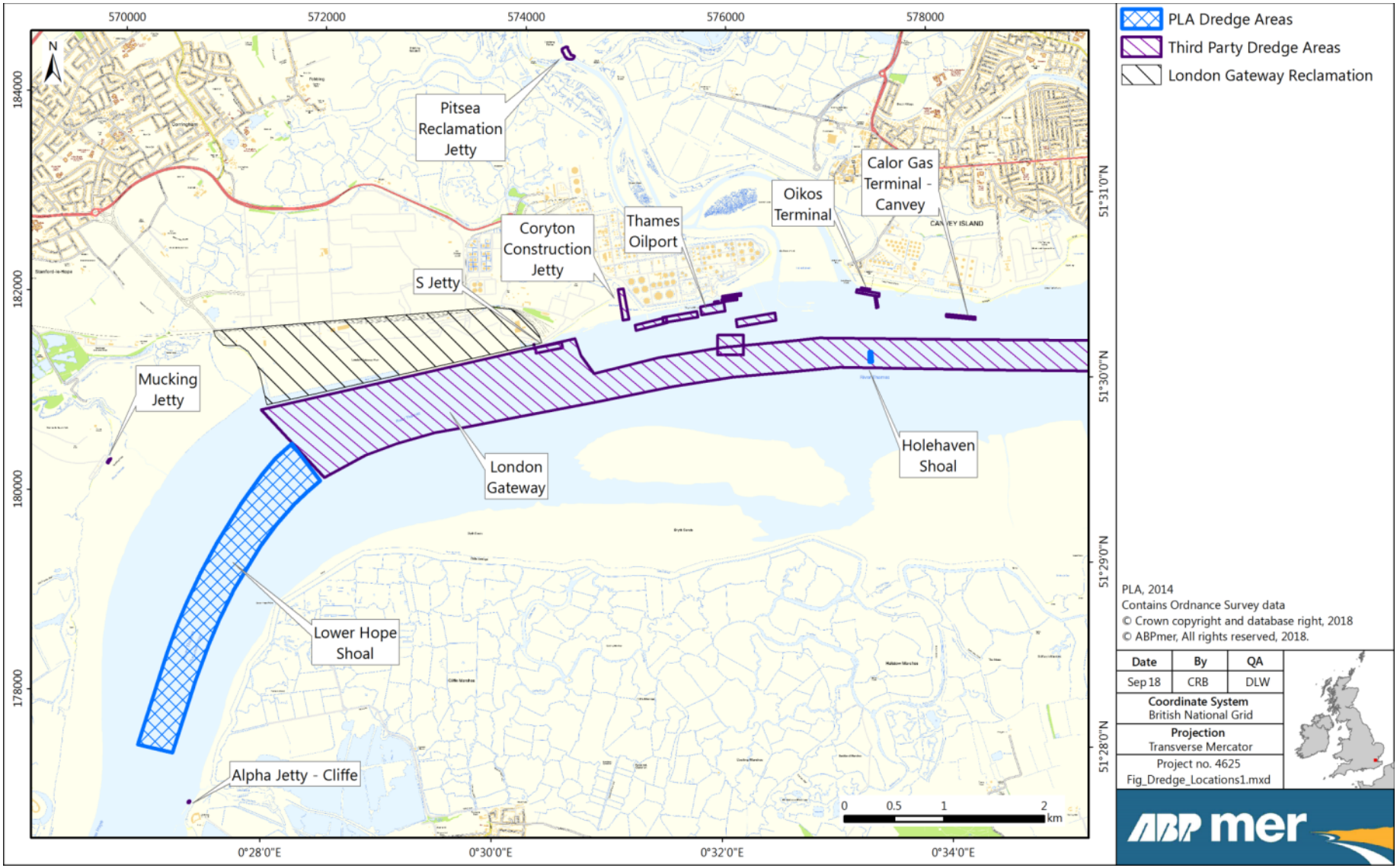

Figure 4. Dredge locations (2)

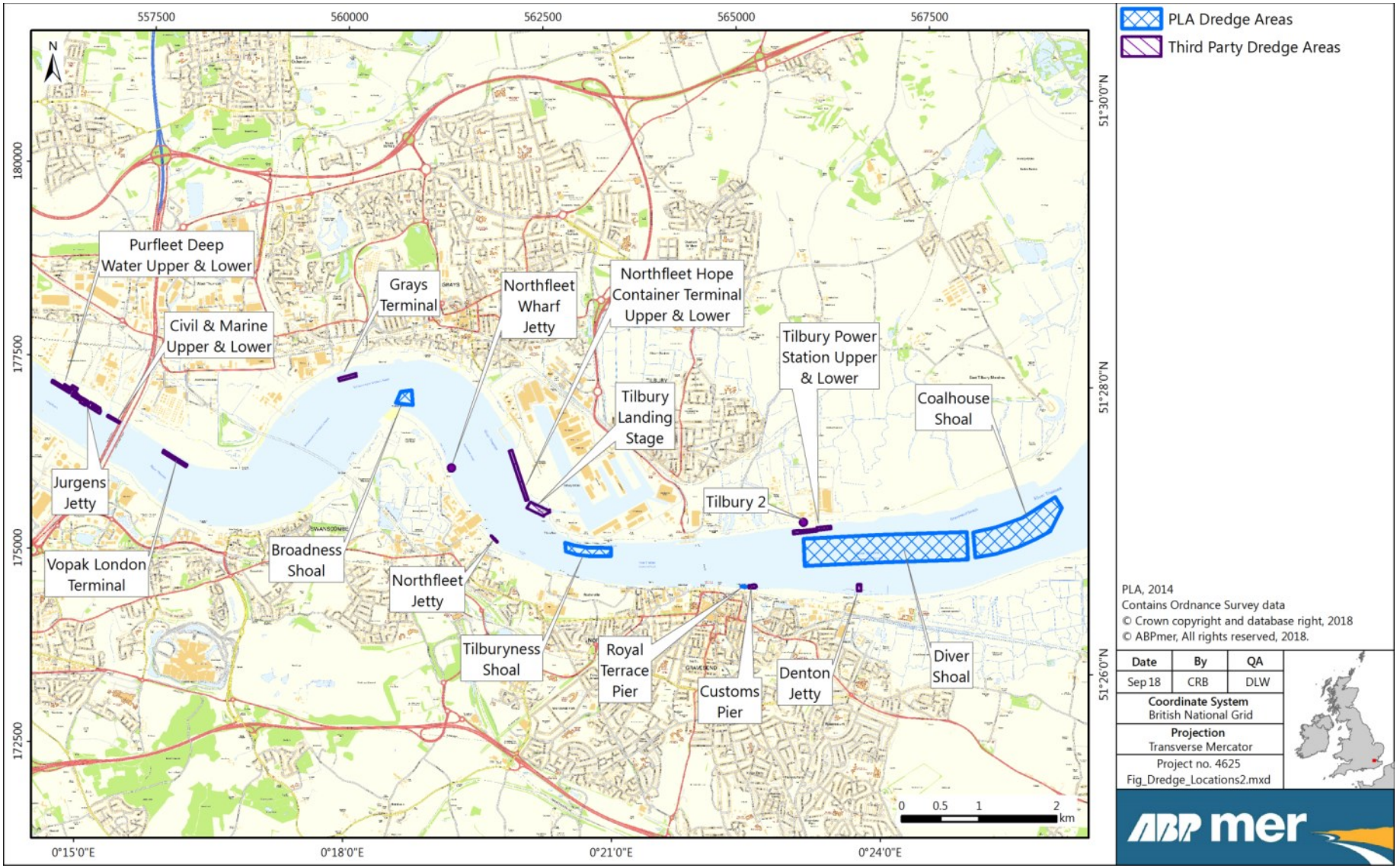

Figure 5. Dredge locations (3)

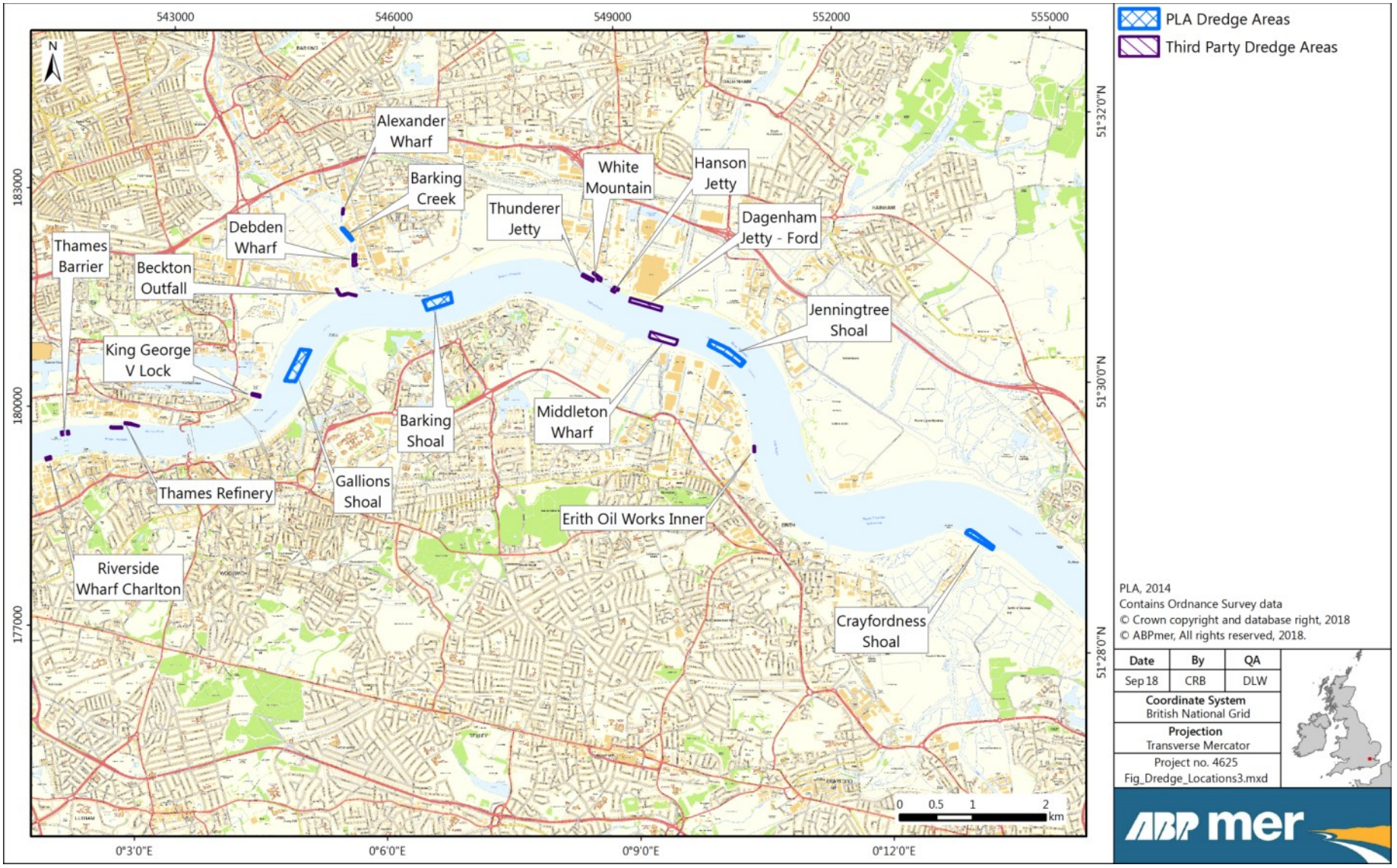

Figure 6. Dredge locations (4)

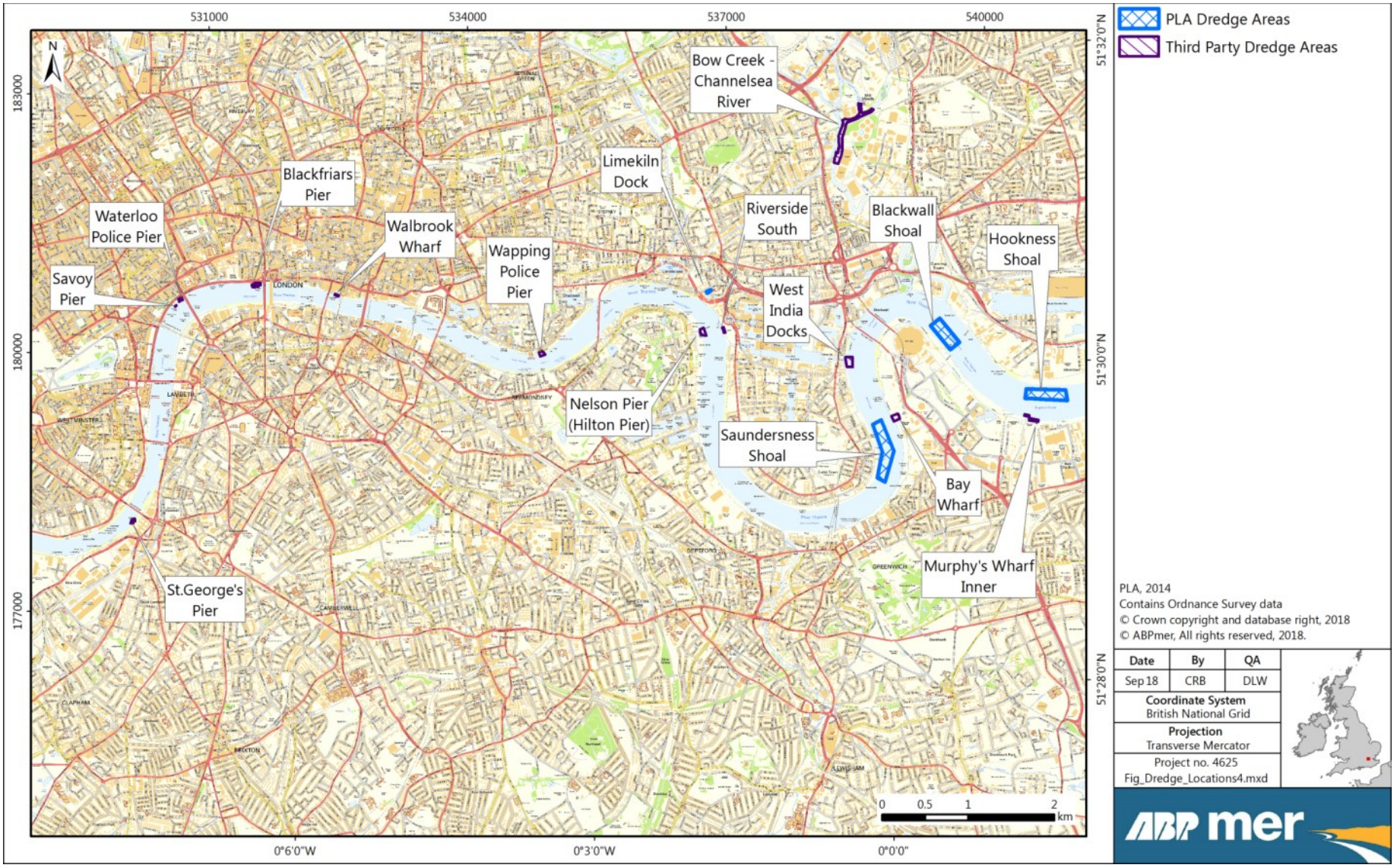

Figure 7. Dredge locations (5)

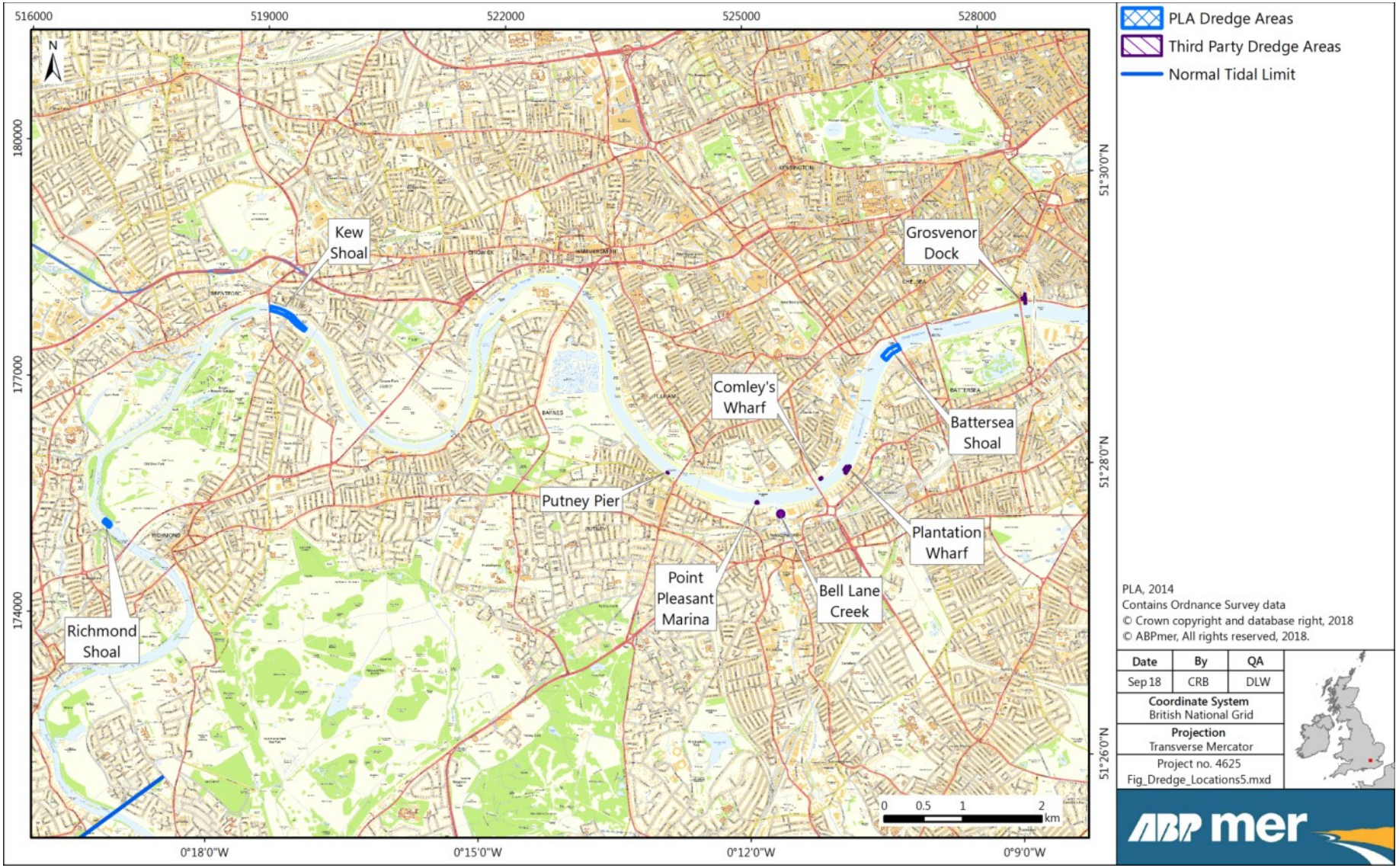

Figure 8. Dredge locations (6)

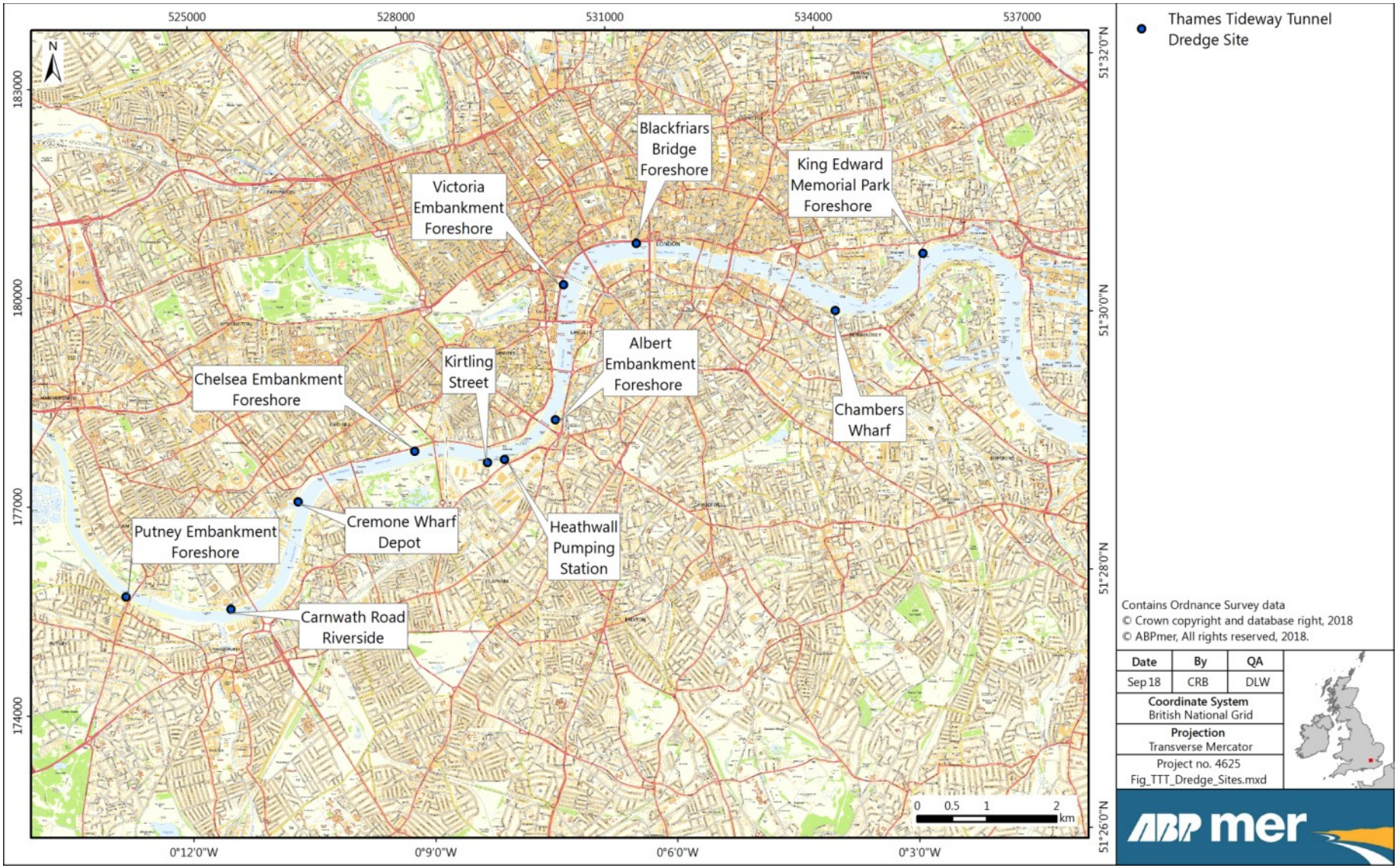

Figure 9. Dredge locations (Thames Tideway Tunnel)

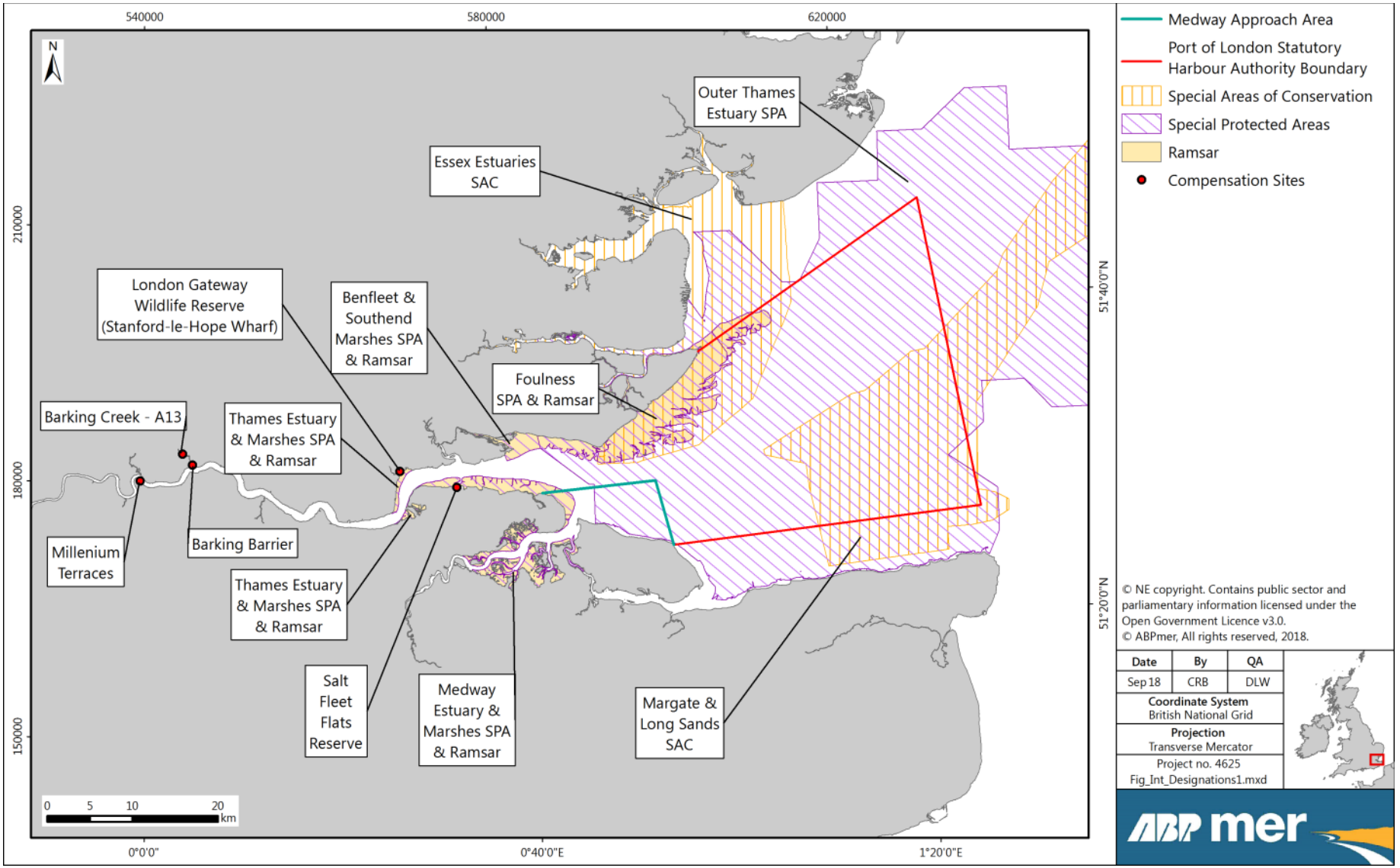

Figure 10. International designated sites and compensation sites

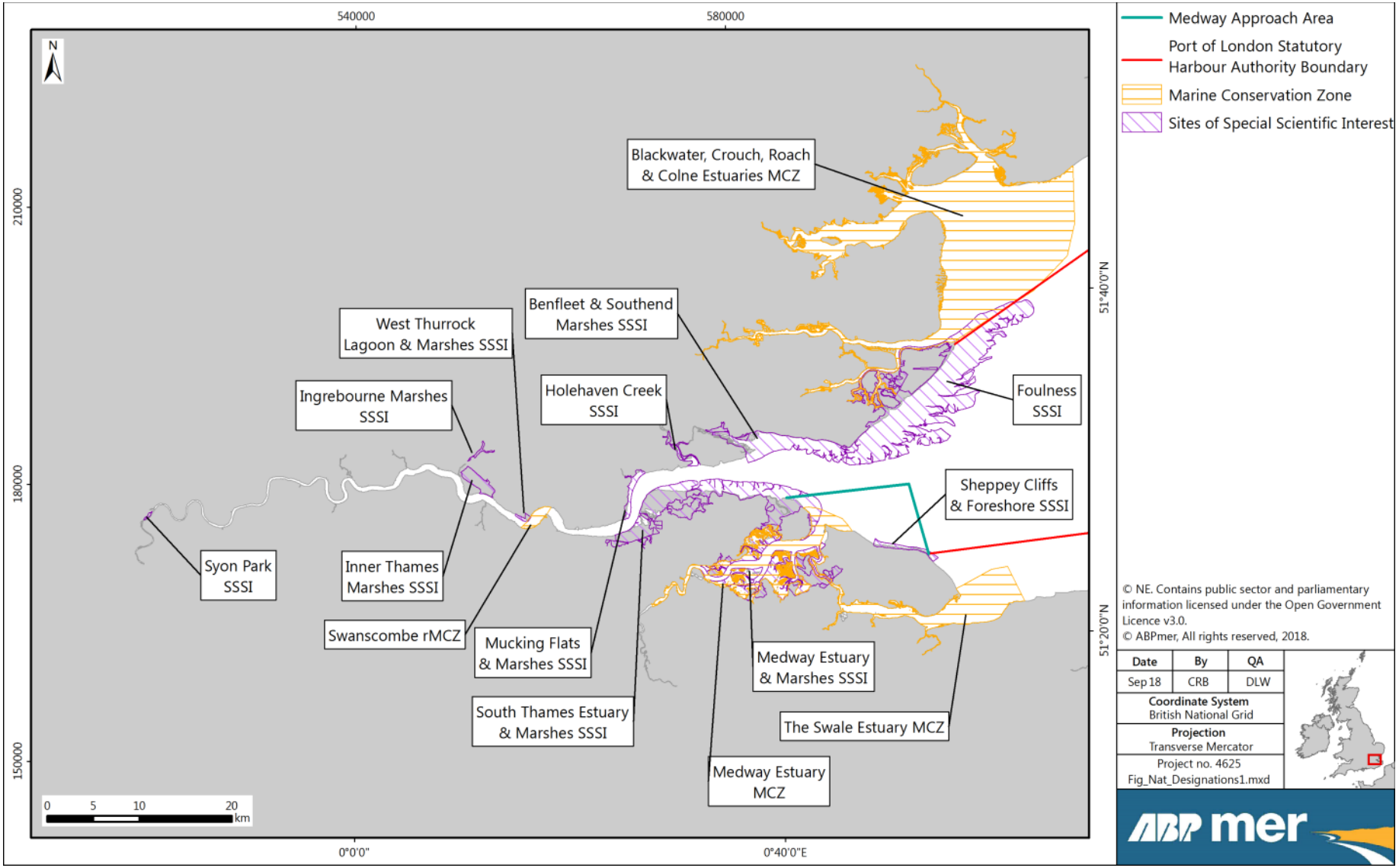

Figure 11. National designated sites

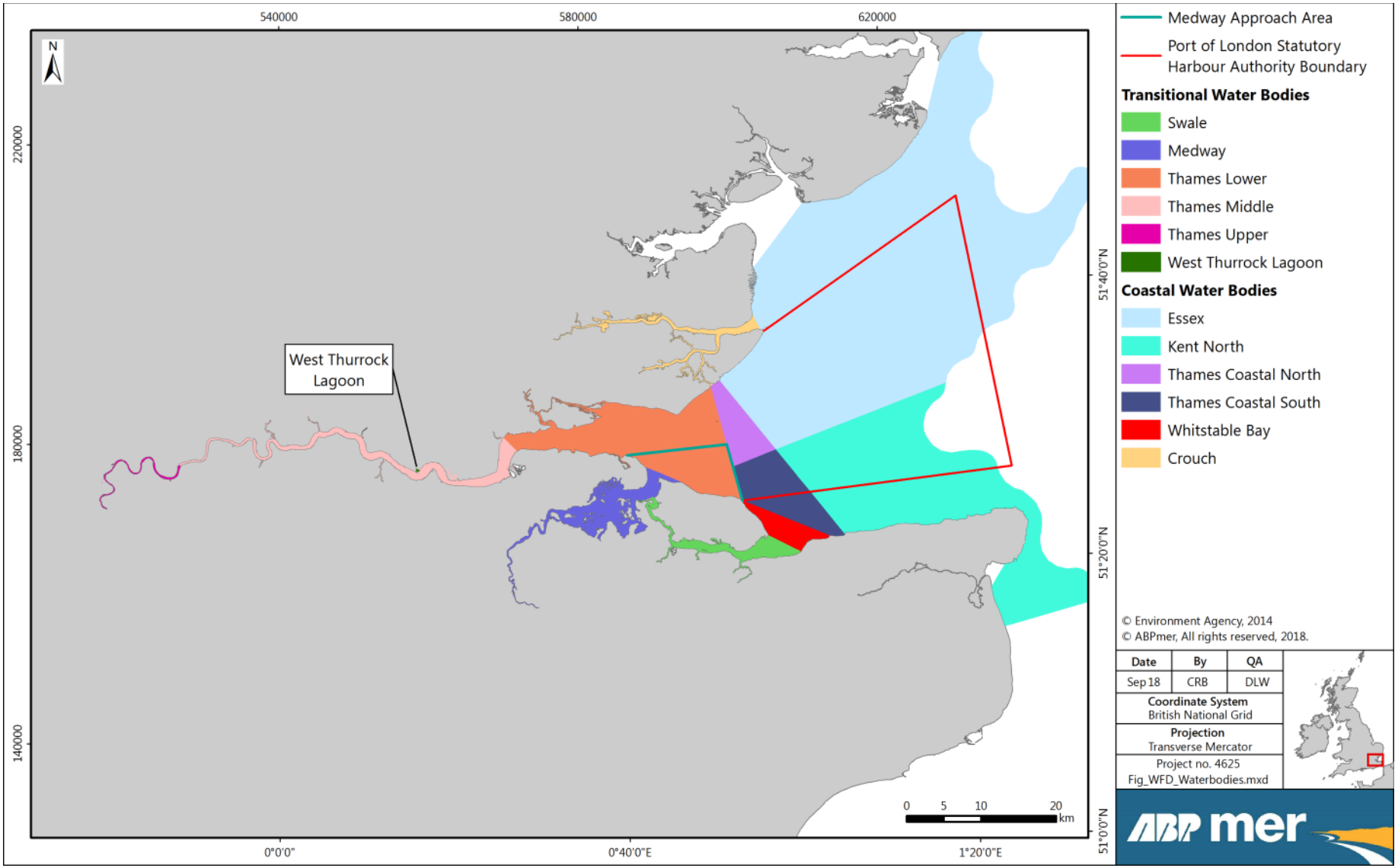

Figure 12. Water Framework Directive (WFD) water bodies

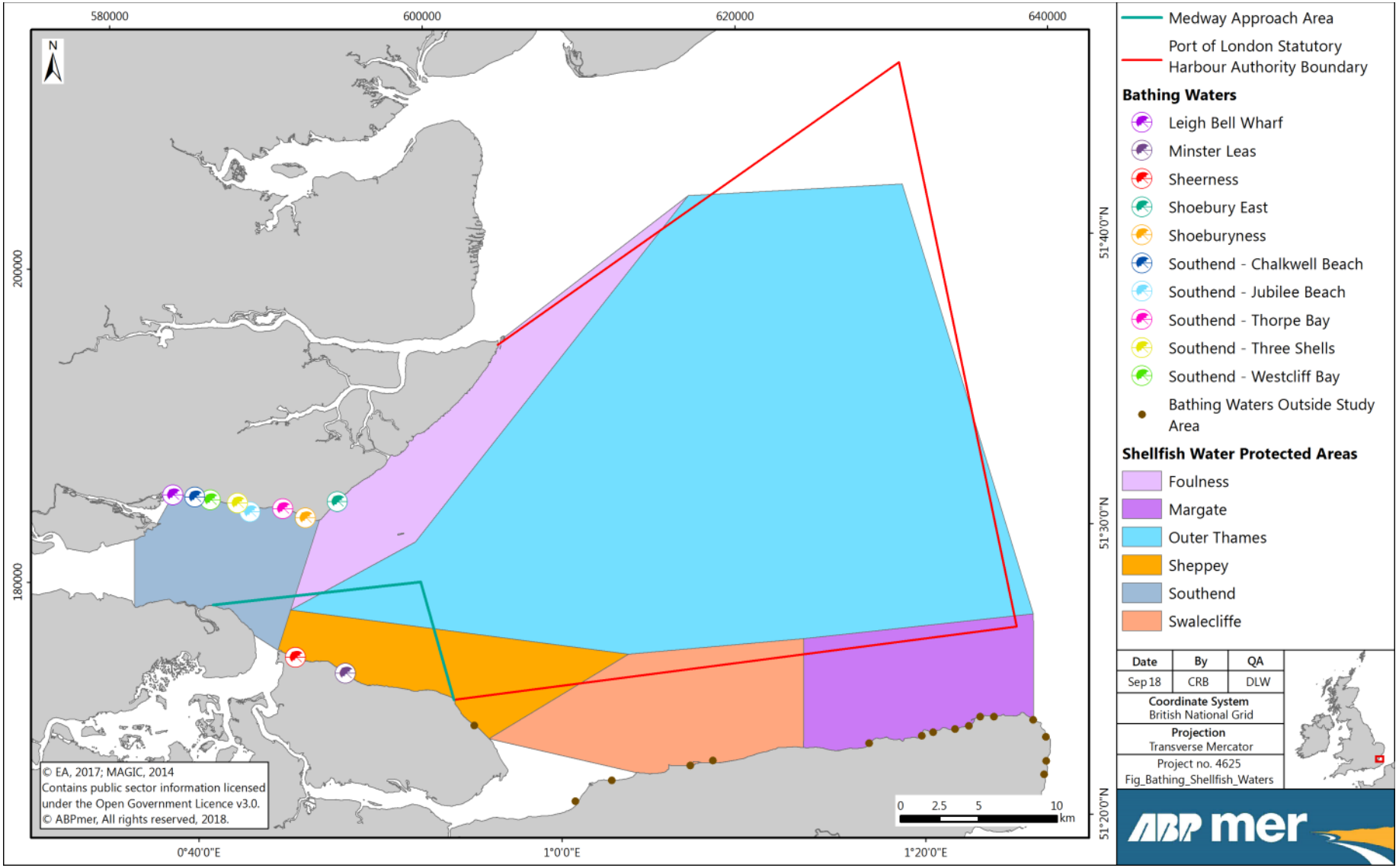

Figure 13. Designated bathing waters and Shellfish Water Protected Areas

Appendices

The following appendices are included:

- Appendix A: Information for an Appropriate Assessment; and
- Appendix B: Sediment Quality Data.

Appendix A – Information for an Appropriate Assessment

A.1 Context

The Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations 2017) implement the Habitats Directive (92/43/EEC, as amended) and Birds Directive (2009/147/EC) in UK waters and require that an Appropriate Assessment (AA) be undertaken where a plan or project is not directly connected with, or necessary for the management of designated European sites or offshore 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.

These sites include the following which comprise the Natura 2000 network:

- Special Areas of Conservation (SACs) designated under the Habitats Directive for their habitats and/or species of European importance;
- Special Protection Areas (SPAs) classified under the Birds Directive for rare, vulnerable and regularly occurring migratory bird species and internationally important wetlands;
- Sites that are proposed for designation and inclusion in the Natura 2000 network and those sites that are currently in the process of being classified i.e. potential SPAs (pSPAs), candidate and possible SACs (cSACs and pSACs) and Sites of Community Importance (SCIs);
- Listed or proposed Ramsar Sites (listed under the Ramsar Convention on Wetlands of International Importance); and
- Sites identified, or required, as compensatory measures for adverse effects on European sites, pSPAs, cSACs, pSACs and listed or proposed Ramsar sites.

These sites are collectively referred to throughout this report as European/Ramsar sites.

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 Habitats Directive, and assessed in accordance with Article 6(3) of that Directive (Defra, 2007). This Appendix presents the relevant information to allow the lead Competent Authority, the Port of London Authority (the PLA), taking appropriate advice from Natural England, to record the AA. The Appendix is informed by the information presented in the Maintenance Dredge Protocol (MDP) Baseline Document (PLA, 2014) and this update report.

As this report provides an update to the MDP Baseline Document (PLA, 2014), this Appendix should be considered to effectively replace the corresponding 'Information for an Appropriate Assessment' in that document (also Appendix A).

A.2 Designated European/Ramsar Sites

The international nature conservation importance of the Thames Estuary and the surrounding area is recognised through designation of a number of sites for nature conservation importance (Figure A.1). Section 5 of the above update report identifies the European/ Ramsar sites where the possibility of a LSE cannot be excluded, either as a result of maintenance dredge operations alone or in-combination with other plans or projects, and have therefore been screened into the AA. These are labelled on Figure A.1 and are as follows:

- Outer Thames Estuary SPA;
- Margate and Long Sands SAC;
- Essex Estuaries SAC;
- Southern North Sea SAC;
- Foulness (Mid-Essex Coast Phase 5) SPA and Ramsar;
- Benfleet and Southend Marshes SPA and Ramsar;
- Medway Estuary and Marshes SPA and Ramsar; and
- Thames Estuary and Marshes SPA and Ramsar.

European Marine Sites (EMS) is the collective term for SACs and SPAs that are covered by tidal water (continuously or intermittently). The following EMS and corresponding international designations are located in the study area:

- Essex Estuaries EMS, comprising:
  - Essex Estuaries SAC; and
  - Foulness SPA.
- Benfleet and Southend Marshes EMS, comprising:
  - Benfleet and Southend Marshes SPA.
- Swale and Medway EMS, comprising:
  - Medway Estuary & Marshes SPA.
- Thames Estuary EMS, comprising:
  - Thames Estuary and Marshes SPA

Natural England has statutory responsibility to advise relevant authorities as to the conservation objectives for EMS and operations which may cause deterioration or disturbance of natural habitats and species. This advice is provided under Regulation 37 of the Habitats Regulations 2017 (previously Regulation 35).

The role of the conservation objectives for an EMS is to define the nature conservation objectives for the features of interest, thereby representing the aims and requirements of the Habitats and Birds Directives in relation to the site. A detailed breakdown of the qualifying interest features and the associated conservation objectives for the European/Ramsar sites listed above can be found in Section 5 of the above update report.

The National Planning Policy Framework (Ministry of Housing, Communities and Local Government, 2018) sets out the Government's planning policies for England and confirms (in Paragraph 176) that sites identified, or required, as compensatory measures for adverse effects on habitat sites, pSPA, pSACs and listed or proposed Ramsar sites should be given the same protection as habitats sites. On this basis, all completed managed realignment or recharge sites that have been created for compensatory purposes were identified. These are included in Figure A.1 and are as follows:

- London Gateway Wildlife Reserve (Stanford-le-Hope Wharf);
- Salt Fleet Flats Reserve (previously Site X);

- Barking Creek – Barking Barrier;
- Barking Creek – A13; and
- Millennium Terraces.

The qualifying interest features of the compensatory sites that occur in the study area are not known. It has been assumed 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 therefore does not include any specific further consideration of these sites.

A.3 Potential Impacts on Interest Features

This section provides a review of the potential impacts of the PLA and third party maintenance dredging operations alone (Sections A.3.1 to A.3.2; and requirement for mitigation measures in Section A.3.3) and in-combination with other relevant plans and projects (Section A.3.4), on the qualifying interest features of designated sites that have been screened into the assessment (see Section A.2). This assessment has been carried out in the context of the nature of the maintenance dredging activities, and the geographical locations of both the works and the interest features. It is also based on existing knowledge and evidence with no new analysis undertaken.

The historic maintenance dredging regime (between 2004 and 2013) is described in detail in the MDP Baseline Document (PLA, 2014), while updated information between January 2014 and April 2018 is provided in Section 3 of this update report. As described in Section 3, maintenance dredging by the PLA and third parties occurs throughout the PLA Harbour Authority boundary, although most of the maintenance dredging currently occurs in the outer region of the Inner Estuary (see Figure A.2 and Figure A.3). Dredging methods used typically include water injection dredging (WID), trailer suction hopper dredging (TSHD), plough dredging (bed levelling) and backhoe excavator dredging. Dredging of the approaches in the Outer Thames is typically achieved using TSHD (with some WID) as the sediment predominantly comprises fine to coarse sands (and other coarser material, i.e. gravel and debris), whilst dredging of more muddy sediments (silt) and fine sands within the (outer) Inner Estuary is predominantly carried out using WID and ploughing. Upstream of Tower Bridge, the sediment is more gravelly and the predominant maintenance dredge method is backhoe excavator dredging.

The predominant dredge method, sediment type and recorded dredge volumes between 2004 and 2013 at each the PLA and third party maintenance dredge area are described in the MDP Baseline Document (PLA, 2014), while updated information from between January 2014 and April 2018 are described in Section 3.2 of this update report (where this information was available). The locations of the PLA and third party maintenance dredge operations in the context of the designated sites that have been screened into the AA are shown on Figure A.2 and Figure A.3; for completeness, these figures include locations of dredge operations from between 2004 and 2013, as well as January 2014 to April 2018. Three dredge areas directly overlap with designated sites (see Table A.1 for summary of dredge volumes per year and dredge technique), namely:

- The Outer Thames Estuary main navigation approach channel:
  - London Gateway (approaches);
  - Black Deep;
  - Knock John;
  - Oaze Deep;
  - West Oaze; and
  - Medway Approach Channel;
- Smallgains Creek; and
- Mucking Flats.

Dredge Site	Dredge Technique	Sediment Type	Dredge Volume (m^3)				
			2014	2015	2016	2017	2018*
London Gateway	WID	Silt/sand	0	0	0	9.647	0
West Oaze	WID	Sand	0	0	2,799	0	0
Medway Approach Channel	THSD	Silt/sand	0	0	0	105,332	0
Note: there was no dredging activity for the period January 2014 to April 2018 inclusive at the following dredge sites: Black Deep, Knock John, Oaze Deep, Smallgains Creek or Mucking Flats (also see Section 3.2 of this update report). * Data available up to the end of April 2018; WID – water injection dredging; TSHD – trailer suction hopper dredging.							

Table A.1. Summary of dredge sites which directly overlap with designated sites

The disposal of any maintenance dredge arisings from the PLA and third party maintenance dredge operations occurs to land (i.e. Rainham Silt Lagoons, Cliffe Pools and Goshem's) and at marine licensed disposal sites (i.e. South Falls, Inner Gabbard and North Edinburgh Channel). Figure A.4 provides a map of disposal locations used for the disposal of maintenance dredge material from sites within the PLA Harbour Authority boundary (it should be noted that frequency and volumes disposed at these sites is unclear).

As the land disposal sites are outside of the marine environment, there is no impact pathway linking these disposal operations to the qualifying interest features. Therefore, there is no potential for LSE and these operations are not considered further as part of the assessment. The South Falls and the Inner Gabbard marine disposal sites are located offshore (outside of the PLA Harbour Authority boundary) and overlap the Southern North Sea SAC, while the North Edinburgh Channel (TH080) is within the Outer Thames Estuary SPA and Margate and Long Sands SAC. Therefore, these marine disposal sites are assessed.

Advice on Operations has been prepared by Natural England for SACs and SPAs to identify pressures associated with the most commonly occurring marine activities to designated features and subfeatures, including the potential impact of maintenance dredging. It provides a detailed assessment of sensitivity for each feature/subfeature or supporting habitat to these pressures. The assessment of marine activities and pressures and any supporting evidence is available on Natural England's Designated Sites View (https://designatedsites.naturalengland.org.uk).

A.3.1 Direct Impacts on Interest Features

In general terms, depending on the nature, scale, timing, duration and magnitude of effect, the potential direct impacts of maintenance dredging on the qualifying interest features of the designated sites could include:

- Change in habitat and loss of benthic organisms within the footprint of the dredged areas and marine disposal sites;
- Disturbance of sediment during the dredging process, resulting in the creation of sediment plumes causing an increase in turbidity, suspended sediment concentrations, organic matter, and ultimately smothering during disposal;
- The potential remobilisation of contaminated sediments associated with suspended sediment as a result of dredging and disposal activity, which could impact on water quality; and
- Potential for disturbance caused by interruption of possible lines of sight and noise during the dredging and disposal activities.

Each of these potential impact pathways are assessed in turn in the following sections.

A.3.1.1 Change in Habitat and Loss of Benthic Organisms

The direct removal of sediment and benthos as a result of maintenance dredging within the boundary of the designated sites occurs along the main navigation channel in the Outer Thames Estuary, and also in two small discrete areas: Smallgains Creek and Mucking Jetty on the north bank of the Thames Estuary (see Figure A.2 and Figure A.3). It should be noted that maintenance dredging has not been undertaken at either of these sites between January 2014 and April 2018. The designated sites and features with which these dredge areas overlap are shown below (see Section 5 of this update report).

Maintenance dredging in the main navigation channel overlaps with the Outer Thames Estuary SPA and runs adjacent to the Margate and Long Sands SAC, the features of which are as follows:

- The Outer Thames Estuary SPA is designated for the Red-throated diver (*Gavia stellata*), Little tern (*Sternula albifrons*) and Common tern (*Sterna hirundo*), supported by habitats including shallow coastal waters and areas in the vicinity of sub-tidal sandbanks;
- The qualifying feature of the Margate and Long Sands SAC is sandbanks which are slightly covered by sea water all the time (1110).

The Smallgains Creek dredge area overlaps with the Benfleet and Southend Marshes SPA and Ramsar site which are designated for waterfowl and are supported by a range of intertidal habitats including intertidal mudflat and sandflat communities, saltmarsh communities, eelgrass beds (*Zostera* beds) and shell banks.

Mucking Jetty dredge area (most recently dredged in 2010) overlaps with the Thames Estuary and Marshes SPA and Ramsar site, which are designated for a number of waterfowl and are supported by a range of intertidal habitats, including intertidal mudflat and sandflat communities.

The seabed of the Outer Thames Estuary is predominantly fine and medium sands but with considerable amounts of gravel or shell in the deeper areas, e.g. north and east of the Isle of Sheppey, where much of the coarser material is oyster and other shell material (London Array Ltd, 2005). The indicative subtidal habitats that occur in the wider study area can be obtained from the predictive habitat maps produced as part of the EUSeaMap project (Joint Nature Conservation Committee (JNCC), 2010). The subtidal seabed habitats at the maintenance dredge areas that overlap with designated sites are predicted to comprise a mosaic of subtidal sand, coarse and mixed sediments.

The typical invertebrate assemblage changes throughout the estuary, which is largely a function of the range in salinity and physical condition, including substrate type. Across the Margate and Long Sands SAC, polychaete worms were the most abundant communities found, followed by crustaceans, molluscs and echinoderms (Bhatia, 2015). The subtidal benthic environment in the Outer Thames Estuary is generally dominated by nemerteans, polychaetes (*Nephtys* spp., *Magelona johnstoni*, *Spiophanes bombyx*), oligochaetes (*Tubificoides* spp.), amphipods (*Bathyporeia elegans*) and bivalves (*Abra alba*, *Venus* spp.) and are characteristic of the benthic environments of this bio-geographic region (ABPmer, 2007; Dong Energy, 2007; GREP, 2002; London Array Ltd, 2005; MALSF, 2009; TEDA, 2010; Vattenfall, 2011). In addition, the Ross worm (*Sabellaria spinulosa*), which in its reef form is a UK Biodiversity Action Plan (BAP) habitat, has been found to be present in small numbers in the Black Deep area of the navigation channel in the Outer Thames Estuary (London Gateway, 2004).

Species richness and diversity generally correlates with sediment type with few species and low abundance found within the fine sand or gravelly sand substrates dominating the Outer Thames Estuary, whilst the muddy, gravelly sites generally located further inshore are relatively species rich. Maintenance dredging in the main navigation channel in the Outer Thames Estuary occurs rarely given that the system is largely self-scouring. The last time this part of the channel was maintenance dredged was in 2009 where 856 m^3 was removed from the seabed at Knock John. Prior to this, no known maintenance dredging had occurred since 2004 (see the MDP Baseline Document; PLA, 2014). The development of the London Gateway port facility has involved deepening parts of the approach channel in the Outer Thames. No maintenance dredging has yet been required since the completion of the capital dredge in 2013 and the Environmental Statement did not predict any requirement for maintenance dredging in the Outer Thames given the self-scouring nature of the channel, although this will need to be reviewed on an ongoing basis. Smallgains Creek was most recently maintenance dredged in 2007, although the volume that was dredged is not known. Similarly, Mucking Jetty was most recently maintenance dredged in 2010 by backhoe and a total of 950 m^3 was removed comprising mainly silts. The future maintenance dredge requirements for these sites are not known and, therefore, may need to be assessed if and when required.

Following dredging and disposal activities, benthic communities are expected to be able to recover (or adapt) given the low frequency and small-scale nature of the disturbance. Furthermore, maintenance dredging will not expose a different type of sediment to that which is currently present and therefore the nature of marine communities that will re-colonise the area would be similar to the communities that were present before. Re-colonisation of the seabed would take place by recruitment of larvae and the migration of adult individuals into the affected area from adjacent areas.

Disposal of material at the South Falls and Inner Gabbard marine disposal sites will be within the Southern North Sea SAC. However, the frequency of disposal activities is currently low and extent of disturbance to supporting habitats of Harbour porpoise is minimal.

Overall, the sensitivity of the habitats and associated benthic communities is considered to be low. The exposure to change is negligible given the very low frequency and small magnitude of the disturbance. The potential impact of dredging causing a loss of benthic organisms within the dredged area is therefore considered to be insignificant.

A.3.1.2 Disturbance of Sediment and Smothering

Maintenance dredging creates temporary sediment plumes which in turn can increase turbidity and the concentration of suspended organic matter. The scale of any changes in suspended sediment concentrations (SSCs) will vary in space and time depending on the tidal state, range of tide and material type, as well as location, rates and methods of maintenance dredging.

The sediment plumes that are generated by maintenance dredging and disposal undertaken by the PLA and third parties are likely to overlap with a number of the designated sites that have been screened into the assessment (see Section A.2), in particular the Outer Thames Estuary SPA, Margate and Longsands SAC, Southern North Sea SAC, Benfleet and Southend Marshes SPA and Ramsar site and the Thames Estuary and Marshes SPA and Ramsar.

Dredging of more muddy sediments (silt) and fine sands within the Inner Estuary is predominantly carried out using WID and plough dredging. Dredging of the approaches in the Outer Thames is typically achieved using TSHD, with limited use of WID as the

sediments predominantly comprise fine to coarse sands (and other coarser material, i.e. gravel and debris).

WID involves the injection of high volumes of water at low pressure into recently deposited seabed sediments. This re-fluidises the silts and fine sands, which then flow by gravity or current from the dredge site. The water is injected at low pressures, ensuring the sediment material is re-energised as a density current at the bed, rather than being re-suspended into the full water column. To be effective, the technique requires a flow gradient away from the dredge site, so material is transported to locations from which it is subsequently re-distributed by natural currents. The technique therefore promotes relocation of material based on local dispersion rather than removal to licensed marine or land (terrestrial) disposal sites. Retention of sediments within the natural estuarine system is widely considered to be a potentially significant environmental benefit of the technique. In order to minimise the environmental effects, dredging is required to be undertaken on an ebb tide to provide maximum dispersion and minimise sedimentation on the designated conservation sites (a condition imposed by the PLA as Harbour Authority). Where adjacent facilities are dredged, the sequence in which berths are dredged is managed, when possible, to work downstream, thereby avoiding deposition within recently maintained areas.

Similar to WID, ploughing should not typically lead to significant re-suspension of sediment into the upper water column, but if the sediment ploughed is soft it may be sufficiently disturbed to raise smaller sediment fractions into suspension. The amount of suspended sediment that is released into the water column by a small/medium size TSHD is relatively small per load. Further information on the full range of maintenance dredging methods that are used on the Thames Estuary is included in the MDP Baseline Document (PLA, 2014).

Numerical modelling undertaken for the London Gateway capital dredge scheme[1] identified that for silt dredging the greatest increases in SSC are predicted to occur within about 200 m of the dredger perpendicular to tidal flow and about 3 km in the direction of tidal flow (London Gateway, 2004). Whilst the sediment plume is predicted to extend beyond this, i.e. potentially up to an extent of 10-15 km in some areas, the increases in SSCs are generally lower than baseline variations and, therefore, unlikely to have a significant effect on protected sites at these distances. In contrast, sand (mainly dredged within the approaches and navigation channel) will drop out of suspension in much greater proximity to the dredger and is therefore considered to have an extent of impact considerably less than 5 km.

Sediment modelling has also been undertaken as part of the Smallgains Creek maintenance dredge application to identify whether there would be an impact on the sensitive seagrass beds in Benfleet and Southend Marshes SPA and Ramsar (PLA, 2009). This demonstrated that, using WID, peak levels of up to 200 mg/l above background levels may occur for up to 20 minutes before gradually decaying to normal background levels (no distances over which this peak increase occurs is provided in the report). The modelling also indicated that approximately 25% of the seagrass beds may be affected by an increase in suspended sediment levels of up to 100 mg/l, which is comparable to the maximum levels that are experienced at the site during the range of normal conditions, including storm events (see PLA, 2009).

During maintenance dredging, the material that is suspended into the water column disperses and re-settles onto other areas. Sand material will be re-deposited within close proximity to the dredge site whereas fine silts may remain in suspension for a period of days

[1] This information has been referred to as it provides useful information on sediment plumes and hence hydromorphological linking in the Outer Thames Estuary, however, it is important to note that this modelling was undertaken for a large capital dredge and therefore lower SSCs would be expected for any future maintenance dredge campaigns in this location.

following dredging. Furthermore, any material that settles is very short-lived, most likely only occurring during slack water periods and being re-dispersed as tidal currents increase. In summary, these periods of deposition are transient and the scale of any exposure is considered to be within the existing natural variability of the system. There is potential for smothering of benthic organisms where the material is deposited at disposal sites. The majority of the material deposited will be sand and will quickly settle to the bed before being redistributed by the ambient flows regime. Strategic placement of the deposited material throughout the North Edinburgh Channel disposal site will minimise the initial depth change following each disposal, at the same time reducing the impact on the flow regime. If required, a sand placement plan could be developed and agreed with Natural England.

Intertidal and subtidal estuarine habitats and associated benthic communities are naturally adapted to fluctuating conditions and the resuspension and deposition of sediments on a daily basis (through tidal action), lunar cycles (due to the differing influences of spring and neap tides) and on a seasonal basis (due to storm activity and conditions of extreme waves). The sensitivity of benthic communities associated with designated features to smothering/ siltation rate changes (light), based on Natural England's advice on operations for maintenance dredging within the Margate and Long Sands SAC and Essex Estuaries SAC, is typically 'not sensitive' to 'medium'. These habitats have been historically exposed to changes in suspended sediments and sedimentation as a result of ongoing maintenance dredging for over two centuries in some places. Overall, given the low level of exposure and the low sensitivity of interest features, the impact of this temporary disturbance is considered to be minor and unlikely to change the overall favourable condition status of interest features.

An increase in suspended sediments may reduce visibility and affect the feeding success of the Red-throated diver, Little tern and Common tern, which are features of the Outer Thames Estuary SPA, as they forage visually. The effects of suspended sediment plumes are considered temporary, lasting no longer than a few hours. The worst case footprints of the plume from TSHD are localised around the dredged area. In addition, only a very small proportion of this foraging area will be affected by maintenance dredge activities. Therefore, these bird features are not considered to be significantly affected due to their ability to forage over extensive areas and any effects would be very temporary and localised in nature.

A.3.1.3 Potential Remobilisation of Contaminated Sediments

Unlike water quality, there are no formal quantitative environmental quality standards (EQS) for the concentration of contaminants in sediments, although the Water Framework Directive (WFD; 2000/60/EC) has introduced optional standards for a small number of priority and priority hazardous substances. The Centre for Environment, Fisheries and Aquaculture Science (Cefas) has prepared a series of Guideline Action Levels to assist in the assessment of dredged material (and its suitability for disposal to sea). In general, contaminant levels in dredged material below Action Level 1 (AL1) are of no concern and are unlikely to influence the licensing decision. However, dredged material with contaminant levels above Action Level 2 (AL2) is generally considered unsuitable for disposal at sea. Dredged material with contaminant levels between AL1 and AL2 requires further consideration (and may require testing) before a decision can be made. The Cefas Guideline Action Levels should not be viewed as pass/fail thresholds. However, these guidelines provide an appropriate context for consideration of contaminant levels in sediments and are used as part of a 'weight of evidence' approach to assessing dredged material.

The sediments that are maintenance dredged and disposed within the Thames Estuary (both within and outwith European/Ramsar sites) exhibit a varied degree of contamination across

a range of chemical parameters including metals, organotins, polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs). Refer to the MDP Baseline Document (PLA, 2014) for results between 2004 and 2013, and Appendix B of this update report for results between January 2014 and April 2018. In general, sediment quality results throughout the study area exhibit a varied degree of contamination for those parameters analysed. The available sediment quality data indicates that contaminant concentrations are typically below AL1; however, there are numerous instances where concentrations are above AL1, with a small number of concentrations observed above AL2. There is significant variation both between and within sites, indicating that contamination is potentially localised.

It is not expected that water quality and prey species for birds will be adversely affected by the re-suspension of sediments and associated contaminants through existing maintenance dredging activities undertaken by the PLA and third parties. Generally, any contamination that has been detected occurs at isolated locations and, therefore, only a small amount of contaminated material will be redistributed and deposited during dredging. The PLA has developed guidelines on the number of samples required which is dependent upon the quantity of sediment to be dredged. This provides a mechanism for modifying or preventing dredging if the sediments are significantly contaminated. Furthermore, there is strict legislation and water quality assessments in place that must be adhered to in order to obtain a dredging licence. If any contaminant concentrations are deemed too high then dredging and disposal of that material is restricted. It is therefore considered unlikely that maintenance dredging and disposal has, to date, had an adverse effect on the integrity of the EMS through remobilisation of contaminated sediments. Subject to the existing maintenance dredging testing (i.e. sediment sampling and laboratory analysis for contaminants) and licensing regime (requirement for third parties to obtain a marine licence from the MMO and the consent from the PLA) remaining in place, it is unlikely that an impact would occur in the future.

A.3.1.4 Potential for Disturbance Caused by Interruption of Possible Line of Sight and Noise

Bird species features associated with the relevant SPAs can be found in the MDP Baseline Document (PLA, 2014) and Section 5.1.2 of this update report. Noise levels generated by the dredgers are no greater than noise generated by other vessels that routinely use the estuary throughout the year. The noise from the TSHD is continuous and, therefore, in general, birds are considered to rapidly become habituated (Hill et al. 1997) (although see also information on the Red-throated diver below). With regard to disturbance from movement, waterbirds are already accustomed to high levels of commercial and recreational activity in the estuary, and, therefore, the slow and relative infrequent movements of the vessels involved in the dredging process are unlikely to cause significant additional disturbance. The counts of birds, which were deemed to warrant designation, occurred at a time when maintenance dredging was already ongoing. The overall potential for disturbance effects on birds using the estuary and wider area is considered to be insignificant.

It should be noted that the Red-throated diver (*Gavia stellata*), which is a feature of the Outer Thames Estuary SPA, is highly sensitive to non-physical disturbance by noise and visual presence during the winter (Garthe and Huppop, 2004). Disturbance can cause these birds to reduce or cease feeding in a given area or to be displaced (JNCC, 2013). Disturbance and displacement effects may arise from shipping (including recreational boating) and boat movements associated with activities such as marine aggregate extraction and fishing activities (Cook and Burton, 2010). Approaching ships and smaller vessels have been shown to cause displacement, even when several kilometres away (Dierschke et al. 2017). As such, maintenance dredging of the main approach channel within the Outer Thames Estuary SPA has the potential to disturb Red-throated divers. It is also noted that there are

many winter activities at the riverside and within the intertidal habitats and open waters which have the capacity to disturb SPA waterfowl interest and/or impact on its supporting habitat (as noted for the Benfleet and Southend Marshes SPA; Natural England's Designated Sites View). This includes significant recreational watercraft use, bait digging, dog walking, commercial fishing and development pressure (Southend on Sea Borough Council, 2010; Liley et al. 2012).

As previously noted, the London Gateway port development Environmental Statement did not predict any requirement for maintenance dredging in the outer part of the Estuary given its self-scouring nature (although this will need to be reviewed on an ongoing basis). Furthermore, as the main approach channel is already frequently used by shipping, and shipping channels are already known to be avoided by Red-throated divers, any additional vessel movements associated with any such future maintenance dredge requirements would not be expected to result in any increase in disturbance to this species.

A.3.1.5 Summary of Direct Impacts

The frequency and scale of disturbance as a result of the PLA and third party maintenance dredging and disposal activities is considered to be very low. Furthermore, qualifying features of European/Ramsar sites (e.g. benthic communities, birds, marine mammals) have been historically exposed to this disturbance for over two centuries in some places and therefore impacts related to this disturbance are already reflected in the sites. In summary, none of the direct impacts related to the continuation of maintenance dredging and disposal of maintenance dredge arisings at the existing levels are likely to change the condition of the qualifying interest features that have been identified in the relevant citations for each of the respective European/Ramsar sites.

A.3.2 Indirect Impacts on Interest Features

The potential indirect impacts of maintenance dredging and disposal operations in the Thames Estuary are limited to changes in the sediment supply and any associated effects on the designated sites and interest features.

As detailed within the MDP Baseline Document (PLA, 2014) and Sections 3 of this update report, maintenance dredging undertaken by both the PLA and third parties has been predominantly achieved by WID and ploughing. Through these methods of dredging, sediment is typically retained in the estuary and dispersed locally in the water column, therefore promoting relocation of material and contributing to local sediment supply, rather than removal to licensed marine or land disposal sites. In the instances where disposal is required (i.e. through TSHD or backhoe dredging), land disposal facilities within the Thames Estuary at Rainham Silt Lagoons and Cliffe Pools have most commonly been used.

Maintenance dredge arisings that are disposed of onshore at Rainham Silt Lagoons and Cliffe Pools and at marine disposal sites (e.g. South Falls) results in a removal of sediment from the marine system creating an artificial sediment sink in sediment budget terms which in turn can modify the sediment regime and reduce supply to other nearby areas.

Drawing together an extensive set of contemporary literature and source data (i.e. published research, consultancy reports and technical documents), the Greater Thames Coastal Habitat Management Plan (CHaMP) (ABPmer, 2008) provided an estimate of the sediment budget within the Thames Estuary. The outcome of this sediment budget analysis suggested that the estuary has had a sufficient supply of sediment throughout the last 100 years to enable accretion (i.e. an accretional morphological behaviour). As part of the Greater Thames CHaMP sediment budget analysis, it was assumed that approximately

113,000 tonnes/year, equivalent to *circa* 225,000 m^3/year, of sediment is removed from the system and disposed to land (or offshore disposal sites) through maintenance dredging. A comparison of these values with those derived as part of the MDP Baseline Document (PLA, 2014) suggested that the maximum volumes of sediment removed from the system in recent years is in the order of 20,000 m^3/year. This was calculated through the summation of maintenance dredge volumes disposed to both land and sea by the PLA and third parties between 2004 and 2013 (the frequency and volumes of disposed maintenance material during this update period – January 2014 to April 2018 – are unknown, although it is assumed to be minimal). As such, there is much greater potential for an accretional behaviour within the Thames Estuary than previously calculated; assuming other aspects of the sediment budget analysis remains constant.

In the future, with the inclusion of predicted maintenance dredging for London Gateway, this volume may be potentially increased by a further 250,000 m^3/year. This conservatively assumes that all dredging is undertaken by TSHD and disposed at the licensed offshore disposal sites (outside of the estuary system), although a considerable amount of dredging may realistically be achieved through WID. Taking into account this considerable change in future dredging requirements, the sediment budget analysis for the estuary is still expected to remain positive with potential for ongoing accretion.

There is currently no evidence that the existing maintenance dredging and disposal activity is detrimentally affecting the habitat interest features in Thames Estuary. This is supported by the condition statement assessment of the respective Sites of Special Scientific Interest (SSSI) Units, which predominantly class the estuary as in favourable (average of 56.8% of the area) and unfavourable but recovering (average of 30.7% of the area) condition.

In the Outer Thames, it is not expected that maintenance dredging will be required and hence it would not be anticipated that it would affect sediment transport in relation to the offshore sandbanks associated with the Outer Thames Estuary SPA and Margate and Longsands SAC, or the supporting habitats of the Southern North Sea SAC. In summary, given the physical processes operating in the estuary and the nature of maintenance dredging, the potential indirect impacts associated with maintenance dredging and disposal are considered insignificant and these interest features will therefore not be adversely affected.

A.3.3 Mitigation Measures

Through the collation of material to support the AA, there has been no identification of a need for new mitigation measures to be introduced. However, it should be noted that existing licence conditions include constraints on dredging and disposal, and such conditions thus form an important part of the baseline against which the potential effects have been assessed. These conditions are described in the MDP Baseline Document (PLA, 2014; Section 3) and include, but are not limited to, the following for certain dredge methods:

- Water Injection Dredging – to undertake dredging on the ebb phase of the tide only; and
- Dispersive methods are restricted (not to be carried out) above Tilbury Bridge during the months of June to August inclusive, to avoid water quality issues during months of high water temperatures and low oxygen levels (exceptions to this condition, due to other seasonal site specific licence conditions, are noted in the MDP Baseline Document; PLA, 2014).

Additional general conditions that apply for three year licences are:

- To supply the PLA on each anniversary of the date of the licence, for the duration of the licence, the start and end dates of each dredging campaign and the quantity of material removed during each dredging campaign carried out in that year; and
- In relation to investigations and sediment sampling, to undertake further sampling during the Licence period if required by the PLA due to the occurrence of a pollution event, or there is an indication one has occurred involving a discharge or a possible discharge of polluting oil, noxious liquid substances or harmful substances or goods either in the area to be dredged or in the vicinity of a dredge area (the PLA to be provided the results of the sediment sampling as soon as possible thereafter).

A.3.4 In-combination Effects

The MDP Baseline Document (PLA, 2014) and Section 3 of this update report provide information on the PLA and third party maintenance dredge operations which are ongoing and classified as 'maintenance' at the time of publication. This section summarises any known and publicised 'plans or projects' which could have implications for maintenance dredging within the study area if constructed in the future. After publication of the baseline, any new proposed plans or projects which might give rise to an in-combination effect with respect to maintenance dredging should be assessed against the existing maintenance dredging regime described in the MDP Baseline Document (PLA, 2014) and this update report. Defra (2007) states that 'the onus will also be on the developer [of a future project] to resource the updating of the Baseline Document' in respect of the new plan or project which affect the context, assessment or detail within the MDP Baseline Document and, as a result, this assessment.

Where such developments entail reclamation, dredging or the construction of infrastructure in tidal waters, potential impacts would be considered through an Environmental Impact Assessment (EIA) that would be required to support an application for development permission. Where the development has the potential to affect a European/Ramsar site, the requirements of the Habitats Regulations would also need to be complied with. In such cases, these developments will require their own mitigation/compensation, prior to considering the future effects on maintenance dredging, which is the focus of this AA.

This in-combination assessment has focussed on the potential for in-combination effects of maintenance dredging to arise with other plans and projects predominantly within the Inner Thames Estuary component of the SHA. This is due to the fact that, to date, maintenance dredging of the main navigation channel in the Outer Thames has only be undertaken sporadically, and required very small volumes to be dredged, given that the system in this area is largely self-scouring (see Section 5 of the MDP Baseline Document (PLA, 2014) for Coastal and Estuarine Processes and Morphology). Furthermore, it has been predicted that future maintenance dredge requirements for the approach channel to the new London Gateway facility will mainly be required within Sea Reach (see Figure 3 of the update report). As such, it was considered unlikely that in-combination effects of maintenance dredging with plans or projects in the Outer Thames Estuary (e.g. with marine aggregate extraction from active/exploratory areas or offshore wind farm development) would occur. Hence, the following text summarises known consented and unconsented plans and projects predominantly within the Inner Thames Estuary.

Tilbury2: At the time of writing, a consenting decision has not been made regarding the new port facility acting alongside the existing Port of Tilbury (referred to as Tilbury2). The project will involve the extension of existing jetty facilities and the dredging of berth pockets at the development site. Details of any future maintenance dredge requirements as part of this

application are unknown and therefore it is not possible at this stage to assess the potential in-combination effects with current maintenance dredge operations.

Thames Estuary 2100 (TE2100): The TE2100 Plan (Environment Agency, 2012) was developed by the Environment Agency to provide strategic direction for managing tidal flood risk in the Thames Estuary to the end of the century and was approved by Defra in 2012. The TE2100 area includes the Thames Estuary, its tidal tributaries and floodplain from Teddington downstream to a line between Shoeburyness and Sheerness. It sets out how the Environment Agency, working with partners, will continue to protect 1.25 million people and £200 billion worth of property from tidal flood risk.

The Plan provides a strategic framework through to the end of the century together with the strategic direction for flood risk management for all parts of the Plan area. It also provides guidance on the flood risk management activities that will be required over the short, medium and long term. The plan predicted that overall there will be a net loss of intertidal area throughout the TE2100 study area as a whole over the next 100 years due to coastal squeeze and identified the need to create intertidal habitat to offset these predicted losses (i.e. compensatory habitat) (Environment Agency, 2012). The Plan requires a review of the indicators of change to be undertaken after 5 years to provide an early assessment, ahead of the full review of the Plan itself in year 10, as to whether anything in the TE2100 Plan needs to be updated or amended. The latest review found that changes in the Estuary are generally taking place in line with the Plan's predictions (Environment Agency, 2016). The implications of the Plan for maintenance dredging remain unknown, but it is considered unlikely that a significant adverse in-combination effect would be anticipated.

Tideway Tunnel: Construction of the Thames Tideway Tunnel, which started in 2016 (for a seven year period), is a tunnel running mostly under the River Thames through central London. The tunnel is intended to provide storage and conveyance of combined raw sewage and rainwater discharges that currently overflow into the river. As part of the Thames Tideway Tunnel project, various sites along the Thames have required dredging activities, thus far involving the removal of 32,251 m³ of sediment. A summary of the depth and volume of sediment dredged or consented to be dredged at each site is providing in Table 6 below of this update report. Relatively minimal maintenance dredging activities occur in this section of the Thames and the Thames Tideway Tunnel dredge areas are not located in the vicinity of any European/Ramsar sites. Overall, the potential for significant adverse in-combination effects with the maintenance dredging operations in the Thames Estuary are therefore considered unlikely.

Medway Approaches, Medway Estuary and The Swale Maintenance Dredging: The Medway Estuary lies on the south side of the outer Thames Estuary in Kent. It forms a single tidal system with The Swale and joins with the Thames Estuary between the Isle of Grain and Sheerness. Shipping approaching the Medway Estuary does so through an approach channel that lies within the Thames Estuary. Maintaining safe port access for commercial and recreational maritime transport is an important function for the Harbour Authority. The volume of maintenance dredging carried out by Peel Ports Medway and third party users across the Medway and The Swale estuaries averages approximately 156,100 m³ annually (PLA, 2014).

Peel Ports Medway has provided the information deemed necessary to inform an AA of the maintenance dredging undertaken by or on behalf of the Authority and all known third party users in the Medway Estuary, its Approaches and The Swale (Peel Ports, 2012; it is recognised that an update to this report is also currently underway). The report concluded that none of the impacts arising from ongoing maintenance dredging and disposal are likely to change the condition of the qualifying interest features for each of the internationally

designated sites. A firm conclusion could not be reached with respect to dredging in some of the third party maintenance dredge sites due to a lack of site-specific sediment analysis. However, available evidence suggests that the risks will be low (i.e. there is no evidence of contamination above the background signature levels either at other maintenance dredge locations or in the wider receiving environment, and there is no evidence of any sediment-related water quality problems according to WFD monitoring outcomes). Overall, the potential for significant adverse in-combination effects with the maintenance dredging operations in the Thames Estuary are therefore considered unlikely.

Fishing activity: There is potential for in-combination effects as a result of physical disturbance from abrasion and biological disturbance due to fishing activity. Fishing activity is known to be widespread throughout the Outer Thames Estuary; however, the gear types used in this area are relatively small and light due to the predominant size of the fishing vessels (i.e. less than 10 m). In this context, fishing is an ongoing activity that has occurred within the boundaries of the Margate and Long Sands SAC and the Outer Thames Estuary SPA prior to designation. There is not anticipated to be any in-combination effects on water quality resulting from fishing activity. There will be limited increased vessel movements associated with the dredging and disposal as compared to the current numbers of vessels that passage through the Outer Thames Estuary. It should be noted that The Margate and Long Sands European Marine Site (Specified Areas) Bottom Towed Fishing Gear Byelaw (https://www.gov.uk/government/publications/the-margate-and-long-sands-european-marine-site-specified-areas-bottom-towed-fishing-gear-byelaw), which came into force in March 2018, protects two specified areas of sandbank in Margate and Long Sands SAC from the impacts of bottom towed fishing gear. With regards to the Outer Thames Estuary SPA, it is recognised that dredging activity would largely be within the main shipping lanes.

Overall the sensitivity of the benthic communities to disturbance is considered to be low, with relatively high recovery rates. The increased footprint of the temporary disturbance resulting from the PLA and third party dredging and disposal activities is therefore not considered to be of a scale that would make the existing situation any worse (i.e. resulting in a failure of the conservation objectives on the basis of in-combination effects). This is set in the overall context of the footprint of the dredge and disposal sites that fall within the boundary of the designated sites.

A.4 Application of the Habitats Directive

For the purposes of this document and application of the Maintenance Dredging Protocol, the Habitats Regulations 2017 are applied as follows:

- Regulation 63 (1) - a competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which either:

  - Is likely to have a significant effect on a European site or a European offshore marine site (either alone or in combination with other plans or projects), and
  - Is not directly connected with or necessary to the management of that site

  must make an AA of the implications for that site in view of that site's conservation objectives. For the purposes of the Regulation 63 (1), the volumes that are maintenance dredged and disposed from the Thames Estuary are sufficient to conclude that there could be an LSE. As a consequence, Regulation 63 (2) and those following are applied.

- Regulation 63 (2) - a person applying for any such consent, permission or other authorisation must provide such information as the competent authority may reasonably require for the purposes of the assessment or to enable them to determine whether an AA is required. Through the MDP Baseline Document (PLA, 2014) and this update report, the information deemed necessary to inform an AA of its maintenance dredging and disposal commitments within the PLA Harbour Authority boundary on the Thames Estuary is provided.

- Regulations 63 (3) and 63 (4) - the competent authority must for the purposes of the assessment consult the appropriate nature conservation body and have regard to any representations made by that body within such reasonable time as the authority specifies. They must also, if they consider it appropriate, take the opinion of the general public, and if they do so, they must take such steps for that purpose as they consider appropriate. The PLA can be considered a Competent Authority responsible for undertaking the AA according to these regulations.

A.4.1 Outcome of the Assessment

In the preparation of this report, it is concluded that maintenance dredging will not result in an adverse effect on the integrity of any of the following European/Ramsar sites:

- Outer Thames Estuary SPA;
- Margate and Long Sands SAC;
- Essex Estuaries SAC;
- Southern North Sea SAC;
- Foulness (Mid-Essex Coast Phase 5) SPA and Ramsar;
- Benfleet and Southend Marshes SPA and Ramsar;
- Medway Estuary and Marshes SPA and Ramsar;
- Thames Estuary and Marshes SPA and Ramsar; and
- Compensatory sites.

The reasons for the above conclusions are outlined below.

Direct Impacts: The frequency and scale of disturbance as a result of the PLA and third party maintenance dredging is considered to be very low. Furthermore, qualifying features of European/Ramsar sites (e.g. benthic communities, birds, marine mammals) have been

historically exposed to this disturbance for over two centuries in some places and are therefore considered to be accustomed to these changes. In summary, none of the direct impacts related to the continuation of maintenance dredging at the existing levels are likely to deteriorate the condition of features of European/Ramsar sites.

Indirect Impacts: The majority of maintenance dredging within the Thames Estuary is undertaken by WID which does not require disposal, but results in sediment being retained in the estuary. This method of dredging is considered to be beneficial in sediment budget terms, given that it results in the relocation of material and contributes to local sediment supply. Maintenance dredge arisings that are disposed of onshore or further offshore, on the other hand, result in an artificial sediment sink. However, an analysis of the sediment budget indicates that sediment sources are exceeding sediment sinks in the estuary and thus the estuary is exhibiting net accretional behaviour. Given the physical processes operating in the estuary and the nature of maintenance dredging, the potential indirect impacts associated with maintenance dredging and disposal are considered insignificant and these interest features will therefore not be adversely affected. No indirect impacts are expected in the Outer Thames as no significant maintenance dredging is likely to be required.

In-combination Effects: Although the details of some of the other plans or projects in the study area are currently unknown, based on currently available information, the in-combination assessment indicates that there is unlikely to be any significant adverse in-combination effects.

A.4.2 Summary

In summary, none of the potential impacts arising from ongoing maintenance dredging are assessed as being significant. They are not therefore likely to change the condition of the designated features that have been identified in the relevant citations for each of the European/Ramsar sites that have been screened into the assessment. It should be noted that this assessment has been based on previous (2004 to 2013) and current (January 2014 to April 2018) levels of maintenance dredging within the study area. If maintenance dredge locations, volumes (outside existing variability) or techniques from existing operations (as at April 2018) are required to change in the future, this would require an additional assessment in the context of the designated features. It is noted that there are several consented projects (not yet undertaken) and unconsented projects which could change the maintenance dredging commitment on the estuary. Further iteration to the MDP Baseline Document may, therefore, be required once such developments have been implemented.

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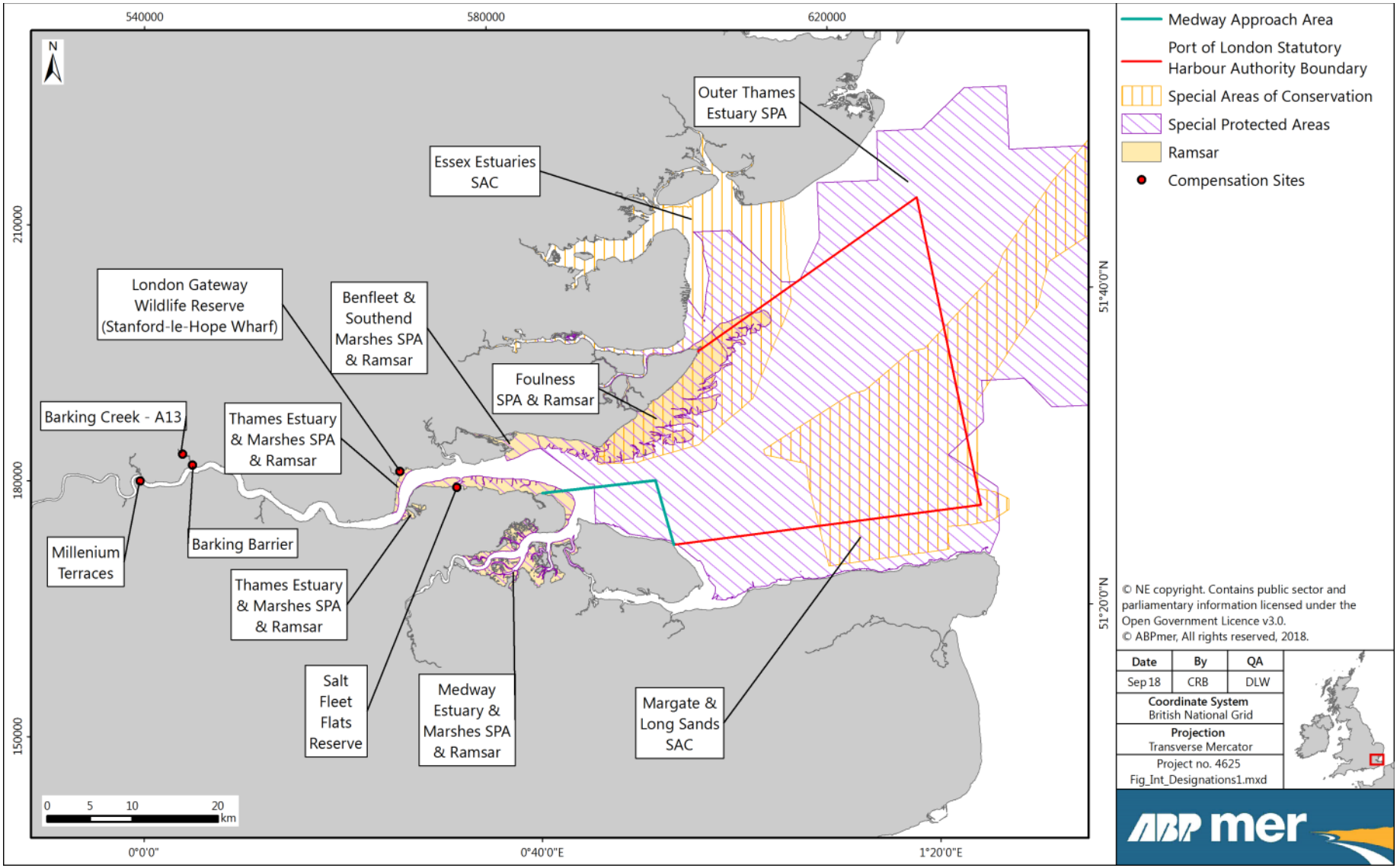

Figure A.1. Designated sites screened into the Appropriate Assessment

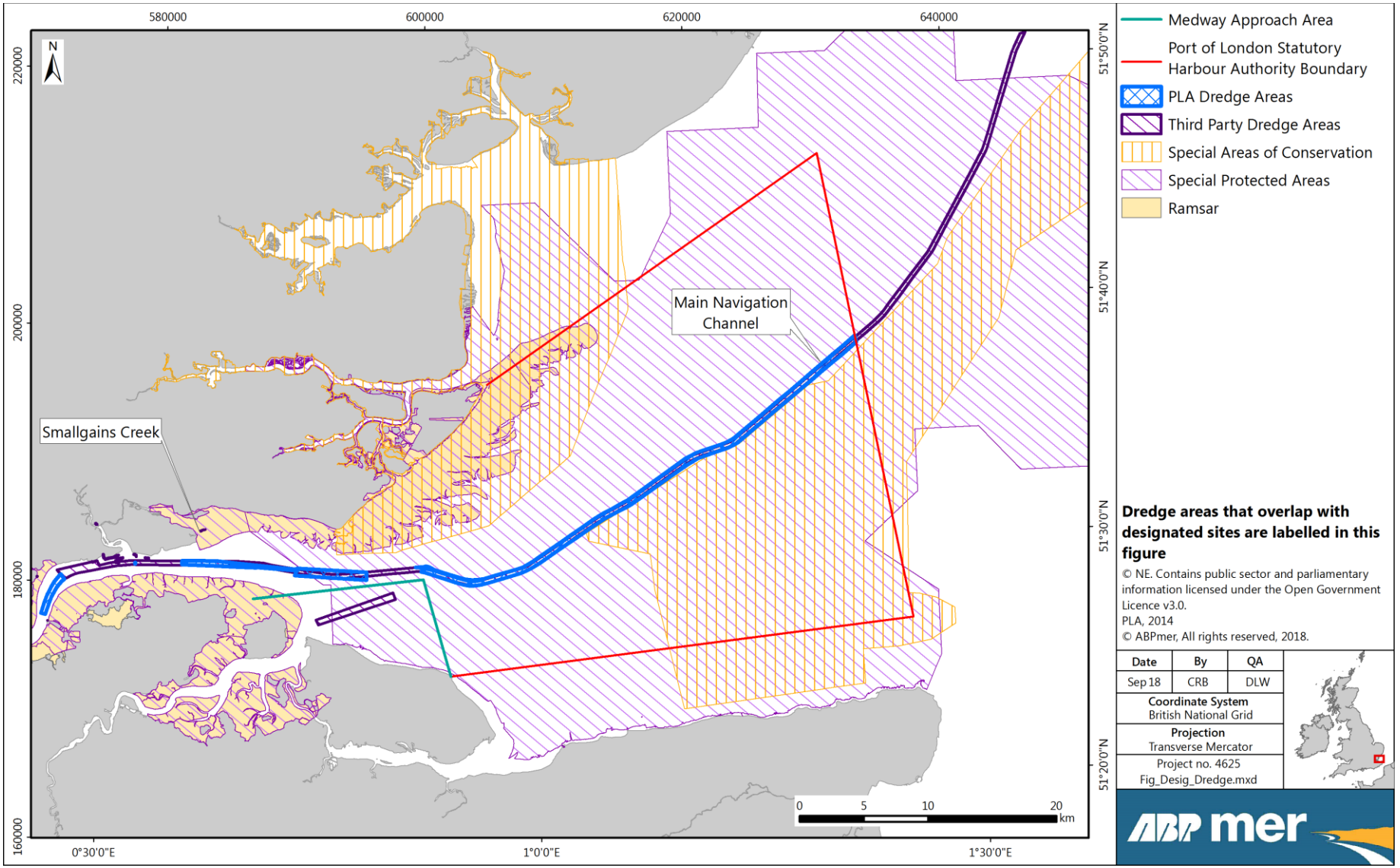

Figure A.2. International designated sites and maintenance dredge sites (1)

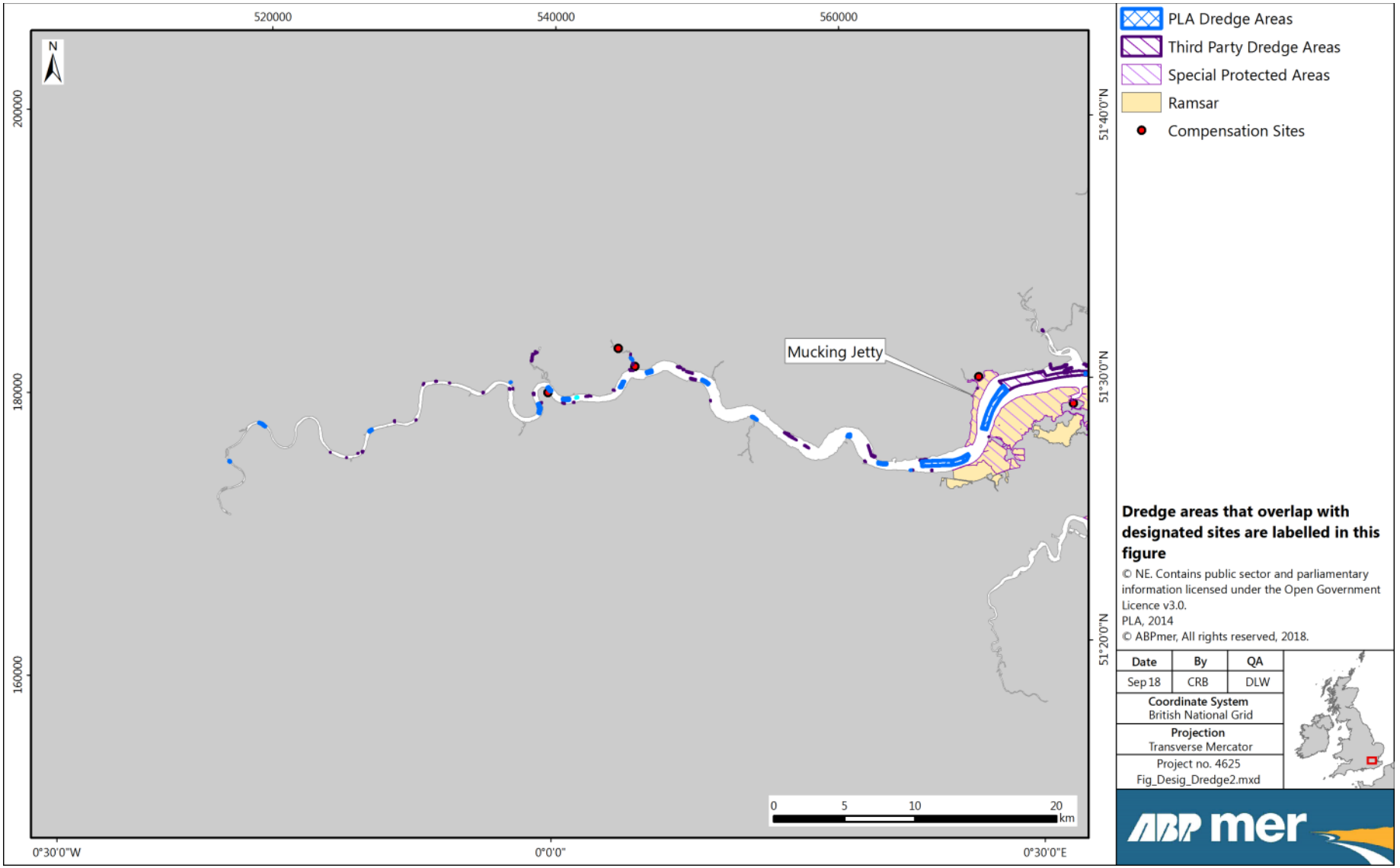

Figure A.3. International designated sites and maintenance dredge sites (2)

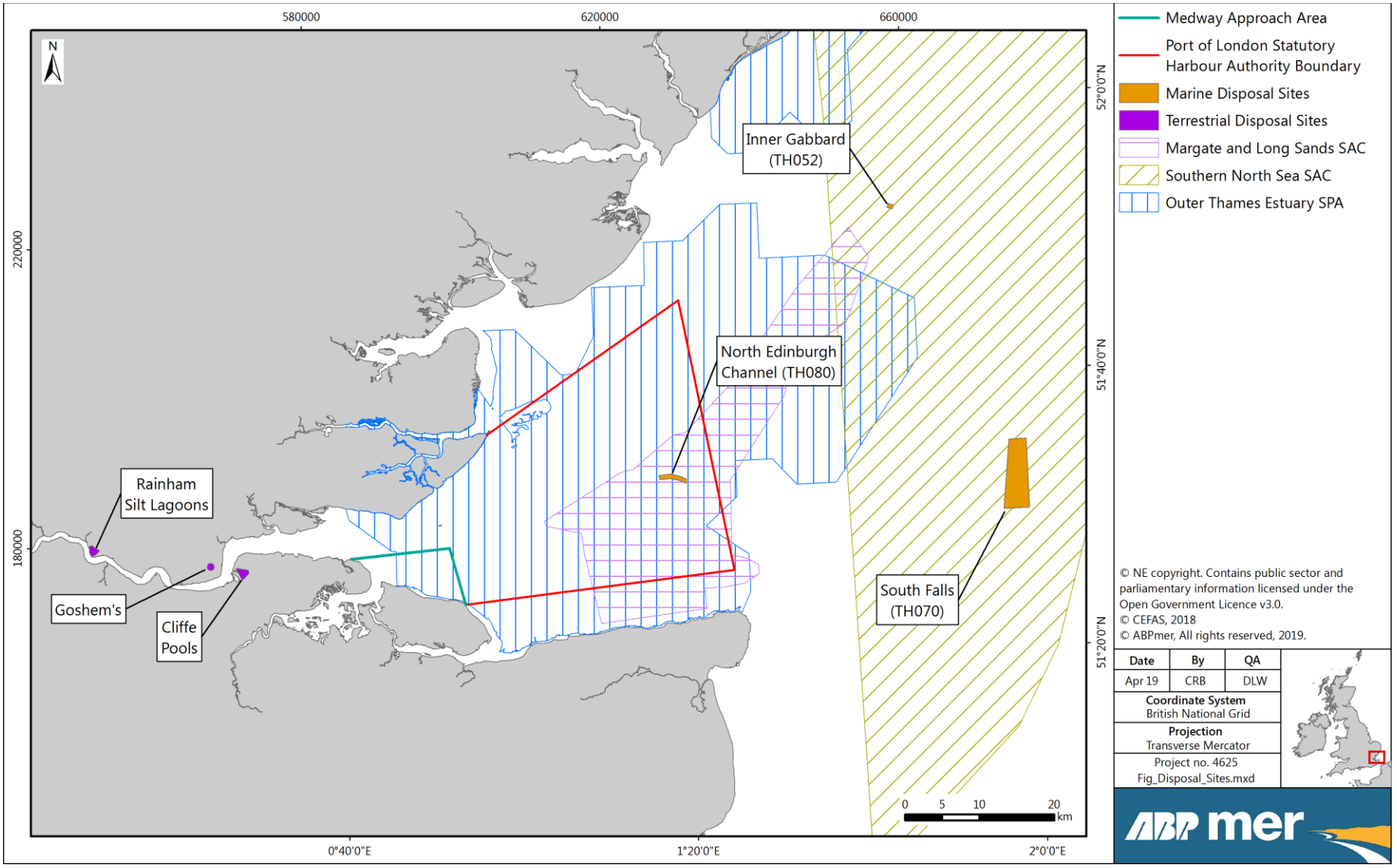

Figure A.4. Disposal sites used by the PLA and third parties and international designated sites

Appendix B - Sediment Quality Data

Sediment quality data from samples collected between January 2014 and April 2018 has been collated and presented below for both the PLA (Section B.1) and third party (Section B.2) dredging activity locations. It should be noted that these sites do not necessarily correspond to the dredge sites discussed above, as some areas will require ongoing monitoring as part of marine licence conditions and, potentially, to prepare for future dredge campaigns.

The contaminants reported include metals, organotins, polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs), as follows:

- Metals:
  - Arsenic (Ar);
  - Cadmium (Cd);
  - Chromium (Cr);
  - Copper (Cu);
  - Mercury (Hg);
  - Nickel (Ni);
  - Lead (Pb); and
  - Zinc (Zn).

- Organotins:
  - Dibutyltin (DBT); and
  - Tributyltin (TBT).

- Polychlorinated biphenyls (PCBs) – ICES 7 congeners:
  - PCB28;
  - PCB52;
  - PCB101;
  - PCB118;
  - PCB138;
  - PCB153; and
  - PCB180.

- Polycyclic aromatic hydrocarbons (PAHs) – USEPA suite of 16:
  - Acenaphthene (ACNAPH);
  - Acenaphthylene (ACNAPT);
  - Anthracene (ANTHRA);
  - Benz(a)anthracene (BAA);
  - Benzo(a)pyrene (BAP);
  - Benzo(b)fluoranthene (BBF);
  - Benzo(g,h,i)perylene (BENZGHI);
  - Benzo(k)fluoranthene (BKF);
  - Chrysene (CHRYS);
  - Dibenz(a,h)anthracene (DIBENAH);
  - Fluoranthene (FLUORAN);
  - Fluorene (FLUOREN);
  - Indeno(123-c,d)pyrene (INDENO);
  - Naphthalene (NAPTH);
  - Phenanthrene (PHENANT); and
  - Pyrene (PYRENE).

There are some gaps in the data where certain parameters were not analysed or where the limit of detection (LOD) was not reported. Where samples depths were not reported (i.e. the depth into the sediment), it is likely that these samples were obtained from the seabed surface using a grab. However, given the uncertainty, these depths have been reported as not available (n/a).

B.1 Sediment Contamination Results – The PLA Dredge Sites

Tables B.1 to B.12 present sediment contamination results from samples collected between January 2014 and April 2018 at the following PLA dredge sites:

- Knock John;
- Royal Terrace Pier;
- West Oaze; and
- Hookness Shoal.

It should be noted that dredging activity has not been undertaken at Knock John between January 2014 and April 2018.

B.1.1 Knock John

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
212333	23/10/15	n/a	110	<0.10	9.7	2	<0.10	6.9	15	31	<0.010	<0.010
212334	23/10/15	n/a	97	<0.10	11	1.5	<0.10	7.8	24	35	<0.010	<0.010
212335	23/10/15	n/a	28	<0.10	7.2	<0.50	<0.10	3.9	3.2	13	<0.010	<0.010
212336	23/10/15	n/a	33	<0.10	7.4	<0.50	<0.10	3.7	4.3	14	<0.010	<0.010
212337	23/10/15	n/a	71	<0.10	8.4	<0.50	<0.10	4.9	14	28	<0.010	<0.010
212338	23/10/15	n/a	22	<0.10	7.1	<0.50	<0.10	3.8	3.1	12	<0.010	<0.010
212339	23/10/15	n/a	21	<0.10	7.7	<0.50	<0.10	3.9	2.3	12	<0.010	<0.010
212340	23/10/15	n/a	50	<0.10	8.5	<0.50	<0.10	4.9	15	29	<0.010	<0.010

Table B.1. Metal and organotin results from Knock John (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
212333	23/10/15	n/a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
212334	23/10/15	n/a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
212335	23/10/15	n/a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
212336	23/10/15	n/a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
212337	23/10/15	n/a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
212338	23/10/15	n/a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
212339	23/10/15	n/a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
212340	23/10/15	n/a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070

Table B.2. Polychlorinated Biphenyl (PCB) results from Knock John (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
212333	23/10/15	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
212334	23/10/15	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
212335	23/10/15	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
212336	23/10/15	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
212337	23/10/15	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
212338	23/10/15	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
212339	23/10/15	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
212340	23/10/15	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)	
212333	23/10/15	n/a	<0.10	0.31	<0.10	<0.10	<0.10	<0.10	0.15	-	
212334	23/10/15	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	
212335	23/10/15	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	
212336	23/10/15	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	
212337	23/10/15	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	
212338	23/10/15	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	
212339	23/10/15	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	
212340	23/10/15	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	

Table B.3. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Knock John (mg/kg)

B.1.2 Royal Terrace Pier

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
498374	14/08/17	n/a	10	0.12	17	16	0.24	11	31	58	<0.010	<0.010
498375	14/08/17	n/a	12	0.14	25	22	0.29	16	41	76	<0.010	<0.010
498376	14/08/17	n/a	16	0.14	32	27	0.46	20	49	96	<0.010	<0.010

Table B.4. Metal and organotin results from Royal Terrace Pier (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
498374	14/08/17	n/a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
498375	14/08/17	n/a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
498376	14/08/17	n/a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070

Table B.5. Polychlorinated Biphenyl (PCB) results from Royal Terrace Pier (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
498374	14/08/17	n/a	<0.10	<0.10	0.76	0.31	<0.10	<0.10	<0.10	<0.10	0.57
498375	14/08/17	n/a	0.26	1.1	0.9	0.29	<0.10	<0.10	<0.10	<0.10	0.52
498376	14/08/17	n/a	0.37	1.4	2.8	0.42	<0.10	<0.10	<0.10	<0.10	0.7
			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)	
498374	14/08/17	n/a	<0.10	3.5	1.2	<0.10	<0.10	9	1.6	-	
498375	14/08/17	n/a	<0.10	<0.10	1.8	<0.10	0.17	14	2.4	-	
498376	14/08/17	n/a	<0.10	6.6	2.9	<0.10	<0.10	18	3.1	-	

Table B.6. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Royal Terrace Pier (mg/kg)

B.1.3 West Oaze

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
197539	21/09/15	n/a	9.5	<0.10	7.0	1.4	<0.10	3.8	12	13	<0.010	<0.010
197540	21/09/15	n/a	8.7	<0.10	8.4	1.7	<0.10	4.4	7	14	<0.010	<0.010
197541	21/09/15	n/a	9.1	<0.10	9.8	3.8	<0.10	5.1	8.7	18	<0.010	<0.010
197542	21/09/15	n/a	8.2	<0.10	8.3	2.8	<0.10	4.6	8	16	<0.010	<0.010
197543	21/09/15	n/a	11	<0.10	12	5.4	<0.10	6.9	11	25	<0.010	<0.010

Table B.7. Metal and organotin results from West Oaze (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
197539	21/09/15	n/a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
197540	21/09/15	n/a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
197541	21/09/15	n/a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
197542	21/09/15	n/a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
197543	21/09/15	n/a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070

Table B.8. Polychlorinated Biphenyl (PCB) results from West Oaze (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
197539	21/09/15	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
197540	21/09/15	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
197541	21/09/15	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
197542	21/09/15	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
197543	21/09/15	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)	
197539	21/09/15	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	
197540	21/09/15	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	
197541	21/09/15	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	
197542	21/09/15	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	
197543	21/09/15	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	

Table B.9. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from West Oaze (mg/kg)

B.1.4 Hookness Shoal

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
487197	23/07/17	n/a	18	0.21	15	28	0.59	12	110	130	<0.010	<0.010
487198	23/07/17	n/a	20	0.15	23	22	0.9	19	110	69	<0.010	<0.010

Table B.10. Metal and organotin results from Hookness Shoal (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
487197	23/07/17	n/a	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0070
487198	23/07/17	n/a	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0070

Table B.11. Polychlorinated Biphenyl (PCB) results from Hookness Shoal (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
487197	23/07/17	n/a	<0.10	<0.10	2.5	4.8	4.8	6.3	2.3	2.5	5.5
487198	23/07/17	n/a	1.4	0.61	2.2	5.2	<0.10	6	2	2.3	<0.10
			DIBENAH	**FLUORAN**	**FLUOREN**	**INDENO**	**NAPTH**	**PHENANT**	**PYRENE**	**Total Hydrocarbons (THC)**	
487197	23/07/17	n/a	0.77	11	<0.10	2.9	<0.10	7	10	-	
487198	23/07/17	n/a	0.53	11	2	2	3.4	8.9	11	-	

Table B.12. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Hookness Shoal (mg/kg)

B.2 Sediment Contamination Results – Third Party Dredge Sites

Tables B.13 to B.102 present sediment contamination results from samples collected between January 2014 and April 2018 at the following third party dredge sites:

- Civil and Marine;
- Customs Pier;
- Jurgens Jetty;
- King George V Lock;
- London Gateway Berths;
- Medway Approach;
- Middleton Jetty;
- Nelson Pier;
- Grays Terminal (NuStar);
- Tilbury2;
- Oikos;
- Purfleet Deep Wharf;
- Robins Wharf;
- S Jetty;
- Tilbury Dock Entrance (Bellmouth) and Tilbury Landing Stage;
- Thames Oilport;
- Thames Refinery;
- Thunderer Jetty;
- West India Docks;
- White Mountain Jetty;
- Bell Lane Creek;
- Northfleet Wharf Jetty;
- Vopak London Terminal;
- Northfleet Hope Container Terminal;
- Thames Tideway Tunnel:
  - Blackfriars Bridge Foreshore;
  - Carnwath Road Riverside;
  - Chambers Wharf;
  - Chelsea Embankment Foreshore;
  - King Edward Memorial Park Foreshore; and
  - Putney Embankment Foreshore.

In addition to the third party dredge sites listed above, dredging activity has been undertaken at Bell Lane Creek, Murphy's Wharf Jetty and Plantation Wharf Pier, as well as Albert Embankment Foreshore, Cremone Wharf Depot, Heathwall Pumping Station, Kirtling Street and Vicoria Embankment Foreshore as part of the Thames Tideway Tunnel project. However, no sediment samples have been collected and analysed from these sites during this period.

It should be noted that dredging activity has not been undertaken at Nelson Pier and Tilbury2 between January 2014 and April 2018.

B.2.1 Civil and Marine

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
27591	14/01/16	0	0.65	<0.011	2.3	2.05	<0.026	1.26	3.21	7.37	<0.001	<0.001
27592	14/01/16	0	3.08	0.05	23.21	7.19	0.09	5.38	13.05	29.73	<0.001	<0.001

Table B.13. Metal and organotin results from Civil and Marine (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
27591	14/01/16	0	0.00031	0.00025	0.00038	0.0003	0.0005	0.00051	0.00031	0.00256
27592	14/01/16	0	<0.0002	<0.0002	0.00021	<0.0002	0.00031	0.00027	<0.0002	<0.00159

Table B.14. Polychlorinated Biphenyl (PCB) results from Civil and Marine (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
27591	14/01/16	0	0.00585	0.00937	0.0235	0.0753	0.0944	0.0921	0.0647	0.0475	0.065
27592	14/01/16	0	0.00784	0.0265	0.0323	0.0931	0.126	0.139	0.093	0.0635	0.0819
			DIBENAH	**FLUORAN**	**FLUOREN**	**INDENO**	**NAPTH**	**PHENANT**	**PYRENE**	**Total Hydrocarbons (THC)**	
27591	14/01/16	0	0.0143	0.141	0.00979	0.0795	0.0235	0.065	0.116	86	
27592	14/01/16	0	0.0188	0.191	0.0199	0.113	0.031	0.105	0.155	136	

Table B.15. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Civil and Marine (mg/kg)

B.2.2 Customs Pier

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
2014/18551	17/09/14	0	16.44	0.24	58.17	34.83	0.5	26.34	65.43	136.07	0.016	<0.002

Table B.16. Metal and organotin results from Customs Pier (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
2014/18551	17/09/14	0	-	-	-	-	-	-	-	-

Table B.17. Polychlorinated Biphenyl (PCB) results from Customs Pier (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
2014/18551	17/09/14	0	0.016	0.021	0.045	0.152	0.261	0.337	0.23	0.16	0.118
			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)	
2014/18551	17/09/14	0	0.047	0.363	0.029	0.31	0.047	0.151	0.279	324	

Table B.18. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Customs Pier (mg/kg)

B.2.3 Jurgens Jetty

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
2014/19750	17/12/14	0	14.27	0.27	38.71	24.79	0.41	17.45	50.46	111.09	<0.001	<0.001
2014/19751	17/12/14	0	10.37	0.16	32.26	16.32	0.23	11.28	24.9	67.18	<0.001	<0.001

Table B.19. Metal and organotin results from Jurgens Jetty (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
2014/19750	17/12/14	0	0.0005	0.00048	0.00079	0.0006	0.0011	0.0011	0.00063	0.00520
2014/19751	17/12/14	0	0.00033	0.00031	0.00055	0.00039	0.00066	0.00066	0.00039	0.00329

Table B.20. Polychlorinated Biphenyl (PCB) results from Jurgens Jetty (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
2014/19750	17/12/14	0	0.02505	0.02715	0.05103	0.21238	0.26603	0.30038	0.23501	0.16973	0.1936
2014/19751	17/12/14	0	0.0137	0.01689	0.03406	0.11466	0.16412	0.20488	0.15291	0.0894	0.0891
			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)	
2014/19750	17/12/14	0	0.04469	0.45319	0.03342	0.31368	0.05313	0.19241	0.339	359	
2014/19751	17/12/14	0	0.02888	0.26916	0.02431	0.21806	0.045	0.11025	0.20278	275	

Table B.21. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Jurgens Jetty (mg/kg)

B.2.4 King George V Lock

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
2015/19999	05/01/15	0	18.34	0.4	65.19	50.54	0.7	32.29	97.14	256.32	0.0211	<0.002
2015/20000	05/01/15	0	19.31	0.38	65.25	51.12	0.76	33.21	98.79	205.45	0.0254	0.0266
2015/20001	05/01/15	0	14.11	0.43	40.23	39.3	0.47	20.06	67.65	135.08	0.0143	0.0161
2015/20002	05/01/15	0	16.85	0.42	58.78	44	0.65	27.03	85.47	168.17	0.0266	0.0291

Table B.22. Metal and organotin results from King George V Lock (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
2015/19999	05/01/15	0	-	-	-	-	-	-	-	-
2015/20000	05/01/15	0	-	-	-	-	-	-	-	-
2015/20001	05/01/15	0	-	-	-	-	-	-	-	-
2015/20002	05/01/15	0	-	-	-	-	-	-	-	-

Table B.23. Polychlorinated Biphenyl (PCB) results from King George V Lock (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
2015/19999	05/01/15	0	0.0567	0.046	0.0964	0.373	0.594	0.656	0.425	0.333	0.819
2015/20000	05/01/15	0	0.0482	0.052	0.132	0.453	0.646	0.703	0.427	0.334	1.03
2015/20001	05/01/15	0	0.0369	0.103	0.184	0.603	0.675	0.662	0.367	0.327	1.35
2015/20002	05/01/15	0	0.0645	0.109	0.231	0.981	1.08	1.01	0.624	0.546	1.99
			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)	
2015/19999	05/01/15	0	0.0693	0.764	0.244	0.37	0.118	0.308	0.638	866	
2015/20000	05/01/15	0	0.0798	0.756	0.267	0.439	0.134	0.379	0.76	875	
2015/20001	05/01/15	0	0.121	0.591	0.296	0.625	0.172	0.644	1.04	729	
2015/20002	05/01/15	0	0.117	0.999	0.278	0.776	0.187	0.694	1.56	1170	

Table B.24. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from King George V Lock (mg/kg)

B.2.5 London Gateway Berths

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
395495	16/12/16	0	9.1	< 0.10	17	9	0.29	15	16	34	<0.01	<0.01
395496	22/12/16	0	8.5	< 0.10	12	5.1	< 0.10	11	7	26	<0.01	<0.01
395497	22/12/16	0	8.7	< 0.10	11	2.6	< 0.10	9.3	4.8	18	<0.01	<0.01
395498	16/12/16	0	7.8	< 0.10	17	5.5	< 0.10	16	8.3	19	<0.01	<0.01

Table B.25. Metal and organotin results from London Gateway Berths (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
395495	16/12/16	0	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.007
395496	22/12/16	0	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.007
395497	22/12/16	0	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.007
395498	16/12/16	0	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.007

Table B.26. Polychlorinated Biphenyl (PCB) results from London Gateway Berths (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
395495	16/12/16	0	0.26	<0.10	0.52	0.49	0.72	0.73	<0.10	0.37	0.62
395496	22/12/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
395497	22/12/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
395498	16/12/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)	
395495	16/12/16	0	<0.10	1.5	0.23	<0.10	<0.10	1.8	1.4	-	
395496	22/12/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	
395497	22/12/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	
395498	16/12/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	

Table B.27. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from London Gateway Berths (mg/kg)

B.2.6 Medway Approach Channel

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
2016/30010	28/06/16	0	20.83	0.45	56.76	27.13	0.15	27.08	38.17	117.73	<0.001	<0.001
2016/30011	28/06/16	0	7.65	0.16	14.59	3.38	<0.038	7.14	9.58	25.81	<0.001	<0.001
2016/30012	28/06/16	0	9.95	0.17	18.04	3.62	<0.027	8.26	11.91	31.57	<0.001	<0.001
2016/30013	28/06/16	0	6.65	0.14	12.96	2.78	<0.031	6.16	8.97	22.68	<0.001	<0.001
2016/30014	28/06/16	0	6.93	0.13	13.19	3.13	<0.028	5.78	8.39	22.23	<0.001	<0.001

Table B.28. Metal and organotin results from Medway Approach Channel (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
2016/30010	28/06/16	0	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0014
2016/30011	28/06/16	0	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0014
2016/30012	28/06/16	0	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0014
2016/30013	28/06/16	0	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0014
2016/30014	28/06/16	0	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0014

Table B.29. Polychlorinated Biphenyl (PCB) results from Medway Approach Channel (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
2016/30010	28/06/16	0	0.00374	0.00427	0.00926	0.0474	0.0483	0.082	0.0412	0.0353	0.0284
2016/30011	28/06/16	0	0.00119	0.00273	0.0048	0.0263	0.0248	0.0368	0.0197	0.0173	0.0146
2016/30012	28/06/16	0	0.0011	0.00289	0.00661	0.0309	0.026	0.0389	0.0196	0.0178	0.0176
2016/30013	28/06/16	0	0.000747	0.000888	0.00247	0.0163	0.012	0.0191	0.0113	0.00982	0.00738
2016/30014	28/06/16	0	0.000968	0.000572	0.00238	0.0169	0.0148	0.0233	0.0127	0.0109	0.00782

			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)
2016/30010	28/06/16	0	0.0071	0.0769	0.0054	0.0517	0.0127	0.0333	0.0571	55.5
2016/30011	28/06/16	0	0.00339	0.0478	0.00288	0.0262	0.00812	0.0278	0.0376	34.4
2016/30012	28/06/16	0	0.00345	0.0444	0.00179	0.0274	0.00509	0.0222	0.0351	29
2016/30013	28/06/16	0	0.00185	0.0186	0.00109	0.0147	0.00368	0.0104	0.0157	18.5
2016/30014	28/06/16	0	0.00218	0.0202	0.00114	0.0151	0.00438	0.011	0.0173	23.9

Table B.30. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Medway Approach Channel (mg/kg)

B.2.7 Middleton Jetty

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
487190	18/07/17	n/a	19	0.28	26	32	0.55	18	73	110	<0.010	<0.010
487191	19/07/17	n/a	11	< 0.10	14	13	0.17	13	68	28	<0.010	<0.010
487192	20/07/17	n/a	23	0.28	37	34	0.79	24	66	120	<0.010	<0.010

Table B.31. Metal and organotin results from Middleton Jetty (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
487190	18/07/17	n/a	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.007
487191	19/07/17	n/a	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.007
487192	20/07/17	n/a	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.007

Table B.32 Polychlorinated Biphenyl (PCB) results from Middleton Jetty (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
487190	18/07/17	n/a	0.17	0.16	0.4	1.4	0.99	2.0	0.98	0.67	1.4
487191	19/07/17	n/a	<0.10	<0.10	0.19	0.3	0.28	0.37	0.26	0.16	<0.10
487192	20/07/17	n/a	<0.10	<0.10	0.28	1.0	<0.10	<0.10	<0.10	<0.10	0.31
			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)	
487190	18/07/17	n/a	<0.10	2.0	0.26	1.2	0.16	1.6	2.0	-	
487191	19/07/17	n/a	<0.10	0.64	<0.10	0.28	<0.10	0.64	0.69	-	
487192	20/07/17	n/a	<0.10	1.5	<0.10	<0.10	<0.10	1.0	1.6	-	

Table B.33. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Middleton Jetty (mg/kg)

B.2.8 Nelson Pier

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
2016/27465	17/12/15	0	31.08	2.36	53.85	114.41	2.89	28.72	586.46	386.52	<0.002	0.062
2016/27466	17/12/15	0	13.31	0.37	32.38	97.58	2.55	19.26	438.62	178.5	<0.002	<0.002

Table B.34. Metal and organotin results from Nelson Pier (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
2016/27465	17/12/15	0	-	-	-	-	-	-	-	-
2016/27466	17/12/15	0	-	-	-	-	-	-	-	-

Table B.35. Polychlorinated Biphenyl (PCB) results from Nelson Pier (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
2016/27465	17/12/15	0	0.739	12.2	13.2	35	32.7	31.5	15.2	9.64	28.9
2016/27466	17/12/15	0	0.233	2.77	4.13	8.02	7.47	7.14	3.46	2.84	6.52
			DIBENAH	**FLUORAN**	**FLUOREN**	**INDENO**	**NAPTH**	**PHENANT**	**PYRENE**	**Total Hydrocarbons (THC)**	
2016/27465	17/12/15	0	4.85	91.4	11.5	20	5.75	71	67.8	11900	
2016/27466	17/12/15	0	1.05	20.4	2.6	4.33	2.41	15	15	3000	

Table B.36. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Nelson Pier (mg/kg)

B.2.9 Grays Terminal (NuStar)

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
2016/30566	29/07/16	0	6.13	0.14	15.46	4.53	<0.036	17.12	8.27	28.06	<0.001	<0.001
2016/30567	29/07/16	2.3	0.16	0.15	1.3	1.3	<0.028	1.15	1.33	10.58	<0.001	<0.001
2016/30568	29/07/16	0	11.01	0.19	23.95	8.4	0.07	28.5	11.56	58.89	0.008	0.023
2016/30569	29/07/16	2.3	0.27	0.23	1.33	1.01	<0.031	1.25	1.4	11.72	<0.001	<0.001
2016/30570	29/07/16	0	1.29	0.2	2.06	1.88	<0.029	1.99	4.06	19.17	<0.001	<0.001
2016/30571	29/07/16	2.3	0.19	0.18	1.59	0.99	<0.034	1.45	1.22	10.91	<0.001	<0.001
2016/30572	29/07/16	0	4.2	0.19	6.11	7.24	<0.032	5.08	14.45	36.19	0.1	2.727
2016/30573	29/07/16	2.3	0.29	0.15	1.39	0.88	<0.031	1.36	1.17	9.47	<0.001	<0.001
2016/30574	29/07/16	0	7.31	0.28	23.7	22.26	0.19	11.69	34.59	98.9	0.0651	0.8746
2016/30575	29/07/16	2.3	0.47	0.16	1.96	1.59	<0.028	3.03	1.01	10.31	<0.001	<0.001

Table B.37. Metal and organotin results from Grays Terminal (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
2016/30566	29/07/16	0	<0.0002	0.00421	0.00969	0.00701	0.014	0.017	0.0182	<0.07031
2016/30567	29/07/16	2.3	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0014
2016/30568	29/07/16	0	<0.0002	<0.0002	<0.0002	<0.0002	0.0023	<0.0002	<0.0002	<0.00143
2016/30569	29/07/16	2.3	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0014
2016/30570	29/07/16	0	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0014
2016/30571	29/07/16	2.3	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0014
2016/30572	29/07/16	0	<0.0002	<0.0002	0.00137	0.000404	0.00208	<0.0002	0.00144	<0.005894
2016/30573	29/07/16	2.3	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0014
2016/30574	29/07/16	0	0.000365	0.000329	0.000923	0.000637	0.00161	0.00194	0.00176	0.008
2016/30575	29/07/16	2.3	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0014

Table B.38. Polychlorinated Biphenyl (PCB) results from Grays Terminal (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
2016/30566	29/07/16	0	0.000757	0.00126	0.00281	0.0193	0.0199	0.0226	0.0179	0.00961	0.00903
2016/30567	29/07/16	2.3	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
2016/30568	29/07/16	0	0.00136	0.00123	0.00327	0.0221	0.0268	0.0261	0.0196	0.0114	0.0145
2016/30569	29/07/16	2.3	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
2016/30570	29/07/16	0	0.000589	0.000627	0.00109	0.011	0.00816	0.00872	0.00636	0.00416	0.00456
2016/30571	29/07/16	2.3	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
2016/30572	29/07/16	0	0.00085	0.00451	0.00282	0.0225	0.0232	0.0225	0.0135	0.0126	0.0156
2016/30573	29/07/16	2.3	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
2016/30574	29/07/16	0	0.00495	0.00491	0.0135	0.0555	0.0984	0.121	0.0697	0.0489	0.0509
2016/30575	29/07/16	2.3	<0.0001	0.0001	0.00014	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)
2016/30566	29/07/16	0	0.00284	0.0163	0.00172	0.0148	0.00679	0.0184	0.0221	53
2016/30567	29/07/16	2.3	<0.0001	<0.0001	<0.0001	<0.0001	0.000333	0.000866	<0.0001	1
2016/30568	29/07/16	0	0.00362	0.0206	0.00122	0.0223	0.00473	0.00821	0.0214	24
2016/30569	29/07/16	2.3	<0.0001	<0.0001	<0.0001	<0.0001	0.000325	0.000511	<0.0001	<0.0001
2016/30570	29/07/16	0	0.00139	0.00874	0.000453	0.00733	0.00125	0.00384	0.00727	8
2016/30571	29/07/16	2.3	<0.0001	0.0008	<0.0001	<0.0001	0.00035	0.00089	0.00038	<0.0001
2016/30572	29/07/16	0	0.00295	0.0369	0.00269	0.0196	0.00175	0.0109	0.0314	12.3
2016/30573	29/07/16	2.3	<0.0001	0.00057	<0.0001	<0.0001	0.00039	0.0008	0.00035	<0.0001
2016/30574	29/07/16	0	0.014	0.141	0.00583	0.0844	0.0117	0.0406	0.126	95.7
2016/30575	29/07/16	2.3	<0.0001	0.00066	<0.0001	<0.0001	0.0004	0.00071	0.00038	<0.0001

Table B.39. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Grays Terminal (mg/kg)

B.2.10 Tilbury2

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
2017-MO-RBS01_0.00-0.30	2017	0-0.3	7.66	0.05	29.9	10.2	0.036	17.7	7.31	32.8	<LOD	<LOD
2017-MO-BH01_0.00-0.50	2017	0-0.5	10.4	0.11	55.8	17.1	0.122	37.2	14.8	61.6	0.003	0.003
2017-MO-BH01_2	2017	2	12.2	0.13	76.8	13.2	0.043	37.8	19.6	94.6	<LOD	<LOD
2017-MO-RBS02_0	2017	0	24.2	0.13	79.3	14.6	0.061	43.2	20.5	96.4	0.002	0.002
2017-MO-BH02_1	2017	1	16.9	0.15	95.9	16.1	0.044	48.8	25.4	114	<LOD	<LOD
2017-MO-BH02_1.6	2017	1.6	27.9	0.15	80.4	13.7	0.049	43	22.9	106	<LOD	<LOD
2017-MO-BH03_0	2017	0	13.2	0.12	54.9	9.45	0.036	28.8	15.2	69.2	<LOD	<LOD
2017-MO-BH03_3	2017	3	14.2	0.18	42	9.76	0.042	28.4	11	66.8	<LOD	<LOD
2017-MO-BH03_5	2017	5	7.44	0.03	14.6	3.86	0.029	11.7	5.3	14.2	<LOD	<LOD
2017-MO-RBS04_0	2017	0	20.3	0.15	62.4	11.9	0.048	38.4	19.7	86.5	<LOD	<LOD
2017-MO-BH04_4	2017	4	4.39	0.011	9.39	1.89	0.027	7.91	1.94	9.72	<LOD	<LOD
2017-MO-BH04_7	2017	7	6.89	0.03	15.3	2.98	0.025	17.5	4.21	16.6	<LOD	<LOD
2017-MO-RBS05_0.00-0.30	2017	0-0.3	33.1	0.14	74.8	13.1	0.051	42.5	24.8	98.6	<LOD	<LOD
2017-MO-BH05_5	2017	5	8.51	0.012	11.4	1.41	0.03	9.27	2.97	11.5	<LOD	<LOD
2017-MO-BH05_8	2017	8	3.24	0.01	6.75	2.1	0.024	10.7	3.07	14.2	<LOD	<LOD
2017-MO-BH06_0	2017	0	17.1	0.14	62.2	11.1	0.044	35.9	17.1	81.3	<LOD	<LOD
2017-MO-BH06_3	2017	3	11.8	0.06	33.7	9.17	0.029	20.2	14.5	36.5	<LOD	<LOD
2017-MO-BH06_5	2017	5	5.86	0.02	10.8	2.36	0.028	11.4	3.84	20.4	<LOD	<LOD
2017-MO-RBS07_0.00-0.30	2017	0-0.3	17.1	0.18	61.4	14.9	0.07	33.9	26.5	92.3	<LOD	<LOD
2017-MO-BH07_0	2017	0	16.3	0.15	58.4	11.8	0.043	32.2	20.1	79.3	<LOD	<LOD

2017-MO-BH07_1	2017	1	15.6	0.14	60.6	11.8	0.039	33.4	20.9	81.7	<LOD	<LOD
217-MO-RBS08_0.00-0.30	2017	0-0.3	33.7	0.43	48.3	54.4	2.97	23.4	207	153	<LOD	<LOD
2017-MO-BH08_0.00-0.50	2017	0-0.5	9.14	0.11	13.5	9.28	0.2	8.91	36.3	34.9	<LOD	<LOD

Table B.40. Metal and organotin results from Tilbury2 (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
2017-MO-RBS01_0.00-0.30	2017	0-0.3	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	-
2017-MO-BH01_0.00-0.50	2017	0-0.5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	-
2017-MO-BH01_2	2017	2	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	-
2017-MO-RBS02_0	2017	0	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	-
2017-MO-BH02_1	2017	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	-
2017-MO-BH02_1.6	2017	1.6	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	-
2017-MO-BH03_0	2017	0	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	-
2017-MO-BH03_3	2017	3	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	-
2017-MO-BH03_5	2017	5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	-
2017-MO-RBS04_0	2017	0	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	-
2017-MO-BH04_4	2017	4	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	-
2017-MO-BH04_7	2017	7	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	-
2017-MO-RBS05_0.00-0.30	2017	0-0.3	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	-
2017-MO-BH05_5	2017	5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	-
2017-MO-BH05_8	2017	8	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	-
2017-MO-BH06_0	2017	0	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	-
2017-MO-BH06_3	2017	3	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	-
2017-MO-BH06_5	2017	5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	-
2017-MO-RBS07_0.00-0.30	2017	0-0.3	<LOD	<LOD	<LOD	<LOD	0.000364	0.000282	<LOD	-
2017-MO-BH07_0	2017	0	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	-
2017-MO-BH07_1	2017	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	-

217-MO-RBS08_0.00-0.30	2017	0-0.3	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	-
2017-MO-BH08_0.00-0.50	2017	0-0.5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	-

Table B.41. Polychlorinated Biphenyl (PCB) results from Tilbury2 (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
2017-MO-RBS01_0.00-0.30	2017	0-0.3	0.00973	0.0142	0.0142	<LOD	0.0118	0.0393	0.0142	0.014	0.0203
2017-MO-BH01_0.00-0.50	2017	0-0.5	0.0101	0.0164	0.0296	<LOD	0.0289	0.0845	0.031	0.0337	0.0529
2017-MO-BH01_2	2017	2	0.000627	0.00068	0.000615	<LOD	<LOD	0.00251	0.00291	0.000782	0.00116
2017-MO-RBS02_0	2017	0	0.0187	0.0124	0.0102	0.00756	<LOD	0.0106	0.00468	<LOD	0.0108
2017-MO-BH02_1	2017	1	0.0197	0.00274	0.00316	<LOD	<LOD	0.00266	0.0021	0.00113	0.00217
2017-MO-BH02_1.6	2017	1.6	0.00123	0.000956	0.000785	<LOD	<LOD	0.00202	0.00224	0.00067	0.00129
2017-MO-BH03_0	2017	0	0.000365	0.000561	0.00055	<LOD	<LOD	0.002	0.00273	0.00073	0.00105
2017-MO-BH03_3	2017	3	0.000334	0.000495	0.000353	<LOD	<LOD	0.0016	0.0151	0.000454	<LOD
2017-MO-BH03_5	2017	5	<LOD	<LOD	<LOD	<LOD	<LOD	0.000157	0.000186	<LOD	<LOD
2017-MO-RBS04_0	2017	0	0.000201	0.000619	0.000713	<LOD	0.00155	0.0053	0.00407	0.00123	0.00124
2017-MO-BH04_4	2017	4	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.000125
2017-MO-BH04_7	2017	7	<LOD	0.0001	<LOD	<LOD	<LOD	0.00124	<LOD	0.00133	0.000136
2017-MO-RBS05_0.00-0.30	2017	0-0.3	0.00101	0.000682	0.000673	<LOD	<LOD	0.00146	0.00195	0.000627	0.00108
2017-MO-BH05_5	2017	5	<LOD	<LOD	<LOD	<LOD	<LOD	0.000207	<LOD	<LOD	<LOD
2017-MO-BH05_8	2017	8	<LOD	0.00013	<LOD	<LOD	<LOD	0.000337	0.000174	<LOD	0.00127
2017-MO-BH06_0	2017	0	0.000557	0.000508	0.000562	<LOD	<LOD	0.00332	0.00397	0.00131	0.00111
2017-MO-BH06_3	2017	3	<LOD	0.000607	0.000271	<LOD	<LOD	0.000545	0.000411	0.000262	0.000901
2017-MO-BH06_5	2017	5	<LOD	0.000141	<LOD	<LOD	<LOD	0.000108	0.000101	<LOD	<LOD
2017-MO-RBS07_0.00-0.30	2017	0-0.3	0.00244	0.00298	0.00868	0.0309	0.0385	0.0626	0.0333	0.022	0.0163
2017-MO-BH07_0	2017	0	0.000799	0.00117	0.00328	0.013	0.0112	0.0197	0.0114	0.00719	0.00583
2017-MO-BH07_1	2017	1	0.000847	0.0014	0.00357	0.015	0.0108	0.0181	0.0107	0.00743	0.00674

217-MO-RBS08_0.00-0.30	2017	0-0.3	0.0351	0.0849	0.32	0.82	0.867	1.11	0.548	0.5	0.579
2017-MO-BH08_0.00-0.50	2017	0-0.5	0.00536	0.0116	0.032	0.101	0.115	0.121	0.0575	0.0534	0.061
			DIBENAH	**FLUORAN**	**FLUOREN**	**INDENO**	**NAPTH**	**PHENANT**	**PYRENE**	**Total Hydrocarbons (THC)**	
2017-MO-RBS01_0.00-0.30	2017	0-0.3	0.00226	0.147	0.025	0.0253	0.0342	0.132	0.0797	176	
2017-MO-BH01_0.00-0.50	2017	0-0.5	0.00725	0.242	0.0275	0.0615	0.0271	0.183	0.118	145	
2017-MO-BH01_2	2017	2	0.000447	0.00402	0.00168	0.00346	0.00254	0.00569	0.00303	12.7	
2017-MO-RBS02_0	2017	0	<LOD	0.0562	0.0137	0.00741	0.0498	0.0838	0.0468	510	
2017-MO-BH02_1	2017	1	0.000303	0.0151	0.00421	0.00351	0.0385	0.0215	0.0141	14.3	
2017-MO-BH02_1.6	2017	1.6	0.000333	0.00455	0.0015	0.00288	0.00334	0.00631	0.00387	14.5	
2017-MO-BH03_0	2017	0	0.000414	0.00387	0.00158	0.00328	0.00197	0.00562	0.00298	10.1	
2017-MO-BH03_3	2017	3	0.000569	0.00323	0.00111	0.00323	0.00149	0.00359	0.00275	34	
2017-MO-BH03_5	2017	5	<LOD	0.00076	0.000123	<LOD	0.000236	0.000917	0.000569	2.4	
2017-MO-RBS04_0	2017	0	0.000706	0.00446	0.00174	0.00282	0.00166	0.00743	0.00373	20.5	
2017-MO-BH04_4	2017	4	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.65	
2017-MO-BH04_7	2017	7	<LOD	0.000992	0.000152	<LOD	0.000235	<LOD	<LOD	0.397	
2017-MO-RBS05_0.00-0.30	2017	0-0.3	0.000256	0.00347	0.00145	<LOD	0.00284	0.00492	0.00323	10.1	
2017-MO-BH05_5	2017	5	<LOD	0.000782	0.000121	<LOD	0.000566	0.000913	0.000498	0.84	
2017-MO-BH05_8	2017	8	<LOD	0.000645	0.000249	<LOD	0.000814	0.00153	0.000567	2.63	
2017-MO-BH06_0	2017	0	0.000633	0.00418	0.00186	0.00521	0.00191	0.00571	0.00305	11	
2017-MO-BH06_3	2017	3	<LOD	0.00451	0.000682	0.00231	0.000545	0.0069	0.00262	<LOD	
2017-MO-BH06_5	2017	5	<LOD	<LOD	0.000198	0.000652	0.00033	0.00159	0.000812	1.34	
2017-MO-RBS07_0.00-	2017	0-0.3	0.00685	0.0556	0.00523	0.0474	0.00975	0.0284	0.0505	66.4	

0.30										
2017-MO-BH07_0	2017	0	0.00221	0.0191	0.00264	0.0147	0.00421	0.0116	0.0176	29.3
2017-MO-BH07_1	2017	1	0.0017	0.0211	0.00301	0.0144	0.00504	0.015	0.0187	24.6
217-MO-RBS08_0.00-0.30	2017	0-0.3	0.131	1.91	0.124	0.762	0.19	0.492	1.36	669
2017-MO-BH08_0.00-0.50	2017	0-0.5	0.0144	0.256	0.0161	0.0974	0.0284	0.0669	0.18	97.1

Table B.42. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Tilbury2 (mg/kg)

B.2.11 Oikos

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
27602	04/01/16	0	9.48	0.36	21.09	12.36	0.26	9.42	20.83	54.66	0.009	<0.002
27603	04/01/16	1.5	13.72	0.16	36.84	21.6	0.26	18.72	38.14	89.15	<0.002	<0.002
27604	04/01/16	1.5	9.84	0.11	19.5	9.93	0.25	9.46	18.86	47.27	<0.002	<0.002
20099679	23/09/16	0	7.92	0.077	20.4	8.52	0.0911	9.14	16.6	43.2	0.00642	0.00612
20099679	23/09/16	0.75	11	0.168	35.4	16.3	0.166	15.9	27.5	70	<0.005	0.00584
20099679	23/09/16	1.5	7.66	0.121	18.6	10	0.0899	8.91	17.9	45.4	<0.005	<0.005
20099679	23/09/16	0	10.4	0.111	30.8	16.1	0.146	14	24.8	64	<0.005	<0.005
20099679	23/09/16	0.75	6.28	0.039	11.1	3.11	0.0154	5.11	6.62	22	0.00515	<0.004
20099679	23/09/16	1.5	5.52	0.041	11.7	3.24	0.0205	5.05	7.65	23.9	<0.004	<0.004
20099679	23/09/16	0	10.6	0.102	32.7	15.7	0.162	14.8	28.4	70.6	<0.005	<0.005
20099679	23/09/16	1.15	12.3	0.164	39.1	18.7	0.192	18.2	32	79.5	<0.005	<0.005
20099679	23/09/16	2.3	6.57	0.166	13.7	5.53	0.051	6.65	11.5	30.9	<0.004	<0.004
20099679	23/09/16	0	8.89	0.091	24.4	9.63	0.1	10.5	18.4	48.3	0.0104	<0.005
20099679	23/09/16	1.25	9.28	0.125	23.4	10.9	0.112	11.1	19.3	51	<0.005	<0.005
20099679	23/09/16	2.5	9.58	0.078	23.7	10.7	0.101	11.4	18.3	51	<0.005	<0.005
20099679	23/09/16	0	5.47	0.049	10.4	3.18	0.0207	4.83	6.34	22.7	<0.004	<0.004
20099679	23/09/16	0.65	5.22	0.039	10.5	2.58	0.0207	4.46	7.37	27.2	<0.004	<0.004
20099679	23/09/16	1.3	7.28	0.052	13.5	5.15	0.043	6.5	11.7	33.4	0.00828	0.00693
20099679	23/09/16	0	9.1	0.036	10.1	2.87	0.0105	4.81	8.72	26.1	<0.004	<0.004
20099679	23/09/16	0.7	6.77	0.045	10.8	3.74	0.0248	5.1	7.71	24.5	<0.004	<0.004
20099679	23/09/16	1.4	7	0.083	12.5	4.79	0.0387	6.02	11.5	28.5	<0.004	<0.004
14906307	25/01/17	0-0.2	11.1	0.144	21.1	15.9	<0.14	14.1	28	79.3	-	-

Table B.43. Metal and organotin results from Oikos (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
27602	04/01/16	0	0.00088	0.00106	0.00161	0.00109	0.0019	0.00195	0.00139	0.010
27603	04/01/16	1.5	0.00064	0.00059	0.00096	0.00071	0.00123	0.0012	0.00068	0.006
27604	04/01/16	1.5	0.0004	0.00036	0.00052	0.00039	0.0006	0.00059	0.0003	0.003
20099679	23/09/16	0	0.000191	0.000163	0.000255	0.000212	0.000331	0.000381	0.000226	0.002
20099679	23/09/16	0.75	0.000374	0.000306	0.00044	0.000375	0.00052	0.000624	0.000367	0.003
20099679	23/09/16	1.5	0.000303	0.000261	0.0004	0.000316	0.000433	0.000567	0.000322	0.003
20099679	23/09/16	0	0.000345	0.000299	0.000432	0.000349	0.00057	0.000622	0.000417	0.003
20099679	23/09/16	0.75	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00056
20099679	23/09/16	1.5	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00056
20099679	23/09/16	0	0.000314	0.000249	0.000381	0.000341	0.000471	0.000557	0.000349	0.003
20099679	23/09/16	1.15	0.00038	0.000339	0.00051	0.00046	0.000683	0.000763	0.000377	0.004
20099679	23/09/16	2.3	0.00014	0.000119	0.000178	0.000145	0.000247	0.000295	0.000164	0.001
20099679	23/09/16	0	0.00026	0.000208	0.000315	0.000255	0.000451	0.000494	0.000283	0.002
20099679	23/09/16	1.25	0.000259	0.000296	0.00194	0.000467	0.00441	0.00693	0.00758	0.022
20099679	23/09/16	2.5	0.000262	0.0002	0.000267	0.000232	0.000373	0.000418	0.000228	0.002
20099679	23/09/16	0	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00056
20099679	23/09/16	0.65	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00056
20099679	23/09/16	1.3	0.0001	0.000083	0.000255	0.00026	0.000531	0.000606	0.000293	0.002
20099679	23/09/16	0	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00056
20099679	23/09/16	0.7	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00056
20099679	23/09/16	1.4	0.000175	0.000289	0.00052	0.000482	0.000648	0.0006	0.000232	0.003
14906307	25/01/17	0-0.2	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.021

Table B.44. Polychlorinated Biphenyl (PCB) results from Oikos (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
27602	04/01/16	0	0.0161	0.017	0.0379	0.106	0.189	0.198	0.141	0.0848	0.0917
27603	04/01/16	1.5	0.019	0.0313	0.0934	0.253	0.337	0.362	0.252	0.153	0.203
27604	04/01/16	1.5	0.0129	0.0316	0.0589	0.209	0.259	0.236	0.166	0.116	0.163
20099679	23/09/16	0	0.0184	0.012	0.0494	0.15	0.184	0.242	0.133	0.106	0.127
20099679	23/09/16	0.75	0.0191	0.0129	0.0422	0.15	0.229	0.287	0.167	0.138	0.124
20099679	23/09/16	1.5	0.0191	0.00923	0.0287	0.115	0.144	0.174	0.101	0.0778	0.0907
20099679	23/09/16	0	0.00523	0.00434	0.0125	0.0446	0.0591	0.0738	0.0463	0.0317	0.0291
20099679	23/09/16	0.75	0.0262	0.0188	0.0507	0.172	0.258	0.366	0.191	0.142	0.145
20099679	23/09/16	1.5	0.00383	0.00295	0.00762	0.022	0.0179	0.0205	0.0137	0.0102	0.00996
20099679	23/09/16	0	0.0141	0.0118	0.0365	0.116	0.15	0.195	0.118	0.0889	0.0894
20099679	23/09/16	1.15	0.0125	0.0135	0.0616	0.142	0.216	0.344	0.163	0.121	0.0893
20099679	23/09/16	2.3	0.00585	0.00696	0.0188	0.0663	0.0883	0.11	0.0752	0.0547	0.0466
20099679	23/09/16	0	0.0164	0.0228	0.0514	0.198	0.28	0.345	0.228	0.158	0.147
20099679	23/09/16	1.25	0.0232	0.0142	0.0737	0.197	0.234	0.271	0.16	0.137	0.156
20099679	23/09/16	2.5	0.0122	0.0109	0.0303	0.126	0.144	0.204	0.125	0.0777	0.0964
20099679	23/09/16	0	0.00101	0.000659	0.00267	0.0087	0.0108	0.013	0.00662	0.00549	0.00665
20099679	23/09/16	0.65	0.000359	0.000356	0.00165	0.00704	0.00506	0.00555	0.0031	0.00336	0.00357
20099679	23/09/16	1.3	0.00538	0.0059	0.0181	0.0577	0.0719	0.0909	0.0596	0.0391	0.0343
20099679	23/09/16	0	0.000244	0.000193	0.000801	0.00142	0.00355	0.00545	0.00234	0.00222	0.00167
20099679	23/09/16	0.7	0.000555	0.00048	0.00215	0.00303	0.00798	0.0106	0.00489	0.00454	0.00414
20099679	23/09/16	1.4	0.00111	0.00126	0.00418	0.0133	0.0185	0.0259	0.013	0.0102	0.00414
14906307	25/01/17	0-0.2	<0.008	<0.012	0.0727	0.176	0.238	0.302	0.168	0.122	0.131
			DIBENAH	**FLUORAN**	**FLUOREN**	**INDENO**	**NAPTH**	**PHENANT**	**PYRENE**	**Total Hydrocarbons**	

										(THC)
27602	04/01/16	0	0.0294	0.244	0.025	0.164	0.0404	0.107	0.199	258
27603	04/01/16	1.5	0.0549	0.551	0.0438	0.291	0.0668	0.276	0.441	359
27604	04/01/16	1.5	0.0384	0.4	0.0345	0.193	0.0568	0.2	0.341	273
20099679	23/09/16	0	0.026	0.355	0.027	0.185	0.0364	0.155	0.239	-
20099679	23/09/16	0.75	0.031	0.355	0.0219	0.212	0.0434	0.121	0.25	-
20099679	23/09/16	1.5	0.0184	0.251	0.0179	0.127	0.0276	0.114	0.179	-
20099679	23/09/16	0	0.00869	0.0945	0.00665	0.0612	0.0245	0.0364	0.0718	-
20099679	23/09/16	0.75	0.0335	0.409	0.0294	0.229	0.0553	0.152	0.302	-
20099679	23/09/16	1.5	0.0025	0.0447	0.0056	0.0179	0.00484	0.0301	0.0352	-
20099679	23/09/16	0	0.0226	0.226	0.0203	0.174	0.0364	0.108	0.188	-
20099679	23/09/16	1.15	0.0309	0.381	0.0266	0.264	0.0387	0.125	0.263	-
20099679	23/09/16	2.3	0.0144	0.11	0.0108	0.109	0.0226	0.0484	0.0965	-
20099679	23/09/16	0	0.0433	0.395	0.0282	0.329	0.0509	0.15	0.336	-
20099679	23/09/16	1.25	0.0308	0.424	0.0341	0.211	0.0454	0.212	0.352	-
20099679	23/09/16	2.5	0.0223	0.209	0.018	0.155	0.0341	0.0916	0.173	-
20099679	23/09/16	0	0.00151	0.0171	0.00185	0.0109	0.00326	0.00755	0.0153	-
20099679	23/09/16	0.65	0.000637	0.00967	0.00097	0.00524	0.00202	0.00375	0.00838	-
20099679	23/09/16	1.3	0.0113	0.117	0.00894	0.0882	0.0193	0.0483	0.0887	-
20099679	23/09/16	0	0.000596	0.00917	0.000455	0.00439	0.000685	0.00291	0.00596	-
20099679	23/09/16	0.7	0.00106	0.0176	0.000864	0.00897	0.00147	0.00578	0.0122	-
20099679	23/09/16	1.4	0.00284	0.021	0.00223	0.0217	0.00532	0.00842	0.0208	-
14906307	25/01/17	0-0.2	<0.023	0.285	0.0208	0.136	0.0401	0.117	0.229	-

Table B.45. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Oikos (mg/kg)

B.2.12 Purfleet Deep Wharf

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
242630	14/01/16	0	20	0.19	14	5.3	<0.10	20	11	35	<0.010	<0.010
242631	14/01/16	0	25	0.25	48	40	0.67	29	84	130	<0.010	<0.010
242632	18/01/16	0	12	<0.10	14	11	0.13	12	36	43	<0.010	<0.010

Table B.46. Metal and organotin results from Purfleet Deep Wharf (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
242630	14/01/16	0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
242631	14/01/16	0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
242632	18/01/16	0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070

Table B.47. Polychlorinated Biphenyl (PCB) results from Purfleet Deep Wharf (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
242630	14/01/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
242631	14/01/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
242632	18/01/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)	
242630	14/01/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	
242631	14/01/16	0	<0.10	0.4	<0.10	<0.10	<0.10	<0.10	0.57	-	
242632	18/01/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	

Table B.48. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Purfleet Deep Wharf (mg/kg)

B.2.13 Robins Wharf

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
322576	08/07/16	1	15	0.17	28	22	0.35	16	44	92	<0.010	<0.010
322577	08/07/16	0	10	0.2	27	24	0.54	14	43	97	<0.010	<0.010

Table B.49. Metal and organotin results from Robins Wharf (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
322576	08/07/16	1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
322577	08/07/16	0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070

Table B.50. Polychlorinated Biphenyl (PCB) results from Robins Wharf (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
322576	08/07/16	1	<0.10	<0.10	0.11	0.32	<0.10	<0.10	<0.10	<0.10	0.87
322577	08/07/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)	
322576	08/07/16	1	<0.10	0.79	<0.10	<0.10	<0.10	0.27	0.54	-	
322577	08/07/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	

Table B.51. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Robins Wharf (mg/kg)

B.2.14 S Jetty

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
2015/26991	23/11/15	0	6.56	0.01	5.74	2.05	<0.029	7.9	4.48	13.43	<0.002	<0.002
2015/26992	23/11/15	0	13.21	0.06	17.49	8.81	0.08	13.53	19.13	39.34	<0.002	<0.002
2015/26993	23/11/15	0	11.05	0.03	11.38	3.61	0.03	8.68	10.26	25.85	<0.002	<0.002
2015/26994	23/11/15	0	18.48	0.26	41.4	30.22	0.4	25.64	54.34	112.03	<0.002	<0.002

Table B.52. Metal and organotin results from S Jetty (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
2015/26991	23/11/15	0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.40
2015/26992	23/11/15	0	0.22	0.2	0.32	0.24	0.43	0.4	0.25	2.06
2015/26993	23/11/15	0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.40
2015/26994	23/11/15	0	0.56	0.52	0.78	0.57	0.96	1.03	0.6	5.02

Table B.53. Polychlorinated Biphenyl (PCB) results from S Jetty (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
2015/26991	23/11/15	0	<0.0001	<0.0001	<0.0001	<0.0001	0.00048	0.00039	0.00041	0.00014	<0.0001
2015/26992	23/11/15	0	0.00928	0.00778	0.0265	0.067	0.102	0.104	0.0887	0.0477	0.0572
2015/26993	23/11/15	0	<0.0001	0.00198	0.00298	0.0193	0.0196	0.0234	0.0175	0.01	0.0149
2015/26994	23/11/15	0	<0.0001	<0.0001	<0.0001	<0.0001	0.00048	0.00039	0.00041	0.00014	<0.0001

			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)
2015/26991	23/11/15	0	<0.00026	0.00036	<0.0001	<0.0001	<0.00044	<0.00051	0.0005	2
2015/26992	23/11/15	0	0.0177	0.11	0.018	0.0974	0.171	0.0914	0.129	170
2015/26993	23/11/15	0	0.00387	0.0247	0.00178	0.019	0.00605	0.0146	0.023	98
2015/26994	23/11/15	0	<0.00026	0.00036	<0.0001	<0.0001	<0.00044	<0.00051	0.0005	2

Table B.54. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from S Jetty (mg/kg)

B.2.15 Tilbury Dock Entrance (Bellmouth) and Tilbury Landing Stage

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
520787	04/10/17	n/a	15	0.21	31	29	0.43	19	59	97	<0.010	<0.010
520788	04/10/17	n/a	17	0.2	38	32	0.61	23	67	110	<0.010	<0.010
520789	04/10/17	n/a	15	0.19	33	28	0.48	20	58	100	<0.010	<0.010
520790	04/10/17	n/a	13	0.13	25	20	0.38	15	44	78	<0.010	<0.010
520791	04/10/17	n/a	18	0.18	38	33	0.52	24	64	110	<0.010	<0.010
520795	04/10/17	n/a	16	< 0.10	20	70	0.11	54	56	81	<0.010	<0.010

Table B.55. Metal and organotin results from Tilbury Dock Entrance and Tilbury Landing Stage (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
520787	04/10/17	n/a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
520788	04/10/17	n/a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
520789	04/10/17	n/a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
520790	04/10/17	n/a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
520791	04/10/17	n/a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
520795	04/10/17	n/a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070

Table B.56. Polychlorinated Biphenyl (PCB) results from Tilbury Dock Entrance and Tilbury Landing Stage (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
520787	04/10/17	n/a	<0.10	<0.10	<0.10	0.67	0.37	0.22	0.31	<0.10	0.68
520788	04/10/17	n/a	<0.10	<0.10	<0.10	0.53	<0.10	<0.10	<0.10	<0.10	0.61
520789	04/10/17	n/a	<0.10	<0.10	0.25	0.48	0.2	0.6	0.58	0.37	0.69
520790	04/10/17	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
520791	04/10/17	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
520795	04/10/17	n/a	1.3	0.34	2.9	10	9.8	12	6	5	8.6

			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)
520787	04/10/17	n/a	0.41	0.56	<0.10	0.1	<0.10	<0.10	0.29	-
520788	04/10/17	n/a	<0.10	0.32	<0.10	<0.10	<0.10	<0.10	0.15	-
520789	04/10/17	n/a	0.51	0.44	<0.10	0.34	<0.10	0.48	0.27	-
520790	04/10/17	n/a	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-
520791	04/10/17	n/a	<0.10	0.31	<0.10	<0.10	<0.10	0.28	0.25	-
520795	04/10/17	n/a	2.2	17	1.3	6.7	0.67	13	16	-

Table B.57. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Tilbury Dock Entrance and Tilbury Landing Stage (mg/kg)

B.2.16 Thames Oilport

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
52725	28/07/17	0	9.36	0.09	15.54	4.53	0.07	7.15	13.69	40.22	<0.002	<0.002
52726	28/07/17	0	10.99	0.09	14.46	4.31	0.05	6.68	12.42	36.21	<0.002	<0.002
52727	28/07/17	0	8.9	0.27	15.71	4.83	0.05	7.53	14.2	37.77	<0.002	<0.002
52728	28/07/17	0	10.28	0.13	22	11.49	0.12	10.77	19.64	53.27	<0.002	<0.002
52729	28/07/17	0	12.61	0.17	35.37	14.64	0.2	15.77	28.57	75.04	<0.002	<0.002
52730	28/07/17	0	10.2	0.08	12.32	2.42	<0.03	5.98	14.6	30.92	<0.002	<0.002
52731	28/07/17	0	7.72	0.08	13.65	2.94	0.04	5.79	9.9	29.53	<0.002	<0.002
52732	28/07/17	0	7.09	0.06	12.8	2.67	<0.03	5.64	9.86	27.6	<0.002	<0.002
52733	28/07/17	0	29.64	0.05	13.63	3.63	0.05	8.35	27.09	69.22	<0.002	<0.002

Table B.58. Metal and organotin results from Thames Oilport (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
52725	28/07/17	0	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<1.4
52726	28/07/17	0	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<1.4
52727	28/07/17	0	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<1.4
52728	28/07/17	0	0.000265	<0.0002	0.000353	0.000291	0.000418	0.000399	0.000206	<0.00213
52729	28/07/17	0	0.000381	0.000286	0.000459	0.000371	0.00054	0.000516	0.000287	0.0028
52730	28/07/17	0	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<1.4
52731	28/07/17	0	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<1.4
52732	28/07/17	0	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<1.4
52733	28/07/17	0	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<1.4

Table B.59. Polychlorinated Biphenyl (PCB) results from Thames Oilport (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
52725	28/07/17	0	0.0017	0.0163	0.0387	0.0972	0.0721	0.084	0.0359	0.0378	0.0663
52726	28/07/17	0	0.00291	0.011	0.0266	0.108	0.103	0.113	0.059	0.0496	0.0751
52727	28/07/17	0	0.00216	0.0034	0.00706	0.0279	0.033	0.0412	0.0246	0.017	0.0162
52728	28/07/17	0	0.00605	0.0166	0.0428	0.104	0.118	0.138	0.0824	0.0605	0.072
52729	28/07/17	0	0.0106	0.0145	0.0366	0.11	0.147	0.176	0.112	0.0766	0.08
52730	28/07/17	0	0.00423	0.00336	0.00888	0.0541	0.0834	0.0796	0.0515	0.0491	0.025
52731	28/07/17	0	0.00132	0.000998	0.00241	0.0152	0.0158	0.0187	0.0134	0.0114	0.00693
52732	28/07/17	0	0.00123	0.00119	0.00289	0.0144	0.0158	0.0185	0.0141	0.0107	0.00649
52733	28/07/17	0	0.000468	0.000766	0.00186	0.00568	0.00516	0.00574	0.00421	0.00291	0.0023

			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)
52725	28/07/17	0	0.0103	0.253	0.0154	0.0544	0.0116	0.121	0.171	54.8
52726	28/07/17	0	0.0141	0.25	0.0146	0.0832	0.0385	0.0906	0.22	109
52727	28/07/17	0	0.00526	0.0419	0.00489	0.0338	0.0147	0.0239	0.0399	45.4
52728	28/07/17	0	0.0189	0.254	0.0228	0.116	0.0525	0.144	0.199	130
52729	28/07/17	0	0.0252	0.249	0.023	0.157	0.0507	0.118	0.196	144
52730	28/07/17	0	0.0155	0.0509	0.00584	0.0737	0.0277	0.0325	0.0529	124
52731	28/07/17	0	0.00284	0.0191	0.00158	0.0193	0.00375	0.00957	0.0181	20.4
52732	28/07/17	0	0.0028	0.0191	0.00199	0.0207	0.00404	0.0104	0.0179	21.7
52733	28/07/17	0	0.000816	0.00645	0.00115	0.00547	0.00292	0.00603	0.00732	15.7

Table B.60. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Thames Oilport (mg/kg)

B.2.17 Thames Refinery

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
13271864	14/04/16	0-0.2	9.06	0.536	21.9	40.3	0.427	12.9	69.4	112	<0.04	<0.04
13271865	14/04/16	0-0.2	7.18	0.191	13.9	38.3	0.497	8.17	83.2	70.8	<0.04	<0.04
13271866	14/04/16	0-0.2	14.7	0.718	40.8	51.6	0.704	23.8	78.7	188	<0.04	<0.04
13271867	14/04/16	0-0.2	6.14	0.346	11.8	25.1	0.319	7.21	52.4	76.3	<0.04	<0.04

Table B.61. Metal and organotin results from Thames Refinery (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
13271864	14/04/16	0-0.2	<0.003	<0.003	<0.003	<0.003	0.00436	0.00688	0.00312	<0.026
13271865	14/04/16	0-0.2	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.021
13271866	14/04/16	0-0.2	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.021
13271867	14/04/16	0-0.2	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.021

Table B.62. Polychlorinated Biphenyl (PCB) results from Thames Refinery (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
13271864	14/04/16	0-0.2	0.096	0.0562	0.211	0.856	1.03	1.03	0.735	0.476	0.703
13271865	14/04/16	0-0.2	0.0504	0.0248	0.26	0.555	0.477	0.584	0.289	0.276	0.572
13271866	14/04/16	0-0.2	0.0636	0.0778	0.171	0.792	1.02	1.12	0.714	0.432	0.676
13271867	14/04/16	0-0.2	0.0415	0.0314	0.109	0.672	0.73	0.833	0.499	0.309	0.581

			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)
13271864	14/04/16	0-0.2	0.164	1.54	0.107	0.574	0.126	0.837	1.34	-
13271865	14/04/16	0-0.2	0.0845	1.01	0.033	0.239	0.0259	0.411	0.751	-
13271866	14/04/16	0-0.2	0.169	1.39	0.0847	0.599	0.109	0.599	1.24	-
13271867	14/04/16	0-0.2	0.112	1.29	0.0409	0.388	0.0523	0.34	1.16	-

Table B.63. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Thames Refinery (mg/kg)

B.2.18 Thunderer Jetty

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
2014/16448	18/06/14	1.1	3.01	0.03	14	1.45	0.026	4.26	1.87	11.38	<0.001	<0.001
2014/16450	18/06/14	0.83	11.29	0.09	13.87	3.33	0.033	13.32	4.64	23.6	<0.001	<0.001
2014/16452	18/06/14	0	16.58	1.29	72.34	65.4	0.84	34.24	139.05	217.61	0.086	0.243
2014/16453	18/06/14	2	14.04	1.02	85.11	59.03	0.9	35.59	132.01	203.85	0.058	0.068
2014/16455	18/06/14	0	10.83	0.53	39.96	36.14	0.4	19.84	48.52	175.06	0.018	0.041
2014/16456	18/06/14	2	13.56	0.09	17.34	3.11	0.032	18.8	3.65	52.83	<0.001	<0.001

Table B.64. Metal and organotin results from Thunderer Jetty (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
2014/16448	18/06/14	1.1	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0014
2014/16450	18/06/14	0.83	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0014
2014/16452	18/06/14	0	0.00243	0.00264	0.00441	0.00243	0.00589	0.00799	0.00865	0.0344
2014/16453	18/06/14	2	0.00259	0.00228	0.00369	0.00242	0.0046	0.00575	0.00307	0.0244
2014/16455	18/06/14	0	0.00226	0.00171	0.00182	0.00136	0.00173	0.00185	0.00095	0.0117
2014/16456	18/06/14	2	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0014

Table B.65. Polychlorinated Biphenyl (PCB) results from Thunderer Jetty (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
2014/16448	18/06/14	1.1	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
2014/16450	18/06/14	0.83	0.0001	0.0001	0.00021	0.0001	0.0001	0.0007	0.00057	0.00016	0.0001
2014/16452	18/06/14	0	0.05548	0.14012	0.28822	0.82003	1.05162	1.32026	0.89988	0.55856	0.60427
2014/16453	18/06/14	2	0.03644	0.09726	0.15033	0.46654	0.69975	0.85443	0.62377	0.37139	0.37017
2014/16455	18/06/14	0	0.01333	0.07412	0.12923	0.3703	0.3784	0.42504	0.2478	0.20876	0.24883
2014/16456	18/06/14	2	0.0001	0.00479	0.00252	0.0001	0.00056	0.00079	0.0009	0.00025	0.0001

			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)
2014/16448	18/06/14	1.1	0.0001	0.00057	0.0001	0.0001	0.00045	0.00081	0.01096	2
2014/16450	18/06/14	0.83	0.0001	0.00075	0.0001	0.0008	0.00096	0.00097	0.03092	20
2014/16452	18/06/14	0	0.1804	1.89631	0.16959	1.03387	0.25379	0.75484	1.47523	1453
2014/16453	18/06/14	2	0.12199	1.03883	0.09677	0.72974	0.13714	0.46511	0.84073	1048
2014/16455	18/06/14	0	0.05612	0.93698	0.07302	0.29184	0.13943	0.4356	0.75171	383
2014/16456	18/06/14	2	0.0001	0.00237	0.0013	0.0013	0.0016	0.00206	0.00145	20

Table B.66. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Thunderer Jetty (mg/kg)

B.2.19 West India Docks

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
246289	27/01/16	0	22	0.12	49	44	0.74	28	96	140	<0.010	<0.010
246290	27/01/16	0	25	0.35	54	62	0.7	32	110	200	<0.010	<0.010
246291	27/01/16	0	21	0.26	49	54	0.59	28	95	170	<0.010	<0.010

Table B.67. Metal and organotin results from West India Docks (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
246289	27/01/16	0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.07
246290	27/01/16	0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.07
246291	27/01/16	0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.07

Table B.68. Polychlorinated Biphenyl (PCB) results from West India Docks (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
246289	27/01/16	0	<0.1	0.21	0.28	0.53	0.71	0.88	<0.1	1.2	1.4
246290	27/01/16	0	0.12	0.27	0.73	0.65	1	1.2	<0.1	1.8	2
246291	27/01/16	0	<0.1	0.16	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)	
246289	27/01/16	0	<0.1	1.1	<0.1	<0.1	0.11	0.95	1.2	-	
246290	27/01/16	0	<0.1	2	0.21	<0.1	0.11	2.5	2.6	-	
246291	27/01/16	0	<0.1	1.7	<0.1	<0.1	0.17	1.5	2.8	-	

Table B.69. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from West India Docks (mg/kg)

B.2.20 White Mountain

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
2014/19748	17/12/14	0	20.72	0.45	69.74	54.51	0.94	33.68	99.8	203.63	<0.002	0.03
2014/19749	17/12/14	0	9.14	0.23	29.49	29.66	0.3	28.23	39.77	84.45	<0.002	<0.002

Table B.70. Metal and organotin results from White Mountain (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
2014/19748	17/12/14	0	0.001	0.001	0.0017	0.0011	0.0022	0.0023	0.0014	0.0107
2014/19749	17/12/14	0	0.0011	0.0011	0.0016	0.0012	0.002	0.0023	0.0014	0.0107

Table B.71. Polychlorinated Biphenyl (PCB) results from White Mountain (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
2014/19748	17/12/14	0	0.04579	0.03956	0.08269	0.37845	0.5318	0.6471	0.51587	0.30391	0.3257
2014/19749	17/12/14	0	0.03698	0.04232	0.08074	0.30411	0.42024	0.53715	0.4006	0.24319	0.25463
			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)	
2014/19748	17/12/14	0	0.09142	0.81771	0.05097	0.70174	0.09568	0.27863	0.6422	756	
2014/19749	17/12/14	0	0.07593	0.64572	0.0556	0.55324	0.09315	0.2725	0.49658	591	

Table B.72. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from White Mountain (mg/kg)

B.2.21 Bell Lane Creek

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
95891	28/01/15	0	8.1	0.14	12	11	0.51	9.9	1000	23	-	-
95892	28/01/15	1	3.0	<0.10	2.6	2.0	<0.10	3.2	110	5.2	-	-
95893	28/01/15	0	8.6	0.51	11	2.3	0.22	9.9	740	55	-	-
95894	28/01/15	1	9.4	0.11	20	5.9	<0.10	15	19	11	-	-
95895	28/01/15	0	11	4.6	32	100	0.71	28	3600	180	-	-
95896	28/01/15	1	12	1.4	19	62	0.25	21	530	61	-	-
2016/27399	2016	0	56.03	13.59	408.52	351.4	4.14	197.15	901.38	1576	0.213	0.882
2016/27400	2016	0	9.17	0.46	47.58	56.05	0.5	22.72	92.89	191.4	0.019	<LOD
2016/27401	2016	0	17.37	4.2	120.79	128.13	1.73	57.37	335.11	484.4	0.069	0.156
2016/27402	2016	0	14.13	2.44	77.09	108.54	0.85	36.33	189.42	388.8	0.029	<LOD
2016/27403	2016	0	15.74	8.51	103.08	180.32	1.66	52.84	465.95	666.5	0.073	0.101
2016/27404	2016	n/a	8.84	0.75	44.1	62.26	0.59	22.07	100.2	216.7	0.013	<LOD
2016/27405	2016	n/a	24.04	5.01	139.91	173.92	1.82	70.16	374.66	621.1	0.114	0.207
2016/27406	2016	n/a	10.97	9.32	64.48	199.4	0.96	31.83	332.19	551.7	0.028	<LOD
2016/27407	2016	n/a	8.98	1.51	50.19	103.43	0.55	25.12	201.73	376.6	0.031	<LOD

Table B.73. Metal and organotin results from Bell Lane Creek (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
95891	28/01/15	0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.10
95892	28/01/15	1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.10
95893	28/01/15	0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.10
95894	28/01/15	1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.10
95895	28/01/15	0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.10
95896	28/01/15	1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.10
2016/27399	2016	0	-	-	-	-	-	-	-	-
2016/27400	2016	0	0.0027	0.002	0.0006	0.0004	0.0005	0.0017	0.0017	0.0096
2016/27401	2016	0	0.0063	0.0041	0.0011	0.0006	0.0012	0.0038	0.0037	0.0208
2016/27402	2016	0	-	-	-	-	-	-	-	-
2016/27403	2016	0	-	-	-	-	-	-	-	-
2016/27404	2016	n/a	0.0032	0.0023	0.0007	0.0004	0.0008	0.0023	0.0023	0.012
2016/27405	2016	n/a	-	-	-	-	-	-	-	-
2016/27406	2016	n/a	0.0029	0.0021	0.0006	0.0004	0.0009	0.0029	0.0024	0.0122
2016/27407	2016	n/a	-	-	-	-	-	-	-	-

Table B.74. Polychlorinated Biphenyl (PCB) results from Bell Lane Creek (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
95891	28/01/15	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
95892	28/01/15	1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
95893	28/01/15	0	<0.10	<0.10	<0.10	0.25	<0.10	<0.10	<0.10	<0.10	0.54
95894	28/01/15	1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
95895	28/01/15	0	0.24	<0.10	0.2	0.79	0.93	1.2	0.75	0.3	0.84
95896	28/01/15	1	<0.10	0.12	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
2016/27399	2016	0	0.151	0.494	0.54	1.43	2.03	2.31	1.52	1.01	1.36
2016/27400	2016	0	0.104	0.0817	0.212	0.975	1.75	1.48	1.17	0.665	0.792
2016/27401	2016	0	0.19	0.432	0.559	1.67	2.34	2.57	1.9	1.17	1.51
2016/27402	2016	0	0.226	0.527	0.816	3.88	4.57	4.5	2.53	2.14	3.39
2016/27403	2016	0	0.331	0.836	1.25	5.58	6.95	7.6	4.96	3.18	5.55
2016/27404	2016	n/a	0.185	0.491	0.435	1.5	2.04	2.25	1.76	1.04	1.79
2016/27405	2016	n/a	0.2	1.84	0.548	1.93	2.78	3.33	2.74	1.62	2.13
2016/27406	2016	n/a	0.214	0.635	0.777	3.73	4.25	4.45	2.93	1.99	3.94
2016/27407	2016	n/a	0.264	0.591	0.695	3.57	4.9	5.02	3.98	2.33	3.53

			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)
95891	28/01/15	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-
95892	28/01/15	1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-
95893	28/01/15	0	<0.10	0.77	<0.10	<0.10	<0.10	0.4	0.68	-
95894	28/01/15	1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-
95895	28/01/15	0	<0.10	2.5	0.23	0.29	0.75	1.6	2.3	-
95896	28/01/15	1	<0.10	0.15	<0.10	<0.10	0.45	0.11	0.15	-
2016/27399	2016	0	0.314	3.68	0.586	1.74	0.34	2.57	3.26	3970

2016/27400	2016	0	0.24	1.94	0.128	1.54	0.173	0.683	1.75	1930
2016/27401	2016	0	0.403	4.2	0.477	2.2	0.346	1.92	3.54	2370
2016/27402	2016	0	0.582	9.61	0.414	3.34	0.359	3.3	7.73	3730
2016/27403	2016	0	0.944	14.2	0.719	5.61	0.533	6.43	11.8	5960
2016/27404	2016	n/a	0.332	3.96	0.33	1.88	0.504	2.92	3.4	2960
2016/27405	2016	n/a	0.433	5.07	0.626	2.93	0.395	2.73	4.56	3260
2016/27406	2016	n/a	0.613	8.59	0.457	3.29	0.494	4.21	6.95	3570
2016/27407	2016	n/a	0.839	8.16	0.55	4.33	0.432	3.08	7.01	5660

Table B.75. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Bell Lane Creek (mg/kg)

B.2.22 Northfleet Wharf Jetty

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
003035009	16/11/14	0	7.08	0.061	5	3.46	0.0346	3.42	4.94	15.8	<0.003	<0.003
003035011	16/11/14	1	5.6	0.056	11	6.83	0.0545	6.1	10.4	25.8	0.00863	0.0169
003035012	16/11/14	0	26.3	0.126	67.4	12.3	0.0302	34.2	17	79.2	<0.005	<0.005
003035013	16/11/14	0.3	20.2	0.11	63.9	11.5	0.0186	33	16.7	76	<0.005	<0.005
003035014	16/11/14	0	10.8	0.032	5.33	2.41	0.00552	4.51	3.68	11.7	<0.003	<0.003
003035015	16/11/14	1.7	7.45	0.024	6	79.9	0.00328	18.6	49.9	439	<0.003	<0.003
003035016	16/11/14	0	9.08	0.028	4.8	2.16	0.00439	3.45	3.51	12	<0.003	<0.003
003035017	16/11/14	0.9	9.83	0.041	5.75	2.84	0.00615	4.82	3.83	13.5	0.00619	0.0504
003035018	17/11/14	0	11.4	0.298	43	30.2	0.37	18.4	49.6	103	0.0605	0.0256
003035019	17/11/14	1.2	11.7	0.36	53.2	43.7	1.09	23.5	70.7	140	0.0652	0.0232
003035020	17/11/14	2.4	27.1	8.15	171	173	6.04	63	313	777	0.697	0.566
003035021	17/11/14	0	11.1	0.466	55.5	41.4	0.498	23.9	66	145	0.0239	0.0128
003035022	17/11/14	0.65	12	0.362	61.9	42.4	0.685	27.7	78.4	151	0.0415	0.016
003035023	17/11/14	1.3	14.5	2.27	128	70.1	1.84	29.3	106	269	0.0452	0.0189
003035024	17/11/14	0	16.8	0.384	82.7	49.4	0.64	35.3	82.1	180	0.0234	0.0126
003035025	17/11/14	3	22.2	5.92	166	143	4.8	63.3	216	580	1.65	1.02
003035026	17/11/14	6	35.8	7.14	164	176	5.58	67.1	333	744	0.382	0.153
003035027	20/11/14	0	11	0.446	45.5	30.5	0.431	19.9	61	124	0.0269	0.0105
003035028	20/11/14	3.5	24.1	7.08	182	164	6.44	64	269	670	0.471	1.02
003035029	20/11/14	6	37.5	8.8	183	197	5.85	71.2	311	831	0.591	0.195
003035030	20/11/14	0	15.1	0.16	13.1	21.9	0.00753	17.7	8.66	22.7	0.00729	0.0172
003035031	20/11/14	1.7	6.87	0.06	4.73	2.1	0.00251	3.23	3.55	10.3	0.0137	0.049

003035032	20/11/14	0	13.7	0.58	74.4	51.3	0.775	30.7	90.1	181	0.0408	0.0182
003035033	20/11/14	3.05	22.2	6.96	189	165	5.78	67.1	260	675	0.326	0.198
003035034	20/11/14	6	38.1	8.28	183	211	6.12	68.5	283	837	0.567	0.247
003035035	20/11/14	0	22.4	6.13	146	139	5.02	62.3	406	653	1	0.576
003035036	20/11/14	1.5	31.4	5.93	160	166	6.45	59.8	492	625	0.839	0.706
003035037	20/11/14	3	33.3	6.78	178	180	6.82	63	283	692	0.66	0.588

Table B.76. Metal and organotin results from Northfleet Wharf Jetty (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
003035009	16/11/14	0	0.000223	0.000134	0.00012	<0.0001	0.000121	0.000145	<0.0001	<0.000943
003035011	16/11/14	1	0.000123	0.000101	0.000164	<0.0001	0.000179	0.000267	0.000141	<0.001075
003035012	16/11/14	0	0.000509	0.000262	0.000147	0.000121	<0.0001	0.000106	<0.0001	<0.001345
003035013	16/11/14	0.3	0.000176	0.000116	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.000792
003035014	16/11/14	0	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0007
003035015	16/11/14	1.7	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0007
003035016	16/11/14	0	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0007
003035017	16/11/14	0.9	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0007
003035018	17/11/14	0	0.000786	0.000641	0.000738	0.00059	0.000696	0.000897	0.000505	0.004853
003035019	17/11/14	1.2	0.00104	0.000725	0.000897	0.000574	0.000933	0.00118	0.000776	0.006125
003035020	17/11/14	2.4	0.141	0.0814	0.0494	0.0356	0.0304	0.032	0.0245	0.3943
003035021	17/11/14	0	0.00106	0.00078	0.000915	0.000607	0.000861	0.00117	0.000779	0.006172
003035022	17/11/14	0.65	0.00191	0.00134	0.00158	0.00097	0.00134	0.000896	0.00142	0.009456
003035023	17/11/14	1.3	0.0284	0.0153	0.0104	0.00761	0.00719	0.00872	0.00608	0.0837
003035024	17/11/14	0	0.00198	0.00168	0.00216	0.00139	0.00227	0.00231	0.00193	0.01372
003035025	17/11/14	3	0.0582	0.0381	0.0322	0.0211	0.0252	0.0253	0.0218	0.2219
003035026	17/11/14	6	0.0465	0.0281	0.0217	0.014	0.0147	0.0137	0.0108	0.1495
003035027	20/11/14	0	0.0015	0.00102	0.00115	0.000722	0.0013	0.00134	0.00104	0.008072
003035028	20/11/14	3.5	0.0948	0.0616	0.0435	0.0282	0.0321	0.0309	0.0253	0.3164
003035029	20/11/14	6	0.188	0.0706	0.0467	0.0292	0.0318	0.0297	0.0281	0.4241
003035030	20/11/14	0	0.000533	0.00031	0.000241	0.000161	0.000124	0.000168	0.000155	0.001692
003035031	20/11/14	1.7	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0007
003035032	20/11/14	0	0.00182	0.00154	0.0018	0.00114	0.00237	0.00248	0.00134	0.01249

003035033	20/11/14	3.05	0.0776	0.0486	0.0364	0.0243	0.0289	0.0264	0.0225	0.2647
003035034	20/11/14	6	0.131	0.0821	0.0503	0.0347	0.0419	0.0343	0.0282	0.4025
003035035	20/11/14	0	0.0903	0.0561	0.0356	0.0241	0.0269	0.0252	0.0215	0.2797
003035036	20/11/14	1.5	0.121	0.0637	0.042	0.0287	0.0305	0.0286	0.0224	0.3369
003035037	20/11/14	3	0.133	0.077	0.05	0.0357	0.0399	0.037	0.027	0.3996

Table B.77. Polychlorinated Biphenyl (PCB) results from Northfleet Wharf Jetty (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
003035009	16/11/14	0	0.00241	0.00235	0.0109	0.0249	0.035	0.0269	0.0243	0.0166	0.0229
003035011	16/11/14	1	0.00392	0.00253	0.0163	0.047	0.0616	0.0521	0.0466	0.0309	0.0405
003035012	16/11/14	0	0.00158	<0.001	0.00383	0.00494	0.00867	0.00764	0.00798	0.00432	0.00567
003035013	16/11/14	0.3	0.00108	<0.001	0.00276	0.00336	0.00448	0.00477	0.00498	0.00249	0.00318
003035014	16/11/14	0	<0.001	<0.001	0.00608	0.0156	0.0199	0.0152	0.0126	0.00966	0.0135
003035015	16/11/14	1.7	<0.001	<0.001	#VALUE!	0.00245	0.0064	0.00453	0.00424	0.00272	<0.003
003035016	16/11/14	0	<0.001	<0.001	0.0018	0.00539	0.00906	0.00704	0.0067	0.00429	0.00486
003035017	16/11/14	0.9	<0.001	0.00104	0.00289	0.0117	0.0203	0.0156	0.0135	0.00963	0.0104
003035018	17/11/14	0	0.0432	0.013	0.125	0.416	0.464	0.392	0.315	0.21	0.317
003035019	17/11/14	1.2	0.0402	0.0115	0.113	0.438	0.499	0.428	0.356	0.235	0.34
003035020	17/11/14	2.4	0.27	0.115	0.444	2.38	3.35	3.15	2.74	1.6	2
003035021	17/11/14	0	0.0299	0.0121	0.0771	0.365	0.438	0.398	0.312	0.207	0.269
003035022	17/11/14	0.65	0.0371	0.016	0.0875	0.33	0.441	0.414	0.366	0.208	0.255
003035023	17/11/14	1.3	0.103	0.0319	0.24	0.711	1.17	0.965	0.776	0.525	0.663
003035024	17/11/14	0	0.0373	0.0124	0.12	0.434	0.6	0.547	0.506	0.306	0.34
003035025	17/11/14	3	0.0972	0.0571	0.257	1.16	1.62	1.72	1.56	0.803	0.763
003035026	17/11/14	6	0.116	0.0629	0.298	1.34	1.52	1.54	1.34	0.757	0.862
003035027	20/11/14	0	0.0496	0.00867	0.157	0.549	0.602	0.537	0.434	0.308	0.408
003035028	20/11/14	3.5	0.106	0.0679	0.246	1.2	1.86	2.07	1.77	0.94	0.846
003035029	20/11/14	6	0.316	0.117	0.549	2.51	3.08	3.16	2.6	1.55	1.67
003035030	20/11/14	0	0.00132	<0.001	0.00653	0.0145	0.0247	0.0212	0.0243	0.0123	0.0123
003035031	20/11/14	1.7	0.00194	0.00191	<0.001	0.00166	0.00211	0.00249	0.00319	0.00136	<0.003
003035032	20/11/14	0	0.0246	0.0127	0.0713	0.243	0.363	0.359	0.327	0.183	0.182

003035033	20/11/14	3.05	0.104	0.066	0.241	1.19	1.63	1.77	1.54	0.799	0.749
003035034	20/11/14	6	0.246	0.131	0.501	2.16	2.97	2.98	2.5	1.44	1.43
003035035	20/11/14	0	0.15	0.0657	0.345	1.58	2.05	2.1	1.77	1.01	1.08
003035036	20/11/14	1.5	0.141	0.0705	0.343	1.55	2.04	2.16	1.85	1.04	1.08
003035037	20/11/14	3	0.129	0.0908	0.366	1.59	2.33	2.42	2.1	1.11	1.1
			DIBENAH	**FLUORAN**	**FLUOREN**	**INDENO**	**NAPTH**	**PHENANT**	**PYRENE**	**Total Hydrocarbons (THC)**	
003035009	16/11/14	0	0.00423	0.0397	<0.005	0.0229	0.0075	0.0186	0.0362	19.8	
003035011	16/11/14	1	0.00907	0.0853	<0.005	0.0435	0.00819	0.0374	0.0764	64.2	
003035012	16/11/14	0	0.00121	0.0119	<0.005	0.00631	<0.005	0.0122	0.0107	21	
003035013	16/11/14	0.3	0.00105	0.00834	<0.005	0.00353	<0.005	0.0111	0.00744	14.7	
003035014	16/11/14	0	0.00322	0.0263	<0.005	0.0124	<0.005	0.011	0.0227	6.1	
003035015	16/11/14	1.7	<0.001	0.00409	<0.005	0.00399	<0.005	<0.005	0.0042	8.42	
003035016	16/11/14	0	0.00141	0.0081	<0.005	0.00652	<0.005	<0.005	0.0088	10.2	
003035017	16/11/14	0.9	0.00307	0.0158	<0.005	0.0123	<0.005	0.00675	0.0175	8.67	
003035018	17/11/14	0	0.0733	0.666	0.0542	0.307	0.0805	0.358	0.588	766	
003035019	17/11/14	1.2	0.0818	0.71	0.0403	0.346	0.076	0.34	0.626	966	
003035020	17/11/14	2.4	0.528	3.84	0.325	2.36	0.476	1.8	3.43	3060	
003035021	17/11/14	0	0.071	0.529	0.0318	0.311	0.0993	0.22	0.495	820	
003035022	17/11/14	0.65	0.0746	0.52	0.0424	0.36	0.0928	0.271	0.496	832	
003035023	17/11/14	1.3	0.178	1.53	0.115	0.724	0.234	0.746	1.25	1600	
003035024	17/11/14	0	0.0965	0.762	0.0399	0.518	0.0798	0.297	0.654	732	
003035025	17/11/14	3	0.265	1.84	0.137	1.48	0.25	0.702	1.56	5030	
003035026	17/11/14	6	0.239	2.26	0.158	1.34	0.175	0.739	1.71	4880	
003035027	20/11/14	0	0.091	0.966	0.0474	0.456	0.0797	0.431	0.824	646	
003035028	20/11/14	3.5	0.308	2.08	0.153	1.8	0.281	0.705	1.69	2860	

003035029	20/11/14	6	0.475	4.38	0.388	2.69	0.547	1.43	3.14	4120
003035030	20/11/14	0	0.0638	0.0287	<0.005	0.0186	<0.005	0.0112	0.0257	29.6
003035031	20/11/14	1.7	<0.001	0.0037	<0.005	0.00206	-	<0.005	0.00476	4.25
003035032	20/11/14	0	0.0633	0.435	0.0293	0.311	0.0596	<0.005	0.428	1820
003035033	20/11/14	3.05	0.275	1.94	0.157	1.55	0.271	0.696	1.6	4040
003035034	20/11/14	6	0.46	3.28	0.319	2.6	0.444	1.28	2.56	4590
003035035	20/11/14	0	0.319	2.59	0.196	1.84	0.267	0.815	2.11	3600
003035036	20/11/14	1.5	0.313	2.72	0.176	1.82	0.351	0.939	2.16	3750
003035037	20/11/14	3	0.374	2.56	0.197	2.14	0.349	0.941	2.16	76.6

Table B.78. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Northfleet Wharf Jetty (mg/kg)

B.2.23 Vopak London Terminal

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
VPK_817	15/04/14	n/a	24	0.46	48	67	0.59	36	63	190	<0.010	<0.010
VPK_818	15/04/14	n/a	26	0.45	53	80	0.62	34	67	210	<0.010	<0.010
VPK_839	15/04/14	n/a	19	0.28	32	33	0.61	20	49	100	<0.010	<0.010
VPK_820	08/05/14	n/a	39	0.16	60	8.5	<0.10	39	34	99	<0.010	<0.010
VPK_821	08/05/14	n/a	59	0.13	85	8.8	0.12	43	49	120	<0.010	<0.010

Table B.79. Metal and organotin results from Vopak London Terminal (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
VPK_817	15/04/14	n/a	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.007
VPK_818	15/04/14	n/a	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.007
VPK_839	15/04/14	n/a	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.007
VPK_820	08/05/14	n/a	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.007
VPK_821	08/05/14	n/a	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.007

Table B.80. Polychlorinated Biphenyl (PCB) results from Vopak London Terminal (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
VPK_817	15/04/14	n/a	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
VPK_818	15/04/14	n/a	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
VPK_839	15/04/14	n/a	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
VPK_820	08/05/14	n/a	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
VPK_821	08/05/14	n/a	<0.1	<0.1	0.49	0.93	1	1.5	1.5	1.4	0.93
			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)	
VPK_817	15/04/14	n/a	<0.1	0.86	<0.1	<0.1	<0.1	<0.1	1	-	
VPK_818	15/04/14	n/a	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	
VPK_839	15/04/14	n/a	<0.1	1.3	<0.1	<0.1	<0.1	<0.1	1.3	-	
VPK_820	08/05/14	n/a	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.3	-	
VPK_821	08/05/14	n/a	0.79	2.6	<0.1	2	<0.1	1.1	2.2	-	

Table B.81. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Vopak London Terminal (mg/kg)

B.2.24 Northfleet Hope Container Terminal

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
1	2014	n/a	18	0.21	37	34	0.37	23	63	100	0.01	0.01
2	2014	n/a	18	0.23	43	41	0.51	24	76	120	0.01	0.01
3	2014	n/a	15	0.17	29	32	0.27	18	47	89	0.01	0.01
520792	04/10/17	n/a	17	0.2	33	30	0.41	23	52	150	<0.010	<0.010
520793	04/10/17	n/a	18	0.21	32	30	0.44	21	53	99	<0.010	<0.010
520794	04/10/17	n/a	19	0.25	35	33	0.49	22	61	110	<0.010	<0.010

Table B.82. Metal and organotin results from Northfleet Hope Container Terminal (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
1	2014	n/a	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.007
2	2014	n/a	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.007
3	2014	n/a	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.007
520792	04/10/17	n/a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
520793	04/10/17	n/a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
520794	04/10/17	n/a	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070

Table B.83. Polychlorinated Biphenyl (PCB) results from Northfleet Hope Container Terminal (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
1	2014	n/a	-	-	-	-	-	-	-	-	-
2	2014	n/a	-	-	-	-	-	-	-	-	-
3	2014	n/a	-	-	-	-	-	-	-	-	-
520792	04/10/17	n/a	<0.10	<0.10	<0.10	0.36	<0.10	<0.10	<0.10	<0.10	0.47
520793	04/10/17	n/a	<0.10	<0.10	<0.10	0.57	0.29	0.48	0.37	0.41	0.56
520794	04/10/17	n/a	<0.10	<0.10	<0.10	0.42	<0.10	<0.10	<0.10	<0.10	0.48
			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)	
1	2014	n/a	-	-	-	-	-	-	-	-	
2	2014	n/a	-	-	-	-	-	-	-	-	
3	2014	n/a	-	-	-	-	-	-	-	-	
520792	04/10/17	n/a	<0.10	0.34	<0.10	<0.10	<0.10	<0.10	0.18	-	
520793	04/10/17	n/a	0.41	0.42	<0.10	0.5	<0.10	0.25	0.24	-	
520794	04/10/17	n/a	<0.10	0.29	<0.10	<0.10	<0.10	<0.10	0.16	-	

Table B.84. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Northfleet Hope Container Terminal (mg/kg)

B.2.25 Thames Tideway Tunnel

B.2.25.1 Blackfriars Bridge Foreshore

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
2015/25694	20/07/15	0	12.01	0.44	19.76	63.86	0.4	14.69	147.84	115.84	<0.002	<0.002
2015/25695	20/07/15	0	15.95	0.46	27.75	41.47	1.79	22.25	151.81	91.68	<0.002	<0.002
2015/25696	20/07/15	0	12.74	0.81	19.2	72.61	0.26	18.4	194.41	133.89	<0.002	0.00931
2015/25697	20/07/15	0	26.82	0.08	40.73	10.73	<0.028	42.56	28.6	49.05	<0.002	<0.002
2015/25698	20/07/15	0	25.5	0.14	69.48	25.71	0.19	60.8	45.53	98.61	<0.002	<0.002
2015/25699	20/07/15	0	36.12	0.06	33.23	3.89	<0.025	43.67	9.78	38.55	<0.002	<0.002
2015/25700	20/07/15	0	23.63	2.09	188.19	204.15	0.92	48.18	5435.6	893.19	<0.002	<0.002
2015/25701	20/07/15	0	12.67	0.15	13.98	2.68	<0.024	14.89	6.81	21.46	<0.002	<0.002
2015/25702	20/07/15	n/a	22.18	0.03	20.25	4.12	<0.024	23.14	5.43	29.62	<0.002	<0.002
2015/25703	20/07/15	n/a	18.4	0.15	84.66	28.65	0.05	54.04	18.02	91.94	<0.002	<0.002
2015/25704	20/07/15	0	11.76	0.11	17.73	3.84	0.03	20.71	9.36	27.91	<0.002	<0.002
2015/25705	20/07/15	n/a	13.85	0.04	14.01	2.84	<0.028	24.46	3.86	18.45	<0.002	<0.002
11801027	20/07/15	0	10.7	0.319	15	79.2	0.458	15.2	141	115	<0.04	<0.02
11801028	20/07/15	0	14	0.395	22.4	38.4	1.76	21.4	129	93.2	<0.04	<0.02
11801029	20/07/15	0	5.14	0.173	6.18	9.26	<0.14	9.01	17.1	60.5	<0.04	<0.02
11801030	20/07/15	0	142	2	16	<14	<1.4	387	19.9	26.6	<0.04	<0.02
11801031	20/07/15	0	46.2	0.392	31.1	19.9	<0.14	94.8	51.8	67.5	<0.04	<0.02
11801032	20/07/15	0	21.6	0.245	15.5	3.13	<0.14	18.9	11.2	20.1	<0.04	<0.02
11801033	20/07/15	0	74.4	0.269	16.2	91.3	1.01	25.5	1030	227	<0.04	<0.02

Table B.85. Metal and organotin results from Blackfriars Bridge Foreshore (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
2015/25694	20/07/15	0	0.2	0.2	0.22	0.2	0.3	0.24	0.22	1.58
2015/25695	20/07/15	0	0.23	0.2	0.2	0.2	0.2	0.2	0.2	1.43
2015/25696	20/07/15	0	0.4	0.47	0.64	0.47	0.67	0.77	0.48	3.9
2015/25697	20/07/15	0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.4
2015/25698	20/07/15	0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.4
2015/25699	20/07/15	0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.4
2015/25700	20/07/15	0	0.23	0.2	0.28	0.21	0.25	0.2	0.2	1.57
2015/25701	20/07/15	0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.4
2015/25702	20/07/15	n/a	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.4
2015/25703	20/07/15	n/a	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.4
2015/25704	20/07/15	0	-	-	-	-	-	-	-	-
2015/25705	20/07/15	n/a	-	-	-	-	-	-	-	-
11801027	20/07/15	0	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.021
11801028	20/07/15	0	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.021
11801029	20/07/15	0	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.021
11801030	20/07/15	0	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.021
11801031	20/07/15	0	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.021
11801032	20/07/15	0	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.021
11801033	20/07/15	0	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.021

Table B.86. Polychlorinated Biphenyl (PCB) results from Blackfriars Bridge Foreshore (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
2015/25694	20/07/15	0	0.0107	0.0322	0.0604	0.195	0.244	0.241	0.0359	0.104	0.167
2015/25695	20/07/15	0	0.0249	0.163	0.377	1.43	1.24	1.2	0.478	0.586	1.09
2015/25696	20/07/15	0	0.0103	0.0158	0.0395	0.248	0.28	0.269	0.151	0.118	0.191
2015/25697	20/07/15	0	0.0001	0.0001	0.00029	0.00247	0.00108	0.00125	0.00115	0.0005	0.00114
2015/25698	20/07/15	0	0.0008	0.00164	0.00769	0.027	0.0226	0.0211	0.00768	0.0101	0.0205
2015/25699	20/07/15	0	0.00031	0.00077	0.00123	0.00532	0.0048	0.00465	0.00259	0.00203	0.00356
2015/25700	20/07/15	0	0.0141	0.125	0.0973	0.188	0.198	0.199	0.107	0.0827	0.172
2015/25701	20/07/15	0	0.00022	0.00793	0.004	0.0001	0.00076	0.0007	0.00044	0.00031	0.00058
2015/25702	20/07/15	n/a	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
2015/25703	20/07/15	n/a	0.0001	0.0001	0.0001	0.0001	0.00012	0.00152	0.00181	0.00031	0.0001
2015/25704	20/07/15	0	0.0001	0.00086	0.00057	0.00102	0.00075	0.00076	0.00058	0.0003	0.00079
2015/25705	20/07/15	n/a	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
11801027	20/07/15	0	0.0537	0.0329	0.0995	0.367	0.415	0.454	0.23	0.177	0.254
11801028	20/07/15	0	0.133	0.0461	0.37	1.74	1.51	1.75	0.646	0.699	1.29
11801029	20/07/15	0	0.0152	0.0308	0.0396	0.158	0.156	0.23	0.157	0.0767	0.173
11801030	20/07/15	0	<0.008	<0.012	<0.016	<0.014	<0.015	<0.015	<0.024	<0.014	<0.010
11801031	20/07/15	0	<0.008	<0.012	<0.016	<0.014	<0.015	<0.015	<0.024	<0.014	<0.010
11801032	20/07/15	0	<0.008	<0.012	<0.016	<0.014	<0.015	<0.015	<0.024	<0.014	<0.010
11801033	20/07/15	0	0.0646	<0.012	0.0527	0.11	0.0689	0.0983	0.0479	0.0389	0.1

			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)
2015/25694	20/07/15	0	0.129	0.414	0.0351	0.165	0.0319	0.198	0.349	168
2015/25695	20/07/15	0	0.198	2.11	0.276	0.633	0.287	1.19	2.13	936
2015/25696	20/07/15	0	0.0396	0.428	0.0152	0.185	0.0269	0.142	0.463	183

2015/25697	20/07/15	0	0.00016	0.00241	0.0001	0.00134	0.00038	0.00105	0.0141	4.3
2015/25698	20/07/15	0	0.00258	0.0324	0.00155	0.0108	0.00229	0.00948	0.0323	17
2015/25699	20/07/15	0	0.00076	0.00435	0.00067	0.00334	0.0027	0.00298	0.00928	6
2015/25700	20/07/15	0	0.0289	0.327	0.0763	0.121	0.12	0.235	0.379	402
2015/25701	20/07/15	0	0.00015	0.00303	0.00274	0.00045	0.00203	0.0205	0.0144	6
2015/25702	20/07/15	n/a	0.0001	0.00024	0.0001	0.0001	0.00038	0.00051	0.00126	1
2015/25703	20/07/15	n/a	0.0004	0.00022	0.00017	0.0019	0.00037	0.00043	0.00217	14
2015/25704	20/07/15	0	0.00014	0.00156	0.00068	0.00049	0.00105	0.00287	0.00375	4
2015/25705	20/07/15	n/a	0.0001	0.00021	0.0001	0.0001	0.00037	0.00043	0.00048	0.1
11801027	20/07/15	0	0.0582	0.619	0.0623	0.198	0.0418	0.355	0.507	-
11801028	20/07/15	0	0.222	2.12	0.225	0.613	0.208	1.06	2.35	-
11801029	20/07/15	0	0.0325	0.263	0.0213	0.103	0.0115	0.166	0.22	-
11801030	20/07/15	0	<0.023	<0.017	<0.010	<0.018	<0.009	<0.015	<0.015	-
11801031	20/07/15	0	<0.023	<0.017	<0.010	<0.018	<0.009	<0.015	<0.015	-
11801032	20/07/15	0	<0.023	<0.017	<0.010	<0.018	<0.009	<0.015	<0.015	-
11801033	20/07/15	0	<0.023	0.161	0.0347	0.0345	0.0712	0.12	0.163	-

Table B.87. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Blackfriars Bridge Foreshore (mg/kg)

B.2.25.2 Carnwath Road Riverside

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
29953	05/07/16	0	23.32	0.35	27.8	24.31	0.14	36.78	65.26	107.21	<0.001	<0.001
29954	05/07/16	0	7.17	0.76	35.05	36.02	0.47	17.78	64.47	142.33	0.0153	<0.001
29955	05/07/16	0	18.62	0.35	35.23	19.74	0.23	31.76	555.11	134.26	<0.001	<0.001
30032	05/07/16	0	10.53	0.42	24.05	42.69	0.44	14.33	190.79	143.84	0.0065	0.0254
30033	05/07/16	1.75	15.98	0.05	20.74	3.19	0.05	22.52	13.61	24.81	<0.001	<0.001
30034	05/07/16	0	10.2	0.36	21.57	31.21	0.23	16.51	86.76	100.74	<0.001	0.0207
30035	05/07/16	1.75	5.07	0.06	15.13	4.5	<0.021	17.96	5.15	23.8	<0.001	<0.001
30036	05/07/16	0	8.35	0.67	31.17	38.17	0.21	18.05	114.82	148.91	<0.001	0.0165
30037	05/07/16	1.75	16.62	1.02	46.32	21.27	0.12	35.32	48.79	96.49	<0.001	<0.001
30038	05/07/16	0	5.84	0.33	17.31	77.37	0.09	11.33	704.59	187.69	<0.001	0.0099
30039	05/07/16	1.75	12.19	1.75	26.5	35.87	0.16	20.88	87.07	129.54	<0.001	<0.001
30040	05/07/16	0	6.78	0.52	24.62	24.62	0.19	13.78	87.8	119.57	0.0060	0.0247
30041	05/07/16	1.75	47.15	0.33	58.51	85.12	4.43	26.43	323.29	246.6	<0.001	<0.001

Table B.88. Metal and organotin results from Carnwath Road Riverside (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
29953	05/07/16	0	0.000656	0.000438	0.000514	0.000426	0.00061	0.000548	0.000475	0.004
29954	05/07/16	0	0.00152	0.0015	0.0021	0.00166	0.00245	0.00236	0.00136	0.013
29955	05/07/16	0	0.000578	0.000443	0.00069	0.000449	0.000998	0.00102	0.000577	0.005
30032	05/07/16	0	0.000295	0.000305	0.00043	0.000309	0.000443	0.000486	0.000273	0.003
30033	05/07/16	1.75	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0014
30034	05/07/16	0	<0.0002	<0.0002	0.000564	0.000654	0.0017	0.00195	0.00364	<0.008908
30035	05/07/16	1.75	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0014
30036	05/07/16	0	0.000415	0.000538	0.000744	0.000555	0.000879	0.000832	0.000463	0.004
30037	05/07/16	1.75	0.00149	0.00205	0.00248	0.00194	0.00198	0.002	0.00106	0.013
30038	05/07/16	0	0.000691	0.000607	0.00059	0.000494	0.000658	0.00065	0.00036	0.004
30039	05/07/16	1.75	0.000899	0.00295	0.00241	0.0018	0.00192	0.00189	0.00104	0.013
30040	05/07/16	0	0.000999	0.00355	0.00966	0.00812	0.0133	0.0119	0.00964	0.057
30041	05/07/16	1.75	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0014

Table B.89. Polychlorinated Biphenyl (PCB) results from Carnwath Road Riverside (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
29953	05/07/16	0	0.0163	0.0286	0.0566	0.282	0.325	0.346	0.191	0.173	0.191
29954	05/07/16	0	0.103	0.115	0.288	0.844	1.39	1.44	0.882	0.689	0.73
29955	05/07/16	0	0.0179	0.0127	0.0383	0.177	0.267	0.279	0.209	0.137	0.12
30032	05/07/16	0	0.0282	0.0864	0.125	0.516	0.556	0.598	0.338	0.268	0.38
30033	05/07/16	1.75	0.00159	0.0109	0.00713	0.042	0.0284	0.0307	0.0144	0.0139	0.0214
30034	05/07/16	0	0.0124	0.0437	0.0748	0.396	0.381	0.418	0.205	0.178	0.257
30035	05/07/16	1.75	<0.0001	0.000646	<0.0001	0.00277	0.000794	0.000642	0.00026	0.000306	0.000414
30036	05/07/16	0	0.0557	0.0629	0.182	0.866	0.937	0.9	0.526	0.464	0.593
30037	05/07/16	1.75	0.0248	0.0289	0.0622	0.339	0.346	0.366	0.215	0.166	0.208
30038	05/07/16	0	0.0447	0.176	0.269	0.918	0.949	0.91	0.503	0.456	0.689
30039	05/07/16	1.75	0.106	0.254	0.294	1.26	1.16	1.14	0.555	0.551	0.831
30040	05/07/16	0	0.052	0.145	0.155	0.727	0.796	0.833	0.497	0.38	0.497
30041	05/07/16	1.75	0.0664	0.531	0.558	2.42	2.42	2.46	1.17	1.26	1.92

			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)
29953	05/07/16	0	0.0396	0.545	0.0288	0.238	0.0566	0.194	0.439	210
29954	05/07/16	0	0.21	1.63	0.154	0.947	0.258	0.664	1.52	1050
29955	05/07/16	0	0.0381	0.295	0.0172	0.248	0.052	0.0951	0.264	190
30032	05/07/16	0	0.0705	0.971	0.0559	0.393	0.0903	0.442	0.948	359
30033	05/07/16	1.75	0.00433	0.0268	0.00455	0.0157	0.0107	0.0322	0.0729	76
30034	05/07/16	0	0.0463	0.765	0.0364	0.255	0.0519	0.299	0.742	213
30035	05/07/16	1.75	<0.0001	0.000929	0.000225	<0.0001	0.000546	<0.0001	0.00653	2.32
30036	05/07/16	0	0.119	1.64	0.079	0.645	0.167	0.542	1.51	114
30037	05/07/16	1.75	0.0424	0.402	0.0343	0.237	0.0819	0.163	0.636	288

30038	05/07/16	0	0.109	1.79	0.164	0.633	0.22	1.14	1.59	557
30039	05/07/16	1.75	0.146	2.09	0.286	0.694	0.406	1.79	2.31	1120
30040	05/07/16	0	0.106	1.4	0.11	0.608	0.174	0.633	1.27	497
30041	05/07/16	1.75	0.323	3.18	0.374	1.43	0.435	3.4	3.89	2490

Table B.90. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Carnwath Road Riverside (mg/kg)

A.2.25.3 Chambers Wharf

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
298891	19/05/16	0	22	<0.10	32	6.6	<0.10	31	9.9	28	<0.010	<0.010
298892	19/05/16	2.95	8.9	0.36	40	34	0.1	41	16	88	<0.010	<0.010
298893	19/05/16	0	16	0.64	19	30	1.2	25	600	160	<0.010	<0.010
298894	19/05/16	2.1	170	0.34	34	24	0.19	100	21	80	<0.010	<0.010
298895	19/05/16	0	23	0.15	35	91	3.9	60	860	310	<0.010	<0.010
298896	19/05/16	4.8	17	0.23	31	23	<0.10	38	14	62	<0.010	<0.010
298897	19/05/16	0	19	0.53	27	67	1.7	31	570	170	<0.010	<0.010
298898	19/05/16	2.8	10	0.28	35	31	0.23	37	31	81	<0.010	<0.010
298899	19/05/16	0	20	<0.10	20	130	0.44	25	430	29	<0.010	<0.010
298900	19/05/16	3.6	14	0.26	35	26	0.13	34	16	71	<0.010	<0.010
298901	19/05/16	0	6.4	0.1	16	11	0.12	23	330	29	<0.010	<0.010
298902	19/05/16	0	11	0.43	35	36	0.44	28	79	100	<0.010	<0.010

Table B.91. Metal and organotin results from Chambers Wharf (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
298891	19/05/16	0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
298892	19/05/16	2.95	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
298893	19/05/16	0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
298894	19/05/16	2.1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
298895	19/05/16	0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
298896	19/05/16	4.8	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
298897	19/05/16	0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
298898	19/05/16	2.8	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
298899	19/05/16	0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
298900	19/05/16	3.6	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
298901	19/05/16	0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
298902	19/05/16	0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070

Table B.92. Polychlorinated Biphenyl (PCB) results from Chambers Wharf (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
298891	19/05/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
298892	19/05/16	2.95	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
298893	19/05/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
298894	19/05/16	2.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
298895	19/05/16	0	<0.10	<0.10	0.45	1	1	0.96	0.55	0.23	1.3
298896	19/05/16	4.8	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
298897	19/05/16	0	0.76	7.3	7.7	20	19	22	10	8.6	21
298898	19/05/16	2.8	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
298899	19/05/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
298900	19/05/16	3.6	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
298901	19/05/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
298902	19/05/16	0	<0.10	<0.10	0.17	0.55	0.75	1.1	0.53	0.33	1.1

			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)
298891	19/05/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-
298892	19/05/16	2.95	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-
298893	19/05/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-
298894	19/05/16	2.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-
298895	19/05/16	0	0.17	3.2	<0.10	0.63	<0.10	1.9	2.9	-
298896	19/05/16	4.8	<0.10	0.3	<0.10	<0.10	<0.10	0.39	0.29	-
298897	19/05/16	0	3.3	53	6.3	12	4.17	58	47	-
298898	19/05/16	2.8	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-
298899	19/05/16	0	<0.10	0.13	<0.10	<0.10	<0.10	0.11	0.12	-
298900	19/05/16	3.6	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-

298901	19/05/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-
298902	19/05/16	0	0.14	1.9	<0.10	0.49	<0.10	0.77	1.6	-

Table B.93. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Chambers Wharf (mg/kg)

B.2.25.4 Chelsea Embankment Foreshore

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
2018216251	16/01/18	0	24.8	0.164	20.9	11.7	0.147	14.5	38	51.3	<0.002	<0.002

Table B.94. Metal and organotin results from Chelsea Embankment Foreshore (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
2018216251	16/01/18	0	<0.0002	<0.0002	0.000505	0.000569	0.00151	0.00132	0.000936	<0.00524

Table B.95. Polychlorinated Biphenyl (PCB) results from Chelsea Embankment Foreshore (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
2018216251	16/01/18	0	0.00921	0.0151	0.0231	0.0921	0.114	0.108	0.0943	0.048	0.0637
			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)	
2018216251	16/01/18	0	0.0227	0.135	0.0127	0.119	0.0342	0.0806	0.182	305	

Table B.96. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Chelsea Embankment Foreshore (mg/kg)

B.2.25.5 King Edward Memorial Park Foreshore

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
201734403	25/01/17	0	10.78	0.25	17.08	28.92	1.05	13.34	332.1	47.2	<0.002	<0.002
201734404	25/01/17	0	102.43	1.59	103.14	194.05	5.49	36.06	516.69	575.4	<0.002	<0.002
201734405	25/01/17	0	48.92	0.8	73.66	84.66	4.47	23.18	771.79	353.7	<0.002	<0.002

Table B.97. Metal and organotin results from King Edward Memorial Park Foreshore (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
201734403	25/01/17	0	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0014
201734404	25/01/17	0	<0.0002	<0.0002	0.000512	<0.0002	<0.0002	<0.0002	<0.0002	<0.001712
201734405	25/01/17	0	0.000954	0.00154	0.00102	0.00194	0.000453	<0.0002	0.00111	<0.007217

Table B.98. Polychlorinated Biphenyl (PCB) results from King Edward Memorial Park Foreshore (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
201734403	25/01/17	0	0.00748	0.0603	0.062	0.101	0.0713	0.0703	0.0654	0.0265	0.0954
201734404	25/01/17	0	0.749	1.83	2.22	7.19	11.8	10.1	8.23	5.23	6.02
201734405	25/01/17	0	0.0915	2.05	1.32	3.27	3.44	3.42	1.93	1.57	2.76
			DIBENAH	**FLUORAN**	**FLUOREN**	**INDENO**	**NAPTH**	**PHENANT**	**PYRENE**	**Total Hydrocarbons (THC)**	
201734403	25/01/17	0	0.0176	0.0892	0.0623	0.0402	0.138	0.405	0.117	912	
201734404	25/01/17	0	1.8	18.6	2.05	9.75	1.04	4.8	13.1	8490	
201734405	25/01/17	0	0.505	10.7	1.36	2.39	0.864	4.32	7.3	2940	

Table B.99. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from King Edward Memorial Park Foreshore (mg/kg)

B.2.25.6 Putney Embankment Foreshore

Sample ID	Date Sampled	Depth (m)	Ar	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
2016/33544	28/10/16	0	18.37	1.25	79.7	752.66	0.94	44.88	407.67	502.86	<0.003	<0.003
2016/33545	28/10/16	0	10.71	0.76	30.07	139.87	0.19	21.14	480.87	160.53	<0.001	0.0128
2016/33546	28/10/16	0	5.31	0.3	19.09	48.5	0.37	10.45	111.7	111.93	<0.001	<0.001
2016/33547	28/10/16	0	9.22	0.23	10.57	29.1	<0.021	13.38	29.1	78.93	<0.001	<0.001
2016/33548	28/10/16	0	7.48	0.28	17.18	66.36	0.11	11.89	139.19	135.8	<0.001	0.0343
2016/33549	28/10/16	0	6.86	0.51	20.92	210.21	0.14	12.07	173.85	142.07	0.0098	0.0320
370396	14/10/16	0	12	<0.10	15	3.2	<0.10	15	22	20	<0.010	<0.010
370397	14/10/16	1.75	11	0.31	50	28	<0.10	50	18	150	<0.010	<0.010
370398	14/10/16	0	14	<0.10	18	12	0.27	18	120	38	<0.010	<0.010
370399	14/10/16	2.1	14	0.12	53	27	<0.10	51	20	77	<0.010	<0.010
370400	14/10/16	0	15	<0.10	15	11	4.5	16	41	31	<0.010	<0.010
370401	14/10/16	1.1	14	0.14	52	28	<0.10	50	19	77	<0.010	<0.010
370402	15/10/16	0	6.3	0.26	14	4.4	<0.10	11	5.3	19	<0.010	<0.010
370403	15/10/16	2.2	12	0.11	46	26	<0.10	43	18	69	<0.010	<0.010
370404	14/10/16	0	13	0.18	16	1.7	<0.10	13	4.7	16	<0.010	<0.010
370405	14/10/16	1	19	0.11	12	4.3	< 0.10	17	12	25	<0.010	<0.010
374402	28/10/16	n/a	34	1.1	45	600	0.54	42	1100	320	<0.010	<0.010
374403	28/10/16	n/a	14	0.48	24	130	0.71	20	240	140	<0.010	<0.010
374404	28/10/16	n/a	19	0.33	20	85	0.36	18	490	97	<0.010	<0.010
374405	28/10/16	n/a	15	0.34	30	69	0.17	22	73	170	<0.010	<0.010
374406	28/10/16	n/a	21	0.15	22	72	0.15	21	160	96	<0.010	<0.010
374407	28/10/16	n/a	12	2.4	40	74	0.29	21	200	160	<0.010	<0.010

Table B.100. Metal and organotin results from Putney Embankment Foreshore (mg/kg)

Sample ID	Date Sampled	Depth (m)	PCB28	PCB52	PCB101	PCB118	PCB138	PCB153	PCB180	Total PCB ICES 7
2016/33544	28/10/16	0	0.00112	0.00271	0.00798	0.00674	0.00551	0.00547	0.00151	0.03104
2016/33545	28/10/16	0	0.00046	0.000893	0.00167	0.00147	0.00261	0.00199	0.000961	0.010054
2016/33546	28/10/16	0	0.000471	0.00093	0.00146	0.000946	0.00164	0.00137	0.000698	0.007515
2016/33547	28/10/16	0	0.000429	0.000388	0.00113	0.000983	0.00156	0.00155	0.00102	0.00706
2016/33548	28/10/16	0	0.000379	0.0011.9	0.00356	0.00308	0.00398	0.00327	0.00202	0.016289
2016/33549	28/10/16	0	0.000336	0.000254	0.0012	0.000964	0.00241	0.00228	0.00156	0.009004
370396	14/10/16	0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
370397	14/10/16	1.75	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
370398	14/10/16	0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
370399	14/10/16	2.1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
370400	14/10/16	0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
370401	14/10/16	1.1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
370402	15/10/16	0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
370403	15/10/16	2.2	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
370404	14/10/16	0	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
370405	14/10/16	1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.070
374402	28/10/16	n/a	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0070
374403	28/10/16	n/a	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0070
374404	28/10/16	n/a	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0070
374405	28/10/16	n/a	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0070
374406	28/10/16	n/a	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0070
374407	28/10/16	n/a	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0070

Table B.101. Polychlorinated Biphenyl (PCB) results from Putney Embankment Foreshore (mg/kg)

Sample ID	Date Sampled	Depth (m)	ACNAPH	ACNAPT	ANTHRA	BAA	BAP	BBF	BENZGHI	BKF	CHRYS
2016/33544	28/10/16	0	0.122	0.154	0.43	1.66	1.93	2.28	1.4	1.1	1.25
2016/33545	28/10/16	0	0.215	0.158	0.997	2.4	2.58	2.51	1.32	1.21	2.14
2016/33546	28/10/16	0	0.0872	0.058	0.4	1.07	1.21	1.24	0.67	0.575	0.89
2016/33547	28/10/16	0	0.0137	0.0102	0.0499	0.306	0.438	0.53	0.319	0.248	0.242
2016/33548	28/10/16	0	0.0298	0.0726	0.113	0.523	0.61	0.632	0.365	0.296	0.365
2016/33549	28/10/16	0	0.0569	1.02	0.825	2.69	2.88	3.01	1.35	1.39	1.96
370396	14/10/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
370397	14/10/16	1.75	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
370398	14/10/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
370399	14/10/16	2.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
370400	14/10/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
370401	14/10/16	1.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
370402	15/10/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
370403	15/10/16	2.2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
370404	14/10/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
370405	14/10/16	1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
374402	28/10/16	n/a	<0.10	<0.10	0.53	3	2.7	3.5	1.7	1.5	2.6
374403	28/10/16	n/a	0.18	0.35	1.3	4.1	3.3	3.9	1.8	1.6	3.3
374404	28/10/16	n/a	0.74	3.3	9.7	18	15	17	8.3	6.6	15
374405	28/10/16	n/a	<0.10	<0.10	<0.10	0.36	0.39	0.64	<0.10	0.43	0.34
374406	28/10/16	n/a	<0.10	<0.10	<0.10	0.25	0.26	0.31	<0.10	0.24	0.4
374407	28/10/16	n/a	1	0.21	0.75	3.1	2.8	3.6	2	1.6	2.9

			DIBENAH	FLUORAN	FLUOREN	INDENO	NAPTH	PHENANT	PYRENE	Total Hydrocarbons (THC)
2016/33544	28/10/16	0	0.236	3.07	0.164	1.75	0.325	1.11	4.17	1500
2016/33545	28/10/16	0	0.284	5.24	0.331	1.7	0.147	3.11	5.7	889

2016/33546	28/10/16	0	0.151	2.22	0.103	0.964	0.118	0.816	2.05	670
2016/33547	28/10/16	0	0.0703	0.534	0.015	0.451	0.0271	0.121	0.398	183
2016/33548	28/10/16	0	0.0858	1.02	0.0519	0.529	0.0924	0.299	0.856	316
2016/33549	28/10/16	0	0.367	5.72	0.435	2.1	0.314	2.35	4.94	802
370396	14/10/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-
370397	14/10/16	1.75	<0.10	0.24	<0.10	<0.10	<0.10	<0.10	0.24	-
370398	14/10/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-
370399	14/10/16	2.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-
370400	14/10/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.22	-
370401	14/10/16	1.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-
370402	15/10/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-
370403	15/10/16	2.2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-
370404	14/10/16	0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-
370405	14/10/16	1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-
374402	28/10/16	n/a	0.49	4.6	<0.10	1.7	<0.10	0.67	6	-
374403	28/10/16	n/a	0.49	9	0.35	1.9	<0.10	4.7	8	-
374404	28/10/16	n/a	2	46	4.1	8.9	0.29	45	39	-
374405	28/10/16	n/a	<0.10	0.98	<0.10	<0.10	<0.10	<0.10	0.82	-
374406	28/10/16	n/a	<0.10	0.63	<0.10	<0.10	<0.10	<0.10	0.54	-
374407	28/10/16	n/a	0.72	5.1	0.4	1.8	0.13	3.2	4.6	-

Table B.102. Polycyclic Aromatic Hydrocarbon (PAH) and Total Hydrocarbon (THC) results from Putney Embankment Foreshore (mg/kg)