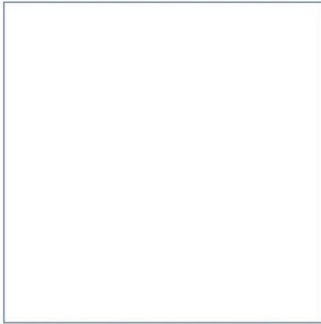
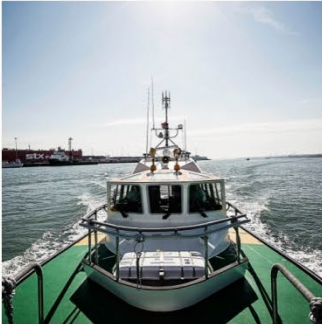
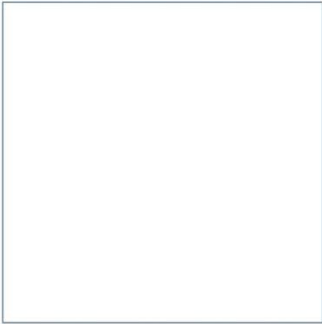
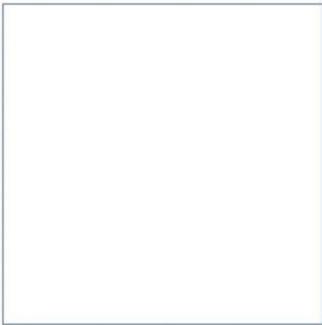


Peel Ports Group

Medway Maintenance Dredge Protocol (MDP) Baseline Document

Update

July 2022



Innovative Thinking - Sustainable Solutions



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Medway Maintenance Dredge Protocol (MDP) Baseline Document Update

July 2022



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ABPmer

Quayside Suite, Medina Chambers, Town Quay, Southampton, Hampshire SO14 2AQ
T: +44 (0) 2380 711844 W: <http://www.abpmer.co.uk/>

Executive Summary

Peel Ports Group, the owner and operator of the Port of Sheerness and Chatham Docks, and the Statutory Harbour Authority (SHA) for the Medway Estuary and The Swale (collectively referred to as “the Medway” hereafter), has commissioned ABPmer to compile a Maintenance Dredge Protocol (MDP) Baseline Document. The aim of the MDP is to collate readily available relevant information into a Baseline Document to assist operators and regulators seeking, or giving approval, for maintenance dredging activities that could potentially affect European designated sites. This Baseline Document provides information for the Medway and its approaches:

- To provide the relevant information to allow Natural England to consider and endorse an Appropriate Assessment; and
- To provide the information needed to inform the preparation of Water Framework Directive (WFD) compliance assessments in accordance with the Environment Agency’s ‘Clearing the Waters for All’ guidance.

The Medway is a complex arrangement of tidal channels, which drain around large islands of saltmarsh and mudflat with peninsulas of marshland. Human influence within the Medway has a history spanning many centuries. Nearly all the shoreline within the Medway has been protected by some form of flood defence in the past.

The nature conservation interests of the Medway and Thames Estuaries, and The Swale, are of high importance with large sea expanses and adjacent coastlines having been designated as nationally and internationally protected sites. There are 14 internationally designated sites which overlap or are in the vicinity of maintenance dredge areas and/or disposal sites, including Special Protection Areas (SPAs), Ramsar Sites and Special Areas of Conservation (SACs); namely:

- Benfleet and Southend Marshes SPA and Ramsar;
- Essex Estuaries SAC;
- Foulness SPA and Ramsar;
- Margate and Long Sands SAC;
- Medway Estuary and Marshes SPA and Ramsar;
- Outer Thames Estuary SPA;
- Southern North Sea SAC;
- Thames Estuary and Marshes SPA and Ramsar; and
- The Swale SPA and Ramsar.

The Medway has been extensively used for maritime trade and transport for centuries, and currently provide a number of port and harbour facilities. Maintaining safe port access for commercial and recreational maritime transport is an important function for the Harbour Authority. This necessitates the maintenance dredging of navigable channels within the estuaries and their approaches, alongside jetties and berths to remove recently deposited sediment.

The total volume of maintenance dredging undertaken by Peel Ports Medway as Statutory Harbour Authority within the Medway Approaches, Medway Estuary and The Swale between 2002 and 2020 ranged from 500 to 185,092 m³ per year, and averaged approximately 86,114m³ per year. The volume of material is highly variable year to year as a result of variable sedimentation patterns which are driven by the local estuarine processes and the commercial ‘need’ for dredging. Additional dredging activity is also undertaken by third parties, with total annual volumes ranging from 4,449 to 126,475 m³ and averaging approximately 43,849 m³ per year.

This Baseline Document, which addresses the maintenance commitments of the Harbour Authority, has been developed over multiple iterations to include previous and current third party maintenance dredge activities on the Medway, to present a complete account of the activities undertaken; and to provide the most up to date version for use by competent authorities and dredge operators.

It is not anticipated that this Baseline Document should require substantial revision unless major changes are proposed or significant new information becomes available. In such a case, this document should be updated to reflect these changes. This document must be kept up-dated if it is to be used in assessing maintenance dredging, and it is therefore essential that the most up to date copy is available, and used by, competent authorities and operators.

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1 Introduction

This document presents an up-to-date account of maintenance dredging in the Medway Estuary and The Swale, in accordance with the Maintenance Dredge Protocol (MDP) (Department for Environment, Food and Rural Affairs (Defra), 2007). It is referred to as a 'Baseline Document' and is intended to summarise relevant and available information to inform decision-making in connection with maintenance dredging activities and marine licence applications for dredged material disposal. The Medway Estuary and The Swale is collectively referred to "the Medway" in this report.

Peel Ports Medway is part of the Peel Ports Group and a privately-owned company. The Port of Sheerness Limited (PoSL) is the Statutory Harbour Authority (SHA) for the Medway, as detailed within the Medway Ports Authority Act 1973. The Port of London Authority (PLA) is the SHA for the Approaches to the Medway (Medway Approach Channel); however, Peel Ports Medway does have responsibility for the conservancy of the Medway Approach Channel.

Statutory obligations are vested in PoSL which trades as 'Peel Ports Medway'. In this capacity, Peel Ports Group commissioned ABPmer to prepare the original Baseline Document in 2012 (Peel Ports Group, 2012), which was subsequently updated by MarineSpace Limited in partnership with HR Wallingford and Bright Angel Coastal Consultants Ltd in 2018 (MarineSpace Limited *et al.*, 2018). This revision has been prepared by ABPmer, updating the Baseline Document with data from 2018 to 2020 inclusive. It provides information to facilitate Habitats Regulations Assessments (HRAs), Appropriate Assessments, Water Framework Directive (WFD) compliance assessments and Marine Conservation Zone (MCZ) assessments where these are required.

1.1 Study area

This updated Baseline Document covers the Medway Estuary from Sheerness in the north, to the tidal limit at Allington Lock on the River Medway in the south, and The Swale, which stretches from the Queenborough Spit Buoy in the west to Shell Ness in the east (Figure 1.1). The approach channel to the Medway Estuary, which falls within the Thames Estuary is also included in this analysis. The extent of associated designated marine protected areas and associated features is presented in Section 7 of this Baseline Document.

1.2 Report objectives

This report has been prepared in order to comply with the requirements of the Conservation Assessment Protocol for maintenance dredging, with respect to The Conservation of Habitats and Species Regulations 2017 (as amended) (the Habitats Regulations). It is the Government's view, as was initially instated 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 (92/43/EEC) and assessed in accordance with Article 6(3) of that Directive (Defra, 2007). A requirement therefore exists to ensure that maintenance dredging operations with the potential to affect Natura 2000 sites are considered in a wider sediment management context.

The aim of the protocol is to collate relevant information into a Baseline Document to make the process of assessing the effect of maintenance dredging more explicit for all parties. To fulfil this obligation, ABPmer was commissioned by Peel Ports Group to compile an updated MDP Baseline Document for the Medway (hereafter referred to as the Baseline Document).

In addition to the requirements of the Habitat Regulations, this document also addresses requirements in respect of maintenance dredging and disposal under the WFD (2000/60EC) and the Priority Substances Directive (2008/105/EC as amended by 2013/39/EU) by way of the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. These Regulations were modified by the Floods and Water (Amendment etc) (EU Exit) Regulations 2019 on 31 January 2020. The lead authority for overseeing the implementation of the WFD within England is the Environment Agency. Furthermore, this document also contains details of nationally designated Sites of Scientific Interest (SSSIs) and MCZs, as well as habitats and species identified as being of principal importance in England through the Natural Environment and Rural Communities (NERC) Act 2006.

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

1.3 Report Structure

The Baseline Document is structured into the following sections:

- Section 2:** **Legislation** – Details the legislative context for the MDP and the marine navigation dredging framework under the WFD;
- Section 3:** **Coastal and estuarine processes and morphology** – Outlines relevant coastal, estuarine and morphological processes for the Medway;
- Section 4:** **Dredging information** – Details the history of dredging within Medway, as well as the adjacent Outer Thames Estuary, followed by current dredging and disposal practices;
- Section 5:** **Sediment quality** – Contains information relating to sediment quality and presents an overall assessment of sediment quality from previous licence applications;
- Section 6:** **Marine Licence information** – Summarises the Marine Licences held by relevant parties and project-specific licence conditions;
- Section 7:** **Environmental information** – Outlines the designated sites within the study area and the associated qualifying/interest features and conservation objectives/advice, as well as detailing relevant WFD water bodies and their current status; and
- Section 8:** **Knowledge gaps** – Describes any knowledge gaps identified during the data collation stages of this Baseline Document.

In addition, the following appendices are provided to support the Baseline Document:

- Appendix A: Sediment quality data** – Collates data from previous sampling schedules to inform conclusions on sediment contamination within this baseline report;
- Appendix B: SSSI Favourable condition status** – Collates SSSI unit status gathered from Natural England’s Designated Sites Viewer;
- Appendix C: Information to inform an appropriate assessment** – presents the Habitats Regulations Assessment (HRA) that has been undertaken of the maintenance dredging and disposal of maintenance dredge arisings from within the Medway and its approaches; and
- Appendix D: Natural England Comments Log** – presents the comments that were received from Natural England on a draft version of the Updated MDP Baseline Document and WFD Assessment for the Medway and its approaches.

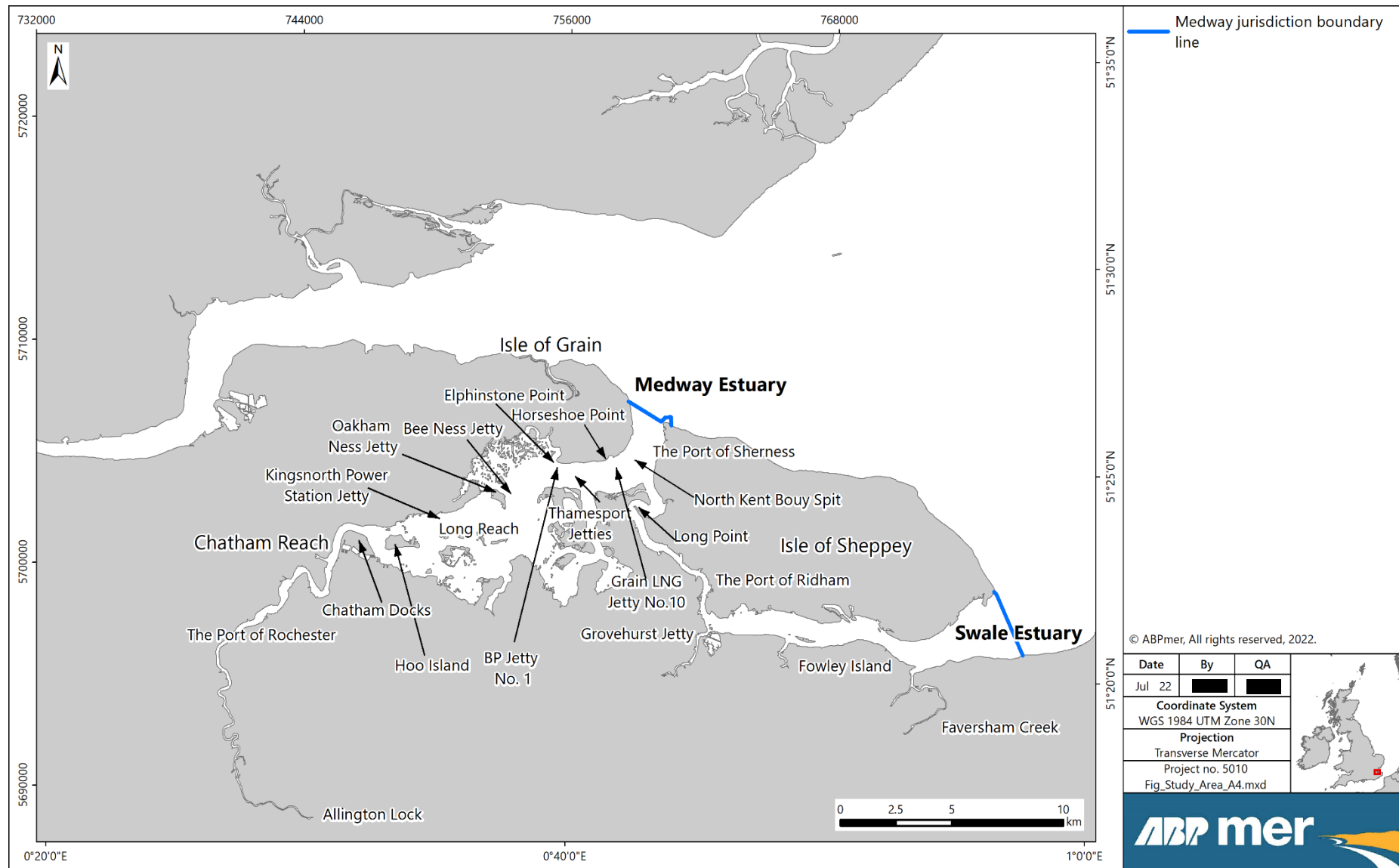


Figure 1.1 The Medway study area

2 Legislation

Marine navigation dredging (including capital and maintenance) and disposal at sea are highly regulated activities due to their potential to negatively affect the environment if they are not carefully considered and controlled. The following sections detail the national and international legislative context in which this Baseline Document has been drafted with respect to navigation dredging.

2.1 National legislation

Dredge and disposal operations are regulated in England by the Marine Management Organisation (MMO), an executive non-departmental public body established and given powers under the Marine and Coastal Access Act 2009. The current process of marine licensing under the Marine and Coastal Access Act 2009 came into force on 6 April 2011 and covers the area from Mean High Water Springs (MHWS) out to 12 nautical miles (nm). This process requires anybody wishing to undertake works which are deemed to involve a licensable activity to obtain a marine licence from the MMO, unless the activity qualifies for an exemption from marine licensing.

The Marine and Coastal Access Act 2009 and the Marine Licensing (Exempted Activities) Order 2011 (as amended) set out activities which may be exempt from requiring a marine licence in certain circumstances. This includes certain dredging activities carried out by, or on behalf of, a Harbour Authority, which involves the relocation of sediments inside surface waters, including for the purpose of managing waters and waterways (also see Section 2.5). The activity must be authorised by a local Act or harbour order and the authority must demonstrate to the MMO's satisfaction that the sediments are non-hazardous. Similarly, small-scale navigational dredging (removing under 500 m³ dredge material per campaign and under 1,500 m³ per annum; referred to as '*de minimus*' dredging) carried out for navigational purposes in an area that has been dredged at least once in the preceding 10 years is exempted from the requirements of a marine licence.

It should be noted that while certain dredging activities are exempted from requiring a marine licence to be issued by the MMO, the activity of disposing dredged material at sea (i.e. conventional disposal of dredge arisings at a licensed marine disposal site) requires a separate marine licence.

2.2 Habitats Regulations

Under Regulation 63 of the Habitats Regulations, competent authorities are required to carry out an Appropriate Assessment if the proposed works are within or adjacent to a designated European Marine Site (EMS) and if they are likely to have a 'significant effect' on the site, either alone or in combination with other 'plans and projects'. The UK Government considers that maintenance dredging proposals, which could potentially affect an EMS, need assessing in accordance with Article 103(7) of the Habitats and Species Regulations. In effect this means that ongoing maintenance dredging should be considered as a relevant 'plan or project' and requires its effects on the EMS to be considered according to a specified procedural framework that may result in a requirement for an Appropriate Assessment prior to any consent being granted.

The MDP is intended to use readily available data to complete a Baseline Document (this document) and, drawing upon existing information, to describe the current and historical patterns of dredging in relation to the conservation status of the EMS. Completion of the protocol is voluntary; however, those estuaries with completed Baseline Documents may use these in support of maintenance dredge and disposal applications. The marine licensing authority (the MMO in England) will use Baseline Documents

as a reference point to provide a basis against which maintenance dredging and disposal applications can be assessed. It is anticipated that this strategy will streamline the consenting procedure.

2.3 Marine Conservation Zones

Part 5 of the Marine and Coastal Access Act 2009 provides for the identification, designation and management of nationally important MCZs. Four Regional Projects were established to develop recommendations for MCZs in English waters. Recommendations for waters covered by the study area were made by the Balanced Seas MCZ Regional Project in September 2011. The Government issued a public consultation on MCZ recommendations in December 2012 which proposed to formally designate MCZs in a phased manner over succeeding years. In November 2013, Defra announced the designation of 27 MCZs around England's coast. Defra opened the consultation on a second tranche of MCZs in January 2015, with 23 further sites designated in January 2016. As part of tranche 3, 41 new sites (and 12 additional features) were designated. The third phase essentially completed the UK Blue Belt and thus contribution to the ecologically coherent network in the North East Atlantic in terms of the representation of species and habitats¹.

Once designated, public authorities have certain obligations to support the achievement of conservation objectives in delivering their statutory duties (to the extent that this is compatible with the exercise of their statutory functions). In some instances, this may require the implementation of management measures to control levels of human activity in order to achieve the conservation objectives. For licensable activities, the management measures will generally be introduced by means of specific licence conditions. In some circumstances, this may necessitate measures to control maintenance dredging and disposal activities. In relation to maintenance dredging and disposal activities in the Medway, this MDP has sought to include information on MCZs to cover any issues relating to objectives for designated features.

2.4 Water Framework Directive

The WFD (2000/60/EC), which came into force on 22 December 2000, establishes a framework approach to the protection, improvement, management and sustainable use of Europe's rivers, lakes, estuaries, coastal waters and groundwater. The Directive applies to all surface waters out to 1 nm seaward of the baseline for territorial waters and to groundwaters. For management purposes, surface and ground waters are divided into a number of discrete units termed 'water bodies'. Water bodies relevant to this study are presented in Figure 2.1. The overall objective of the WFD is to achieve good status 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 targets for 2021).

The WFD is implemented in England and Wales through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (commonly termed the Water Framework Regulations)². Under the Water Framework Regulations, the Environment Agency is the competent authority for implementation of the WFD in England. Programmes of measures have been developed through a process of river basin management planning and are set out in regionally based River Basin Management Plans (RBMPs). These were first published in 2009 (Cycle 1), and subsequently updated in early 2016 (Cycle 2). The Medway is located within the Thames River Basin District which is reported in the Thames RBMP (Environment Agency, 2016).

¹ <https://www.gov.uk/government/collections/marine-conservation-zone-designations-in-england> (Accessed August 2021).

² Modified by the Floods and Water (Amendment etc) (EU Exit) Regulations 2019 on 31 January 2020.

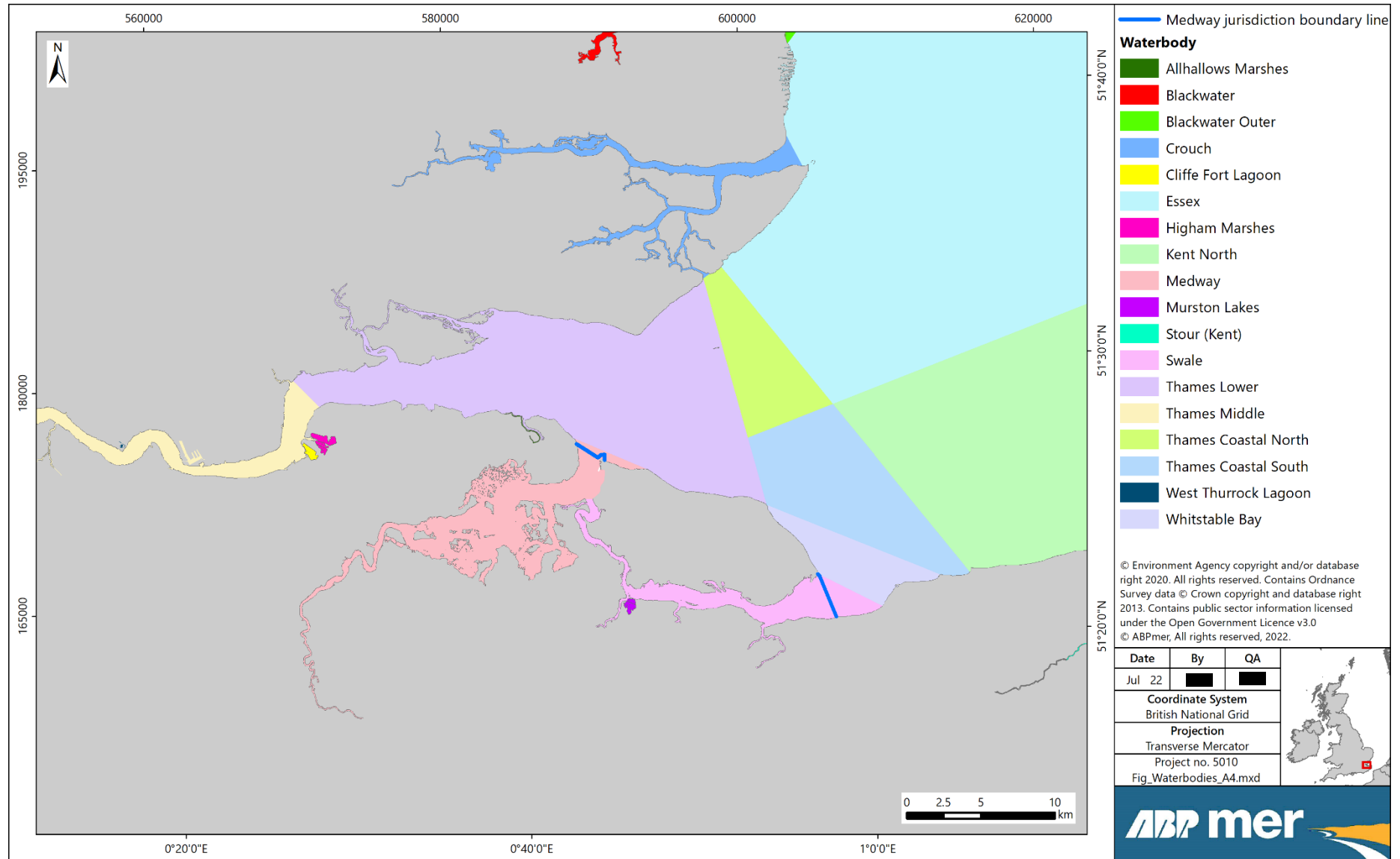


Figure 2.1 Transitional and coastal water bodies in study area

Consideration of WFD requirements is necessary for activities and developments which have the potential to cause deterioration in ecological, quantitative and/or chemical status of a water body, or to compromise improvements which might otherwise lead to a water body meeting its WFD objectives. Therefore, it is necessary to consider the potential for maintenance dredging and disposal activities to impact WFD water bodies in and around the Medway. In 2016, the Environment Agency published guidance, commonly referred to as 'Clearing the Waters for All', regarding how to assess the impact of activities in transitional and coastal waters³.

2.5 Local harbour powers

The Medway Ports Reorganisation Scheme 1968 created the 'Medway Ports Authority' for the purpose of securing the efficient and economical development of harbours, then under the respective jurisdictions of the Commissioners of the Faversham Navigation, the Conservators of Milton Creek, the Conservators of the River Medway, the Medway Lower Navigation Company and the Queenborough-in-Sheppey Corporation. These harbours were transferred to the Authority by the Scheme in October 1969.

The Medway Ports Authority Act 1973 repealed certain of the 1968 provisions and conferred further powers and included a definition of the 'Medway Approach Area'. Following the requirements of the Ports Act 1991, the Medway Ports Authority Scheme 1991 transferred property, rights and liabilities as well as all functions conferred or imposed upon the Authority by any provision contained in the Medway Ports Authority Act 1973 to 'Medway Ports Ltd'. The provisions of the Medway Ports Authority Act 1973 were then vested within 'Port of Sheerness Ltd' (PoSL). Medway Ports Ltd was then the subject of a 'management buyout' with employees able to own shares. Following a declaration to the effect that it was the wish of the Company to become a public limited company, listed on the London stock market, the Company was then in a position for already-listed companies to bid for it. In October 1993, the Company was bought by the Mersey Docks and Harbour Company (MDHC) of Liverpool. MDHC was subsequently purchased by Peel Holdings in September 2005. Therefore, Peel Ports Medway is now part of the Peel Ports Group and a privately-owned company. PoSL is the SHA for the Medway, as detailed within the Medway Ports Authority Act 1973.

The Medway Ports Authority Act 1973 conveys powers to carry out dredging under Section 36, Part 1 of the Act. This allows Peel Ports Medway to deepen, dredge, scour and improve the bed and foreshore of the waters of the port and blast any rock within the port. Consent is still required from the MMO in the form of a Marine Licence in order to deposit any dredge arisings at sea.

In addition, Peel Ports Medway has the powers to grant a dredging licence to third parties within its area of jurisdiction under Section 38 of the Medway Ports Authority Act 1973. Under Section 40 of the Act, third party dredging may not take place unless such a licence has been granted. Obtaining a local Harbour Authority Licence does not remove the need to seek a Marine Licence from the Regulator (the MMO) in order to dredge or deposit material in tidal waters.

- Section 38 of the Medway Ports Authority Act 1973 states that:
 - (1) The Authority may upon such terms and conditions as they think fit grant to any person a licence to dredge in any part of the bed and foreshore of the waters of the port; and,

³ <https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters> (Accessed August 2021).

(2) Application for a dredging licence shall be made in writing to the Authority and shall be accompanied by plans, sections and particulars defining the nature, extent and manner of the operations to be carried out in the exercise of the powers granted by the licence and in granting any such licence the Authority may require modifications in the plans, sections and particulars so submitted.

- Section 40 of the Medway Ports Authority Act 1973 states that:

(1) No person shall:

a) construct, alter, renew or extend any works on, under or over tidal waters or tidal lands below the level of high water in the port unless he is licensed so to do by a works licence and except upon the terms and conditions (if any) upon which the licence is granted and in accordance with the plans, sections and particulars approved in pursuance of Section 37 (licensing of works) or Section 39 (appeals in respect of works licence or dredging licence) of this Act; and

b) dredge, dig or raise any gravel, sand, clay or other substance in the bed and foreshore of the waters of the port unless he is licensed so to do by a dredging licence and except upon the terms and conditions (if any) upon which the licence is granted and in accordance with the plans, sections and particulars approved in pursuance of Section 38 (licence to dredge) or Section 39 (appeals in respect of works licence or dredging licence) of this Act.

Further legislative requirements apply when works are of a sufficient nature or scale or are within a 'sensitive' area for nature conservation. The Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) provide a requirement to carry out an EIA prior to granting consent where a plan or project is deemed likely to give rise to significant effects.

Historically, dredge practice in the Medway has been exempted from marine licensing, as the sediments were not deposited at sea. Under the Marine and Coastal Access Act 2009, Water Injection Dredging (WID) became a licensable activity in 2014. However, where a local Harbour Authority has powers to dredge, as is the case for Peel Ports Medway's own dredging within the Medway, the activity is exempted from licensing under the Marine and Coastal Access Act 2009.

As the SHA, Peel Ports Medway, is responsible for maintaining safe port access for both commercial and recreational maritime transport around the Medway. Figure 2.2 illustrates Peel Ports Medway's administrative boundary as the SHA. Sediment is constantly entering and departing the estuary, some of which settles in dredged channels, berthing pockets, the docks, marinas and jetties. Dredging is therefore required to remove recently deposited sediment.

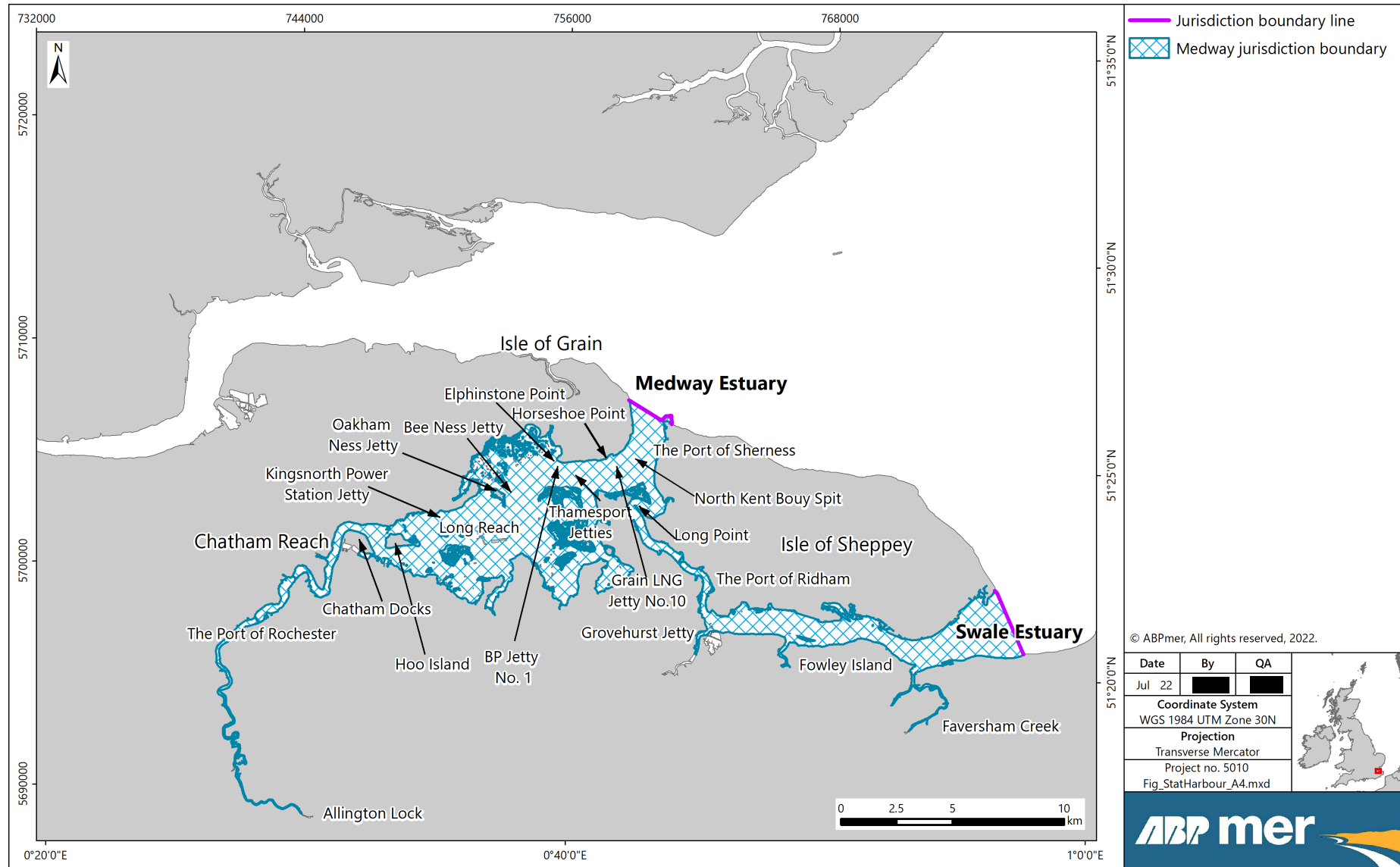


Figure 2.2 Statutory Harbour Authority area within the Medway

3 Coastal and Estuarine Processes and Morphology

3.1 General estuary form

The Medway Estuary is located on the north Kent coast and flows into the lower Thames Estuary at its mouth between the Isle of Grain and Isle of Sheppey. Beyond Chatham, the Medway broadens from a narrow river estuary to a 1 to 2 km wide meandering main channel, flanked by extensive tidal flats and saltmarshes which have a history of extensive reclamation; at its widest point, the estuary is approximately 8 km wide at high water. The estuary's marginal shoals are intersected by a number of major tidal creeks, providing small amounts of localised freshwater input. The Isle of Grain and the Isle of Sheppey which are islands of London Clay constrain the estuary at its mouth and are ringed by alluvial deposits and maintained by robust sea defences. This narrowing of the estuary mouth leads to a deep and stable main channel (Kirby, 2010).

The Swale has a channel length of approximately 18.4 km from its eastern mouth at Whitstable to the Kingsferry Bridge, and separates the Isle of Sheppey from the mainland of Kent and adjoins the Medway Estuary to the west. The Swale is defined by the Shoreline Management Plan (Halcrow, 2010) and Futurecoast as an estuary, but it is effectively a tidal channel with two mouths (Defra, 2002), and will therefore be referred to as The Swale. The intertidal area is predominantly mud, which grades to sand towards the mouth in the east. The Swale has been extensively reclaimed over time.

Table 3.1 summarises the key parameters for the Medway Estuary and The Swale, as taken from the Futurecoast study (Defra, 2002).

Table 3.1 Key parameters for the Medway Estuary and The Swale

Parameter	Medway Estuary	The Swale
Total area	7,560 hectares	3,283 hectares
Intertidal area	5,380 hectares	2,576 hectares
Marsh area	754 hectares	414 hectares
Shoreline	143.4 km	79.3 km
Channel length	40.9 km	18.4 km
Mean spring tidal range (Sheerness)	5.2 m	5.3 m
Mean river flow	11.7 m ³ /second	-
Maximum river flow	152.8 m ³ /second	-
Cross sectional area	22,495 m ²	9,918 m ²
Mouth width	1,430 m	4,900 m
Valley width	8,000 m	4,900 m

Source: Defra (2002)

3.2 Hydrodynamic regime

3.2.1 Tides

The Medway is a macro-tidal estuary, experiencing a spring tidal range of 5.2 m at Sheerness and increasing inland to 5.7 m at Rochester, before decreasing to 3.5 m at Allington Lock, the tidal limit (United Kingdom Hydrographic Office (UKHO), 2010). It has been suggested by International Estuarine

and Coastal Specialists Ltd (IECS, 1993) that the Medway is a resonant tidal estuary whereby tidal wave reflection sets up a standing wave tide whose amplitude is increased towards the edge of the main channel. Within the Medway, variations in the dimensions of the subtidal and intertidal areas result in differences in the propagation of the tidal wave along the estuary (ABPmer, 2007). At Sheerness, the tides are relatively symmetrical on neaps but exhibit very slight asymmetry on springs with longer ebb phase duration. Within the estuary, the hydrodynamic regime experiences a slight flood tide dominance, before reverting back to ebb dominance in the meandering channel from Chatham to the tidal limit. Tidal information for the Medway Estuary is summarised in Table 3.2.

Table 3.2 Summary of the tidal levels in the Medway Estuary

Tidal Level	Sheerness	
	m (CD)	m (ODN)
Highest Astronomical Tide	6.3	3.4
Mean High Water Springs	5.8	2.9
Mean High Water Neaps	4.7	1.8
Mean Sea Level	3.1	0.2
Mean Low Water Neaps	1.5	-1.4
Mean Low Water Springs	0.6	-2.3
Lowest Astronomical Tide	0.0	-2.9

CD – Chart Datum; ODN – Ordnance Datum Newlyn

Source: UKHO (2017)

The tides within The Swale are more complicated as a result of it being open to tidal influences at both ends. In general, the flood runs inwards from both mouths of The Swale and converges near to Fowley Island; at Grovehurst Jetty the spring tidal range is 5.3 m (UKHO, 2017). Approximately 5 minutes after high water at Sheerness, the tide east of Fowley Island turns in an easterly direction. At Sheerness at approximately high water +01:05 hours, the stream in the west of the channel from Long Point to the channel entrance changes direction to flow towards the Medway causing the flows to separate until slack water at low tide (IECS, 1993).

In the approach channel to the Medway Estuary, velocities reaching 0.6 to 0.8 m/s are experienced on the flood and ebb phases of a spring tide respectively. Within the Medway Estuary, the outer and upper estuary exhibit ebb dominance whilst the middle estuary is slightly flood dominated (ABPmer, 2007). The spring tidal velocities with the Medway Estuary are summarised in Table 3.3.

Table 3.3 Summary of spring tidal velocities in the Medway Estuary

Location	Spring Tide Velocities (m/s)	
	Flood	Ebb
Sheerness Harbour	0.40	0.90
Horseshoe Point (Tidal Diamond C)	1.44	1.82
Elphinstone Point (Tidal Diamond D)	0.86	1.47
Bee Ness Jetty	0.95	0.55
Oakham Ness Jetty	0.75	0.85
Kingsnorth Jetty	0.50	0.70
Chaltham Reach	0.40	0.60

Source: UKHO (2017)

Within The Swale, the peak ebb velocities are generally between 0.4 to 0.8 m/s, with the exception of Long Reach where velocities of up to 1.0 m/s can be reached. Typically, peak flood velocities along The Swale range between 0.6 to 1.0 m/s (IECS, 1993).

3.2.2 Waves

There is limited available information regarding the wave climate within the Medway Estuary or The Swale, though the combination of offshore banks and the constricted estuary mouths would suggest that limited wave energy propagates into the estuaries. As such, it is likely that any waves present in the water bodies are internally generated wind waves (ABPmer, 2007). Waves along the Essex coastline are predominantly from the north-northeast to northeast and have a significant swell component with a long fetch, thereby providing longer wave conditions in the Outer Thames Estuary (Motyka and Welsby, 1987).

3.3 Material type

The Medway predominantly comprises mud and muddy sand. The bottom of the main channel comprises mud, sand and broken shell, with occasional patches of gravel and shingle. The distribution of these various sediments indicates a tidally dominated system with the finer material found around the margins and within embayments, and coarser sands and gravels within higher energy environments, such as channels and associated sand banks (ABPmer, 2007). Particle Size Analysis (PSA) data indicate that the sediments along the Medway Approach Channel are mainly muddy sand to sand, with the mean grain size varying from approximately 0.10 to 0.14 mm (100 to 140 μ m).

3.4 Sediment transport pathways and budget

As mentioned in Section 3.2, the Medway experiences slight flood tidal dominance at its mouth which becomes less pronounced further up the estuary, before reverting to ebb dominance in the meandering channel from Chatham to the tidal limit. This indicates that the estuary is likely to be an importer of fine sediment from the Thames Estuary. However, available sediment data for the Medway Estuary indicates that the sediment sinks are greater than the sources, although this does not take into account a potential supply of marine sediment from the Thames Estuary, which may be significant. It would also be reasonable to assume that the inclusion of this sediment would lead to a balanced or source dominant sediment budget, further confirmed by the accretional behaviour of the subtidal channel and saltmarshes. The saltmarshes have been expanding since 1972 following a historical trend of erosion, with accretion largely due to saltmarsh regeneration through the expansion of cordgrass *Spartina* (ABPmer, 2008). Table 3.4 summarises the sediment budget data available for the Medway.

Table 3.4 Summary of Medway Estuary sediment budget

Dynamic Status	Element	Description	Rate of Sediment Load (tonnes/year)	Total (tonnes/year)
Sources	Rivers	Fluvial sediment supply	Unquantified	138,000 (not including marine sediment supply)
	Mudflat	Erosion	138,500	
	Marine source	Marine sediment supply	Unquantified - potentially 1,000,000 available	
Sinks	Saltmarsh	Accretion (horizontal)	24,384	230,873
	Saltmarsh	Accretion (vertical)	22,834	
	Intertidal	Accretion	34,155	
	Subtidal	Accretion	150,000	
Transfers	Water body	Suspended sediment	600,000	600,000

Source: ABPmer (2008)

The Swale is unusual in that it has two mouths with one situated to the southeast of the Isle of Sheppey and a second at the confluence with the Medway. ABPmer (2008) determined through tidal asymmetry analysis that the estuary experiences weak flood dominance at its confluence with the Thames Estuary, suggesting a potential for a net import of sediment. The central section of The Swale also indicated ebb dominance, suggesting an export of fine material along the central stretch of the estuary. Due to a lack of available data for The Swale, quantification of the sediment budget is difficult. However, The Swale is presently accreting both in the subtidal and intertidal areas which would indicate that the estuary is currently a net sink for sediment. Table 3.5 summarises the sediment budget data available for The Swale.

Table 3.5 Summary of The Swale sediment budget

Dynamic Status	Element	Description	Rate of Sediment Load (tonnes/year)	Total (tonnes/year)
Sources	Marine source	Marine sediment supply	Unquantified - potentially 1,000,000 available	Unknown
Sinks	Saltmarsh	Accretion	6,000	56,000
	Intertidal and subtidal	Accretion	50,000	

Source: ABPmer (2008)

3.5 Anthropogenic change

Other than historical dredging practices (discussed in Section 4.1), the main anthropogenic changes experienced within the Medway are related to the construction of sea defences. Almost all of the present shoreline of the Medway Estuary is protected by some form of flood defence, with most of these embankments in place by about 1840. However, since this time, many of the walls have been subsequently breached, with the enclosed areas reverting back to saltmarshes or intertidal flats. These breached walls provide protection for many of the areas they enclose, thus enhancing sedimentation rates (IECS, 1993). Kirby (1990) found rates of sedimentation were greater in the embankment sheltered areas, with accretion rates of up to 9.85 mm/year, as opposed to an average of 2.61 mm/year in unprotected areas.

The modern form of the Medway is substantially influenced by the surrounding geology that limits scope for adjustment in response to changing conditions. Nevertheless, there have been a range of changes by previous generations and more recently. The sedimentation patterns within the Medway over the past century have been significantly affected by a combination of natural changes such as sea level rise, and anthropogenic activities. Most of the anthropogenic changes have taken place since the early-mid 1800s and largely involve dredging and engineering works.

Published in 2010, the Shoreline Management Plan (SMP) which covers the Medway (Halcrow, 2010) acknowledges the anthropogenic influences on the industrialised, yet heavily designated, estuary, with extensive hold the line (HTL) and managed realignment (MR) plans (Table 3.6). The estuary can be segmented into five distinct areas, as follows:

- Medway Estuary Mouth;
- Northern Medway Banks;
- Southern Medway Banks;
- River Medway; and
- The Swale.

Table 3.6 Shoreline management policies for the Medway

Policy No.	Policy Unit	Policy Plan		
		2025	2055	2105
Medway Estuary Mouth				
E4 01	Grain Tower to Colemouth Creek	HTL	HTL	HTL
E4 29	Rushenden to Sheerness	HTL	HTL	HTL
E4 30a	Medway Islands	NAI	NAI	NAI
E4 30b	Medway Islands	NAI	NAI	NAI
Northern Medway Bank				
E4 02	Colemouth Creek to Bee Ness Jetty	MR/HTL	MR/HTL	MR/HTL
E4 03	Kingsworth Power Station	HTL	HTL	HTL
E4 04	Power Station to Cockham Wood	MR/HTL	MR/HTL	MR/HTL
E4 05	Cockham Wood	NAI	NAI	NAI
River Medway				
E4 06	Lower Upnor to Medway Bridge	HTL	HTL	HTL
E4 07	Medway Bridge to North Halling	HTL	HTL	HTL
E4 08	North Halling to Snodland (Pt. 1)	MR/HTL	MR/HTL	MR/HTL
	North Halling to Snodland (Pt. 2)	MR/HTL	MR/HTL	MR/HTL
E4 09	Snodland to Allington Lock (Pt. 1)	HTL	MR/HTL	MR/HTL
	Snodland to Allington Lock (Pt. 2)	HTL	MR/HTL	MR/HTL
E4 10	Allington Lock to north Wouldham (Pt. 1)	HTL	MR/HTL	MR/HTL
	Allington Lock to north Wouldham (Pt. 2)	HTL	MR/HTL	MR/HTL
E4 11	Wouldham Marshes	MR	MR	MR
E4 12	Medway Bridge to west St Mary's Island	HTL	HTL	HTL
E4 13	St Mary's Island to the Strand	HTL	HTL	HTL
Southern Medway Bank				
E4 14	The Strand to west Montey Hill	HTL	MR	MR
E4 15	Motney Hill to Ham Green	MR/HTL	MR/HTL	MR/HTL
E4 16	Ham Green to east of Upchurch	NAI	NAI	NAI
E4 17	East of Upchurch to East Lower Halstow	MR/HTL	MR/HTL	MR/HTL
E4 18	Barksore Marshes	MR	NAI	NAI
E4 19	Funton to Raspberry Hill	NAI	NAI	NAI
E4 20	Chetney Marshes	MR	MR	MR
The Swale				
E4 21	Kingsferry Bridge to Milton Creek	HTL	HTL	HTL
E4 22	Milton Creek	HTL	HTL	HTL
E4 23	Murston Pits to Faversham (Pt. 1)	HTL	MR/HTL	MR/HTL
	Murston Pits to Faversham (Pt. 2)	HTL	MR/HTL	MR/HTL
	Murston Pits to Faversham (Pt. 3)	HTL	MR/HTL	MR/HTL
E4 24	Faversham to Nagden	HTL	HTL	HTL
E4 25	Shell Ness to Sayes Court	MR	MR	MR
E4 26	Sayes Court to north Elmey Island (Pt. 1)	MR	MR	MR
	Sayes Court to north Elmey Island (Pt. 2)	MR	MR	MR
E4 27	North Elmey Island to Kingsferry Bridge	HTL	MR	MR
E4 28	Kingsferry Bridge to Rushenden	HTL	MR	MR
HTL - Hold The Line; MR - Managed Realignment; NAI - No Active Intervention.				

Source: Halcrow (2010)

The Medway Mouth is split 50/50 between HTL and no active intervention (NAI), whilst the Northern Medway Bank is mostly MR with some aspects of HTL and one area with NAI. Upstream, the River

Medway is dominated by HTL areas up to 2025, thereafter, four more sites are designated as MR/HTL (managed realignment with localised hold the line). The Southern Medway Bank also sees fluctuating designations post-2025, with one area transitioning from HTL to MR, and another from MR to NAI. Finally, The Swale areas are dominated by HTL and MR designations, with three areas transitioning from HTL to MR/HTL in 2055.

3.5.1 Capital dredging

Capital dredging within the estuary has been confined to relatively small areas such as berth pockets and their approaches. More significant campaigns have mainly involved the approaches to the Port of Sheerness. The first post-World War Two measures took place between 2.4 and 6.4 km off Garrison Point where depths were increased by about 0.2 m in 1952 (IECS, 1993), followed by further relatively small dredging campaigns the 1960s and 1970s that may have been a combination of maintenance and capital dredging. A larger campaign between 1989 and 1991 resulted in deepening of the approach channel to the Medway from -8.5 m CD to -11 m CD and involved the removal of approximately 3 million m³ of coarse gravelly sediments. The Approach channel was deepened further in 2001 to the current depth of -12.5 m CD this dredge involved the removal of approximately 0.8 million m³ of material. Deepening within the Medway Estuary and berths was undertaken with WID, the dredging in the approach channel being undertaken by trailer suction hopper dredging (TSHD).

3.5.2 Maintenance dredging

Maintenance dredging practices in the Medway have changed in the past 20 years. Traditional disposal on land (at Rushenden and Hoo Island) and offshore, permanently removed sediment from the system. However, there has been no disposal to land-based sites in recent years. Today, WID and other forms of agitation dredging are the main techniques used to maintain berthing pockets, but with the continued use of TSHD at the Medway Approach Channel (although WID has also been used in this area). These forms of dredging rely on the tides to disperse accumulated sediment. They effectively keep sediment within the system and lead to localised elevation of suspended sediments that are then carried to other parts of the estuary where they may settle.

3.5.3 Sea walls

During the Holocene transgression, the original tidal basin filled with sediment and formed extensive seasonally inundated saltmarshes that were substantially removed from tidal influences by construction of sea walls. Estimates of the extent of losses to sea walls do not appear to have been produced. Some additional 'reclamations' have also taken place for port infrastructure, such as at Lappel Bank where 0.22 km² of mudflat was lost in 1996. In addition, port infrastructure at Sheerness and on the Isle of Grain have effectively reinforced the already inerodible geology. Many of the sea walls remain in place and have been substantially hardened, but some, such as Burntwick Island, breached and have not been maintained. The impact of sea wall construction in an accreting system may not have been significant but, once erosion commenced, the collapse of sea walls would have exacerbated increases in the tidal prism as discussed earlier. These breached walls provide protection against wave action for many of the areas they enclose, thus enhancing sedimentation rates (IECS, 1993).

3.5.4 Clay extraction

Clay extraction for brick making is considered by IECS (1993) to be the critical trigger for saltmarsh erosion that led to the current form of the Medway Estuary, having commenced in 1840 (Kirby, 1994). The role of clay extraction in precipitating erosion is largely based on circumstantial evidence and analysis of 19th Century charts. The evidence is regarded by IECS (1993) as convincing, but with an important caveat that its effects cannot be distinguished from the effects of relative sea level rise.

4 Dredging Information

The SHA, PoSL, which forms part of the Peel Ports Group and trading as Peel Ports Medway, has a statutory duty to provide and maintain advertised depths of water in the navigable channels within the estuaries and their approaches, and alongside jetties and berths. This is achieved through regular, carefully planned maintenance dredge campaigns, and additional capital dredge campaigns when required.

The following sections describe historic and current known dredge activities carried out by the Harbour Authority. Details are provided on the dredge quantities, dredge techniques and the status of the dredge disposal sites (i.e. open, closed and disused). In addition to dredging carried out by the Harbour Authority, it is known that numerous other organisations carry out or have carried out maintenance dredging within the Medway. Whilst the total quantity dredged by third parties is small in comparison to that carried out by the Harbour Authority, it is nonetheless important that it is properly considered.

4.1 Historic dredging

Dredging within the Medway probably started in *circa* 1840, with the intensive extraction of clay for the brick-making and cement industries until 1905, although limited clay-digging continued until 1963 (IECS, 1993). Large areas of marsh were removed during this period, enhancing the natural recession of the marshes which began around 1700 and was caused by an unascertained but natural change in the regime from accretion-dominated to an erosive trend (Kirby, 1994).

The first reported case of capital dredging within the Medway Approach Channel took place in 1952, where the channel depth was increased by about 0.2 m (IECS, 1993). Following this, the channel experienced siltation by 0.04 to 0.11 m/year in the stretch between 6.4 and 4.4 km off Garrison Point (HR Wallingford, 1975). This was later followed by additional dredging campaigns in 1957 and 1968, which resulted in the short-term deepening of the approach channel, again with siltation taking place in the periods following the campaigns.

During 1972, dredging took place over the stretch 2.4 to 7.4 km off Garrison Point, increasing water depths up to 0.5 m. Contrary to the previous dredging campaigns, the depth continued to increase naturally following the campaign at rates of 0.06 to 0.1 m/year (IECS, 1993; HR Wallingford, 1975). Due to the self-maintaining nature of the Medway Approach Channel following the 1972 capital dredge campaign, maintenance dredging of the approach channel became unnecessary in the short-term.

Port records from the period 1983 to 1999 show a regular maintenance dredge commitment for the dock system at Sheerness and Chatham. Full details of the techniques used during this period are not available; however, given the available technology at the time, it is likely that a combination of grab dredgers and bed levelling was used. Small TSHD dredgers have been utilised in the approaches to the Chatham Locks, with the material being pumped ashore onto the licensed land-based disposal site on Hoo Island.

4.2 Current dredge practice

4.2.1 Overview

This report covers maintenance dredging carried out by the Harbour Authority, who are permitted to dredge under their Harbour Act (see Section 2.5) and may dispose of material at sea through relevant Marine Licences issued by the MMO. Figure 4.1 to Figure 4.3 depict maintenance dredge locations within the Medway Estuary, the Medway approaches and The Swale, with Figure 4.9 showing disposal location used for dredge material.

Dredging across the study area is undertaken by three principal methods:

- Trailing Suction Hopper Dredging (TSHD) predominantly along the Medway Approach Channel;
- Water Injection Dredging (WID) within the Medway, as well as the Medway Approach Channel in recent years; and
- Plough dredging when smaller more manoeuvrable dredging vessels are required.

Typical dredge campaigns will vary in length from a single day to three weeks, depending on the area requiring dredging and the dredging method used. A description of the various dredging techniques can be found in the subsequent section, with further details of the individual dredge areas, volumes and methods detailed in Section 4.2.3.

4.2.2 Dredging methods

Trailer Suction Hopper Dredging (TSHD)

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

Water Injection Dredging (WID)

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

WID in the Medway makes best use of the tidal state to retain material within the estuarine system; for example, in The Swale, WID takes place approximately an hour before to three hours after high tide. Within the Medway, WID takes place either side of high water, more so on the flood, to help ensure the sediment is kept within the system. WID is not suitable for all locations and bed materials, and consequently it is used selectively within the Medway based on expert advice.

Grab Hopper Dredging (GHD)

Grab Hopper Dredging (GHD) involves a vessel which has one or more dredging cranes mounted around a receiving hopper. The cranes are fitted with grabs that pick-up material from the seabed and discharge the material into the hopper. Vessels are usually held in position while working by anchors and moorings, but some vessels few are fitted with spuds, or piles, which can be dropped onto the seabed whilst the dredger is operating. Once loaded, the vessel moves to a disposal site to discharge material, which is normally achieved through direct placement at the site by direct bottom dumping.

Plough dredging

Plough dredging utilises a tug equipped with a plough unit. The plough is lowered to a predetermined depth and is used to drag sediment along the seabed. Ploughing is typically used in confined areas due to the small size and manoeuvrability of the vessel, moving material from inaccessible areas such as dock entrances, corners or complicated areas of bathymetry to areas accessible by TSHD or GHD, or is used for bed-levelling purposes only. Plough dredging should not typically lead to significant re-suspension of sediment, but if the sediment ploughed is soft it may be sufficiently disturbed to raise smaller sediment fractions into suspension.

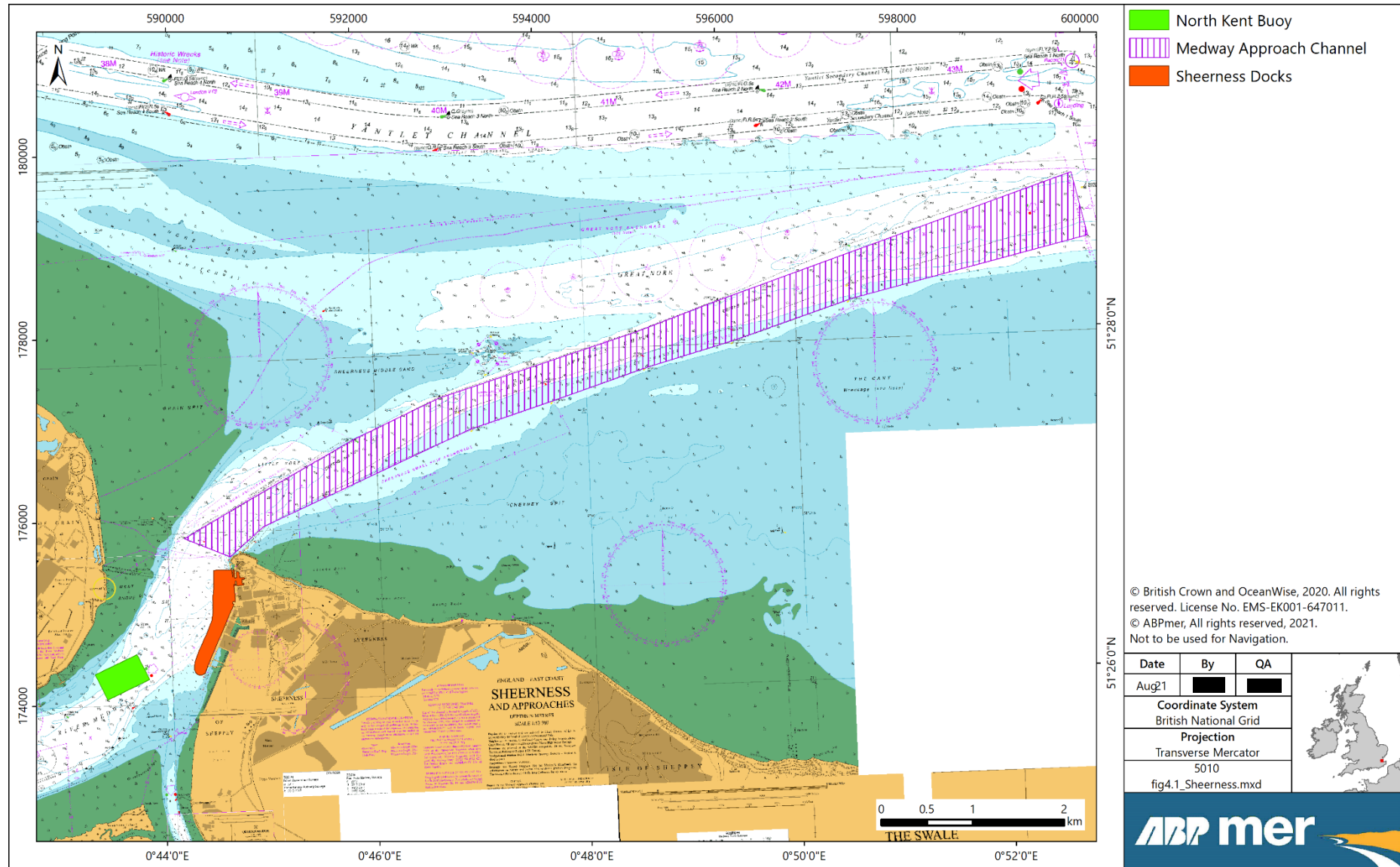


Figure 4.1 Dredge areas for the Medway Approach Channel, North Kent Navigation Buoy and Sheerness Docks

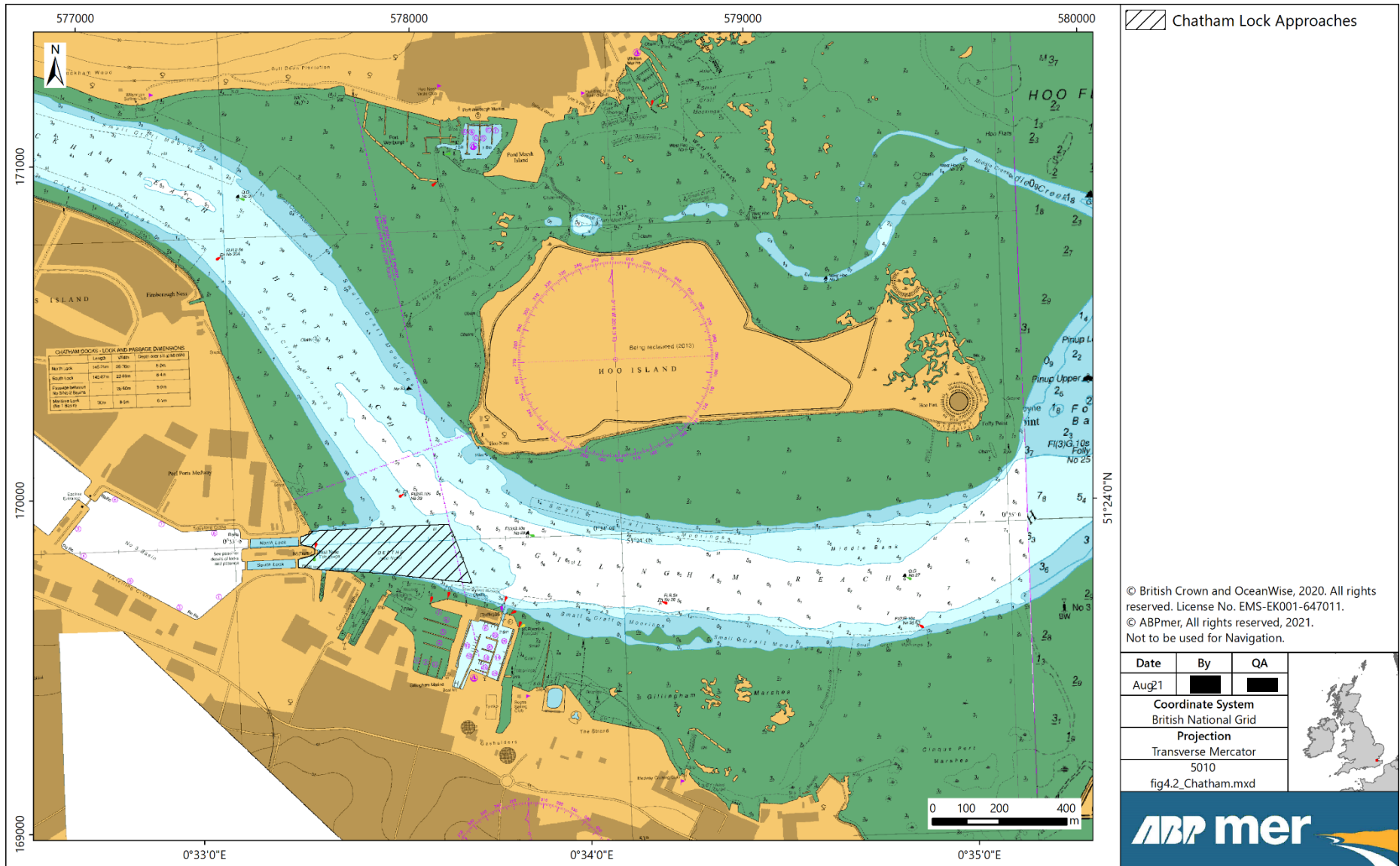


Figure 4.2 Dredge area for Chatham Lock Approaches

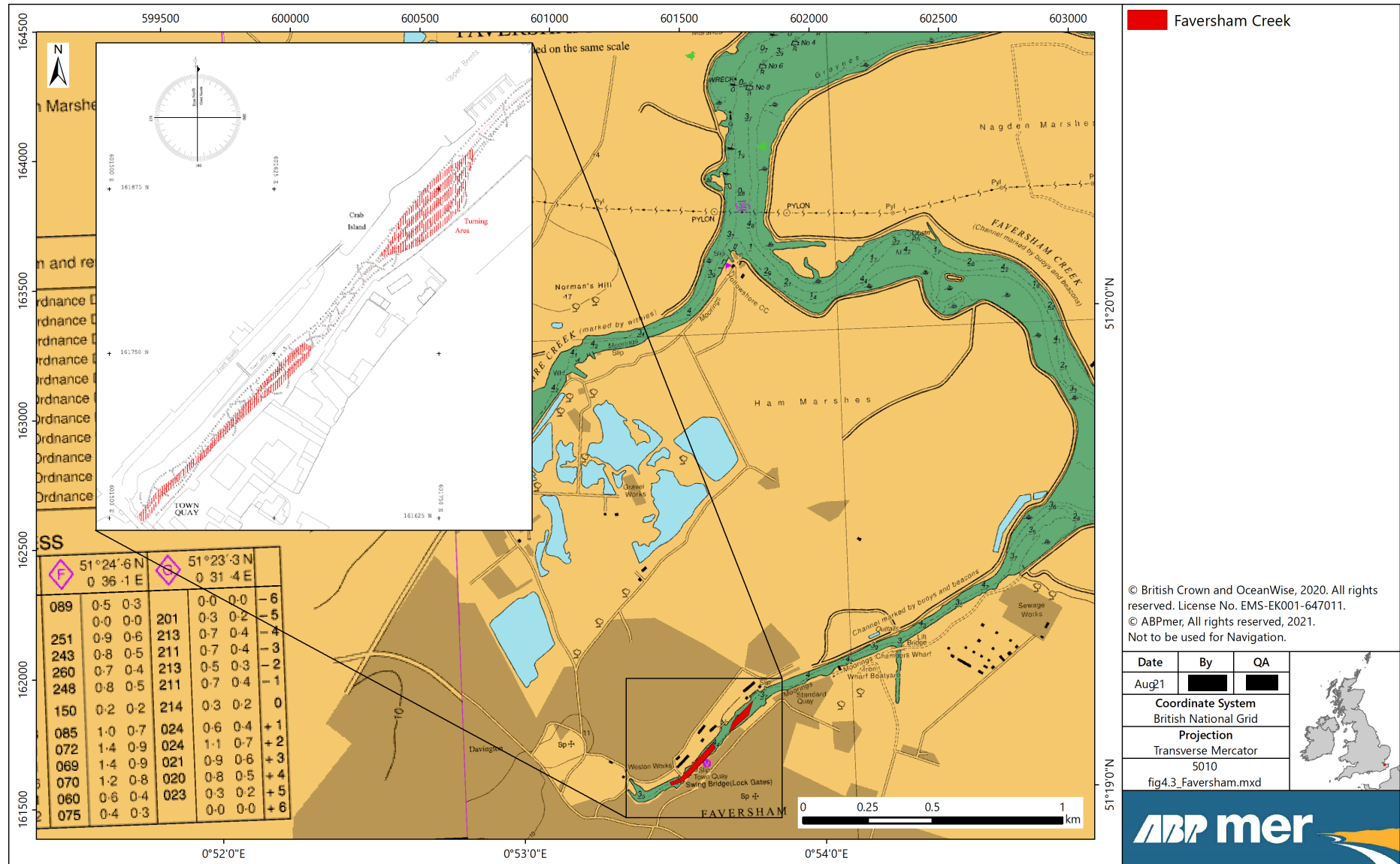


Figure 4.3 Dredge areas for Faversham Creek

4.2.3 Dredge volumes by Peel Ports Medway

The total volume of maintenance dredging undertaken by Peel Ports Medway within the study area between 2002 and 2020, reported as part of previous MDP Baseline Documents and this update, ranges from 500 to 185,092 m³ per year (Table 4.1 and Figure 4.4). The dredge areas maintained by Peel Ports Medway are discussed below, specifically:

- Medway Approach Channel;
- Sheerness Docks;
- North Kent Buoy Spit;
- Chatham Lock Approaches; and
- Faversham Creek.

This is followed by details of third party dredging within the study area in Section 4.2.4.

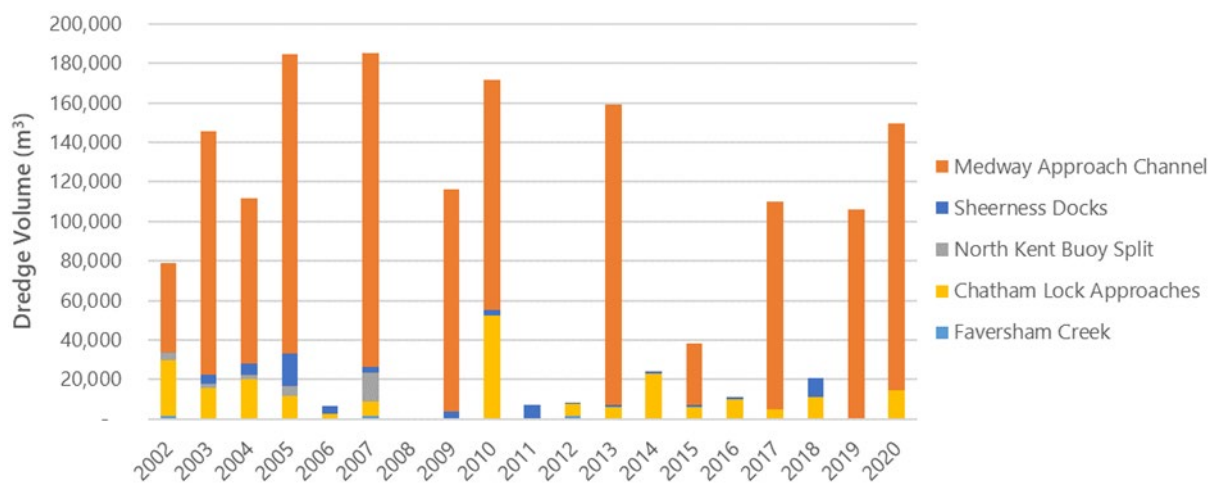


Figure 4.4 Dredge volumes for areas maintained by Peel Ports Medway

Medway Approach Channel

Prior to 1990, the maintained depth of the Medway Approach Channel was -8.5 m CD, with a capital dredge in 1989 and 1990 increasing the depth to -11.0 m CD. Approximately 3 million m³ of mainly gravel-sized sediment was removed during the capital dredge and deposited on the Lappel-Bank reclamation site (IECS, 1993). A further 163,000 and 162,000 hopper tonnes of material was deposited at the South Falls (TH070) and Medway Approach Channel (TH101) disposal sites, respectively. Maintenance dredging then took place at various times by TSHD until 2001 when a second capital dredge campaign increased the depth to -12.5 m CD, with a total of 544,342 tonnes of material deposited at the South Falls and Garrison Point (TH103) disposal sites. The dredged material deposited at both the Medway Approach Channel and Garrison Point disposal sites was primarily clay.

Once the 2001 capital dredge had been completed, maintenance dredging was conducted using WID. However, WID (undertaken in 2002 and 2003) was originally deemed to be unsuccessful due to rapid infilling. In January 2004, a disposal licence was applied for and granted, with maintenance dredging subsequently carried out by TSHD to an advertised depth of -12.5 m CD, with disposal at the South Falls and Inner Gabbard (TH052) disposal sites. Maintenance dredge campaigns for the Medway Approach Channel were organised on a *circa* 18-month cycle, and typically no longer than 2 to 3 weeks in duration.

Table 4.1 Dredge volumes for areas maintained by Peel Ports Medway

Dredge Area	Dredge Method	Dredge Volume (m ³)				
		2002	2003	2004	2005	2006
Medway Approach Channel	TSHD	0	0	83,525	151,960	0
	WID	45,100	123,000	0	0	0
Sheerness Docks	WID	0	4,983	5,523	16,349	4,000
North Kent Buoy Spit	TSHD	0	0	0	0	0
	WID	4,335	2,097	2,356	4,949	0
Chatham Lock Approaches	WID	28,083	15,538	20,230	11,597	2,374
Faversham Creek	WID	1,500	0	0	0	0
Total	-	79,018	145,618	111,634	184,855	6,374
Dredge Area	Dredge Method	Dredge Volume (m ³)				
		2007	2008	2009	2010	2011
Medway Approach Channel	TSHD	158,725	0	112,286	116,236	0
	WID	0	0	0	0	0
Sheerness Docks	WID	3,000	0	4,000	3,010	7,220
North Kent Buoy Spit	TSHD	14,644	0	0	0	0
	WID	0	0	0	0	0
Chatham Lock Approaches	WID	7,223	0	0	52,276	0
Faversham Creek	WID	1,500	500	0	0	0
Total	-	185,092	500	116,286	171,522	7,220
Dredge Area	Dredge Method	Dredge Volume (m ³)				
		2012	2013	2014	2015	2016
Medway Approach Channel	TSHD	0	152,096	0	31,167	0
	WID	0	0	0	0	0
Sheerness Docks	WID	1,000	1,000	1,200	1,000	1,000
North Kent Buoy Spit	TSHD	0	0	0	0	0
	WID	0	0	0	0	0
Chatham Lock Approaches	WID	6,000	6,000	23,000	6,000	10,000
Faversham Creek	WID	1,500	0	0	0	0
Total	-	8,500	159,096	24,200	38,167	11,000
Dredge Area	Dredge Method	Dredge Volume (m ³)				
		2017	2018	2019	2020	
Medway Approach Channel	TSHD	105,000	0	86,864	135,349	
	WID	0	0	19,363	0	
Sheerness Docks	WID	0	10,000	0	0	
North Kent Buoy Spit	TSHD	0	0	0	0	
	WID	0	0	0	0	
Chatham Lock Approaches	WID	5,000	11,000	0	14,500	
Faversham Creek	WID	0	0	0	0	
Total	-	110,000	21,000	106,227	149,849	

Note: TSHD – Trailing Suction Hopper Dredging; WID – Water Injection Dredging.
Values in orange – estimate for WID dredge volume provided by Peel Ports Medway.
Value in green – combination of plough dredging (1,159 m³) and WID (1,851 m³).
Value in blue – combination of plough dredging (24,635 m³) and TSHD (27,641 m³).

In 2018, PoSL were granted a ten-year Marine Licence (L/2018/00185) to continue using TSHD within the Medway Approach Channel, with disposal permitted to the Inner Gabbard and South Falls licensed marine disposal sites. Around this time, considerations and assessments of the use of WID within the Medway Approach Channel were presented in a separate report (Brooke, 2017). Subsequently, PoSL were granted Marine Licence L/2019/00092 in 2019 to utilise WID as part of the maintenance dredging programme. In September 2019, WID was used within the Medway Approach Channel, removing 19,363 m³ of material, although the area continues to be dredged primarily using TSHD.

Annual dredge volumes for the Medway Approach Channel using TSHD and/or WID over the period 2002 to 2020 inclusive are provided in Figure 4.5.

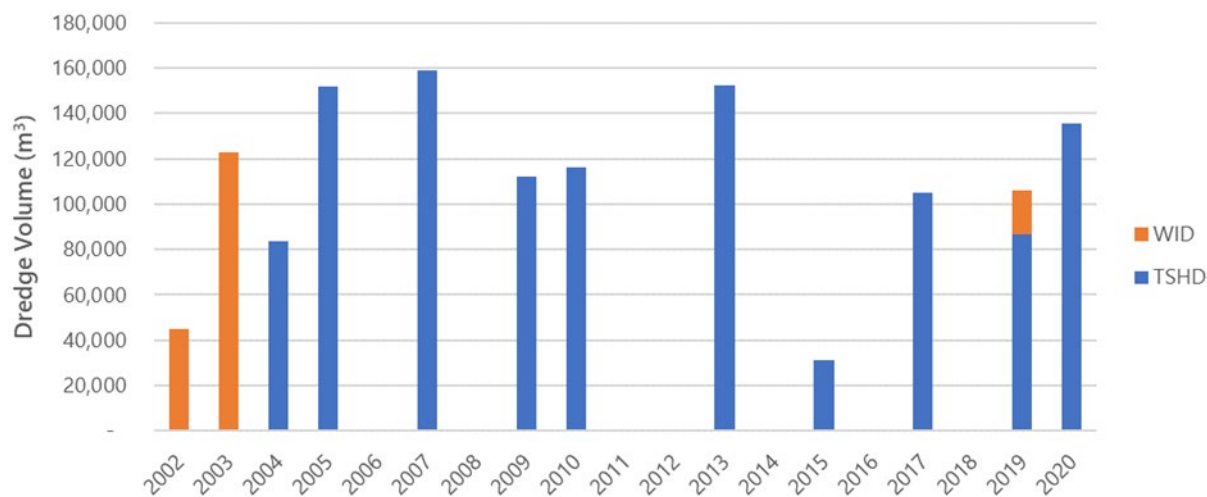


Figure 4.5 Dredge volumes for the Medway Approach Channel

Sheerness Docks

Maintenance dredging to remove silt which accumulates close to the jetty faces at Sheerness Docks takes place once or twice a year, with each campaign typically lasting one day. Since 2002, annual dredge volumes for Sheerness Docks have typically been below 10,000 m³ (see Table 4.1), except for campaigns in 2005 (16,349 m³) and 2018 (10,000 m³). The berths at Sheerness are maintained to the following advertised depths by plough dredging and WID methods:

- Berth 1: -12.2 m CD
- Berths 2, 3, 6 and 7: -11.0 m CD
- Berth 4: -9.0 m CD
- Berth 5: -5.5 m CD
- Berth 10: -9.0 m CD

Annual dredge volumes for the Sheerness Docks using WID over the period 2002 to 2020 inclusive are provided in Figure 4.6.

North Kent Buoy Spit

An area around the North Kent Buoy Spit, to the west of Sheerness Docks, required maintenance dredging in the early 2000s. This was initially undertaken using WID (less than 5,000 m³). However, the most recent maintenance dredge was completed in 2007 using TSHD (14,644 m³), with disposal at the South Falls (TH070) licensed marine disposal site. There are no further dredging records for the North Kent Buoy Spit since this campaign (see Table 4.1).

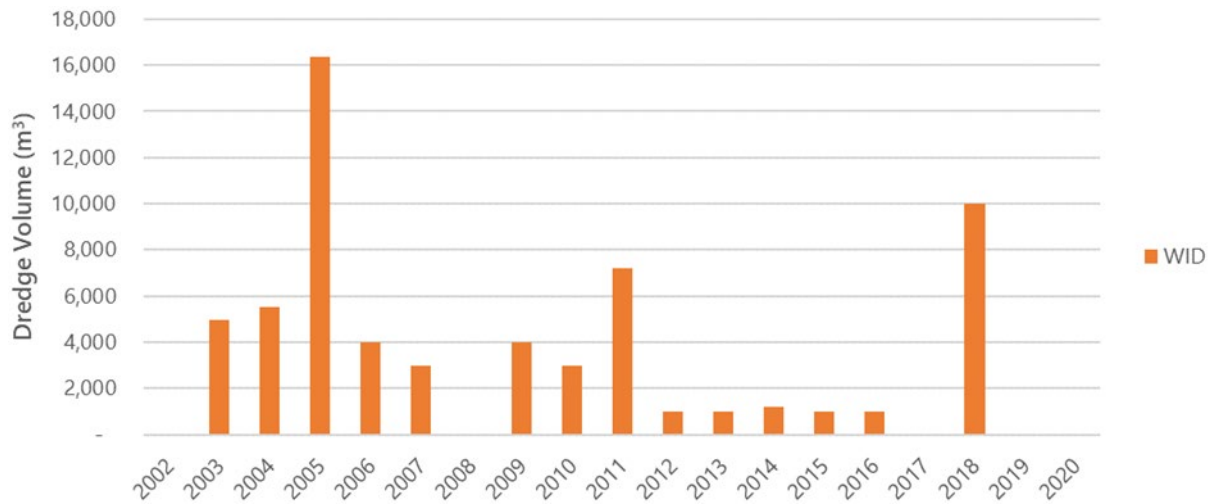


Figure 4.6 Dredge volumes for Sheerness Docks

Chatham Lock Approaches

Chatham Lock Approaches are routinely maintained by WID methods, generally once a year with each campaign lasting no more than a week. The north and south approaches to the lock are maintained at the advertised depths of -4.5 m CD and -4.3 m CD, respectively.

Historically, approximately every 10 years, the area is dredged by a small TSHD which is usually a 5-day campaign, with the dredge arisings taken to the Hoo Island licensed land-based disposal site. There is no requirement to apply for a marine licence for dredged materials removed by TSHD under Harbour Authority powers which are then subsequently taken to land, as no deposit is made within the sea. Material placed on land is controlled under the Environment Agency Environmental Permitting arrangements. However, it should be noted that TSHD of the approaches with disposal to Hoo Island has only been carried out once since 2002; this occurred in 2010 (52,276 m³).

Annual dredge volumes for the Chatham Lock Approaches using TSHD (supported by plough dredging) or WID over the period 2002 to 2020 inclusive are provided in Figure 4.7.

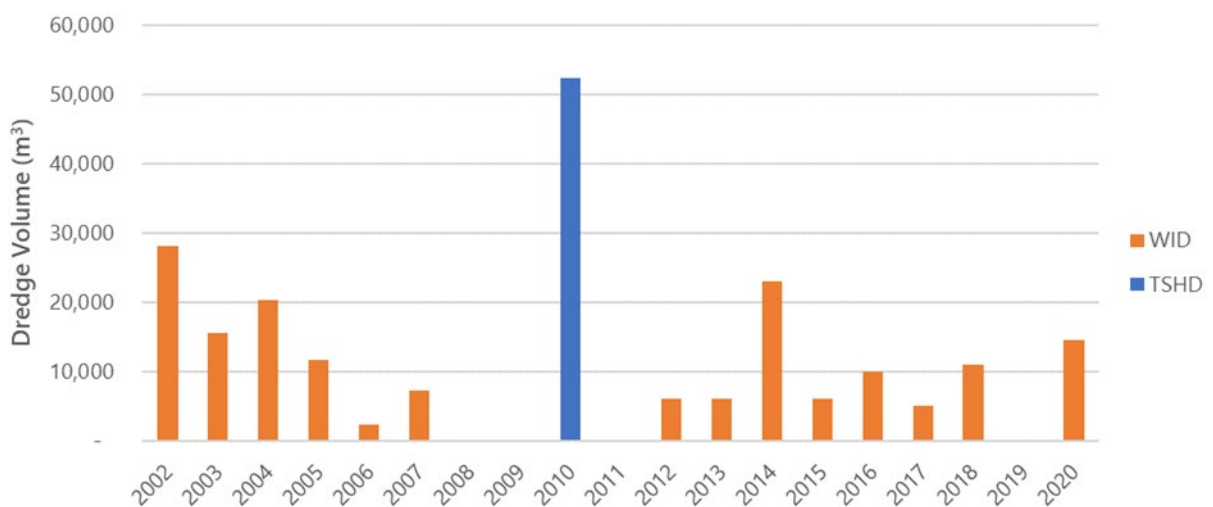


Figure 4.7 Dredge volumes for the Chatham Lock Approaches

Faversham Creek

Historically, no dredging was carried out in Faversham Creek due to the constant movement of vessels along the creek keeping the channel useable for these vessels. However, the main navigation channel immediately downstream of the swing bridge in Faversham was kept clear by means of sluicing, whereby the gates at the bridge are closed at high water, trapping water in the Upper Pen. When the tide has receded, the gates are opened to clear recent deposits of silt, to down-stream locations, predominantly the wider part of the creek known as the 'Turning Area'.

Following a decline in regular vessel traffic into Faversham Creek, the profile of the creek changed, and Peel Ports Medway carried out limited maintenance dredging in specific areas to keep the fairway navigable. However, the most recent WID campaign was completed in 2012 amounting to approximately 1,500 m³ in total.

4.2.4 Third party dredging

The Medway hosts numerous docks, jetties, marinas, pontoons, anchorages and slipways which are used by a range of commercial and recreational estuary users. These smaller port and harbour facilities require regular maintenance dredging to remove recently deposited material, and to ensure the safety of navigation and berthing. Whilst Peel Ports Medway has a responsibility to maintain the main navigational fairways and its own berths, the maintenance dredging of non-Harbour Authority berths and approaches is the responsibility of third party organisations, referred to in this text as 'third party dredging'. This section details the activities at third party dredging locations in response to Peel Ports Medway's request for information for inclusion within this updated Baseline Document, summarised in Table 4.2 (2002 to 2011) and Table 4.3 (2012 to 2020). It should be noted that third party dredge data reported from 2017 in the previous Baseline Document (MarineSpace Limited et al. 2018) was incomplete due to the timing of the report; however, these figures have been corrected as part of this update.

Total annual dredge volumes for third parties between 2002 and 2020 (inclusive) range from 4,449 to 126,475 m³, averaging approximately 43,849 m³ per year. The majority of third party dredging is undertaken within the Medway, both in terms of number of dredge areas and dredge volume (see Figure 4.8). The vast majority of dredging is dredged using WID, with periodic use of TSHD for a small number of significant dredges (some of which would be considered a capital project). In providing a worst-case total annual volume for third party maintenance dredging to be used to inform the Appropriate Assessment for the Medway, a value of 80,000 m³ is considered a proportionate and realistic estimate. This recognises that the maximum total volume reported between 2002 and 2020 (i.e. 126,475 m³ in 2018) was largely due to maintenance dredging at London Thamesport following a temporary lapse in the licence required to undertake the works. Conversely, use of the mean over the reporting period would underestimate the potential dredging operations by third parties across the Medway.

Table 4.2 Total third party dredge volumes within the Medway (2002–2011)

Licensee	Dredging Method	Dredge Volume (m ³)									
		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Isle of Grain BP	WID	1,272	1,183	585	1,941	1,005	7,750	14,897	19,371	14,562	20,282
Grain LNG	WID	0	0	0	779	443	213	856	3,839	2,330	7,299
London Thamesport	WID	3,000	15,000	18,000	9,000	24,000	24,000	15,000	18,000	18,000	24,000
Kingsnorth Power Station (Intake Channel)	Backhoe	-	0	0	0	0	15,350	20,075	0	0	5,723
Shoregate Wharf Sailing Club	WID	150	0	0	0	0	30	0	0	0	0
Stargate Marine	WID	0	0	0	1,500	1,500	1,500	1,500	1,500	1,500	1,500
Whitton Marine Ltd	WID	-	-	-	1,500	1,500	1,500	1,500	1,500	1,500	0
J C Marine Ltd	WID	-	12,000	12,000	12,000	12,000	12,000	12,000	13,000	13,000	30,000
Hoo Ness Yacht Club	By hand	65	65	66	66	66	68	78	80	80	80
Residential Marine Ltd (Hoo Marina)	WID	50	50	50	50	50	50	2,550	50	100	3,650
Residential Marine Ltd (Port Werburgh)	WID	-	-	-	-	-	-	-	-	-	-
Medway Sailing Club	WID	0	100	0	0	100	0	100	0	0	100
Medway Water Sports Centre	WID	0	150	0	0	150	0	0	150	0	200
Gillingham Marina	WID	20	20	20	20	20	20	20	20	8,195	8,195
Gillingham Pier	WID	-	-	-	-	-	10,000	0	0	0	0
Medway Yacht Club	WID	440	440	440	440	440	440	790	440	440	440
Marina Developments Ltd	WID	-	-	-	-	3,200	0	0	0	2,000	0
HM Forces	By hand	16.5	16.5	16.5	16.5	16.5	16.5	16.5	15	15	15
Turks Boatyard Slipway	WID	-	-	-	-	-	20	20	20	20	20
Rochester Cruising Club	WID	100	100	100	100	100	100	100	100	100	100
Pelican Cruising Club	Air bubbler	3	3	3	3	3	78	3	3	3	3
Strood Yacht Club	WID	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Beacon Boatyard	WID	60	150	30	600	100	2,000	50	120	200	3,200
Cuxton Marina Ltd	WID	355	5	355	5	5	256	6	6	6	6
Elmhaven Marina Ltd.	WID	-	-	-	-	-	-	-	-	-	-

Licensee	Dredging Method	Dredge Volume (m ³)									
		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Grain LNG Jetty 10	WID	-	-	-	-	-	-	-	-	-	-
Grain LNG Jetty 8	WID	-	-	-	-	-	-	-	-	-	-
Wilsonian Sailing Club	WID	-	-	-	-	-	-	-	-	-	-
Scotline Terminal	WID	-	-	-	-	-	-	-	-	-	-
Medway Estuary Total		6,532	30,283	32,666	29,021	45,699	76,392	70,562	59,214	63,051	105,813
Ridham Sea Terminals Ltd	WID	-	-	1,212	0	0	0	6,000	6,000	6,000	-
Swale Marina Services Ltd	WID	500	500	500	500	500	500	500	500	500	500
Youngboats Ltd	WID	0	250	100	0	0	0	0	0	0	0
Queenborough Harbour	WID	-	-	-	-	-	-	-	-	-	-
Quayside Properties Ltd	WID	1,000	1,000	1,000	1,000	1,000	1,000	1,000	500	500	1,000
The Swale Total		1,500	1,750	2,812	1,500	1,500	1,500	7,500	7,000	7,000	1,500
Total		8,032	32,033	35,478	30,521	47,199	77,892	78,062	66,214	70,051	107,313

Table 4.3 Total third party dredge volumes within the Medway (2012–2020)

Licensee	Dredging Method	Dredge Volume (m ³)								
		2012	2013	2014	2015	2016	2017	2018	2019	2020
Isle of Grain BP	WID	0	21,300	17,100	0	0	9,228	19,533	3,950	1,975
Grain LNG	WID	6,060	943	2,552	6,898	826	0	12,113	0	4,184
London Thamesport	WID	0	0	0	0	0	0	89,330	0	0
Kingsnorth Power Station (Intake Channel)	Backhoe	-	-	-	-	-	-	-	-	-
Shoregate Wharf Sailing Club	WID	-	-	-	-	-	-	-	-	-
Stargate Marine	WID	-	-	-	-	0	0	0	0	0
Whitton Marine Ltd	WID	-	-	-	-	-	-	-	-	-
J C Marine Ltd	WID	-	-	-	-	-	-	-	-	-
Hoo Ness Yacht Club	By hand	-	-	-	-	-	-	-	-	-
Residential Marine Ltd (Hoo Marina)	WID	900	900	900	900	900	-	-	-	-
Residential Marine Ltd (Port Werburgh)	WID	900	900	900	900	900	0	0	0	0
Medway Sailing Club	WID	-	-	-	-	-	-	-	-	-
Medway Water Sports Centre	WID	-	-	-	-	-	-	-	-	-
Gillingham Marina	WID	20	0	0	0	0	-	-	-	-
Gillingham Pier	WID	0	0	0	0	0	-	-	-	-
Medway Yacht Club	WID	100	100	100	100	100	100	-	-	-
Marina Developments Ltd	WID	0	0	0	500	0	0	-	-	-
HM Forces	By hand	-	-	-	-	-	-	-	-	-
Turks Boatyard Slipway	WID	-	-	-	-	-	-	-	-	-
Rochester Cruising Club	WID	0	0	0	0	0	0	-	-	-
Pelican Cruising Club	Air bubbler	-	-	-	-	-	-	-	-	-
Strood Yacht Club	WID	300	0	0	0	0	0	-	-	-
Beacon Boatyard	WID	100	190	100	0	0	0	-	-	-
Cuxton Marina Ltd	WID	0	0	0	0	0	0	-	-	-
Elmhaven Marina Ltd.	WID	0	0	450	0	0	0	-	-	-
Grain LNG Jetty 10	WID	207	93	3,558	342	-	-	-	-	-

Licensee	Dredging Method	Dredge Volume (m ³)								
		2012	2013	2014	2015	2016	2017	2018	2019	2020
Grain LNG Jetty 8	WID	736	2,459	3,340	484	-	-	-	-	-
Wilsonian Sailing Club	WID	0	0	0	0	0	0	-	-	-
Scotline Terminal	WID	0	0	0	0	0	3,500	-	-	-
Medway Estuary Total		9,323	26,885	29,000	10,124	2,726	12,828	120,976	3,950	6,159
Ridham Sea Terminals Ltd	WID	6,000	6,000	6,000	6,000	6,000	0	5,000	0	13,500
Swale Marina Services Ltd	WID	480	480	480	480	480	480	499	499	499
Youngboats Ltd	WID	0	0	0	0	0	-	-	-	-
Queenborough Harbour	WID	0	0	0	0	0	500	-	-	-
Quayside Properties Ltd	WID	1,000	1,000	1,000	1,000	1,000	-	-	-	-
The Swale Total		7,480	7,480	7,480	7,480	7,480	980	5,499	499	13,999
Total		16,803	34,365	36,480	17,604	10,206	13,808	126,475	4,449	20,158

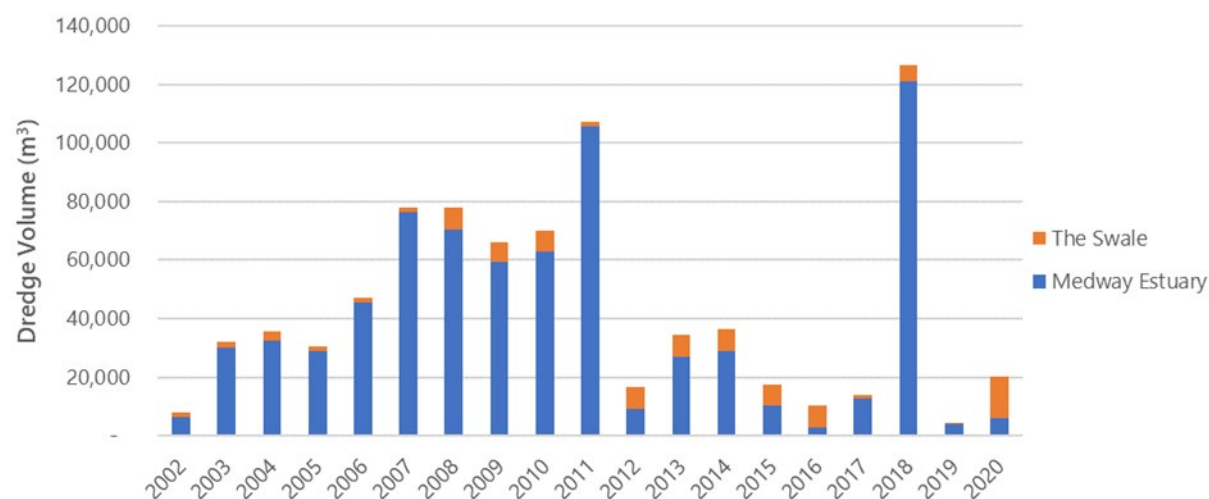


Figure 4.8 Total third party dredge volumes within the Medway

4.2.5 Disposal sites

Prior to 1990, nearly all dredging within the Medway involved the transport and deposit of dredge arisings into reclamation or onto land-based disposal sites. As such, all sediment was removed from the tidal system and was therefore unavailable for re-distribution and deposition.

Peel Ports Medway currently operate two land-based dredge disposal facilities within the Medway; the first at Hoo Island and the second at Rushenden Marshes (see Figure 4.9). Both sites are designed to receive and handle dredged material associated with the maintenance of navigation dredging. In addition, the Hoo Island site also accepts material from terrestrial sources for engineering purposes (such as maintaining internal bunds). It should be noted that Peel Ports Medway have not disposed of dredge material to either of these land-based sites in recent years.

There are a number of licensed marine disposal sites within the Thames Estuary (Figure 4.9), with South Falls (TH070) and Inner Gabbard (TH052) the main sites used for maintenance dredge material. The Medway Approach Channel (TH101) and Garrison Point (TH103) licensed disposal sites have been used for capital dredge campaigns, but these sites are not used for maintenance dredging. The Medway Approach Channel site (TH101) is now closed; however, all other sites remain open, although Garrison Point (TH103) has not been used since the 2001 capital dredge campaign (i.e. disused). Table 4.4 and Figure 4.10 present disposal quantities released at the South Falls and Inner Gabbard licensed disposal sites from the Medway Approach Channel. Between 2002 and 2020 inclusive, the total quantity of dredge material (primarily sand) deposited at the South Falls and Inner Gabbard licensed disposal sites is 771,883 and 403,344 tonnes, respectively.

In addition to the disposal of dredge arisings, both at sea and to land, the majority of material within the Medway is dredged using WID methods. Historically, this practice has been exempted from the requirements of a marine licence, as the sediments were not deposited at sea and therefore no disposal takes place. Under the Marine and Coastal Access Act 2009, WID became a licensable activity. Where a local Harbour Authority has powers to dredge, as is the case for Peel Ports Medway within the Medway, the activity is exempted from marine licensing. Within the Medway Approach Channel, however, a marine licence is required for undertaking WID. Between 2002 and 2020 inclusive, an estimated total volume of 436,030 m³ of dredge material was removed by Peel Ports Medway from the Medway Approach Channel, Sheerness Docks, North Kent Buoy, Chatham Lock Approaches and Faversham Creek using WID (see Table 4.1). Additional volumes have also been dredged by third parties during this period (see Table 4.2 and Table 4.3).

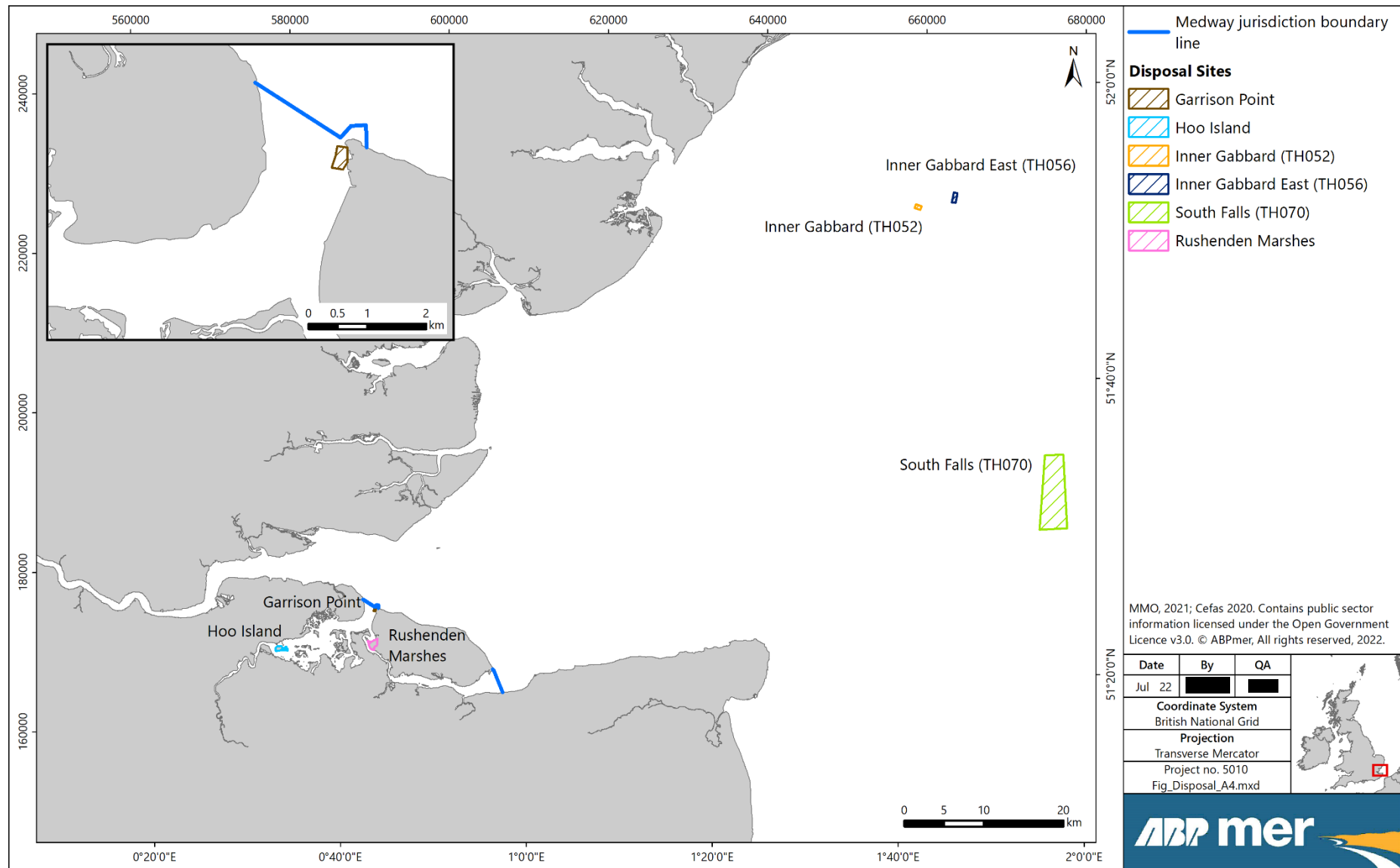


Figure 4.9 Dredge disposal sites

Table 4.4 Maintenance dredge disposal quantities from the Medway Approach Channel deposited at licensed marine disposal sites

Year	Disposal Quantity (Tonnes)	
	South Falls (TH070)	Inner Gabbard (TH052)
2002*	0	0
2003*	0	0
2004	100,230	0
2005	121,335	77,409
2006	0	0
2007	148,875	22,579
2008	0	0
2009	113,982	22,641
2010	89,502	73,228
2011	0	0
2012	0	0
2013	101,397	81,118
2014	0	0
2015	0	37,400
2016	0	0
2017	44,208	0
2018	0	0
2019*	52,354	0
2020	0	88,969

* Note, WID used to dredge the Medway Approach Channel in 2002 and 2003; therefore, no deposits to a licensed marine disposal site in these two years. In 2019, while TSHD was primarily used to remove significant quantities of dredge material (which required disposal at sea), WID was also trialed within the Medway Approach Channel (19,363 m³).

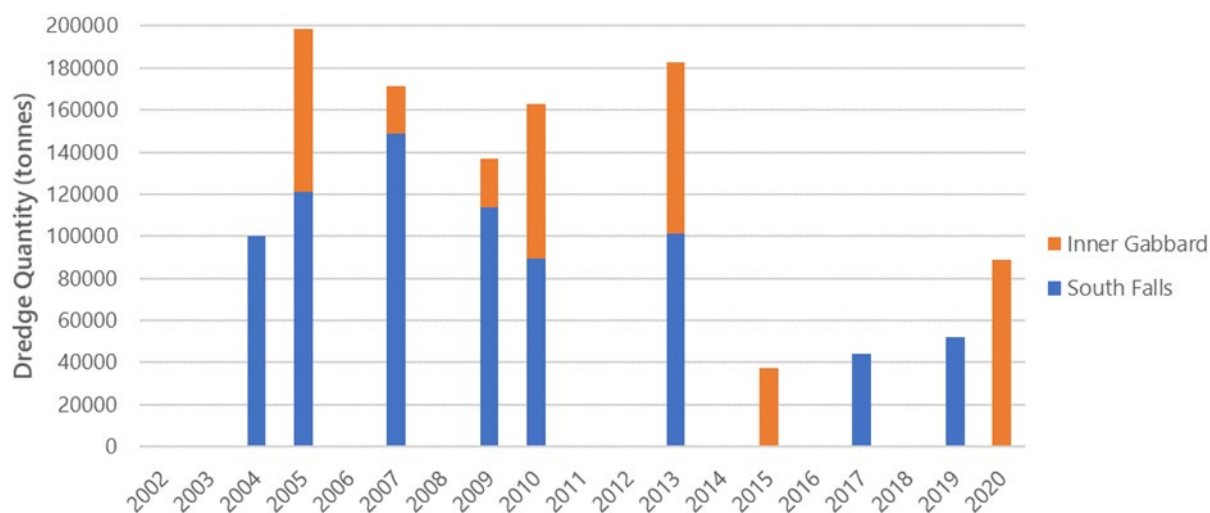


Figure 4.10 Maintenance dredge disposal quantities from the Medway Approach Channel deposited at licensed marine disposal sites

4.3 Beneficial use

Waste policy and, consequently, the preparation of waste hierarchy assessments, is strongly governed by the waste hierarchy set out in Article 4 of the Waste Framework Directive (2008/98/EC). The waste hierarchy ranks waste management options according to what is best for the environment and comprises the following, in order of most to least favoured (top to bottom):

- Prevention;
- Re-use;
- Recycle;
- Other recovery; and
- Disposal.

The waste hierarchy places emphasis on waste prevention or minimisation of waste, followed where possible by re-use of the material. For any dredging project, the *in situ* characteristics of the material (physical and chemical), the method and frequency of dredging (and any subsequent processing), determines its characteristics for consent through the waste hierarchy. This understanding is central for consideration of management options for dealing with dredged material with respect to the waste hierarchy. Marine licencing guidance states that an applicant must take account of the waste hierarchy and consider alternative means of dredge and disposal before applying for a marine licence.

There is a general acknowledgement that, where practicable, the beneficial use of dredge material is a positive option. This provides a more sustainable approach to sediment management compared to disposal at sea or, the least desirable option, sending dredged material to landfill. Beneficial use can involve a wide range of activities, projects and stakeholders, such as recharging saltmarsh, creating and/or protecting coastal habitat for birds and the use of WID technology to retain sediment in the local sediment system.

While the majority of dredge material originating from the Medway Approach Channel is deposited at licensed marine disposal sites, transferring the sediment away from the Medway, a sizeable proportion of dredging activity within the study area involves WID. Furthermore, the availability of disposal facilities at Hoo Island, as well as the Rushenden Marshes site, has provided opportunities for dredged material to be beneficially use within the Medway in recent year. While the majority of dredge material originating from the Medway Approach Channel is currently deposited at licensed marine disposal sites, transferring the sediment away from the Medway, most of the other dredging activity within the study area involves WID. In recent years, the availability of disposal facilities at Hoo Island, as well as the Rushenden Marshes site, has provided opportunities for dredged material from the inner Medway and Swale to be beneficially used within the Medway Estuary and The Swale. The Medway supports a significant population of breeding and migratory birds, some of which are threatened by habitat loss from islands being eroded or regularly over-topped during high tides. Peel Ports Medway is discussing potential options for further beneficial re-use of maintenance dredge material from the Medway Approach Channel for habitat creation with the Royal Society for the Protection of Birds (RSPB). The re-use of dredged material has the potential to play a key role in providing enhanced habitat to support the variety of bird species in Medway. Possible sites requiring further investigation include Nor Marsh, Darnet Ness, Bishop Saltings, Greenborough Marshes, Burntwick Island and Deadman's Island.

5 Sediment Quality

5.1 Background

This section describes the chemical characteristics of sediments within the study area. As part of the marine licensing process, sediment samples are routinely collected within respective dredge areas, firstly to support the initial marine licence application/renewal and subsequently to provide interim data. The samples are analysed by MMO-approved laboratories and the results are reviewed to determine the ongoing suitability for dredging works and, if required, disposal at sea.

The analysis of sediment samples typically includes the following range of chemical parameters (note, the full suite is not always required for each dredge location, depending on historic sampling):

- Trace metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc);
- Organotins (tributyltin (TBT) and dibutyltin (DBT));
- Polycyclic aromatic hydrocarbons (PAHs; USEPA suite of 16, plus other compounds);
- Total hydrocarbon content (THC); and
- Polychlorinated biphenyls (PCBs; sum of 25 congeners and sum of ICES 7 congeners).

In addition, sediment samples are often analysed by MMO-approved laboratories for particle size distribution to determine the physical sediment composition (i.e. proportion of silt, sand and gravel in individual samples).

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 (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; see Table 5.1). 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 may require further consideration 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 Cefas Guideline Action Levels are currently being reviewed by Defra, but no decision has yet been made to amend existing standards or introduce additional standards.

Prior to the collection of sediment samples, it is standard practice for the applicant to request a 'Sample Plan' from the MMO, who will consult Cefas to determine the appropriate suite of chemical analysis.

Table 5.1. Cefas Guideline Action Levels

Contaminant	Units	Cefas Guideline Action Levels	
		Action Level 1 (AL1)	Action Level 2 (AL2)
Trace Metals			
Arsenic (As)	mg/kg	20	100
Cadmium (Cd)	mg/kg	0.4	5
Chromium (Cr)	mg/kg	40	400
Copper (Cu)	mg/kg	40	400
Lead (Pb)	mg/kg	50	500
Mercury (Hg)	mg/kg	0.3	3
Nickel (Ni)	mg/kg	20	200
Zinc (Zn)	mg/kg	130	800
Organotins			
Dibutyltin (DBT)	mg/kg	0.1	1
Tributyltin (TBT)	mg/kg	0.1	1
Polychlorinated Biphenyls (PCBs)			
Sum of ICES 7 congeners	µg/kg	10	-
Sum of 25 congeners	µg/kg	20	200
Polycyclic Aromatic Hydrocarbons (PAHs) and Total Hydrocarbon Content (THC)			
Acenaphthene	mg/kg	0.1	-
Acenaphthylene	mg/kg	0.1	-
Anthracene	mg/kg	0.1	-
Benzo[a]anthracene	mg/kg	0.1	-
Benzo[a]pyrene	mg/kg	0.1	-
Benzo[b]fluoranthene	mg/kg	0.1	-
Benzo[g,h,i]perylene	mg/kg	0.1	-
Benzo[e]pyrene	mg/kg	0.1	-
Benzo[k]fluoranthene	mg/kg	0.1	-
C1-Napthalene	mg/kg	0.1	-
C1-Phenanthrenes	mg/kg	0.1	-
C2-Napthalene	mg/kg	0.1	-
C3-Napthalene	mg/kg	0.1	-
Chrysene	mg/kg	0.1	-
Dibenzo[a,h]anthracene	mg/kg	0.1	-
Fluoranthene	mg/kg	0.1	-
Fluorene	mg/kg	0.1	-
Indeno[1,2,3-cd]pyrene	mg/kg	0.1	-
Napthalene	mg/kg	0.1	-
Perylene	mg/kg	0.1	-
Phenanthrene	mg/kg	0.1	-
Pyrene	mg/kg	0.1	-
THC	mg/kg	100	-
Organochlorine Pesticides (OCPs)			
Dichlorodiphenyltrichloroethane (DDT)	µg/kg	1	-
Dieldrin	µg/kg	5	-

5.2 Sediment quality within the study area

Over the last 20 years, sediment samples have been collected from various locations within the Medway to consider suitability of dredging and disposal activities (Figure 5.1). Table 5.2 provides a summary of sediment sampling undertaken by Peel Ports Medway and third parties, including the suite of contaminants analysed. Full sediment quality results are presented in Appendix A. This includes data presented in previous versions of the Baseline Document (Peel Ports Group, 2012; MarineSpace Limited et al. 2018), updated with data provided by Peel Ports Medway covering the period from 2017 to 2020 inclusive.

Sediment quality data are summarised for the following areas:

- Medway Approach Channel (Section 5.2.1);
- Saltpan Reach (Section 5.2.2);
- River Medway and Hoo Island (Section 5.2.3);
- The Swale (Section 5.2.4); and
- Faversham and Oare Creeks (Section 5.2.5).

5.2.1 Medway Approach Channel

Sediment samples have been collected on relatively frequent basis from the Medway Approach Channel, specifically in 2003, 2007, 2009, 2010, 2016 and, most recently, 2019 (Figure 5.2). These sediment samples have been collected to inform marine licence applications submitted by PoSL/Peel Ports Medway to dispose of dredged material from the Medway Approach Channel at licensed marine disposal sites, as discussed in Section 4.

Metal and organotin concentrations were consistently below Cefas Guideline AL1, except for minor exceedances of cadmium in one sample collected in 2009 (MAC14) and arsenic, cadmium, chromium and nickel in one sample from 2016 (MAC29). Values were largely below Cefas AL1 where concentrations of individual PAHs have been reported, with a few minor exceedances (noting there is currently no Cefas Guideline AL2s for PAHs). PCB concentrations were low, with values often reported as less than the limit of detection.

Overall, contaminant concentrations in sediment within the Medway Approach Channel have been shown to be low; this is to be expected given the predominantly sandy composition of dredged material in this area, with contaminants largely associated with finer material such as mud/silt.

Table 5.2 Summary of sediment sampling in the Medway

Year	Sample Location	Number of Samples (Sample ID)	Figure(s)	Contaminant				
				Metals	Organotins	PAHs	THC	PCBs
Peel Ports Medway								
2003	Medway Approach Channel	8	N/A	✓	✓	✓	✓	✓
2007	North Kent Navigation Buoy and Medway Approach Channel	12 (NKB1, NKB2, MAC1–MAC10)	Figure 5.2 Figure 5.3	✓	✓			
2009	Medway Approach Channel	8 (MAC11– MAC18)	Figure 5.2	✓	✓	✓		✓
2010	Chatham Lock Approaches	6 (CLA1–CLA6)	Figure 5.5	✓				
2010	Medway Approach Channel	10 (MAC19–MAC28)	Figure 5.2	✓	✓			
2011	Sheerness Docks	8 (PP1–PP8)	Figure 5.3	✓	✓			
2012	River Medway and The Swale	30 (RMS1–RMS30)	Figure 5.3 Figure 5.4 Figure 5.5 Figure 5.6 Figure 5.7 Figure 5.8 Figure 5.9	✓	✓	✓		✓
2016	Medway Approach Channel	5 (MAC29–MAC33)	Figure 5.2	✓	✓	✓	✓	✓
2018	Shoregate Wharf and Stangate Creek	2	N/A	✓		✓		✓
2019	Medway Approach Channel	5 (MAC34–MAC38)	Figure 5.2	✓	✓	✓		✓
Third Party								
2002	Isle of Grain LNG	6 (NG1–NG6)	Figure 5.3	✓	✓			
2006	Faversham Creek	10 (F1–F10)	Figure 5.9	✓	✓	✓	✓	✓
2008	Thamesport	4 (HP1–HP4)	Figure 5.4	✓				
2009	Faversham and Oare Creek	8	N/A	✓				
2010	Isle of Grain Jetty 1	6 (LNG1–LNG6)	Figure 5.4	✓				
2010	Oare Creek (Swale)	17	N/A	✓				
2010	Gillingham Marina Basin 1	3 (GM1–GM3)	Figure 5.5	✓				
2011	BP Isle of Grain Jetty 1	18	N/A	✓	✓			
2011	Entrance to East Swale	2 (LA1, LA2)	Figure 5.8	✓				
2011	Kingsnorth Power Station	1 (KPS1)	Figure 5.5	✓	✓			
2011	Faversham Creek (Town Quay)	1	N/A	✓				
PAHs – Polycyclic Aromatic Hydrocarbons; THC – Total Hydrocarbon Content; PCBs - Polychlorinated Biphenyls; N/A – not applicable (no coordinates available).								

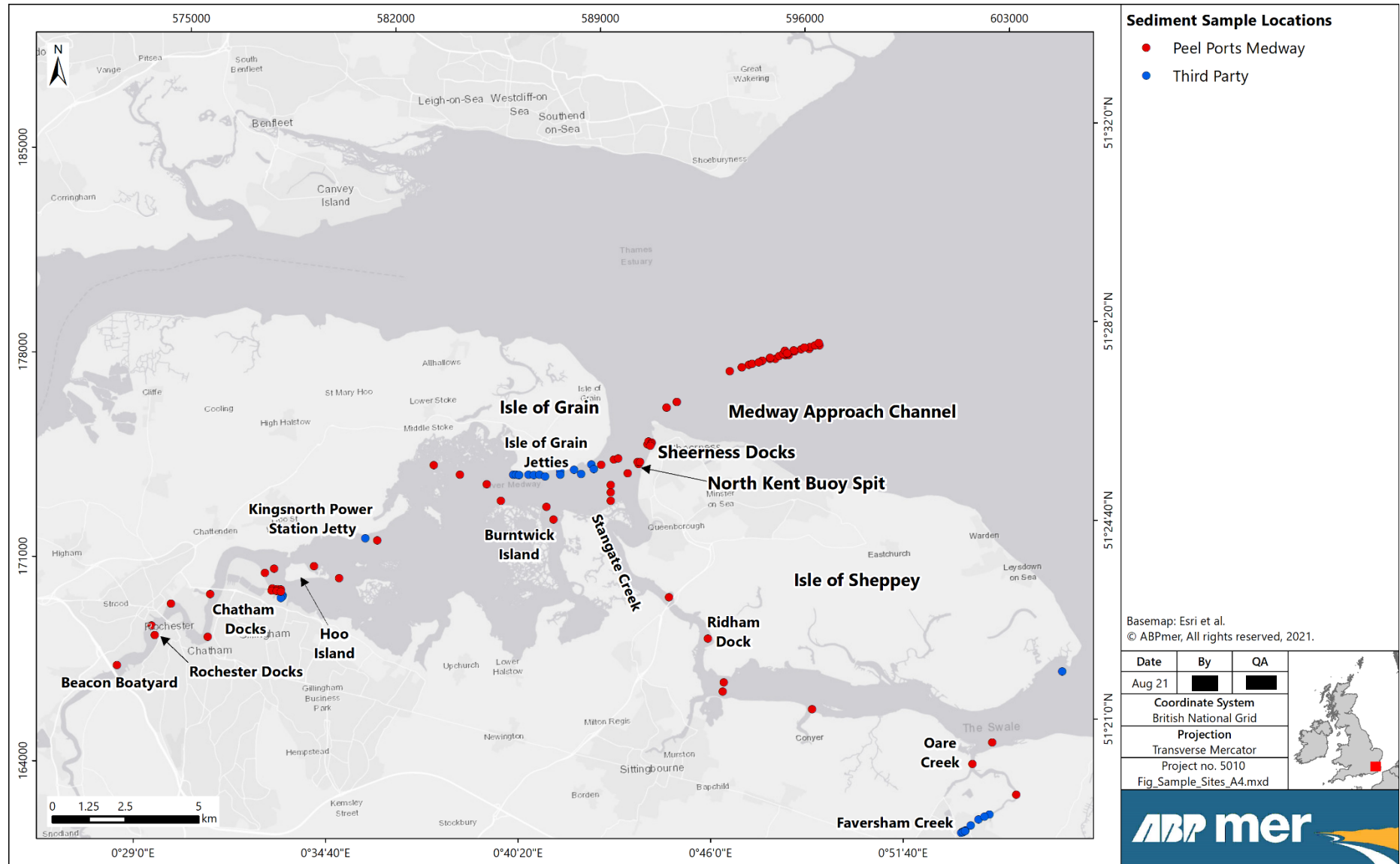


Figure 5.1 Peel Ports Medway and third party sediment sample locations in the Medway

5.2.2 Saltpan Reach

Sediment quality data from samples RMS1 to RMS11, collected by Peel Ports Medway in 2012, cover the area of Saltpan Reach, encompassing the entrance to Stangate Creek and the intertidal areas of Stoke Saltings and Queenborough Spit (note, samples RMS4 and RMS5, plus RMS8 and RMS9 were bulked together, hence the sample analysis from these sites provides a generalised view of the quality of the mid and upper intertidal areas). The intertidal deposits in this area are predominantly muddy to the south and west of Saltpan Reach becoming coarser towards the eastern end of the Isle of Grain jetties, up to Cockleshell Jetty where sandy shale mixed with some fine silt is present (HR Wallingford, 2002). Two samples were also obtained by Peel Ports Medway around the North Kent Navigation Buoy (NKB1 and NKB2) in 2007, while Sheerness Docks were sampled in 2011 (PP1-PP8). To further complement the data for Saltpan Reach, additional sediment contamination data has been made available by a number of third parties, including Isle of Grain BP, London Thamesport and Grain LNG. See Figure 5.3 and Figure 5.4 for sample locations.

Metal concentrations across the area are generally below Cefas Guideline AL1 for arsenic, cadmium, mercury, lead and zinc and can be considered of no concern with respect to their potential to cause pollution with contaminant levels unlikely to influence the licensing process. Levels of chromium, copper and nickel at all sites sampled in 2012 (RMS1-RMS11) were above Cefas Guideline AL1. One exceedance of Cefas Guideline AL2 was noted in sample RMS7 located within Stangate Creek, where a very high level of mercury was detected (24.5 mg/kg). As mercury in all other sample sites was found to be below Cefas Guideline AL1 (except RMS3; marginally exceedance of Cefas Guideline AL1), it is suggested that this is an isolated hot-spot which should be noted for future reference. Sampling around the North Kent Navigation Buoy in 2007 indicated arsenic concentrations above Cefas Guideline AL1 in two samples (NKB1 and NKB2), with lead and zinc concentrations also above this threshold in the former. Metal concentrations within Sheerness Dock were largely below Cefas Guideline AL1, except for cadmium in seven samples and lead in one sample (all marginal exceedances of Cefas Guideline AL1). Third party sampling indicates metal concentrations are typically low at respective dredge areas, with minor exceedances of Cefas Guideline AL1 (no exceedances of Cefas Guideline AL2).

Concentrations of organotins and PCBs were all below Cefas Guideline AL1, or below the limits of detection. Sample RMS7 from Stangate Creek showed elevated levels of several PAHs. Most of these were at least four times higher than Cefas Guideline AL1, with pyrene being eight times higher than the threshold. It can be concluded that the receiving (background) environment has a signature of elevated PAH contamination which might influence marine license decision making if local dredge, disposal or marine works sediment quality were further elevated.

A previous study by Haskoning (2008) completed for Capital Dredge work for Thamesport on the Isle of Grain reviewed eight sites across the intertidal and sub-tidal. These sites were sampled using a vibrocore, with samples for sediment contamination analysis taken at three depths. This indicated some contamination above Cefas Guideline AL1 of the Thamesport Capital Dredge sediments by metals, and that all sites had total PCB levels below the limit of detection.

5.2.3 River Medway and Hoo Island

The samples from this section cover Kingsnorth Power Station at the eastern end of Hoo Flats, to Cockham Reach at the western end of the intertidal area around Hoo Island; these locations are identified as samples RMS12 through to RMS16. In addition, the area encompasses samples RMS17 to RMS22, which are progressively placed along the River Medway channel intertidal working up-estuary. Most sample locations have been placed within areas which would accumulate material through geomorphological processes, and thereby provide a good measure of sediment quality within each Reach. Six samples were collected in 2010 by Peel Ports Medway within the Chatham Lock Approaches,

while Gillingham Marina obtained three samples in the same year. See Figure 5.5 and Figure 5.6 for individual sample locations.

A similar contamination pattern to that of Saltpan Reach (see Section 5.2.2) was noted around Hoo Island, its intertidal area and the upstream River Medway with regards to metals. The concentration of metals across the area were generally below Cefas Guideline AL1 for arsenic and cadmium. However, concentrations were above Cefas Guideline AL1 for chromium, copper, mercury, nickel, lead and zinc in most samples from RMS12 to RMS22. One exceedance of Cefas Guideline AL2 was noted in sample RMS13, taken to the east of Hoo Island on the subtidal spit, which provides a pinch point to the main navigation channel marked with 'Folly' Starboard hand marker buoy. This location recorded an exceedance of Cefas Guideline AL2 for arsenic (104 mg/kg). It should be noted that the exceedance only marginally passes the threshold; however, the high level of arsenic recorded is notable against other results from nearby samples. As arsenic in other sample sites is mostly below Cefas Guideline AL1, it is suggested that this is an isolated hot-spot which should be noted for future reference.

Organotin and PCB concentrations were all below Cefas Action Level 1, or below the limits of detection. RMS14 (located in Middle Creek), and RMS15 and RMS16 either side of Short Reach, suggested there were elevated levels of several PAH compounds. Mostly, these concentrations ranged from four to six times higher than Cefas Guideline AL1. This indicates a history of marine use where boat maintenance products such as oils and chemicals have been released into the water column and foreshore mud and are now present in the sediment. Consideration should be applied to activities that might further distribute material with elevated levels of PAH into areas of the estuary which are comparatively cleaner. Notably, RMS13 (which exceeded Cefas Guideline AL2 for arsenic) was the only site sampled around Hoo Island with negligible levels of PAHs which might be explained by its location away from areas of mooring, shore-side boat repair and light industrial use.

5.2.4 The Swale

This area includes Ferry Reach on The Swale through to the entrance of Conyer Creek. Sediment quality data is available from Peel Ports Medway sampling in 2012 (RMS23 through to RMS27), as well as third party samples from the entrance to East Swale as part of the London Array cable route studies (LA1 and LA2). See Figure 5.7 and Figure 5.8 for sample locations.

Concentrations of metals across the area were generally below Cefas Guideline AL1 for arsenic, cadmium, mercury and lead and can be considered of little concern with respect to their potential to cause further pollution. Levels of chromium, copper, nickel and zinc at nearly all sample sites were above Cefas Guideline AL1, but none of these exceeded Cefas Guideline AL2 indicating that sediment quality in respect of these metals can be considered a background signature, and should not preclude sediment disposal at sea.

Organotin concentrations were all below Cefas Guideline AL1, or below the limits of detection, while PCB concentrations from sediments within this area were all below Cefas Guideline AL1 (sum of ICES 7 congeners). Of the samples taken for PAH analysis, 76 % were above Cefas Guideline AL1, albeit most of these only marginally exceeded the threshold. RMS24 (located in Clay Reach) and RMS27 (entrance to Conyer Creek) showed elevated levels of several PAH compounds. The samples from The Swale are considerably cleaner from a PAH perspective than samples from the more developed area of the Medway Estuary (around Hoo Island and the Tidal River Medway, for example). However, higher levels of PAH are noted in some locations such as the entrance to Conyer Creek. A wider sampling exercise would provide a greater resolution of information allowing more accurate sediment concentration mapping within The Swale and its Creeks. However, this would need placing in context with the existing maintenance dredge commitment of the area, with fewer dredge sites around The Swale in comparison to the Medway Estuary.

5.2.5 Faversham and Oare Creeks

An overview of sediment contamination within the creek systems is provided by the sampling campaign undertaken by Peel Ports Medway in 2012, in which samples were collected from the intertidal area at the entrance to the creek system (RMS28), near the confluence of the Oare and Faversham creeks (Site RMS29) and within Faversham Creek (RMS30). To further complement this data, third party sediment contamination information provides further information on sediment quality in Faversham Creek. This consisted of 10 sediment samples which were collected and analysed in 2006 from positions further upstream along Faversham Creek (in the vicinity of maintenance dredging operations, downstream of the swing bridge; F1-10). The location of the Peel Ports Medway and third party sample sites is provided in Figure 5.9. In addition, further third party sediment contamination data is available for both Faversham and Oare creeks, but the location at which the samples were taken are unknown. Nevertheless, this information further provides a valuable high-level understanding of sediment quality in these areas.

Results from the sampling campaign undertaken by Peel Ports Medway show that fewer metals exceeded Cefas Guideline AL1 at the entrances to the creek system (RMS28) than further upstream (RMS29 and RMS30). However, those metals which did exceed this threshold at RMS28 were found to be of a greater concentration than those recorded at RMS30. Concentrations of cadmium were below Cefas Guideline AL1 at all sampled locations, whilst mercury marginally exceeded Cefas Guideline AL2 at RMS29, with a concentration of 3.1 mg/kg. No source of this increased mercury contamination has been identified. It is also worth mentioning that there were elevated levels of copper and zinc at RMS29. In considering third party data, concentrations were for the most part above Cefas Guideline AL1 for all metals. The data would suggest that there is very little variation in metal concentrations (contamination) along this stretch of Faversham Creek (i.e. between Standard Quay and the Swing Bridge). The sediment contamination results for the additional third party information also identified that Cefas Guideline AL1 was exceeded for a number of metals within Faversham Creek, but more importantly, the datasets indicated that metals contamination in Oare Creek were very similar (Cefas Guideline AL2 was not exceeded for any samples).

Organotin concentrations were below Cefas Guideline AL1 in samples collected by Peel Ports Medway from Faversham Creek in 2012 (RMS28, RMS29 and RMS30). In the case of the third party data (F1-F10), only six of the ten samples collected in 2006 were analysed for TBT; however, these samples identified that TBT concentrations were less than 0.02 mg/kg (below the limits of detection) and subsequently below Cefas Guideline AL1 (DBT concentrations were not analysed). PCB concentrations at RMS29, which is near to the confluence of the Oare and Faversham creeks, greatly exceeded the Cefas Guideline AL1 for the sum of ICES 7 congeners (note, there is currently no Cefas Guideline AL2 for this threshold). However, PCB concentrations within Faversham Creek, reported as part of third party sampling in 2006, were consistently below the limits of detection for all sampled locations (ICES 7 congeners only).

Analysis of the Peel Ports Medway collected samples identified that RMS28, at the entrance to the creek system, indicated concentrations were mostly below Cefas Guideline AL1; however, many of the tested PAH compounds exceeded the Cefas Guideline AL1 at RMS29 and RMS30. Of these two sites, RMS29 was found to have the highest concentrations of PAHs, some of which were the largest values recorded in the sampling exercise (i.e. across all 30 sites sampled within the Medway in 2012). Taking into account the increased mercury and PCB concentrations also found at RMS29, it would be reasonable to assume that there may be, or have been, a contaminant source in the immediate location of the site. Further upstream along Faversham Creek, the third party data identifies that at the sampled locations (F1, F4, F7 and F9), PAH concentrations exceeded Cefas Guideline AL1 apart from acenaphthylene, acenaphthene and fluorene. However, PAH concentrations at these locations were considerably lower compared to those analysed at RMS29 and RMS30.

5.3 Summary of sediment quality

In general, contaminant concentrations in sediment samples collected from the Medway Estuary were below Cefas Guideline AL1 (i.e. metals, organotins, PCBs and PAHs). As such, there is no concern that the dredged material originating from within the open water of the Medway Estuary, or associated enclosed dock approaches and internals, has the potential to cause pollution, and sediment quality issues are therefore unlikely to influence the decision to issue a marine licence. Contaminant concentrations with the Medway Approach Channel are low.

Sediment samples from within more southerly locations, such as The Swale and the Faversham and Oare creeks, however, indicate that elevated and more widespread levels of contamination may be present at some locations (as opposed to hot-spots within the Medway Estuary). However, there have been no specific conditions within licence documents to suggest disposal at sea of the dredged material should be limited in scope for this section of the study area. Therefore, it can be concluded that the concentrations in these areas did not present an unacceptable risk to the marine environment in terms of further pollution.

Other than the Medway Approach Channel, it should be noted that limited contemporary sediment quality data is available for the wider Medway,. Some of these areas are not subject to regular dredging, notably Faversham, Oare and Milton Creeks, and have not been dredged since 2012. Furthermore, sample plans issued by the MMO, in consultation with Cefas, are commonly including polybrominated diphenyl ethers (PBDEs) as part of the required analysis to inform marine licence applications; however, there is currently no baseline data for these parameters in the area and thus potential issues are unknown. Peel Ports Medway is, therefore, looking to develop a sampling campaign for the Medway and Swale to update the baseline information available on sediment chemistry.

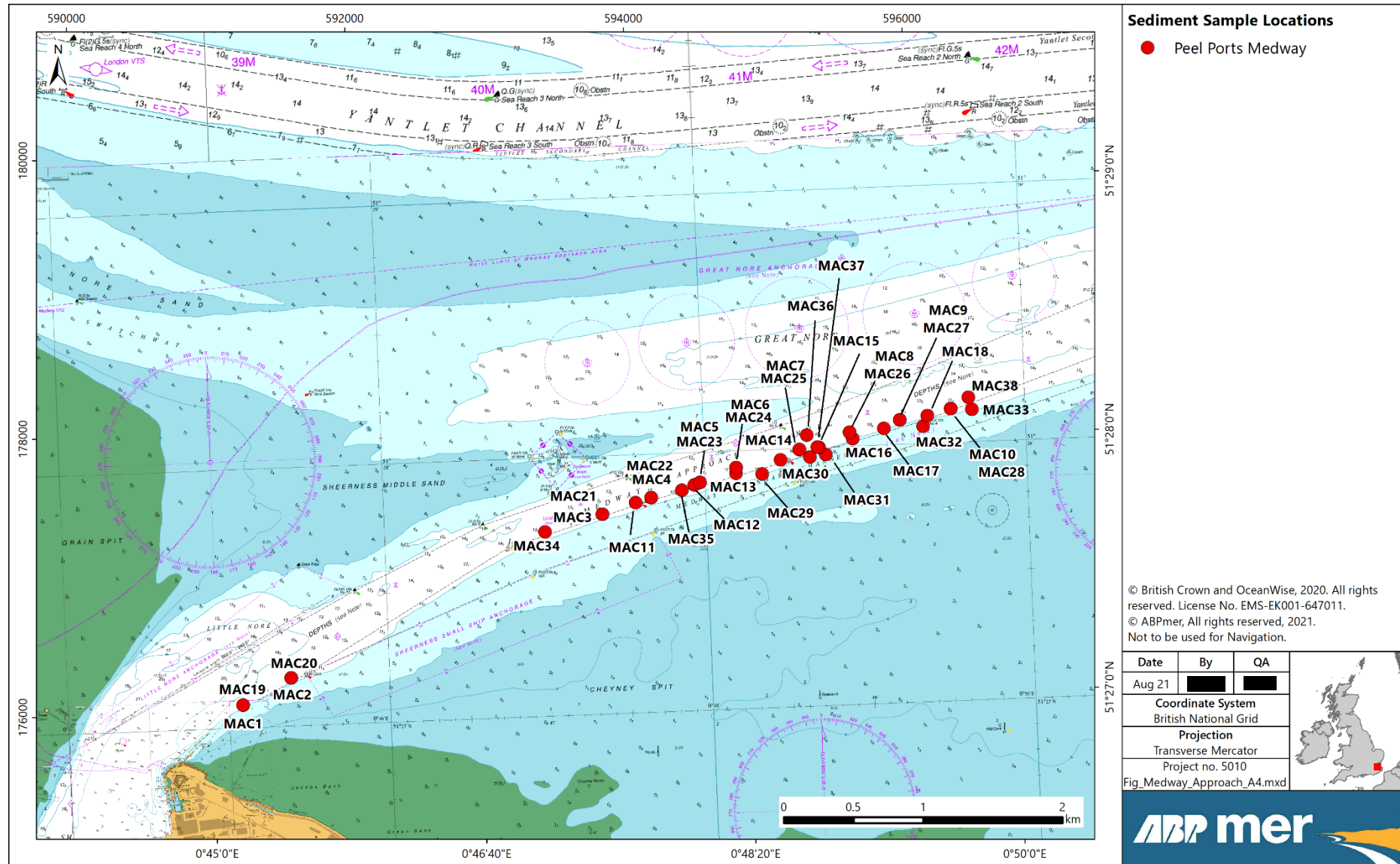


Figure 5.2 Sediment sample locations in the Medway Approach Channel

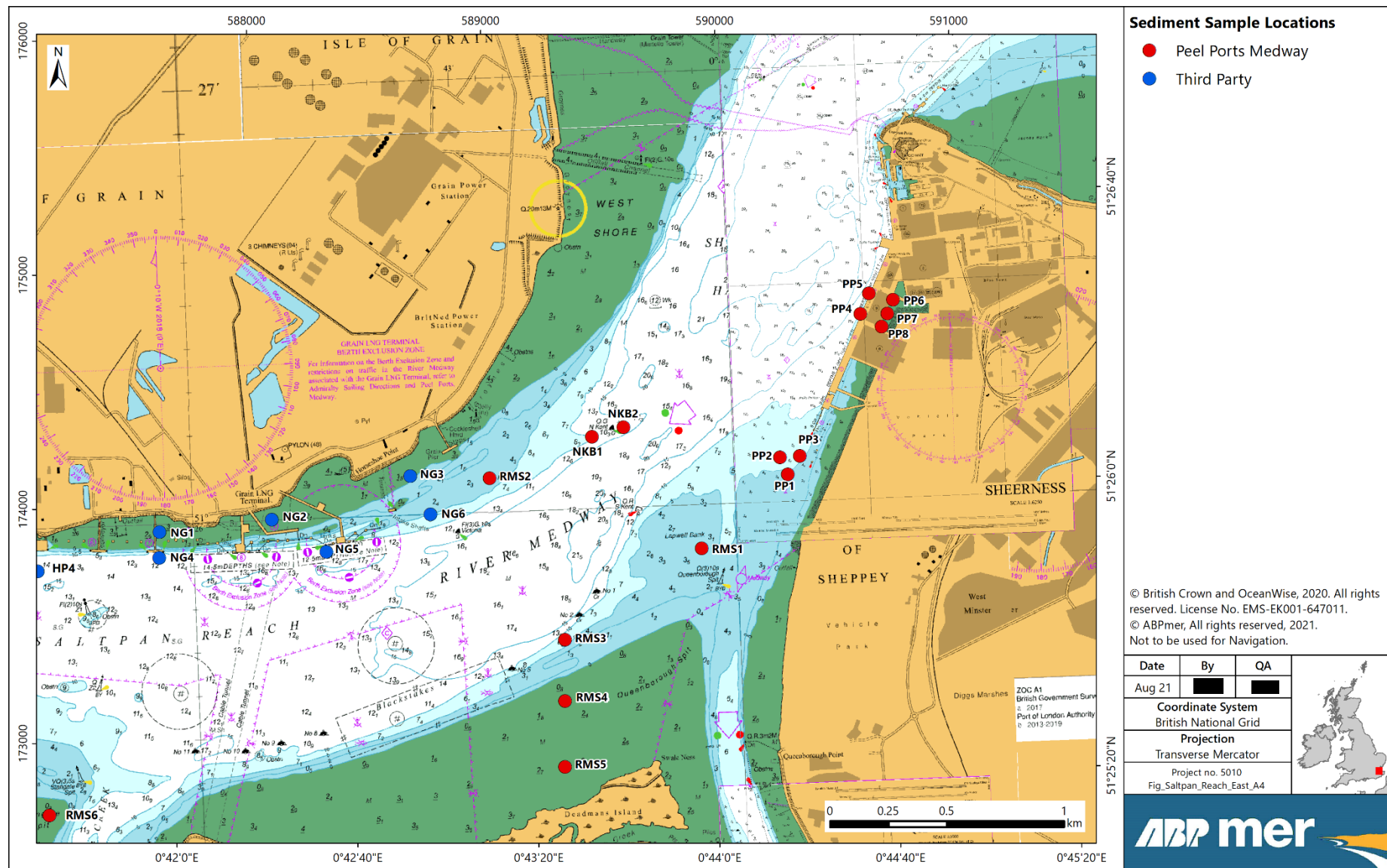


Figure 5.3 Sediment sample locations in Saltpan Reach East

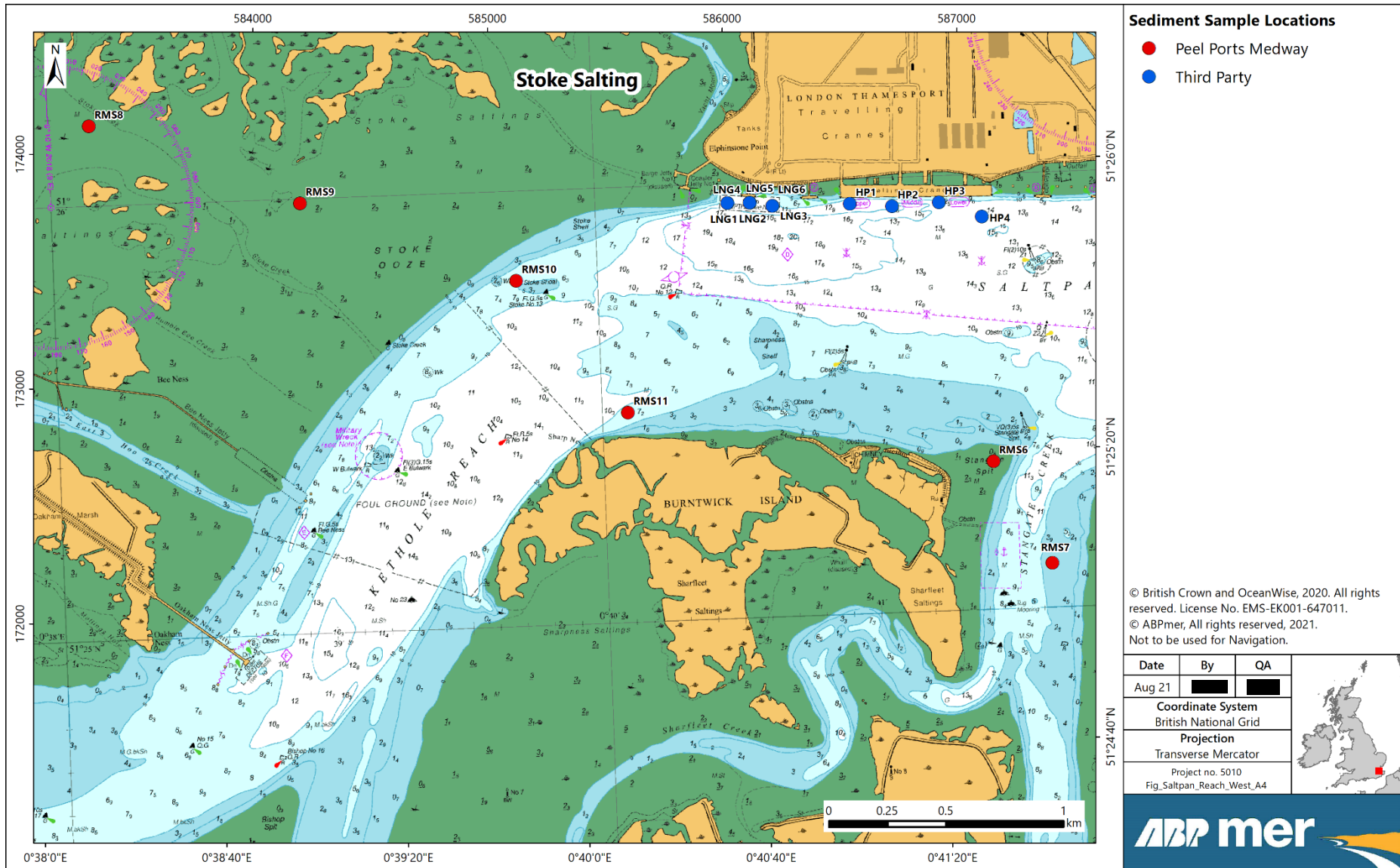


Figure 5.4 Sediment sample locations in Saltpan Reach West

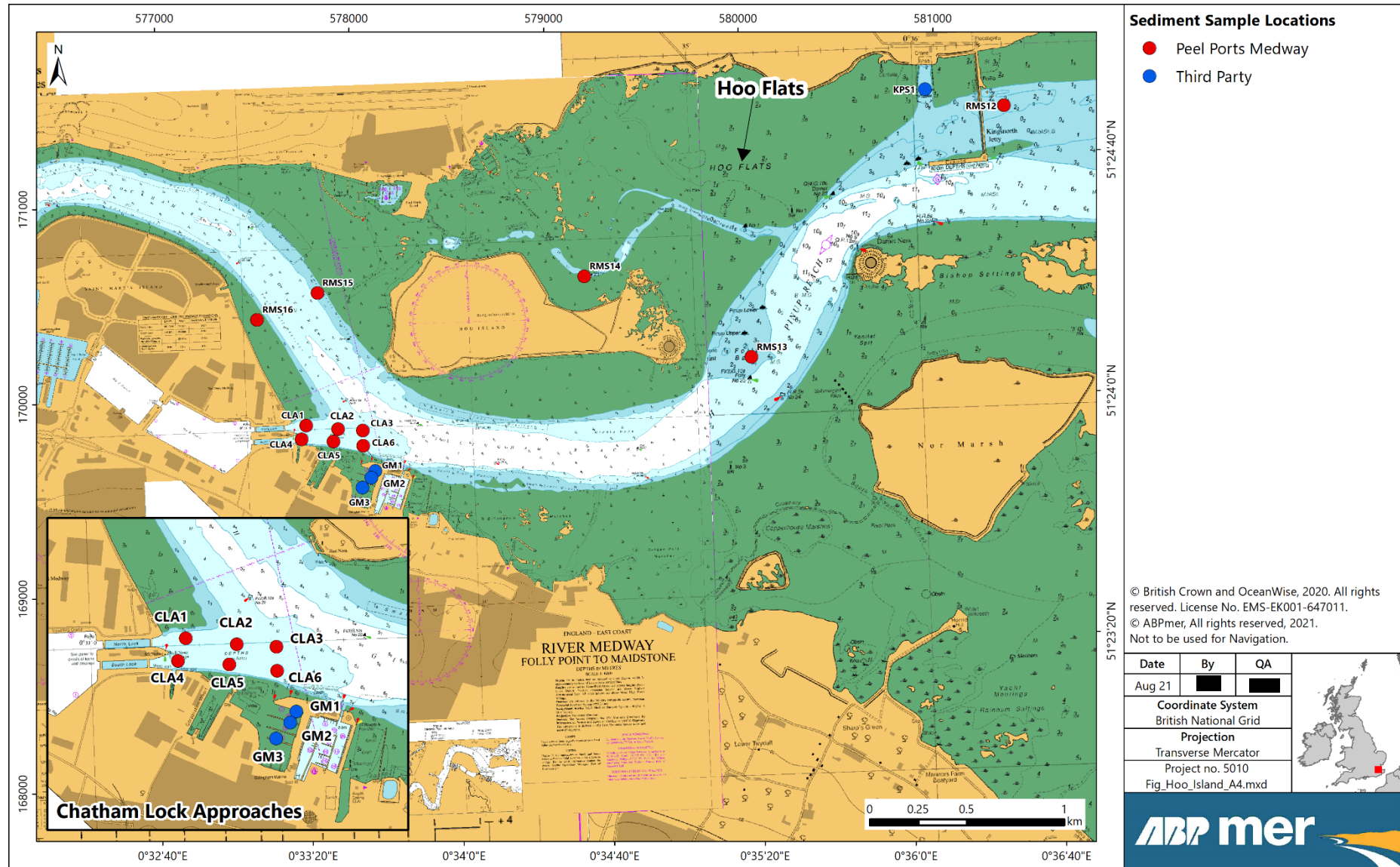


Figure 5.5 Sediment sample locations in the vicinity of Hoo Island

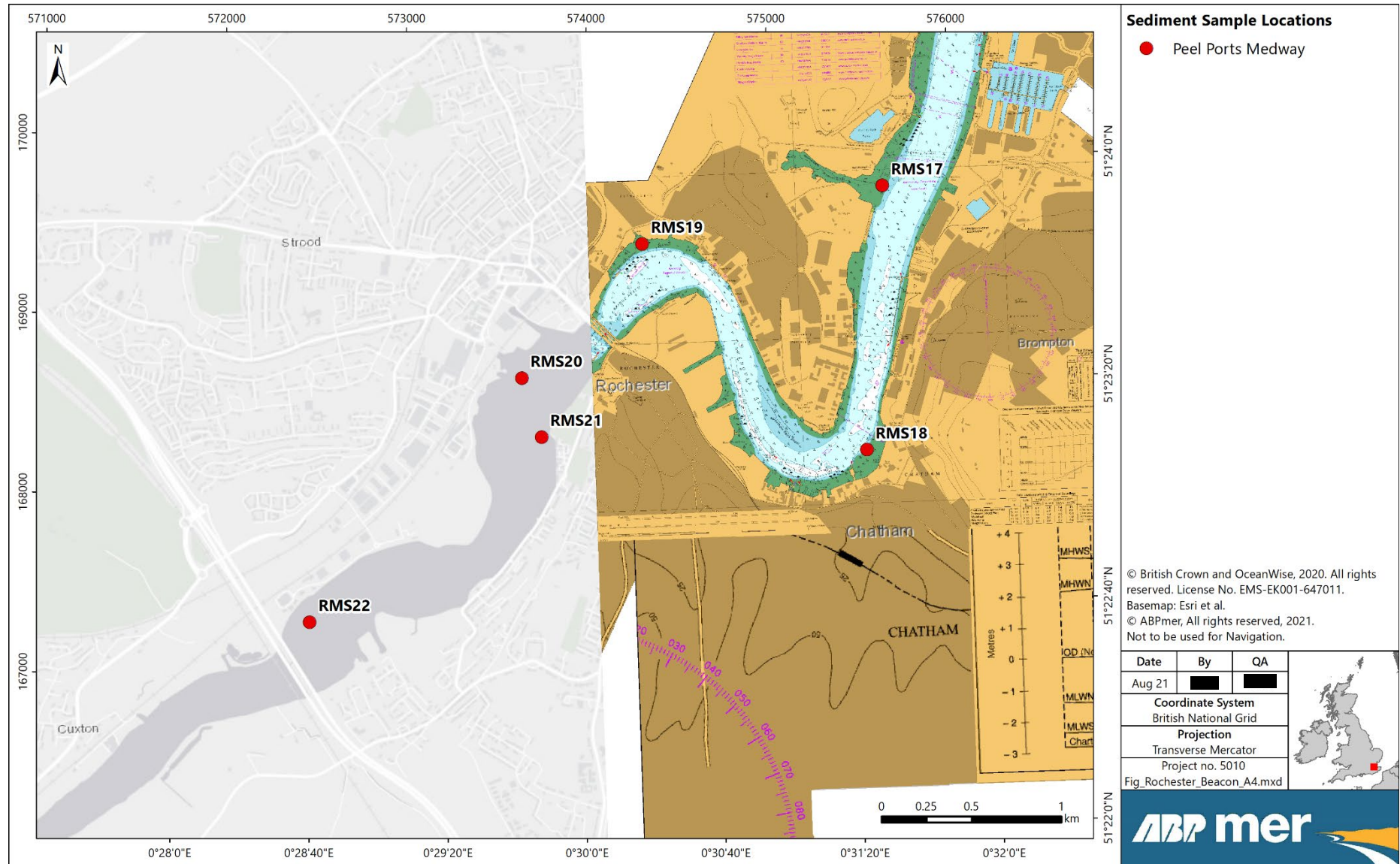


Figure 5.6 Sediment sample locations in the tidal River Medway

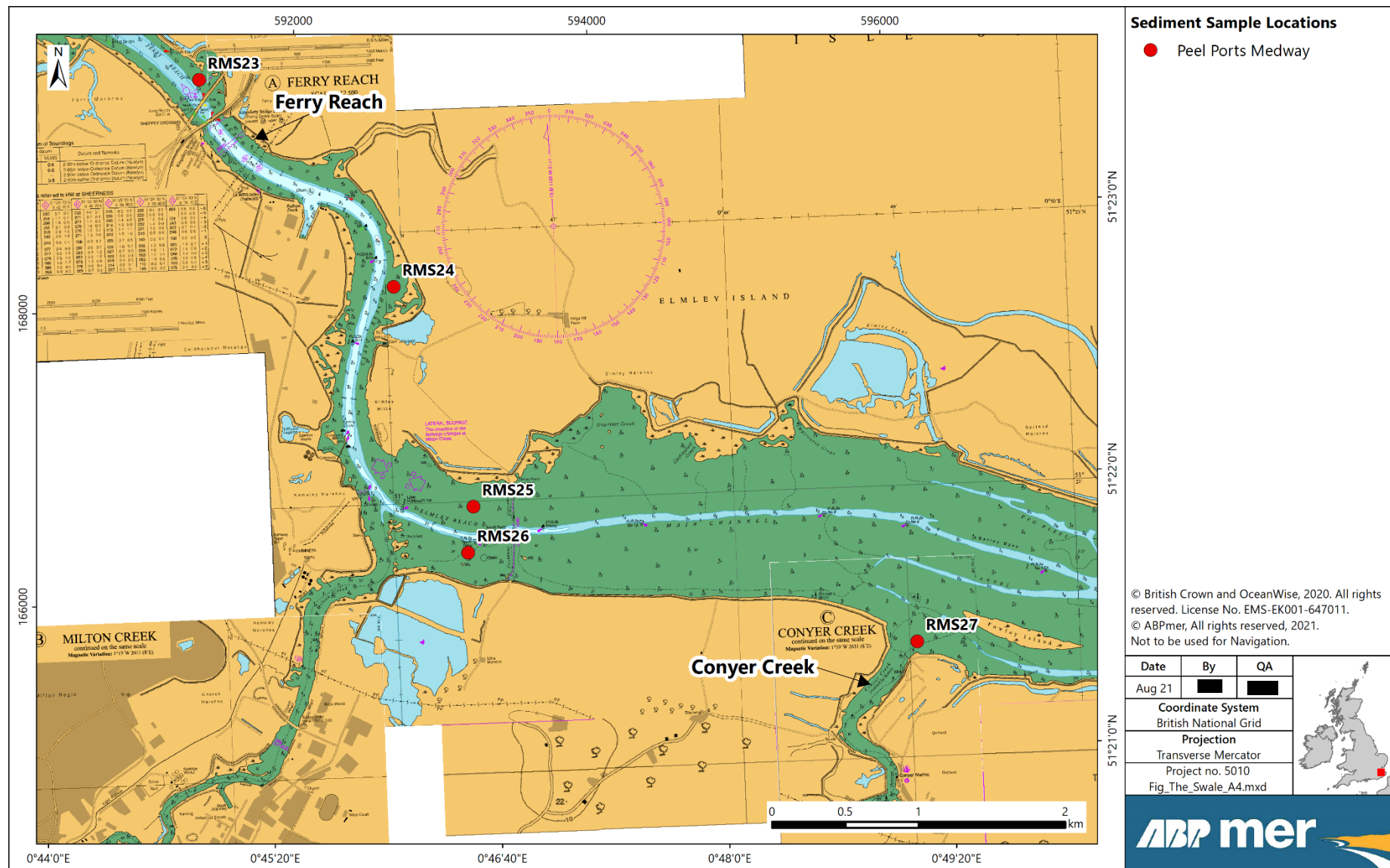


Figure 5.7 Sediment sample locations in The Swale

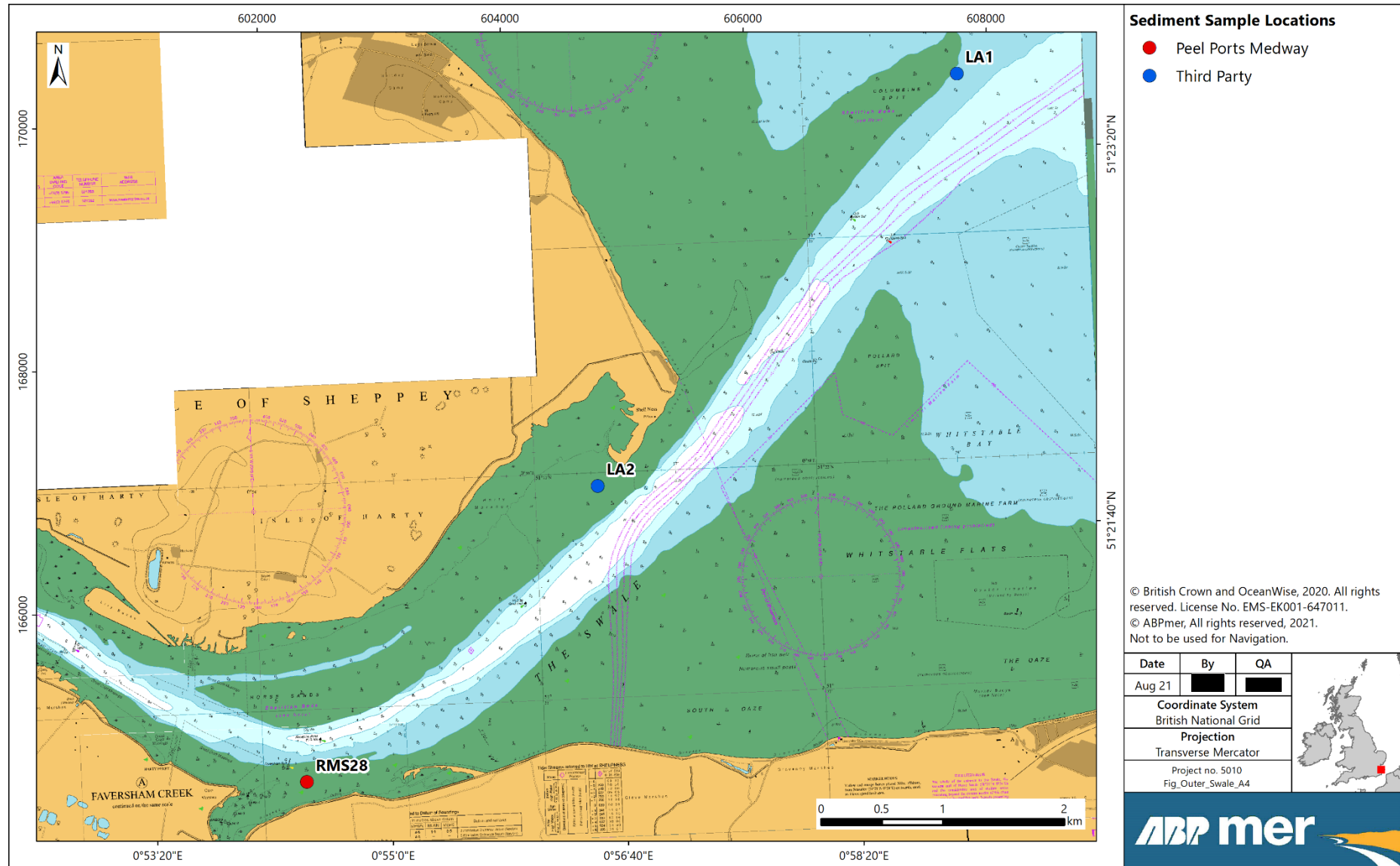


Figure 5.8 Sediment sample locations in The Swale (Outer)

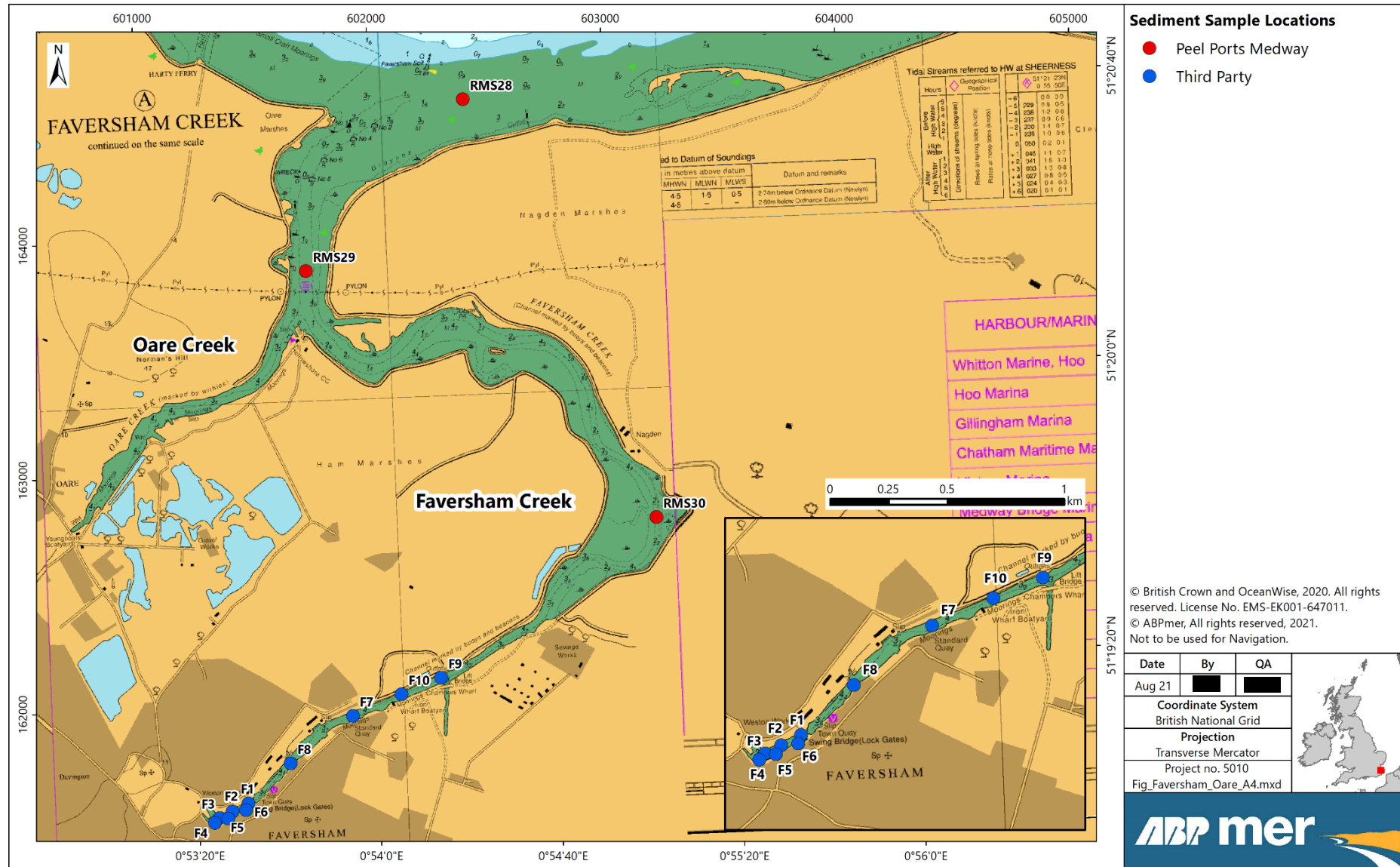


Figure 5.9 Sediment sample locations in Faversham Creek and Oare Creek

6 Marine Licence Information

Five Marine Licences are currently issued (at the time of writing in August 2021) for dredging and/or disposal activities within the Medway. This section itemises the current licences and selected licence conditions of relevance to the Baseline Document, specifically:

- Medway Approach Channel (TSHD and disposal at sea) (Section 6.1);
- Medway Approach Channel (WID) (Section 6.2);
- Grain LNG Jetties 8 and 10 (Section 6.3);
- Isle of Grain Power Station (Section 6.4); and
- London Thamesport (Section 6.5).

6.1 Medway Approach Channel (TSHD and disposal at sea)

In May 2018, a ten-year Marine Licence (L/2018/00185) was issued to PoSL for the dredging and subsequent disposal of material originating from within the Medway Approach Channel, valid until 04 May 2028. The licence permits up to 130,000 m³ of sand to be removed from the Medway Approach Channel per annum using TSHD to achieve depths of -12 m CD, with disposal of dredged material to the South Falls (TH070) and/or Inner Gabbard (TH052) licensed marine disposal sites. Table 6.1 presents the project-specific conditions itemised within the Marine Licence issued by the MMO (this is not a full list of conditions; general licence conditions have been omitted).

Table 6.1 Medway Approach Channel project-specific licence conditions (TSHD and disposal at sea)

Licence Condition	Description and Reason
5.2.1	The undertaker must ensure that a Notice to Mariners is issued at least 10 working days prior to the commencement of the licensed activities (or any part of them). Such notice must advise of the start date of each campaign and the expected vessel routes from the local construction ports to the relevant location. <i>Reason: To ensure that other marine users are aware of works; to ensure navigational safety is maintained.</i>
5.2.2	During the course of disposal, material must be distributed evenly over the disposal sites South Falls (TH070) and Inner Gabbard (TH052). <i>Reason: To ensure an even spread of material is achieved over the area of the disposal site in order to avoid shoaling and minimise risk to navigational safety.</i>
5.2.3	The licence holder must ensure no more than 221,000 tonnes wet weight in total is disposed of at the disposal sites Inner Gabbard (TH052) and South Falls (TH070), as appropriate, per annum. <i>Reason: To ensure that acceptable volumes of material can be accommodated within the capacity of the disposal site.</i>
5.2.4	Bunding and/or storage facilities must be installed to contain and prevent the release of fuel, oils, and chemicals associated with plant, refuelling and construction equipment, into the marine environment. Secondary containment must be used with a capacity of no less than 110% of the container's storage capacity. <i>Reason: To minimise the risk of marine pollution incidents.</i>
5.2.5	Any oil, fuel or chemical spill within the marine environment must be reported to the MMO Marine Pollution Response Team within 12 hours.

Licence Condition	Description and Reason
	<i>Reason: To ensure that any spills are appropriately recorded and managed to minimise the risk to sensitive receptors and the marine environment.</i>
5.2.6	Any man-made material must be separated from the dredged material and disposed of to land. <i>Reason: To minimise the amount of man-made materials disposed of at sea.</i>
5.2.7	The licence holder must submit a sediment sampling plan request at least 6 months prior to the end of year 5 from the date of issue. The sediment sampling and analysis must be completed by a laboratory validated by the MMO at least 6 weeks prior to the end of year 5 from the date of issue. The licensed activities must not recommence until written approval is provided by the MMO. <i>Reason: To ensure only suitable material is dredged and disposed of at sea.</i>
5.2.8	The licence holder must submit an updated Maintenance Dredge Protocol document to the MMO for consultation with Natural England and the Environment Agency. This must be completed within 2 months following the issue of this licence. <i>Reason: To ensure that comments raised by consultees are addressed fully; to ensure that all relevant local protected sites are considered appropriately.</i>
5.2.9	The licence holder must submit to the MMO an updated Water Framework Directive (WFD) assessment at least 6 months prior to the end of year 5 from the date of issue. The dredging and disposal must not commence until written approval is provided by the MMO. <i>Reason: To assess the potential impacts of the dredging on water quality; to ensure that previous WFD-related judgments are still valid.</i>
5.2.10	The licence holder must notify the local MMO office of the completion of the licensed activities by the licence holder, no later than 10 working days after their completion. <i>Reason: To ensure the local MMO office is aware of the licensed activities at sea occurring within its jurisdiction in order to notify other sea users and to arrange any enforcement visits where appropriate.</i>
5.2.11	The licence holder must notify The Source Data Receipt team, UK Hydrographic Office, of completion of each dredging campaign, no later than 10 working days after completion. A copy of the notification must be sent to the MMO within one week of the notification being sent. <i>Reason: To ensure necessary amendments to charts can be made.</i>
5.2.12	The licence holder must inform the MMO of the location and quantities of material disposed of each month under this licence. This information must be submitted to the MMO by 31 January each year for the months August to January inclusive, and by 31 July each year for the months February to July inclusive. <i>Reason: To allow compliance reporting under the OSPAR Convention agreement as required by Article 4 (3) of Annex II and Article 4(1) of Annex II.</i>

6.2 Medway Approach Channel (WID)

In March 2019, a ten-year Marine Licence (L/2019/00092) was issued to PoSL for the use of WID within the Medway Approach Channel, valid until 14 March 2029. The licence permits PoSL to dredge up to 110,000 m³ of sand per annum from the Medway Approach Channel to provide depths of -11.3 m CD. Table 6.2 presents the project-specific conditions itemised within the Marine Licence issued by the MMO (this is not a full list of conditions; general licence conditions have been omitted).

Table 6.2 Medway Approach Channel project-specific licence conditions (WID)

Licence Condition	Description and Reason
5.2.1	Water injection dredging may not be undertaken at the same time as trailer suction hopper dredging operations under license L/2018/00185/1 [see Section 6.1]. <i>Reason: To negate in combination effects of operations being undertaken at same time.</i>
5.2.2	Bunding and/or storage facilities must be installed to contain and prevent the release of fuel, oils, and chemicals associated with plant, refuelling and construction equipment, into the marine environment. Secondary containment must be used with a capacity of no less than 110% of the container's storage capacity. <i>Reason: To minimise the risk of marine pollution incidents.</i>
5.2.3	Any oil, fuel or chemical spill within the marine environment must be reported to the MMO Marine Pollution Response Team within 12 hours. <i>Reason: To ensure that any spills are appropriately recorded and managed to minimise the risk to sensitive receptors and the marine environment.</i>
5.2.4	Dredging must not take place during the months of February and March. <i>Reason: Smelt (<i>Osmerus eperlanus</i>) a proposed feature⁴ (in the Medway Estuary MCZ) are sensitive to dredging activities. The most sensitive time for this species is during their migration period in the spring (around February/March).</i>
5.2.5	The licence holder must submit a sediment sampling plan request at least 6 months prior to the end of year 5 from the date of issue of the trailer suction hopper dredging licence, L/2018/00185/1 [see Section 6.1], on 4 May 2018. The sediment sampling and analysis must be completed by a laboratory validated by the MMO at least 6 weeks prior to the end of year 5 from the date of issue of the trailer suction hopper dredging licence, L/2018/00185/1 [see Section 6.1], on 4 May 2018. The licensed activities must not recommence until written approval is provided by the MMO. <i>Reason: To ensure only suitable material is dredged and disposed of at sea.</i>
5.2.6	The licence holder must submit to the MMO an updated Water Framework Directive (WFD) assessment at least 6 months prior to the end of year 5 from the date of issue of the trailer suction hopper dredging licence, L/2018/00185/1 [see Section 6.1], on 4 May 2018. The dredging and disposal must not commence until written approval is provided by the MMO. <i>Reason: To assess the potential impacts of the dredging on water quality; to ensure that previous WFD-related judgments are still valid.</i>
5.2.7	The licence holder must notify The Source Data Receipt team, UK Hydrographic Office, of the completion of each dredging campaign, no later than 10 working days after completion. A copy of the notification must be sent to the MMO within one week of the notification being sent <i>Reason: To ensure necessary amendments to charts can be made.</i>
5.2.8	The licence holder must notify the local MMO office of the completion of the licensed activities by the licence holder, no later than 10 working days after their completion. <i>Reason: To ensure the local MMO officer is aware of the licensed activities at sea occurring within its jurisdiction in order to notify other sea users and to arrange any enforcement visits where appropriate.</i>

⁴ Since this marine licence condition was drafted, smelt has become a feature of the Medway Estuary MCZ (i.e. it is no longer a proposed feature).

6.3 Grain LNG Jetties 8 and 10

In December 2015, an eight-year Marine Licence (L/2015/00407) was issued to National Grid Grain LNG for the use of WID within the River Medway to maintain the Grain LNG Jetties 8 and 10, valid until 30 November 2023. The licence permits National Grid Grain LNG to remove up to 4,106.25 m³ of sand each year per jetty, thus up to 8,320.5 m³ in total. Jetties 8 and 10 will be maintained at -14.5 m CD and -12.5 m CD, respectively. Table 6.3 presents the project-specific conditions itemised within the Marine Licence issued by the MMO (this is not a full list of conditions; general licence conditions have been omitted).

Table 6.3 Grain LNG Jetties 8 and 10 project-specific licence conditions

Licence Condition	Description and Reason
5.2.1	Peel Ports (Medway) Harbour Authority must be notified of the licensed activities a minimum of 5 working days in advance of commencement of each activity and a copy of that notice sent to the MMO within 5 working days of the issue of that notice. <i>Reason: To ensure other vessels in the vicinity can plan and safely conduct their passage.</i>
5.2.2	Bundling and/or storage facilities must be installed to contain and prevent the release of fuel, oils, and chemicals associated with plant, refuelling and construction equipment, into the marine environment. Secondary containment must be used with a capacity of no less than 110% of the container's storage capacity. <i>Reason: To minimise the risk of marine pollution incidents.</i>
5.2.3	Any oil, fuel or chemical spill within the marine environment must be reported to the MMO Marine Pollution Response Team within 12 hours. <i>Reason: To ensure that any spills are appropriately recorded and managed to minimise the risk to sensitive receptors and the marine environment.</i>
5.2.4	No more than 4,106.25 m ³ must be dredged per annum at each jetty. <i>Reason: To ensure the licensed activities are undertaken in line with the scope of the application assessed.</i>
5.2.5	The licence holder must submit a sediment sampling plan request at least 6 months prior to the end of year 5 (2020) from the date of issue. The sediment sampling and analysis must be completed by a laboratory validated by the MMO at least 6 weeks prior to the end of year 5 (2020) from the date of issue. The licensed activity must not continue beyond year 5 (2020) until written approval is provided by the MMO. <i>Reason: To ensure only suitable material is dredged.</i>
5.2.6	The licence holder must submit pre and post dredge surveys, together with an interpretation of the difference between the survey results and a volume calculation within 4 weeks of completion of each dredge campaign. <i>Reason: To evidence the location and volume of material removed.</i>
5.2.7	Dredging must not exceed depths of: 14.5 metres below chart datum at Jetty 8. 12.5 metres below chart datum at Jetty 10. <i>Reason: To ensure dredging does not exceed specified dredge depths.</i>

6.4 Isle of Grain Power Station

In February 2019, a ten-year Marine Licence (L/2019/00043) was issued to Uniper UK Limited for the dredging and subsequent disposal of material originating from within the Grain Power Station cooling water intake, valid until 06 February 2029. The licence permits Uniper UK Limited to remove up to an initial 13,000 m³ of dredge material (sand and clay) as part of capital works (initial two years), with subsequent maintenance dredge activities limited to 26,000 m³ of material (sand and clay) for the remainder of the licence period (over a period of eight years). Sediment will be dredged up to -4.1 m CD using a variety of techniques including WID, TSHD, backhoe/grab dredging and plough dredging (to be informed by geotechnical survey data). Where TSHD is used, disposal is permitted to the South Falls (TH070) licensed marine disposal site. Table 6.4 presents the project-specific conditions itemised within the Marine Licence issued by the MMO (this is not a full list of conditions; general licence conditions have been omitted).

Table 6.4 Isle of Grain Power Station project-specific licence conditions

Licence Condition	Description and Reason
5.2.1	HM Coastguard must be notified prior to commencement of licensed activities. A copy of this notification must be submitted to the MMO within 7 days of issue of this notification. <i>Reason: To ensure HM Coastguard is aware of the activities.</i>
5.2.2	A method statement must be submitted to the MMO at least 6 weeks prior to the proposed commencement. Any changes to these method statements must be submitted to the MMO at least 6 weeks prior to the commencement of further works. The Method Statement must also include the proposed timescales for completing the activities and the expected frequency for undertaking these throughout the licence period. <i>Reason: To ensure that the method contains appropriate mitigations which are within the scope of the assessed activities.</i>
5.2.3	The District (MMO) Marine Office must be notified of the timetable of works/operations at least 10 days prior to any activities commencing. <i>Reason: To ensure that the MMO officers are aware of the operations at sea occurring within its jurisdiction in order to notify other sea users and can arrange enforcement visits as appropriate.</i>
5.2.4	The licence holder must ensure no more than 221,000 tonnes wet weight in total is disposed of at the disposal site South Falls (TH070), as appropriate, per annum. <i>Reason: To ensure that acceptable volumes of material can be accommodated within the capacity of the disposal site.</i>
5.2.5	Bunding and/or storage facilities must be installed to contain and prevent the release of fuel, oils, and chemicals associated with plant, refuelling and construction equipment, into the marine environment. Secondary containment must be used with a capacity of no less than 110% of the container's storage capacity. <i>Reason: To minimise the risk of marine pollution incidents.</i>
5.2.6	Any oil, fuel or chemical spill within the marine environment must be reported to the MMO Marine Pollution Response Team within 12 hours. <i>Reason: To ensure that any spills are appropriately recorded and managed to minimise the risk to sensitive receptors and the marine environment.</i>
5.2.7	Any man-made material must be separated from the dredged material and disposed of to land. <i>Reason: To minimise the amount of man-made materials disposed of at sea.</i>

Licence Condition	Description and Reason
5.2.8	<p>The licence holder must submit a sediment sampling plan request at least 6 months prior to the end of year 5 from the date of issue. The sediment sampling and analysis must be completed by a laboratory validated by the MMO at least 6 weeks prior to the end of year 5 from the date of issue. The licensed activities must not recommence until written approval is provided by the MMO.</p> <p><i>Reason: To ensure only suitable material is dredged and disposed of at sea.</i></p>
5.2.9	<p>The licence holder must submit to the MMO an updated Water Framework Directive (WFD) assessment at least 6 months prior to the end of year 5 from the date of issue. The dredging and disposal must not commence until written approval is provided by the MMO.</p> <p><i>Reason: To assess the potential impacts of the dredging on water quality; to ensure that previous WFD-related judgments are still valid.</i></p>
5.2.10	<p>No works must be undertaken between October and March (Inclusive).</p> <p><i>Reason: To avoid disturbance to the over-wintering birds, an interest feature of the Medway Estuary and Marshes SPA/Ramsar/SSSI, which use the area from October to March inclusively.</i></p>
5.2.11	<p>Any finds of possible heritage significance encountered during works (e.g. wrecks, aircraft, dredged or surface finds) must be reported immediately (within 12 hours of discovery) to the MMO and works halted until an archaeologist can assess the potential significance and recommend any further mitigation that may be necessary.</p> <p><i>Reason: To preserve, protect and record any potential historical findings exposed during the works.</i></p>
5.2.12	<p>During the course of disposal, material must be distributed evenly over the disposal site South Falls (TH070).</p> <p><i>Reason: To ensure an even spread of material is achieved over the area of the disposal site in order to avoid shoaling and minimise risk to navigational safety.</i></p>
5.2.13	<p>The licence holder must notify the local MMO office of the completion of the licensed activities by the licence holder, no later than 10 working days after their completion.</p> <p><i>Reason: To ensure the local MMO office is aware of the licensed activities at sea occurring within its jurisdiction in order to notify other sea users and to arrange any enforcement visits where appropriate.</i></p>
5.2.14	<p>The licence holder must notify The Source Data Receipt team, UK Hydrographic Office no later than 10 working days after completion. A copy of the notification must be sent to the MMO within one week of the notification being sent.</p> <p><i>Reason: To ensure necessary amendments to charts can be made.</i></p>
5.2.15	<p>The licence holder must inform the MMO of the location and quantities of material disposed of each month under this licence. This information must be submitted to the MMO by 31 January each year for the months August to January inclusive, and by 31 July each year for the months February to July inclusive.</p> <p><i>Reason: To allow compliance reporting under the OSPAR Convention agreement as required by Article 4 (3) of Annex II and Article 4(1) of Annex II.</i></p>

6.5 London Thamesport

In July 2018, a five-year Marine Licence (L/2018/00269) was issued to Thamesport (London) Ltd for dredging of the London Thamesport Wharf berth area, valid until 03 July 2023. The licence permits the initial removal of up to 219,000 m³ of dredge material, followed by up to 24,000 m³ per annum (five years) in maintenance dredging, thus up to 339,000 m³ in total. All dredging will be undertaken using WID, aiming to achieve depths of -15 m CD. Table 6.5 presents the project-specific conditions itemised within the Marine Licence issued by the MMO (this is not a full list of conditions; general licence conditions have been omitted).

Table 6.5 London Thamesport project-specific licence conditions

Licence Condition	Description and Reason
5.2.1	No works shall take place during any periods of severe winter weather prolonged enough to trigger a voluntary or statutory suspension of wildfowling, known as a 'winter wildfowling ban' or 'severe weather alert for the shooting of wildfowl and waders'. In the event of a stoppage, work can resume after three days of continuous temperatures over 0 degrees Celsius. After a continuous week of cold weather (i.e. frozen conditions for seven consecutive days), advice should be sought from the Site Ecologist or Ornithologist. <i>Reason: To avoid impacts on overwintering birds</i>
5.2.2	The licence holder must submit a sediment sampling plan request at least 6 months prior to the end of 2021. The sediment sampling and analysis must be completed by a laboratory validated by the MMO at least 6 weeks prior to the end of 2021. The licensed activities must not recommence until written approval is provided by the MMO. <i>Reason: To ensure only suitable material is dredged of at sea.</i>
5.2.3	Berth pocket surveys of Grain BP (Jetty No. 1) and Grain LNG (Jetties No. 8 and 10) must be carried out prior to the Thamesport dredging commencing (pre-dredge), shortly before the phase 1 of the dredging is completed (interim) and after phase 1 of the dredging is completed (post-dredge). Where phase 2 of the dredge follows consecutively to phase 1, the post-dredge survey must take place after phase 2 of the dredge is completed. The survey methodology should follow that normally adopted by Peel Ports in their routine surveys of the Medway estuary and berths. The results of the surveys must be submitted to the MMO together with an interpretation of the difference between the survey results and the original modelled outputs within 4 weeks of completion of phase 1 of the activities or phase 2 if it follows consecutively. Dredging activities must not recommence until written approval is provided by the MMO. <i>Reason: To validate the modelled siltation levels.</i>
5.2.4	Bunding and/or storage facilities must be installed to contain and prevent the release of fuel, oils, and chemicals associated with plant, refuelling and construction equipment, into the marine environment. Secondary containment must be used with a capacity of no less than 110% of the container's storage capacity. <i>Reason: To minimise the risk of marine pollution incidents.</i>
5.2.5	Any oil, fuel or chemical spill within the marine environment must be reported to the MMO Marine Pollution Response Team within 12 hours. <i>Reason: To ensure that any spills are appropriately recorded and managed to minimise the risk to sensitive receptors and the marine environment.</i>
5.2.6	Dredging must not be undertaken between 1st April and 31st May inclusive. <i>Reason: To avoid adverse impacts to migratory fish.</i>

7 Environmental Information

This section of the Baseline Document presents information on the national and international designated sites and features that occur in the study area (Section 7.1), and associated conservation advice (Section 7.2), followed by details of relevant to the WFD, including water body status, designated bathing waters and Shellfish Water Protected Areas (Section 7.3).

7.1 Designated sites and features

The Medway and the surrounding area are of high nature conservation importance, with large areas of the estuary and the adjacent coastline designated as nationally and internationally protected sites. There are currently 14 European/internationally designated sites which overlap or in the vicinity of the maintenance dredge operations and relevant licensed marine disposal sites, including SPAs, SACs and Ramsar sites, as shown in Figure 7.1. SSSIs largely overlap with the intertidal areas of European and international designated sites, and there are also two MCZ within the Medway (Figure 7.2).

The MAGIC website (<https://magic.defra.gov.uk/>) provides maps of marine habitat and species biotope records that contribute to designated Marine Protected Area (MPA) features. This includes Marine Conservation Zone (MCZ) species/habitats of conservation importance and broadscale habitat; Special Protection Area (SPA) supporting habitat; and Special Areas of Conservation (SAC) features/subfeatures. As new evidence of the extent of these features becomes available, these maps are updated. The key MPA features that are currently mapped in the vicinity of the existing maintenance dredge areas in the Medway and its approaches and are hydrodynamically linked to these areas are estuaries, intertidal mudflats and sandflats, saltmarsh, intertidal mixed sediments, intertidal rock and records of smelt and tentacled lagoon worm. The sensitivity of these features to the pressures from maintenance dredge and disposal activities are assessed in the HRA included in Appendix C.

The following sections discuss European/international and national designated sites, and associated habitat and species features, of relevance to this Baseline Document:

- Special Protection Areas (SPAs) (Section 7.1.1);
- Special Areas of Conservation (SACs) (Section 7.1.2);
- Ramsar sites (Section 7.1.3);
- European Marine Sites (EMS) (Section 7.1.4);
- Sites of Special Scientific Interest (SSSIs) (Section 7.1.5);
- Marine Conservation Zones (MCZs) (Section 7.1.6); and
- Species and habitats of principal importance (Section 7.1.7).

7.1.1 Special Protection Areas

The Birds Directive (2009/147/EC) requires all member states to identify areas to be given special protection for the rare or vulnerable species listed in Annex 1 of the Directive (Article 4.1), for regularly occurring migratory species (Article 4.2) and for the protection of wetlands, especially wetlands of international importance. This legislation has since been transposed into UK legislation by the Habitats Regulations. These areas are known as Special Protection Areas (SPAs) and those relevant to this Baseline Document include (see Figure 7.1):

- Benfleet and Southend Marshes SPA;
- Foulness (Mid-Essex Coast Phase 5) SPA;
- Thames Estuary and Marshes SPA;

- Medway Estuary and Marshes SPA;
- The Swale SPA; and
- Outer Thames Estuary SPA.

An overview of the reasons for designations is included in Table 7.1 .

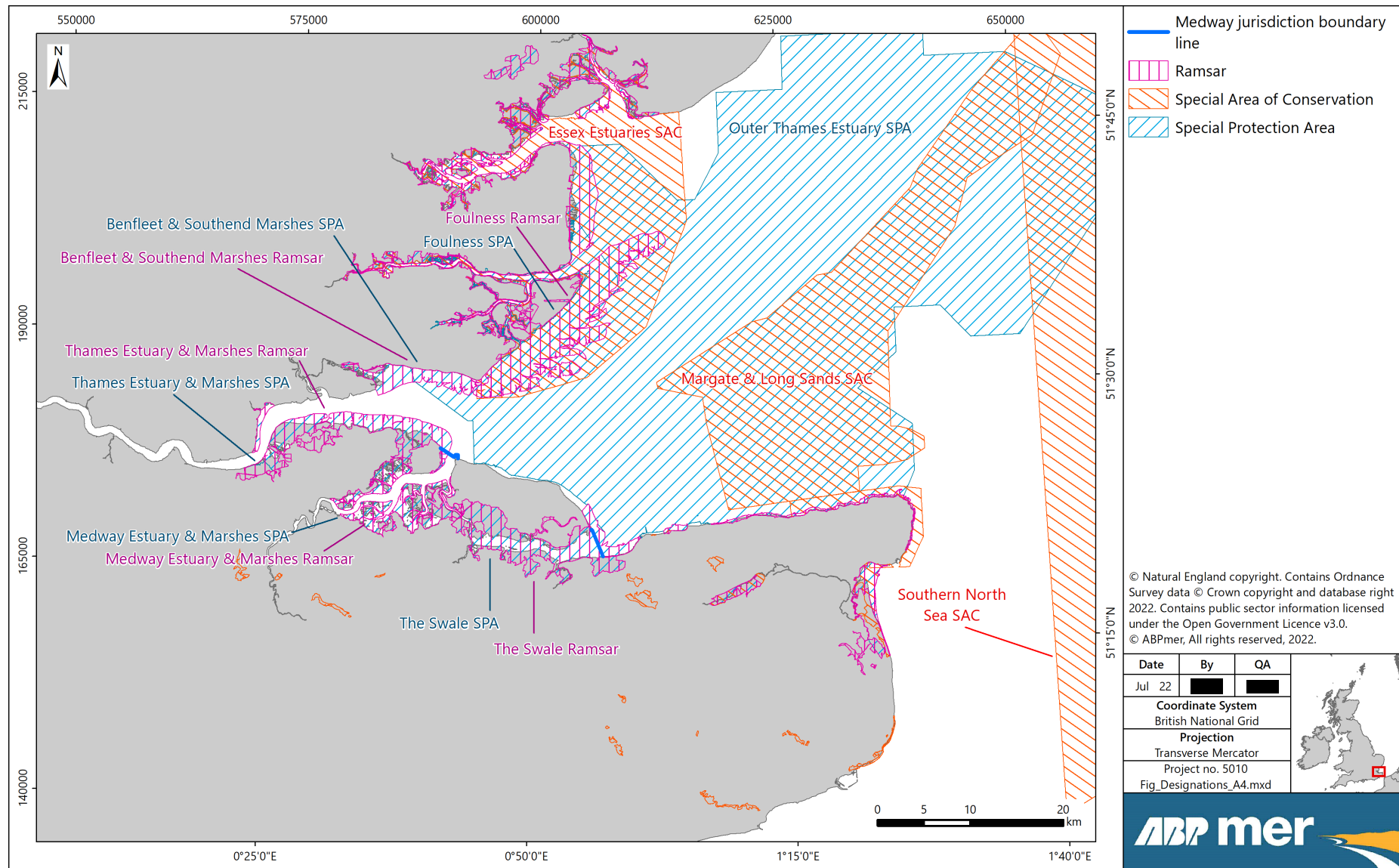


Figure 7.1 European and international nature conservation designated sites in the study area

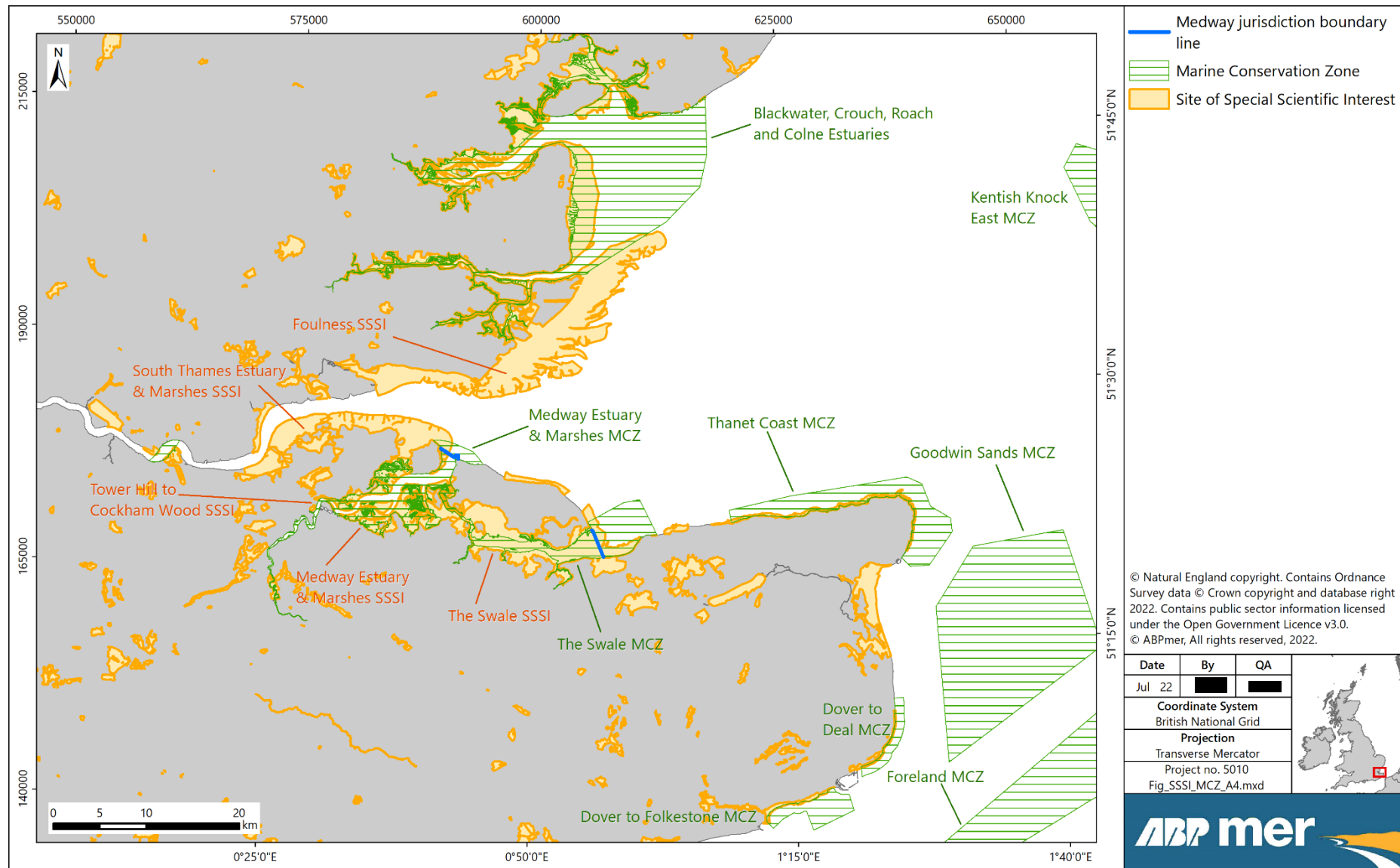


Figure 7.2 SSSIs and MCZs in the study area

Table 7.1 Qualifying bird species of SPAs within the study area

Common Name	Latin Name	Site					
		Benfleet and Southend Marshes SPA	Foulness (Mid-Essex Coast Phase 5) SPA	Thames Estuary and Marshes SPA	Medway Estuary and Marshes SPA	The Swale SPA	Outer Thames Estuary SPA
<i>Article 4.1 and Article 4.2 qualifying species</i>							
Northern pintail	<i>Anas acuta</i>				✓ (wintering)		
Northern shoveller	<i>Anas clypeata</i>				✓ (wintering)		
Eurasian teal	<i>Anas crecca</i>				✓ (wintering)	✓ (wintering)	
Eurasian wigeon	<i>Anas penelope</i>				✓ (wintering)		
Mallard	<i>Anas platyrhynchos</i>				✓ (wintering)		
Gadwall	<i>Anas strepera</i>					✓ (wintering)	
Turnstone	<i>Arenaria interpres</i>				✓ (wintering)		
Pochard	<i>Aythya ferina</i>				✓ (wintering)		
Dark-bellied brent goose	<i>Branta bernicla bernicla</i>	✓ (wintering)	✓ (wintering)		✓ (wintering)	✓ (wintering)	
Dunlin	<i>Calidris alpina alpina</i>	✓ (wintering)		✓ (wintering)	✓ (wintering)	✓ (wintering)	
Red knot	<i>Calidris canutus</i>	✓ (wintering)	✓ (wintering)	✓ (wintering)	✓ (wintering)		
Common ringed plover	<i>Charadrius hiaticula</i>	✓ (wintering)	✓ (breeding)	✓ (concentration)	✓ (wintering)	✓ (wintering)	
Hen harrier	<i>Circus cyaneus</i>		✓ (wintering)	✓ (wintering)	✓ (wintering)		
Bewick's swan	<i>Cygnus columbianus bewickii</i>				✓ (wintering)		
Merlin	<i>Falco columbarius</i>				✓ (wintering)		
Red-throated diver	<i>Gavia stellata</i>				✓ (wintering)		✓ (wintering)
Eurasian oystercatcher	<i>Haematopus ostralegus</i>		✓ (wintering)		✓ (wintering)	✓ (wintering)	
Bar-tailed godwit	<i>Limosa lapponica</i>		✓ (wintering)				
Black-tailed godwit	<i>Limosa limosa islandica</i>			✓ (wintering)	✓ (wintering)		
Eurasian curlew	<i>Numenius arquata</i>				✓ (wintering)	✓ (wintering)	
Great cormorant	<i>Phalacrocorax carbo</i>				✓ (wintering)		
Grey plover	<i>Pluvialis squatarola</i>	✓ (wintering)	✓ (wintering)	✓ (wintering)	✓ (wintering)	✓ (wintering)	
Great crested grebe	<i>Podiceps cristatus</i>				✓ (wintering)		
Pied avocet	<i>Recurvirostra avosetta</i>		✓ (wintering)	✓ (wintering)	✓ (breeding and wintering)		

Common Name	Latin Name	Site					
		Benfleet and Southend Marshes SPA	Foulness (Mid-Essex Coast Phase 5) SPA	Thames Estuary and Marshes SPA	Medway Estuary and Marshes SPA	The Swale SPA	Outer Thames Estuary SPA
Little tern	<i>Sterna albifrons</i>		✓ (breeding)		✓ (breeding)		✓ (breeding)
Common tern	<i>Sterna hirundo</i>		✓ (breeding)		✓ (breeding)		✓ (breeding)
Sandwich tern	<i>Sterna sandvicensis</i>		✓ (breeding)				
Common shelduck	<i>Tadorna tadorna</i>				✓ (breeding)		
Common greenshank	<i>Tringa nebularia</i>				✓ (breeding)		
Common redshank	<i>Tringa totanus</i>		✓ (wintering)	✓ (wintering)	✓ (breeding)	✓ (wintering)	

Source: Natural England's Designated Sites View (<https://designatedsites.naturalengland.org.uk>; Accessed August 2021)

7.1.2 Special Areas of Conservation

The Habitats Directive (92/43/EEC) requires the establishment of a network of important high-quality conservation sites that will make a significant contribution to conserving habitat types and species identified in Annexes I and II of the Directive. There are three Special Areas of Conservation (SACs) within the study area of this Baseline Document, namely (see Figure 7.1):

- Margate and Long Sands SAC;
- Southern North Sea SAC; and
- Essex Estuaries SAC.

The Annex I habitats and Annex II species which form the basis of these designations are summarised in Table 7.2.

Table 7.2 Protected habitats and species of SACs in study area

Site	Annex	Description
Margate and Long Sands SAC	Annex I Habitats	Sandbanks which are slightly covered by sea water all the time (1110).
	Annex II Species	None.
Southern North Sea SAC	Annex I Habitats	None.
	Annex II Species	Harbour porpoise (<i>Phocoena phocoena</i>) (1351).
Essex Estuaries SAC	Annex I Habitats	Estuaries (1130).
		Mudflats and sandflats not covered by seawater at low tide (1140).
		Salicornia and other annuals colonising mud and sand (1310).
		<i>Spartina</i> swards (<i>Spartinion maritimae</i>) (1320).
		Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) (1330).
		Mediterranean and thermo-Atlantic halophilous scrubs (<i>Sarcocornetea fruticosi</i>) (1420).
	Sandbanks which are slightly covered by sea water all the time ¹ (1110).	
Annex II Species	None.	

Source: Natural England's Designated Sites View (<https://designatedsites.naturalengland.org.uk>; Accessed August 2021)

7.1.3 Ramsar Sites

Under the 1971 Ramsar Convention on Wetlands of International Importance, it is a requirement of signatory states to protect wetland sites of international importance, including those that are important waterfowl habitats. There are five Ramsar sites relevant to this Baseline Document including (see Figure 7.1):

- Benfleet and Southend Marshes Ramsar;
- Foulness (Mid-Essex Coast Phase 5) Ramsar;
- Thames Estuary and Marshes Ramsar;
- Medway Estuary and Marshes Ramsar; and
- The Swale Ramsar.

An overview of the reasons for designations (Ramsar criterion) is provided in Table 7.3.

Table 7.3 Qualifying criteria of Ramsar sites in study area

Site	Qualifying Criteria
Benfleet and Southend Marshes Ramsar	Ramsar Criterion 5 – Assemblages of international importance. Species with peak counts in winter: 32,867 waterfowl (5-year peak mean, 1998/99-2002/2003).
	Ramsar Criterion 6 – Species/populations occurring at levels of international importance. Qualifying species/populations (as identified at designation). Species with peak counts in spring/autumn: Dark-bellied brent goose (<i>Branta bernicla bernicla</i>). Species with peak counts in winter: Grey plover (<i>Pluvialis squatarola</i>), Red knot (<i>Calidris canutus islandica</i>).
Foulness (Mid-Essex Coast Phase 5) Ramsar	Ramsar Criterion 1 – This site qualifies by virtue of the extent and diversity of saltmarsh habitat present. This and four other sites in the Mid-Essex Coast Ramsar site complex, include a total of 3,237 ha. That represent 70% of the saltmarsh habitat in Essex and 7% of the total area of saltmarsh in Britain.
	Ramsar Criterion 2 – The site supports a number of nationally-rare and nationally-scarce plant species, and British Red Data Book invertebrates.
	Ramsar Criterion 3 – The site contains extensive saltmarsh habitat, with areas supporting full and representative sequences of saltmarsh plant communities covering the range of variation in Britain.
	Ramsar Criterion 5 – Assemblages of international importance: Species with peak counts in winter: 82,148 waterfowl (5-year peak mean 1998/99-2002/2003).
	Ramsar Criterion 6 – species/populations occurring at levels of international importance. Qualifying species/populations (as identified at designation): Species with peak counts in spring/autumn: Common redshank (<i>Tringa totanus totanus</i>). Species with peak counts in winter: Dark-bellied brent goose (<i>Branta bernicla bernicla</i>), Eurasian oystercatcher (<i>Haematopus ostralegus ostralegus</i>), Grey plover (<i>Pluvialis squatarola</i>), Red knot (<i>Calidris canutus islandica</i>), Bar-tailed godwit (<i>Limosa lapponica lapponica</i>).
Thames Estuary and Marshes Ramsar	Ramsar Criterion 2 – The site supports one endangered plant species and at least 14 nationally scarce plants of wetland habitats. The site also supports more than 20 British Red Data Book invertebrate.
	Ramsar Criterion 5 - Assemblages of international importance: Species with peak counts in winter: 45,118 waterfowl (5-year peak mean 1998/99-2002/2003)
	Ramsar Criterion 6 – species/populations occurring at levels of international importance. Qualifying species/populations (as identified at designation): Species with peak counts in spring/autumn: Ringed plover (<i>Charadrius hiaticula</i>), Black-tailed godwit (<i>Limosa limosa islandica</i>). Species with peak counts in winter: Grey plover (<i>Pluvialis squatarola</i>), Red knot (<i>Calidris canutus islandica</i>), Dunlin (<i>Calidris alpina alpina</i>), Common redshank (<i>Tringa totanus totanus</i>).
Medway Estuary and Marshes Ramsar	Ramsar Criterion 2 – The site supports a number of species of rare plants and animals. The site holds several nationally scarce plants, including sea barley <i>Hordeum marinum</i> , curved hard-grass <i>Parapholis incurva</i> , annual beard-grass <i>Polypogon monspeliensis</i> , Borrer's saltmarsh-grass <i>Puccinellia fasciculata</i> , slender hare's-ear <i>Bupleurum tenuissimum</i> , sea clover <i>Trifolium squamosum</i> , saltmarsh goose-foot <i>Chenopodium chenopodioides</i> , golden samphire <i>Inula crithmoides</i> , perennial glasswort <i>Sarcocornia perennis</i> and one-flowered glasswort <i>Salicornia pusilla</i> . A total of at least twelve British Red Data Book species of wetland invertebrates have been recorded on the site. These include a ground beetle <i>Polistichus connexus</i> , a fly <i>Cephalops perspicuus</i> , a dancefly <i>Poecilobothrus ducalis</i> , a fly <i>Anagnota collini</i> , a weevil <i>Baris scolopacea</i> , a water beetle <i>Berosus spinosus</i> , a beetle <i>Malachius vulneratus</i> , a rove beetle <i>Philonthus punctus</i> , the

Site	Qualifying Criteria
	ground lackey moth <i>Malacosoma castrensis</i> , a horsefly <i>Atylotus latistriatus</i> , a fly <i>Campsicnemus magius</i> , a soldier beetle <i>Cantharis fusca</i> , and a crane fly <i>Limonia danica</i> . A significant number of non-wetland British Red Data Book species also occur.
	Ramsar Criterion 5 – Assemblages of international importance: Species with peak counts in winter: 47,637 waterfowl (5-year peak mean 1998/99-2002/2003).
	Ramsar Criterion 6 – species/populations occurring at levels of international importance. Qualifying species/populations (as identified at designation): Species with peak counts in spring/autumn: Grey plover (<i>Pluvialis squatarola</i>), Common redshank (<i>Tringa totanus totanus</i>). Species with peak counts in winter: Dark-bellied brent goose (<i>Branta bernicla bernicla</i>), Common shelduck (<i>Tadorna tadorna</i>), Northern pintail (<i>Anas acuta</i>), Ringed plover (<i>Charadrius hiaticula</i>), Red knot (<i>Calidris canutus islandica</i>), Dunlin (<i>Calidris alpina alpina</i>).
The Swale Ramsar	Ramsar Criterion 2 – The site supports nationally scarce plants and at least seven British Red data book invertebrates.
	Ramsar Criterion 5 – Assemblages of international importance: Species with peak counts in winter: 77,501 waterfowl (5-year peak mean 1998/99-2002/2003)
	Ramsar Criterion 6 – species/populations occurring at levels of international importance. Qualifying species/populations (as identified at designation): Species with peak counts in spring/autumn: Common redshank (<i>Tringa totanus totanus</i>). Species with peak counts in winter: Dark-bellied brent goose (<i>Branta bernicla bernicla</i>), Grey plover (<i>Pluvialis squatarola</i>).

Source: Natural England's Designated Sites View (<https://designatedsites.naturalengland.org.uk>; Accessed August 2021)

7.1.4 European Marine Sites

A European Marine Site (EMS) is the collective term for SACs and SPAs that are covered by tidal water (continuously or intermittently) and protect some of Britain's most special marine and coastal habitats and species of European importance. In accordance with Government advice in both England and Wales, Ramsar sites must be given the same consideration as European sites when considering plans and projects which might affect them. EMS within the study area include the Essex Estuaries, Benfleet and Southend Marshes, Medway Estuary and Marshes, The Swale, Thames Estuary and Marshes, Foulness (Mid-Essex Coast Phase 5) and Outer Thames Estuary, which are all of international significance for the biodiversity they support.

7.1.5 Sites of Special Scientific Interest

The Wildlife and Countryside Act 1981 provides for the designation and management of SSSIs. These sites are designated to safeguard, for present and future generations, the diversity and geographic range of habitats, species, and geological and physiographical features, including the full range of natural and semi-natural ecosystems and of important geological and physiographical phenomena throughout England and Wales. The Countryside and Rights of Way Act 2000 also provides for public access, on foot, to certain types of land; amends the law for public rights of way; increases protection for SSSIs and strengthens wildlife enforcement legislation; and provides for better management of Areas of Outstanding Natural Beauty (AONB). SSSIs within the study area include (see Figure 7.2):

- South Thames Estuary and Marshes SSSI;
- Medway Estuary and Marshes SSSI;
- The Swale SSSI; and
- Tower Hill to Cockham Wood SSSI.

The majority of features within these SSSIs are also protected through the European and International designations. Where the SSSIs uniquely protect intertidal features not covered by the European or International designations, the potential impacts to these SSSI features also need to be considered. There are no interaction pathways between dredging activities and terrestrial features protected by these SSSIs, therefore SSSI features not covered by European and International designations have not been considered further.

7.1.6 Marine Conservation Zones

Two MCZs are present within the study area, namely the Medway Estuary MCZ and Swale Estuary MCZ (see Figure 7.2). Uniquely, the Medway Estuary MCZ is separated into two sub-zones due to the expansion of the site in May 2019 to include the targeted recovery of smelt (*Osmerus eperlanus*) populations within the extended boundary. Protected features of these two nationally designated sites are provided in Table 7.4.

Table 7.4 Study area MCZs and protected features

Site	Protected Features	General Management Approach
Medway Estuary MCZ	Estuarine rocky habitats	Maintain in favourable condition
	Intertidal mixed sediments	
	Intertidal sand and muddy sand	
	Low energy intertidal rock	
	Peat and clay exposures	
	Subtidal coarse sediment	
	Subtidal mud	
	Subtidal sand	
	Tentacled Lagoon Worm (<i>Alkmaria romijni</i>)	
	Smelt (<i>Osmerus eperlanus</i>)	
Swale Estuary MCZ	Estuarine rocky habitats	Maintain in favourable condition
	Low energy intertidal rock	
	Intertidal mixed sediments	
	Intertidal coarse sediment	
	Intertidal sand and muddy sand	
	Subtidal coarse sediment	
	Subtidal mixed sediments	
	Subtidal sand	
Subtidal mud		

Source: Natural England's Designated Sites View (<https://designatedsites.naturalengland.org.uk>; Accessed August 2021)

7.1.7 Species and habitats of principal importance

A list of species and habitats of principal importance has been developed under S41 of the Natural Environment and Rural Communities (NERC) Act 2006. The Section 41 list contains numerous species and habitats of principal importance which occur in England.

Species and habitats of principal importance identified within and in the vicinity of the Medway, with benthic relevance, include:

- Coastal saltmarsh;
- Estuarine rocky habitats;
- Intertidal mudflats;
- Peat and clay exposures;
- Seagrass beds;
- Subtidal sands and gravels;
- Tide-swept channels;
- Harbour porpoise (*phocoena phocoena*); and
- Smelt (*Osmerus eperlanus*).

7.2 Conservation advice

Natural England has a statutory responsibility to advise relevant authorities in England as to the conservation objectives for EMS, as well as operations which may cause deterioration or disturbance of natural habitats and species. This advice is provided under Regulation 37 of the Habitats Regulations (formerly Regulation 35). The role of the conservation objectives for an EMS is to define the nature conservation aspirations for the features of interest, thereby representing the aims and requirements of the Habitats and Birds Directives in relation to the site. Natural England has updated conservation advice for most EMS in England, available via the Designated Sites View⁵.

The Conservation Objectives for the Essex Estuaries SAC and Margate and Long Sands SAC are as follows (both refer to the same text):

- The objectives are to ensure that, subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the Favourable Conservation Status of its qualifying features, by maintaining or restoring:
 - The extent and distribution of qualifying natural habitats and habitats of the qualifying species;
 - The structure and function (including typical species) of qualifying natural habitats;
 - The structure and function of the habitats of the qualifying species;
 - The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;
 - The populations of each of the qualifying species; and
 - The distribution of qualifying species within the site.

The Conservation Objectives for the Southern North Sea SAC vary from the above SACs due to the uniqueness of the designated feature, Harbour porpoise (*Phocoena phocoena*). The Conservation Objectives for the Southern North Sea SAC are as follows:

- To ensure that the integrity of the site is maintained and that it makes the best possible contribution to maintaining Favourable Conservation Status for Harbour Porpoise in UK waters. In the context of natural change, this will be achieved by ensuring that:
 - Harbour porpoise is a viable component of the site;
 - There is no significant disturbance of the species; and
 - The condition of supporting habitats and processes, and the availability of prey is maintained.

⁵ <https://designatedsites.naturalengland.org.uk> (Accessed August 2021).

The conservation objectives for the relevant SPAs (see Section 7.1.1) are as follows:

- The objectives are to ensure that, subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:
 - The extent and distribution of the habitats of the qualifying features;
 - The structure and function of the habitats of the qualifying features;
 - The supporting processes on which the habitats of the qualifying features rely;
 - The populations of each of the qualifying features; and
 - The distribution of qualifying features within the site.

In each case, the above Conservation Objectives should be reviewed in conjunction with the latest advice provided by Natural England.

Favourable condition status has not yet been defined specifically for all the European/Ramsar sites; however, condition assessments of the respective SSSIs (see Figure 7.2) which cover virtually the same geographic extent as the European/Ramsar sites (Figure 7.1) have been undertaken by Natural England. Detailed Supplementary Advice on Conservation Objectives and Advice on Operations has, however, been prepared by Natural England for SACs, SPAs and MCZs which set out the targets for attributes and also identify pressures associated with the most commonly occurring marine activities to designated features and subfeatures, including the potential impact of maintenance dredging and disposal. In addition, this advice provides a detailed assessment of sensitivity for each feature/subfeature or supporting habitat to these pressures. Refer to Natural England's Designated Sites View for conservation objectives, latest condition assessment and the assessment of marine activities, pressures and any supporting evidence.

A detailed breakdown of the condition assessment of each of the SSSIs within the study area can be found in Appendix B, with a summary of these results being presented in Table 7.5. The overall status for the South Thames Estuary and Marshes SSSI and The Swale SSSI is greater than 97% favourable or unfavourable recovering. The Medway Estuary and Marshes SSSI, however, has a majority area (53.71%) designated as unfavourable recovering, with a large proportion (45.56%) being designated as unfavourable declining. Despite the high proportion of unfavourable declining, only unit 100 is identified as such. This unit consists of 2,163 hectares of littoral sediment and is being damaged by algal blooms smothering the mudflats and reducing the food availability for the Medway bird assemblage. These deleterious effects are unlikely to be affected by dredge deposition into the designated disposal sites or any dredging activity (including WID).

Table 7.5 Favourable condition status of SSSIs in the study area

Favourable Condition Status	South Thames Estuary and Marshes SSSI	Medway Estuary and Marshes SSSI	The Swale SSSI
% Area Favourable	95.28	0.00	97.83
% Area Unfavourable Recovering	2.35	53.71	0.00
% Area Unfavourable No Change	0.59	0.24	2.17
% Area Unfavourable Declining	1.79	45.56	0.00
% Area Destroyed/Part Destroyed	0.00	0.47	0.00

Source: Natural England's Designated Sites View (<https://designatedsites.naturalengland.org.uk>; Accessed August 2021)

7.3 Water Framework Directive

The 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 and replaced in April 2017 by the Water Environment (WFD) (England and Wales) Regulations 2017 (noting, these were modified by the Floods and Water (Amendment etc.) (EU Exit) Regulations 2019 on 31 January 2020). The overall objective of the WFD is to achieve good status (GS) in all inland, transitional, coastal and ground waters by 2021 (original objective was by 2015), unless alternative objectives are set and there are appropriate reasons for time limited derogation.

The WFD divides rivers, lakes, lagoons, estuaries, coastal waters (out to 1 nm from the low water mark), man-made docks and canals into a series of discrete surface water bodies. It sets ecological as well as chemical targets (objectives) for each surface water body. For a surface water body to be at overall GS, the water body must be achieving good ecological status (GES) and good chemical status (GCS). Ecological status is measured on a scale of high, good, moderate, poor or bad, while chemical status is measured as good or fail (i.e. failing to achieve good).

Each surface water body has a hydromorphological designation that describes how modified a water body is from its natural state. Water bodies are either undesignated (i.e. natural, unchanged), designated as a heavily modified water body (HMWB) or designated as an artificial water body (AWB). HMWBs are defined as bodies of water which, as a result of physical alteration by human use activities (such as flood protection and navigation) are substantially changed in character and cannot therefore meet GES. AWBs are artificially created through human activity. The default target for HMWBs and AWBs under the WFD is to achieve good ecological potential (GEP), a status recognising the importance of their human use while ensuring ecology is protected as far as possible.

The ecological status/potential of surface waters is classified using information on the biological (e.g. fish, benthic invertebrates, phytoplankton, angiosperms and macroalgae), physico-chemical (e.g. dissolved oxygen and dissolved inorganic nitrogen) and hydromorphological (e.g. hydrological regime) quality of the water body, as well as several specific pollutants (e.g. copper and zinc). Compliance with chemical status objectives is assessed in relation to environmental quality standards (EQS) for a specified list of 'priority' and 'priority hazardous' substances. These substances were first established by the Priority Substances Directive (PSD) (2008/105/EC) which entered into force in 2009.

The PSD sets objectives, amongst other things, for the reduction of these substances through the cessation of discharges or emissions. As required by the WFD and PSD, a proposal to revise the list of priority (hazardous) substances was submitted in 2012. Subsequently, an updated PSD (2013/39/EU) was published in 2013, identifying new priority substances, setting EQSs for those newly identified substances, revising the EQS for some existing substances in line with scientific progress and setting biota EQSs for some existing and newly identified priority substances. The updated PSD is explained in the WFD (Standards and Classification) Directions (England and Wales) 2015.

In addition to surface water bodies, the WFD also incorporates groundwater water bodies. Groundwaters are assessed against different criteria compared to surface water bodies since they do not support ecological communities (i.e. it is not appropriate to consider ecological status of a groundwater). Therefore, groundwater water bodies are classified as good or poor quantitative status in terms of their quantity (groundwater levels and flow directions) and quality (pollutant concentrations and conductivity), along with chemical (groundwater) status.

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 and interim classifications via the Catchment Data Explorer⁶. The study area around the Medway is located within the Thames river basin district which is reported in the Thames RBMP (Environment Agency, 2016).

Consideration of WFD requirements is necessary for activities which have the potential to cause deterioration in ecological, quantitative and/or chemical status of a water body or to compromise improvements which might otherwise lead to a water body meeting its WFD objectives. Therefore, it is necessary to consider the potential for maintenance dredging to impact WFD water bodies, specifically referring to the following environmental objectives of the WFD:

- Prevent deterioration in status of all surface water bodies (Article 4.1 (a)(i));
- Protect, enhance and restore all surface water bodies with the aim of achieving good surface water status by 2015 (now working towards 2021) or later assuming grounds for time limited derogation (Article 4.1 (a)(ii));
- Protect and enhance all HMWBs/AWBs, with the aim of achieving GEP and GCS by 2015 (now working towards 2021) or later assuming grounds for time limited derogation (Article 4.1 (a)(iii));
- Reduce pollution from priority substances and cease or phase out emissions, discharges and losses of priority hazardous substances (Article 4.1 (a)(iv));
- Prevent or limit the input of pollutants into groundwater and prevent deterioration of the status of all groundwater water bodies (Article 4.1 (b)(i));
- Protect, enhance and restore all groundwater water bodies and ensure a balance between abstraction and recharge of groundwater (Article 4.1 (b)(ii));
- Ensure achievement of objectives in other water bodies is not compromised (Article 4.8); and
- Ensure compliance with other community environmental legislation (Article 4.9).

In 2016, the Environment Agency published guidance, referred to as Clearing the Waters for All⁷, regarding how to assess the impact of activities in transitional and coastal waters.

7.3.1 Water bodies in the study area

The current status of water bodies in the Thames River Basin District is given in Cycle 2 of the Thames RBMP (Environment Agency, 2016), with interim classifications provided via the Environment Agency's Catchment Data Explorer⁸. The study area around the Medway includes the following transitional and coastal waterbodies (see Figure 2.1):

- Medway transitional water body (GB530604002300);
- Swale transitional water body (GB530604011500);
- Thames Lower transitional water body (GB530603911401);
- Thames Coastal North coastal water body (GB640603690000);
- Thames Coastal South coastal water body (GB640604640000);
- Whitstable Bay coastal water body (GB640604290000);
- Essex coastal water body (GB650503520001); and
- Kent North coastal water body (GB650704510000).

⁶ <https://environment.data.gov.uk/catchment-planning> (Accessed August 2021).

⁷ <https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters> (Accessed August 2021).

⁸ <https://environment.data.gov.uk/catchment-planning> (Accessed August 2021).

Numerous riverine (freshwater) water bodies drain into the transitional and coastal water bodies around the Medway, while groundwaters underlay the terrestrial margins. These water bodies have been screened out of this Baseline Document as maintenance dredging and disposal activities are unlikely to result in adverse effects (e.g. riverine water bodies are beyond the normal tidal limit (NTL) or behind a sluice/weir, while works are unlikely to result in saline intrusion for groundwaters).

Table 7.6 provides a summary of water body status (based on 2019 interim classifications) for the transitional and coastal water bodies screened into the Baseline Document. All eight water bodies are currently failing to achieve GS, consistently as a result of failing chemical status, while ecological potential is also moderate or worse in each case. In terms of chemical status, the priority hazardous substances Polybrominated diphenyl ethers (PBDE) and Mercury and its compounds were reported as 'fail' for all eight water bodies, with Benzo(ghi)perylene and Tributyltin compounds are also failing in several water bodies.

7.3.2 Water quality – Bathing Waters Directive

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).

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.

The Directive aims to protect the environment and public health, and maintain amenity use of designated bathing waters (fresh and saline) by reducing the risk of pollution. It requires popular bathing waters to be 'designated' and monitored for water quality, particularly for human waste from sewage treatment works or agricultural waste.

During the 2019 bathing season (from 15 May to 30 September each year)⁹, there were 420 identified and monitored bathing waters in England, 105 in Wales, 85 in Scotland and 26 in Northern Ireland; thus, a total of 636 bathing waters across the UK. Nearly all bathing waters in England (98.3%) met the new minimum standards required by the revised Bathing Waters Directive and 71.4% met the very highest Excellent standard; compared to 63.6% in 2015.

The closest designated bathing water to dredge areas within the study area is Sheerness (Figure 7.3). West Beach, Whitstable bathing water is located at the mouth of The Swale, while numerous bathing waters are located along the coast of the Isle of Sheppey and the northern bank of the Thames Estuary. Water quality classifications for the period 2016 to 2019 can be found in Table 7.7.

⁹ Note, bathing waters were not sampled during the bathing season in 2020 due to the COVID-19 pandemic and safety concerns for Environment Agency officers.

Table 7.6 Summary of water body status in the study area

Water Body Name (Code and Designation)	Current Overall Status (2019)	Parameters Currently Failing to Achieve Good
Medway (GB530604002300, HMWB)	Moderate (moderate ecological potential; failing chemical status)	Mitigation measures assessment (moderate or less); Dissolved inorganic nitrogen (moderate); Dichlorvos (fail); Polybrominated diphenyl ethers (PBDE) (fail); Benzo(ghi)perylene (fail); Mercury and its compounds (fail); Tributyltin compounds (fail).
Swale (GB530604011500, HMWB)	Moderate (moderate ecological potential; failing chemical status)	Mitigation measures assessment (moderate or less); Dissolved inorganic nitrogen (moderate); Polybrominated diphenyl ethers (PBDE) (fail); Mercury and its compounds (fail).
Thames Lower (GB530603911401, HMWB)	Moderate (moderate ecological potential; failing chemical status)	Mitigation measures assessment (moderate or less); Angiosperms (moderate); Dissolved inorganic nitrogen (moderate); Cypermethrin (fail); Polybrominated diphenyl ethers (PBDE) (fail); Benzo(ghi)perylene (fail); Mercury and its compounds (fail); Tributyltin compounds (fail).
Thames Coastal North (GB640603690000, HMWB)	Moderate (moderate ecological potential; failing chemical status)	Mitigation measures assessment (moderate or less); Dissolved inorganic nitrogen (moderate); Polybrominated diphenyl ethers (PBDE) (fail); Mercury and its compounds (fail).
Thames Coastal South (GB6406046400009 HMWB)	Moderate (moderate ecological potential; failing chemical status)	Mitigation measures assessment (moderate or less); Dissolved inorganic nitrogen (moderate); Polybrominated diphenyl ethers (PBDE) (fail); Benzo(ghi)perylene (fail); Mercury and its compounds (fail).
Whitstable Bay (GB640604290000, HMWB)	Poor (poor ecological potential; failing chemical status)	Mitigation measures assessment (moderate or less); Phytoplankton (poor); Dissolved inorganic nitrogen (moderate); Polybrominated diphenyl ethers (PBDE) (fail); Benzo(ghi)perylene (fail); Mercury and its compounds (fail).
Essex (GB650503520001, HMWB)	Moderate (moderate ecological potential; failing chemical status)	Mitigation measures assessment (moderate or less); Dissolved inorganic nitrogen (moderate); Polybrominated diphenyl ethers (PBDE) (fail); Mercury and its compounds (fail).
Kent North (GB650704510000, HMWB)	Moderate (moderate ecological potential; failing chemical status)	Mitigation measures assessment (moderate or less); Polybrominated diphenyl ethers (PBDE) (fail); Mercury and its compounds (fail).

Source: Environment Agency's Catchment Data Explorer
(<https://environment.data.gov.uk/catchment-planning>; Accessed August 2021)

Table 7.7 Bathing waters classifications in study area (2016-2019)

Bathing Water	2016	2017	2018	2019
Sheerness	Excellent	Excellent	Excellent	Excellent
Minster Leas	Excellent	Excellent	Excellent	Excellent
Leysdown	Good	Excellent	Good	Excellent
West Beach, Whitstable	Excellent	Good	Good	Good
Tankerton	Excellent	Excellent	Excellent	Excellent
Herne Bay Central	Good	Good	Good	Good
Herne Bay	Excellent	Excellent	Excellent	Excellent
Leigh Bell Wharf	Sufficient	Sufficient	Poor	Sufficient
Southend Chalkwell	Good	Good	Sufficient	Good
Southend Westcliff Bay	Excellent	Excellent	Excellent	Excellent
Southend Three Shells	Good	Good	Excellent	Excellent
Southend Jubilee	Good	Good	Good	Good
Southend Thorpe Bay	Excellent	Excellent	Excellent	Excellent
Shoeburyness	Excellent	Excellent	Excellent	Excellent
Shoebury East	Excellent	Excellent	Excellent	Excellent

Source: Environment Agency's Bathing Water Quality (<https://environment.data.gov.uk/bwq/profiles>; Accessed August 2021)

7.3.3 Water quality - Shellfish Waters Directive

The Shellfish Waters Directive (2006/113/EC) 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 intervalvular 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 several Shellfish Water Protected Areas within or in the vicinity of maintenance dredging and disposal activities for the Medway, namely (Defra, 2016; see Figure 7.3):

- Foulness;
- Southend;
- Outer Thames;
- Swale Central;
- Swale East;
- Sheppey; and
- Swalecliffe.

Table 7.8 presents details of classification zones located within the Thames Estuary and Swale bivalve mollusc production areas. These classification zones are designated for *Cerastoderma edule* (Common edible cockle), *Crassostrea gigas* (Pacific oyster), *Mytilus* spp. (*Mytilus edulis* (blue mussel), *Mytilus galloprovincialis* (Mediterranean mussel) and hybrids), *Ostrea edulis* (Native oyster) and/or *Ensis* spp. (Razor clams). These zones were classified as Class A, Class B, Class B (Long-term; B-LT), Class C or Seasonal A/B for 2020/21. The EU legislation, retained post-Brexit, determining the classification of shellfish waters within the UK is EC Regulation 2019/627, namely Articles 53 (Class A), 54 (Class B) and 55 (Class C). The classification of shellfish waters determines the level of treatment required before molluscs can be placed on the market.

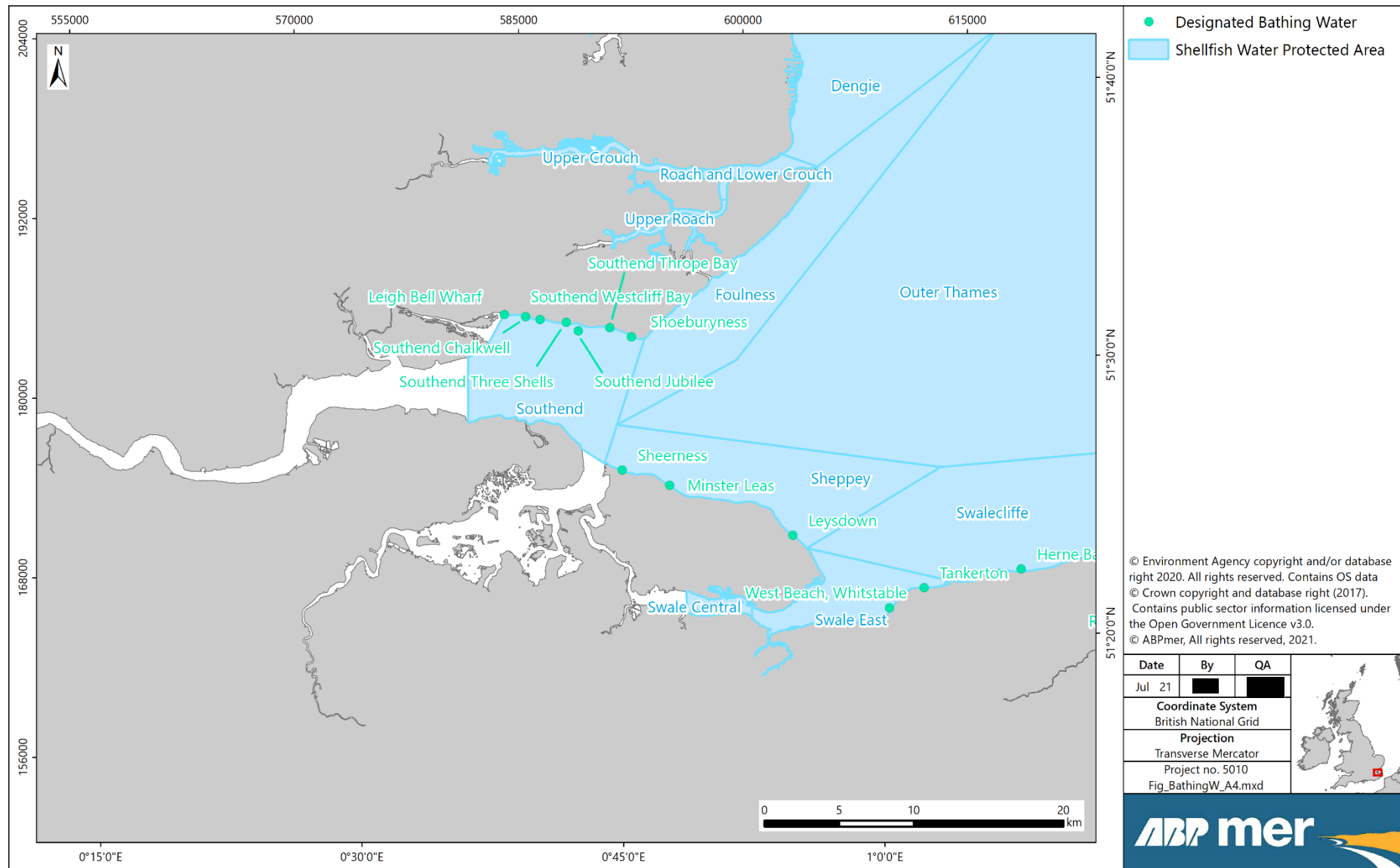


Figure 7.3 Designated bathing waters and Shellfish Water Protected Areas in the study area

Table 7.8 Bivalve mollusc classification for 2020/2021

Production Area	Classification Zone	Species	Class
Thames Estuary	Maplin West	<i>C. edule</i>	Seasonal A/B (Class A season 1 June – 31 October, reverting to Class B at all other times)
	Maplin Central	<i>C. edule</i>	Class A
	Maplin East	<i>C. edule</i>	Seasonal A/B (Class A season 1 June – 31 October, reverting to Class B at all other times)
	East of Southend Pier	<i>C. gigas</i>	Class B
	Leigh Foreshore	<i>C. edule</i>	Class C
		<i>Mytilus spp.</i>	
	Phoenix	<i>C. edule</i>	Class A
	Barrow Deep	<i>O. edulis</i>	Seasonal A/B (Class A season 1 December – 30 September, reverting to Class B at all other times)
	Black Deep	<i>Ensis spp.</i>	Class A
	East Barrows	<i>C. edule</i>	Class B (Preliminary)
	West Barrows (Zone 9)	<i>C. edule</i>	Class B (Preliminary)
	Barrows (Zone 12)	<i>C. edule</i>	Class B (Preliminary)
	Southend Flats	<i>C. edule</i>	Class C
		<i>Mytilus spp.</i>	
	West of Southend Pier	<i>C. gigas</i>	Class B (Long-term)
	East Cant, Middle and Scrapsgate – TECFO Area 13 (modified)	<i>C. edule</i>	Class C (Preliminary)
West Cant and Scrapsgate – TECFO Area 13 (modified)	<i>C. edule</i>	Class B (Long-term)	
North Sheppey	<i>Mytilus spp.</i>	Class B (Long-term)	
Swale	Swale Causeway	<i>C. gigas</i>	Class B (Long-term)
		<i>O. edulis</i>	
	Swale Inner North	<i>C. gigas</i>	Class B (Long-term)
	Swale Inner South	<i>C. gigas</i>	Class B (Long-term)
	Swale Outer	<i>C. gigas</i>	Class B (Long-term)
<i>C. edule</i>		Class C (Preliminary)	

Source: Food Standards Agency (<https://www.food.gov.uk/business-guidance/shellfish-classification>; Accessed August 2021)

Category criteria for bivalve mollusc classification zones are summarised as follows:

- Class A: Molluscs must contain 80% of results ≤ 230 *E.coli* per 100 grams of flesh, no results exceeding 700 *E.coli* per 100g flesh. Molluscs can be harvested for direct human consumption.
- Class B: 90% of sampled molluscs must be $\leq 4,600$ *E.coli* 100 grams of flesh; samples must not exceed 46,000 *E. coli* per 100 grams of flesh. Molluscs can go for human consumption after purification in an approved plant, or after relaying in an approved Class A relaying area, or after an approved heat treatment process. All samples must be less than 46,000 *E.coli*/100g.
- Class C: Molluscs must contain $\leq 46,000$ *E. coli* per 100 grams of flesh. Molluscs can go for human consumption only after: Relaying for at least two months in an approved Class B relaying area followed by treatment in an approved purification centre, or relaying in an approved Class A relaying area, or an approved heat treatment process.

Sites failing on coliform guideline standards usually do so because mussels accumulate bacteria from water as they filter feed. Human and animal waste is the source input of coliform, and reducing inputs from sewage treatment and farm derived waste is the most effective way to manage the source inputs.

7.3.4 Water quality – other directives

There are further EU Directives that impose objectives relevant to the regulation of surface water quality, such as the Urban Waste Water Treatment Directive (91/271/EEC) and the Nitrates Directive (91/676/EEC). The European Union (Withdrawal) Act 2018 ensures incorporation of these EU Directives in UK legislation post-Brexit.

The Urban Waste Water Treatment Directive 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 due to elevated nitrate concentrations and act as an indication that action is required to prevent further pollution caused by nutrients. There are several Bathing Water and Shellfish Water sensitive areas located within the study area¹⁰.

The Nitrates Directive 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. Three surface nitrate vulnerable zones (NVZs) surround the north section of the Medway Estuary, namely:

- Coastal Streams to Lower Thames NVZ;
- Tidal Medway Drain A NVZ; and
- Tidal Medway Drain B NVZ.

7.3.5 Directive overlap

The WFD makes clear that, in the case of protected areas (i.e. where the presence of a protected area introduces different targets to a particular water body), the more stringent objective applies. There is no indication from the latest Thames RBMP (Environment Agency, 2016) that any of the WFD objectives would be more stringent than those of the Birds and Habitats Directives, thus it is assumed that any WFD compliance assessment for maintenance dredging and disposal would defer to the outcomes of the MDP with regard to compliance with the objectives of internationally designated sites.

¹⁰ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/796755/sensitive-areas-map-kent-south-london.pdf (Accessed August 2021).

8 Knowledge Gaps

During the process of compiling this Baseline Document update, the following knowledge gaps were identified:

- Some updates to environmental information have not been completed for 2020 due to COVID-19 restriction. For example, bathing waters were not monitored by the Environment Agency due to the risk to survey personnel and, therefore, the latest bathing water classification data reported in this Baseline Document is from 2019.
- It is noted that Samples Plans issued by the MMO (prepared in consultation with Cefas) are increasingly including the requirement to analyse sediment samples for PBDEs. There is currently a lack of data relating to PBDEs from sediment samples collected within the dredge areas of the Medway. This is further highlighted given the consistent failing of PBDEs in transitional and coastal water bodies in and around the Medway under the WFD.
- There is no sediment quality data from third parties since 2011 (see Table 5.2). If any suitable data from third parties is made available from samples collected within respective dredge areas of the Medway, these should be included in future iterations of this Baseline Document.

9 References

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10 Abbreviations

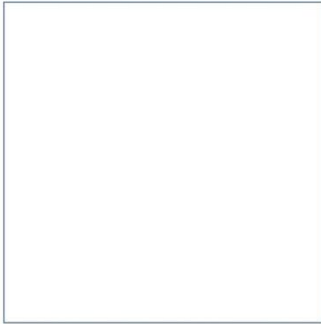
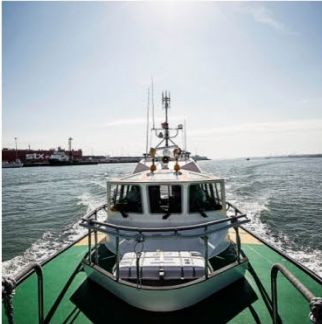
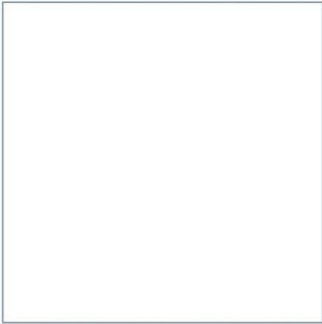
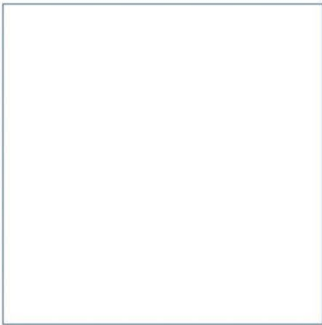
AL1	Cefas Guideline Action Level 1
AL2	Cefas Guideline Action Level 2
AONB	Area of Outstanding Natural Beauty
AWB	Artificial Water Bodies
BTO	British Trust for Ornithology
CD	Chart Datum
Cefas	Centre for Environment, Fisheries and Aquaculture Science
DBT	Dibutyltin
Defra	Department for the Environment, Food and Rural Affairs
EMS	European Marine Site
EQS	Environmental Quality Standard
EU	European Union
GCS	Good Chemical Status
GEP	Good Ecological Potential
GES	Good Ecological Status
GHD	Grab Hopper Dredging
GS	Good Status
HMWB	Heavily Modified Water Body
HRA	Habitats Regulations Assessment
HTL	Hold The Line
IECS	International Estuarine and Coastal Specialists Ltd
LOD	Limit of Detection
MCAA	Marine and Coastal Access Act
MCZ	Marine Conservation Zone
MDHC	Mersey Docks and Harbour Company
MDP	Maintenance Dredge Protocol
MHWS	Mean High Water Springs
MMO	Marine Management Organisation
MPA	Marine Protected Area
MR	Managed realignment
NAI	No Active Intervention
NERC	Natural Environment and Rural Communities
nm	Nautical Mile
NTL	Normal Tidal Limit
NVZ	Nitrate Vulnerable Zone
OCP	Organochlorine Pesticide
ODN	Ordnance Datum Newlyn
PAH	Polycyclic Aromatic Hydrocarbon
PBDE	Polybrominated Diphenyl Ether
PCB	Polychlorinated Biphenyl
PLA	Port of London Authority
PoSL	Port of Sheerness Limited
PSA	Particle Size Analysis
PSD	Priority Substances Directive
RBMP	River Basin Management Plan
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SHA	Statutory Harbour Authority

SMP	Shoreline Management Plan
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
TBT	Tributyltin
THC	Total Hydrocarbon Content
TSHD	Trailer Suction Hopper Dredging
UK	United Kingdom
UKHO	United Kingdom Hydrographic Office
WFD	Water Framework Directive
WID	Water Injection Dredging

Cardinal points/directions are used unless otherwise stated.

SI units are used unless otherwise stated.

Appendices



Innovative Thinking - Sustainable Solutions

A Sediment Quality Data

This appendix presents the current Cefas Guideline Action Levels, as set in 1994 (Section A.1)¹¹, followed by sediment quality data from the Medway Estuary and The Swale. This includes data collected by Peel Ports Medway and Third Parties from across the study area, as follows:

- Peel Ports Medway (Section A.2):
 - Medway Approach Channel – 2003 (Section A.2.1);
 - North Kent Navigation Buoy and Medway Approach Channel – 2007 (Section A.2.2);
 - Medway Approach Channel – 2009 (Section A.2.3);
 - Chatham Lock Approaches – 2010 (Section A.2.4);
 - Medway Approach Channel – 2010 (Section A.2.5);
 - Sheerness Docks – 2011 (Section A.2.6);
 - River Medway and The Swale – 2012 (Section A.2.7);
 - Medway Approach Channel – 2016 (Section A.2.8);
 - Shoregate Wharf and Stangate Creek (Section A.2.9); and
 - Medway Approach Channel – 2019 (Section A.2.10).

- Third Party (Section A.3):
 - Isle of Grain LNG Jetty 10 – 2002 (Section A.3.1);
 - Faversham Creek – 2006 (Section A.3.2);
 - Thamesport – 2008 (Section A.3.3);
 - Faversham Creek – 2009 (Section A.3.4);
 - Oare Creek – 2009 (Section A.3.5);
 - Isle of Grain Jetty 1 – 2010 (Section A.3.6);
 - Oare Creek – 2010 (Section A.3.7);
 - Gillingham Marina Basin 1 – 2010 (Section A.3.8);
 - Entrance to East Swale – 2011 (Section A.3.9);
 - BP Isle of Grain Jetty 1 – 2011 (Section A.3.10);
 - Kingsnorth Power Station Intake Channel – 2011 (Section A.3.11); and
 - Faversham Creek – Swale (Town Quay) – 2011 (Section A.3.12).

For ease of comparison, the tables have been colour-coded with the current Cefas Guideline Action Levels.

¹¹ <https://www.gov.uk/guidance/marine-licensing-sediment-analysis-and-sample-plans> (Accessed August 2021).

A.1 Cefas Guideline Action Levels

Table A.1. Cefas Action Levels

Contaminant	Units	Cefas Guideline Action Levels	
		Action Level 1 (AL1)	Action Level 2 (AL2)
Arsenic (As)	mg/kg	20	100
Cadmium (Cd)	mg/kg	0.4	5
Chromium (Cr)	mg/kg	40	400
Copper (Cu)	mg/kg	40	400
Lead (Pb)	mg/kg	50	500
Mercury (Hg)	mg/kg	0.3	3
Nickel (Ni)	mg/kg	20	200
Zinc (Zn)	mg/kg	130	800
Dibutyltin (DBT)	mg/kg	0.1	1
Tributyltin (TBT)	mg/kg	0.1	1
Sum of ICES 7 PCB congeners	µg/kg	10	-
Sum of 25 PCB congeners	µg/kg	20	200
Acenaphthene (ACENAPH)	mg/kg	0.1	-
Acenaphthylene (ACENAPT)	mg/kg	0.1	-
Anthracene (ANTHRAC)	mg/kg	0.1	-
Benzo[a]anthracene (BAA)	mg/kg	0.1	-
Benzo[a]pyrene (BAP)	mg/kg	0.1	-
Benzo[b]fluoranthene (BBF)	mg/kg	0.1	-
Benzo[g,h,i]perylene (BENZGHI)	mg/kg	0.1	-
Benzo[e]pyrene (BEP)	mg/kg	0.1	-
Benzo[k]fluoranthene (BKF)	mg/kg	0.1	-
C1-Napthalene (C1N)	mg/kg	0.1	-
C1-Phenanthrenes (C1PHEN)	mg/kg	0.1	-
C2-Napthalene (C2N)	mg/kg	0.1	-
C3-Napthalene (C3N)	mg/kg	0.1	-
Chrysene (CHRYSEN)	mg/kg	0.1	-
Dibenzo[a,h]anthracene (DBENAH)	mg/kg	0.1	-
Fluoranthene (FLUORAN)	mg/kg	0.1	-
Fluorene (FLUOREN)	mg/kg	0.1	-
Indeno[1,2,3-cd]pyrene (INDPYR)	mg/kg	0.1	-
Napthalene (NAPTH)	mg/kg	0.1	-
Perylene (PERYLEN)	mg/kg	0.1	-
Phenanthrene (PHENANT)	mg/kg	0.1	-
Pyrene (PYRENE)	mg/kg	0.1	-
Total Hydrocarbon Content (THC)	mg/kg	100	-
Dichlorodiphenyltrichloroethane (DDT)	mg/kg	0.001	-
Dieldrin	mg/kg	0.005	-

A.2 Peel Ports Medway

A.2.1 Medway Approach Channel (2003)

Table A.2 Trace metal and organotin concentrations from sediment samples collected from the Medway Approach Channel (2003)

Laboratory Sample N ^o .	Figure ID	Total Solids (%)	Trace Metals and Organotins (mg/kg dry weight)									
			As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
Cefas Guideline AL1			20	0.4	40	40	0.3	20	50	130	0.1	0.1
Cefas Guideline AL2			100	5	400	400	3	200	500	800	1	1
2003/5870	-	74.9	6.7	0.03	10.5	1.6	0.01	4.9	7.3	18.7	<0.001	<0.001
2003/5874	-	73	6.3	0.03	10.4	1.6	0.01	4.7	7	17.8	<0.001	<0.001
2003/5875	-	75.2	5.7	0.03	9.8	1.5	0.01	4.4	6	16	<0.001	<0.001
2003/5876	-	71.2	6.3	0.03	10.7	2.1	0.01	4.9	7	19.7	<0.001	<0.001
2003/5877	-	70.6	6.9	0.03	10.9	2.1	0.07	5.1	7.2	19.8	<0.001	<0.001
2003/5878	-	72.5	5.7	0.03	10.5	1.8	0.01	4.6	6.5	17.9	<0.001	<0.001
2003/5879	-	74.1	5.8	0.03	11.7	1.9	0.03	5.3	6.2	17.5	<0.001	<0.001
2003/5880 (bulk)	-	74.9	6.7	0.03	10.5	1.6	0.01	4.9	7.3	18.7	<0.001	<0.001
Key	Below AL1	Below AL1										
	Above AL1, Below AL2	Above AL1, Below AL2										
	Above AL2	Above AL2										

Table A.3 Polychlorinated biphenyl (PCB) concentrations from sediment samples collected from the Medway Approach Channel (2003)

Laboratory Sample N ^o .	Figure ID	PCBs (µg/kg dry weight)													
		#18	#28	#31	#44	#47	#49	#52	#66	#101	#105	#110	#118	#128	
	Cefas Guideline AL1	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Cefas Guideline AL2	-	-	-	-	-	-	-	-	-	-	-	-	-	
2003/5870	-	<0.13	<0.16	<0.11	<0.13	<0.15	<0.13	<0.23	<0.10	<0.14	<0.15	<0.16	<0.18	<0.15	
2003/5879	-	<0.13	<0.16	<0.11	<0.13	<0.15	<0.13	<0.23	<0.10	<0.14	<0.15	<0.16	<0.18	<0.15	
2003/5880 (bulk)	-	<0.13	<0.16	<0.11	<0.13	<0.15	<0.13	<0.23	<0.10	<0.14	<0.15	<0.16	<0.18	<0.15	
Laboratory Sample N ^o .	Figure ID	#138	#141	#149	#151	#153	#156	#158	#170	#180	#183	#187	#194	ΣICES 7 PCBs	Σ25 PCBs
	Cefas Guideline AL1	-	-	-	-	-	-	-	-	-	-	-	-	10	20
	Cefas Guideline AL2	-	-	-	-	-	-	-	-	-	-	-	-	-	200
2003/5870	-	<0.18	<0.14	<0.31	<0.15	<0.17	<0.09	<0.08	<0.16	<0.16	<0.14	<0.17	<0.06	-	-
2003/5879	-	<0.18	<0.14	<0.31	<0.15	<0.17	<0.09	<0.08	<0.16	<0.16	<0.14	<0.17	<0.06	-	-
2003/5880 (bulk)	-	<0.18	<0.14	<0.31	<0.15	<0.17	<0.09	<0.08	<0.16	<0.16	<0.14	<0.17	<0.06	-	-
Key	Below AL1														
	Above AL1, Below AL2														
	Above AL2														

Table A.4 Polycyclic aromatic hydrocarbon (PAH) concentrations and total hydrocarbon content (THC) from sediment samples collected from the Medway Approach Channel (2003)

Laboratory Sample N ^o .	Figure ID	PAHs (mg/kg dry weight)											
		ACENAPH	ACENAPT	ANTHRAC	BAA	BAP	BBF	BENZGHI	BEP	BKF	CIN	CIPHEN	
Cefas Guideline AL1		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Cefas Guideline AL2		-	-	-	-	-	-	-	-	-	-	-	-
2003/5870	-	0.0002	0.0002	0.0014	0.016	0.008	0.0084	0.002	0.009	0.0034	0.0037	0.0047	
2003/5879	-	0.0002	0.0002	0.0006	0.0075	0.0043	0.0061	0.0014	0.0056	0.0018	0.0061	0.0046	
2003/5880 (bulk)	-	0.0002	0.0002	0.0012	0.013	0.005	0.0066	0.0018	0.0086	0.0043	0.0074	0.0062	
Laboratory Sample N ^o .	Figure ID	PAHs (mg/kg dry weight)											
		C2N	C3N	CHRYSEN	DBENZAH	FLUORAN	FLUOREN	INDPYR	NAPTH	PERYLEN	PHENANT	PYRENE	THC
Cefas Guideline AL1		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	100
Cefas Guideline AL2		-	-	-	-	-	-	-	-	-	-	-	-
2003/5870	-	0.0047	0.0082	0.007	0.0006	0.015	0.0008	0.0027	0.0016	0.0053	0.0073	0.013	8.8
2003/5879	-	0.0088	0.016	0.0061	0.0004	0.0068	0.0009	0.0011	0.0016	0.0048	0.0056	0.0066	9.7
2003/5880 (bulk)	-	0.010	0.019	0.0045	0.0006	0.0078	0.0006	0.0017	0.002	0.0056	0.0071	0.0089	13
Key	Below AL1												
	Above AL1, Below AL2												
	Above AL2												

A.2.2 North Kent Navigation Buoy and Medway Approach Channel (2007)

Table A.5 Trace metal and organotin concentrations from sediment samples collected from the North Kent Navigation Buoy and the Medway Approach Channel (2007)

Laboratory Sample N ^o	Figure ID	Total Solids (%)	Trace Metals and Organotins (mg/kg dry weight)									
			As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
		Cefas Guideline AL1	20	0.4	40	40	0.3	20	50	130	0.1	0.1
		Cefas Guideline AL2	100	5	400	400	3	200	500	800	1	1
2007/02495	NKB1	50.44	73	0.08	8	10	0.07	11	87	169	<0.001	<0.001
2007/02496	NKB2	83.96	73	0.09	3.9	6.8	0.07	10	44	99	<0.001	<0.001
2007/02497	MAC1	58.31	19	0.09	23	14	0.15	16	25	60	<0.002	<0.002
2007/02498	MAC2	69.76	13	0.08	15	12	0.11	12	30	45	<0.001	<0.001
2007/02499	MAC3	64.28	13	0.06	12	5.4	0.05	6.3	13	47	<0.002	<0.002
2007/02500	MAC4	69.84	11	0.05	8.5	2.7	0.02	4.7	9.5	22	<0.002	<0.002
2007/02501	MAC5	67.34	9.3	0.06	11	4.8	0.05	6.8	12	27	<0.001	<0.002
2007/02502	MAC6	71.84	8.8	0.05	6.4	2.2	0.02	4.4	1.9	19	<0.001	<0.002
2007/02503	MAC7	70.4	11	0.08	8.4	3.7	0.03	4.9	11	30	<0.001	<0.002
2007/02504	MAC8	66.81	10	0.05	10	5.1	0.04	6	12	25	<0.001	<0.002
2007/02505	MAC9	71.62	8.4	0.05	7.6	2.5	0.02	4.7	7.8	27	<0.002	<0.002
2007/02506	MAC10	45.45	14	0.09	21	13	0.14	15	26	54	<0.002	<0.002
Key	Below AL1											
	Above AL1, Below AL2											
	Above AL2											

A.2.3 Medway Approach Channel (2009)

Table A.6 Trace metal and organotin concentrations from sediment samples collected from the Medway Approach Channel (2009)

Laboratory Sample N ^o .	Figure ID	Total Solids (%)	Trace Metals and Organotins (mg/kg dry weight)									
			As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
		Cefas Guideline AL1	20	0.4	40	40	0.3	20	50	130	0.1	0.1
		Cefas Guideline AL2	100	5	400	400	3	200	500	800	1	1
225592	MAC11	-	6	0.2	8	5	<0.05	6	9	28	<0.02	<0.02
225593	MAC12	-	6	0.2	8	3	<0.05	5	7	24	<0.02	<0.02
225594	MAC13	-	6	0.2	5	3	<0.05	4	6	21	<0.02	<0.02
225595	MAC14	-	8	0.4	11	9	<0.06	9	14	42	<0.02	<0.02
225596	MAC15	-	5	0.2	5	3	<0.05	4	5	22	<0.02	<0.02
225597	MAC16	-	5	0.2	7	3	<0.05	4	6	21	<0.02	<0.02
225598	MAC17	-	5	0.2	7	4	<0.05	5	7	23	<0.02	<0.02
225599	MAC18	-	6	0.2	8	5	<0.05	6	7	25	<0.02	<0.02
Key	Below AL1											
	Above AL1, Below AL2											
	Above AL2											

Table A.7 Polychlorinated biphenyl (PCB) concentrations from sediment samples collected from the Medway Approach Channel (2009)

Laboratory Sample N ^o .	Figure ID	PCBs (µg/kg dry weight)													
		#18	#28	#31	#44	#47	#49	#52	#66	#101	#105	#110	#118	#128	
	Cefas Guideline AL1	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Cefas Guideline AL2	-	-	-	-	-	-	-	-	-	-	-	-	-	
225592	MAC11	-	<0.01	-	-	-	-	<0.01	-	<0.01	-	-	<0.01	-	
225593	MAC12	-	<0.01	-	-	-	-	<0.01	-	<0.01	-	-	<0.01	-	
225594	MAC13	-	<0.01	-	-	-	-	<0.01	-	<0.01	-	-	<0.01	-	
225595	MAC14	-	<0.01	-	-	-	-	<0.01	-	<0.01	-	-	<0.01	-	
225596	MAC15	-	<0.01	-	-	-	-	<0.01	-	<0.01	-	-	<0.01	-	
225597	MAC16	-	<0.01	-	-	-	-	<0.01	-	<0.01	-	-	<0.01	-	
225598	MAC17	-	<0.01	-	-	-	-	<0.01	-	<0.01	-	-	<0.01	-	
225599	MAC18	-	<0.01	-	-	-	-	<0.01	-	<0.01	-	-	<0.01	-	
Laboratory Sample N ^o .	Figure ID	#138	#141	#149	#151	#153	#156	#158	#170	#180	#183	#187	#194	ΣICES 7 PCBs	Σ25 PCBs
		-	-	-	-	-	-	-	-	-	-	-	-	-	10
	Cefas Guideline AL2	-	-	-	-	-	-	-	-	-	-	-	-	-	200
225592	MAC11	<0.01	-	-	-	<0.01	-	-	-	<0.01	-	-	-	-	-
225593	MAC12	<0.01	-	-	-	<0.01	-	-	-	<0.01	-	-	-	-	-
225594	MAC13	<0.01	-	-	-	<0.01	-	-	-	<0.01	-	-	-	-	-
225595	MAC14	<0.01	-	-	-	<0.01	-	-	-	<0.01	-	-	-	-	-
225596	MAC15	<0.01	-	-	-	<0.01	-	-	-	<0.01	-	-	-	-	-
225597	MAC16	<0.01	-	-	-	<0.01	-	-	-	<0.01	-	-	-	-	-
225598	MAC17	<0.01	-	-	-	<0.01	-	-	-	<0.01	-	-	-	-	-
225599	MAC18	<0.01	-	-	-	<0.01	-	-	-	<0.01	-	-	-	-	-
Key	Below AL1														
	Above AL1, Below AL2														
	Above AL2														

Table A.8 Polycyclic aromatic hydrocarbon (PAH) concentrations and total hydrocarbon content (THC) from sediment samples collected from the Medway Approach Channel (2009)

Laboratory Sample N ^o .	Figure ID	PAHs (mg/kg dry weight)											
		ACENAPH	ACENAPT	ANTHRAC	BAA	BAP	BBF	BENZGHI	BEP	BKF	CIN	CIPHEN	
Cefas Guideline AL1		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
Cefas Guideline AL2		-	-	-	-	-	-	-	-	-	-	-	
225592	MAC11	0.2	0.1	<0.1	0.6	1.1	1.1	1	-	1.3	-	-	
225593	MAC12	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	
225594	MAC13	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	
225595	MAC14	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	
225596	MAC15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	
225597	MAC16	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	
225598	MAC17	0.2	0.1	<0.1	0.3	0.8	1.2	0.8	-	0.8	-	-	
225599	MAC18	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	-	
Laboratory Sample N ^o .	Figure ID	C2N	C3N	CHRYSEN	DBENZAH	FLUORAN	FLUOREN	INDPYR	NAPTH	PERYLEN	PHENANT	PYRENE	THC
		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	100
Cefas Guideline AL1		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	100
Cefas Guideline AL2		-	-	-	-	-	-	-	-	-	-	-	-
225592	MAC11	-	-	0.9	0.9	0.3	<0.1	1.5	<0.1	-	<0.1	0.5	-
225593	MAC12	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-
225594	MAC13	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-
225595	MAC14	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-
225596	MAC15	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-
225597	MAC16	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-
225598	MAC17	-	-	0.3	0.7	0.3	<0.1	0.9	0.2	-	0.2	0.4	-
225599	MAC18	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-
Key	Below AL1												
	Above AL1, Below AL2												
	Above AL2												

A.2.4 Chatham Lock Approaches (2010)

Table A.9 Trace metal and organotin concentrations from sediment samples collected from Chatham Lock Approaches (2010)

Laboratory Sample N ^o .	Figure ID	Total Solids (%)	Trace Metals and Organotins (mg/kg dry weight)									
			As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
Cefas Guideline AL1			20	0.4	40	40	0.3	20	50	130	0.1	0.1
Cefas Guideline AL2			100	5	400	400	3	200	500	800	1	1
1	CLA1	-	15	1.1	55	32	0.4	26	-	140	-	-
2	CLA2	-	15	1.1	56	33	0.42	26	-	140	-	-
3	CLA3	-	15	1.1	55	30	0.34	26	-	130	-	-
4	CLA4	-	9	0.8	39	24	0.37	20	-	110	-	-
5	CLA5	-	12	0.9	45	28	0.32	22	-	120	-	-
6	CLA6	-	13	1	51	32	0.33	25	-	130	-	-
Key	Below AL1											
	Above AL1, Below AL2											
	Above AL2											

A.2.5 Medway Approach Channel (2010)

Table A.10 Trace metal and organotin concentrations from sediment samples collected from the Medway Approach Channel (2010)

Laboratory Sample N ^o .	Figure ID	Total Solids (%)	Trace Metals and Organotins (mg/kg dry weight)									
			As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
Cefas Guideline AL1			20	0.4	40	40	0.3	20	50	130	0.1	0.1
Cefas Guideline AL2			100	5	400	400	3	200	500	800	1	1
2010/01292 (bulk)	MAC19 and 20	62.2	10	0.0	19	7.2	0.06	11	14	38	<LOD	<LOD
2010/01293 (bulk)	MAC21, 22, 23 and 24	66.2	9	0.0	18	5.3	0.04	9	14	33	<LOD	<LOD
2010/01294 (bulk)	MAC25, 26, 27 and 28	60.4	10	0.0	25	7.3	0.06	11	18	41	<LOD	<LOD
Key	Below AL1											
	Above AL1, Below AL2											
	Above AL2											

A.2.6 Sheerness Docks (2011)

Table A.11 Trace metal and organotin concentrations from sediment samples collected from Sheerness Docks (2011)

Laboratory Sample N ^o .	Figure ID	Total Solids (%)	Trace Metals and Organotins (mg/kg dry weight)									
			As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
		Cefas Guideline AL1	20	0.4	40	40	0.3	20	50	130	0.1	0.1
		Cefas Guideline AL2	100	5	400	400	3	200	500	800	1	1
1	PP1	-	11	0.4	18	13	0.1	12	18	55	-	<1
2	PP2	-	12	0.4	20	24	0.1	15	20	57	-	<1
3	PP3	-	12	0.5	24	15	0.1	16	22	64	-	<1
4	PP4	-	9.2	0.4	18	11	0.1	11	17	54	-	<1
5	PP5	-	9.9	0.5	22	11	<0.05	15	72	49	-	<1
6	PP6	-	8.8	0.3	16	11	0.1	10	15	46	-	<1
7	PP7	-	12	0.5	23	15	0.1	15	21	63	-	<1
8	PP8	-	9.5	0.4	19	13	0.1	12	20	57	-	<1
Key	Below AL1											
	Above AL1, Below AL2											
	Above AL2											

A.2.7 River Medway and The Swale (2012)

Table A.12 Trace metal and organotin concentrations from sediment samples collected from the River Medway and The Swale (2012)

Laboratory Sample N ^o .	Figure ID	Total Solids (%)	Trace Metals and Organotins (mg/kg dry weight)									
			As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
		Cefas Guideline AL1	20	0.4	40	40	0.3	20	50	130	0.1	0.1
		Cefas Guideline AL2	100	5	400	400	3	200	500	800	1	1
Site 1	RMS1	70.2	11	0.1	83.4	46.4	0.1	30.8	37.1	93.3	<0.004	<0.004
Site 2	RMS2	75.3	9.6	0.1	163	156	0	106	15.2	63	<0.004	<0.004
Site 3	RMS3	59.7	18	0.4	176	156	0.5	82.7	81.4	191	0.052	0.006
Site 4 & 5	RMS4 and 5	54.1	14.9	0.2	185	234	0.2	96.3	39.1	146	<0.006	<0.006
Site 6	RMS6	52.7	15.5	0.1	151	146	0.2	80.9	40	126	<0.006	<0.006
Site 7	RMS7	56.9	63.7	0.2	206	83.7	24.5	114	243	214	<0.005	<0.005
Site 8 & 9	RMS8 and 9	53	14.6	0.1	113	61.8	0.2	53.7	41.6	125	<0.006	<0.006

Laboratory Sample N ^o .	Figure ID	Total Solids (%)	Trace Metals and Organotins (mg/kg dry weight)									
			As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
Cefas Guideline AL1			20	0.4	40	40	0.3	20	50	130	0.1	0.1
Cefas Guideline AL2			100	5	400	400	3	200	500	800	1	1
Site 10	RMS10	59.5	11.7	0.1	94.5	66.6	0.1	34.5	33.3	96.7	<0.005	<0.005
Site 11	RMS11	69.5	30.7	0.1	224	136	0	124	26.3	116	<0.004	<0.004
Site 12	RMS12	43.5	14.6	0.2	119	72.4	0.2	57.1	45.7	132	<0.006	0.009
Site 13	RMS13	93.7	104	0.2	286	243	0.2	172	113	371	<0.003	<0.003
Site 14	RMS14	55.1	29.3	0.6	101	84.5	0.8	49.7	102	211	0.018	0.005
Site 15	RMS15	36.5	16.9	0.3	166	129	0.3	94.8	60.6	216	0.026	0.01
Site 16	RMS16	48.8	14.5	0.2	192	129	0.4	115	55.9	170	0.018	0.02
Site 17	RMS17	46.9	16.1	0.3	173	139	0.4	91.4	65.9	216	0.026	0.01
Site 18	RMS18	47.1	15.4	0.3	168	87.7	0.3	75.9	72.5	204	0.026	0.02
Site 19	RMS19	45.5	21.9	0.6	163	123	0.5	81.6	94.8	277	0.052	0.03
Site 20	RMS20	41.1	15.6	0.3	139	110	0.4	68.9	66.4	191	0.026	0.02
Site 21	RMS21	56.6	10	0.4	226	156	0.1	173	25.5	163	<0.006	0.007
Site 22	RMS22	48.5	22.1	0.2	111	66.7	0.4	55.8	91.3	140	<0.006	<0.006
Site 23	RMS23	54.3	17.5	0.2	154	193	0.2	76.4	50.7	163	0.016	<0.005
Site 24	RMS24	50.1	24.6	0.7	128	82.9	0.8	59.4	82.9	214	<0.006	<0.006
Site 25	RMS25	46.6	14.6	0.2	99	56.1	0.2	45.3	48.4	142	<0.007	<0.007
Site 26	RMS26	56.8	16.5	0.2	111	60.1	0.2	45	47.5	137	0.013	<0.005
Site 27	RMS27	55.2	25.4	0.9	203	205	0.7	99	69.7	217	0.026	0.005
Site 28	RMS28	53.2	13.5	0.1	155	104	0.1	68.4	33.2	114	<0.006	<0.006
Site 29	RMS29	40.8	30.9	0.2	184	215	3.1	89	145	206	0.026	0.04
Site 30	RMS30	43.5	21.3	0.3	119	59.7	0.3	48.3	54.5	156	0.026	0.03
Key	Below AL1											
	Above AL1, Below AL2											
	Above AL2											

Table A.13 Polychlorinated biphenyl (PCB) concentrations from sediment samples collected from the River Medway and The Swale (2012)

Laboratory Sample N ^o .	Figure ID	PCBs (µg/kg dry weight)												
		#18	#28	#31	#44	#47	#49	#52	#66	#101	#105	#110	#118	#128
	Cefas Guideline AL1	-	-	-	-	-	-	-	-	-	-	-	-	-
	Cefas Guideline AL2	-	-	-	-	-	-	-	-	-	-	-	-	-
Site 1	RMS1	-	<0.1	-	-	-	-	<0.1	-	<0.1	-	-	<0.1	-
Site 2	RMS2	-	<0.1	-	-	-	-	<0.1	-	<0.1	-	-	<0.1	-
Site 3	RMS3	-	1	-	-	-	-	0	-	1	-	-	1	-
Site 4 & 5	RMS4 and 5	-	0	-	-	-	-	<0.1	-	<0.1	-	-	<0.1	-
Site 6	RMS6	-	<0.1	-	-	-	-	<0.1	-	<0.1	-	-	<0.1	-
Site 7	RMS7	-	<0.1	-	-	-	-	<0.1	-	<0.1	-	-	<0.1	-
Site 8 & 9	RMS8 and 9	-	0	-	-	-	-	<0.1	-	<0.1	-	-	<0.1	-
Site 10	RMS10	-	<0.1	-	-	-	-	<0.1	-	<0.1	-	-	<0.1	-
Site 11	RMS11	-	<0.1	-	-	-	-	<0.1	-	<0.1	-	-	<0.1	-
Site 12	RMS12	-	1	-	-	-	-	0	-	0	-	-	0	-
Site 13	RMS13	-	<0.1	-	-	-	-	<0.1	-	<0.1	-	-	<0.1	-
Site 14	RMS14	-	3	-	-	-	-	7	-	4	-	-	4	-
Site 15	RMS15	-	1	-	-	-	-	1	-	1	-	-	1	-
Site 16	RMS16	-	1	-	-	-	-	1	-	1	-	-	1	-
Site 17	RMS17	-	1	-	-	-	-	1	-	1	-	-	1	-
Site 18	RMS18	-	1	-	-	-	-	2	-	1	-	-	1	-
Site 19	RMS19	-	2	-	-	-	-	3	-	2	-	-	2	-
Site 20	RMS20	-	1	-	-	-	-	2	-	1	-	-	1	-
Site 21	RMS21	-	0	-	-	-	-	1	-	0	-	-	<0.1	-
Site 22	RMS22	-	<0.1	-	-	-	-	<0.1	-	<0.1	-	-	<0.1	-
Site 23	RMS23	-	1	-	-	-	-	<0.1	-	0	-	-	0	-
Site 24	RMS24	-	1	-	-	-	-	1	-	1	-	-	1	-
Site 25	RMS25	-	1	-	-	-	-	0	-	0	-	-	0	-
Site 26	RMS26	-	2	-	-	-	-	1	-	0	-	-	0	-
Site 27	RMS27	-	1.8	-	-	-	-	7	-	3	-	-	4	-
Site 28	RMS28	-	0	-	-	-	-	<0.1	-	<0.1	-	-	<0.1	-
Site 29	RMS29	-	2	-	-	-	-	61	-	171	-	-	150	-
Site 30	RMS30	-	2	-	-	-	-	1	-	1	-	-	1	-

Laboratory Sample N ^o .	Figure ID	#138	#141	#149	#151	#153	#156	#158	#170	#180	#183	#187	#194	ΣICES 7 PCBs	Σ25 PCBs
Cefas Guideline AL1		-	-	-	-	-	-	-	-	-	-	-	-	10	20
Cefas Guideline AL2		-	-	-	-	-	-	-	-	-	-	-	-	-	200
Site 1	RMS1	<0.1	-	-	-	<0.1	-	-	-	<0.1	-	-	-	-	-
Site 2	RMS2	<0.1	-	-	-	<0.1	-	-	-	<0.1	-	-	-	-	-
Site 3	RMS3	1	-	-	-	1	-	-	-	0	-	-	-	-	-
Site 4 & 5	RMS4 and 5	0	-	-	-	0	-	-	-	0	-	-	-	-	-
Site 6	RMS6	<0.1	-	-	-	<0.1	-	-	-	<0.1	-	-	-	-	-
Site 7	RMS7	<0.1	-	-	-	<0.1	-	-	-	<0.1	-	-	-	-	-
Site 8 & 9	RMS8 and 9	0	-	-	-	0	-	-	-	<0.2	-	-	-	-	-
Site 10	RMS10	<0.1	-	-	-	<0.1	-	-	-	<0.1	-	-	-	-	-
Site 11	RMS11	<0.1	-	-	-	<0.1	-	-	-	<0.1	-	-	-	-	-
Site 12	RMS12	0	-	-	-	1	-	-	-	<0.1	-	-	-	-	-
Site 13	RMS13	<0.1	-	-	-	<0.1	-	-	-	<0.1	-	-	-	-	-
Site 14	RMS14	3	-	-	-	3	-	-	-	2	-	-	-	-	-
Site 15	RMS15	1	-	-	-	1	-	-	-	1	-	-	-	-	-
Site 16	RMS16	1	-	-	-	1	-	-	-	<0.2	-	-	-	-	-
Site 17	RMS17	1	-	-	-	1	-	-	-	<0.2	-	-	-	-	-
Site 18	RMS18	1	-	-	-	1	-	-	-	<0.3	-	-	-	-	-
Site 19	RMS19	2	-	-	-	2	-	-	-	1	-	-	-	-	-
Site 20	RMS20	1	-	-	-	0.1	-	-	-	1	-	-	-	-	-
Site 21	RMS21	0	-	-	-	0	-	-	-	0	-	-	-	-	-
Site 22	RMS22	<0.1	-	-	-	<0.1	-	-	-	<0.1	-	-	-	-	-
Site 23	RMS23	0	-	-	-	1	-	-	-	0	-	-	-	-	-
Site 24	RMS24	1	-	-	-	1	-	-	-	1	-	-	-	-	-
Site 25	RMS25	0	-	-	-	1	-	-	-	0	-	-	-	-	-
Site 26	RMS26	0	-	-	-	1	-	-	-	0	-	-	-	-	-
Site 27	RMS27	4	-	-	-	3	-	-	-	2	-	-	-	-	-
Site 28	RMS28	<0.1	-	-	-	<0.1	-	-	-	<0.1	-	-	-	-	-
Site 29	RMS29	142	-	-	-	124	-	-	-	24	-	-	-	-	-
Site 30	RMS30	1	-	-	-	1	-	-	-	1	-	-	-	-	-
Key	Below AL1														
	Above AL1, Below AL2														
	Above AL2														

Table A.14 Polycyclic aromatic hydrocarbon (PAH) concentrations and total hydrocarbon content (THC) from sediment samples collected from the River Medway and The Swale (2012)

Laboratory Sample N ^o	Figure ID	PAHs (mg/kg dry weight)										
		ACENAPH	ACENAPT	ANTHRAC	BAA	BAP	BBF	BENZGHI	BEP	BKF	C1N	C1PHEN
Cefas Guideline AL1		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Cefas Guideline AL2		-	-	-	-	-	-	-	-	-	-	-
Site 1	RMS1	<0.003	0.017	0.04	0.2	0.177	0.168	0.084	-	0.08	-	-
Site 2	RMS2	<0.002	<0.002	<0.002	0.002	0.003	<0.01	<0.01	-	<0.01	-	-
Site 3	RMS3	0.013	0.032	0.047	0.15	0.233	0.274	0.195	-	0.106	-	-
Site 4 & 5	RMS4 and 5	0.011	0.028	0.036	0.171	0.207	0.2	0.139	-	0.106	-	-
Site 6	RMS6	0.005	0.017	0.022	0.079	0.121	0.146	0.096	-	0.056	-	-
Site 7	RMS7	0.048	0.108	0.201	0.42	0.646	0.689	0.413	-	0.265	-	-
Site 8 & 9	RMS8 and 9	0.009	0.017	0.029	0.094	0.13	0.139	0.105	-	0.072	-	-
Site 10	RMS10	0.009	0.015	0.023	0.076	0.106	0.124	0.08	-	0.046	-	-
Site 11	RMS11	<0.002	<0.002	<0.002	0.006	0.007	0.013	0.01	-	<0.01	-	-
Site 12	RMS12	0.027	0.072	0.078	0.325	0.445	0.453	0.291	-	0.196	-	-
Site 13	RMS13	<0.002	0.003	0.008	0.018	0.024	0.029	0.019	-	0.01	-	-
Site 14	RMS14	0.025	0.099	0.096	0.277	0.577	0.618	0.399	-	0.243	-	-
Site 15	RMS15	0.018	0.051	0.064	0.274	0.426	0.453	0.313	-	0.173	-	-
Site 16	RMS16	0.031	0.057	0.099	0.341	0.489	0.523	0.332	-	0.204	-	-
Site 17	RMS17	0.029	0.053	0.1	0.4	0.545	0.542	0.391	-	0.265	-	-
Site 18	RMS18	0.066	0.109	0.186	0.647	0.871	0.832	0.586	-	0.436	-	-
Site 19	RMS19	0.039	0.104	0.137	0.527	0.799	0.794	0.562	-	0.391	-	-
Site 20	RMS20	0.014	0.057	0.095	0.585	0.595	0.506	0.337	-	0.29	-	-
Site 21	RMS21	0.03	0.041	0.061	0.261	0.306	0.288	0.185	-	0.16	-	-
Site 22	RMS22	0.045	0.071	0.465	0.975	0.863	0.717	0.376	-	0.409	-	-
Site 23	RMS23	0.012	0.022	0.039	0.125	0.863	0.191	0.376	-	0.098	-	-
Site 24	RMS24	0.038	0.12	0.175	0.426	0.728	0.722	0.504	-	0.331	-	-
Site 25	RMS25	0.012	0.023	0.029	0.111	0.166	0.184	0.139	-	0.09	-	-
Site 26	RMS26	0.012	0.023	0.105	0.202	0.239	0.217	0.159	-	0.102	-	-
Site 27	RMS27	0.02	0.068	0.077	0.255	0.484	0.507	0.37	-	0.23	-	-
Site 28	RMS28	0.009	0.013	0.017	0.065	0.091	0.1	0.079	-	0.049	-	-
Site 29	RMS29	0.148	0.151	0.801	1.38	1.62	1.4	0.818	-	0.842	-	-
Site 30	RMS30	0.046	0.057	0.114	0.629	0.69	0.638	0.402	-	0.314	-	-

Laboratory Sample N ^o .	Figure ID	C2N	C3N	CHRYSEN	DBENZAH	FLUORAN	FLUOREN	INDPVR	NAPHT	PERYLEN	PHENANT	PYRENE	THC
Cefas Guideline AL1		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	100
Cefas Guideline AL2		-	-	-	-	-	-	-	-	-	-	-	-
Site 1	RMS1	-	-	0.186	0.024	0.209	<0.01	0.076	0.034	-	0.055	0.191	-
Site 2	RMS2	-	-	<0.003	<0.05	<0.04	<0.01	<0.01	<0.03	-	<0.01	0.007	-
Site 3	RMS3	-	-	0.167	0.04	0.254	0.029	0.172	0.094	-	0.127	0.244	-
Site 4 & 5	RMS4 and 5	-	-	0.173	0.031	0.243	0.021	0.129	0.077	-	0.122	0.228	-
Site 6	RMS6	-	-	0.091	0.02	0.133	0.015	0.09	0.044	-	0.081	0.121	-
Site 7	RMS7	-	-	0.459	0.097	0.632	0.068	0.351	0.126	-	0.324	0.823	-
Site 8 & 9	RMS8 and 9	-	-	0.102	0.02	0.159	0.018	0.1	0.085	-	0.102	0.147	-
Site 10	RMS10	-	-	0.081	0.016	0.135	0.015	0.071	0.049	-	0.092	0.123	-
Site 11	RMS11	-	-	0.008	<0.05	0.009	<0.01	<0.01	<0.03	-	0.015	0.01	-
Site 12	RMS12	-	-	0.356	0.066	0.524	0.046	0.245	0.162	-	0.275	0.484	-
Site 13	RMS13	-	-	0.019	<0.05	0.028	<0.01	0.018	<0.03	-	0.016	0.03	-
Site 14	RMS14	-	-	0.339	0.086	0.426	0.038	0.333	0.136	-	0.218	0.696	-
Site 15	RMS15	-	-	0.283	0.065	0.459	0.033	0.263	0.133	-	0.183	0.46	-
Site 16	RMS16	-	-	0.371	0.071	0.637	0.05	0.284	0.227	-	0.349	0.623	-
Site 17	RMS17	-	-	0.427	0.078	0.727	0.04	0.328	0.106	-	0.327	0.932	-
Site 18	RMS18	-	-	0.392	0.123	1.04	0.069	0.51	0.159	-	0.435	1.08	-
Site 19	RMS19	-	-	0.546	0.12	0.805	0.057	0.496	0.145	-	0.301	0.921	-
Site 20	RMS20	-	-	0.578	0.075	1.01	0.027	0.314	0.102	-	0.272	0.88	-
Site 21	RMS21	-	-	0.302	0.04	0.577	0.027	0.182	0.123	-	0.218	0.523	-
Site 22	RMS22	-	-	0.963	0.121	1.43	0.156	0.358	0.117	-	0.517	1.18	-
Site 23	RMS23	-	-	0.143	0.121	0.212	0.022	0.358	0.134	-	0.121	0.195	-
Site 24	RMS24	-	-	0.498	0.109	0.713	0.065	0.436	0.22	-	0.359	0.822	-
Site 25	RMS25	-	-	0.124	0.027	0.195	0.021	0.131	0.116	-	0.111	0.18	-
Site 26	RMS26	-	-	0.202	0.033	0.387	0.017	0.156	0.102	-	0.138	0.343	-
Site 27	RMS27	-	-	0.345	0.075	0.422	0.04	0.328	0.155	-	0.24	0.565	-
Site 28	RMS28	-	-	0.072	0.015	0.12	0.013	0.074	0.069	-	0.067	0.111	-
Site 29	RMS29	-	-	1.64	0.226	2.07	0.187	0.731	0.144	-	1.33	1.7	-
Site 30	RMS30	-	-	0.681	0.1	1.14	0.058	0.372	0.127	-	0.489	1.01	-
Key	Below AL1												
	Above AL1, Below AL2												
	Above AL2												

A.2.8 Medway Approach Channel (2016)

Table A.15 Trace metal and organotin concentrations from sediment samples collected from the Medway Approach Channel (2016)

Laboratory Sample N ^o .	Figure ID	Total Solids (%)	Trace Metals and Organotins (mg/kg dry weight)									
			As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
Cefas Guideline AL1			20	0.4	40	40	0.3	20	50	130	0.1	0.1
Cefas Guideline AL2			100	5	400	400	3	200	500	800	1	1
30010	MAC29	61.52	20.83	0.45	56.76	27.13	0.187	27.08	38.17	117.73	<0.001	<0.001
30011	MAC30	71.01	7.65	0.16	14.59	3.38	<0.038	7.14	9.58	25.81	<0.001	<0.001
30012	MAC31	69.99	9.95	0.17	18.04	3.62	<0.027	8.26	11.91	31.57	<0.001	<0.001
30013	MAC32	72.32	6.65	0.14	12.96	2.78	<0.031	6.16	8.97	22.68	<0.001	<0.001
30014	MAC33	73.38	6.93	0.13	13.19	3.13	<0.028	5.78	8.39	22.23	<0.001	<0.001
Key	Below AL1											
	Above AL1, Below AL2											
	Above AL2											

Table A.16 Polychlorinated biphenyl (PCB) concentrations from sediment samples collected from the Medway Approach Channel (2016)

Laboratory Sample N ^o .	Figure ID	PCBs (µg/kg dry weight)														
		#18	#28	#31	#44	#47	#49	#52	#66	#101	#105	#110	#118	#128		
	Cefas Guideline AL1	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Cefas Guideline AL2	-	-	-	-	-	-	-	-	-	-	-	-	-		
30010	MAC29	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
30011	MAC30	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
30012	MAC31	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
30013	MAC32	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
30014	MAC33	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
Laboratory Sample N ^o .	Figure ID	#138	#141	#149	#151	#153	#156	#158	#170	#180	#183	#187	#194	ΣICES 7 PCBs	Σ25 PCBs	
		-	-	-	-	-	-	-	-	-	-	-	-	-	10	20
	Cefas Guideline AL1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Cefas Guideline AL2	-	-	-	-	-	-	-	-	-	-	-	-	-	200	
30010	MAC29	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-
30011	MAC30	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-
30012	MAC31	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-
30013	MAC32	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-
30014	MAC33	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	-
Key	Below AL1															
	Above AL1, Below AL2															
	Above AL2															

Table A.17 Polycyclic aromatic hydrocarbon (PAH) concentrations and total hydrocarbon content (THC) from sediment samples collected from the Medway Approach Channel (2016)

Laboratory Sample N ^o .	Figure ID	PAHs (mg/kg dry weight)											
		ACENAPH	ACENAPT	ANTHRAC	BAA	BAP	BBF	BENZGHI	BEP	BKF	CTN	CIPHEN	
Cefas Guideline AL1		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Cefas Guideline AL2		-	-	-	-	-	-	-	-	-	-	-	-
30010	MAC29	0.004	0.004	0.009	0.047	0.048	0.082	0.041	0.038	0.035	0.046	0.075	
30011	MAC30	0.001	0.003	0.005	0.026	0.025	0.037	0.02	0.02	0.017	0.032	0.052	
30012	MAC31	0.001	0.003	0.007	0.031	0.026	0.039	0.02	0.018	0.018	0.018	0.043	
30013	MAC32	0.001	0.001	0.002	0.016	0.012	0.019	0.011	0.01	0.01	0.013	0.027	
30014	MAC33	0.001	0.001	0.002	0.017	0.015	0.023	0.013	0.013	0.011	0.017	0.028	
Laboratory Sample N ^o .	Figure ID	C2N	C3N	CHRYSEN	DBENZAH	FLUORAN	FLUOREN	INDPYR	NAPTH	PERYLEN	PHENANT	PYRENE	THC
		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	100
Cefas Guideline AL1		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	100
Cefas Guideline AL2		-	-	-	-	-	-	-	-	-	-	-	-
30010	MAC29	0.058	0.101	0.028	0.007	0.077	0.005	0.052	0.013	0.028	0.033	0.057	56
30011	MAC30	0.043	0.078	0.015	0.003	0.048	0.003	0.026	0.008	0.014	0.028	0.038	34
30012	MAC31	0.026	0.054	0.018	0.003	0.044	0.002	0.027	0.005	0.014	0.022	0.035	29
30013	MAC32	0.017	0.03	0.007	0.002	0.019	0.001	0.015	0.004	0.009	0.01	0.016	19
30014	MAC33	0.027	0.039	0.008	0.002	0.02	0.001	0.015	0.004	0.012	0.011	0.017	24
Key	Below AL1												
	Above AL1, Below AL2												
	Above AL2												

A.2.9 Shoregate Wharf and Stangate Creek (2018)

Table A.18 Trace metal and organotin concentrations from sediment samples collected from Shoregate Wharf and Stangate Creek (2018)

Laboratory Sample N ^o	Figure ID	Total Solids (%)	Trace Metals and Organotins (mg/kg dry weight)									
			As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
Cefas Guideline AL1			20	0.4	40	40	0.3	20	50	130	0.1	0.1
Cefas Guideline AL2			100	5	400	400	3	200	500	800	1	1
Shoregate Wharf	-	-	13	<0.2	32	45	<1	18	35	116	-	-
Stangate Creek	-	-	9	<0.2	15	11	<1	9	16	45	-	-
Key	Below AL1											
	Above AL1, Below AL2											
	Above AL2											

Table A.19 Polychlorinated biphenyl (PCB) concentrations from sediment samples collected from Shoregate Wharf and Stangate Creek (2018)

Laboratory Sample N ^o	Figure ID	PCBs (µg/kg dry weight)													
		#18	#28	#31	#44	#47	#49	#52	#66	#101	#105	#110	#118	#128	
Cefas Guideline AL1		-	-	-	-	-	-	-	-	-	-	-	-	-	
Cefas Guideline AL2		-	-	-	-	-	-	-	-	-	-	-	-	-	
Shoregate Wharf	-	-	<0.008	-	-	-	-	<0.008	-	<0.008	-	-	<0.008	-	
Stangate Creek	-	-	<0.008	-	-	-	-	<0.008	-	<0.008	-	-	<0.008	-	
Laboratory Sample N ^o	Figure ID	#138	#141	#149	#151	#153	#156	#158	#170	#180	#183	#187	#194	ΣICES 7 PCBs	Σ25 PCBs
Cefas Guideline AL1		-	-	-	-	-	-	-	-	-	-	-	-	10	20
Cefas Guideline AL2		-	-	-	-	-	-	-	-	-	-	-	-	-	200
Shoregate Wharf	-	<0.008	-	-	-	<0.008	-	-	-	<0.008	-	-	-	-	-
Stangate Creek	-	<0.008	-	-	-	<0.008	-	-	-	<0.008	-	-	-	-	-
Key	Below AL1														
	Above AL1, Below AL2														
	Above AL2														

Table A.20 Polycyclic aromatic hydrocarbon (PAH) concentrations and total hydrocarbon content (THC) from sediment samples collected from Shoregate Wharf and Stangate Creek (2018)

Laboratory Sample N ^o .	Figure ID	PAHs (mg/kg dry weight)											
		ACENAPH	ACENAPT	ANTHRAC	BAA	BAP	BBF	BENZGHI	BEP	BKF	CTN	CIPHEN	
Cefas Guideline AL1		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
Cefas Guideline AL2		-	-	-	-	-	-	-	-	-	-	-	
Shoregate Wharf	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	
Stangate Creek	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	
Laboratory Sample N ^o .	Figure ID	PAHs (mg/kg dry weight)											
		C2N	C3N	CHRYSEN	DBENZAH	FLUORAN	FLUOREN	INDPYR	NAPTH	PERYLEN	PHENANT	PYRENE	THC
Cefas Guideline AL1		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	100
Cefas Guideline AL2		-	-	-	-	-	-	-	-	-	-	-	-
Shoregate Wharf	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-
Stangate Creek	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	-
Key	Below AL1												
	Above AL1, Below AL2												
	Above AL2												

A.2.10 Medway Approach Channel (2019)

Table A.21 Trace metal and organotin concentrations from sediment samples collected from the Medway Approach Channel (2019)

Laboratory Sample N ^o .	Figure ID	Total Solids (%)	Trace Metals and Organotins (mg/kg dry weight)									
			As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
Cefas Guideline AL1			20	0.4	40	40	0.3	20	50	130	0.1	0.1
Cefas Guideline AL2			100	5	400	400	3	200	500	800	1	1
GS001	MAC34	64.4	15	0.07	12.1	9.3	0.02	8.2	20.6	63.9	<0.005	<0.005
GS002	MAC35	76.2	10.4	0.08	11.8	10.1	0.02	7.6	12.8	48.7	<0.005	<0.005
GS003	MAC36	77.2	6.2	0.06	9.2	8.6	<0.015	5.8	7.6	37.5	<0.005	<0.005
GS004	MAC37	78.8	6.4	0.05	9.1	8.3	<0.015	5.8	6.7	39.4	<0.005	<0.005
GS005	MAC38	73.6	4.6	<0.04	8.3	7.5	<0.015	5.2	7.8	73.1	<0.005	<0.005
Key	Below AL1											
	Above AL1, Below AL2											
	Above AL2											

Table A.22 Polychlorinated biphenyl (PCB) concentrations from sediment samples collected from the Medway Approach Channel (2019)

Laboratory Sample N ^o .	Figure ID	PCBs (µg/kg dry weight)													
		#18	#28	#31	#44	#47	#49	#52	#66	#101	#105	#110	#118	#128	
	Cefas Guideline AL1	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Cefas Guideline AL2	-	-	-	-	-	-	-	-	-	-	-	-	-	
GS001	MAC34	-	<0.0008	-	-	-	-	<0.0008	-	<0.0008	-	-	<0.0008	-	
GS002	MAC35	-	<0.0008	-	-	-	-	<0.0008	-	<0.0008	-	-	<0.0008	-	
GS003	MAC36	-	<0.0008	-	-	-	-	<0.0008	-	<0.0008	-	-	<0.0008	-	
GS004	MAC37	-	<0.0008	-	-	-	-	<0.0008	-	<0.0008	-	-	<0.0008	-	
GS005	MAC38	-	<0.0008	-	-	-	-	<0.0008	-	<0.0008	-	-	<0.0008	-	
Laboratory Sample N ^o .	Figure ID	#138	#141	#149	#151	#153	#156	#158	#170	#180	#183	#187	#194	ΣICES 7 PCBs	Σ25 PCBs
		Cefas Guideline AL1	-	-	-	-	-	-	-	-	-	-	-	-	10
	Cefas Guideline AL2	-	-	-	-	-	-	-	-	-	-	-	-	-	200
GS001	MAC34	<0.0008	-	-	-	<0.0008	-	-	-	<0.0008	-	-	-	-	-
GS002	MAC35	<0.0008	-	-	-	<0.0008	-	-	-	<0.0008	-	-	-	-	-
GS003	MAC36	<0.0008	-	-	-	<0.0008	-	-	-	<0.0008	-	-	-	-	-
GS004	MAC37	<0.0008	-	-	-	<0.0008	-	-	-	<0.0008	-	-	-	-	-
GS005	MAC38	<0.0008	-	-	-	<0.0008	-	-	-	<0.0008	-	-	-	-	-
Key	Below AL1														
	Above AL1, Below AL2														
	Above AL2														

Table A.23 Polycyclic aromatic hydrocarbon (PAH) concentrations and total hydrocarbon content (THC) from sediment samples collected from the Medway Approach Channel (2019)

Laboratory Sample N ^o .	Figure ID	PAHs (mg/kg dry weight)											
		ACENAPH	ACENAPT	ANTHRAC	BAA	BAP	BBF	BENZGHI	BEP	BKF	CIN	CIPHEN	
Cefas Guideline AL1		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
Cefas Guideline AL2		-	-	-	-	-	-	-	-	-	-	-	
GS001	MAC34	0.00421	0.00172	0.00659	0.0136	0.0279	0.0277	0.028	-	0.0197	-	-	
GS002	MAC35	0.00243	0.011	0.0466	0.0746	0.0725	0.0562	0.0459	-	0.0315	-	-	
GS003	MAC36	<0.001	<0.001	<0.001	0.00244	0.00918	0.00728	0.0128	-	0.00288	-	-	
GS004	MAC37	<0.001	<0.001	<0.001	<0.001	<0.001	0.00144	0.00161	-	<0.001	-	-	
GS005	MAC38	<0.001	<0.001	<0.001	0.00241	0.00408	0.00443	0.00438	-	0.00227	-	-	
Laboratory Sample N ^o .	Figure ID	C2N	C3N	CHRYSEN	DBENZAH	FLUORAN	FLUOREN	INDPYR	NAPTH	PERYLEN	PHENANT	PYRENE	THC
		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	100
Cefas Guideline AL1		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	100
Cefas Guideline AL2		-	-	-	-	-	-	-	-	-	-	-	-
GS001	MAC34	-	-	0.0182	0.0055	0.0304	0.00336	0.0264	0.0129	-	0.0169	0.0328	-
GS002	MAC35	-	-	0.0758	0.00945	0.184	0.0124	0.0458	0.00304	-	0.145	0.162	-
GS003	MAC36	-	-	0.00382	0.00156	0.00387	<0.001	0.0096	<0.001	-	0.00186	0.00493	-
GS004	MAC37	-	-	<0.001	<0.001	<0.001	<0.001	0.00144	<0.001	-	<0.001	0.00137	-
GS005	MAC38	-	-	0.00326	<0.001	0.00661	<0.001	0.0035	<0.001	-	0.00362	0.00623	-
Key	Below AL1												
	Above AL1, Below AL2												
	Above AL2												

A.3 Third Party

A.3.1 Isle of Grain LNG Jetty 10 (National Grid - 2002)

Table A.24 Trace metal and organotin concentrations from sediment samples collected from Isle of Grain LNG Jetty 10 (2002)

Laboratory Sample N ^o .	Figure ID	Total Solids (%)	Trace Metals and Organotins (mg/kg dry weight)									
			As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
Cefas Guideline AL1			20	0.4	40	40	0.3	20	50	130	0.1	0.1
Cefas Guideline AL2			100	5	400	400	3	200	500	800	1	1
1	NG1	-	7	0.1	10	3	0.1	4	12	33	-	<0.02
10	NG2	-	8	0.1	13	6	0.1	4	15	40	-	<0.02
16	NG3	-	14	0.4	21	16	0.7	7	46	107	-	<0.02
17	NG4	-	9	0.1	15	7	0.2	6	21	47	-	<0.02
21	NG5	-	9	0	8	4	0.1	4	16	45	-	<0.02
26	NG6	-	7	0	7	4	0.1	3	10	25	-	<0.02
Key	Below AL1											
	Above AL1, Below AL2											
	Above AL2											

A.3.2 Faversham Creek (Swale Borough Council - 2006)

Table A.25 Trace metal and organotin concentrations from sediment samples collected from Faversham Creek (2006)

Laboratory Sample N ^o .	Figure ID	Total Solids (%)	Trace Metals and Organotins (mg/kg dry weight)									
			As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
		Cefas Guideline AL1	20	0.4	40	40	0.3	20	50	130	0.1	0.1
		Cefas Guideline AL2	100	5	400	400	3	200	500	800	1	1
1	F1	-	27	0.3	65	43	0.5	35	63	129	-	<0.02
2	F2	-	20	0.4	87	43	0.5	33	55	127	-	-
3	F3	-	29	0.3	64	46	0.7	36	59	131	-	-
4	F4	-	24	0.6	60	46	0.7	35	61	131	-	<0.02
5	F5	-	21	0.4	65	45	0.6	35	63	137	-	-
6	F6	-	22	0.7	64	46	0.6	34	61	135	-	-
7	F7	-	22	0.6	89	44	0.5	34	60	126	-	<0.02
8	F8	-	27	0.6	65	42	0.6	35	54	120	-	<0.02
9	F9	-	23	0.5	55	36	0.6	33	52	106	-	<0.02
10	F10	-	24	0.6	62	40	0.6	35	55	115	-	<0.02
Key	Below AL1											
	Above AL1, Below AL2											
	Above AL2											

Table A.26 Polychlorinated biphenyl (PCB) concentrations from sediment samples collected from Faversham Creek (2006)

Laboratory Sample N ^o .	Figure ID	PCBs (µg/kg dry weight)													
		#18	#28	#31	#44	#47	#49	#52	#66	#101	#105	#110	#118	#128	
	Cefas Guideline AL1	-	-	-	-	-	-	-	-	-	-	-	-	-	
	Cefas Guideline AL2	-	-	-	-	-	-	-	-	-	-	-	-	-	
1	F1	-	<0.005	-	-	-	-	<0.005	-	<0.005	-	-	<0.005	-	
4	F4	-	<0.005	-	-	-	-	<0.005	-	<0.005	-	-	<0.005	-	
7	F7	-	<0.005	-	-	-	-	<0.005	-	<0.005	-	-	<0.005	-	
9	F9	-	<0.005	-	-	-	-	<0.005	-	<0.005	-	-	<0.005	-	
Laboratory Sample N ^o .	Figure ID	#138	#141	#149	#151	#153	#156	#158	#170	#180	#183	#187	#194	ΣICES 7 PCBs	Σ25 PCBs
		Cefas Guideline AL1	-	-	-	-	-	-	-	-	-	-	-	-	10
	Cefas Guideline AL2	-	-	-	-	-	-	-	-	-	-	-	-	-	200
1	F1	<0.005	-	-	-	<0.005	-	-	-	<0.005	-	-	-	-	-
4	F4	<0.005	-	-	-	<0.005	-	-	-	<0.005	-	-	-	-	-
7	F7	<0.005	-	-	-	<0.005	-	-	-	<0.005	-	-	-	-	-
9	F9	<0.005	-	-	-	<0.005	-	-	-	<0.005	-	-	-	-	-
Key	Below AL1														
	Above AL1, Below AL2														
	Above AL2														

Table A.27 Polycyclic aromatic hydrocarbon (PAH) concentrations and total hydrocarbon content (THC) from sediment samples collected from Faversham Creek (2006)

Laboratory Sample N ^o .	Figure ID	PAHs (mg/kg dry weight)											
		ACENAPH	ACENAPT	ANTHRAC	BAA	BAP	BBF	BENZGHI	BEP	BKF	CIN	CIPHEN	
Cefas Guideline AL1		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Cefas Guideline AL2		-	-	-	-	-	-	-	-	-	-	-	-
1	F1	<0.05	<0.05	0.16	0.19	0.09	0.24	0.08	-	0.24	-	-	
4	F4	0.06	0.05	0.35	0.37	0.32	0.61	0.24	-	0.55	-	-	
7	F7	0.05	<0.05	0.31	0.23	0.13	0.28	0.09	-	0.26	-	-	
9	F9	<0.05	<0.05	0.15	0.09	<0.05	0.13	<0.05	-	0.09	-	-	
Laboratory Sample N ^o .	Figure ID	C2N	C3N	CHRYSEN	DBENZAH	FLUORAN	FLUOREN	INDPYR	NAPTH	PERYLEN	PHENANT	PYRENE	THC
		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	100
Cefas Guideline AL2		-	-	-	-	-	-	-	-	-	-	-	-
1	F1	-	-	0.22	<0.05	-	0.08	0.07	0.07	-	0.13	0.56	<1
4	F4	-	-	0.5	0.06	-	0.08	0.19	0.1	-	0.13	0.87	<1
7	F7	-	-	0.36	<0.05	-	0.06	0.09	0.07	-	0.27	0.86	<1
9	F9	-	-	0.1	<0.05	-	<0.05	<0.05	0.06	-	0.1	0.33	<1
Key	Below AL1												
	Above AL1, Below AL2												
	Above AL2												

A.3.3 Thamesport (Hutchison Ports – 2008)

Table A.28 Trace metal and organotin concentrations from sediment samples collected from Thamesport (2008)

Laboratory Sample N ^o .	Figure ID	Total Solids (%)	Trace Metals and Organotins (mg/kg dry weight)									
			As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
Cefas Guideline AL1			20	0.4	40	40	0.3	20	50	130	0.1	0.1
Cefas Guideline AL2			100	5	400	400	3	200	500	800	1	1
1	HP1	-	25.9	0.3	59	39	0.5	40	76	171	-	-
2	HP2	-	16	0.2	38	24	0.5	23	50	105	-	-
3	HP3	-	30	0.3	67	40	0.5	44	79	185	-	-
4	HP4	-	14	0.2	27	16	0.3	17	37	77	-	-
Key	Below AL1											
	Above AL1, Below AL2											
	Above AL2											

A.3.4 Faversham Creek (2009)

Table A.29 Trace metal and organotin concentrations from sediment samples collected from Faversham Creek (2009)

Laboratory Sample N ^o .	Figure ID	Total Solids (%)	Trace Metals and Organotins (mg/kg dry weight)									
			As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
Cefas Guideline AL1			20	0.4	40	40	0.3	20	50	130	0.1	0.1
Cefas Guideline AL2			100	5	400	400	3	200	500	800	1	1
FAV C1	-	-	15	0.9	42	50	0.31	25	47	160	-	-
FAV C2	-	-	14	0.8	35	46	0.29	22	45	130	-	-
FAV C3	-	-	19	1	39	170	0.31	23	70	230	-	-
Key	Below AL1											
	Above AL1, Below AL2											
	Above AL2											

A.3.5 Oare Creek (2009)

Table A.30 Trace metal and organotin concentrations from sediment samples collected from Oare Creek (2009)

Laboratory Sample N ^o .	Figure ID	Total Solids (%)	Trace Metals and Organotins (mg/kg dry weight)									
			As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
Cefas Guideline AL1			20	0.4	40	40	0.3	20	50	130	0.1	0.1
Cefas Guideline AL2			100	5	400	400	3	200	500	800	1	1
OAR C1	-	-	20	0.8	30	91	2.3	20	110	160	-	-
OAR C2	-	-	18	0.9	33	39	0.46	21	89	120	-	-
OAR C3	-	-	24	1	26	200	0.48	20	480	330	-	-
OAR C4	-	-	14	0.8	53	88	0.3	30	40	140	-	-
OAR C5	-	-	14	0.7	40	200	0.24	23	40	120	-	-
Key	Below AL1											
	Above AL1, Below AL2											
	Above AL2											

A.3.6 Isle of Grain Jetty 1 (National Grid - 2010)

Table A.31 Trace metal and organotin concentrations from sediment samples collected from Isle of Grain Jetty 1 (2010)

Laboratory Sample N ^o .	Figure ID	Total Solids (%)	Trace Metals and Organotins (mg/kg dry weight)									
			As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
Cefas Guideline AL1			20	0.4	40	40	0.3	20	50	130	0.1	0.1
Cefas Guideline AL2			100	5	400	400	3	200	500	800	1	1
4BP1G	LNG1	-	8.4	<0.02	19	11	<0.14	10.5	19.6	50.5	-	-
5BP1G	LNG2	-	7.7	<0.02	16.4	10	0.2	9.31	16.7	44.1	-	-
6BP1G	LNG3	-	9.2	<0.02	22.2	13.4	<0.14	13	21.6	60.8	-	-
1BP1G	LNG4	-	11.8	<0.02	26.7	31.4	0.4	15.8	34.6	111	-	-
2BP1G	LNG5	-	8.5	<0.02	19.2	12.9	<0.14	10.9	18.1	56.1	-	-
3BP1G	LNG6	-	10.3	<0.02	24.2	16.8	0.296	14.2	27.2	68.6	-	-
Key	Below AL1											
	Above AL1, Below AL2											
	Above AL2											

A.3.7 Oare Creek (2010)

Table A.32 Trace metal and organotin concentrations from sediment samples collected from Oare Creek (2010)

Laboratory Sample N ^o .	Figure ID	Total Solids (%)	Trace Metals and Organotins (mg/kg dry weight)									
			As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
Cefas Guideline AL1			20	0.4	40	40	0.3	20	50	130	0.1	0.1
Cefas Guideline AL2			100	5	400	400	3	200	500	800	1	1
1A Surface	-	-	12	0.7	45	47	0.38	25	44	130	-	-
1A 0.5m	-	-	15	0.2	5	10	0.57	5	8	30	-	-
1B Surface	-	-	11	0.5	49	46	0.45	26	46	140	-	-
1B 0.5m	-	-	17	1.1	47	52	0.76	27	110	340	-	-
1B 0.7m	-	-	19	1.1	42	100	0.88	28	180	280	-	-
2A Surface	-	-	14	0.5	58	40	0.27	28	35	120	-	-
2A 0.4m	-	-	13	0.6	56	45	0.35	27	37	130	-	-
2A 0.7m	-	-	15	0.7	60	42	0.76	30	54	150	-	-
2B Surface	-	-	14	0.5	57	39	0.27	27	33	120	-	-
2B 0.4m	-	-	12	0.5	53	47	0.33	26	35	120	-	-
2B 0.7m	-	-	15	0.5	60	53	0.37	28	40	130	-	-
3A Surface	-	-	14	0.4	58	34	0.23	27	31	120	-	-
3A 0.4m	-	-	13	0.5	56	37	0.27	26	32	120	-	-
3A 0.7m	-	-	14	0.6	57	41	0.35	27	40	130	-	-
3B Surface	-	-	14	0.5	59	39	0.23	27	41	120	-	-
3B 0.4m	-	-	14	0.5	57	41	0.28	28	36	130	-	-
3B 0.7m	-	-	17	0.6	58	46	0.34	28	37	130	-	-
Key	Below AL1											
	Above AL1, Below AL2											
	Above AL2											

A.3.8 Gillingham Marina Basin 1 (Gillingham Marina - 2010)

Table A.33 Trace metal and organotin concentrations from sediment samples collected from Gillingham Marina Basin 1 (2010)

Laboratory Sample N ^o .	Figure ID	Total Solids (%)	Trace Metals and Organotins (mg/kg dry weight)									
			As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
Cefas Guideline AL1			20	0.4	40	40	0.3	20	50	130	0.1	0.1
Cefas Guideline AL2			100	5	400	400	3	200	500	800	1	1
1	GM1	-	13	0.7	46	47	0.3	23	41	180	-	-
2	GM2	-	12	0.7	42	42	0.4	22	41	190	-	-
3	GM3	-	14	0.7	49	52	0.4	24	44	160	-	-
Key	Below AL1											
	Above AL1, Below AL2											
	Above AL2											

A.3.9 Entrance to East Swale (Dong/E.ON/Masdar - 2011)

Table A.34 Trace metal and organotin concentrations from sediment samples collected from Entrance to East Swale (2011)

Laboratory Sample N ^o .	Figure ID	Total Solids (%)	Trace Metals and Organotins (mg/kg dry weight)									
			As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
Cefas Guideline AL1			20	0.4	40	40	0.3	20	50	130	0.1	0.1
Cefas Guideline AL2			100	5	400	400	3	200	500	800	1	1
C14	LA1	-	2	<1	19	9	<1	10	12	70	-	-
C16	LA2	-	4	<1	22	10	<1	11	11	71	-	-
Key	Below AL1											
	Above AL1, Below AL2											
	Above AL2											

A.3.10 BP Isle of Grain Jetty 1 (BP - 2011)

Table A.35 Trace metal and organotin concentrations from sediment samples collected from BP Isle of Grain Jetty 1 (2011)

Laboratory Sample N ^o .	Figure ID	Total Solids (%)	Trace Metals and Organotins (mg/kg dry weight)									
			As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
		Cefas Guideline AL1	20	0.4	40	40	0.3	20	50	130	0.1	0.1
		Cefas Guideline AL2	100	5	400	400	3	200	500	800	1	1
180774	-	-	4.1	<0.2	8.4	4.1	<0.1	4.5	5.5	25	-	-
180775	-	-	-	-	-	-	-	-	-	-	-	<0.01
180777	-	-	8.5	<0.2	25	21	<0.1	14	29	78	-	-
180778	-	-	-	-	-	-	-	-	-	-	-	<0.01
180780	-	-	9.8	<0.2	25	21	<0.1	13	28	82	-	-
180781	-	-	-	-	-	-	-	-	-	-	-	<0.01
180783	-	-	10	<0.2	26	19	<0.1	17	24	66	-	-
180784	-	-	-	-	-	-	-	-	-	-	-	<0.01
180786	-	-	18	0.9	44	52	<0.1	24	65	150	-	-
180787	-	-	-	-	-	-	-	-	-	-	-	<0.01
180790	-	-	-	-	-	-	-	-	-	-	-	<0.01
180791	-	-	12	<0.2	26	18	<0.1	16	23	66	-	-
180793	-	-	-	-	-	-	-	-	-	-	-	<0.01
180794	-	-	14	0.6	32	34	<0.1	16	45	100	-	-
180796	-	-	-	-	-	-	-	-	-	-	-	<0.01
180797	-	-	17	0.8	48	55	0.4	22	74	150	-	-
180799	-	-	-	-	-	-	-	-	-	-	-	<0.01
180800	-	-	10	0.4	28	28	<0.1	14	45	-	-	-
Key	Below AL1											
	Above AL1, Below AL2											
	Above AL2											

A.3.11 Kingsnorth Power Station Intake Channel (E.ON - 2011)

Table A.36 Trace metal and organotin concentrations from sediment samples collected from Kingsnorth Power Station Intake Channel (2011)

Laboratory Sample N ^o .	Figure ID	Total Solids (%)	Trace Metals and Organotins (mg/kg dry weight)									
			As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
Cefas Guideline AL1			20	0.4	40	40	0.3	20	50	130	0.1	0.1
Cefas Guideline AL2			100	5	400	400	3	200	500	800	1	1
1	KPS1		12	<0.2	24	20	<0.3	15	27	79	-	<0.01
Key	Below AL1											
	Above AL1, Below AL2											
	Above AL2											

A.3.12 Faversham Creek – Swale Town Quay (2011)

Table A.37 Trace metal and organotin concentrations from sediment samples collected from Faversham Creel – Swale Town Quay (2011)

Laboratory Sample N ^o .	Figure ID	Total Solids (%)	Trace Metals and Organotins (mg/kg dry weight)									
			As	Cd	Cr	Cu	Hg	Ni	Pb	Zn	DBT	TBT
Cefas Guideline AL1			20	0.4	40	40	0.3	20	50	130	0.1	0.1
Cefas Guideline AL2			100	5	400	400	3	200	500	800	1	1
1	-	-	15	0.7	69	43	0.29	29	41	150	-	-
Key	Below AL1											
	Above AL1, Below AL2											
	Above AL2											

B SSSI Favourable Condition Status

This appendix provides details of favourable condition status for the following Sites of Special Scientific Interest (SSSIs) within the study area of the Mersey Estuary and The Swale, based on data from Natural England's Designated Sites View (<https://designatedsites.naturalengland.org.uk>; accessed August 2021):

- South Thames Estuary and Marshes SSSI (Section B.1);
- Medway Estuary and Marshes SSSI (Section B.2); and
- The Swale SSSI (Section B.3).

B.1 South Thames Estuary and Marshes SSSI

Table B.1 Condition status of the South Thames Estuary and Marshes SSSI units

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
006	81.31	Neutral Grassland – Lowland	19/02/2009	Favourable	Uneven area of grazed grassland with large areas of ephemeral standing water at the time of survey. More permanent water in the ditches and drains which also support emergent vegetation including common reed and sea club rush. Sward generally short with areas of taller tussocks. No negative indicators. Unit assessed for value as breeding and over wintering bird habitat.	
007	84.34	Neutral Grassland – Lowland	19/02/2009	Favourable	Uneven area of grazed grassland with large areas of ephemeral standing water at the time of survey. More permanent water in the ditches and drains which also support emergent vegetation including common reed and sea club rush. Sward generally short with areas of taller tussocks. No negative indicators. Unit assessed for value as breeding and over wintering bird habitat.	
008	27.76	Neutral Grassland – Lowland	12/02/2009	Favourable	Uneven area of grazed grassland with large areas of ephemeral standing water at the time of survey. More permanent water in the ditches and drains which also support emergent vegetation including common reed and sea club rush. Sward generally short with areas of taller tussocks and occasional scrub along the ditches. No negative indicators. Unit assessed for value as breeding and over wintering bird habitat.	
009	69.45	Neutral Grassland – Lowland	26/10/2010	Favourable	The unit supports low-lying semi-improved grassland of value in providing roosting habitat for overwintering birds. There is good sward height, and well managed ditches with a good range of vegetation successional stages. Current management appears to be appropriate to maintain the grassland in suitable condition for the wintering bird assemblage.	
010	86.11	Neutral Grassland – Lowland	12/02/2021	Favourable	No negative indicators on this unit, the ditches were being appropriately managed on a rotational basis, with trampling by grazing animal. The grasslands sward height is short and appropriately managed for breeding waders. Unit assessed for value as breeding and over wintering bird habitat.	
011	59.48	Neutral Grassland – Lowland	26/10/2010	Unfavourable - Recovering	This unit supports low-lying semi-improved grassland of value in providing roosting habitat for overwintering birds. There is also a network of ditches which provide habitat diversity. Work continues to restore the ditch system with internal ditches of the unit in need of further work. Patches of scrub are present	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
					which reduce the value of the grassland for roosting wildfowl. The grassland has a mix of suitable sward height. Both cattle and sheep were present during the site visit. Current management appears to be appropriate to maintain the grassland in suitable condition for the breeding bird assemblage. The majority of this unit is currently under an ELS/HLS agri-environment agreement which supports appropriate management to improve habitat conditions.	
012	37.28	Neutral Grassland – Lowland	19/02/2009	Favourable	Uneven area of grazed grassland with large areas of ephemeral standing water at the time of survey. More permanent water in the ditches and drains which also support emergent vegetation including common reed and sea club rush. Sward generally short with areas of taller tussocks and occasional taller herbaceous vegetation. No negative indicators. Unit assessed for value as breeding and over wintering bird habitat.	
013	83.91	Neutral Grassland – Lowland	19/02/2009	Favourable	Uneven area of grazed grassland with large areas of ephemeral standing water at the time of survey. More permanent water in the ditches and drains which also support emergent vegetation including common reed and sea club rush. Sward generally short with areas of taller tussocks and occasional scrub along the ditches. No negative indicators. Unit assessed for value as breeding and over wintering bird habitat.	
014	76.70	Neutral Grassland – Lowland	19/02/2009	Favourable	Uneven area of grazed grassland with large areas of ephemeral standing water at the time of survey. More permanent water in the ditches and drains which also support emergent vegetation including common reed and sea club rush. Sward generally short with areas of taller tussocks, occasional taller herbaceous vegetation and Juncus. No negative indicators. Unit assessed for value as breeding and over wintering bird habitat.	
015	47.88	Neutral Grassland – Lowland	19/02/2009	Favourable	Uneven area of grazed grassland with large areas of ephemeral standing water at the time of survey. More permanent water in the ditches and drains which also support emergent vegetation including common reed and sea club rush. Sward generally short with areas of taller tussocks, occasional taller herbaceous vegetation and Juncus. No negative indicators. Unit assessed for value as breeding and over wintering bird habitat.	
016	46.23	Neutral Grassland – Lowland	19/02/2009	Favourable	Uneven area of grazed grassland with large areas of ephemeral standing water at the time of survey. More permanent water in the ditches and drains which also support emergent vegetation including common reed and sea club rush. Sward generally short with areas of taller tussocks, occasional taller herbaceous	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
					vegetation and Juncus. Larger margins of common reed adjacent to Long Hope Fleet with wider areas (up to 20m) of open standing/flowing water used by 100s of widgeon in the winter months. No negative indicators. Unit assessed for value as breeding and over wintering bird habitat.	
017	2.28	Neutral Grassland – Lowland	19/02/2009	Favourable	Large margins of common reed adjacent to areas of open standing/flowing water used by 100s of widgeon in the winter months. No negative indicators. Unit assessed for value as breeding and over wintering bird habitat.	
018	4.37	Neutral Grassland – Lowland	19/02/2009	Favourable	Area of natural creek with emergent vegetation adjacent, mainly of common reed but also taller herbaceous vegetation with occasional scrub where narrow. Water body of variable width providing all year round standing open water not subject to tides. No negative indicators.	
019	24.56	Neutral Grassland – Lowland	12/02/2009	Favourable	Area of natural creek with emergent vegetation adjacent, mainly of common reed but also taller herbaceous vegetation with occasional scrub where narrow. Water body of variable width providing all year round standing open water not subject to tides. Narrow area of grazed grassland adjacent. No negative indicators. Unit assessed for value as breeding and over wintering bird habitat.	
020	15.54	Neutral Grassland – Lowland	14/02/2009	Favourable	Site Check & Survey – Nice clear water in the ditches, early and mid-successional plant species, no scrub problems with open aspects, the ditch (including the main drain; Borrow Ditch) recorded plants included; sea club rush soft hornwort, spiked water milfoil, ivy leaved duckweed, common reed, lesser reedmace, grey club rush, floating sweet grass, tubular water dropwort, fennel pondweed, spear leaved orache. Most ditches 2-3 metres wide, Borrow ditch – 12m wide and more than 2 m deep, Field Unit & Local Area Team – [REDACTED] 6/17 [REDACTED] 14/02/20	
021	39.27	Neutral Grassland – Lowland	12/02/2009	Favourable	Unit includes an area of the seawall which is a close grazed earth bank with a level area between it and the main carrier. Also includes a larger area of grazing of short turf interspersed with taller tussocks, juncus and areas of tall herbaceous vegetation. Lots of ephemeral standing water and more permanent areas of water in the many ditches and drains with marginal emergent vegetation including common reed and sea club rush. Unit assessed for value as breeding and over wintering bird habitat.	
022	16.09	Neutral Grassland – Lowland	12/02/2009	Favourable	Area of natural creek with emergent vegetation adjacent, mainly of common reed but also taller herbaceous vegetation but no scrub. Water body of variable width providing all year round standing open water not subject to tides.	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
024	52.50	Neutral Grassland – Lowland	12/02/2009	Favourable	Cattle grazing at time of survey giving rise to areas of short turf interspersed with taller tussocks, juncus and areas of tall herbaceous vegetation. Lots of ephemeral standing water and more permanent areas of water in the many ditches and drains with marginal emergent vegetation including common reed, sea club rush and reed mace. Signs of recent ditch reprofiling with the spoil levelled to create a low bund which was effectively increasing surface water. No scrub but an ungrazed area of about 2ha of common reeds at one end adjacent to a firing range installation. Unit assessed for value as breeding and over wintering bird habitat.	
025	72.15	Neutral Grassland – Lowland	12/02/2009	Favourable	Horses grazing parts at time of survey with supplementary feed and poached areas mainly beneath power lines and less than 5%. Also sheep grazing at time of survey giving rise to areas of short turf interspersed with taller tussocks, juncus and areas of tall herbaceous vegetation. Lots of ephemeral standing water and more permanent areas of water in the many ditches and drains with marginal emergent vegetation including common reed and reed mace. Scrub was occasional on the landward side of the unit under the power lines, less than 5%. Unit assessed for value as breeding and over wintering bird habitat. Many birds on the unit including Shelduck, geese, Lapwing, Curlew, Avocet and flocks of Starlings.	
026	74.24	Neutral Grassland – Lowland	12/02/2009	Favourable	Cattle grazing at time of survey giving rise to areas of short turf interspersed with taller tussocks, juncus and areas of tall herbaceous vegetation. Lots of ephemeral standing water and more permanent areas of water in the many ditches and drains with marginal emergent vegetation including common reed and reed mace. Scrub was more than occasional (between 5% and 10%) but this is deliberate to provide refuge for Great Crested Newts known to be on this unit. Unit assessed for value as breeding and over wintering bird habitat. Many birds on the unit including Shelduck, geese, Lapwing, Curlew, Avocet and flocks of Starlings.	
027	72.35	Neutral Grassland – Lowland	12/02/2009	Favourable	Cattle grazing at time of survey giving rise to areas of short turf interspersed with taller tussocks, juncus and areas of tall herbaceous vegetation. Lots of ephemeral standing water and more permanent areas of water in the many ditches and drains with marginal emergent vegetation including common reed and reed mace. Scrub was occasional, less than 5%. No negative indicators. Unit assessed for value as breeding and over wintering bird habitat.	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
028	61.67	Neutral Grassland – Lowland	12/02/2009	Favourable	Sheep grazing at time of survey giving rise to areas of short turf interspersed with taller tussocks, juncus and areas of tall herbaceous vegetation. Lots of ephemeral standing water and more permanent areas of water in the many ditches and drains with marginal emergent vegetation including common reed and reed mace. Scrub was occasional, less than 5%. No negative indicators. Unit assessed for value as breeding and over wintering bird habitat.	
029	63.75	Neutral Grassland – Lowland	12/02/2009	Favourable	Sheep grazing at time of survey giving rise to areas of short turf interspersed with taller tussocks, juncus and areas of tall herbaceous vegetation. Lots of ephemeral standing water and more permanent areas of water in the many ditches and drains with marginal emergent vegetation including common reed and reed mace. Scrub was occasional, less than 5%. No negative indicators. Unit assessed for value as breeding and over wintering bird habitat.	
031	81.49	Neutral Grassland – Lowland	19/03/2009	Favourable	Uneven area of grassland generally short with areas of taller tussocks, occasional taller herbaceous vegetation and Juncus. With large areas of ephemeral standing water at the time of survey also more permanent water in the ditches and larger water bodies which support emergent vegetation including common reed and sea club rush. 100s of ducks and waders of several species large and small. Areas of scrub on the edge of the unit backing onto the houses <5%. A small part of the unit was horse grazed at the time of survey with a more evenly short sward and areas of poaching <5%. No negative indicators. Unit assessed for value as breeding and over wintering bird habitat.	
032	86.54	Neutral Grassland – Lowland	19/03/2009	Favourable	Uneven area of grassland generally short with areas of taller tussocks, occasional taller herbaceous vegetation and Juncus. With large areas of ephemeral standing water at the time of survey also more permanent water in the ditches and larger water bodies which support emergent vegetation including common reed and sea club rush. 100s of ducks and waders of several species large and small. No negative indicators. Unit assessed for value as breeding and over wintering bird habitat.	
034	91.26	Neutral Grassland – Lowland	19/03/2009	Favourable	Uneven area of grassland generally sparsely grazed with most of the unit taller tussocks with occasional taller herbaceous vegetation and Juncus. Large areas of ephemeral standing water at the time of survey also more permanent water in the ditches and larger water bodies which support emergent vegetation including common reed and sea club rush. Despite the possibility that this unit	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
					was ungrazed in 2008/09, taken as a whole the site is verging on overgrazed so this unit provides a sheltered area of cover away from any access and as such is contributing to the overall habitat. No negative indicators. Unit assessed for value as breeding and over wintering bird habitat.	
035	49.97	Neutral Grassland – Lowland	19/03/2009	Favourable	Cattle grazing at time of survey giving rise to areas of short turf interspersed with taller tussocks and areas of tall herbaceous vegetation. Lots of ephemeral standing water and more permanent areas of water in the many ditches and drains with marginal emergent vegetation including common reed and sea club rush. Scrub was occasional, less than 5%. No negative indicators. Unit assessed for value as breeding and over wintering bird habitat.	
036	93.48	Neutral Grassland – Lowland	19/03/2009	Favourable	Cattle grazing at time of survey giving rise to areas of short turf interspersed with taller tussocks, Juncus and areas of tall herbaceous vegetation. Lots of ephemeral standing water and more permanent areas of water in the many ditches and drains with marginal emergent vegetation including common reed and sea club rush. Scrub was occasional, less than 5%. No negative indicators. Unit assessed for value as breeding and over wintering bird habitat.	
037	75.24	Neutral Grassland – Lowland	19/03/2009	Favourable	Uneven area of grassland generally short with areas of taller tussocks, occasional taller herbaceous vegetation and Juncus, dryer areas with ant hills. With large areas of ephemeral standing water at the time of survey also more permanent water in the ditches and larger water bodies which support emergent vegetation including common reed and sea club rush. 100s of ducks of several species large and small, waders, geese and swans at time of survey, lapwing displaying. No negative indicators. Unit assessed for value as breeding and over wintering bird habitat.	
038	29.48	Neutral Grassland – Lowland	19/03/2009	Favourable	Large (>10m) margins of common reed bordering areas of open standing water. Adjacent grassland generally short with areas of taller tussocks, occasional taller herbaceous vegetation and Juncus. No negative indicators. Unit assessed for value as breeding and over wintering bird habitat.	
039	147.66	Neutral Grassland – Lowland	19/03/2009	Favourable	Grazed grassland generally short with areas of taller tussocks, occasional taller herbaceous vegetation and Juncus, dryer areas with ant hills. Large areas of ephemeral standing water at the time of survey also more permanent water in the ditches and larger water bodies which support emergent vegetation including common reed and sea club rush. No negative indicators. Unit assessed for value as breeding and over wintering bird habitat.	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
040	17.39	Neutral Grassland – Lowland	12/02/2009	Favourable	Close grazed turf on level ground with areas of ephemeral standing water at the time of survey. More permanent water in drains and ditches, emergent aquatic vegetation including Phragmites and Reedmace. No negative indicators. Unit assessed for value as breeding and over wintering bird habitat.	
041	31.09	Neutral Grassland – Lowland	13/03/2009	Unfavourable – No change	The unit has been subject to damage by being regularly ploughed. The habitat is not meeting objectives for the breeding and wintering bird features.	Agriculture - Other
042	35.67	Neutral Grassland – Lowland	12/02/2009	Favourable	A grazed area of short turf interspersed with taller tussocks, Juncus and areas of tall herbaceous vegetation. Lots of ephemeral standing water and more permanent areas of water in the many ditches and drains with marginal emergent and floating vegetation including common reed and reed mace. Scrub was occasional, less than 5%. No negative indicators. Unit assessed for value as breeding and over wintering bird habitat.	
043	19.77	Neutral Grassland – Lowland	12/02/2009	Favourable	A grazed area of short turf interspersed with taller tussocks, Juncus and areas of tall herbaceous vegetation. Lots of ephemeral standing water and more permanent areas of water in the many ditches and drains with marginal emergent and floating vegetation including common reed and reed mace. Scrub was occasional, less than 5%. No negative indicators. Unit assessed for value as breeding and over wintering bird habitat.	
044	14.44	Boundary and Linear Features	12/02/2009	Favourable	Sheep grazed giving rise to areas of short turf interspersed with taller tussocks. Scrub is dominant at one end of the unit and forms an effective screen of an industrial site from the rest of the grazing marsh. Unit assessed for value as breeding and over wintering bird habitat.	

B.2 Medway Estuary and Marshes SSSI

Table B.2 Condition status of the Medway Estuary and Marshes SSSI units

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
001	72.97	Neutral Grassland - Lowland	07/09/2010	Unfavourable - Recovering	This assessment was based on bird data alone and has not taken into account habitat features. Data supplied by BTO (WeBS counts for 2003 to 2008) in the Medway Estuary and Marshes indicates that the criterion for a number of wintering and breeding birds (population should be maintained above 50% of that at designation) is not met. These birds are Little Tern, Dark-bellied Brent Goose, Shelduck, Wigeon, Teal, Great Crested Grebe, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank. Wintering and breeding bird numbers have declined significantly at this site for reasons which are not clear. Management is in place to maintain the habitat required to support the assemblage of wintering and breeding birds through stewardship schemes, ditch management, the consenting process and the Local Development Framework process. Drawing from previous condition assessments, habitat quality is thought to be good and not the cause of declines. As it is currently unclear as to why bird declines are occurring, a number of reasons are being investigated including disturbance, bird movements within the region and internationally. Further consideration on condition will be given when the results of current research are available; in the meantime, the site remains recovering but at risk.	
021	11.57	Neutral Grassland - Lowland	07/09/2010	Unfavourable - No change	This assessment was based on bird data alone and has not taken into account habitat features. Data supplied by BTO (WeBSs counts for 2003 to 2008) in the Medway Estuary and Marshes indicates that the criterion for a number of wintering and breeding birds (population should be maintained above 50% of that at designation) is not met. These birds are Little Tern, Dark-bellied Brent Goose, Shelduck, Wigeon, Teal, Great Crested Grebe, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank. Wintering and breeding bird numbers have declined significantly at this site for reasons which are not clear. Management is in place to maintain the habitat required to support the assemblage of wintering and breeding birds through stewardship schemes, ditch management, the consenting process and the Local Development Framework process. Drawing from previous condition assessments, habitat quality is thought to be good and not the cause of declines. As it is currently unclear as to why bird declines are occurring, a number	Agriculture – Undergrazing Lack of Corrective Works – Inappropriate Ditch Management.

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
					of reasons are being investigated including disturbance, bird movements within the region and internationally. Further consideration on condition will be given when the results of current research are available; in the meantime, the site remains recovering but at risk.	
023	51.33	Neutral Grassland - Lowland	07/09/2010	Unfavourable - Recovering	This assessment was based on bird data alone and has not taken into account habitat features. Data supplied by BTO (WeBS counts for 2003 to 2008) in the Medway Estuary and Marshes indicates that the criterion for a number of wintering and breeding birds (population should be maintained above 50% of that at designation) is not met. These birds are Little Tern, Dark-bellied Brent Goose, Shelduck, Wigeon, Teal, Great Crested Grebe, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank. Wintering and breeding bird numbers have declined significantly at this site for reasons which are not clear. Management is in place to maintain the habitat required to support the assemblage of wintering and breeding birds through stewardship schemes, ditch management, the consenting process and the Local Development Framework process. Drawing from previous condition assessments, habitat quality is thought to be good and not the cause of declines. As it is currently unclear as to why bird declines are occurring, a number of reasons are being investigated including disturbance, bird movements within the region and internationally. Further consideration on condition will be given when the results of current research are available; in the meantime, the site remains recovering but at risk.	
027	78.93	Neutral Grassland - Lowland	07/09/2010	Unfavourable - Recovering	This assessment was based on bird data alone and has not taken into account habitat features. Data supplied by BTO (WeBS counts for 2003 to 2008) in the Medway Estuary and Marshes indicates that the criterion for a number of wintering and breeding birds (population should be maintained above 50% of that at designation) is not met. These birds are Little Tern, Dark-bellied Brent Goose, Shelduck, Wigeon, Teal, Great Crested Grebe, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank. Wintering and breeding bird numbers have declined significantly at this site for reasons which are not clear. Management is in place to maintain the habitat required to support the assemblage of wintering and breeding birds through stewardship schemes, ditch management, the consenting process and the Local Development Framework process. Drawing from previous condition assessments, habitat quality is thought to be good and not the cause of declines. As it is currently unclear as to why bird declines are occurring, a number	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
					of reasons are being investigated including disturbance, bird movements within the region and internationally. Further consideration on condition will be given when the results of current research are available; in the meantime, the site remains recovering but at risk.	
030	52.24	Inshore Sublittoral Sediment	18/02/2015	Unfavourable - Recovering	Hoo Island is in the process of agreeing a post industrial use restoration plan. The island has been used for decades to take river dredging in particular from the construction of Chatham Docks. The island is divided up into bunded sections which have been used to accept dredging. There is an external bund around the whole exterior of the island under an Environmental Permit administered through the EA. There is some bank stabilisation and plans being agreed ecological restoration and conservation management aimed at s41 invertebrates and birds. The site is currently a mix of successional communities on dredged material within the bunded areas with some extensive areas of ruderal and some very small patches of reed bed. The bunds are generally rough MG5 type grassland. The eastern end of the island has not been used for dredging and has a good area of salt marsh. WeBS counts for 2003 to 2008 in the Medway Estuary and Marshes indicates number of wintering and breeding birds is too low including Little Tern, Dark-bellied Brent Goose, Shelduck, Wigeon, Teal, Great Crested Grebe, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank. Wintering and breeding bird numbers have declined significantly across the SSSIs for reasons which are not clear. Feb 15	
031	36.92	Neutral Grassland - Lowland	07/09/2010	Unfavourable - Recovering	This assessment was based on bird data alone and has not taken into account habitat features. Data supplied by BTO (WeBS counts for 2003 to 2008) in the Medway Estuary and Marshes indicates that the criterion for a number of wintering and breeding birds (population should be maintained above 50% of that at designation) is not met. These birds are Little Tern, Dark-bellied Brent Goose, Shelduck, Wigeon, Teal, Great Crested Grebe, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank. Wintering and breeding bird numbers have declined significantly at this site for reasons which are not clear. Management is in place to maintain the habitat required to support the assemblage of wintering and breeding birds through stewardship schemes, ditch management, the consenting process and the Local Development Framework process. Drawing from previous condition assessments, habitat quality is thought to be good and not the cause of declines. As it is currently unclear as to why bird declines are occurring, a number	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
					of reasons are being investigated including disturbance, bird movements within the region and internationally. Further consideration on condition will be given when the results of current research are available; in the meantime, the site remains recovering but at risk.	
032	17.21	Neutral Grassland - Lowland	07/09/2010	Unfavourable - Recovering	This assessment was based on bird data alone and has not taken into account habitat features. Data supplied by BTO (WeBS counts for 2003 to 2008) in the Medway Estuary and Marshes indicates that the criterion for a number of wintering and breeding birds (population should be maintained above 50% of that at designation) is not met. These birds are Little Tern, Dark-bellied Brent Goose, Shelduck, Wigeon, Teal, Great Crested Grebe, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank. Wintering and breeding bird numbers have declined significantly at this site for reasons which are not clear. Management is in place to maintain the habitat required to support the assemblage of wintering and breeding birds through stewardship schemes, ditch management, the consenting process and the Local Development Framework process. Drawing from previous condition assessments, habitat quality is thought to be good and not the cause of declines. As it is currently unclear as to why bird declines are occurring, a number of reasons are being investigated including disturbance, bird movements within the region and internationally. Further consideration on condition will be given when the results of current research are available; in the meantime, the site remains recovering but at risk.	
033	90.11	Neutral Grassland - Lowland	07/09/2010	Unfavourable - Recovering	This assessment was based on bird data alone and has not taken into account habitat features. Data supplied by BTO (WeBS counts for 2003 to 2008) in the Medway Estuary and Marshes indicates that the criterion for a number of wintering and breeding birds (population should be maintained above 50% of that at designation) is not met. These birds are Little Tern, Dark-bellied Brent Goose, Shelduck, Wigeon, Teal, Great Crested Grebe, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank. Wintering and breeding bird numbers have declined significantly at this site for reasons which are not clear. Management is in place to maintain the habitat required to support the assemblage of wintering and breeding birds through stewardship schemes, ditch management, the consenting process and the Local Development Framework process. Drawing from previous condition assessments, habitat quality is thought to be good and not the cause of declines. As it is currently unclear as to why bird declines are occurring, a number	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
					of reasons are being investigated including disturbance, bird movements within the region and internationally. Further consideration on condition will be given when the results of current research are available; in the meantime, the site remains recovering but at risk.	
034	130.55	Neutral Grassland - Lowland	07/09/2010	Unfavourable - Recovering	This assessment was based on bird data alone and has not taken into account habitat features. Data supplied by BTO (WeBS counts for 2003 to 2008) in the Medway Estuary and Marshes indicates that the criterion for a number of wintering and breeding birds (population should be maintained above 50% of that at designation) is not met. These birds are Little Tern, Dark-bellied Brent Goose, Shelduck, Wigeon, Teal, Great Crested Grebe, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank. Wintering and breeding bird numbers have declined significantly at this site for reasons which are not clear. Management is in place to maintain the habitat required to support the assemblage of wintering and breeding birds through stewardship schemes, ditch management, the consenting process and the Local Development Framework process. Drawing from previous condition assessments, habitat quality is thought to be good and not the cause of declines. As it is currently unclear as to why bird declines are occurring, a number of reasons are being investigated including disturbance, bird movements within the region and internationally. Further consideration on condition will be given when the results of current research are available; in the meantime, the site remains recovering but at risk.	
035	16.43	Neutral Grassland - Lowland	07/09/2010	Unfavourable - Recovering	This assessment was based on bird data alone and has not taken into account habitat features. Data supplied by BTO (WeBS counts for 2003 to 2008) in the Medway Estuary and Marshes indicates that the criterion for a number of wintering and breeding birds (population should be maintained above 50% of that at designation) is not met. These birds are Little Tern, Dark-bellied Brent Goose, Shelduck, Wigeon, Teal, Great Crested Grebe, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank. Wintering and breeding bird numbers have declined significantly at this site for reasons which are not clear. Management is in place to maintain the habitat required to support the assemblage of wintering and breeding birds through stewardship schemes, ditch management, the consenting process and the Local Development Framework process. Drawing from previous condition assessments, habitat quality is thought to be good and not the cause of declines. As it is currently unclear as to why bird declines are occurring, a number	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
					of reasons are being investigated including disturbance, bird movements within the region and internationally. Further consideration on condition will be given when the results of current research are available; in the meantime, the site remains recovering but at risk.	
039	7.96	Neutral Grassland - Lowland	07/09/2010	Unfavourable - Recovering	This assessment was based on bird data alone and has not taken into account habitat features. Data supplied by BTO (WeBS counts for 2003 to 2008) in the Medway Estuary and Marshes indicates that the criterion for a number of wintering and breeding birds (population should be maintained above 50% of that at designation) is not met. These birds are Little Tern, Dark-bellied Brent Goose, Shelduck, Wigeon, Teal, Great Crested Grebe, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank. Wintering and breeding bird numbers have declined significantly at this site for reasons which are not clear. Management is in place to maintain the habitat required to support the assemblage of wintering and breeding birds through stewardship schemes, ditch management, the consenting process and the Local Development Framework process. Drawing from previous condition assessments, habitat quality is thought to be good and not the cause of declines. As it is currently unclear as to why bird declines are occurring, a number of reasons are being investigated including disturbance, bird movements within the region and internationally. Further consideration on condition will be given when the results of current research are available; in the meantime, the site remains recovering but at risk.	
040	50.87	Neutral Grassland - Lowland	07/09/2010	Unfavourable - Recovering	This assessment was based on bird data alone and has not taken into account habitat features. Data supplied by BTO (WeBS counts for 2003 to 2008) in the Medway Estuary and Marshes indicates that the criterion for a number of wintering and breeding birds (population should be maintained above 50% of that at designation) is not met. These birds are Little Tern, Dark-bellied Brent Goose, Shelduck, Wigeon, Teal, Great Crested Grebe, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank. Wintering and breeding bird numbers have declined significantly at this site for reasons which are not clear. Management is in place to maintain the habitat required to support the assemblage of wintering and breeding birds through stewardship schemes, ditch management, the consenting process and the Local Development Framework process. Drawing from previous condition assessments, habitat quality is thought to be good and not the cause of declines. As it is currently unclear as to why bird declines are occurring, a number	

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					of reasons are being investigated including disturbance, bird movements within the region and internationally. Further consideration on condition will be given when the results of current research are available; in the meantime, the site remains recovering but at risk.	
041	13.51	Neutral Grassland - Lowland	07/09/2010	Unfavourable - Recovering	This assessment was based on bird data alone and has not taken into account habitat features. Data supplied by BTO (WeBS counts for 2003 to 2008) in the Medway Estuary and Marshes indicates that the criterion for a number of wintering and breeding birds (population should be maintained above 50% of that at designation) is not met. These birds are Little Tern, Dark-bellied Brent Goose, Shelduck, Wigeon, Teal, Great Crested Grebe, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank. Wintering and breeding bird numbers have declined significantly at this site for reasons which are not clear. Management is in place to maintain the habitat required to support the assemblage of wintering and breeding birds through stewardship schemes, ditch management, the consenting process and the Local Development Framework process. Drawing from previous condition assessments, habitat quality is thought to be good and not the cause of declines. As it is currently unclear as to why bird declines are occurring, a number of reasons are being investigated including disturbance, bird movements within the region and internationally. Further consideration on condition will be given when the results of current research are available; in the meantime, the site remains recovering but at risk.	
042	36.51	Neutral Grassland - Lowland	07/09/2010	Unfavourable - Recovering	This assessment was based on bird data alone and has not taken into account habitat features. Data supplied by BTO (WeBS counts for 2003 to 2008) in the Medway Estuary and Marshes indicates that the criterion for a number of wintering and breeding birds (population should be maintained above 50% of that at designation) is not met. These birds are Little Tern, Dark-bellied Brent Goose, Shelduck, Wigeon, Teal, Great Crested Grebe, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank. Wintering and breeding bird numbers have declined significantly at this site for reasons which are not clear. Management is in place to maintain the habitat required to support the assemblage of wintering and breeding birds through stewardship schemes, ditch management, the consenting process and the Local Development Framework process. Drawing from previous condition assessments, habitat quality is thought to be good and not the cause of declines. As it is currently unclear as to why bird declines are occurring, a number	

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					of reasons are being investigated including disturbance, bird movements within the region and internationally. Further consideration on condition will be given when the results of current research are available; in the meantime, the site remains recovering but at risk.	
043	9.85	Neutral Grassland - Lowland	07/09/2010	Unfavourable - Recovering	This assessment was based on bird data alone and has not taken into account habitat features. Data supplied by BTO (WeBS counts for 2003 to 2008) in the Medway Estuary and Marshes indicates that the criterion for a number of wintering and breeding birds (population should be maintained above 50% of that at designation) is not met. These birds are Little Tern, Dark-bellied Brent Goose, Shelduck, Wigeon, Teal, Great Crested Grebe, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank. Wintering and breeding bird numbers have declined significantly at this site for reasons which are not clear. Management is in place to maintain the habitat required to support the assemblage of wintering and breeding birds through stewardship schemes, ditch management, the consenting process and the Local Development Framework process. Drawing from previous condition assessments, habitat quality is thought to be good and not the cause of declines. As it is currently unclear as to why bird declines are occurring, a number of reasons are being investigated including disturbance, bird movements within the region and internationally. Further consideration on condition will be given when the results of current research are available; in the meantime, the site remains recovering but at risk.	
048	16.97	Neutral Grassland - Lowland	07/09/2010	Unfavourable - Recovering	This assessment was based on bird data alone and has not taken into account habitat features. Data supplied by BTO (WeBS counts for 2003 to 2008) in the Medway Estuary and Marshes indicates that the criterion for a number of wintering and breeding birds (population should be maintained above 50% of that at designation) is not met. These birds are Little Tern, Dark-bellied Brent Goose, Shelduck, Wigeon, Teal, Great Crested Grebe, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank. Wintering and breeding bird numbers have declined significantly at this site for reasons which are not clear. Management is in place to maintain the habitat required to support the assemblage of wintering and breeding birds through stewardship schemes, ditch management, the consenting process and the Local Development Framework process. Drawing from previous condition assessments, habitat quality is thought to be good and not the cause of declines. As it is currently unclear as to why bird declines are occurring, a number	

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					of reasons are being investigated including disturbance, bird movements within the region and internationally. Further consideration on condition will be given when the results of current research are available; in the meantime, the site remains recovering but at risk.	
049	28.29	Neutral Grassland - Lowland	07/09/2010	Unfavourable - Recovering	This assessment was based on bird data alone and has not taken into account habitat features. Data supplied by BTO (WeBS counts for 2003 to 2008) in the Medway Estuary and Marshes indicates that the criterion for a number of wintering and breeding birds (population should be maintained above 50% of that at designation) is not met. These birds are Little Tern, Dark-bellied Brent Goose, Shelduck, Wigeon, Teal, Great Crested Grebe, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank. Wintering and breeding bird numbers have declined significantly at this site for reasons which are not clear. Management is in place to maintain the habitat required to support the assemblage of wintering and breeding birds through stewardship schemes, ditch management, the consenting process and the Local Development Framework process. Drawing from previous condition assessments, habitat quality is thought to be good and not the cause of declines. As it is currently unclear as to why bird declines are occurring, a number of reasons are being investigated including disturbance, bird movements within the region and internationally. Further consideration on condition will be given when the results of current research are available; in the meantime, the site remains recovering but at risk.	
054	26.49	Neutral Grassland - Lowland	07/09/2010	Unfavourable - Recovering	This assessment was based on bird data alone and has not taken into account habitat features. Data supplied by BTO (WeBS counts for 2003 to 2008) in the Medway Estuary and Marshes indicates that the criterion for a number of wintering and breeding birds (population should be maintained above 50% of that at designation) is not met. These birds are Little Tern, Dark-bellied Brent Goose, Shelduck, Wigeon, Teal, Great Crested Grebe, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank. Wintering and breeding bird numbers have declined significantly at this site for reasons which are not clear. Management is in place to maintain the habitat required to support the assemblage of wintering and breeding birds through stewardship schemes, ditch management, the consenting process and the Local Development Framework process. Drawing from previous condition assessments, habitat quality is thought to be good and not the cause of declines. As it is currently unclear as to why bird declines are occurring, a number	

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					of reasons are being investigated including disturbance, bird movements within the region and internationally. Further consideration on condition will be given when the results of current research are available; in the meantime, the site remains recovering but at risk.	
055	38.52	Neutral Grassland - Lowland	07/09/2010	Unfavourable - Recovering	This assessment was based on bird data alone and has not taken into account habitat features. Data supplied by BTO (WeBS counts for 2003 to 2008) in the Medway Estuary and Marshes indicates that the criterion for a number of wintering and breeding birds (population should be maintained above 50% of that at designation) is not met. These birds are Little Tern, Dark-bellied Brent Goose, Shelduck, Wigeon, Teal, Great Crested Grebe, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank. Wintering and breeding bird numbers have declined significantly at this site for reasons which are not clear. Management is in place to maintain the habitat required to support the assemblage of wintering and breeding birds through stewardship schemes, ditch management, the consenting process and the Local Development Framework process. Drawing from previous condition assessments, habitat quality is thought to be good and not the cause of declines. As it is currently unclear as to why bird declines are occurring, a number of reasons are being investigated including disturbance, bird movements within the region and internationally. Further consideration on condition will be given when the results of current research are available; in the meantime, the site remains recovering but at risk.	
056	40.49	Neutral Grassland - Lowland	07/09/2010	Unfavourable - Recovering	This assessment was based on bird data alone and has not taken into account habitat features. Data supplied by BTO (WeBS counts for 2003 to 2008) in the Medway Estuary and Marshes indicates that the criterion for a number of wintering and breeding birds (population should be maintained above 50% of that at designation) is not met. These birds are Little Tern, Dark-bellied Brent Goose, Shelduck, Wigeon, Teal, Great Crested Grebe, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank. Wintering and breeding bird numbers have declined significantly at this site for reasons which are not clear. Management is in place to maintain the habitat required to support the assemblage of wintering and breeding birds through stewardship schemes, ditch management, the consenting process and the Local Development Framework process. Drawing from previous condition assessments, habitat quality is thought to be good and not the cause of declines. As it is currently unclear as to why bird declines are occurring, a number	

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					of reasons are being investigated including disturbance, bird movements within the region and internationally. Further consideration on condition will be given when the results of current research are available; in the meantime, the site remains recovering but at risk.	
057	34.20	Neutral Grassland - Lowland	07/09/2010	Unfavourable - Recovering	This assessment was based on bird data alone and has not taken into account habitat features. Data supplied by BTO (WeBS counts for 2003 to 2008) in the Medway Estuary and Marshes indicates that the criterion for a number of wintering and breeding birds (population should be maintained above 50% of that at designation) is not met. These birds are Little Tern, Dark-bellied Brent Goose, Shelduck, Wigeon, Teal, Great Crested Grebe, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank. Wintering and breeding bird numbers have declined significantly at this site for reasons which are not clear. Management is in place to maintain the habitat required to support the assemblage of wintering and breeding birds through stewardship schemes, ditch management, the consenting process and the Local Development Framework process. Drawing from previous condition assessments, habitat quality is thought to be good and not the cause of declines. As it is currently unclear as to why bird declines are occurring, a number of reasons are being investigated including disturbance, bird movements within the region and internationally. Further consideration on condition will be given when the results of current research are available; in the meantime, the site remains recovering but at risk.	
058	2.59	Neutral Grassland - Lowland	07/09/2010	Unfavourable - Recovering	This assessment was based on bird data alone and has not taken into account habitat features. Data supplied by BTO (WeBS counts for 2003 to 2008) in the Medway Estuary and Marshes indicates that the criterion for a number of wintering and breeding birds (population should be maintained above 50% of that at designation) is not met. These birds are Little Tern, Dark-bellied Brent Goose, Shelduck, Wigeon, Teal, Great Crested Grebe, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank. Wintering and breeding bird numbers have declined significantly at this site for reasons which are not clear. Management is in place to maintain the habitat required to support the assemblage of wintering and breeding birds through stewardship schemes, ditch management, the consenting process and the Local Development Framework process. Drawing from previous condition assessments, habitat quality is thought to be good and not the cause of declines. As it is currently unclear as to why bird declines are occurring, a number	

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					of reasons are being investigated including disturbance, bird movements within the region and internationally. Further consideration on condition will be given when the results of current research are available; in the meantime, the site remains recovering but at risk.	
074	22.17	Neutral Grassland - Lowland	07/09/2010	Unfavourable - Recovering	This assessment was based on bird data alone and has not taken into account habitat features. Data supplied by BTO (WeBS counts for 2003 to 2008) in the Medway Estuary and Marshes indicates that the criterion for a number of wintering and breeding birds (population should be maintained above 50% of that at designation) is not met. These birds are Little Tern, Dark-bellied Brent Goose, Shelduck, Wigeon, Teal, Great Crested Grebe, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank. Wintering and breeding bird numbers have declined significantly at this site for reasons which are not clear. Management is in place to maintain the habitat required to support the assemblage of wintering and breeding birds through stewardship schemes, ditch management, the consenting process and the Local Development Framework process. Drawing from previous condition assessments, habitat quality is thought to be good and not the cause of declines. As it is currently unclear as to why bird declines are occurring, a number of reasons are being investigated including disturbance, bird movements within the region and internationally. Further consideration on condition will be given when the results of current research are available; in the meantime, the site remains recovering but at risk.	
075	6.36	Neutral Grassland - Lowland	07/09/2010	Unfavourable - Recovering	This assessment was based on bird data alone and has not taken into account habitat features. Data supplied by BTO (WeBS counts for 2003 to 2008) in the Medway Estuary and Marshes indicates that the criterion for a number of wintering and breeding birds (population should be maintained above 50% of that at designation) is not met. These birds are Little Tern, Dark-bellied Brent Goose, Shelduck, Wigeon, Teal, Great Crested Grebe, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank. Wintering and breeding bird numbers have declined significantly at this site for reasons which are not clear. Management is in place to maintain the habitat required to support the assemblage of wintering and breeding birds through stewardship schemes, ditch management, the consenting process and the Local Development Framework process. Drawing from previous condition assessments, habitat quality is thought to be good and not the cause of declines. As it is currently unclear as to why bird declines are occurring, a number	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
					of reasons are being investigated including disturbance, bird movements within the region and internationally. Further consideration on condition will be given when the results of current research are available; in the meantime, the site remains recovering but at risk.	
076	1.12	Fen, Marsh and Swamp - Lowland	07/09/2010	Unfavourable - Recovering	This assessment was based on bird data alone and has not taken into account habitat features. Data supplied by BTO (WeBS counts for 2003 to 2008) in the Medway Estuary and Marshes indicates that the criterion for a number of wintering and breeding birds (population should be maintained above 50% of that at designation) is not met. These birds are Little Tern, Dark-bellied Brent Goose, Shelduck, Wigeon, Teal, Great Crested Grebe, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank. Wintering and breeding bird numbers have declined significantly at this site for reasons which are not clear. Management is in place to maintain the habitat required to support the assemblage of wintering and breeding birds through stewardship schemes, ditch management, the consenting process and the Local Development Framework process. Drawing from previous condition assessments, habitat quality is thought to be good and not the cause of declines. As it is currently unclear as to why bird declines are occurring, a number of reasons are being investigated including disturbance, bird movements within the region and internationally. Further consideration on condition will be given when the results of current research are available; in the meantime, the site remains recovering but at risk.	
099	20.9	Fen, Marsh and Swamp - Lowland	01/04/2011	Unfavourable - Recovering	HLS agreement live from 1st April 2011. covering ditch and reedbed restoration.	
100	2163.4	Littoral Sediment	20/03/2017	Unfavourable - Declining	Algal blooms were detected on Bartlett spit and Bishops ooze on 8-8-2016 directly in front of the Motney Sewage treatment works outfall - smothering the mudflats and impacting on the food availability for the Medway bird assemblage	Freshwater Pollution - Water Pollution – Agriculture/Run Off
101	1647.8	Littoral Sediment	07/09/2010	Unfavourable - Recovering	This assessment was based on bird data alone and has not taken into account habitat features. Data supplied by BTO (WeBS counts for 2003 to 2008) in the Medway Estuary and Marshes indicates that the criterion for a number of wintering and breeding birds (population should be maintained above 50% of that at designation) is not met. These birds are Little Tern, Dark-bellied Brent Goose,	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
					Shelduck, Wigeon, Teal, Great Crested Grebe, Ringed Plover, Grey Plover, Dunlin, Curlew and Redshank. Wintering and breeding bird numbers have declined significantly at this site for reasons which are not clear. Management is in place to maintain the habitat required to support the assemblage of wintering and breeding birds through stewardship schemes, ditch management, the consenting process and the Local Development Framework process. Drawing from previous condition assessments, habitat quality is thought to be good and not the cause of declines. As it is currently unclear as to why bird declines are occurring, a number of reasons are being investigated including disturbance, bird movements within the region and internationally. Further consideration on condition will be given when the results of current research are available; in the meantime, the site remains recovering but at risk.	
106	22.56	Inshore Sublittoral Sediment	27/02/2009	Destroyed	This area of mudflats was lost to planning development (car park) which is part of Sheerness Docks. The special interest feature has been irretrievably lost.	Planning Permission - General

B.3 The Swale SSSI

Table B.3 Condition status of The Swale SSSI units

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
001	687.21	Neutral Grassland - Lowland	27/01/2009	Favourable	The condition of the grassland was considered to be very good for most of the key breeding bird species. No indications of any management problems during the breeding period were noted. Site visit in January confirmed that good conditions are present for wintering birds. Comments on individual attributes: Habitat extent ? there were no indications of reduction in extent of key habitats supporting the breeding bird or wintering bird assemblage. Breeding bird assemblage diversity ? there are no indications of a reduction in diversity; 42 species recorded as breeding in 2008 in this unit. Aggregation of rare breeding birds- figures indicate that the unit contributes significantly to overall numbers of key breeding species for which the site is of particular importance: Confirmed numbers of breeding pairs recorded in unit 1:Pochard 24Shoveler 13Gadwall 6Avocet 9This indicates that the site meets the target for pochard and gadwall based on these figures, and that the unit contributes significantly towards the targets for shoveler and avocet. Overall habitat conditions: the habitat is generally regarded as being in very good condition for the breeding bird assemblage. Works have been undertaken in recent years to improve habitat quality and extend the area of habitat of high value for breeding birds. The grassland is in very good condition with respect to suitability for wintering birds and large aggregations of birds were present during visit. [REDACTED] visited the site.	
002	217.58	Neutral Grassland - Lowland	04/03/2009	Favourable	Only the suitability of the grassland for the wintering and breeding bird assemblages was assessed during this visit. The condition of the grassland is excellent. No indications of any management problems were noted. Comments on individual attributes: Habitat extent ? there were no indications of reduction in extent of key habitats supporting the breeding bird or wintering bird assemblages. Overall habitat condition: the habitat is in very good condition for the breeding and wintering bird assemblages. The sward is short and well grazed with frequent patches of shallow open water and there are areas of taller vegetation alongside ditches providing cover. There are also patches of bare mud in places suitable for feeding. Large aggregations of birds were present during visit.	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
003	129.05	Neutral Grassland - Lowland	26/01/2009	Favourable	The unit supports low-lying semi-improved grassland some of which has the microtopography ('lumps and bumps?') associated with reclaimed saltmarsh. Larger mounds of soil possibly from excavation of some of the bigger water bodies are supporting rabbits and there are a lot of anthills on the dryer ground. The sward was short with taller tussocks and a lot of standing shallow water at time of survey. Birds were present in large numbers throughout the unit. Current management appears to be appropriate to maintain the grassland in suitable condition for the wintering bird assemblage. Comments on individual attributes: Grassland extent? there were no indications of loss of grassland. Sward structure? The grassland is in very good condition with respect to suitability for wintering birds. The grassland is short but reeds and rushes are frequent providing cover and structural diversity. Patches of exposed wet mud were noted in places. So, overall there appears to be a suitable range of features present to support wintering birds and the fields may also be suitable for breeding species such as lapwing. Hen harrier seen at the time of survey.	
007	28.08	Neutral Grassland - Lowland	26/01/2009	Favourable	The unit supports low-lying semi-improved grassland some of which has the microtopography ('lumps and bumps?') associated with reclaimed saltmarsh. The sward showed signs of grazing with some short areas and taller tussocks with plenty of standing shallow water at time of survey. Current management appears to be appropriate to maintain the grassland in suitable condition for the wintering bird assemblage. Comments on individual attributes: Grassland extent? there were no indications of loss of grassland. Sward structure? The grassland is in good condition with respect to suitability for wintering birds. Reeds and rushes are present, at least as marginal vegetation of the more permanent water bodies, providing cover and structural diversity. Patches of exposed wet mud were noted in places. Overall there appears to be a suitable range of features present to support wintering birds and the fields may also be suitable for breeding species such as lapwing. However, the unit is on the margins of the site with various predator perches such as power lines and road infrastructure including a rather large bridge.	
008	20.98	Neutral Grassland - Lowland	26/01/2009	Favourable	The unit mostly supports low-lying semi-improved grassland and is generally drier grassland than most of the site. There is evidence of recent cattle grazing and the sward is generally short with tussocks and taller vegetation scattered throughout. Current management appears to be appropriate to maintain the grassland in	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
					suitable condition for the wintering bird assemblage. Comments on individual attributes: Grassland extent ? there were no indications of loss of grassland .Sward structure ? The low-lying grassland is fairly uniform but there are occasional patches of open shallow water and some permanent pools. Some of these have reed margins and there are occasional patches of rushes providing structural diversity. Areas of exposed wet mud were noted in places. So, overall there appears to be a suitable range of features present to support wintering birds and the fields may also be suitable for breeding species such as lapwing.	
009	97.86	Neutral Grassland - Lowland	26/01/2009	Favourable	The unit supports low-lying semi-improved grassland some of which has the microtopography ('lumps and bumps?) associated with reclaimed saltmarsh. The sward showed signs of grazing with some short areas and taller tussocks with plenty of standing shallow water at time of survey. Current management appears to be appropriate to maintain the grassland in suitable condition for the wintering bird assemblage. Comments on individual attributes: Grassland extent ? there were no indications of loss of grassland. Sward structure ? The grassland is in very good condition with respect to suitability for wintering birds. Reeds and rushes are present providing cover and structural diversity. Patches of exposed wet mud were noted in places. So, overall there appears to be a suitable range of features present to support wintering birds and the fields may also be suitable for breeding species such as lapwing.	
010	69.20	Standing Open Water and Canals	28/01/2009	Favourable		
012	83.58	Neutral Grassland - Lowland	28/01/2009	Favourable		
013	14.88	Neutral Grassland - Lowland	26/01/2009	Favourable	The unit supports low-lying semi-improved grassland some of which has the microtopography ('lumps and bumps?) associated with reclaimed saltmarsh. The sward was being grazed by sheep at the time of survey with plenty of standing shallow water. Current management appears to be appropriate to maintain the grassland in suitable condition for the wintering bird assemblage. Comments on individual attributes: Grassland extent? there were no indications of loss of grassland. Sward structure? The grassland is in very good condition with respect to suitability for wintering birds. Reeds and rushes are present as marginal	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
					vegetation of the more permanent water bodies and in occasional larger stands providing cover and structural diversity. Patches of exposed wet mud were noted in places. So, overall there appears to be a suitable range of features present to support wintering birds and the fields may also be suitable for hunting raptors as reported by a local at the time.	
014	39.92	Neutral Grassland - Lowland	28/01/2009	Favourable	The unit supports low-lying semi-improved grassland. The sward was short and had a lot of standing shallow water at time of survey. Lapwing were noted in the compartment. Current management appears to be appropriate to maintain the grassland in suitable condition for the wintering bird assemblage. Comments on individual attributes: Grassland extent ? there were no indications of loss of grassland. Sward structure ? The grassland is in very good condition with respect to suitability for wintering birds. The grassland is short but rushes are occasional and there is cover provided by areas of short reed alongside many of the ditches. Rotational management of the ditches has been carried out. Patches of exposed wet mud were noted in places. So, overall there appears to be a suitable range of features present to support wintering birds and the fields may also be suitable for breeding species such as lapwing. ██████████ visited.	
016	67.49	Neutral Grassland - Lowland	28/01/2009	Favourable	The unit supports low-lying semi-improved grassland, including extensive areas of short grazed damp turf dominated by fescues and creeping bent with perennial rye-grass, meadow barley, creeping buttercup and clovers, along with areas of tussocky grasses and rushes adding to the variation structure, and occasional patches of standing shallow water at time of survey. In addition, ditches within the site are in good condition, the margins supporting common reed, sometimes in dense patches, along with sea club-rush and smaller amounts of bulrush. During the survey there were no indications of management problems or damage, and the site is maintained as favourable for the wintering bird assemblage. Comments on individual attributes: Grassland extent ? there were no indications of loss of grassland. Sward structure ? The grassland is in very good condition with respect to suitability for wintering birds. The grassland is short but rushes are frequent providing cover and structural diversity. Patches of exposed wet mud were noted in places. Overall, there appears to be a suitable range of features present to support wintering birds and the fields may also be suitable for breeding species such as lapwing.	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
017	44.43	Neutral Grassland - Lowland	27/01/2009	Favourable		
018	52.30	Neutral Grassland - Lowland	27/01/2009	Favourable	Two of the fields are mostly submerged in standing water and dominated by <i>Scirpus maritimus</i> , reflecting the brackish influence. The two southern most fields are grazed by horses and sheep, with a sward which appears to be slightly tussocky but it was difficult to see from a distance. There are some small areas of concrete hard standing in the western fields, but this was probably there prior to the SSSI notification. The north western field adjacent to the saxon shore way appears to have the same slightly tussocky sward structure as the other fields but very little standing water visible. (managed by sheep grazing). Part of this field is dominated by wet scrub but this adds a little diversity to the grazing marsh habitat. Overall the sward structure and areas of standing water make it suitable for use by wintering birds.	
019	24.86	Neutral Grassland - Lowland	04/03/2009	Favourable	The unit supports low-lying semi-improved grassland, including a mix of short grassland and taller areas with tussocky grasses and rushes, with patches of shallow open water. Current management appears to be appropriate to maintain the grassland in suitable condition for the wintering bird assemblage. Comments on individual attributes: Grassland extent ? there were no indications of loss of grassland. Sward structure ? The grassland is in good condition with respect to suitability for wintering birds. The grassland is short but rushes are frequent providing cover and structural diversity. Patches of exposed wet mud were noted in places. Overall, the unit supports a suitable range of features present to support wintering birds.	
020	53.11	Neutral Grassland - Lowland	26/01/2009	Favourable	This unit is a thin strip of semi-improved grassland either side of a water course (>20m wide) including several creeks and remnant features of reclaimed saltmarsh. The water course has been engineered in the past, probably to aid flow, and the spoil has been used to create parallel flood defences on either side restricting the areas of semi natural habitat to the current thin strip. Also providing impeded drainage and associated temporary open water at intervals along its course. Sheep grazed at the time of survey the grass is short in places interspersed with taller tussocks and areas of taller vegetation. Patches of reeds and rushes occur in wetter areas and also border the water courses. Good feeding, resting and	

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					possibly nesting habitat for a number of wetland bird species and supporting large numbers of waterfowl at the time of survey.	
021	18.77	Neutral Grassland - Lowland	26/01/2009	Favourable	This unit is a thin strip of semi-improved grassland either side of a water course less wide than in unit 20 (10m wide).The water course has been engineered in the past, probably to aid flow, and the spoil has been used to create parallel flood defences on either side restricting the areas of semi natural habitat to the current thin strip. Also providing impeded drainage and associated temporary open water at intervals along its course. Cattle grazed and at least one area topped the grass is short in places interspersed with taller tussocks and areas of taller vegetation. Patches of reeds and rushes occur in wetter areas and also border the water courses. Is an area known for hunting raptors, supporting good numbers of waterfowl at the time of survey.	
022	19.34	Fen, Marsh and Swamp - Lowland	26/01/2009	Favourable	This unit is a thin strip of semi-improved grassland either side of a water course less wide than in unit 20 (<10m wide).The water course has been engineered in the past, probably to aid flow, and the spoil has been used to create parallel flood defences on either side restricting the areas of semi natural habitat to the current thin strip. Also providing impeded drainage and associated temporary open water at intervals along its course. Some areas cut but not grazed prior to the survey the grass is mainly taller tussocks with areas of taller vegetation. Patches of reeds and rushes occur in wetter areas and also border the water courses. Is an area known for hunting raptors, supporting good numbers of waterfowl at the time of survey.	
023	48.38	Neutral Grassland - Lowland	28/01/2009	Favourable	The unit supports low-lying semi-improved grassland some of which has the microtopography ('lumps and bumps?') associated with reclaimed saltmarsh. The sward was short and had a lot of standing shallow water at time of survey. Birds were present in the compartment. Current management appears to be appropriate to maintain the grassland in suitable condition for the wintering bird assemblage. Comments on individual attributes: Grassland extent ? there were no indications of loss of grassland. Sward structure ? The grassland is in very good condition with respect to suitability for wintering birds. The grassland is short but rushes are frequent providing cover and structural diversity. Patches of exposed wet mud were noted in places. So, overall there appears to be a suitable range of features present to support winteri fields may also be suitable for breeding species such as lapwing. visited.	

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031	53.45	Neutral Grassland - Lowland	01/05/2014	Favourable	<p>Specialist Survey: "AQUATIC INVERTEBRATE SURVEY OF THE SEASALTER LEVELS, WHITSTABLE KENT. MAY and JULY 2013. Report to Natural England. Final: May 2014. [REDACTED] Invertebrate Ecologist. "Summary taken from report, with SSSI Unit Numbers added in CAPITAL LETTERS:GENERAL RESULTS OF AQUATIC INVERTEBRATE SURVEY: Ditches on the RSPB reserve (SSSI UNIT 47) generally had the highest species richness in May 2013 with a maximum of 36 and an average of 27.5. The only exception was Ditch 22 on Denley Hill (SSSI UNIT 48) which had a score of 32 which was by far the highest scoring west of the railway line. The Leisure Plots (SSSI UNITS 32 AND PARTS OF UNITS 33 AND 56) and Graveney Marshes (NORTH-WEST = SSSI UNITS 48, 56, 33) are generally characterised by relatively low species richness. The latter may be explained by reed encroachment in the ditches, brackish ditches and lack of sympathetic habitat management. In July 2013, the RSPB ditches (SSSI UNIT 47) again scored highly although one ditch from Graveney Marshes was also high scoring (Ditch 17) with a score of 36. This ditch had the lowest species richness (6) in May 2013 – some of these differences may be explained by the fact that the May sample was taken amongst reeds whilst the July sample was taken from an open section. One ditch on the Leisure Plots (Ditch 7) (IN SSSI UNIT 32) in July 2013 was also reasonably high scoring. As with May, the Leisure Plots and Graveney Marshes produced the majority of the lower scoring ditches. Tables 5 and 6 also present species richness results for the five survey areas. In both months, Seasalter Levels (East) (SSSI UNITS 65, 47 AND EASTERN HALF OF UNIT 64) has the highest species richness based on the target groups. Species richness is considerably higher on the RSPB reserve in July compared with May (the reason for this is unclear). Surprisingly, Denley Hill Farm comes out as being the least species-rich in both May and July despite the fact that Ditch 22 is high scoring. It is possible that the low species-richness for Denley Hill may partly reflect some uniformity in terms of the ditches sampled in this area. Tables 5 and 6 should be compared with botanical species richness in Table 2 of Banks (2014). The plant survey found that Denley Hill Farm had the highest species-richness although this was decreasing and had been substantially higher in the past. The better plant results compared with the invertebrates might be partly explained by the greater number of ditches surveyed for botany but this is unlikely to explain all the differences between the two survey results. CONCLUSIONS OF AQUATIC INVERTEBRATE SURVEY: The results of an aquatic invertebrate survey on</p>	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
					<p>Seasalter Levels, Whitstable, Kent are presented. Invertebrates have been assessed using species richness, conservation value, habitat value, and tolerance (or otherwise) to salinity. Non-native species have also been indicated and discussed. The main useful values are species richness and conservation value. The former indicate that ditches on the RSPB reserve generally had the highest species richness in May 2013. The Leisure Plots and Graveney Marshes are generally characterised by relatively low species richness in May 2013. The latter may be explained by reed encroachment in the ditches, the presence of brackish ditches and lack of sympathetic habitat management. In July 2013, RSPB ditches again scored highly although one ditch from Graveney Marshes was also high scoring and one ditch on the Leisure Plots was also reasonably high scoring. As with the survey results from May 2013, the Leisure Plots and Graveney Marshes produced the majority of the lower scoring ditches. The target invertebrate groups present on Seasalter Levels are discussed with reference to other grazing marshes based on the surveyor’s experience. It would appear that there are several common or local absentees and several uncommon taxa that might be expected on grazing marshes appear to be absent. Reasons for this might include the fact that this is site is peripheral to other grazing marshes in North Kent, but the long period of neglect including encroachment by Phragmites and intensive farming methods are likely to be greater factors. There is little value in closely comparing the present survey with the previous ones of Philp (1982, 1994) because the latter were largely preliminary. Conservation Value was assessed for May and July 2013. Two Near Threatened (NT), 4 Red Data Book (RDB) and 24 Nationally Scarce (NS) species were recorded. The Leisure Plots come out as having higher total species scores and slightly higher SQI scores compared to Graveney Marshes. These probably reflect the intensive sheep grazing with high stocking rates on the latter. The Denley Hill Farm ditches were intermediate in terms of mean total species scores and mean SQI values between the Leisure Plots and the Seasalter Levels. The Seasalter Levels (SSSI UNITS SOUTH OF THE RAILWAY LINE) had the highest values indicating the most favourable conditions for aquatic invertebrates on the entire survey area.</p>	
032	61.69	Neutral Grassland - Lowland	01/05/2014	Unfavourable - No change	<p>Specialist Survey: "AQUATIC INVERTEBRATE SURVEY OF THE SEASALTER LEVELS, WHI ██████████ MAY and JULY 2013. Report to Natural England. Final: May 2014 ██████████, Invertebrate Ecologist." Summary taken from report, with SSSI</p>	Agriculture - Overgrazing

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					<p>Unit Numbers added in CAPITAL LETTERS: GENERAL RESULTS OF AQUATIC INVERTEBRATE SURVEY: Ditches on the RSPB reserve (SSSI UNIT 47) generally had the highest species richness in May 2013 with a maximum of 36 and an average of 27.5. The only exception was Ditch 22 on Denley Hill (SSSI UNIT 48) which had a score of 32 which was by far the highest scoring west of the railway line. The Leisure Plots (SSSI UNITS 32 AND PARTS OF UNITS 33 AND 56) and Graveney Marshes (NORTH-WEST = SSSI UNITS 48, 56, 33) are generally characterised by relatively low species richness. The latter may be explained by reed encroachment in the ditches, brackish ditches and lack of sympathetic habitat management. In July 2013, the RSPB ditches (SSSI UNIT 47) again scored highly although one ditch from Graveney Marshes was also high scoring (Ditch 17) with a score of 36. This ditch had the lowest species richness (6) in May 2013 – some of these differences may be explained by the fact that the May sample was taken amongst reeds whilst the July sample was taken from an open section. One ditch on the Leisure Plots (Ditch 7) (IN SSSI UNIT 32) in July 2013 was also reasonably high scoring. As with May, the Leisure Plots and Graveney Marshes produced the majority of the lower scoring ditches. Tables 5 and 6 also present species richness results for the five survey areas. In both months, Seasalter Levels (East) (SSSI UNITS 65, 47 AND EASTERN HALF OF UNIT 64) has the highest species richness based on the target groups. Species richness is considerably higher on the RSPB reserve in July compared with May (the reason for this is unclear). Surprisingly, Denley Hill Farm comes out as being the least species-rich in both May and July despite the fact that Ditch 22 is high scoring. It is possible that the low species-richness for Denley Hill may partly reflect some uniformity in terms of the ditches sampled in this area. Tables 5 and 6 should be compared with botanical species richness in Table 2 of Banks (2014). The plant survey found that Denley Hill Farm had the highest species-richness although this was decreasing and had been substantially higher in the past. The better plant results compared with the invertebrates might be partly explained by the greater number of ditches surveyed for botany but this is unlikely to explain all the differences between the two survey results. CONCLUSIONS OF AQUATIC INVERTEBRATE SURVEY: The results of an aquatic invertebrate survey on Seasalter Levels, Whitstable, Kent are presented. Invertebrates have been assessed using species richness, conservation value, habitat value, and tolerance (or otherwise) to salinity. Non-native species have also been indicated and discussed.</p>	<p>Agriculture – Undergrazing Lack of Corrective Works – Inappropriate Ditch Management</p> <p>Lack of Corrective Works – Inappropriate Scrub Control</p> <p>Planning Permission – General</p> <p>Public Access/ Disturbance - Vehicles</p> <p>Vehicles – Illicit Vehicles</p> <p>Vehicles - Other</p>

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					<p>The main useful values are species richness and conservation value. The former indicate that ditches on the RSPB reserve generally had the highest species richness in May 2013. The Leisure Plots and Graveney Marshes are generally characterised by relatively low species richness in May 2013. The latter may be explained by reed encroachment in the ditches, the presence of brackish ditches and lack of sympathetic habitat management. In July 2013, RSPB ditches again scored highly although one ditch from Graveney Marshes was also high scoring and one ditch on the Leisure Plots was also reasonably high scoring. As with the survey results from May 2013, the Leisure Plots and Graveney Marshes produced the majority of the lower scoring ditches. The target invertebrate groups present on Seasalter Levels are discussed with reference to other grazing marshes based on the surveyor’s experience. It would appear that there are several common or local absentees and several uncommon taxa that might be expected on grazing marshes appear to be absent. Reasons for this might include the fact that this is site is peripheral to other grazing marshes in North Kent, but the long period of neglect including encroachment by Phragmites and intensive farming methods are likely to be a greater factors. There is little value in closely comparing the present survey with the previous ones of Philp (1982, 1994) because the latter were largely preliminary. Conservation Value was assessed for May and July 2013. Two Near Threatened (NT), 4 Red Data Book (RDB) and 24 Nationally Scarce (NS) species were recorded. The Leisure Plots come out as having higher total species scores and slightly higher SQI scores compared to Graveney Marshes. These probably reflect the intensive sheep grazing with high stocking rates on the latter. The Denley Hill Farm ditches were intermediate in terms of mean total species scores and mean SQI values between the Leisure Plots and the Seasalter Levels. The Seasalter Levels (SSSI UNITS SOUTH OF THE RAILWAY LINE) had the highest values indicating the most favourable conditions for aquatic invertebrates on the entire survey area.</p>	
033	59.23	Neutral Grassland - Lowland	01/05/2014	Unfavourable - No change	<p>Specialist Survey: “AQUATIC INVERTEBRATE SURVEY OF THE SEASALTER LEVELS, WHI ██████████ MAY and JULY 2013. Report to Natural England. Final: May 201 ██████████, Invertebrate Ecologist.” Summary taken from report, with SSSI Unit Numbers added in CAPITAL LETTERS: GENERAL RESULTS OF AQUATIC INVERTEBRATE SURVEY: Ditches on the RSPB reserve (SSSI UNIT 47) generally had the highest species richness in May 2013 with a maximum of 36 and an average of</p>	<p>Agriculture - Undergrazing</p> <p>Lack of Corrective Works –</p>

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					<p>27.5. The only exception was Ditch 22 on Denley Hill (SSSI UNIT 48) which had a score of 32 which was by far the highest scoring west of the railway line. The Leisure Plots (SSSI UNITS 32 AND PARTS OF UNITS 33 AND 56) and Graveney Marshes (NORTH-WEST = SSSI UNITS 48, 56, 33) are generally characterised by relatively low species richness. The latter may be explained by reed encroachment in the ditches, brackish ditches and lack of sympathetic habitat management. In July 2013, the RSPB ditches (SSSI UNIT 47) again scored highly although one ditch from Graveney Marshes was also high scoring (Ditch 17) with a score of 36. This ditch had the lowest species richness (6) in May 2013 – some of these differences may be explained by the fact that the May sample was taken amongst reeds whilst the July sample was taken from an open section. One ditch on the Leisure Plots (Ditch 7) (IN SSSI UNIT 32) in July 2013 was also reasonably high scoring. As with May, the Leisure Plots and Graveney Marshes produced the majority of the lower scoring ditches. Tables 5 and 6 also present species richness results for the five survey areas. In both months, Seasalter Levels (East) (SSSI UNITS 65, 47 AND EASTERN HALF OF UNIT 64) has the highest species richness based on the target groups. Species richness is considerably higher on the RSPB reserve in July compared with May (the reason for this is unclear). Surprisingly, Denley Hill Farm comes out as being the least species-rich in both May and July despite the fact that Ditch 22 is high scoring. It is possible that the low species-richness for Denley Hill may partly reflect some uniformity in terms of the ditches sampled in this area. Tables 5 and 6 should be compared with botanical species richness in Table 2 of Banks (2014). The plant survey found that Denley Hill Farm had the highest species-richness although this was decreasing and had been substantially higher in the past. The better plant results compared with the invertebrates might be partly explained by the greater number of ditches surveyed for botany but this is unlikely to explain all the differences between the two survey results. CONCLUSIONS OF AQUATIC INVERTEBRATE SURVEY: The results of an aquatic invertebrate survey on Seasalter Levels, Whitstable, Kent are presented. Invertebrates have been assessed using species richness, conservation value, habitat value, and tolerance (or otherwise) to salinity. Non-native species have also been indicated and discussed. The main useful values are species richness and conservation value. The former indicate that ditches on the RSPB reserve generally had the highest species richness in May 2013. The Leisure Plots and Graveney Marshes are generally</p>	<p>Inappropriate Ditch Management</p> <p>Lack of Corrective Works – Inappropriate Scrub Control</p>

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					<p>characterised by relatively low species richness in May 2013. The latter may be explained by reed encroachment in the ditches, the presence of brackish ditches and lack of sympathetic habitat management. In July 2013, RSPB ditches again scored highly although one ditch from Graveney Marshes was also high scoring and one ditch on the Leisure Plots was also reasonably high scoring. As with the survey results from May 2013, the Leisure Plots and Graveney Marshes produced the majority of the lower scoring ditches. The target invertebrate groups present on Seasalter Levels are discussed with reference to other grazing marshes based on the surveyor’s experience. It would appear that there are several common or local absentees and several uncommon taxa that might be expected on grazing marshes appear to be absent. Reasons for this might include the fact that this is site is peripheral to other grazing marshes in North Kent, but the long period of neglect including encroachment by Phragmites and intensive farming methods are likely to be a greater factors. There is little value in closely comparing the present survey with the previous ones of Philp (1982, 1994) because the latter were largely preliminary. Conservation Value was assessed for May and July 2013. Two Near Threatened (NT), 4 Red Data Book (RDB) and 24 Nationally Scarce (NS) species were recorded. The Leisure Plots come out as having higher total species scores and slightly higher SQI scores compared to Graveney Marshes. These probably reflect the intensive sheep grazing with high stocking rates on the latter. The Denley Hill Farm ditches were intermediate in terms of mean total species scores and mean SQI values between the Leisure Plots and the Seasalter Levels. The Seasalter Levels (SSSI UNITS SOUTH OF THE RAILWAY LINE) had the highest values indicating the most favourable conditions for aquatic invertebrates on the entire survey area.</p>	
034	14.58	Neutral Grassland - Lowland	27/01/2009	Favourable	<p>The unit supports low-lying semi-improved grassland some of which has the microtopography ('lumps and bumps?') associated with reclaimed saltmarsh with plenty of standing shallow water. Current management appears to be appropriate to maintain the grassland in suitable condition for the wintering bird assemblage. Comments on individual attributes: Grassland extent ? there were no indications of loss of grassland. Sward structure ? The grassland is in good condition with respect to suitability for wintering birds. Reeds and rushes are present as marginal vegetation of the more permanent water bodies and in occasional larger stands</p>	

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					providing cover and structural diversity. Overall there appears to be a suitable range of features present to support wintering birds.	
035	53.45	Neutral Grassland - Lowland	27/01/2009	Favourable	The unit supports low-lying semi-improved grassland some of which has the microtopography ('lumps and bumps?') associated with reclaimed saltmarsh. The sward was being grazed by cattle at the time of survey with plenty of standing shallow water. Current management appears to be appropriate to maintain the grassland in suitable condition for the wintering bird assemblage. Comments on individual attributes: Grassland extent ? there were no indications of loss of grassland. Sward structure ? The grassland is in very good condition with respect to suitability for wintering birds. Reeds and rushes are present as marginal vegetation of the more permanent water bodies and in occasional larger stands providing cover and structural diversity. Patches of exposed wet mud were noted in places. Overall there appears to be a suitable range of features present to support wintering birds.	
036	50.22	Neutral Grassland - Lowland	27/01/2009	Favourable	The unit supports low-lying semi-improved grassland some of which has the microtopography ('lumps and bumps?') associated with reclaimed saltmarsh, with plenty of standing shallow water. Current management appears to be appropriate to maintain the grassland in suitable condition for the wintering bird assemblage. Comments on individual attributes: Grassland extent ? there were no indications of loss of grassland. Sward structure ? The grassland is in good condition with respect to suitability for wintering birds. Reeds and rushes are present as marginal vegetation of the more permanent water bodies and in occasional larger stands providing cover and structural diversity. Patches of exposed wet mud were noted in places. Overall there appears to be a suitable range of features present to support wintering birds.	
037	41.21	Neutral Grassland - Lowland	27/01/2009	Favourable	The unit supports low-lying semi-improved grassland some of which has the microtopography ('lumps and bumps?') associated with reclaimed saltmarsh, with plenty of standing shallow water. Current management appears to be appropriate to maintain the grassland in suitable condition for the wintering bird assemblage. Comments on individual attributes: Grassland extent ? there were no indications of loss of grassland. Sward structure ? The grassland is in good condition with respect to suitability for wintering birds. Reeds and rushes are present as marginal vegetation of the more permanent water bodies and in occasional larger stands providing cover and structural diversity. Patches of exposed wet mud were noted	

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					in places. Overall there appears to be a suitable range of features present to support wintering birds.	
038	43.08	Neutral Grassland - Lowland	26/10/2010	Favourable	This is an important part of the Swale with extensive areas of wet grassland, salt-marsh and mudflat supporting breeding waders and wintering wildfowl. Current management by hay cutting and cattle grazing is appropriate to maintain the grassland in suitable condition for birds. There is no indication that the extent of saltmarsh and mudflat is declining and coastal processes are able to proceed naturally. The unit is managed in two compartments. The larger southern section is managed by the RSPB as part of the Elmley National Nature Reserve and is managed with the objective of providing ideal conditions for breeding waders and over-wintering waders and wildfowl. The smaller northern section is managed by grazing, with a hay crop removed from the area next to the seawall in summer. In winter, this area becomes waterlogged providing good conditions for feeding birds. Data indicate that bird numbers in this part of the site are meeting targets and that the site is in favourable condition.	
040	22.06	Standing Open Water and Canals	28/01/2009	Favourable		
041	44.62	Neutral Grassland - Lowland	27/01/2009	Favourable	This is a very well managed Kent Wildlife Trust nature reserve, where great efforts have been made over the years to raise water levels and create areas of standing water habitat for wetland birds. The site has a mixture of tussocky pasture, areas of standing water, ditches and reedbed. Many wetland birds were seen on the site. The site was only observed from the saxon shore way with binoculars and not walked over.	
043	63.84	Neutral Grassland - Lowland	27/01/2009	Favourable	The unit supports low-lying semi-improved grassland, recently grazed by cattle, including extensive areas of short grazed damp turf dominated by fescues and creeping bent with perennial rye-grass, meadow barley, creeping buttercup and clovers, along with areas of tussocky grasses and rushes adding to the variation structure, and occasional patches of standing shallow water at time of survey. In addition, the manmade channel in the east of the site along with ditches in good condition across the site support common reed, sometimes in dense patches, along with sea club-rush and smaller amounts of bulrush. Birds were present in the compartment. Current management appears to be appropriate to maintain the grassland in suitable condition for the wintering bird assemblage. Comments on	

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					individual attributes: Grassland extent ? there were no indications of loss of grassland. Sward structure ? The grassland is in very good condition with respect to suitability for wintering birds. The grassland is short but rushes are frequent providing cover and structural diversity. Patches of exposed wet mud were noted in places. Overall there appears to be a suitable range of features present to support wintering birds and the fields may also be suitable for breeding species such as lapwing.	
047	75.21	Neutral Grassland - Lowland	01/05/2014	Favourable	Specialist Survey: "AQUATIC INVERTEBRATE SURVEY OF THE SEASALTER LEVELS, WHIT TABLE KENT MAY and JULY 2013. Report to Natural England. Final: May 2014. [REDACTED] Invertebrate Ecologist. "Summary taken from report, with SSSI Unit Numbers added in CAPITAL LETTERS:GENERAL RESULTS OF AQUATIC INVERTEBRATE SURVEY: Ditches on the RSPB reserve (SSSI UNIT 47) generally had the highest species richness in May 2013 with a maximum of 36 and an average of 27.5. The only exception was Ditch 22 on Denley Hill (SSSI UNIT 48) which had a score of 32 which was by far the highest scoring west of the railway line. The Leisure Plots (SSSI UNITS 32 AND PARTS OF UNITS 33 AND 56) and Graveney Marshes (NORTH-WEST = SSSI UNITS 48, 56, 33) are generally characterised by relatively low species richness. The latter may be explained by reed encroachment in the ditches, brackish ditches and lack of sympathetic habitat management. In July 2013, the RSPB ditches (SSSI UNIT 47) again scored highly although one ditch from Graveney Marshes was also high scoring (Ditch 17) with a score of 36. This ditch had the lowest species richness (6) in May 2013 – some of these differences may be explained by the fact that the May sample was taken amongst reeds whilst the July sample was taken from an open section. One ditch on the Leisure Plots (Ditch 7) (IN SSSI UNIT 32) in July 2013 was also reasonably high scoring. As with May, the Leisure Plots and Graveney Marshes produced the majority of the lower scoring ditches. Tables 5 and 6 also present species richness results for the five survey areas. In both months, Seasalter Levels (East) (SSSI UNITS 65, 47 AND EASTERN HALF OF UNIT 64) has the highest species richness based on the target groups. Species richness is considerably higher on the RSPB reserve in July compared with May (the reason for this is unclear). Surprisingly, Denley Hill Farm comes out as being the least species-rich in both May and July despite the fact that Ditch 22 is high scoring. It is possible that the low species-richness for Denley Hill may partly reflect some uniformity in terms of the ditches sampled in this area.	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
					<p>Tables 5 and 6 should be compared with botanical species richness in Table 2 of Banks (2014). The plant survey found that Denley Hill Farm had the highest species-richness although this was decreasing and had been substantially higher in the past. The better plant results compared with the invertebrates might be partly explained by the greater number of ditches surveyed for botany but this is unlikely to explain all the differences between the two survey results. CONCLUSIONS OF AQUATIC INVERTEBRATE SURVEY: The results of an aquatic invertebrate survey on Seasalter Levels, Whitstable, Kent are presented. Invertebrates have been assessed using species richness, conservation value, habitat value, and tolerance (or otherwise) to salinity. Non-native species have also been indicated and discussed. The main useful values are species richness and conservation value. The former indicate that ditches on the RSPB reserve generally had the highest species richness in May 2013. The Leisure Plots and Graveney Marshes are generally characterised by relatively low species richness in May 2013. The latter may be explained by reed encroachment in the ditches, the presence of brackish ditches and lack of sympathetic habitat management. In July 2013, RSPB ditches again scored highly although one ditch from Graveney Marshes was also high scoring and one ditch on the Leisure Plots was also reasonably high scoring. As with the survey results from May 2013, the Leisure Plots and Graveney Marshes produced the majority of the lower scoring ditches. The target invertebrate groups present on Seasalter Levels are discussed with reference to other grazing marshes based on the surveyor’s experience. It would appear that there are several common or local absentees and several uncommon taxa that might be expected on grazing marshes appear to be absent. Reasons for this might include the fact that this is site is peripheral to other grazing marshes in North Kent, but the long period of neglect including encroachment by <i>Phragmites</i> and intensive farming methods are likely to be greater factors. There is little value in closely comparing the present survey with the previous ones of Philp (1982, 1994) because the latter were largely preliminary. Conservation Value was assessed for May and July 2013. Two Near Threatened (NT), 4 Red Data Book (RDB) and 24 Nationally Scarce (NS) species were recorded. The Leisure Plots come out as having higher total species scores and slightly higher SQI scores compared to Graveney Marshes. These probably reflect the intensive sheep grazing with high stocking rates on the latter. The Denley Hill Farm ditches were intermediate in terms of mean total species scores</p>	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
					and mean SQI values between the Leisure Plots and the Seasalter Levels. The Seasalter Levels (SSSI UNITS SOUTH OF THE RAILWAY LINE) had the highest values indicating the most favourable conditions for aquatic invertebrates on the entire survey area.	
048	85.20	Neutral Grassland - Lowland	01/05/2014	Favourable	Specialist Survey: "AQUATIC INVERTEBRATE SURVEY OF THE SEASALTER LEVELS, WHIT TABLE KENT, MAY and JULY 2013. Report to Natural England. Final: May 2013. Invertebrate Ecologist. "Summary taken from report, with SSSI Unit Numbers added in CAPITAL LETTERS:GENERAL RESULTS OF AQUATIC INVERTEBRATE SURVEY: Ditches on the RSPB reserve (SSSI UNIT 47) generally had the highest species richness in May 2013 with a maximum of 36 and an average of 27.5. The only exception was Ditch 22 on Denley Hill (SSSI UNIT 48) which had a score of 32 which was by far the highest scoring west of the railway line. The Leisure Plots (SSSI UNITS 32 AND PARTS OF UNITS 33 AND 56) and Graveney Marshes (NORTH-WEST = SSSI UNITS 48, 56, 33) are generally characterised by relatively low species richness. The latter may be explained by reed encroachment in the ditches, brackish ditches and lack of sympathetic habitat management. In July 2013, the RSPB ditches (SSSI UNIT 47) again scored highly although one ditch from Graveney Marshes was also high scoring (Ditch 17) with a score of 36. This ditch had the lowest species richness (6) in May 2013 – some of these differences may be explained by the fact that the May sample was taken amongst reeds whilst the July sample was taken from an open section. One ditch on the Leisure Plots (Ditch 7) (IN SSSI UNIT 32) in July 2013 was also reasonably high scoring. As with May, the Leisure Plots and Graveney Marshes produced the majority of the lower scoring ditches. Tables 5 and 6 also present species richness results for the five survey areas. In both months, Seasalter Levels (East) (SSSI UNITS 65, 47 AND EASTERN HALF OF UNIT 64) has the highest species richness based on the target groups. Species richness is considerably higher on the RSPB reserve in July compared with May (the reason for this is unclear). Surprisingly, Denley Hill Farm comes out as being the least species-rich in both May and July despite the fact that Ditch 22 is high scoring. It is possible that the low species-richness for Denley Hill may partly reflect some uniformity in terms of the ditches sampled in this area. Tables 5 and 6 should be compared with botanical species richness in Table 2 of Banks (2014). The plant survey found that Denley Hill Farm had the highest species-richness although this was decreasing and had been substantially higher in	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
					<p>the past. The better plant results compared with the invertebrates might be partly explained by the greater number of ditches surveyed for botany but this is unlikely to explain all the differences between the two survey results. CONCLUSIONS OF AQUATIC INVERTEBRATE SURVEY: The results of an aquatic invertebrate survey on Seasalter Levels, Whitstable, Kent are presented. Invertebrates have been assessed using species richness, conservation value, habitat value, and tolerance (or otherwise) to salinity. Non-native species have also been indicated and discussed. The main useful values are species richness and conservation value. The former indicate that ditches on the RSPB reserve generally had the highest species richness in May 2013. The Leisure Plots and Graveney Marshes are generally characterised by relatively low species richness in May 2013. The latter may be explained by reed encroachment in the ditches, the presence of brackish ditches and lack of sympathetic habitat management. In July 2013, RSPB ditches again scored highly although one ditch from Graveney Marshes was also high scoring and one ditch on the Leisure Plots was also reasonably high scoring. As with the survey results from May 2013, the Leisure Plots and Graveney Marshes produced the majority of the lower scoring ditches. The target invertebrate groups present on Seasalter Levels are discussed with reference to other grazing marshes based on the surveyor’s experience. It would appear that there are several common or local absentees and several uncommon taxa that might be expected on grazing marshes appear to be absent. Reasons for this might include the fact that this is site is peripheral to other grazing marshes in North Kent, but the long period of neglect including encroachment by Phragmites and intensive farming methods are likely to be a greater factors. There is little value in closely comparing the present survey with the previous ones of Philp (1982, 1994) because the latter were largely preliminary. Conservation Value was assessed for May and July 2013. Two Near Threatened (NT), 4 Red Data Book (RDB) and 24 Nationally Scarce (NS) species were recorded. The Leisure Plots come out as having higher total species scores and slightly higher SQI scores compared to Graveney Marshes. These probably reflect the intensive sheep grazing with high stocking rates on the latter. The Denley Hill Farm ditches were intermediate in terms of mean total species scores and mean SQI values between the Leisure Plots and the Seasalter Levels. The Seasalter Levels (SSSI UNITS SOUTH OF THE RAILWAY LINE) had the highest values</p>	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
					indicating the most favourable conditions for aquatic invertebrates on the entire survey area.	
049	28.86	Neutral Grassland - Lowland	28/01/2009	Favourable	The unit supports low-lying semi-improved grassland, including an excellent mosaic of short grazed damp turf dominated by fescues and creeping bent with perennial rye-grass, meadow barley, creeping buttercup and clovers, along with areas of tussocky grasses and rushes adding to the variation structure, and occasional patches of standing shallow water at time of survey. Common reeds occur relatively densely in places along the ditches across the site. Birds were using the site during the time of survey. Current management appears to be appropriate to maintain the grassland in suitable condition for the wintering bird assemblage. Comments on individual attributes: Grassland extent ? there were no indications of loss of grassland. Sward structure ? The grassland is in very good condition with respect to suitability for wintering birds. The grassland is short but rushes are frequent providing cover and structural diversity. Patches of exposed wet mud were noted in places. Overall there appears to be a suitable range of features present to support wintering birds and the fields may also be suitable for breeding species such as lapwing.	
051	99.72	Neutral Grassland - Lowland	27/01/2009	Favourable		
052	46.19	Neutral Grassland - Lowland	27/01/2009	Favourable	The unit supports low-lying semi-improved grassland, including extensive areas of short grazed damp turf dominated by fescues and creeping bent with perennial rye-grass, meadow barley, creeping buttercup and clovers, along with areas of tussocky grasses and rushes adding to the variation structure, and occasional patches of standing shallow water at time of survey. In addition, ditches within the site are in good condition, the margins supporting common reed, sometimes in dense patches, along with sea club-rush and smaller amounts of bulrush. Lengths of the ditches have been recently cut back particularly within the southern part of the unit as part of on-going low-level maintenance, providing a range of successional stages along the ditches across the unit. Current management appears to be appropriate to maintain the grassland in suitable condition for the wintering bird assemblage. Comments on individual attributes: Grassland extent ? there were no indications of loss of grassland. Sward structure ? The grassland is in very good condition with respect to suitability for wintering birds. The	

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					grassland is short but rushes are frequent providing cover and structural diversity. Patches of exposed wet mud were noted in places. Overall, there appears to be a suitable range of features present to support wintering birds and the fields may also be suitable for breeding species such as lapwing.	
054	54.92	Neutral Grassland - Lowland	27/01/2009	Favourable	The unit supports low-lying semi-improved grassland some of which has the microtopography ('lumps and bumps?') associated with reclaimed saltmarsh. The sward was being grazed by sheep at the time of survey with plenty of standing shallow water. Current management appears to be appropriate to maintain the grassland in suitable condition for the wintering bird assemblage. Comments on individual attributes: Grassland extent ? there were no indications of loss of grassland. Sward structure ? The grassland is in very good condition with respect to suitability for wintering birds. Reeds and rushes are present as marginal vegetation of the more permanent water bodies and in occasional larger stands providing cover and structural diversity. Patches of exposed wet mud were noted in places. Overall there appears to be a suitable range of features present to support wintering birds.	
055	35.83	Neutral Grassland - Lowland	27/01/2009	Favourable	The unit supports low-lying semi-improved grassland, including extensive areas of short grazed damp turf dominated by fescues and creeping bent with perennial rye-grass, meadow barley, creeping buttercup and clovers, along with areas of tussocky grasses and rushes adding to the variation structure, and occasional patches of standing shallow water at time of survey. In addition, ditches within the site are in good condition, the margins supporting common reed, sometimes in dense patches, along with sea club-rush and smaller amounts of bulrush. During the survey there were no indications of management problems or damage, and the site is maintained as favourable for the wintering bird assemblage. Comments on individual attributes: Grassland extent ? there were no indications of loss of grassland. Sward structure ? The grassland is in very good condition with respect to suitability for wintering birds. The grassland is short but rushes are frequent providing cover and structural diversity. Patches of exposed wet mud were noted in places. Overall, there appears to be a suitable range of features present to support wintering birds and the fields may also be suitable for breeding species such as lapwing.	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
056	43.09	Neutral Grassland - Lowland	01/05/2014	Favourable	<p>Specialist Survey: "AQUATIC INVERTEBRATE SURVEY OF THE SEASALTER LEVELS, WHITSTABLE KENT. MAY and JULY 2013. Report to Natural England. Final: May 2014. [REDACTED] Invertebrate Ecologist. "Summary taken from report, with SSSI Unit Numbers added in CAPITAL LETTERS:GENERAL RESULTS OF AQUATIC INVERTEBRATE SURVEY: Ditches on the RSPB reserve (SSSI UNIT 47) generally had the highest species richness in May 2013 with a maximum of 36 and an average of 27.5. The only exception was Ditch 22 on Denley Hill (SSSI UNIT 48) which had a score of 32 which was by far the highest scoring west of the railway line. The Leisure Plots (SSSI UNITS 32 AND PARTS OF UNITS 33 AND 56) and Graveney Marshes (NORTH-WEST = SSSI UNITS 48, 56, 33) are generally characterised by relatively low species richness. The latter may be explained by reed encroachment in the ditches, brackish ditches and lack of sympathetic habitat management. In July 2013, the RSPB ditches (SSSI UNIT 47) again scored highly although one ditch from Graveney Marshes was also high scoring (Ditch 17) with a score of 36. This ditch had the lowest species richness (6) in May 2013 – some of these differences may be explained by the fact that the May sample was taken amongst reeds whilst the July sample was taken from an open section. One ditch on the Leisure Plots (Ditch 7) (IN SSSI UNIT 32) in July 2013 was also reasonably high scoring. As with May, the Leisure Plots and Graveney Marshes produced the majority of the lower scoring ditches. Tables 5 and 6 also present species richness results for the five survey areas. In both months, Seasalter Levels (East) (SSSI UNITS 65, 47 AND EASTERN HALF OF UNIT 64) has the highest species richness based on the target groups. Species richness is considerably higher on the RSPB reserve in July compared with May (the reason for this is unclear). Surprisingly, Denley Hill Farm comes out as being the least species-rich in both May and July despite the fact that Ditch 22 is high scoring. It is possible that the low species-richness for Denley Hill may partly reflect some uniformity in terms of the ditches sampled in this area. Tables 5 and 6 should be compared with botanical species richness in Table 2 of Banks (2014). The plant survey found that Denley Hill Farm had the highest species-richness although this was decreasing and had been substantially higher in the past. The better plant results compared with the invertebrates might be partly explained by the greater number of ditches surveyed for botany but this is unlikely to explain all the differences between the two survey results. CONCLUSIONS OF AQUATIC INVERTEBRATE SURVEY: The results of an aquatic invertebrate survey on</p>	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
					<p>Seasalter Levels, Whitstable, Kent are presented. Invertebrates have been assessed using species richness, conservation value, habitat value, and tolerance (or otherwise) to salinity. Non-native species have also been indicated and discussed. The main useful values are species richness and conservation value. The former indicate that ditches on the RSPB reserve generally had the highest species richness in May 2013. The Leisure Plots and Graveney Marshes are generally characterised by relatively low species richness in May 2013. The latter may be explained by reed encroachment in the ditches, the presence of brackish ditches and lack of sympathetic habitat management. In July 2013, RSPB ditches again scored highly although one ditch from Graveney Marshes was also high scoring and one ditch on the Leisure Plots was also reasonably high scoring. As with the survey results from May 2013, the Leisure Plots and Graveney Marshes produced the majority of the lower scoring ditches. The target invertebrate groups present on Seasalter Levels are discussed with reference to other grazing marshes based on the surveyor’s experience. It would appear that there are several common or local absentees and several uncommon taxa that might be expected on grazing marshes appear to be absent. Reasons for this might include the fact that this is site is peripheral to other grazing marshes in North Kent, but the long period of neglect including encroachment by Phragmites and intensive farming methods are likely to be a greater factors. There is little value in closely comparing the present survey with the previous ones of Philp (1982, 1994) because the latter were largely preliminary. Conservation Value was assessed for May and July 2013. Two Near Threatened (NT), 4 Red Data Book (RDB) and 24 Nationally Scarce (NS) species were recorded. The Leisure Plots come out as having higher total species scores and slightly higher SQI scores compared to Graveney Marshes. These probably reflect the intensive sheep grazing with high stocking rates on the latter. The Denley Hill Farm ditches were intermediate in terms of mean total species scores and mean SQI values between the Leisure Plots and the Seasalter Levels. The Seasalter Levels (SSSI UNITS SOUTH OF THE RAILWAY LINE) had the highest values indicating the most favourable conditions for aquatic invertebrates on the entire survey area.</p>	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
057	126.57	Neutral Grassland - Lowland	27/01/2009	Favourable	The unit supports low-lying semi-improved grassland some of which has the microtopography ('lumps and bumps?') associated with reclaimed saltmarsh. The sward was short and had a lot of standing shallow water at time of survey. Thousands of birds were present at the time of survey. Current management appears to be appropriate to maintain the grassland in suitable condition for the wintering bird assemblage. Comments on individual attributes: Grassland extent ? there were no indications of loss of grassland. Sward structure ? The grassland is in very good condition with respect to suitability for wintering birds. The grassland is short but rushes are frequent providing cover and structural diversity. Patches of exposed wet mud were noted in places. Overall there are a suitable range of features present to support wintering birds and the fields may also be suitable for breeding species such as lapwing.	
058	53.11	Neutral Grassland - Lowland	27/01/2009	Favourable		
059	39.18	Neutral Grassland - Lowland	27/01/2009	Favourable		
060	37.91	Neutral Grassland - Lowland	28/01/2009	Favourable	The unit supports low-lying semi-improved grassland some of which has the microtopography ('lumps and bumps?') associated with reclaimed saltmarsh. The sward was short and had a lot of standing shallow water at time of survey. Hundreds of waterfowl were present at the time of survey and a hen harrier was seen hunting. Current management (cattle grazing) is appropriate to maintain the grassland in suitable condition for the wintering bird assemblage. Comments on individual attributes: Grassland extent ? there were no indications of loss of grassland. Sward structure ? The grassland is in very good condition with respect to suitability for wintering birds. The grassland is short but rushes are frequent providing cover and structural diversity. Patches of exposed wet mud were noted in places. Overall there are a suitable range of features present to support wintering birds and the fields may also be suitable for breeding species such as lapwing.	
061	37.31	Neutral Grassland - Lowland	04/03/2009	Favourable	The unit supports low-lying semi-improved grassland, including extensive areas of short grazed damp turf with scattered patches of shallow water. There are also areas of tussocky grasses and rushes adding to the variation in structure. The	

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					ditches appear to be in good condition. Current management appears to be appropriate to maintain the grassland in suitable condition for the wintering bird assemblage. Comments on individual attributes: Grassland extent ? there were no indications of loss of grassland. Sward structure ? The grassland is in very good condition with respect to suitability for wintering birds. The grassland is short but rushes are frequent providing cover and structural diversity. Patches of exposed wet mud were noted in places. Overall, there appears to be a suitable range of features present to support wintering birds and the fields may also be suitable for breeding species such as lapwing.	
062	10.10	Neutral Grassland - Lowland	28/01/2009	Favourable	The unit supports low-lying semi-improved grassland, grazed by sheep, including extensive areas of short grazed damp turf, areas of tussocky grasses and rushes adding to the variation structure, and occasional patches of standing shallow water at time of survey. Birds were seen using the site at the time of survey, including curlew and lapwing. Current management appears to be appropriate to maintain the grassland in suitable condition for the wintering bird assemblage. Comments on individual attributes: Grassland extent ? there were no indications of loss of grassland. Sward structure ? The grassland is in very good condition with respect to suitability for wintering birds. The grassland is short but rushes are frequent providing cover and structural diversity. Patches of exposed wet mud were noted in places. Overall there appears to be a suitable range of features present to support wintering birds and the fields may also be suitable for breeding species such as lapwing.	
063	5.99	Neutral Grassland - Lowland	28/01/2009	Favourable	The unit supports low-lying semi-improved grassland, including extensive areas of short grazed damp turf, areas of tussocky grasses and rushes adding to the variation structure, and occasional patches of standing shallow water at time of survey. Current management appears to be appropriate to maintain the grassland in suitable condition for the wintering bird assemblage. Comments on individual attributes: Grassland extent ? there were no indications of loss of grassland. Sward structure ? The grassland is in very good condition with respect to suitability for wintering birds. The grassland is short but rushes are frequent providing cover and structural diversity. Patches of exposed wet mud were noted in places. Overall there appears to be a suitable range of features present to support wintering birds and the fields may also be suitable for breeding species such as lapwing.	

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064	45.11	Neutral Grassland - Lowland	01/05/2014	Favourable	<p>Specialist Survey: "AQUATIC INVERTEBRATE SURVEY OF THE SEASALTER LEVELS, WHITSTABLE KENT, MAY and JULY 2013. Report to Natural England. Final: May 2013 [REDACTED], Invertebrate Ecologist. "Summary taken from report, with SSSI Unit Numbers added in CAPITAL LETTERS:GENERAL RESULTS OF AQUATIC INVERTEBRATE SURVEY: Ditches on the RSPB reserve (SSSI UNIT 47) generally had the highest species richness in May 2013 with a maximum of 36 and an average of 27.5. The only exception was Ditch 22 on Denley Hill (SSSI UNIT 48) which had a score of 32 which was by far the highest scoring west of the railway line. The Leisure Plots (SSSI UNITS 32 AND PARTS OF UNITS 33 AND 56) and Graveney Marshes (NORTH-WEST = SSSI UNITS 48, 56, 33) are generally characterised by relatively low species richness. The latter may be explained by reed encroachment in the ditches, brackish ditches and lack of sympathetic habitat management. In July 2013, the RSPB ditches (SSSI UNIT 47) again scored highly although one ditch from Graveney Marshes was also high scoring (Ditch 17) with a score of 36. This ditch had the lowest species richness (6) in May 2013 – some of these differences may be explained by the fact that the May sample was taken amongst reeds whilst the July sample was taken from an open section. One ditch on the Leisure Plots (Ditch 7) (IN SSSI UNIT 32) in July 2013 was also reasonably high scoring. As with May, the Leisure Plots and Graveney Marshes produced the majority of the lower scoring ditches. Tables 5 and 6 also present species richness results for the five survey areas. In both months, Seasalter Levels (East) (SSSI UNITS 65, 47 AND EASTERN HALF OF UNIT 64) has the highest species richness based on the target groups. Species richness is considerably higher on the RSPB reserve in July compared with May (the reason for this is unclear). Surprisingly, Denley Hill Farm comes out as being the least species-rich in both May and July despite the fact that Ditch 22 is high scoring. It is possible that the low species-richness for Denley Hill may partly reflect some uniformity in terms of the ditches sampled in this area. Tables 5 and 6 should be compared with botanical species richness in Table 2 of Banks (2014). The plant survey found that Denley Hill Farm had the highest species-richness although this was decreasing and had been substantially higher in the past. The better plant results compared with the invertebrates might be partly explained by the greater number of ditches surveyed for botany but this is unlikely to explain all the differences between the two survey results. CONCLUSIONS OF AQUATIC INVERTEBRATE SURVEY: The results of an aquatic invertebrate survey on</p>	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
					Seasalter Levels, Whitstable, Kent are presented. Invertebrates have been assessed using species richness, conservation value, habitat value, and tolerance (or otherwise) to salinity. Non-native species have also been indicated and discussed. The main useful values are species richness and conservation value. The former indicate that ditches on the RSPB reserve generally had the highest species richness in May 2013. The Leisure Plots and Graveney Marshes are generally characterised by relatively low species richness in May 2013. The latter may be explained by reed encroachment in the ditches, the presence of brackish ditches and lack of sympathetic habitat management. In July 2013, RSPB ditches again scored highly although one ditch from Graveney Marshes was also high scoring and one ditch on the Leisure Plots was also reasonably high scoring. As with the survey results from May 2013, the Leisure Plots and Graveney Marshes produced the majority of the lower scoring ditches. The target invertebrate groups present on Seasalter Levels are discussed with reference to other grazing marshes based on the surveyor’s experience. It would appear that there are several common or local absentees and several uncommon taxa that might be expected on grazing marshes appear to be absent. Reasons for this might include the fact that this is site is peripheral to other grazing marshes in North Kent, but the long period of neglect including encroachment by Phragmites and intensive farming methods are likely to be a greater factors. There is little value in closely comparing the present survey with the previous ones of Philp (1982, 1994) because the latter were largely preliminary. Conservation Value was assessed for May and July 2013. Two Near Threatened (NT), 4 Red Data Book (RDB) and 24 Nationally Scarce (NS) species were recorded. The Leisure Plots come out as having higher total species scores and slightly higher SQI scores compared to Graveney Marshes. These probably reflect the intensive sheep grazing with high stocking rates on the latter. The Denley Hill Farm ditches were intermediate in terms of mean total species scores and mean SQI values between the Leisure Plots and the Seasalter Levels. The Seasalter Levels (SSSI UNITS SOUTH OF THE RAILWAY LINE) had the highest values indicating the most favourable conditions for aquatic invertebrates on the entire survey area.	
065	11.23	Neutral Grassland - Lowland	01/05/2014	Favourable	Specialist Survey: "AQUATIC INVERTEBRATE SURVEY OF THE SEASALTER LEVELS, WHI ██████████ MAY and JULY 2013. Report to Natural England. Final: May 201 ██████████, Invertebrate Ecologist. "Summary taken from report, with SSSI	

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Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
					<p>The main useful values are species richness and conservation value. The former indicate that ditches on the RSPB reserve generally had the highest species richness in May 2013. The Leisure Plots and Graveney Marshes are generally characterised by relatively low species richness in May 2013. The latter may be explained by reed encroachment in the ditches, the presence of brackish ditches and lack of sympathetic habitat management. In July 2013, RSPB ditches again scored highly although one ditch from Graveney Marshes was also high scoring and one ditch on the Leisure Plots was also reasonably high scoring. As with the survey results from May 2013, the Leisure Plots and Graveney Marshes produced the majority of the lower scoring ditches. The target invertebrate groups present on Seasalter Levels are discussed with reference to other grazing marshes based on the surveyor's experience. It would appear that there are several common or local absentees and several uncommon taxa that might be expected on grazing marshes appear to be absent. Reasons for this might include the fact that this is site is peripheral to other grazing marshes in North Kent, but the long period of neglect including encroachment by Phragmites and intensive farming methods are likely to be a greater factors. There is little value in closely comparing the present survey with the previous ones of Philp (1982, 1994) because the latter were largely preliminary. Conservation Value was assessed for May and July 2013. Two Near Threatened (NT), 4 Red Data Book (RDB) and 24 Nationally Scarce (NS) species were recorded. The Leisure Plots come out as having higher total species scores and slightly higher SQI scores compared to Graveney Marshes. These probably reflect the intensive sheep grazing with high stocking rates on the latter. The Denley Hill Farm ditches were intermediate in terms of mean total species scores and mean SQI values between the Leisure Plots and the Seasalter Levels. The Seasalter Levels (SSSI UNITS SOUTH OF THE RAILWAY LINE) had the highest values indicating the most favourable conditions for aquatic invertebrates on the entire survey area.</p>	
067	5.96	Neutral Grassland - Lowland	28/01/2009	Favourable	<p>The unit mostly supports low-lying semi-improved grassland and is, in places, drier grassland than most of the site. There is evidence of recent grazing and the sward is generally short with tussocks and taller vegetation scattered throughout. Current management appears to be appropriate to maintain the grassland in suitable condition for the wintering bird assemblage. Comments on individual attributes: Grassland extent ? there were no indications of loss of grassland,</p>	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
					although unit seems to include the several cottages and a farm yard. Sward structure ? The low-lying grassland is fairly uniform but there are occasional patches of open shallow water and some permanent pools. Some of these have reed margins and there are occasional patches of rushes providing structural diversity. Areas of exposed wet mud were noted in places. So, overall there appears to be a suitable range of features present to support wintering birds and the fields may also be suitable for breeding species such as lapwing.	
068	44.24	Neutral Grassland - Lowland	28/01/2009	Favourable	The unit supports low-lying semi-improved grassland some of which has the microtopography ('lumps and bumps?') associated with reclaimed saltmarsh. The sward showed signs of grazing with some short areas and taller tussocks with plenty of standing shallow water at time of survey. Current management appears to be appropriate to maintain the grassland in suitable condition for the wintering bird assemblage. Comments on individual attributes: Grassland extent ? there were no indications of loss of grassland. Sward structure ? The grassland is in good condition with respect to suitability for wintering birds. Reeds and rushes are present, at least as marginal vegetation of the more permanent water bodies, providing cover and structural diversity. Patches of exposed wet mud were noted in places. Overall there appears to be a suitable range of features present to support wintering birds and the fields may also be suitable for breeding species such as lapwing. However the unit is on the margins of the site with various predator perches such as power lines and road infrastructure including a rather large bridge.	
069	13.11	Neutral Grassland - Lowland	28/01/2009	Favourable	The unit supports low-lying semi-improved grassland some of which has the microtopography ('lumps and bumps?') associated with reclaimed saltmarsh. The sward was short and had a lot of standing shallow water at time of survey. Hundreds of birds were present at the time of survey. Current management (cattle grazing) is appropriate to maintain the grassland in suitable condition for the wintering bird assemblage. Comments on individual attributes: Grassland extent ? there were no indications of loss of grassland. Sward structure ? The grassland is in very good condition with respect to suitability for wintering birds. The grassland is short but rushes are frequent providing cover and structural diversity. Patches of exposed wet mud were noted in places. Overall there are a suitable range of features present to support wintering birds and the fields may also be suitable for breeding species such as lapwing and curlew.	

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
070	6.03	Neutral Grassland - Lowland	28/01/2009	Favourable	Favourable. The unit supports low-lying semi-improved grassland. Sheep were grazing at time of survey and the sward is short. Some of the ditches have recently been cleaned out. Current management appears to be appropriate to maintain the grassland in suitable condition for the wintering bird assemblage. Comments on individual attributes: Grassland extent ? there were no indications of loss of grassland. Sward structure ? The low-lying grassland is fairly uniform but there are occasional patches of open shallow water. Some of these have patches of rush providing structural diversity and there are occasional small tussocky patches of rushes in the fields. Patches of exposed wet mud were noted in places. So, overall there appears to be a suitable range of features present to support wintering birds and given the low levels of disturbance in this area the fields may also be suitable for breeding species such as lapwing. [REDACTED] visited.	
071	18.40	Neutral Grassland - Lowland	27/01/2009	Favourable		
072	26.60	Neutral Grassland - Lowland	28/01/2009	Favourable		
074	26.19	Neutral Grassland - Lowland	04/08/2009	Favourable		
078	5.81	Neutral Grassland - Lowland	27/01/2009	Favourable		
079	20.22	Neutral Grassland - Lowland	27/02/2009	Unfavourable - No change		Agriculture - Undergrazing
080	10.40	Neutral Grassland - Lowland	26/10/2010	Favourable		
081	6.32	Neutral Grassland - Lowland	27/01/2009	Favourable		

Unit No.	Area (ha)	Main Habitat	Latest Assessment Date	Assessment Description	Condition Assessment Comment	Reason for Adverse Condition
082	4.44	Neutral Grassland - Lowland	28/01/2009	Favourable		
110	1492.98	Littoral Sediment	12/04/2005	Favourable		
111	1768.67	Littoral Sediment	12/04/2005	Favourable		

C Information to Inform an Appropriate Assessment and Marine Conservation Zone Assessment

C.1 Background

The Medway Estuary lies on the south side of the outer Thames Estuary in Kent, in the south-east of England. It forms a single tidal system with The Swale and joins with the Thames Estuary between the Isle of Grain and Sheerness. The Medway Estuary and The Swale is collectively referred to “the Medway” in this appendix.

The Medway comprises a complex arrangement of tidal channels, which drain around large islands of saltmarsh and mudflat with peninsulas of marshland. Almost all of the present shoreline of the Medway Estuary is protected by some form of flood defence. Most of these embankments were in place by about 1840. However, since this time many of the walls have been subsequently breached, with the enclosed areas reverting back to saltmarshes or intertidal flats.

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 Statutory Harbour Authority (SHA).

Peel Ports Medway is part of the Peel Ports Group and a privately-owned company. The Port of Sheerness Limited (PoSL) is the SHA for the Medway as detailed within the Medway Ports Authority Act 1973. The Port of London Authority (PLA) is the SHA for the Approaches to the Medway (Medway Approach Channel); however, Peel Ports Medway does have responsibility for the conservancy of the Medway Approach Channel.

Statutory obligations are vested in PoSL which trades as ‘Peel Ports Medway’. Peel Ports Medway has a statutory duty to provide and maintain advertised depths of water in the navigable channels within the estuary and its approaches, and alongside jetties and berths. This necessitates the maintenance dredging of access channels and berth pockets to remove recently deposited sediment.

This appendix provides the information deemed necessary to inform an Appropriate Assessment (AA) and Marine Conservation Zone (MCZ) Assessment of the maintenance dredging undertaken by or on behalf of the SHA and all known third party users in the Medway and its approaches.

The total average volume of material removed by all parties in the 19 year period between 2002 to 2020 equates to approximately 130,000 m³ per annum (see Table C1) of which, Peel Ports Medway maintenance dredge activities comprise approximately 86,100 m³ per annum and third party maintenance dredge activities comprise approximately 43,900 m³ per annum. There is, however, considerable annual variability in the amount of maintenance dredging that is undertaken by both Peel Ports Medway and third party operators throughout the study area. At some sites, for example, maintenance dredging is not undertaken in all years. The maximum regional and total volumes dredged, in any one year, over the 19 year period (2002 to 2020) are shown in Table C1. The overall total maximum annual maintenance dredge volume removed by all parties over the 19 year period is 263,000 m³ (in 2007). A risk envelope has been used to consider the worst case scenario in this appendix. In this way, the potential effects associated with the removal of the maximum regional and total annual

volumes of material since 2002 from the Medway and its approaches have been assessed as a worst case.

Of the total maintenance dredge activities, on average 62 % per annum is moved by agitation dredge methods (mainly WID and plough dredging) which equates to an average of approximately 80,200 m³ (and maximum of approximately 162,200 m³), and 38 % per annum is dredged and disposed of at sea or within terrestrial disposal facilities ashore, which equates to an average of 49,800 m³ (and maximum of approximately 100,800 m³).

Table C1. Average and maximum dredge volumes over the last 19 years (2002 to 2020)

Site	Average Dredged Volume (m ³)	Maximum Dredged Volume (m ³)	Average Regional Total Volume (m ³)	Maximum Regional Total Volume (m ³)
Medway Approach and Sheerness Docks				
Medway Approach Channel*	69,509	158,725	74,334	176,369
Sheerness Docks*	3,331	16,349		
North Kent Buoy Spit*	1,494	14,644		
Middle Medway				
Isle of Grain BP	8,207	21,300	36,601	120,976
Grain LNG	2,597	12,113		
London Thamesport	13,544	89,330		
Kingsnorth Power Station (Intake Channel)	4,572	20,075		
Shoregate Wharf Sailing Club	18	150		
Stargate Marine	700	1,500		
Whitton Marine Ltd	1,286	1,500		
J C Marine Ltd	14,222	30,000		
Hoo Ness Yacht Club	71	80		
Residential Marine Ltd (Hoo Marina)	743	3,650		
Residential Marine Ltd (Port Werburgh)	500	900		
Medway Sailing Club	40	100		
Medway Water Sports Centre	65	200		
Gillingham Marina	1,105	8,195		
Gillingham Pier	1,000	10,000		
Inner Medway				
Chatham Lock Approaches*	11,517	52,276	13,927	56,060
Medway Yacht Club	334	790		
Marina Developments Ltd	475	3,200		
HM Forces	16	17		

Site	Average Dredged Volume (m ³)	Maximum Dredged Volume (m ³)	Average Regional Total Volume (m ³)	Maximum Regional Total Volume (m ³)
Turks Boatyard Slipway	20	20		
Rochester Cruising Club	63	100		
Pelican Cruising Club	11	78		
Strood Yacht Club	644	1,000		
Beacon Boatyard	431	3,200		
Cuxton Marina Ltd	63	355		
Elmhaven Marina Ltd.	75	450		
Grain LNG Jetty 10	1,050	3,558		
Grain LNG Jetty 8	1,755	3,340		
Wilsonian Sailing Club	0	0		
Scotline Terminal	583	3,500		
The Swale				
Ridham Sea Terminals Ltd	4,232	13,500	5,102	13,999
Swale Marina Services Ltd	494	500		
Youngboats Ltd	23	250		
Queenborough Harbour	83	500		
Quayside Properties Ltd	933	1,000		
Faversham Creek*	263	1,500		
Total Area				390
Total Average Annual Maintenance Dredge Volume (m³)				130,000
Total Maximum Annual Maintenance Dredge Volume (m³)				263,000
*Peel Ports Medway maintenance dredge site				

C.1.1 Report context

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

European sites are defined in the Habitats Regulations as including the following:

- Special Areas of Conservation (SACs) designated under the EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (the Habitats Directive) for their habitats and/or species of European importance;
- Special Protection Areas (SPAs) classified under the EC Directive on the Conservation of Wild Birds (the Birds Directive) for rare, vulnerable and regularly occurring migratory bird species and internationally important wetlands;
- Sites of Community Importance (SCIs) that have been adopted by the European Commission but not yet formally designated by the government of each country; and
- Candidate SACs (cSACs) that have been submitted to the European Commission, but not yet formally adopted.

In England, it is also policy under the National Planning Policy Framework (DCLG, 2012) that the following wildlife sites should be given the same protection as European sites:

- Potential SPAs (pSPAs) and possible SACs (pSACs);
- Listed or proposed Ramsar sites under the 1971 Ramsar Convention on Wetlands of International Importance;¹² and
- Sites identified, or required, as compensatory measures for adverse effects on European sites.

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

It is the Government's view that maintenance dredging should be considered as a 'plan or project' for the purposes of the Habitats Regulations (Defra, 2007). This appendix presents the relevant information to allow the Competent Authority, the Marine Management Organisation (MMO), taking appropriate advice from Natural England, to record the AA.

In this context, ABPmer has been commissioned to produce a Maintenance Dredge Baseline Document to comply with the requirements of the Conservation Assessment Protocol for maintenance dredging. The Baseline Document provides current and historical information on dredging activities in the Medway and its approaches, and synthesises existing relevant information about the environmental status of the area. The Baseline Document (main report), should be read alongside this appendix which specifically reviews the available evidence and provides information to determine whether maintenance dredging and disposal activities undertaken by or on behalf of the SHA and all known third party users in the Medway and its approaches is having a potential impact on the interest features of any European/Ramsar sites.

Under Section 126 of the Marine and Coastal Act 2009 an assessment is also required to determine the significance of impacts on Marine Conservation Zone (MCZ) features and whether there is any significant

¹² pSPAs, pSACs and proposed Ramsar sites are sites on which Government has initiated public consultation on the scientific case for designation as a SPA, cSAC or Ramsar site.

risk of a project hindering the Conservation Objectives of the MCZ. This report also provides the information required for an MCZ Assessment.

C.2 Marine Protected Areas

C.2.1 European/Ramsar sites

Section 7 of the Baseline Document (main report) identifies European/Ramsar sites located within 5 km of the maintenance dredge and disposal sites in the study area. These sites are as follows:

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

A European Marine Site (EMS) is the collective term for SACs and SPAs that are covered by tidal water (continuously or intermittently). In accordance with Government advice in both England and Wales, Ramsar sites must be given the same consideration as European sites when considering plans and projects which might affect them. EMS within the study area include the Essex Estuaries, Benfleet and Southend Marshes, Medway Estuary and Marshes, The Swale, Thames Estuary and Marshes, Foulness (Mid-Essex Coast Phase 5) and Outer Thames Estuary.

C.2.2 Marine Conservation Zones

Section 7 of the Baseline Document (main report) identifies MCZs located within 5 km of the maintenance dredge and disposal sites in the study area. These sites are as follows:

- Medway Estuary MCZ; and
- Swale Estuary MCZ.

Of particular note is that the Kent and Essex Inshore Fisheries and Conservation Authority (IFCA), working with the Rochester Oyster and Floating Fishery, developed The River Medway Nursery Area No-Take Zone (NTZ) Byelaw to create a substantial NTZ in the Medway Estuary (Kent and Essex IFCA, 2022). The NTZ covers 12.1 km² of saltmarsh and mudflat habitats that support a wide variety of fish. The byelaw prohibits any fishing activity within the intertidal areas along the northern banks of the estuary, spanning from Hoo Marina to Elphinstone Point. This includes angling and netting from boat or shore, and bait digging.

C.2.3 MPA conservation advice

Natural England has statutory responsibility to advise relevant authorities as to the conservation objectives for all Marine Protected Areas (MPAs) within English territorial waters and operations which may cause deterioration or disturbance of natural habitats and species. The Joint Nature Conservation Committee (JNCC) has a statutory responsibility to advise relevant authorities as to the conservation objectives for MPAs which extend from the edge of territorial waters out to the UK Continental Shelf.

The role of the conservation objectives for a EMS is to define the nature conservation aspirations for the features of interest, thereby representing the aims and requirements of the Habitats and Birds Directives in relation to the site.

Natural England has produced formal marine conservation advice packages and supporting documents to help with individual site MPA assessments and the impact of marine activity in sensitive areas for all of the MPAs in the study area located within English territorial waters, namely Benfleet and Southend Marshes SPA and Ramsar site; Essex Estuaries SAC; Foulness (Mid-Essex Coast Phase 5) SPA and Ramsar site; Margate and Long Sands SAC; Medway Estuary and Marshes SPA and Ramsar site; Outer Thames Estuary SPA; Thames Estuary and Marshes SPA and Ramsar site; and The Swale SPA and Ramsar site (Natural England, 2021). Natural England and JNCC has jointly prepared formal marine conservation advice package for the offshore MPA, the Southern North Sea SAC (JNCC, 2021).

A detailed breakdown of the interest features and the associated conservation objectives for the MPAs that occur in the vicinity of the maintenance dredging and disposal operations can be found in Section 7 of the Baseline Document (main report).

C.3 Potential Impacts on Interest Features of MPAs

This section provides a review of the potential impacts of the maintenance dredge and disposal operations within the SHA alone (Sections C3.1 to C3.2, and requirement for mitigation measures in Section C3.3) and in-combination with other relevant plans and projects (including third party maintenance dredge operations) (Section C3.4), on the interest features of MPAs that were identified in Section C2. This assessment has been carried out in the context of the nature of the maintenance dredging and disposal activities, and the geographical locations of both the works and the interest features. As outlined in the Defra guidance (2007), it is based on existing knowledge and evidence with no new analysis undertaken. Figure C1 and Figure C2 show the location of the surrounding MPAs. Figure C3 to Figure C6 show the location of the Peel Ports Medway maintenance dredge areas and also, where spatial information is available, the third party dredge areas. Figure C7 shows the location of the licensed terrestrial and marine disposal sites.

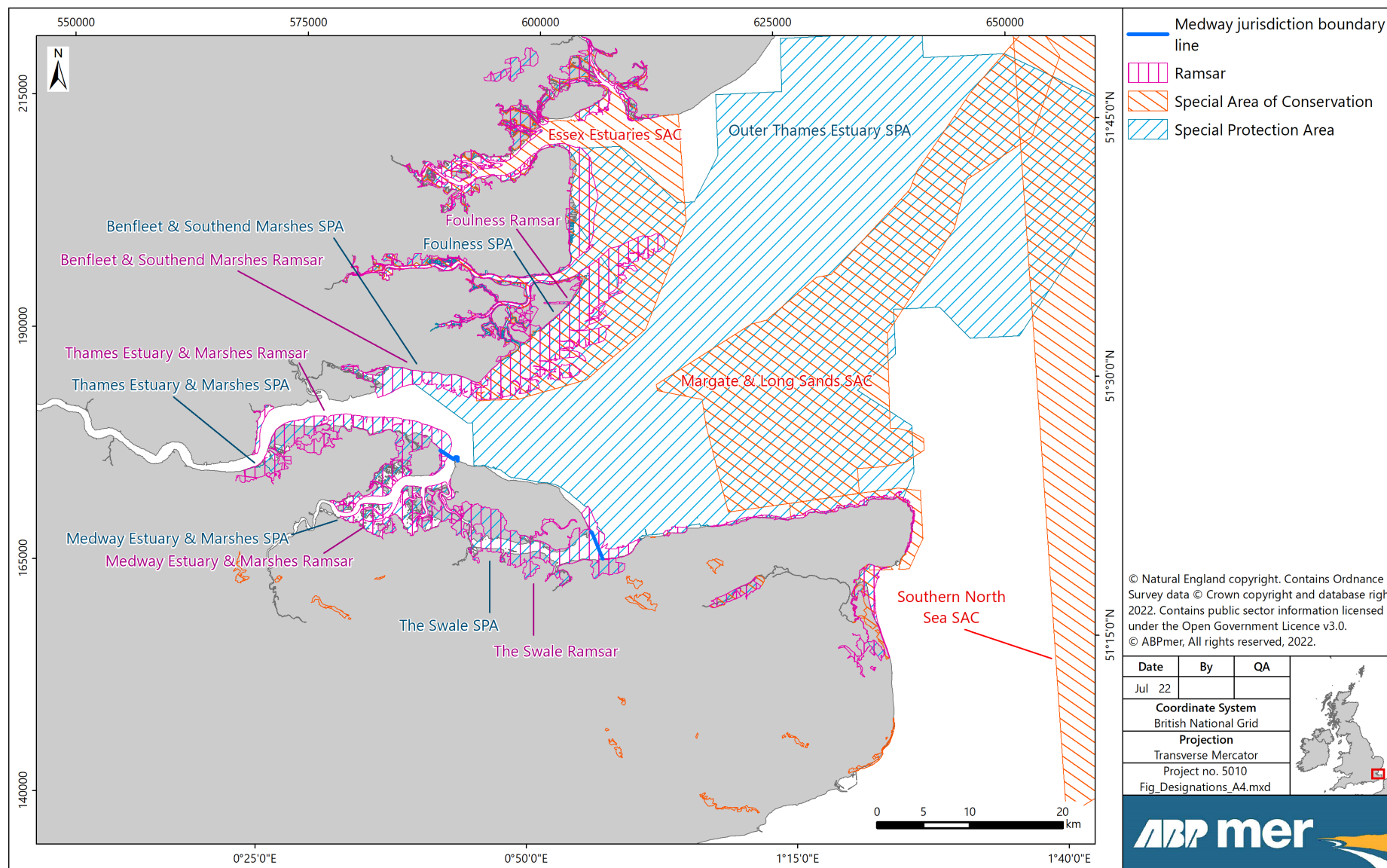


Figure C1. European and international nature conservation designated sites in the study area

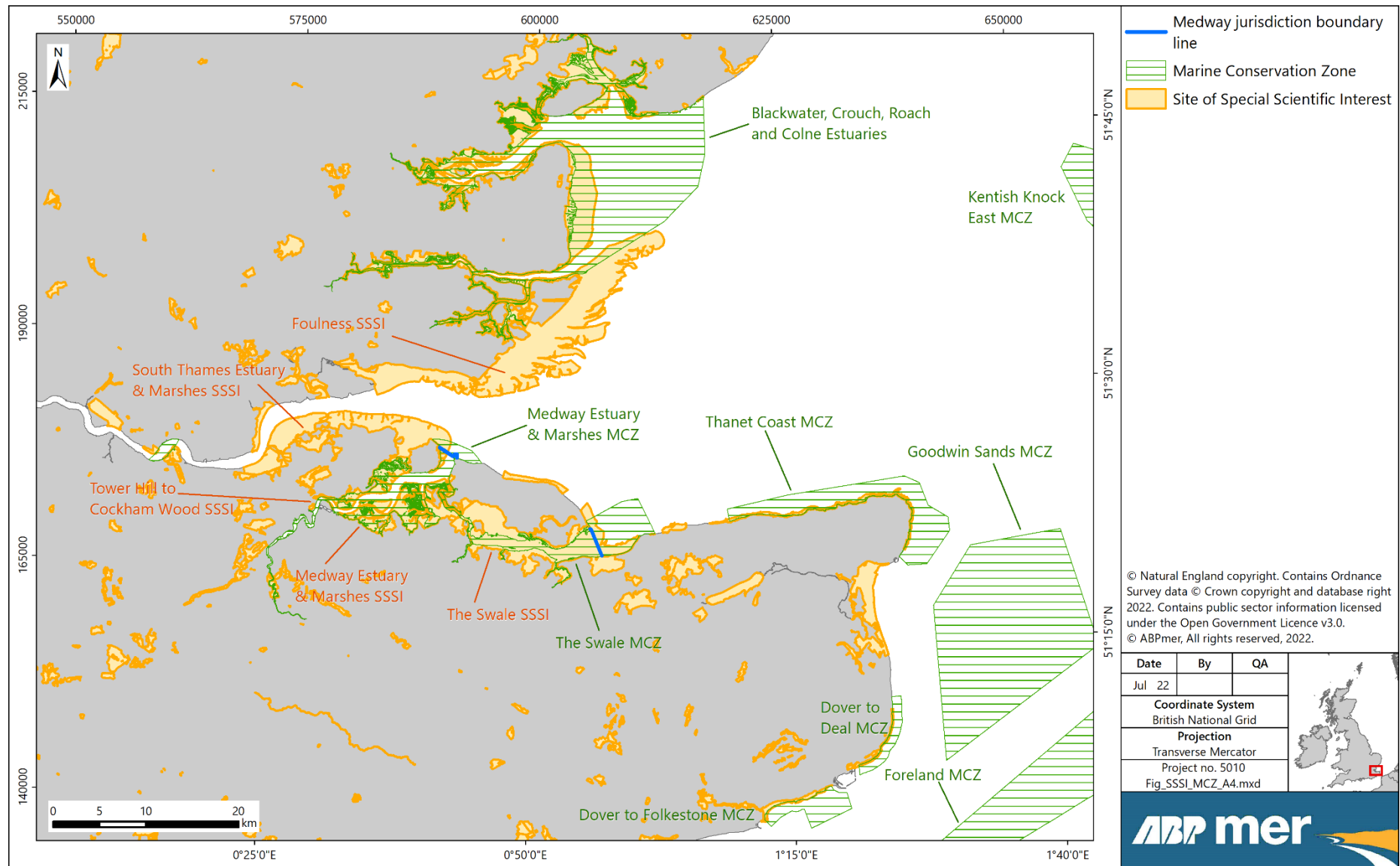


Figure C2. MCZs in the study area

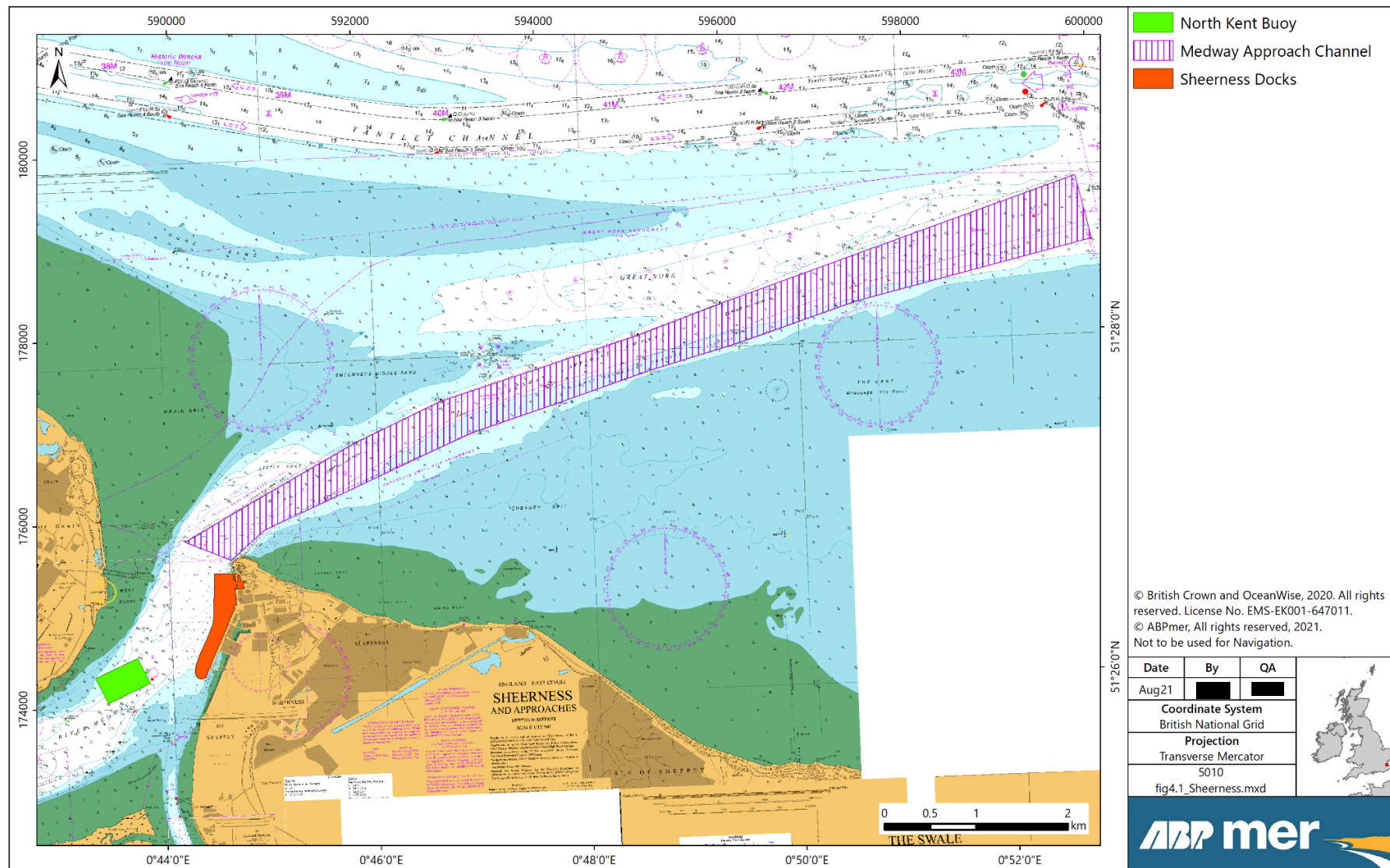


Figure C3. The Medway Approach Channel, Sheerness Docks and North Kent Buoy dredge locations

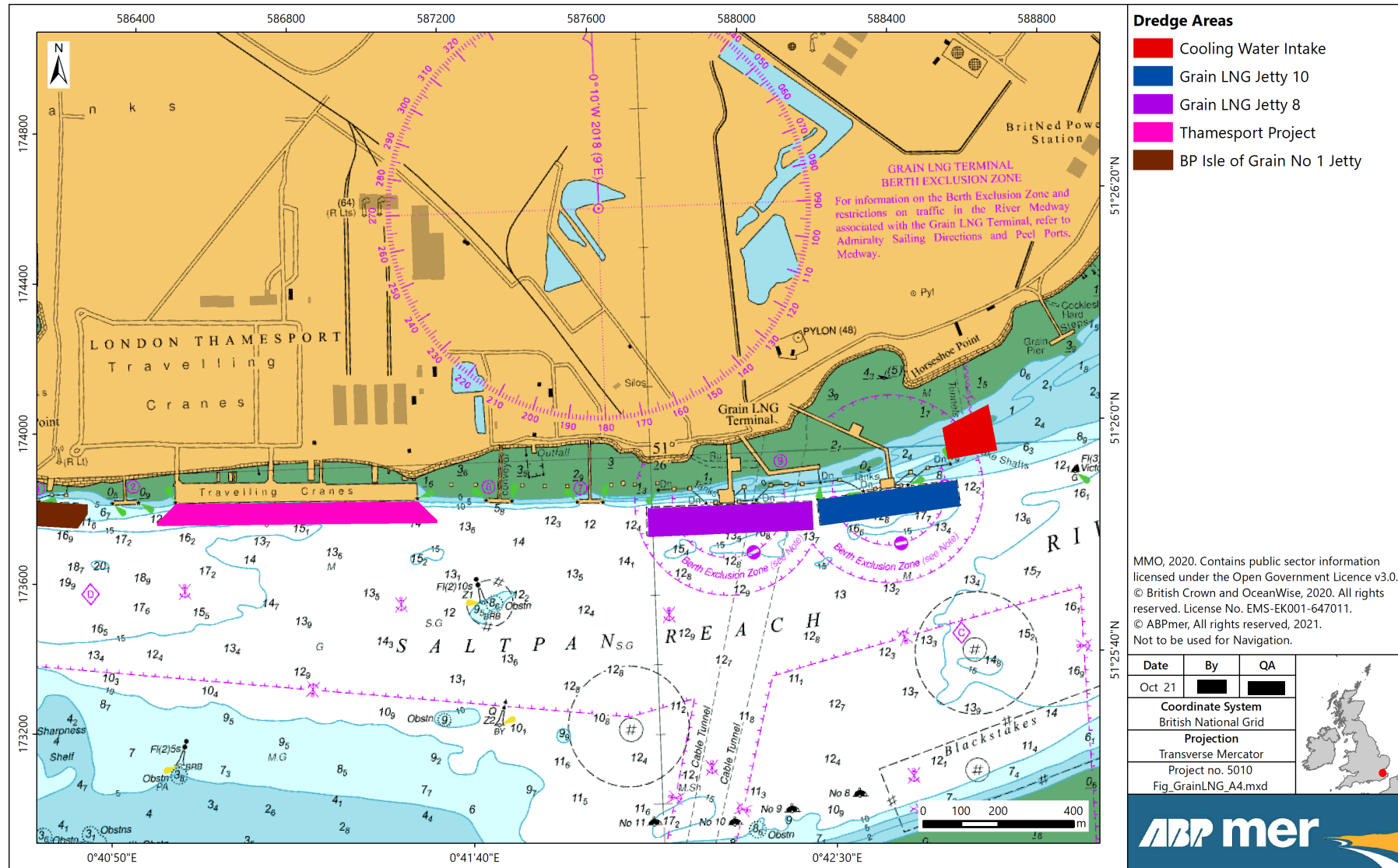


Figure C4. Dredge areas around the Isle of Grain LNG Jetty

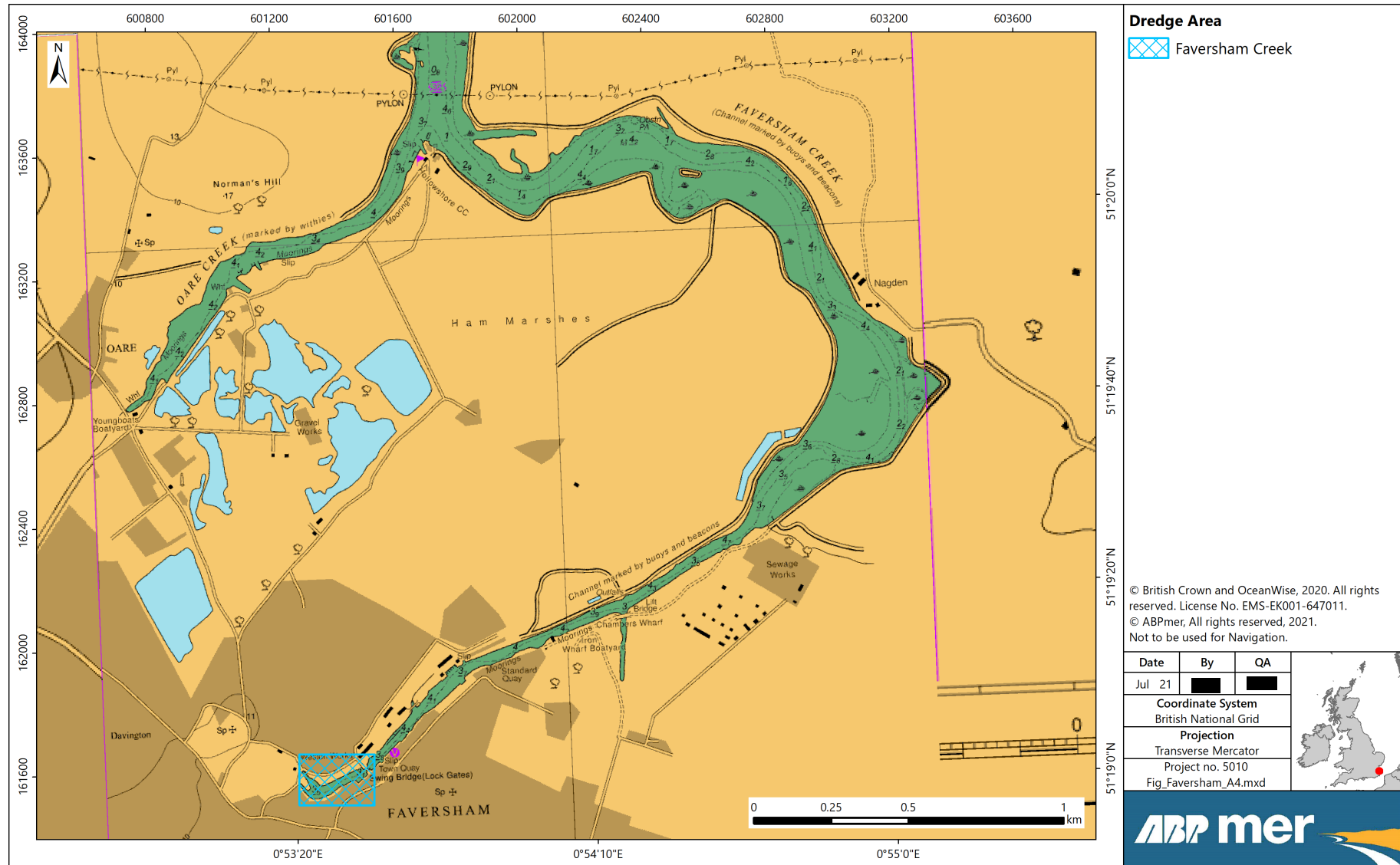


Figure C5. The Faversham Creek dredge area

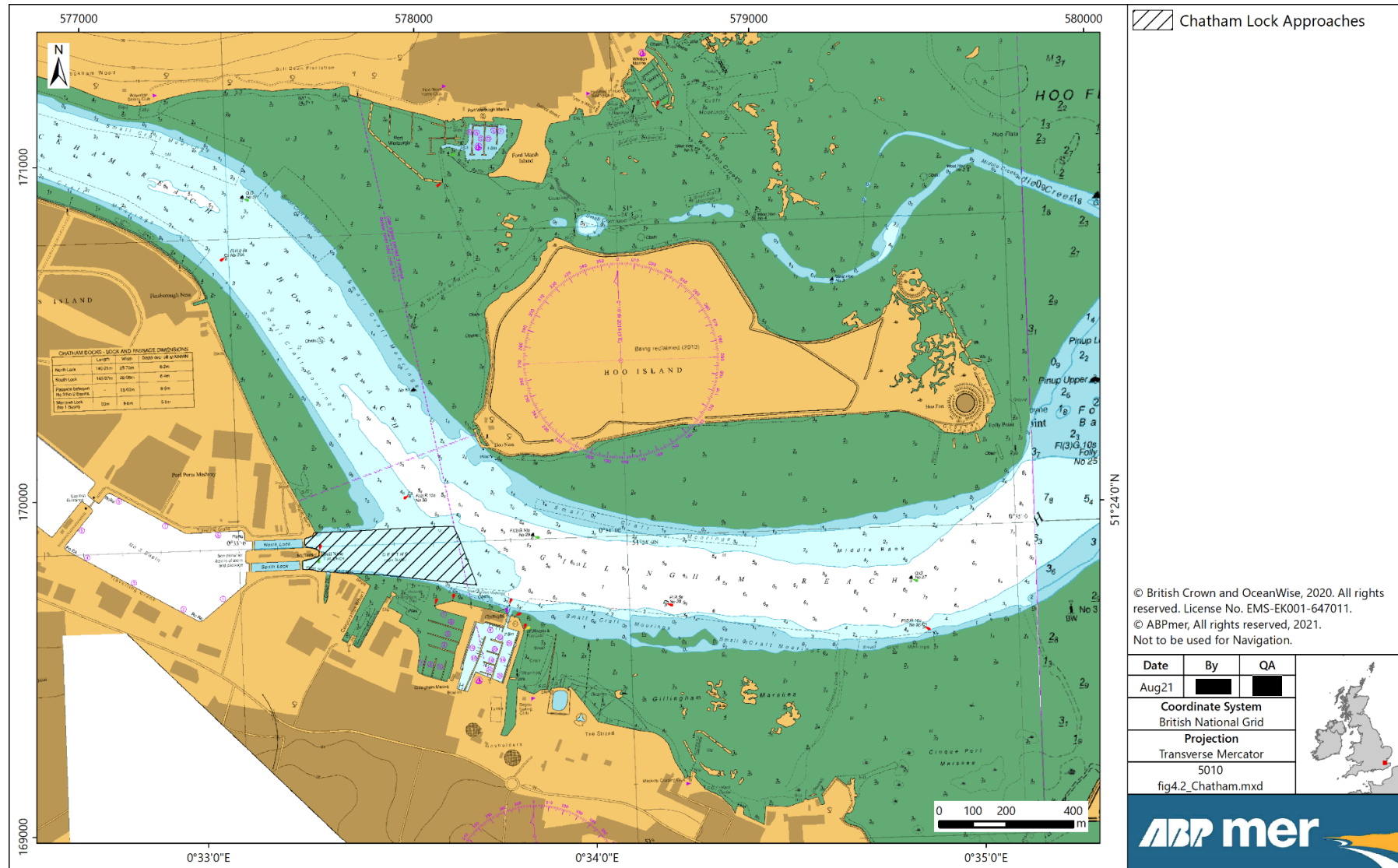


Figure C6. The Chatham Lock Approaches dredge area

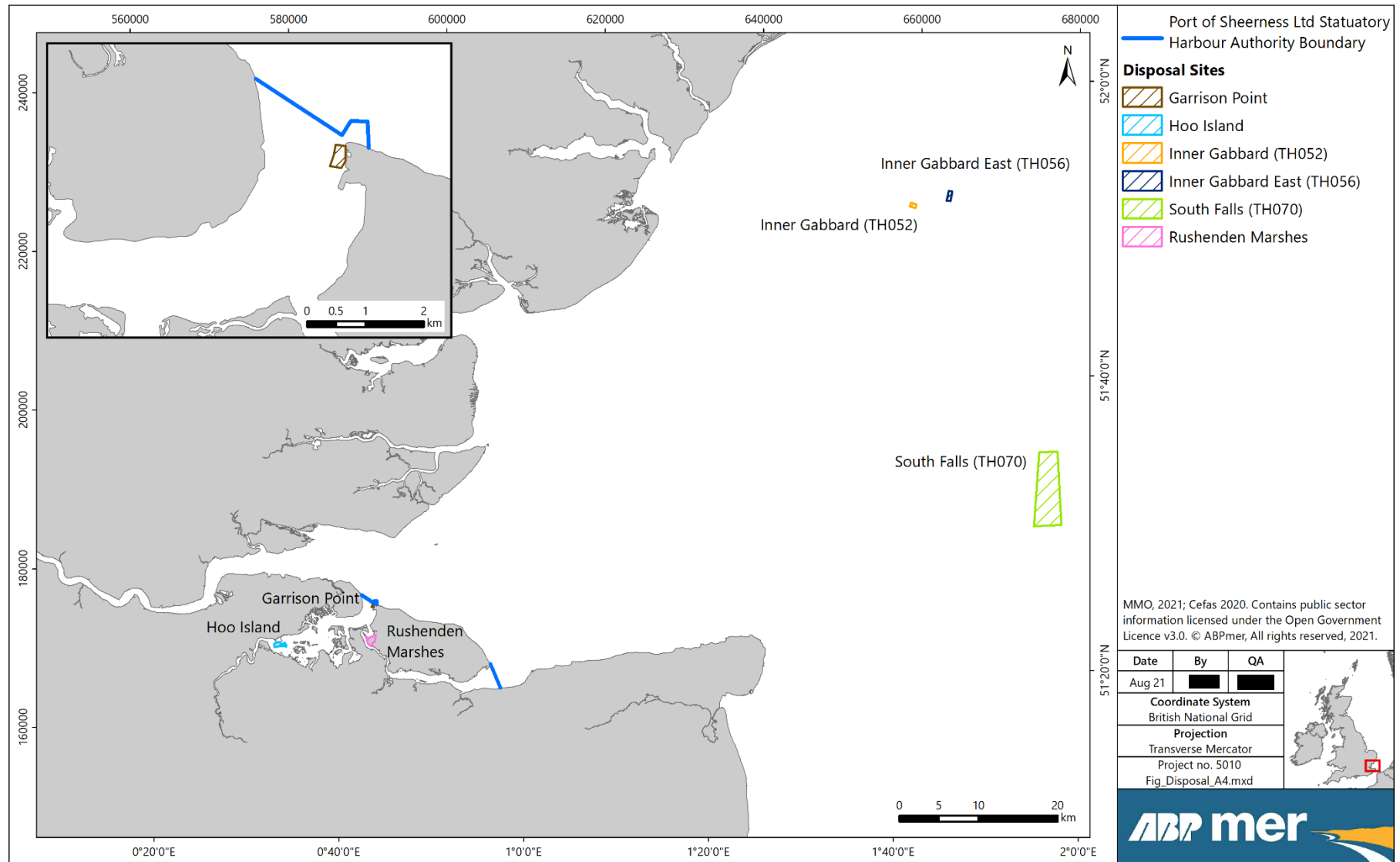


Figure C7. Dredge disposal sites

C.3.1 Direct impacts on interest features

In general terms, depending on the nature, scale, timing, duration and magnitude of the change, the potential direct impacts of maintenance dredging and disposal on the interest features of the MPAs will vary. The risk profile associated with pressures identified in the MPA conservation advice packages for maintenance dredging and disposal activities are included in Table C2. The MPA conservation advice packages also provide a detailed assessment of the sensitivity, resistance and resilience of feature/subfeatures or supporting habitat to these pressures and the underlying evidence and confidence underpinning this assessment. The sensitivity of interest features and supporting habitat to medium-high risk pressures associated with maintenance dredging and disposal activities across MPAs within study area are included in Table C3. This information has been used as appropriate to inform the assessment.

Table C2. Risk profiles of maintenance dredging activities including disposal across MPAs within study area

Pressure Name	Risk Profile
Abrasion/disturbance of the substrate on the surface of the seabed	Medium-High Risk
Barrier to species movement	Medium-High Risk
Changes in suspended solids (water clarity)	Medium-High Risk
Habitat structure changes - removal of substratum (extraction)	Medium-High Risk
Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion	Medium-High Risk
Physical change (to another seabed type)	Medium-High Risk
Physical change (to another sediment type)	Medium-High Risk
Smothering and siltation rate changes (Heavy)	Medium-High Risk
Smothering and siltation rate changes (Light)	Medium-High Risk
Above water noise	Low Risk
Collision ABOVE water with static or moving objects not naturally found in the marine environment (e.g., boats, machinery, and structures)	Low Risk
Collision BELOW water with static or moving objects not naturally found in the marine environment	Low Risk
Deoxygenation	Low Risk
Emergence regime changes, including tidal level change considerations	Low Risk
Hydrocarbon & PAH contamination	Low Risk
Introduction of light	Low Risk
Introduction of other substances (solid, liquid or gas)	Low Risk
Introduction or spread of invasive non-indigenous species (INIS)	Low Risk
Nutrient enrichment	Low Risk
Radionuclide contamination	Low Risk
Synthetic compound contamination (incl. pesticides, antifoulants, pharmaceuticals)	Low Risk
Transition elements & organo-metal (e.g. TBT) contamination	Low Risk
Underwater noise changes	Low Risk
Vibration	Low Risk
Visual disturbance	Low Risk
Water flow (tidal current) changes, including sediment transport considerations	Low Risk

Source: Natural England (2022)

Table C3. Sensitivity of interest features to medium-high risk pressures associated with maintenance dredging and disposal activities across MPAs within study area

Pressure Name	All bird interest features	Tentacled lagoon worm	Smelt	Coastal lagoons	Coastal reedbeds	Freshwater and coastal grazing marsh	Mediterranean and thermos-Atlantic halophilous scrubs	Salicornia and other annuals colonising mud and sand	Atlantic salt meadows	Spartina swards	Intertidal coarse sediment	Intertidal mixed sediments	Intertidal mud	Intertidal sand and muddy sand	Intertidal seagrass beds	Intertidal rock	Intertidal stony reef	Low energy intertidal rock	Intertidal biogenic reef: mussel beds	Peat and clay exposures	Estuarine rocky habitats	Subtidal seagrass beds	Subtidal coarse sediment	Subtidal mixed sediments	Subtidal mud	Subtidal sand	Cirralittoral rock	Water column
Abrasion/ disturbance of the substrate on the surface of the seabed		S	S	S				S	S	S	S	S	S	S	S		S	S	S	S	S	S	S	S	S	S	S	
Barrier to species movement	S [^]		S	NS				S	S	S	NS	NS	NS	NS		NS		NS	S		NS		NS		NS	NS	S	S
Changes in suspended solids (water clarity)	S*	NS	S	S				S	S	S	S	S	S	S	S	S	S	S	NS	NS	S	S	NS	S	S	S	S	S
Habitat structure changes - removal of		S	S	S				S	S	S	S	S	S	S	S				S			S	S	S	S	S		S

Pressure Name	All bird interest features	Tentacled lagoon worm	Smelt	Coastal lagoons	Coastal reedbeds	Freshwater and coastal grazing marsh	Mediterranean and thermos-Atlantic halophilous scrubs	Salicornia and other annuals colonising mud and sand	Atlantic salt meadows	Spartina swards	Intertidal coarse sediment	Intertidal mixed sediments	Intertidal mud	Intertidal sand and muddy sand	Intertidal seagrass beds	Intertidal rock	Intertidal stony reef	Low energy intertidal rock	Intertidal biogenic reef: mussel beds	Peat and clay exposures	Estuarine rocky habitats	Subtidal seagrass beds	Subtidal coarse sediment	Subtidal mixed sediments	Subtidal mud	Subtidal sand	Cirralittoral rock	Water column
substratum (extraction)																												
Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion		S		S				S	S	S	S	S	S	S	S			S	S	S	S	S	S	S	S	S	S	S
Physical change (to another seabed type)		S		S				S	S	S	S	S	S	S	S	S		S	S		S	S					S	
Physical change (to another sediment type)		S		S				S	S	S	S	S	S	S	S				S	S		S	S	S	S	S		

Pressure Name	All bird interest features	Tentacled lagoon worm	Smelt	Coastal lagoons	Coastal reedbeds	Freshwater and coastal grazing marsh	Mediterranean and thermos-Atlantic halophilous scrubs	Salicornia and other annuals colonising mud and sand	Atlantic salt meadows	Spartina swards	Intertidal coarse sediment	Intertidal mixed sediments	Intertidal mud	Intertidal sand and muddy sand	Intertidal seagrass beds	Intertidal rock	Intertidal stony reef	Low energy intertidal rock	Intertidal biogenic reef: mussel beds	Peat and clay exposures	Estuarine rocky habitats	Subtidal seagrass beds	Subtidal coarse sediment	Subtidal mixed sediments	Subtidal mud	Subtidal sand	Cirralittoral rock	Water column
Smothering and siltation rate changes (Heavy)		S	S	S			S	S	S	S	S	S	S	S	S	S		S	S	S	S	S	S	S	S	S	S	
Smothering and siltation rate changes (Light)		S	S	S			NS	NS	NS	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	
S - sensitive																												
NS – not sensitive																												
Not relevant																												
^ apart from Common Tern																												
* diving species only																												

Source: Natural England (2022)

In the case of Low Risk pressures, unless there are evidence-based case or site specific factors that increase the risk, or uncertainty on the level of pressure on a receptor, these pressures generally do not occur at a level of concern and should not require consideration as part of the assessment. Given the recurring maintenance dredging of the study area since the early-mid 1800s, it is perceived that no new Medium-High risk pressures are likely to be relevant.

Taking account of the MPA conservation advice packages, the key potential direct impacts of maintenance dredging and disposal activities on features of MPAs are considered to be as follows:

- Change in habitat and loss of benthic organisms within the footprint of the dredge and disposal areas;
- Disturbance of sediment, resulting in the creation of sediment plumes causing an increase in turbidity, suspended sediment concentrations (SSC), organic matter, and ultimately smothering of habitats during the dredging process and/or during disposal;
- The potential remobilisation of contaminated sediments associated with suspended sediment as a result of dredging activity, which could in turn affect water quality; and
- Potential for disturbance caused by interruption of possible line of sight and noise during the dredging and disposal activities.

These potential pathways are assessed in turn in the following sections.

Change in habitat and loss of benthic organisms

The MPAs that are directly affected by maintenance dredge activities in the Medway and its approaches are the Outer Thames Estuary SPA, Medway Estuary and Marshes SPA and Ramsar site, the Swale SPA and Ramsar site, the Medway Estuary MCZ and the Swale MCZ.

The direct removal of sediment and associated benthic community as a result of maintenance dredging within the boundary of the affected MPAs occurs at all the maintenance dredge sites within the Medway Approach and Sheerness Docks, the majority of the dredge sites within the Middle Medway (specifically the Isle of Grain BP, Grain LNG, London Thamesport, Kingsnorth power station, the Shoregate Wharf Sailing Club, Stargate Marine, Whitton Marine Ltd, JC Marine Ltd, Residential Marine Ltd, Medway Sailing Club, Medway Water Sports centre, Gillingham Pier), and all the dredge sites within the Inner Medway and The Swale (see Table C1).

Maintenance dredging activities in the Medway have been occurring since the early-mid 1800s in some places and, therefore, prior to designation of the MPAs. Furthermore, the maintenance dredge and disposal locations that directly overlap the MPAs are accustomed to high levels of commercial and recreational vessel activity. These areas are already subject to regular vessels movements and maintenance dredging and disposal activities, and as such the potential for these areas to support established benthos and thus a food resource to birds is limited.

Following dredging and disposal activities, benthic communities are expected to be able to recover (or adapt) given the low frequency occurrence of the disturbance event at any one time and the small-scale nature of the disturbance in the context of the MPAs. 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 associated with the maintenance

activities in the Medway and its approaches is currently low and the extent of disturbance to supporting habitat and prey of harbour porpoise is minimal in the context of the size of the European site.

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 occurrence of the disturbance event at any one time and small magnitude of the disturbance in the context of the MPAs. The potential impact of dredging causing a loss of benthic organisms within the dredged area is therefore considered to be insignificant, in the context of natural variability.

In the context of the site's conservation objectives, the condition of supporting habitat and the availability of prey will be maintained. In other words, there is not expected to be any discernible change to the overall extent or distribution of supporting habitat (and associated species) or a change to the structure and function of this habitat. Overall, the change in supporting habitat is considered to result in **no potential for an adverse effect on the integrity (AEOI) of any MPA supporting habitat interest features.**

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 SSC will vary spatiotemporally at any one 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 Peel Ports Medway and third parties are likely to overlap with a number of the MPAs that have been screened into the assessment, in particular the Medway Estuary and Marshes SPA and Ramsar site, The Swale SPA and Ramsar site, the Outer Thames Estuary SPA, the Southern North Sea SAC, the Medway Estuary MCZ and the Swale MCZ.

The method of maintenance dredging by TSHD which is used in the Medway Approach Channel and North Kent Buoy Spit has the potential to cause an increase in SSC during the dredging process and during the disposal of the material at the marine licensed disposal sites at 'South Falls' (TH070) and the 'Inner Gabbard' (TH052) (Figure C7). Further information on the TSHD method of dredging is included in Section 4.2.2 of the Baseline Document (main report). The amount of suspended sediment that is released into the water column by a small/medium size TSHD is relatively small per load. During dredging, the material that is suspended into the water column disperses and re-settles after a short time. Sand and coarser grained material will be re-deposited within close proximity to the dredge site whereas fine silts may remain in suspension for a period of days 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 at any one time is considered to be within the existing natural variability of the system.

There is potential for smothering of benthic organisms where the dredged material from the TSHD is deposited at the marine disposal sites. The majority of the material deposited will be muddy sand and will quickly settle to the bed before being redistributed by the ambient flow regime. Strategic placement of the deposited material throughout the disposal sites will minimise the initial depth change following each disposal, at the same time reducing the impact on the flow regime. If required, a sediment placement plan could be developed and agreed with Natural England as part of the marine licencing process for individual maintenance dredge disposal licence applications.

The main method of maintenance dredging in the Medway is by WID. This method is described in Section 4.2.2 of the Baseline Document (main report). The aim of this method is not to suspend sediments within the water column, but rather to move sediments from one area to another along the seabed, thus keeping the sediment within the system. The mobile bed layer moves along the bed by gravity to deeper areas in the vicinity of the dredge. The material disperses within the navigation channel over a number of tides contributing to local sediment supply. This method results in localised smothering as the sediments are transported along the seabed. Given the localised extent and reduced sediment suspension, the impact of dredging is considered to be reduced by using the WID method.

A small amount of plough dredging is also undertaken in the Medway when smaller more manoeuvrable dredging vessels are required. 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. Further information on the plough dredging methods is included in Section 4.2.2 of the Baseline Document (main report).

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 interest features to smothering/ siltation rate changes (light), based on Natural England's advice on operations for maintenance dredging is typically 'not sensitive' to 'medium' (Natural England, 2021). These habitats have been historically exposed to changes in suspended sediments and sedimentation as a result of ongoing maintenance dredging since the early-mid 1800s in some places. Furthermore, these areas are already regularly disturbed through vessel movements and as such would be expected to be relatively species poor. In the context of naturally high suspended sediment concentrations within and around the Medway, the habitats and associated benthic species that are present are expected to have a relatively high degree of tolerance to disturbance including smothering as a result of the redeposition of suspended sediment.

In terms of disposal activities, the MPA supporting habitat interest features have been characterised by the changes brought about by this regular disturbance over variable time periods for many years and these activities have not raised any concerns to date. Habitats and associated benthic communities have, therefore, developed to be accustomed to these variable conditions (a minor part of which comprise the maintenance dredge arisings) above the natural background variability of what is already a highly dynamic area.

In the context of the site's conservation objectives, the condition of supporting habitat and the availability of prey will be maintained. In other words, there is not expected to be any discernible change to the overall extent or distribution of habitat (and associated species) or a change to the structure and function of this habitat. Overall, the disturbance and smothering of habitat and associated species is considered to result in **no potential for an adverse effect on the integrity (AEOI) of any MPA supporting habitat interest features.**

An increase in suspended sediments may reduce visibility and affect the feeding success of fish, marine mammal and diving bird interest features of MPAs. Fish interest features within the Medway and surrounding area (specifically smelt which is an interest feature of the Medway Estuary MCZ) are considered to be well adapted to living in an area with variable and often high suspended sediment loads. Any changes to SSC will be largely limited to the immediate vicinity of the maintenance dredge areas and disposal sites. Changes in SSC beyond the immediate vicinity of these areas will be temporary, short-lived and transient in nature. The resultant changes in dissolved oxygen (DO) will also be negligible and short-lived, with tidal exchange quickly replenishing the oxygen supply. In addition, only a very small proportion of the foraging area for fish, marine mammal and diving bird interest features

of MPAs will be affected by maintenance dredge and disposal activities. These interest features feed on a range of food items and, therefore, their sensitivity to a temporary change in the availability of a particular food resource is considered to be low. Their high mobility also enables them to move freely to avoid areas of adverse conditions and to use other prey resources. These MPA interest features are, therefore, not considered to be significantly affected due to their ability to forage over extensive areas and the fact that any changes would be very short-lived and localised in nature.

In the context of the site's conservation objectives, the condition of fish, marine mammal and diving bird interest features as a viable component of the MPAs, and the availability of prey will be maintained. In other words, there is not expected to be any discernible change in the overall population or distribution of interest features or their prey. Overall, the disturbance of sediment is considered to result in **no potential for an adverse effect on the integrity (AEIOI) of any MPA fish, marine mammal and diving bird interest features.**

Potential remobilisation of contaminated sediments

There is the potential for sediment-bound contaminants to be re-mobilised in the water column following an increase in SSC during maintenance dredging and disposal activities. There are strict legislation and sediment quality assessments in place that must be adhered to in order to obtain a maintenance dredge licence. If any sediment contaminant concentration is deemed too high then dredging and disposal of that material is restricted.

Some maintenance dredging activities within the Medway can be carried out by Peel Ports Medway under its own powers and do not require a marine licence. In addition, small scale third party maintenance dredging is licenced directly by Peel Ports Medway rather than the MMO through the marine licensing regime. Peel Ports Medway follows the same approach and principles as the MMO does in determining dredge licence applications (i.e. taking account of existing permitted depths, volumes/quantities and dredge and disposal methods etc.) when it undertakes any maintenance dredging under its own powers as well as in the evaluation of any third party applications to dredge within the Statutory Harbour Authority area.

There are no formal quantitative EQS for the concentration of contaminants in sediments, although the WFD has introduced optional standards for a small number of 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 Cefas Guideline Action Level 1 (AL1) are of no concern and are unlikely to influence the licensing decision. However, dredged material with contaminant levels above Cefas Guideline Action Level 2 (AL2) is generally considered unsuitable for disposal at sea. Dredged material with contaminant levels between AL1 and AL2 may require further consideration 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 by the MMO as part of the marine licensing process and by Peel Ports Medway when it undertakes any maintenance dredging under its own powers or evaluates any third party applications to dredge.

Over the last 20 years, sediment samples have been collected from various locations within the Medway to consider suitability of dredging and disposal activities. In general, contaminant concentrations in sediment samples collected from the Medway Estuary were below Cefas Guideline AL1 (i.e. metals, organotins, polychlorinated biphenyls (PCBs) and poly aromatic hydrocarbons (PAHs)). Contaminant concentrations within the Medway Approach Channel were low. There have been a few exceedances of Cefas Guideline AL2 (e.g. mercury and arsenic). However, as mercury and arsenic in the majority of

other sample sites was found to be below Cefas Guideline AL1 (or marginally exceeding Cefas Guideline AL1), these are considered to be isolated hotspots. Sediment samples from within more southerly locations, such as The Swale and the Faversham and Oare creeks indicate that elevated and more widespread levels of contamination may be present at some locations. Further details of historic sediment sampling is available in Section 5 of the Baseline Document (main report).

Generally, any material with higher levels of contaminants occurs at isolated locations and, therefore, comprises a negligible proportion of the total volume of maintenance dredge material, which could be redistributed and deposited during maintenance dredging and disposal. Based on sediment samples from 2012 (the most recent and complete set of data for the majority of the Medway), contaminant concentrations in dredge material are generally low and considered suitable for disposal at sea. The extent of sediment dispersal as a result of maintenance dredging activity in the Medway is considered to be spatially limited and significant elevations in the concentrations of contaminants within the water column are not anticipated. During disposal at marine licensed disposal sites, sediment will be rapidly dispersed in the water column. Therefore, the already low levels of contaminants in the dredged sediments will be dispersed further.

Overall, fish interest features (specifically European smelt which is an interest feature of the Medway Estuary MCZ) are not considered to be sensitive to the small magnitude of changes in water quality that are predicted during maintenance dredging at any one time. These changes are, therefore, not anticipated to result in any significant displacement or a barrier to migratory fish interest features. The temporary and localised changes in water column contamination levels are considered unlikely to produce any lethal or sub-lethal effects in marine mammal interest features or their prey (specifically harbour porpoise which is an interest feature of the Southern North Sea SAC). The concentrations required to produce these effects are generally acquired through long-term, chronic exposure to prey species in which contaminants have bioaccumulated. The localised changes in water quality, as a result of the potential release of any sediment-bound contaminants, will be temporary and considered unlikely to be of a concentration that will be harmful to bird interest features or their prey (including Red-Throated Diver, Common Tern and Little Tern which are interest features of the Medway Estuary and Marshes SPA and Outer Thames SPA). Overall, the potential effects resulting from the release of sediment bound contaminants on interest features are assessed as negligible.

Subject to the existing maintenance dredging testing (i.e. sediment sampling and laboratory analysis for contaminants) and licensing regime remaining in place, it is unlikely that a significant impact would occur in the future. Furthermore, best practice pollution prevention guidelines will be followed in line with Marine Licence requirements to minimise the risk of accidental spillages and the risk of introduction of contaminants throughout the dredging process. Adherence to these guidelines will also mean that only materials that are suitable for use in the marine environment will be used, and all equipment, temporary works and debris will be removed from the site on completion of works. Peel Ports Medway adheres to the same approach and principals when it undertakes any maintenance dredging under its own powers or evaluates any third party applications to dredge.

Due to the elevated levels of PAH in Faversham, Oare and Milton Creeks (sites 29 and 30 in particular) and proximity to shellfish waters, it has been necessary to instigate a notification system for dredge activity through conditions on the approved license (PoSL and/or MMO). Notification procedure for Faversham, Oare and Milton Creek Dredge campaigns:

- Licensee is required to notify the Group Hydrographic and Dredging Manager (GHDM) of dredge requirement no less than 10 days prior to works commencing. Licensee is also required to confirm that no shellfish activity is taking place during the same period;

- GHDM will notify local Environment Agency and Natural England offices regarding activity and requests responses within the 10 day window. Stating duration of dredge, approximate volume and location;
- Once responses received by GHDM the licensee will be given permission to commence works or instructed to defer depending on responses received; and
- End of campaign report sent to local Environment Agency and Natural England including photos/surveys of pre and post operations.

In the context of the site's conservation objectives, the condition of fish, marine mammal and bird interest features as a viable component of the MPAs and the availability of prey will be maintained. In other words, there is not expected to be any discernible change in the overall population or distribution of interest features or their prey. Overall, the potential remobilisation of contaminated sediments is considered to result in **no potential for an adverse effect on the integrity (AEOI) of any MPA fish, marine mammal and bird interest features.**

Potential disturbance caused by interruption of possible line of sight and noise

Noise levels generated by the dredgers are no greater than noise generated by other vessels that routinely use the Medway and Outer Thames area throughout the year. The noise from dredgers 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 vessel movement, waterbirds are already accustomed to high levels of commercial and recreational activity in the area, and, therefore, the slow and relative infrequent movements at any one time of the vessels involved in the dredging process are unlikely to cause significant disturbance. Research has shown that disturbance to birds from vessel movements generally occurs within 50 to 100 m of a receptor with sensitive sites such as breeding colonies and roosting sites most susceptible to disturbance (IECS, 2009; Chatwin *et al.*, 2013). The navigation channel is already subject to ongoing vessel movements, and as such, it can be assumed that any birds occurring within this area are habituated to this form of disturbance. Dredging is not labour intensive on the deck of a vessel, and so the disturbance from human movement is considered negligible. Furthermore, machinery and vehicle movements are better tolerated than people at the source of the disturbance (Hill *et al.*, 1997; IECS, 1999). In addition, given that maintenance dredging has been ongoing since the early-mid 1800s in some places, the counts of birds, which were deemed to warrant designation would have occurred at a time when maintenance dredging of this site was already ongoing.

When foraging at sea, terns are reported to be relatively insensitive to disturbance by shipping activities (Natural England and JNCC, 2019). However, Red-Throated Diver is considered highly sensitive to noise and visual disturbance from vessels compared with other species (Jarret *et al.*, 2018; Fliessbach *et al.*, 2019; Natural England and JNCC, 2019). Disturbance can cause these birds to reduce or cease feeding in a given area or to be displaced. Movement of vessels and other activity have been shown to elicit flushing responses at distances of 1-2 km from a disturbance source in this species although most disturbance typically occurs within <1 km (Garthe and Hüppop, 2004; Schwemmer *et al.*, 2011; HELCOM, 2013). Approaching ships and smaller vessels have also been shown to cause displacement, even when several kilometres away (Dierschke *et al.*, 2017). As such, maintenance dredging of the Medway Approach Channel and marine disposal activities has the potential to disturb Red-Throated Divers.

As the Medway Approach Channel is already frequently used by shipping, and shipping channels are already known to be avoided by Red-throated divers, any vessel movements associated with any such future maintenance dredge requirements would not be expected to result in any increase in disturbance to this species.

Dredging noise impacts on fish, bird and marine mammal interest features or their prey are restricted to behavioural changes through avoidance, which are limited to a relatively localised area around the dredger. As the dredger vessel is moving, interest features or their mobile prey are not physically constrained and will be able to move away from the source of the noise and return once dredging activity has ceased. Noise generated during dredging would not, therefore, exclude species occurring in the study area from habitats and/or prey. Furthermore, levels of underwater noise generated by dredgers are similar to vessels and no different to maintenance dredging activities that are already regularly present. Overall, the ability of highly mobile interest features to catch prey items is not considered to be impaired, particularly given the scale of their foraging ranges.

In the context of the site's conservation objectives, there will be no significant disturbance or displacement of fish, marine mammal or bird MPA interest features or their prey. Overall, the levels of noise and visual disturbance effects during maintenance dredging and disposal activities are considered to result in **no potential for an AEOI on the fish, marine mammal and bird interest features of any MPAs.**

C.3.2 Indirect impacts on interest features

The potential indirect impacts of maintenance dredging and disposal operations in the Medway and surrounding area are limited to changes in the sediment supply and any associated effects on the MPAs and interest features.

As detailed in Section 4.2.2 of the Baseline Document (main report) and in the introduction to this appendix, maintenance dredging undertaken by both Peel Ports Medway and third parties has been predominantly achieved by WID. 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. Some of the material dredged by WID may potentially move up onto the intertidal designated sites following the dispersion of the mobile bed layer. However, the extent of this potential 'feeding' of the intertidal is considered insignificant taking into account the amount of material dredged and the size of the Medway.

Maintenance dredge arisings that are disposed of onshore at land disposal sites (e.g. Hoo Island) and at marine disposal sites (e.g. South Falls) results in the 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.

To put this dredging in context, the sediment budget for the Medway (see Section 3.4 of the Baseline Document (main report)) concludes that, taking into account the supply of marine sediment from the Thames Estuary (which may be significant - circa 1,000,000 tonnes/yr), sediment sources are greater than the sinks (relating to an accretional environment). This is confirmed by the accretional behaviour of the subtidal channels and saltmarshes within the Medway, in which saltmarshes have been expanding since 1972 with accretion largely due to saltmarsh regeneration through the expansion of *Spartina*. It is, therefore, unlikely that maintenance dredging at the present level that involves the removal of sediment from the system would have any significant effect on the sediment supply to these areas. In addition, there is currently no evidence, anecdotal or otherwise, of changes to accretion patterns as a result of maintenance dredging.

There is currently no evidence that the existing maintenance dredging and disposal activity is detrimentally affecting the habitat supporting interest features in Medway. This is supported by the condition statement assessment of the respective Sites of Special Scientific Interest (SSSI) Units. The overall status for the South Thames Estuary and Marshes SSSI and The Swale SSSI is greater than 97%

favourable or unfavourable recovering. The Medway Estuary and Marshes SSSI, however, has a majority area (53.71%) designated as unfavourable recovering, with a large proportion (45.56%) being designated as unfavourable declining. Despite the high proportion of unfavourable declining, only unit 100 is identified as such. This unit consists of 2,163 hectares of littoral sediment and is being damaged by algal blooms smothering the mudflats and reducing the food availability for the Medway bird assemblage. These deleterious effects are unlikely to be affected by dredge deposition into the designated disposal sites or any dredging activity (including WID). Further information on the condition assessment of each of the SSSIs within the study area is provided in Section 7.2 of the Baseline Document (main report).

In the context of the site's conservation objectives, the condition of supporting habitat and the availability of prey will be maintained. In other words, there is not expected to be any discernible change to the overall extent or distribution of supporting habitat (and associated species) or a change to the structure and function of this habitat. Overall, the indirect changes in sediment budget are considered to result in **no potential for an AEOI on the supporting habitat interest features of any MPAs.**

C.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 general and specific conditions are described in Section 6 of the Baseline Document (main report) and include, but are not limited to, the following:

- During the course of disposal, material must be distributed evenly over the disposal sites South Falls (TH070) and Inner Gabbard (TH052). *Reason: To ensure an even spread of material is achieved over the area of the disposal site in order to avoid shoaling and minimise risk to navigational safety;*
- Bunding and/or storage facilities must be installed to contain and prevent the release of fuel, oils, and chemicals associated with plant, refuelling and construction equipment, into the marine environment. Secondary containment must be used with a capacity of no less than 110% of the container's storage capacity. *Reason: To minimise the risk of marine pollution incidents.*
- Any oil, fuel or chemical spill within the marine environment must be reported to the MMO Marine Pollution Response Team within 12 hours. *Reason: To ensure that any spills are appropriately recorded and managed to minimise the risk to sensitive receptors and the marine environment;*
- The licence holder must submit a sediment sampling plan request at least 6 months prior to the end of year 5 from the date of issue. The sediment sampling and analysis must be completed by a laboratory validated by the MMO at least 6 weeks prior to the end of year 5 from the date of issue. The licensed activities must not recommence until written approval is provided by the MMO. *Reason: To ensure only suitable material is dredged and disposed of at sea;*
- WID may not be undertaken at the same time as TSHD operations. *Reason: To negate in combination effects of operations being undertaken at same time;*
- Dredging must not take place during the months of February and March. Reason: Smelt (*Osmerus eperlanus*) a proposed feature (in the Medway Estuary MCZ) are sensitive to dredging activities. The most sensitive time for this species is during their migration period in the spring (around February/March);
- No works must be undertaken between October and March (Inclusive). Reason: To avoid disturbance to the over-wintering birds, an interest feature of the Medway Estuary and Marshes SPA/Ramsar/SSSI, which use the area from October to March inclusively;

- No works shall take place during any periods of severe winter weather prolonged enough to trigger a voluntary or statutory suspension of wildfowling, known as a 'winter wildfowling ban' or 'severe weather alert for the shooting of wildfowl and waders'. In the event of a stoppage, work can resume after three days of continuous temperatures over 0 degrees Celsius. After a continuous week of cold weather (i.e. frozen conditions for seven consecutive days), advice should be sought from the Site Ecologist or Ornithologist. *Reason: To avoid impacts on overwintering birds;* and
- Dredging must not be undertaken between 1st April and 31st May inclusive. *Reason: To avoid adverse impacts to migratory fish.*

C.3.4 In-combination effects

Section 4 of Baseline Document (main report) provides information on the Peel Ports Medway 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 Baseline Document (main 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 Maintenance Dredge Protocol (MDP) Baseline Document and, as a result, this assessment.

Where such developments entail reclamation, capital dredging or the construction of infrastructure in tidal waters, potential impacts would be considered through an Environmental Appraisal or Environmental Impact Assessment (EIA) that would be required to support an application for development permission. Where the development has the potential to affect an MPA, the requirements of the Habitats Regulations and/or the MCZ provisions in the Marine and Coastal Access Act (MCAA) 2009 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 appendix.

The following known consented and unconsented plans, projects and activities occur in the study area:

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 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 a significant adverse in-combination effect is not anticipated.

Thames Estuary Maintenance Dredging: The Outer Thames Estuary lies on the north side of the Medway. It joins with the Medway Estuary between the Isle of Grain and Sheerness. Shipping approaching the Thames Estuary does so through an approach channel. Maintaining safe port access for commercial and recreational maritime transport is an important function for the Harbour Authority, the Port of London Authority (PLA).

The PLA 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 Thames Estuary (PLA, 2020). The report concluded that none of the impacts arising from ongoing maintenance dredging and disposal are likely to change the condition of the interest features for each of the European/Ramsar sites screened into the assessment. It should be noted that this assessment was based on previous (2004 to 2013) and current (January 2014 to April 2018) levels of maintenance dredging within the Thames Estuary. If maintenance dredge locations, volumes (outside existing variability) or techniques from existing operations are required to change in the future, this would require an additional assessment in the context of the designated features. Overall, the potential for significant adverse in-combination effects with the maintenance dredging operations in the Thames Estuary are considered unlikely.

Medway Headwall Replacement (Case Ref: MLA/2021/00100): BAM Nuttall is proposing remediation works on a headwall in a tidal main river (River Medway) on behalf of Network Rail. The works will take place near an existing headwall located on the north bank of the River Medway and the majority of activities will be within Mean High Water Springs (MHWS), except part of the drainage works. The works include sheet piling and the installation of a new concrete headwall with training walls and scour protection. These activities have the potential to temporarily disturb MPA interest features. The Environmental Risk Assessment (ERA) and MCZ assessment that was submitted in support of the marine licence application states that all piling works will be undertaken during low water and the potential effect on smelt due to percussive piling activities is moderate / minor. The installation of the new headwall will result in a small amount of saltmarsh loss (less than 1 % of the total saltmarsh in the Medway Estuary MCZ), however, given its denuded status in this location (largely dry) this loss is not considered to be a significant effect. Overall, with the proposed control measures in place, all residual risks are assessed as low by the applicant. In terms of the implications of this project for maintenance dredging in the Medway, it is considered unlikely that a significant adverse in-combination effect would occur.

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 MPAs prior to their designation. The marine habitats and species associated with fishing areas are generally of low conservation value with relatively high recovery rates. The temporary, small and localised disturbance resulting from the maintenance dredging and disposal activities is, therefore, not considered to result in significant in-combination effects with the disturbance effects from existing fishing activities. Overall, the potential for in-combination impacts through ongoing fishing activities on interest features of MPAs is considered to be negligible.

Conclusion

Taking account of the potential impacts of maintenance dredging and disposal activities in the Medway on interest features of MPAs, in addition to the sensitivity and importance of protected sites and features, the potential cumulative and/or in-combination effects are assessed as negligible. In the context of the site's conservation objectives, the above plans, projects and activities are not anticipated to result in in-combination effects of a scale that would change the existing condition status of the interest features recognised within the MPAs screened into this assessment. Overall, there is considered to be **no potential for an AEOL on any interest features either alone and/or in-combination with other plans, projects and activities.**

C.4 Application of the Habitats Regulations

For the purposes of this appendix and application of the MDP (Defra, 2007), the Habitats Regulations 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 Medway (Table C1) 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. This appendix provides the information deemed necessary to inform an AA of the Peel Ports Medway's maintenance dredging commitments within their SHA area.
- 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 MMO is considered the Competent Authority responsible for undertaking the AA according to these regulations.

C.5 Application of the MCZ provisions of the Marine and Coastal Access Act 2009

For the purposes of this appendix, the MCZ provisions of the MCAA are applied as follows:

- Section 126(5) - The authority must not grant authorisation for the doing of the act unless the condition in subsection (6) or the condition in subsection (7) is met;
- Section 126(6) - The condition in this subsection is that the person seeking the authorisation satisfies the authority that there is no significant risk of the act hindering the achievement of the conservation objectives stated for the MCZ.

- Section 126(7) - The condition in this subsection is that, although the person seeking the authorisation is not able to satisfy the authority that there is no significant risk of the act hindering the achievement of the conservation objectives stated for the MCZ, that person satisfies the authority that—
 - (a) there is no other means of proceeding with the act which would create a substantially lower risk of hindering the achievement of those objectives,
 - (b) the benefit to the public of proceeding with the act clearly outweighs the risk of damage to the environment that will be created by proceeding with it, and
 - (c) the person seeking the authorisation will undertake, or make arrangements for the undertaking of, measures of equivalent environmental benefit to the damage which the act will or is likely to have in or on the MCZ.

In response to Section 126(5) of the MCAA, this appendix provides the information considered necessary to confirm that the maintenance disposal and disposal activities associated with the Medway (Table C1) will not hinder the achievement of the conservation objectives of any MCZ interest features in the study area and, therefore, complies with Section 126(6).

C.6 Outcome of the Assessment

In the preparation of this appendix, it is concluded that maintenance dredging in the Medway will not result in an AEOI on any of the following MPAs:

- Margate and Long Sands SAC;
- Medway Estuary and Marshes SPA and Ramsar site;
- Medway Estuary MCZ;
- Outer Thames Estuary SPA;
- Southern North Sea SAC;
- Swale Estuary MCZ;
- Thames Estuary and Marshes SPA and Ramsar site; and
- The Swale SPA and Ramsar site.

The following MPAs are considered to be too far away to be affected by any direct or indirect effects of maintenance dredging and disposal operations:

- Benfleet and Southend Marshes SPA and Ramsar site;
- Essex Estuaries SAC; and
- Foulness (Mid-Essex Coast Phase 5) SPA and Ramsar site.

The reasons for the above conclusions are outlined below.

Direct Impacts: The frequency and scale of disturbance as a result of the Peel Ports Medway and third party maintenance dredging is considered to be very low at any one time and in the context of the MPAs. Furthermore, interest features and supporting features of MPAs (i.e. habitats, benthic communities, fish, marine mammals and birds) have been historically exposed to this disturbance since the early-mid 1800s 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 and disposal activities at the existing levels are likely to change the condition of the interest features of the relevant MPAs.

Indirect Impacts: The majority of maintenance dredging within the Medway 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 within the Medway indicates that sediment sources are exceeding sediment sinks and thus the estuary system is exhibiting net accretional behaviour. Given the physical processes operating in the Medway, the nature of maintenance dredging and the associated Marine Licence conditions which are already in place, no significant sediment budget effects on MPA interest features are anticipated.

In-combination Effects: Although the details of some of the other plans, projects or activities in the study area are currently unknown, based on currently available information, the in-combination effects are not anticipated to be of a scale that would change the existing condition status of the interest features recognised within any MPAs.

C.7 Summary

In summary, none of the potential impacts arising from ongoing maintenance dredging and disposal activities are assessed as being significant. They are not, therefore, likely to change the condition of the MPA interest features that have been screened into the assessment and are considered to result in no potential for an AEOL to occur. It should be noted that this assessment has been based on levels of maintenance dredging undertaken within the study area since 2002. If maintenance dredge locations, volumes (outside existing variability) or techniques from existing operations (as at October 2021) are required to change in the future, and these changes have the potential to alter the worst case risk envelope that has been assessed in this appendix, this would require an additional assessment in the context of the MPA interest features.

C.8 References

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D Natural England Comments Log

This appendix presents the comments that were received from Natural England on a draft version of the Updated MDP Baseline Document and WFD Assessment for the Medway and its approaches. The responses and/or actions to address each individual comment is included.

Table D.1. Comments received from Natural England and how they have been addressed

No	Report	Topic	Section	Comment	Response/Action
1	MPD Baseline Doc	Sediment Chemistry	5	Our main comments relate to the sediment chemistry data which is currently available. We note that all of the contamination data included in the document is outdated. Therefore we advise that if new licences are sought for any dredging activity then evidence in the MDP may not be relied upon. This introduces uncertainty that environmental effects of dredging are not fully understood. Therefore we advise that Peel Ports look to review the data and update the sampling regime accordingly. This includes areas known to have contamination issues, such as Faversham, Oare and Milton Creeks in the Swale. This area specifically is known to have historic sediment contamination and as such small scale dredges may also have an impact on designated sites. Please note Natural England defer to the Environment Agency (EA) for water quality issues.	Peel Ports understand that there are a number of areas in the Medway where more recent sediment quality sampling is required, notably in Faversham Creek, Oare Creek and Milton Creek. However, it should be noted that these areas are not subject to regular dredging, with some of these locations not having been dredged since 2012. Nonetheless, in due course, Peel Ports will look to develop a widespread sampling campaign for the Medway and Swale. Peel Port's intention to undertake updated sampling has been included in Section 5.3 (Summary of sediment quality) of the MDP Report.
2	MPD Baseline Doc	Sediment Chemistry	5	It is understood, from previous consultations, that the port will implement a notification system when issuing licences in Faversham, Oare and Milton Creek areas of the Swale. We welcome the same commitment in the most recent MDP, and that it is stated in the document. Additionally we would welcome some information regarding how sediment contaminant information is managed, particularly from third parties. We recommend that a review of this management may facilitate the data collection to inform the MDP document. For the pressure of remobilisation of contaminated sediments, Peel Ports need to be confident that the current data available justifies the conclusion of an assessment.	Sediment quality data from third party applicants is collected by the Port of Sheerness Ltd and stored on their internal GIS system, enabling data to be visually assessed when making a licencing decision through their Environmental Checklist. In addition, Peel Ports has introduced a notification procedure for Faversham, Oare and Milton Creek Dredge campaigns as described in the 'Potential remobilisation of contaminated sediments' section in Appendix C (HRA).
3	MPD Baseline Doc	Designated Sites	6.2, C.3.3	Natural England welcome the inclusion of details relating to current mitigation measures within the port's jurisdiction. A key concern with dredging activity is impeding the migration of fish species, in particular smelt in the Medway Estuary MCZ which has recover targets for a number of attributes for the species (please refer to the Medway MCZ Supplementary Advice on Conservation Objectives available here for more information: https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UKMCZ0011&SiteName=medway&SiteNameDisplay=Medway+Estuary+MCZ&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=4 .	Noted.

No	Report	Topic	Section	Comment	Response/Action
4	MPD Baseline Doc	Designated Sites	6.2, C.3.3	One of the key pressures that can cause impacts is barrier to species movement, caused by noise and/or turbidity through dredge activity, and this can impact on smelt during key migration times. However, we note and welcome that seasonal restrictions are included as a mitigation measure. It would be good to clarify if this is applicable to all dredging activity, i.e. including third party dredges or a select number of Marine Licences. Additionally, a mitigation measure to reduce the impact on migratory fish is in place for other fish species, we defer to the Environment Agency for fisheries advice outside of designated species (ie smelt).	As noted in Section 6.2, a seasonal restriction for migratory smelt is included as a condition of the 10 year Marine Licence (L/2019/00092) that was issued to the Port of Sheerness Limited for the use of WID within the Medway Approach Channel. The 5 year Marine Licence (L/2018/00269) issued to Thamesport (London) Ltd for dredging of the London Thamesport Wharf berth area also includes a restriction to avoid impacting migratory fish. No other marine licences are known to include a seasonal restriction for migratory fish. The seasonal restriction is, therefore, not currently applicable to other dredge areas.
5	MPD Baseline Doc	SSSIs	3.4	We note the detail supplied for the SSSI condition assessment, but recognise the lack of condition assessment information for the other designated sites to support the MDP. However as mentioned above the Supplementary Advice on Conservation Objectives along with sensitivity information for Medway Estuary MCZ and Medway Estuary and Marshes SPA/Ramsar may provide helpful further detail and should be referred to within the MDP for a clear audit trail (Conservation Advice packages are available on the Designated Sites Viewer) at this time.	Information on the risk profiles of pressures associated with maintenance dredge and disposal activities is included in Table C.1 of the HRA, including reference to the latest conservation advice packages for the relevant sites in the study area. Information on the sensitivity of features/sub-features that is available from the 'advice on operations' part of the conservation advice packages has now been included and referenced also in the HRA. This has identified the key relevant pathways of effects that should be assessed in the HRA and the particular features/subfeatures that are sensitive to those impact pathways.
6	MPD Baseline Doc	Condition assessments and conservation advice packages	All	We acknowledge that the MDP is reviewed every 5 years, however we would welcome a trigger to review the MDP once any relevant condition assessments have been completed, as well as any significant updates to conservation advice packages.	If there is any change in the condition of a feature or an update to site advice that NE believe could have implications for maintenance dredging and disposal activity in the Medway and its approaches, it would be helpful for NE to alert Peel Ports Medway so that it can be considered and addressed as appropriate (either as part of an MDP update or the licensing process). Peel Ports Medway is in the process of exploring whether there is an equivalent group as per Mersey (Mersey Sediment Management Stakeholder Group) that would provide a forum for raising these condition changes and alerting the port.
6	MPD Baseline Doc	HRA	All	Furthermore, we would welcome a map representing the dredge site locations and the habitats/species features of the designated sites.	The MAGIC map website provides site maps and the location of some but not all qualifying marine habitat and species interest features of designated sites. This information is updated on MAGIC as and when new information becomes available. Clear reference to the MAGIC website resource and the features that have been mapped and occur near to the dredge areas are now included in Section 7 of the Updated MDP Baseline Document for information.
7	MPD Baseline Doc	HRA	All	It is unclear whether a risk envelope has been used to consider the worst case scenario when determining the conclusions in the report.	A risk envelope has been used to consider the worst case scenario in the HRA. This is now clarified in the introductory background section of the appendix.

No	Report	Topic	Section	Comment	Response/Action
8	MPD Baseline Doc	HRA	All	Furthermore it is understood that all future dredge requirements may not be known at this time and may need to be assessed if and when required.	Correct but only where they fall outside of the risk envelope. This is now clarified in the summary section of the HRA.
9	MPD Baseline Doc	HRA	Appendix C	Natural England welcome the inclusion of the section 'Information to inform an appropriate assessment and marine conservation zone assessment', as provides the regulator with the necessary information to undertake a Habitats Regulations Assessment (HRA). For completeness it would be useful to include who is responsible for undertaking the HRA for both third party dredges as well as those undertaken by Peel Ports.	When the Port of Sheerness Ltd. is reviewing third party licence applications as the Statutory Harbour Authority the Marine Environmental Checklist is used to assess any significant impacts of the activity on the port or local port environment, and this is undertaken using the data in the MDP. However, we recognise it is important to establish a mechanism to ensure Natural England concur with our conclusions.
10	MPD Baseline Doc	Figures	Figure 2.2	Typo pg 9 Figure 2.2 legend 'Stautory Harbour...'	Figure has been amended.
11	MPD Baseline Doc	HRA	C.3.3	Pg 192; 'Smelt(Osmerus eperlanus) a proposed feature (in the Medway Estuary MCZ)...' Smelt is a feature of the Medway Estuary MCZ, not proposed.	This is the current marine licence condition so instead of amending suggest including a footnote to explain that the feature is no longer proposed as it has been designated.
12	MPD Baseline Doc	HRA	C.3.1	No mention of Medway Estuary MCZ no take zone which is within the Medway MDP jurisdiction. Medway Nursery Area - Kent & Essex IFCA (kentandessex-ifca.gov.uk)	This is now mentioned in the appendix.
13	MPD Baseline Doc	Protected species	7	As aforementioned, it would be useful to have a figure to show the location of dredge sites against known point locality data of protected species, in particular tentacled lagoon worm as considerations should be made for impacts on marine protected species as listed on Schedule 5 of the Wildlife and Countryside Act (1981 as amended). The onus is on the applicant to ensure that they are legally compliant with the legislation throughout the duration of the licence. Further details of species protected, through this legislation can be found here: https://www.gov.uk/government/publications/protected-marine-species	The MAGIC map website provides site maps and the location of some but not all qualifying marine habitat and species interest features of designated sites. This data is displayed publicly for viewing purposes only on MAGIC, but is not available for download. This information is updated on MAGIC as and when new information becomes available. Clear reference to the MAGIC website resource and the features that have been mapped and occur near to the dredge areas are now included in Section 7 of the Updated MDP Baseline Document for information.
14	MPD Baseline Doc	Best practice	C.3.1	We recommend that it is clearly stated that pollution prevention best practice be employed, and materials should be suitable for use in the marine environment. All equipment, temporary works and debris should be removed from the site on completion of works	This has been made clearer in the HRA and WFD assessment.
15	MPD Baseline Doc	Designated Sites	Executive summary	'There are 14 internationally designated sites...' The list which follows only includes 9 of these sites. If five sites have been screened out an explanation is required to justify the decision.	There are 14 sites in the list provided in the Executive Summary: areas designated as both SPAs and Ramsar sites are considered to comprise two separate sites
16	MPD Baseline Doc	Dredge volumes	Executive summary	'The total volume of maintenance dredging undertaken by Peel Ports Medway as Statutory Harbour Authority within the Medway Approaches, Medway Estuary and The Swale between 2002 and 2020 ranged from 500 to 185,092 m ³ per year'. What is the average	The average volume dredged per year over that period is 86,114m ³ . This information has been added to the Executive Summary.

No	Report	Topic	Section	Comment	Response/Action
				volume dredged per year over the period stated? The volumes dredged by the Statutory Harbour Authority (SHA) do not seem so different from the third party dredges. Represent the volumes in the same way so that comparisons can be made.	
17	MPD Baseline Doc	Dredge volumes	Executive summary	Additional dredging activity is also undertaken by third parties, with total annual volumes ranging from 4,449 to 126,475 m3 and averaging approximately 43,849 m3 per year.' Some of these volumes seem very high, is the highest range an outlier compared to the majority? As above, represent the volume data the same to allow for comparisons.	There are two years over this period where the total third party dredge volume was above 100,000m3. Most years around a total of 50,000m3 is dredged by third parties. For a couple of years, less than 10,000m3 was dredged by third parties. Peel Ports is not able to control the individual dredging activities of third parties. A worst case envelope has been presented and assessed in the HRA. Any future dredge activity outside the envelope that is presented will need to assess that it is still acceptable and no worse than what has been assessed in the MDP Baseline Document.
18	MPD Baseline Doc	Introduction	1	'...updating the Baseline Document with data from late 2016' The previous update was undertaken in 2018. What is the reasoning for including data from late 2016?	This is a typo and has been corrected.
19	MPD Baseline Doc	Hydrodynamic regime	3.4 - Tables 3.4 and 3.5	There appears to be some gaps in the data for sediment budget (unknowns). Updating this evidence would improve understanding of activities in this area.	The information presented is based on sediment budget data that is publicly available for the Medway. We understand the concerns and if any further information becomes available, this will be included in future updates of the MDP Baseline Document. The unquantified elements are the fluvial sediment supply and the marine sediment supply which may be significant given the Medway and Swale are accreting both in the subtidal and intertidal areas.
20	MPD Baseline Doc	Capital Dredging	3.5.1	'The Approach channel was deepened further in 2001 to the current depth of -12.5 m CD...' Have there been no more recent capital dredges in this area since 2001?	There has been no more capital dredge activity in the Medway Approach Channel since 2001.
21	MPD Baseline Doc	Maintenance Dredging	3.5.2	'...there has been no disposal to land-based sites in recent years.' When was the last disposal to land based sites?	The last disposal to a land-based disposal site was at Hoo Island in 2005.
22	MPD Baseline Doc	Dredging information	4	'Whilst the total quantity dredged by third parties is small in comparison to that carried out by the Harbour Authority, it is nonetheless important that it is properly considered.' Quantities stated within the executive summary indicate that those dredged by third parties is not so small in comparison to the SHA dredges. A stated average for SHA dredges in the Executive Summary may clearly identify the actual difference between the third party and SHA dredges.	Agreed. See responses above to comments 16 and 17. It is also important to note that the range in scale of third party operators might be influencing that range in annual dredge volumes.
23	MPD Baseline Doc	Disposal sites	4.2.5	'Between 2002 and 2020 inclusive, the total quantity of dredge material (primarily sand) deposited at the South Falls and Inner Gabbard licensed disposal sites is 771,883 and 403,344 tonnes, respectively.' What is the correlation of the quantity of dredged	The quantity disposed is variable year on year and do not appear to be either increasing or decreasing significantly (see Table 4.4).

No	Report	Topic	Section	Comment	Response/Action
				materials disposed at these disposal sites over the years? Is there an increase/decrease/no significant change in relation to the year?	
24	MPD Baseline Doc	Disposal sites	4.2.5	'Between 2002 and 2020 inclusive, an estimated total volume of 436,030 m3 of dredge material was removed by Peel Ports Medway from the Medway Approach Channel, Sheerness Docks, North Kent Buoy, Chatham Lock Approaches and Faversham Creek using WID...' Are there any trends which can be inferred from the use of WID in the Medway/Swale?	No particular trends are discernible from the data (see Table 4.1).
25	MPD Baseline Doc	Beneficial re-use	4.3	'The re-use of dredged material has the potential to play a key role in providing enhanced habitat to support the variety of bird species in Medway. Possible sites requiring further investigation include Nor Marsh, Darnet Ness, Bishop Saltings, Greenborough Marshes, Burntwick Island and Deadman's Island.' Natural England support beneficial re-use of dredged sediment, where appropriate and would welcome future discussions on potential opportunities. We are aware of peat and clay exposures in Deadman's Island and we would advise liaising with NE to ensure proposals of re-use do not impact this feature. However as with everywhere we are aware that sea level rise is a concern in the Medway and is the focus of the MEASS strategy which identifies areas for managed realignment. Additionally there are important colonies of terns (in particular Sandwich terns) and Mediterranean gulls which are under threat from loss of habitat and disturbance. Beneficial re-use is a way forward and we welcome Peel Ports consideration of this. Please note any project would need a comprehensive HRA to be sure the short term disruption would not outweigh the long term benefit. Natural England welcome further discussions as appropriate.	Peel Ports welcome the inclusion of Natural England in our journey to look at beneficial re-use opportunities in the Medway and Swale. In particular we note the importance of liaising with Natural England for any opportunities at Deadman's Island to ensure proposals of re-use do not impact this feature. We note any project would need a comprehensive HRA to be sure the short-term disruption would not outweigh the long-term benefit.
26	MPD Baseline Doc	Background	5.1	'The Cefas Guideline Action Levels are currently being reviewed by Defra, but no decision has yet been made to amend existing standards or introduce additional standards.' We advise that the MDP may require a review pending any decisions made in relation to Action Levels.	Peel Ports note the MDP Baseline Document may require review following any amendment in Cefas action levels.
27	MPD Baseline Doc	Faversham and Oare Creeks	5.2.5	'An overview of sediment contamination within the creek systems is provided by the sampling campaign undertaken by Peel Ports Medway in 2012...' Sediment chemistry data should be analysed with caution as it is now ten years old. This evidence has not been updated since the last MDP review. Is there any plan to obtain contaminant data in the near future?	See response to comment 1 above.
28	MPD Baseline Doc	Faversham and Oare Creeks	5.2.5	Additionally in the previous MDP, a notification system was implemented when issuing licences in areas with historic sediment contamination and we would welcome continuation of this, noting	See response to comment 2 above.

No	Report	Topic	Section	Comment	Response/Action
				that updated sediment contaminant data may be required to support licences area?	
29	MPD Baseline Doc	Conservation Advice	7.2	'Favourable condition status has not yet been defined specifically for all the European/Ramsar sites;' We acknowledge there is a lack of condition assessment information, but detailed supplementary advice on conservation objectives (SACO) for the SPA/Ramsar and MCZ are available and will indicate the current targets that plans and projects should consider their impacts upon.	This has now been further clarified in this section of the report.
30	MPD Baseline Doc	Knowledge gaps	8	'There is no sediment quality data from third parties since 2011 (see Table 5.2). If any suitable data from third parties is made available from samples collected within respective dredge areas of the Medway, these should be included in future iterations of this Baseline Document.' Natural England note the limitations of the data if third parties have not provided sediment chemistry data since 2011. However the data provided by Peel Ports is also, in the main, outdated and we recommend that future surveys may be required. Additionally, how does sediment quality data, albeit outdated, compare to the baseline and what does this mean for dredging? Ideally more recent data is required to be representative of the current levels in the Medway and Swale Estuaries.	See response to comment 1 above.
31	MPD Baseline Doc	HRA	C.3.1	'...loss of benthic organisms within the dredged area is therefore considered to be insignificant, in the context of natural variability.' Is there any evidence to support this statement? The conservation advice packages may have site specific information relating to biotopes in these designated sites. Refer to sensitivities to pressures such as turbidity/abrasion/penetration	The assessment information has been reviewed in the context of the sensitivities provided in the conservation advice packages.
32	MPD Baseline Doc	Mitigation measures	C.3.3	'Dredging must not take place during the months of February and March. Reason: Smelt (<i>Osmerus eperlanus</i>) a proposed feature (in the Medway Estuary MCZ) are sensitive to dredging activities. The most sensitive time for this species is during their migration period in the spring(around February/March)'. NE welcome the inclusion of this measure as ensures that the most sensitive time for smelt migration is avoided. Please be advised that the Conservation Advice for the feature smelt was updated recently. Please check the conservation package to ensure this mitigation is aligned with the updated seasonality for this mobile feature. NE note that in addition to this mitigation there is also one for 'migratory fish' which avoids all of April and May. For fish species not designated we defer to the EA for further advice.	These mitigation measures are related to existing marine licence conditions. As noted in Section 6.2, a seasonal restriction for migratory smelt is included as a condition of the 10 year Marine Licence (L/2019/00092) that was issued to the Port of Sheerness Limited for the use of WID within the Medway Approach Channel. The 5 year Marine Licence (L/2018/00269) issued to Thamesport (London) Ltd for dredging of the London Thamesport Wharf berth area also includes a restriction to avoid impacting migratory fish. No other marine licences are known to include a seasonal restriction for migratory fish. The mitigation measures that are referred to in Section C3.3. of the HRA form part of the baseline against which the potential effects have been assessed as explained in the introduction to this section. The assessment has not identified the need for any further mitigation measures to be introduced.

No	Report	Topic	Section	Comment	Response/Action
33	WFD Assessment	Nature Conservation Designations	2.3.1	'There are nine internationally designated sites...' MDP firstly states 14, ensure both documents are consistent.	This is a typo and should be referring to 14 sites given that SPAs and Ramsar sites need to be individually counted.
34	WFD Assessment	Nature Conservation Designations	2.3.1 - Figure 7	It is noted that the level of detail on designated sites is not as relevant in this report. However an indication of dredge location sites relative to designated sites would be useful (or a referenceto the MDP for further information).	Reference to the HRA provided in the MDP Baseline Document has been included.
35	WFD Assessment	Sediment Quality	2.4	'Sediment quality data from samples collected by Peel Ports Medway in 2012' As highlighted in the MDP comments, there are concerns regarding the dates of the latest sediment contamination data.	See response to comment 1 above.
36	WFD Assessment	Biology Habitats	4.2	'Coastal saltmarsh areas (higher sensitivity habitats) are located within 500 m of the dredge and disposal sites throughout the Medway Estuary'. There are also peat and clay exposures in the Medway Estuary. It would be useful to understand the proximity of this feature from dredge and disposal sites.	Peat and clay exposures are not included as habitats of higher sensitivity in the EA's Clearing the Waters for All Guidance https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters . It is also not mapped on the MAGIC website so it is not possible to confirm their location in relation to the dredge areas.
37	WFD Assessment	Biology Fish	4.3	'Changes in SSC beyond the immediate vicinity of the maintenance dredge areas will be temporary, short-lived and transient in nature'. Large dredge campaigns may result in big, persistent sediment plumes.	This is not considered applicable to the existng maintenance dredge activities in the Medway. Should a large capital dredge or larger than usual maintenance dredge campaign be required in the future outside the worst case envelope that has been assessed, then this would require an additional assessment.
38	WFD Assessment	Protected areas	4.5	'...the release of sediment bound contaminants are assessed as negligible.' With outdated sediment contaminant data this statement should be made cautiously or also include the limitations of relying on the data or include future plans.	We have included reference to Peel Ports' future plans to sample. Please refer to the response to comment 1 above.

Contact Us

ABPmer

Quayside Suite,

Medina Chambers

Town Quay, Southampton

SO14 2AQ

T +44 (0) 23 8071 1840

F +44 (0) 23 8071 1841

E enquiries@abpmer.co.uk

www.abpmer.co.uk

