PORT OF TILBURY LONDON

PLANNING ACT 2008
INFRASTRUCTURE PLANNING
(APPLICATIONS: PRESCRIBED FORMS AND PROCEDURE) REGULATIONS 2009
REGULATION 5 (2) (a)

PROPOSED PORT TERMINAL AT FORMER TILBURY POWER STATION

TILBURY2

TR030003

VOLUME 6 PART B

ES APPENDIX 16.C: WFD ASSESSMENT

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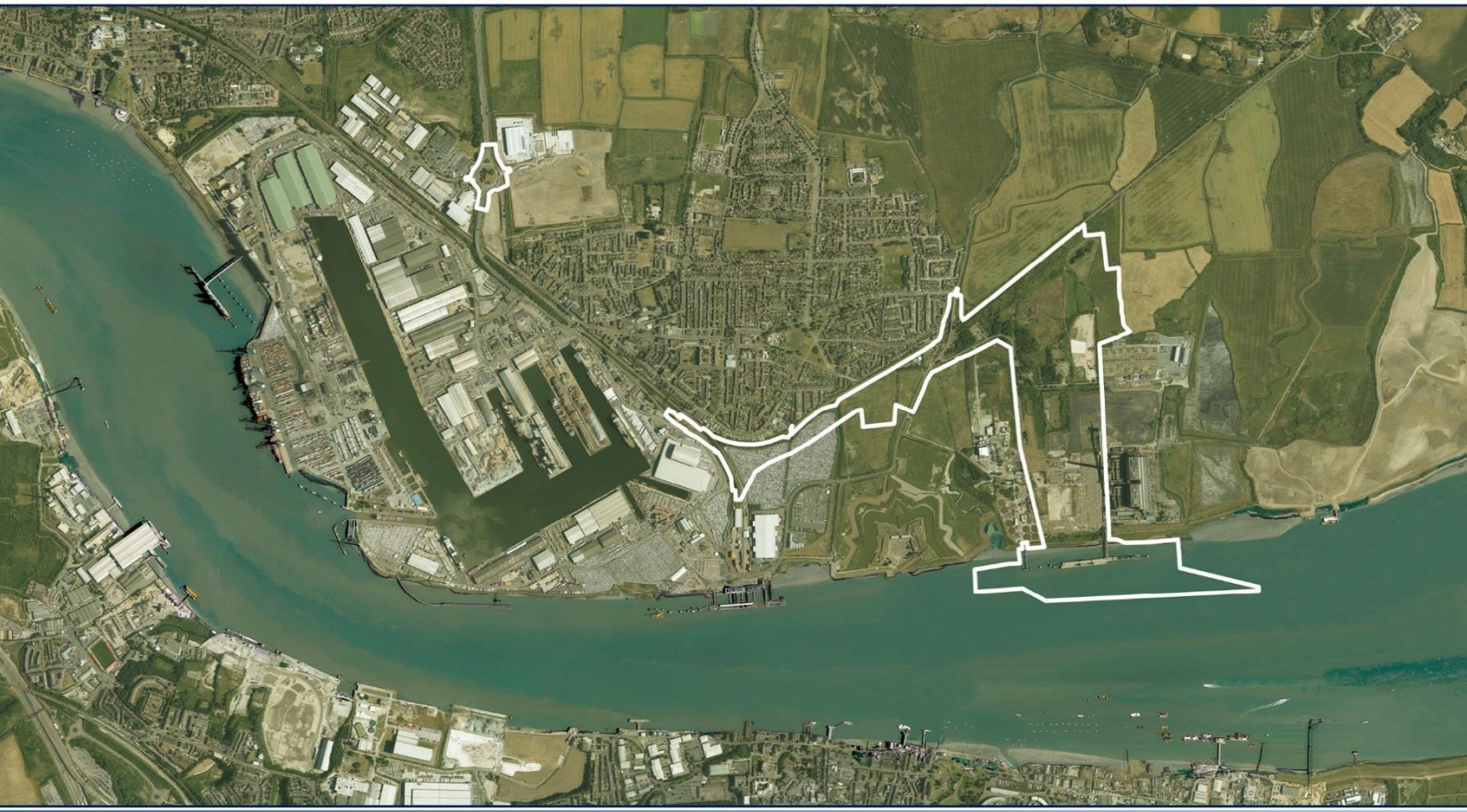

TILBURY2

APPENDIX 16.C: WATER FRAMEWORK DIRECTIVE ASSESSMENT

INTRODUCTION

1.1 Port of Tilbury London Limited (PoTLL) is proposing a new port terminal on the north bank of the River Thames at Tilbury, a short distance to the east of its existing Port. The proposed port terminal will be constructed on land that formed the western part of the now redundant Tilbury Power Station.

1.2 This appendix provides the Water Framework Directive (WFD) impact assessment of the proposals' impact on surface waters located within the Site Boundary. A separate assessment to further evaluate the potential impacts of the scheme on the water environment, with regards to drainage, water quality, hydrogeology and ecology, has been prepared within the chapters of the main Environmental Statement. This appendix focusses solely on WFD compliance.

1.3 The proposals are set out in Chapter 1 and form the basis of this assessment.

1.4 This assessment incorporates all designated surface water bodies that are classified under the WFD, including terrestrial and transitional waters. In addition, it assesses the potential impact on water bodies not currently designated under the WFD, but which comprise significant aquatic habitat.

1.5 Standing water bodies, such as ponds and lakes, are also considered and assessed as part of the WFD impact assessment.

LEGISLATION AND POLICY CONTEXT

1.6 The WFD 2000 requires all natural water bodies to achieve both Good Chemical Status (GCS) and Good Ecological Status (GES) and all Artificial and Heavily Modified Water bodies (A/HMWB) to achieve Good Ecological Potential (GEP). The River Basin Management Plans (RBMP) outline measures required to enable water bodies to achieve Good Status.

1.7 The WFD is transposed into English and Welsh law through The Water Environment (WFD) (England and Wales) Regulations 2003. The regulations have been updated in the recent Water Environment (WFD) (England and Wales) Regulations 2017. This impact assessment follows guidance produced by The Planning Inspectorate in advice note 18 on The WFD in June 2017. This includes three phases of work: i) Preliminary/screening assessment, ii) Scoping assessment and iii) WFD impact assessment. The initial preliminary/screening assessment was set out in the Preliminary Environmental Information Report (PEIR) and detailed what should be screened in and out of the assessment. The scoping assessment has taken on board feedback from stakeholders in their review of the PEIR and outlined work that needed to be undertaken to address these comments. Finally, the WFD impact assessment outlines the results of these additional studies and details mitigation that will be developed to mitigate against any impacts. The appendix detailed below reflects this structure and the three individual phases are detailed accordingly.

1.8 New activities and schemes that affect the water environment may adversely impact biological, hydromorphological, physico-chemical and/or chemical quality elements (WFD quality elements), leading to a deterioration in water body status. They may also render proposed improvement measures ineffective, leading to the water body failing to meet its WFD objectives for GES/GEP. Under the WFD, activities and schemes must not cause deterioration in water body status or prevent a water body from meeting GES/GEP by invalidating improvement measures.

1.9 The overall ecological status of a water body is primarily based on consideration of its biological quality elements and determined by the lowest scoring of these elements. These biological elements are, however, supported by the physico-chemical and hydromorphological quality elements.

1.10 In addition, to achieve the overall WFD aim of GES/GEP, a water body must pass a separate chemical status assessment, relating to pass/fail checks on the concentrations of various identified priority/dangerous substances.

1.11 All developments that are likely to alter or impact water bodies must therefore assess whether the scheme is WFD compliant.

PRELIMINARY WFD ASSESSMENT (SCREENING ASSESSMENT)

1.12 An initial preliminary/screening assessment was undertaken as part of the PEIR. The methodology and results of this preliminary assessment are detailed below.

1.13 The preliminary assessment/screening methodology undertaken to assess the potential impacts and relevant mitigation actions for the proposed scheme is set out below:

- An initial desk based study was undertaken to determine if any WFD assessed water bodies were situated within the site, using the Environment Agency's (EA) Catchment Data Explorer website[1].
- A further desk based assessment was conducted through the Flood Map for Planning website[2] to identify other surface waters on the site.
- A site visit was undertaken on 12/05/17 to check the location of the watercourses and assess their hydrological and ecological characteristics in relation to WFD quality elements and assessment criteria. Information obtained from this survey will also help inform the more detailed WFD assessment.
- A review of the masterplan designs was conducted to assess potential impacts on watercourses. Specifically, the plans were reviewed for watercourse crossings, channel realignments and new inflows/outflows.
- An assessment was undertaken on the transitional water bodies which followed the Government guidance: 'Clearing the Water for All - estuarine and coastal waters'[3].

1.14 The preliminary screening assessment effectively screens in those water bodies that would need to be assessed further in a more detailed WFD assessment. Where water bodies can be screened out from further investigation this will also be done at this stage.

Baseline Environment and Water Body Screening

1.15 The desk study broadly identified 15 surface water features within the Site, including Main Rivers, drainage ditches and ponds (see Figure 1-1 and 1-2). Typical photographs are shown in Figure 1-3 below.

1.16 The Site lies within the Mardyke Operational Catchment and the RoRo Berth on the River Thames is located within the Tidal Thames Operational Catchment. The operational catchment is a term used by the EA as a means of grouping WFD water bodies together for the purposes of Economic appraisal. More broadly the Site is located within the Thames River Basin District and the relevant mitigation measures are outlined within the Thames RBMP.

1.17 The River Thames is the only WFD assessed water body situated within the Site. At this location, the River Thames is a transitional water body (GB530603911402)

[1] http://environment.data.gov.uk/catchment-planning/
[2] https://flood-map-for-planning.service.gov.uk/
[3] EA (2016). *Clearing the Waters for All- Estuarine and Coastal Waters*. Environment Agency. London.

currently designated a HMWB and assessed as having an overall classification of Moderate.

1.18 From a groundwater perspective, based on geological open data (1:50,000 scale), the entire Site is underlain by Undifferentiated Seaford and Newhaven Chalk Formations and Alluvium superficial deposits. Consistent with this, the Site lies within the South Essex Thurrock Chalk Groundwater Body (GB40601G401100) part of the South Essex Thurrock Chalk Operational Catchment and the Thames Management Catchment. More broadly, the site is located within the Thames River Basin District. In the 2015 survey the groundwater body was deemed to be at Good status, with both chemical and quantitative elements at Good status. The objective is Good status by 2021.

1.19 The River Mardyke located to the North West of the existing Tilbury Port is also a designated WFD river and was considered within the WFD screening process; however, its confluence with the River Thames is situated approximately 10km from the Site Boundary (see Figure 1-1) and was thus considered to be outside of the Ecological Zone of Influence (EZoI). The EZoI in this instance was defined to identify those watercourses (and associated biological elements) that could potentially be affected by the proposals, through for example, habitat loss, physical modification, disturbance and/or changes to water quality/quantity. For this WFD compliance assessment the EZoI was taken to be the Site boundary, with any water courses falling within the Site going forward for assessment at the water body scale.

1.20 The Mardyke catchment is located outside of the Site boundary and due to its distance from the scheme, is not expected to be impacted by the development. Subsequently, it has been scoped out of this assessment.

1.21 The Main Rivers of Pincocks Trough (M1), Tilbury East Dock Sewer (M3) and Chadwell Cross Sewer (M2), drain the urban area of Tilbury and the Tilbury Marshes flood storage zone. These watercourses pass through the infrastructure corridor and Tilbury2 site and were included in the preliminary WFD assessment. Despite being ‘Main Rivers’ they are not part of a designated WFD water body.

1.22 The three Main Rivers are large, artificial drainage ditches which act as the main surface water flow pathways within the site (excluding water transported within the River Thames). All three of the watercourses are approximately 3m wide; however, their depths vary significantly throughout each reach. Bank side vegetation typically comprises terrestrial scrub and trees, whilst in-channel vegetation consists of marginal aquatic species, predominantly common reed (*Phragmites australis*).

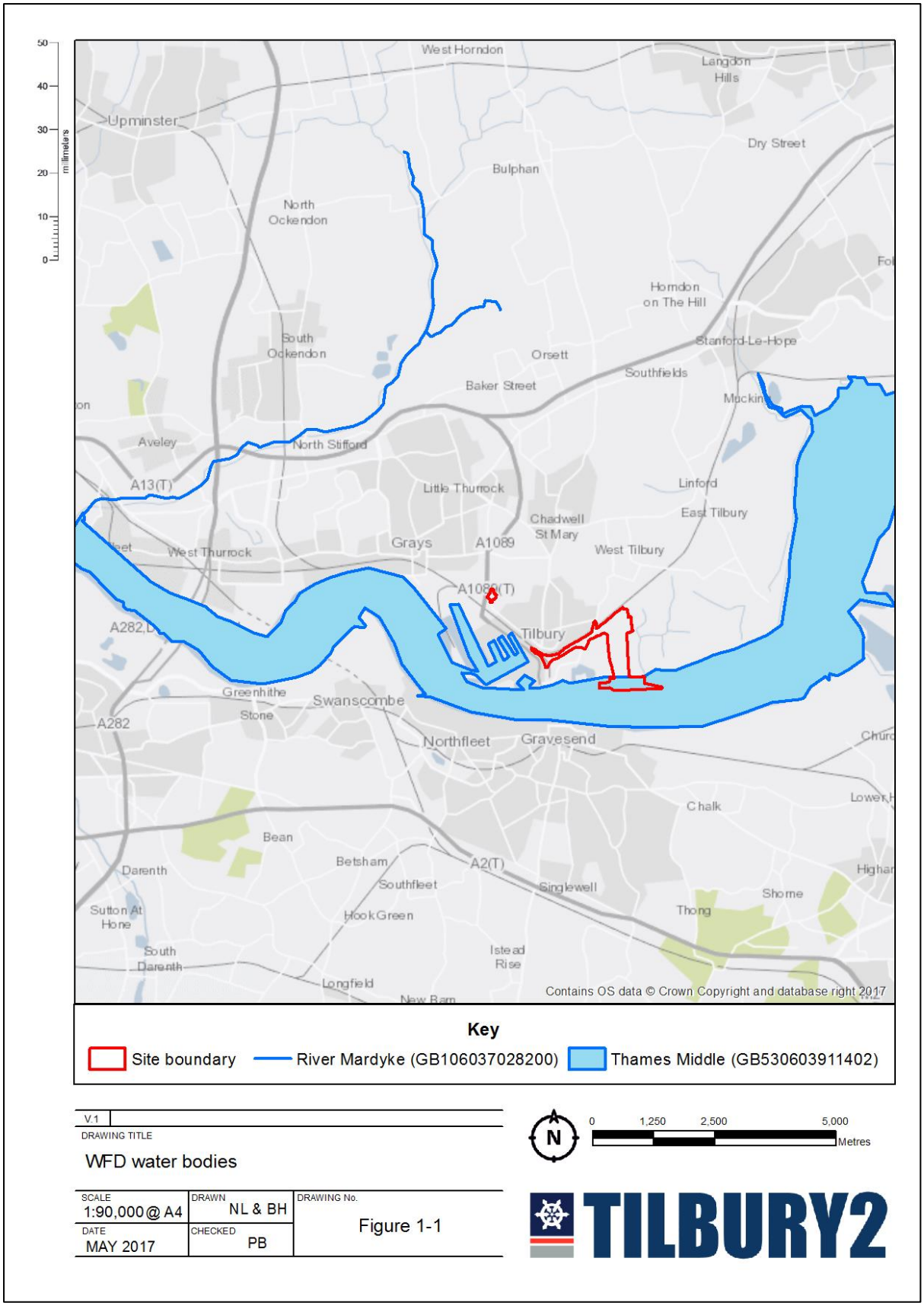

Figure 1-1: WFD water bodies near Tilbury2

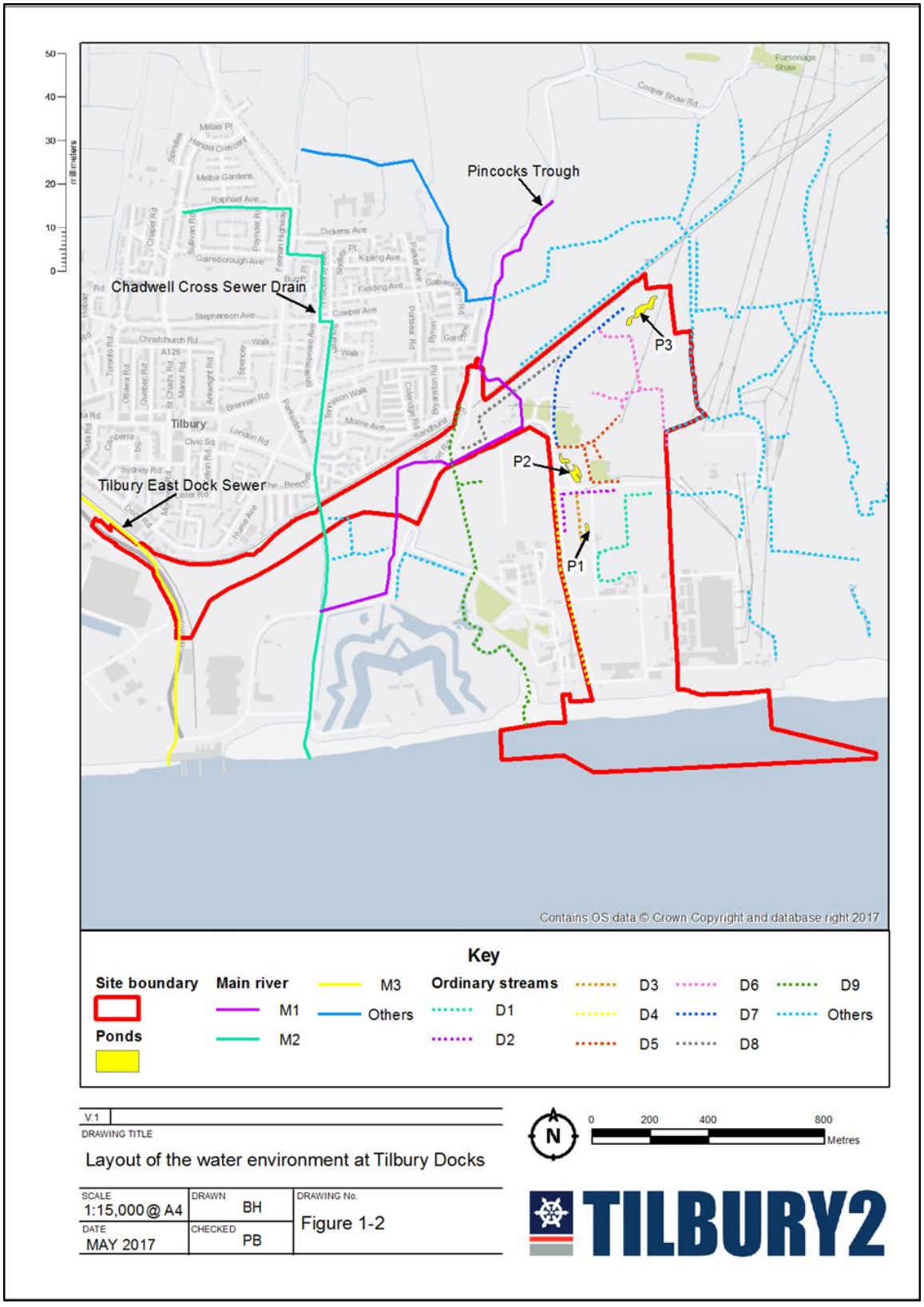

Figure 1-2:Layout of the water environment at Tilbury docks

Ditch 3

Pond 1

Pond 3

Pincocks Trough (M1)

Ditch 6

Middle Thames water body

Figure 1-3: Photographs showing typical water features on site

1.23 In addition to the Main Rivers, several smaller drainage ditches are present on site. Broadly these ditches can be separated into nine distinct watercourses, although it should be noted that the connections between these channels are complex and unidentified interactions or impoundments may exist between and within each watercourse. Table and Figure 1-2 show the location of the ditches on site.

1.24 The ditch networks on the Site are typically low gradient, low flow systems dominated by one or two species of marginal vegetation which heavily encroach the channel. Macrophyte growth is limited within the ditch network due to fluctuating water levels. At the time of the survey water levels were low, following a period of dry weather, with many of the watercourses completely dry.

Table 1-1: Location of drainage ditches (see Figure 1-2)

Watercourse	Central NGR
D1	TQ 65869 75857
D2	TQ 65646 76037
D3	TQ 65703 75954
D4	TQ 65633 75894
D5	TQ 65736 76212
D6	TQ 65931 76397
D7	TQ 65617 76356
D8	TQ 65500 76401
D9	TQ 65302 76006

1.25 The desk study and site visit confirmed the presence of three ponds within the Site Boundary, two of which are located within the area of works. These are known as the TEEC Pond (P1), the Gatehouse Pond (P2) and finally the Compensation Pond (P3).

1.26 The location of the ponds is shown on Figure 1-2.

1.27 The TEEC Pond (P1) and the Gatehouse Pond (P2) have little open water and are heavily encroached by marginal vegetation, predominantly common reed (*Phragmites australis*). The Compensation Pond (P3) is an artificially created pond, approximately 100m in length with extensive open water and marginal habitat.

1.28 The TEEC Pond (P1), the Gatehouse Pond (P2) and the Compensation Pond (P3) have been scoped into the WFD assessment due to their location within the site and within the EZoI.

Table 1-2: Location of ponds (see Figure 1-2)

Pond	Label	NGR
TEEC Pond	P1	TQ 65731 75923
Gatehouse Pond	P2	TQ 65686 76109
Compensation Pond	P3	TQ 65917 76676

1.29 No non-native invasive species have been recorded within the aquatic habitats on site. However, three non-native species have been recorded within the terrestrial habitats, which are listed on Schedule 9 of the Wildlife and Countryside Act, 1981 (as

amended). These are: Japanese rose *Rosa rugosa* and Himalayan cotoneaster *Cotoneaster simonsii*, limited numbers of which were planted as part an earlier landscaping scheme for the site; and wall cotoneaster *Cotoneaster horizontalis*, occasional plants of which have self-seeded into the landscaped bund in the Fortland Distribution Park.

1.30 These species produce seeds that are borne in fruit which is palatable to, and therefore prone to spread by, birds and small mammals. The distribution and extent of these species should be mapped shortly prior to treatment and site clearance works commencing to identify any change in distribution.

1.31 These are all species which have been commonly planted in the past and can be readily eradicated, either by digging out the individual plants at the roots, or by cutting the plants at the base and treating the stumps with herbicide. However, new plants can readily grow from discarded berries (or suckers in the case of Japanese rose) and it is therefore important to ensure that all arisings are removed and disposed of carefully (e.g. by burning on-site, or disposing off-site, as per standard best practice guidance[4]).

Preliminary Impact Assessment results

1.32 There are several potential impacts from the proposals associated with:

- Loss of surface water habitat;
- Deterioration of water quality (associated with increased traffic and operational activities) on the main site;
- Realignment and culverting of water courses;
- Construction, dredging and operation impacts on Thames Middle and Lower water bodies; and
- Construction and operation of the various facilities and their potential impact on groundwater.

1.33 The proposals' designs at the time were reviewed to assess the potential for specific impacts on each water body identified. These impacts are outlined in paragraphs 1.32 to section 1.75.

a) Transitional Water Body assessment

1.34 This section describes the preliminary WFD assessment carried out for the following transitional water bodies:

- Thames Middle; and
- Thames Lower.

1.35 The proposed works for the Tilbury2 scheme lie within the estuarine water body of Thames Middle. The next closest water bodies are the Thames Upper and Thames Lower, located approximately 50km upstream and 7km downstream from the scheme respectively (see Figure 1-4).

[4] https://www.gov.uk/guidance/prevent-the-spread-of-harmful-invasive-and-non-native-plants

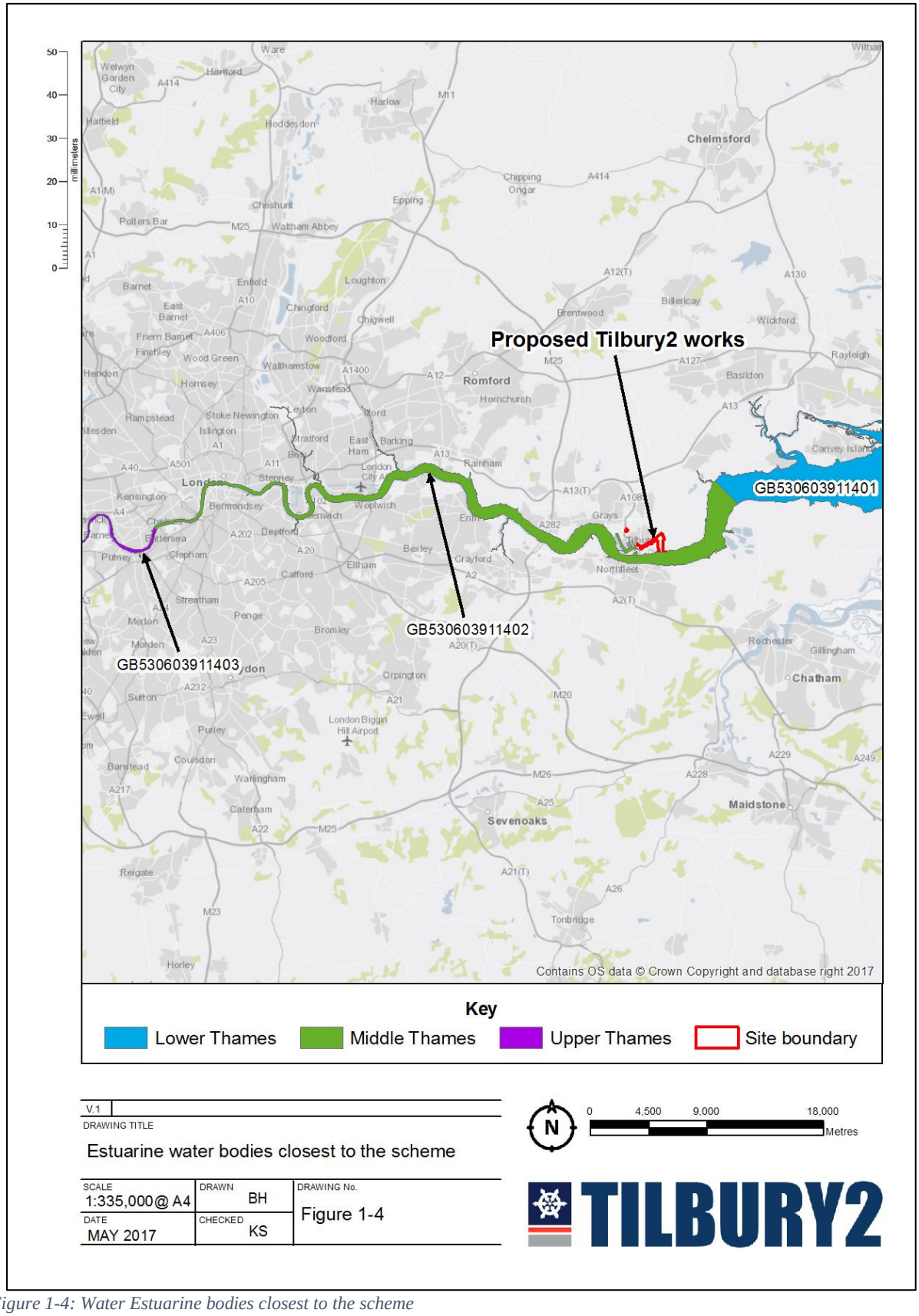

Figure 1-4: Water Estuarine bodies closest to the scheme

1.36 The Thames Middle and Thames Lower water bodies form the lower section of the Thames estuary, a transition area between the river and the marine environment. Given the large volume of water exchanged between these water bodies, they have been identified as receptors of potential impacts from the proposed scheme and have been included in this assessment.

1.37 As part of this assessment, the original Thames RBMP 2009, and the subsequent Thames RBMP 2015 update, were checked against the EA's online information on RBMPs, to determine up to date quality status information for the different water bodies. The status of these water bodies is defined on Table 1-3.

Table 1-3: Water bodies within the Thames RBMP closest to the scheme

Name	ID	Type	Location	Status 2009	Status 2015
Thames Middle	GB530603911402	Estuarine	Scheme takes place in water body	Moderate	Moderate
Thames Lower	GB530603911401	Estuarine	Scheme takes place outside water body	Moderate	Moderate

1.38 This assessment followed the Government guidance: 'Clearing the Water for All - estuarine and coastal waters'[5].

Screening

1.39 The proposed scheme was screened to identify the activities which may present a risk to the relevant WFD water bodies, by causing or contributing to a deterioration of status or jeopardising the water body achieving Good status. This screening considered all activities involved in the scheme, each stage of the activity, and the water bodies which may be affected.

1.40 The activities which were identified as having a potential risk and taken forward for further assessment were:

- Construction of the RoRo terminal and construction materials and aggregates terminal (CMAT);
- Capital and maintenance dredging; and
- Operation.

Scoping

1.41 A scoping exercise was undertaken to identify the potential risks that each activity may pose to the WFD receptors within each water body. These WFD receptors are defined by the Government guidance as the following:

- Hydromorphology;

[5] EA (2016). *Clearing the Waters for All- Estuarine and Coastal Waters*. Environment Agency. London.

- Biology – habitats;
- Biology – fish;
- Water quality;
- Protected areas; and
- Invasive non-native species (INNS)*.

*Since the proposed activities include the movement of vessels and equipment which has been used or travelled through other water bodies, INNS have been included in this assessment.

1.42 The activities were assessed individually against each water body based on the scoping template of the EA ('WFD scoping template'). To support this assessment, the relevant 'water body tables' were consulted to establish the status of each water body. Magic maps[6] was used to find information about the location, size and distance of the WFD habitats (e.g. WFD Protected Areas are not within 2km from the site and thus, have been scoped out of the EIA).

1.43 For full details of the assessment see copies of the scoping templates available at the end of this Appendix.

1.44 The potential risks that were identified in the scoping exercise are summarised in Table 1-4 (Thames Middle) and Table 1-5 (Thames Lower). Full tables on this scoping exercise are shown at the end of this appendix. The tables presented show the results of the scoping exercise only and so reflect the position in terms of the development of the proposals as it stood at the time of that exercise. Updated details on operations and constraints associated with the refined proposals are outlined in the associated CEMP.

[6] Magic (2017). Multi- Agency Geographical Information for the Countryside website. Accessed at: http://www.magic.gov.uk/MagicMap.aspx

Table 1-4: Potential risks to the Thames Middle WFD receptors

WFD receptors	Construction	Dredging	Operation
Hydromorphology	There is a risk of the new port structures causing changes to the hydromorphology.	There is a risk that dredging for navigation (both capital and maintenance dredging) may cause changes to the hydromorphology.	There is a risk that additional navigation by vessels and operation of port facilities may cause changes to the hydromorphology.
Biology – habitats	Risk of impact to saltmarsh habitat from sediment mobilisation.	Risk of impact to saltmarsh habitat from sediment mobilisation.	There is a risk of accidental spillage of material when unloading, which may reduce water quality by increasing the sediment load or through potential contamination.
Biology – fish	Risk of impact to fish migration through sediment mobilisation and underwater noise and vibration.	Risk of impact to fish migration through sediment mobilisation.	There is a risk of contaminating the water by accidental spillage of fuel and chemicals, which may kill fish by clogging sensitive gill structures or by poisoning.
Water quality	Risk of impact to water quality through mobilisation of bed sediments which may include chemicals from the Environment Quality Standards Directive (EQSD) list.	Risk of impact to water quality through mobilisation of bed sediments which may include chemicals from the EQSD list.	Potential release of chemicals into the water column through accidental spillage of fuels and chemicals during vessel operations.
Protected areas	-	-	-
INNS	Potential risk of introduction or spreading of INNS by vessels and materials.	Potential risk of introduction or spreading of INNS by vessels and materials.	Potential risk of introduction or spreading of INNS by vessels and materials.

Table 1-5: Potential risks to the Thames Lower WFD receptors

WFD receptors	Construction	Dredging	Operation
Hydromorphology	-	-	-
Biology – habitats	-	-	-
Biology – fish	-	Possible risk of impact to fish through an increase in water turbidity by sediment mobilisation.	-
Water quality	-	Possible risk of impact to water quality through mobilisation of bed sediments with chemicals from the EQSD list.	-
Protected areas	-	-	-
INNS	-	Potential risk of introduction or spreading of INNS by vessels and materials.	Potential risk of introduction or spreading of INNS by vessels and materials.

Construction

1.45 The installation of sheet piles along the northern edge of the dredge pocket, together with the installation of the mooring dolphins, may result in a localised increase in the level of turbidity in the water column. This may deposit on the saltmarsh habitat near the works or in extreme cases clog the sensitive gill structures of fish migrating through the river. However, given the nature of the works and the strong tidal currents along with naturally high levels of turbidity already occurring in the Thames, the impacts to saltmarsh habitat and fish are considered negligible.

1.46 Similarly, due to the scale and nature of the works and the naturally high levels of turbidity in this area of the Thames, increases in turbidity which may affect water quality are considered negligible.

1.47 Piling works, particularly if impact piling is required, has the potential to generate noise disturbance to fish. There is potential for noise to be transmitted through the water column and disturb fish migrating though the river, particularly during their breeding season.

1.48 As a result, an underwater noise survey was commissioned to determine the existing levels of noise, and underwater noise modelling was undertaken to estimate the likely level of noise from different construction activities and the extent of propagation under different tidal conditions. This is dealt with further in the Biology – Fish section of this document And Appendix 17A of the ES.

1.49 Installation of sheet piles and mooring dolphins also has the potential to release historic contaminants trapped in bed sediments (including chemicals on the EQSD list), which may enter the water column and impact water quality.

1.50 The removal of the Anglian Water jetty is likely to mobilise sediment which may affect the saltmarsh habitat, fish and water quality. The magnitude of the effects will depend on the programme and methodology used to remove the structure; for example, working at low tide and outside fish breeding season is likely to reduce the impacts. This is dealt with further in Biology – Habitats, Biology – Fish and Water Quality sections of this document.

1.51 The increase in marine traffic may result in disturbance to fish populations due to underwater noise and vibration. However, this increase will be localised and temporary during construction.

1.52 The use of vessels, materials and equipment during construction poses the potential risk of introducing and/or spreading INNS if these vessels and materials have been in other water bodies and have not been treated properly.

Dredging

1.53 Dredging has been undertaken regularly at Tilbury Power Station to maintain the berth pocket depth and allow operations during all states of tides for importing coal. Maintenance dredging to a depth of 13.8mCD was undertaken every six months during operation of the power station, mainly by trailer suction hopper dredger. Sediment testing for contaminants was undertaken on a 2-year cycle. The results

from 2007 showed slightly elevated concentrations of cadmium and mercury (above Cefas Action Level 1), with an elevated concentration of lead in one sample[7].

1.54 Further dredging has the potential to release historic contaminants into the water column resulting in an impact to water quality. As a result, a sediment sampling survey has been carried out to inform the baseline before the start of the proposed activities. The samples have been analysed for heavy metals, organotins, polycylic aromatic hydrocarbons (PAHs), Polychlorinated Biphenyls (see Table 1-13), and particle size (see Figure 1-11), and have informed further assessments of the activity (see section Biology – Fish, and section Water Quality in this document.

1.55 The Scoping Report identified the site of the proposed works as having high turbidity levels, with sediment fluxes in the 1,000's of kg/s. The rate of release of sediments during dredging has been estimated to be in the 10's or possibly in the 100's of kg/s. Therefore, the sediment plume is unlikely to cause a significant impact to water quality. A hydrodynamic and sediment modelling study has been undertaken to estimate the likely sediment release rate from the dredging operation and compare that to the natural sediment flux to inform potential impacts to water quality. This study is presented in Appendix 16D of the ES.

1.56 The dredging vessels and equipment used pose the potential risk of introducing and/or spreading INNS, if these vessels and equipment have been in other water bodies and have not been treated properly. Further mitigation measures are provided in the Invasive Non-Native Species section of this document.

Operation

1.57 As with most activities involving cargo vessels, there is a risk of accidental spillages of contaminants or pollutants which can impact fish, water quality and sensitive habitats.

1.58 The increase in marine traffic has the potential to result in disturbance to fish populations though underwater noise and vibration. However, this is not expected to result in significant impacts.

Summary

1.59 In the Thames Middle water body, the proposed works at Tilbury2 (construction, dredging and operation) have the potential to impact the habitat, fish and water quality receptors. They also have the potential risk of introducing or spreading INNS.

1.60 In the Thames Lower water body, dredging works have the potential to impact the fish and water quality receptors. During operation, there is also the potential risk of introducing or spreading INNS.

1.61 A full assessment of potential impacts was not possible in the screening stage due to information still being collected through surveys and modelling. However, this preliminary assessment identifies potential impacts on the relevant WFD receptors, that have been dealt with in the full assessment below.

[7] PLA (2009). *Dredging Conservation Assessment for the Thames Estuary.* Port of London Authority - Hydrographic Service, Gravesend.

b) Terrestrial Water bodies

1.62 At the screening stage scheme elements with potential to impact terrestrial watercourses include:

- The construction of a new access road which incorporates two crossings of Main Rivers (Pincocks Trough (M1) and Chadwell Cross Sewer drain (M2)) could lead to a potential loss of habitat and deterioration in water quality associated with increased traffic. At the time of the preliminary assessment it was anticipated that these crossings could either be bridges (where site constraints allow) or culverts (with appropriate mitigation measures), which have the potential to impact flood risk; as these matters were in the process of being discussed with the Environment Agency. The new access road may impact the hydromorphology of these Main Rivers, but since they are currently very uniform in nature, any potential realignment necessary may offer some improvements.

- D1, D2, D3 and P1 are situated within the proposed container and trailer storage area as part of the RoRo terminal. It is anticipated that these surface water features will be lost as a result of the development, leading to a direct loss of aquatic habitat.

- D5, D6, D7 and part of D8 are located within the proposed CMAT area. It is therefore anticipated that these watercourses will be lost as a result of the scheme. The loss of these surface water features will result in a direct loss of the associated aquatic and marginal habitat.

- The construction of an ancillary building/parking area is anticipated to result in the loss of the Gatehouse Pond (P2). The TEEC Pond (P1) is also likely to be lost from the construction of the storage area. The loss of these ponds will result in a direct loss of aquatic and wetland habitats.

- Additionally, the proposed rail access route at the northern boundary of the Tilbury2 site is expected to result in the realignment of D8 and its tributaries. There are opportunities for both deterioration or improvement in habitat quality at this location dependant on detailed design elements.

- The construction work may adversely impact the physico-chemical elements of the various water bodies. However, this is not assessed directly within the WFD assessment, which focuses on the scheme as constructed, and in operation, providing there are no long-term impacts created as a result of the construction. It is assumed largely that the potential risks to water quality can be managed through the adoption of good construction practices.

1.63 <u>Potential Implications on the WFD</u>

1.64 The construction of two new bridges or culverts within M1 and M2 to facilitate the new access road may result in a loss of habitat for the ecological receptors of macrophytes, diatoms, macroinvertebrates and fish. It is, however, recognised that bridging or culverting of streams is sometimes required and does not necessarily lead to a reduction in overall water body status, or limit the ability of achieving GES or GEP downstream.

1.65 M1 and M2 are unlikely to support significant fish populations due to limited habitat potential and the presence of several impoundments throughout the drainage network. The impact of the proposals on fish is considered to be minimal.

1.66 There are no known eels within the Main Rivers running through the site. They have instead been found on the main River Thames and the neighbouring River Mardyke system. Access to Pincocks Trough and Chadwell Cross Sewer drain is likely to be restricted by an existing flap valve at the end of the channels as they drain into the River Thames as part of controls imposed by the Environment Agency through their protective provisions within the DCO, and as a consequence of compliance with the Drainage Strategy secured through the DCO.

1.67 There are no EA routine fish monitoring locations on any of the Main Rivers within the Site. Additionally, no records of European eel (*Anguilla anguilla*), at any life stage, exist for the watercourses within the Site Boundary (with the exception of the River Thames). The closest EA fish monitoring location is on the River Thames at Denton Wharf (TQ6664674338). Records here cover a period between 2011 and 2015 and include counts of European eel (*A.anguilla*). Additional records for eel have been found on the neighbouring River Mardyke, approximately 7.5km from the site. It is therefore considered possible that European eel (*A.anguilla*) and other fish species could be present within the terrestrial watercourses on site due to their hydrological connection to the River Thames. However, whilst is it possible for eel to be present within Pincocks Trough (M1) and Chadwell Cross Sewer (M2), it is considered that an existing flap valve at the end of these channels is likely to significantly impound the migration of eel and other fish species into these systems. Nonetheless, any channel alterations will incorporate fish passage into the design elements so as to not cause any deterioration in fish passage and, ideally, to enhance fish passage throughout these systems.

1.68 Furthermore, the rivers provide negligible habitat for macrophytes, due to the fluctuating water levels and frequent heavy shading throughout their reaches. M1 was the only location in which a small patch of macrophytes (*Callitriche sp*.) were recorded during the site visit. It is therefore anticipated that the bridging or culverting of these rivers will have a slight negative impact on macrophyte communities at the local scale due to shading effects. This however is not expected to impact WFD compliance.

1.69 Both M1 and M2 provide some habitat for macroinvertebrates. Detailed bridge or culvert designs were not issued for the scheme in the preliminary assessment stage; however, potential changes in flow, bed substrate and plant cover hold the potential to limit macroinvertebrate populations within these reaches. Dependant on the size of the modifications, these effects are likely to be localised and not significant at the water body or catchment scale. In addition, the preliminary assessment considered that if culverts were chosen instead of bridges good design can also mitigate against some of these impacts (e.g. depressed invert, natural substrate, low flow channel, planting at the inlet and outlet and mammal passes). Given the nature of these systems it is considered unlikely that any work would adversely impact the hydromorphological value of these two channels.

1.70 The loss of an extensive network of drainage ditches and ponds is likely to result in a significant reduction in aquatic habitat available for biological quality elements, as well as other ecological receptors such as mammals and plants. Whilst the water bodies being lost are not designated WFD water bodies, the WFD aims to prevent deterioration and enhance status of aquatic ecosystems and associated wetlands. The loss of seven watercourses and two ponds is considered to be significant at the

local scale and impacts may potentially also be realised at the regional scale. At the preliminary assessment stage it was considered that, subject to further design work, it could potentially have been appropriate for some off-site mitigation measures to be considered, such as the creation of additional aquatic features if the necessary space could not be found on site.

1.71 Loss of or realignment of D4 is not expected to occur as it is on the outermost limit of the Site Boundary.

c) Groundwater bodies

1.72 Scheme elements with potential to impact groundwater include:

1.73 Construction of the new access road and general infrastructure associated with the RoRo terminal and CMAT has the potential to impact on the groundwater body. Specifically, deep foundations protruding into the aquifer may modify flow paths, and runoff from potentially contaminated surfaces could be discharged into the aquifer. This will be analysed further as the design progresses.

Conclusion

1.74 Proposed works from Tilbury2, which include construction, dredging and operation, have the potential to impact habitat, fish and water quality receptors on both the Thames Middle and Lower water bodies. They also have the potential risk of introducing or spreading INNS.

1.75 On the main site, several potential impacts of the proposals on the watercourses and ponds situated within the site were identified. All the ditches identified within site are expected to be lost, except for D4 and part of D8. Two ponds, namely the TEEC Pond (P1) and the Gatehouse Pond (P2) are also anticipated to be lost within the current design. Whilst no Main Rivers are to be lost, two crossings are to be constructed for the access road. These water bodies form part of the wider Thames River Basin District and any impact must be assessed against the Thames RBMP's objectives.

1.76 Potential impact on the ground water body from deep foundations protruding into the aquifer and discharge of potentially contaminated runoff to groundwater has been identified. The preliminary assessment considered that this risk could be further assessed as the design for the proposals developed and has been screened in for the next phase of the assessment.

1.77 Further to the results of the preliminary assessment, consultation was undertaken with the EA and Thurrock Borough Council to discuss the wider objectives and measures of the RBMP, and potential mitigation measures for the proposals. The detailed WFD compliance assessment set out in the rest of this document will, with a further developed design since the preliminary assessment, enable an estimation of the magnitude of the impacts and allow the development of suitable mitigation.

WFD SCOPING ASSESSMENT

1.78 The initial preliminary/screening assessment was set out in the Preliminary Environmental Information Report (PEIR) and detailed what should be screened in and out of the assessment. This assessment was reviewed by the regulatory authorities. Feedback provided on this report has been used to inform the next phase of the work (the Scoping Assessment) which is detailed below. Comments have been broken down in four tables (Tables 1.6-1.9) and have been separated into those comments received on transitional water bodies, terrestrial water bodies, groundwater bodies and more general comments, respectively. The summary column demonstrates how these comments will be addressed in the WFD Impact Assessment detailed after the scoping phase.

Table 1-6: Summary of comments received during the public consultation related to transitional water bodies and marine environments under the WFD

Consultee	Summary of comments received relevant to transitional waterbodies (WFD)	Summary of how the issue is being addressed
Comments received in response to the PEIR (including preliminary WFD assessment) (July/August 2017)		
Environment Agency	**Saltmarsh** "Section 7.92 states that The Thames Estuary has an extensive area of saltmarsh on both the north and south shores. Large areas of maritime saltmarsh are present along the foreshore of the Thames Estuary in the vicinity of Tilbury, becoming more extensive to the east of the port.' This statement is inaccurate. The Thames Estuary has seen vast losses of saltmarsh throughout history. Today only tiny fragments remain. Therefore, we would not regard the Thames as having extensive saltmarsh, hence why further losses of this habitat type is significant. The report has mentioned the likelihood of damage or loss of inter-tidal habitats during construction and operation. Given the nature of the development this would seem probable, due to shading, piling, dredging and operation of the port. However, no mention has been made of where and how mitigation will take place, which would be a requirement". "As mentioned it is likely that the flood defence at this site will need raising or be able to accommodate raising and therefore it would seem sensible to incorporate mitigation at the site by redesigning and setting back defences to mitigate for damage and disturbance to the inter-tidal impacts". "By utilising 'Estuary Edges' guidance* and considering all the wider ecological impacts of the scheme on the foreshore and Thames river corridor a suitable design for enhancement along this frontage as part of the development may be possible. If it is not possible to accommodate all mitigation at this site, some	Discussion will continue to assess results from the extended Phase 1 habitat survey. Results appear to indicate loss of intertidal habitat. Discussion will continue to assess if this loss of habitat corresponds to saltmarsh and to what extent (if any) in the section on Biology – Habitats and the full WFD impact assessment. Loss of intertidal habitat by shading from the linkspan of the Tilbury2 jetty, is likely to be offset by the removal of the Anglian Water jetty. Mitigation measures for the potential impact to saltmarsh habitat will be proposed in the Environmental Statement (ES). The Environmental Impact Assessment (EIA) will consider the guidance: 'Estuary Edges' for

Consultee	Summary of comments received relevant to transitional waterbodies (WFD)	Summary of how the issue is being addressed
Environment Agency	may be possible at an alternative location. However, damage to inter-tidal habitat on the Thames must be mitigated for. *Note 'Estuary Edges' guidance - http://www.ecrr.org/Portals/27/Publications/Estuary%20Edges%20-%20design%20advice.pdf **Water Quality** "We have had some detailed discussion with you already on water quality. With no further details our comments are as previously outlined in earlier pre-application consultations. The marine parts of the work include dredging and minor construction that would be subject to consultation with the Marine Management Organisation and the Port of London Authority. We would expect to see full consideration of compliance with the Water Framework Directive, by provision within the EIA of a standalone WFD assessment. The most recent revised guidance for undertaking such an assessment is available at: https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-andcoastal-waters and is known as "Clearing the Waters for All" (which supersedes the earlier "Clearing the Waters" guidance which is now withdrawn)". "We understand that currently there are proposals for a considerable dredge in the order of 100 000 cubic metres, and that this is proposed to be undertaken using a removal dredge technique, with disposal of the dredged material as appropriate to the chemical nature of the sediment, which has yet to be tested for the standard CEFAS suite chemicals appropriate to MMO, dredge licence applications. Our initial view, though we reserve judgement until the WFD assessment is provided, is that a removal dredge can be managed to comply with WFD for water quality, though the timing of the dredge may influence the sensitivity somewhat. A removal dredge will tend not to mobilise much material into the water column and so timing of dredge is rather less important than for dispersive dredges where more material may enter the water column. We note that whilst removal may be more protective of water quality (particularly should sediments show signs of significant levels of contamination and the marine team would be happy to consent to removal methods being used as it poses lower potential risks for water column chemistry), if sediments are less	assessing impacts to saltmarsh. Team will continue discussions with the Marine Management Organisation (MMO), Port of London Authority (PLA) and EA regarding impacts from potential contaminants in river sediments. This is dealt with fully in paragraph 1.151 of the Marine Ecology chapter of the ES Team will produce a standalone WFD as part of the EIA, following the guidance 'Clearing the Waters for All', as previously done for the PEIR. Discussions will continue with MMO, PLA, and EA to discuss results received from sediment sampling analysis, and results from hydrodynamic and sediment modelling. This is dealt with fully in section Hydromorphology, and sections Biology – Fish, and Water Quality of this document and Appendix 16D of the ES. The potential presence and concentration of contaminants in sediments will inform controls on dredging techniques and timings which are secured through the Construction Environmental Management Plan (CEMP) and the DML that forms part of the DCO.

Consultee	Summary of comments received relevant to transitional waterbodies (WFD)	Summary of how the issue is being addressed
Environment Agency	contaminated there may still be potential to use more dispersive dredge methods such as the much cheaper water injection techniques commonly used in the mud reaches, whilst probably remaining WFD compliant, though we would want to see the justifications within the WFD assessment. We would not seek to constrain the operator to a specific dredge technique or combination of techniques until they have assessed the risks of any other options they wish to consider. As Tilbury is right on the boundary of where we and the Port of London generally prohibit dispersive dredge techniques during the months of June-August inclusive (specifically to protect the water column (and fish) at a time when dissolved oxygen may be low and subject to further crashes if storm sewage enters upriver) there would need to be greater attention to when (what time of year and suitable tidal states) the dredge occurred should dispersive dredge techniques be chosen over removal techniques. Until we can be certain the sediments to be removed are not unacceptably contaminated, a presumption of a removal dredge with appropriate offsite disposal (either to land requiring EA waste permits, or to a licensed marine disposal site; whichever is most appropriate for the chemical nature of the material) would be the safer option in terms of gaining WFD approval from us. But we wish to emphasize that at this point we have not yet ruled out the possibility that cheaper, dispersive dredge options with appropriate mitigation and timing, might also be demonstrated to be WFD compliant, however we'd need a more detailed analysis of sediment quality, currents, dilution potential, and the ultimate fate of the sediment (with respect to pathways for material deposition on the protected areas) before we could be convinced that such a large dredge could be done by dispersive means and still remain WFD compliant. We welcome review of the completed WFD assessment justifying why the dredge and any in-river construction works will not compromise attainment of WFD objectives for the Thames Middle, water body or any adjoining linked waterbodies (Thames Lower, Thames Upper- though transfer of effects to Thames Upper can probably be discounted due to distance). We would prefer the WFD assessment to take the form of a standalone document, though this could be a standalone chapter of the EIA."	The results of the hydrodynamic and sediment modelling study (e.g. pathways and deposition of material in protected areas) will be used to inform the future dredging techniques and timings which are secured through the Construction Environmental Management Plan (CEMP) and the DML that forms part of the DCO. Future dredging techniques and timings cannot be ascertained until the proposed discussions and assessments have taken place. Team is undertaking a standalone WFD assessment to demonstrate if any in-river construction works will or will not compromise attainment of the WFD objectives for the Thames Middle and adjoining water bodies as identified in the screening PEIR.

Consultee	Summary of comments received relevant to transitional waterbodies (WFD)	Summary of how the issue is being addressed
Marine Management Organisation	**1. Benthic Ecology** "1.1.The desk-based review has indicated that survey work is needed to gain greater confidence in the benthic features (habitats and invertebrates) that may potentially be directly or indirectly impacted by the project. 1.2.The impacts of the project on marine ecology will be assessed for significance following acquisition and analyses of the field-based data and following hydrodynamic modelling studies. However, all the sources of impact, the pathways, receptors and approaches to assessing impacts presently appear suitable. 1.3. The details of the field survey of the benthic sediments are not presented as part of the Preliminary Environmental Information Report (PEIR) nor any of its appendices, but the MMO are aware that this was agreed under the Intertidal Benthic Report".	Discussion will continue to assess results from intertidal- and subtidal sampling. Assessment will consider presence of protected /rare species e.g. tentacle lagoon worm or lagoon sea slug; and changes to species composition and biotope since last survey (2007-2008). Team will continue engaging with MMO and NE to determine the need for a wildlife licence in case of presence of tentacle lagoon worm, and/or the best suitable mitigation measures.
Marine Management Organisation	**2. Benthic Species** "2.1. With reference to Natural England's comments on Tentacled Lagoon worms (making the assumption of the presence of tentacle lagoon worm in the absence of a presence survey, if the conditions are right for them). This could put the developer in the position of damaging the species place of shelter (if only on paper) or needing to apply unnecessary mitigation. It is mentioned that further surveys are carried out which would avoid this. 2.2. It is mentioned that mitigation will be put in place to limit damage/disturbance. For some of these species (such as tentacled lagoon worm or seahorses), the mitigation will have to be sufficient to prevent offences not just to limit impact. Under the Wildlife and Countryside Act, habitat creation or other forms of compensatory measures as mitigation does not mean that offences do not occur. Mitigation to avoid offences must be steps taken to reasonably avoid the offences occurring".	Discussion will continue to assess results from the extended Phase 1 intertidal habitat survey. Assessment will consider presence/absence of priority habitats, such as saltmarsh.
	3. Conservation "3.1. The MCZ assessment appears fit for purpose and the MMO agree with the final decisions regarding which MCZ features are likely to be affected by the various potential impacts during construction and operation, however, we defer to Natural England regarding the final list of receptors to be included in the assessment. The majority of these are, however, ultimately dependent upon the outcomes of subsequent field data. These	A Marine Conservation Zone (MCZ) assessment will form part of the ES as an appendix to the Marine Ecology chapter (Appendix 11A).

Consultee	Summary of comments received relevant to transitional waterbodies (WFD)	Summary of how the issue is being addressed
	assessments will, therefore, be subsequently finalised within the Environmental Statement (ES). 3.2. One point to note, however, is that impacts to many of the MCZ (or rMCZ) features are assessed based on the spatial extent of the impact relative to the spatial extent of the feature within the MCZ. While it is possible to appreciate that the spatial scale of impact resulting from the scheme is likely to be small for these features, without the area of each feature present within the MCZ it is not possible to assess the relative area likely to be impacted. When undertaking the assessment, the predicted area of each feature likely to be impacted should be given as a percentage of that present within the MCZ? 3.3. The Thames Estuary rMCZ is an important site for fish nursery and spawning, and seasonal seaward migration of smelt, which is a feature of this site. The MCZ Assessment submitted with the PIER report acknowledges that there is potential for the construction activities for impact upon Smelt when they are transiting past the construction works. 3.4. The developer should also be aware of the wildlife licensing regime undertaken by the MMO, and that there may need to be consideration of this for cetaceans depending	

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Marine Management Organisation	on what the ES identifies, and that the MMO cannot issue wildlife licences under the Wildlife and Countryside Act for reasons of Imperative Reasons of Overriding Public Interest (IROPI) but they can be issued for conservation reasons if, for example translocation of species and their habitat was being considered". **4. Fisheries** "4.1.A comprehensive list of fish species present in the Thames has been included, as well as a table for species of conservation importance which are protected under various legislation. 4.2. The report acknowledges that Cefas spawning maps do not extend as far upstream as Tilbury, but the lower estuary has been recognised as an important area for spawning and nursery ground for sole, bass and herring. 4.3. In addition, the subtidal and intertidal areas around Tilbury are recognised as supporting a number of fish species and life stages, whilst the saltmarsh provides a habitat for juvenile species. 4.4. Further discussion provides an appreciation of the seasonal variation and distribution of fish species found in the Thames. This is complemented by Table 11.11 which shows the location and timing of commonly occurring and protected fish species found in the Thames. 4.5. All Data sources used to describe the marine environment and fish species are appropriate and are well suited for characterising fish populations in the tidal Thames. MMO recommend that the survey methods, timings and limitations of survey and gear types as well as gear selectivity are discussed or acknowledged within the ES, especially with regard to the influence on species and life stages captured by individual gear types/sampling methods. 4.6.The Fish Ecology section would benefit from the insertion of a map indicating where survey data was collected in relation to the Tilbury 2 development. 4.7.Seabass have been placed under special protection measures as scientific advice has clearly identified the need to drastically reduce catches of this species, following an increase in the fishing pressure and a reduction in reproduction (Marine Management Organisation, 2017). We would expect the ES to consider seabass in the context of the current special measures in place i.e. are construction activities (e.g. piling and dredging) likely to disturb nursery grounds or juvenile fish.	Comments to 'Fisheries' have been noted and will be taken into account in the WFD impact assessment and in the Marine Ecology chapter of the ES. The remaining comments will be addressed in the Marine Ecology chapter of the ES.

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Marine Management Organisation	4.8.The report acknowledges that the Thames and Blackwater Estuary herring are a discrete population. They are considered separate from the North Sea stock and are the only UK spring-spawning herring stock, spawning from late February to early May (Wood, 1981). 4.9.There is a sentinel fishery for Thames herring that operates between September and 31st January for monitoring purposes only. The most recent assessment of this stock has found that it is below biomass limits so the fishery remains closed to the wider fishing community in 2017. 4.10. Herring (and sprat) and their eggs and larvae are considered to be sensitive to noise and vibration from anthropogenic activities such as piling and dredging. The effects of high levels of noise on fish can include biological, physiological and morphological impacts: - Swim bladder rupture or tissue damage - Behavioural responses (avoidance of areas affected by increased noise) - Physical injury - Auditory tissue damage (including temporary and permanent hearing loss) - Physiological responses (stress, health and overall wellbeing) - Mortality 4.11. Therefore, due to the current state of the Thames herring stock, and the sensitivity of this species to noise, we expect the effects of underwater noise and vibration on herring to be assessed appropriately in the ES. 4.12. The report correctly identifies the potential impacts for the construction and operational phases of the Tilbury 2 development, which will be considered in the EIA. 4.13. MMO note that the mitigation measures will be considered once the potential impacts of Tilbury 2 are fully assessed and understood within the context of the EIA, and that the timing of works will be discussed in ES in relation to key spawning and migratory timing of fish of conservation importance. 4.14. MMO recommend that the following mitigation measures be considered for inclusion in the ES, especially if the noise modelling as discussed below shows potential interaction with and/or impact on sensitive fish receptors: - Commitment to a non-piling ‘window’ which covers the key period of spawning and migration for the key species of conservation importance. - The use of ‘soft start’ procedures for percussive piling, in accordance with Joint Nature Conservation Committee (JNCC)	

Consultee	Summary of comments received relevant to transitional waterbodies (WFD)	Summary of how the issue is being addressed
Marine Management Organisation	protocol for minimising the risk of injury to marine mammals and other fauna from piling noise. - No night time piling. - Downtime during any extended periods of percussive piling - Lighting to be suitably directed away from the aquatic environment. 11.11 which shows the location and timing of commonly occurring and protected fish species found in the Thames. 4.15. The Zoological Society of London (ZSL) has recently published guidance on fish conservation for planners, developers and local authority officers and consultants, which aims to improve fish conservation in the tidal Thames region (ZSL, 2016). - The recommendation is to plan construction and decommissioning works around key ecological events such as fish spawning and aggregation and fish migration. For example: ZSL advise that no development affecting the subtidal habitat of the predicted spawning ground should be permitted during the months where smelt are likely to spawn: late February, March and April. - Any proposed development in this area should specifically evaluate the potential impact on smelt and find ways to adequately reduce and/or mitigate this impact.4.16. Since this is a PEIR, the impacts to fish and magnitude of effect have not yet been assessed. Consequently, mitigations measures are yet to be proposed. Conclusions will be presented in the ES, and we will provide further comment, once this is provided".	
	5. Coastal Processes "5.1.There is no description of the physical environment or hydrodynamic processes at Tilbury. A description of the potential impact of the construction on the physical processes of the region is also lacking. The environmental impact assessment (EIA) should consider how the construction might affect the physical environment, including the local hydrodynamics and sediment dynamics, and the applicant is accordingly requested to add this to the EIA".	Noted. The ES will include an assessment of potential effects from construction on the physical environment in terms of hydrodynamics and sediment movement, establishing variation from the baseline (see paragraph 1.81 onwards).
	6. Underwater Noise "6.1.Chapter 11 gives a detailed account of the benthic, fish and marine mammal baseline. The report includes useful tables showing the location and timing of commonly occurring and protected fish species (Table 11.11). This table also highlights a number of marine and	Team is waiting for results from an underwater noise study, to discuss and assess impacts to marine species.

Consultee	Summary of comments received relevant to transitional waterbodies (WFD)	Summary of how the issue is being addressed
Marine Management Organisation	migratory species including sea bass, herring, shad, sea trout and European eel. 6.2.In terms of marine mammals, harbour seals, grey seals, harbour porpoise and bottlenose dolphins are the most commonly sighted marine mammals in the Thames. 6.3.Para 11.114 states that it is not possible to undertake the assessment of potential effects at this time as key information characterising the baseline environment and modelling of the extent of impacts is currently being collected and evaluated. As such, Tables 11.15 and 11.16 provide a summary of the sources, pathways and receptors that could potentially be impacted by the project during construction and operation, which will be assessed in the EIA and presented in the ES. The tables also provide commentary on the sources of information that will be utilised in the assessment. 6.4.According to the report, piling methods are likely to utilise both vibro and percussive techniques for different elements of the proposals. - The total number of piles to be installed / length of sheet pile wall and the method of installation for each should be clearly provided in the EIA. - Piling methods should be discussed in detail, with an estimation of the duration and timing of piling events provided, especially any occasions where piling is likely to extend for any long periods, or into hours of darkness. - We note that the developer is proposing extended working hours of 7am to 8pm for marine works in order to minimise the construction programme for this element of the work, and that no piling activities will take place on weekends or bank holidays. 6.5.Table 11.15 identifies that a potential pathway for underwater noise and vibration is the piling of mooring dolphins and sheet piling along the northern edge of the dredge pocket, potentially affecting fish and marine mammals. Furthermore, increased vessel movements (during construction and operation) have been identified as causing noise disturbance to fish and marine mammals. It is appropriate that the potential impacts of underwater noise on marine species are briefly discussed herein. 6.6.Dredging, although not specifically mentioned in the table, will also generate underwater noise and the impacts of such on marine fauna should also be considered. 6.7.MMO note the developer's intention to undertake underwater noise modelling to assess the extent to which noise from different construction activities will propagate under	The underwater noise assessment will form part of the ES as an appendix to the noise chapter. Underwater noise impacts on marine ecology will be addressed in the Marine Ecology chapter. The ES will include a description of the number of piles, the lengths of sheet pile wall and installation method as available at this stage of design. Noted. Noted. Noise impacts from dredging will be assessed in the ES in the noise and marine ecology chapters

Consultee	Summary of comments received relevant to transitional waterbodies (WFD)	Summary of how the issue is being addressed
Marine Management Organisation	different tidal conditions in the river. The predicted levels will be assessed against the defined criteria for the affected species. The results from the underwater noise modelling will be presented in the ES in the form of plots of unweighted peak sound pressure levels and sound exposure levels, along with tables of ranges. Please note that the source level used for the modelling should be stated in the underwater noise assessment, along with details and/or references as to where it has been derived from. Potential impacts will be assessed using the output of the underwater noise modelling for species and criteria to be agreed in discussion with regulatory bodies. It is expected that the potential impact on fishes will be based on Popper and Hawkins et al. (2014) and marine mammals on the current NOAA guidelines (2016) along with any additional criteria proposed by the regulator. This assessment will be presented in the ES and inform any additional mitigation measures that may be needed. 6.8.Any periods of simultaneous piling should also be accounted for in the assessment. 6.9.Chapter 17 discusses underwater noise in more detail. We note that the study area for the underwater noise will comprise the area in the vicinity of the jetty and immediately upstream and downstream of the Site (from Cliffe Fort in the east to the Tilbury Docks lock in the west). Baseline conditions will be determined by a two week survey of underwater noise at the jetty which was originally planned for June 2017 (new start date required). This period will cover a full tidal cycle including spring and neap tides, which we agree will be sufficient to provide an indication of underwater noise levels in the vicinity of the jetty. According to the report, given the potential risk to navigation, monitoring in the middle of the river is not possible. The monitoring will be undertaken using an Ocean Sonics icListen HF RB9 hydrophone which will be located in the water column 1-2 m above the riverbed. 6.10. It is recommended that the monitoring is undertaken in accordance to the NPL (2014) Good Practice Guide. - Good Practice Guide for Underwater Noise Measurement, National Measurement Office, Marine Scotland, The Crown Estate, Robinson, S.P., Lepper, P. A. and Hazelwood, R.A., NPL Good Practice Guide No. 133, ISSN: 1368-6550, 2014. 6.11. MMO support the proposals put forward here and recommend the impact criteria identified in the report are adopted. Assessing potential impacts on fish behaviour is more	Acknowledged Noted. Underwater noise modelling is being undertaken. This modelling will help assess the potential for injury and effects on behaviour of both fish and marine mammals within the marine ecology chapter.

Consultee	Summary of comments received relevant to transitional waterbodies (WFD)	Summary of how the issue is being addressed
Marine Management Organisation	challenging as there are currently no behavioural noise exposure criteria. In this case, MMO recommend that behavioural impacts are assessed using the most up to date, relevant, peer-reviewed scientific literature. MMO can advise as appropriate. 6.12. Details of the model used should also be provided in the underwater noise assessment to ensure that an appropriate assessment has been undertaken. 6.13. In terms of mitigation, the report states that the need for further mitigation will be determined following completion of the assessment of significance of impacts which will be presented in the ES. This is acceptable. 6.14. MMO welcome that cumulative impacts are, and will be considered in the ES. This is discussed in paras 11.118 – 11.120 and Table 11.17. The projects listed in Table 11.17 will be assessed for cumulative impacts on marine ecology in the Tilbury 2 ES. Projects screened into the cumulative impacts assessment for marine ecology fall within a 15 km radius of the Site located within the Thames. This covers the area from Erith in the west (upstream) to Canvey island in the east (downstream). 6.15. Once potential effects and impacts have been assessed, appropriate mitigation measures can then be agreed". **7. Dredge and Disposal** "7.1. The applicant has identified that maintenance dredging of the berthing pockets and adjoining approach will be required although due to the hydrodynamic assessment still being undertaken, the volumes/ frequency are not yet known. This should be included within the final ES. 7.2. The fate of the dredged material is yet to be determined. The port is investigating options to re-use the dredged material within the Tilbury 2 development. On land reuse, disposal at sea, or a combination of both options are currently being assessed as part of the EIA process. MMO agree with and welcome this approach. Should the applicant wish to dispose of the material to sea, MMO would expect an assessment to be carried out on the desired disposal site, or information supplied to assess the designation of a new disposal site. 7.3. The MMO note that the results included in the PEIR (Tables 11.7 and 11.8) are from 2007/2008 and the applicant has identified that additional sampling will be required (para. 11.53). The applicant has proposed eight sampling locations from across the dredge site. MMO agree that eight samples should be	The software being used for the underwater acoustic modelling of piling works is INSPIRE. This software has proven accurate for predicting noise levels following its use for the River Thames Blackfriars piling work and subsequent monitoring. Underwater noise impacts on marine ecology is being assessed within the Marine Ecology chapter. Projects listed in Table 11.17 of the PEIR will be assessed in the Marine Ecology chapter. Discussion will continue to assess the results of the hydrodynamic and sediment study to determine the expected maintenance dredging volumes and frequency. The fate of the dredged material will be addressed in the Marine Ecology chapter, following the determination of the preferred dredging techniques.

Consultee	Summary of comments received relevant to transitional waterbodies (WFD)	Summary of how the issue is being addressed
	sufficient and samples should be taken from the surface and every meter down to the maximum depth. This is in line with the sample plan response issued by the MMO on 19 April 2017; however, the MMO in consultation with Cefas may request additional samples if the volumes or dredge areas change following the hydrodynamic studies. The applicant has stated Cefas will be used for chemical analysis. The results should be submitted in the MMO template alongside the final ES. 8. Minor editorial comments 8.1. References for citations made within the Fish and Shellfish section are difficult to find. For ease of reading, we recommend that all citations for each individual ES chapter are itemised in a reference list at the end the chapter, rather than in subscript throughout the report." **Conclusion** "The Preliminary Environmental Information Report is well structured and the project objectives clearly defined. Scoping comments have been adequately addressed and acknowledged. All of the above comments should be taken into consideration and addressed in the resulting Environmental Statement".	
Gravesham Council Gravesham Council	"Our primary concern in relation to Tilbury2 relates to potential impacts on designated sites on the North Kent Marshes (SPA / Ramsar / SSSI). We note that table 11.2 of the PEIR "Scoping opinion responses relating to marine ecology" contains comments from the EA, MMO, PLA and Natural England. Whilst we would defer to the expert opinion of Natural England in this regard, we have found it difficult to identify where actual impacts (if any) are assessed in the PEIR. It is noted that you intend to set out in the ES why you consider HRA is not required in this instance and presume that you are in discussion with Natural England. This particularly the case as the precautionary principle applies whereby a significant effect has to be assumed where the evidence is not available to show otherwise. In summary, the potential impacts that appear to need consideration within the likely significant effects test are: - Impacts on coastal processes including: Disturbance of contaminated sediments,	Issues regarding the Habitat Regulation Assessment (HRA) will be addressed in the Terrestrial Ecology chapter of the ES. The results from intertidal- and subtidal sampling will be taken into account. Assessment will consider presence of protected /rare species e.g. tentacle lagoon worm or lagoon sea slug; and changes to species composition and biotope since last survey (2007-2008). The results from the extended Phase 1 intertidal habitat survey will be taken into account.

Consultee	Summary of comments received relevant to transitional waterbodies (WFD)	Summary of how the issue is being addressed
Gravesham Council	changes in erosion, deposition, sediment regimes and littoral drift patterns impacting on habitats. Habitat loss through dredging and construction of the project. Changes in these habitats may cause impacts to foraging birds and feeding fish. - Habitat loss could impact on intertidal and subtidal benthic ecology. The assemblages of species may also be impacted from changes in sediments (deposition, suspension etc.), water quality, introduction of non-native species. Construction of the Project could cause displacement, disturbance and habitat loss impacts on Coastal birds. - Construction could cause disturbance and mortality on Fish from the vibrations caused by the piling needed for the marine construction elements (para 5.79 explains that "Piling methods are likely to utilise both vibro and percussive techniques for different elements of the proposals"). Lighting, suspended sediment, artificial light, habitat loss could impact on fish including leading to barrier effects to migration. During operation of the project's fish could suffer mortality through being disturbed, loss of habitat and feeding areas and have their migration routes fragmented. - Whilst it is recognised that, compared to other areas within the UK, the presence of marine mammals is low, the project during construction could cause a collision risk and disturbance to marine mammals through piling, capital dredging and general construction activity including to dolphins and porpoises for which there are added protection. The changes in sediment suspension and contaminants from the sediments could also impact on the marine mammals. We would also point out that even if the threshold of 'significant effect' is not passed so as to require HRA, there may still be impacts that potentially require mitigation and the ES should also consider this. We would also draw your attention to the point made above in relation to ship movements and SO2 emissions given an increase in such movements downstream as a result of Tilbury2 may also have implications that need to be taken into consideration. The Zoological Society London (ZSL) is working to ensure that important life stages of fish species and their habitats are protected in the Tidal Thames. With this aim they have published a Guidance Document on Conservation of Tidal Thames fish through the Planning Process. This document provides a single point of reference to Developers, Planners, Biodiversity Officers	Assessment will consider presence/absence of priority habitats, such as saltmarsh, and an estimation of loss of habitat (if any) from the baseline scenario. The footprint of the proposals during operation is small in terms of loss of habitat and feeding areas for fish. Although the proposals are unlikely to cause fragmentation to fish migration routes, mitigation measures such as directional light and timing of dredging activities according to sensitive fish seasons will be implemented. The results from sediment sampling analysis for contaminants will be discussed with MMO, PLA, and EA. This will inform the assessment of impacts to marine mammals in the Marine Ecology chapter of the ES. The ES will take into consideration the Guidance Document on Conservation of Tidal Thames fish through the Planning Process.

Consultee	Summary of comments received relevant to transitional waterbodies (WFD)	Summary of how the issue is being addressed
	and Consultants on how Tidal Thames fish should be considered when planning developments on or beside the river and we recommend this document to the Port of Tilbury. We understand that the Port have been speaking to the fishing industry about their proposals".	
Natural England	"Paragraph 11.2 advises that "ongoing maintenance dredging will be required." Proposed methodology, quantity and frequency of maintenance should be provided so that impacts of this may be properly assessed. Regarding 11.3, where it is stated that "the fate of dredging materials is yet to be determined," Natural England would encourage the beneficial re-use of sediments. The quantity of dredge material anticipated should also be provided. Paragraph 11.5 – Natural England welcomes the proposed data collection and surveys for the marine environment which will provide evidence to support conclusions made. Natural England will be able to provide further comments once the Environmental Statement has been updated following the survey results. Table 11.1: Marine and Coastal Access Act - Natural England welcomes the inclusion of the Thames Estuary recommended Marine Conservation Zone (rMCZ) and the separate Marine Conservation Zone (MCZ) assessment provided particularly the information on smelt as a migratory feature of the rMCZ. We note that the applicants have used information as provided in the Thames Estuary rMCZ factsheet available on the Wildlife Trust website. For your information, the former Thames Estuary rMCZ has now been split into two separate sites; the first (Upper) stretches from Richmond Bridge to Battersea Bridge and the second (Lower) stretches from The Queen Elizabeth II Bridge to Columbia Wharf/Grays respectively. The Upper Thames Estuary rMCZ is proposed as it is an important area for Smelt (*Osmerus eperlanus*). The boundary of the lower site, Swanscombe rMCZ, has been determined to fit more closely around records of the tentacled lagoon-worm (*Alkmaria romijni*) for which there is currently considered to be a gap in the ecological network. This information is in draft status only and forms part of our scientific advice on the sites that are under consideration for Tranche 3. Defra will make decisions regarding which sites and which features will go forward to a public consultation. These sites are not currently a material consideration, but the sites and	Potential impacts to recommended MCZ (rMCZ) conservation features will be assessed in the Marine Ecology chapter.

Consultee	Summary of comments received relevant to transitional waterbodies (WFD)	Summary of how the issue is being addressed
Natural England	features that are put forward to consultation will become a material consideration at that stage. The Thames Estuary rMCZ was last consulted on in 2012/13 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/82726/mcz-annex-a3- 121213.pdf". "Please note that the last consultation does not necessarily reflect what will be put forward should the site go to public consultation as part of tranche 3. The features last consulted on are listed below: Broad scale habitats - □ Intertidal sand and muddy sand □ Intertidal mixed sediment □ Subtidal coarse sediment □ Subtidal sand □ Subtidal mud Habitat Features of Conservation Importance (FOCI) □ Sheltered muddy gravels Species FOCI (low mobility) - □ Tentacled lagoon worm (*Alkmaria romijini*). N.B. intertidal mud is a supporting habitat of this species. Species FOCI (high mobility) - □ European eel (Anguilla Anguilla) NB- eel is no longer considered a suitable feature for designation within an MCZ □ Smelt (Osmerus eperlanus) Paragraph 11.35 - Natural England welcomes the proposed survey work for tentacled lagoon to understand whether this protected species is present in the vicinity of the works. We advise that the applicants should demonstrate within the Environmental Statement that the impacts of the proposal are considered for tentacled lagoon worm under both aspects of legislation which protects this species". "Tentacled lagoon worm is a species listed under schedule 5 (9a) of the Wildlife and Countryside Act 1981 (as amended) and protection concerns the habitat of the species, any act that causes habitat disturbance would be considered an offence under this legislation. The applicant must ensure to be compliant with the legislation when carrying out the proposed works. The Marine and Coastal Access Act (2009) concerns the population of the species and therefore the applicants must demonstrate that the conservation objectives for the population of the worm are not hindered by the proposal. We note that this has been provided within the MCZ assessment in Appendix 11A".	The potential impacts to intertidal habitats will be considered In the Biology – Habitats section of the WFD assessment, and in paragraph 1.128 onwards in the Marine Ecology chapter of the ES. The results from intertidal- and subtidal sampling will be taken into account in the ES and this WFD assessment. Assessment will consider presence of protected /rare species e.g. tentacle lagoon worm or lagoon sea slug; and changes to species composition and biotope since last survey (2007-2008).

Consultee	Summary of comments received relevant to transitional waterbodies (WFD)	Summary of how the issue is being addressed
Natural England	"Paragraph 11.27 – Natural England welcomes the proposed additional benthic survey work which will provide evidence to support conclusions made. Natural England will be able to provide further comments once the Environmental Statement has been updated following the survey results". "Table 11.17 – Nustar Jetty. The dredge has been included within the table of cumulative impacts however the jetty extension has not been included. (Marine Management Organisation application reference MLA/2017/00110)".	Projects listed in Table 11.17 of the PEIR will be assessed in the Marine Ecology chapter as part of the cumulative assessment.
Port of London Authority	"Section 5.64 – It is noted marine works will be limited to 7am to 8pm. Depending on the scale of dredging required and suitability of the material, it may be beneficial to carry out dispersive dredging or some piling techniques at certain stages of tide. This does not seem to accord with the rather arbitrary time restrictions. Section 5.77 – There is reference here to dispersal dredging. No other information is provided". "Table 10.43 – This table sates, under 'Cumulative Impacts' that this related to terrestrial ecology, however much of what has been listed relates to dredging activity on the Thames. It is not clear the extent to which the cumulative impacts are being considered geographically and temporally, especially given the reference to Tideway Tunnel in London and the Medway MCZ later in the assessments. Table 11.15 - Most of the regime issues for consideration fall under the Marine Ecology section of the PEIR report and will be subject to hydrodynamic, sedimentological and dredging plume assessments to inform the ES. The scope of these assessments are not clear from the document although some details were previously included in the EIA Scoping report, the PLA haven't yet seen the actual scope of modelling in particular the flow condition scenarios that will be simulated. The potential for vessel induced scour has notionally been considered and while the direct environmental impacts may not be significant, it can have an implication on maintenance. There is evidence from other sites with a similar arrangement that bed material can be scoured from the berth, pushed up underneath the pontoon and then has the potential to limit the depths on approach to the berth. Table 11.17 - The existing dredging regime of the PLA and 3rd parties will be considered in the ES?"	Consultation with MMO, PLA and EA about the sediment contaminants results, and results from the hydrodynamic and sediment modelling study, will determine whether dredging controls will be able to be imposed through the DML, and this will be discussed in the Marine Ecology chapter of the ES. Projects listed in Table 10.43 of the PEIR will be assessed in the Terrestrial Ecology chapter. The EIA will include a hydrodynamic and sediment movement assessment of the proposed marine structures (including moored vessels) (Water Resources chapter appendix 16D). This assessment will determine effects on river flow velocity and sediment infill rates of the pocket berths. The existing dredging regime of the PLA and 3rd parties will be considered in the ES as part of the Marine Ecology chapter of the ES. The limitation on injection dredging is aimed to protect

Consultee	Summary of comments received relevant to transitional waterbodies (WFD)	Summary of how the issue is being addressed
Port of London Authority	"Section 16.68 – There are various embedded mitigation measures which may restrict the dredging technique or its timings without justification. A post dredge monitoring programme is welcomed. Section 16.69 – It is noted that a maintenance dredging plan is to be produced and any recommended mitigation implemented". "Appendix 16B – WFD Scoping for Dredging – It is noted that dredging methodology is likely to combine suction and bucket dredging. It is also noted water injection dredging will not be used during May – July due to Salmon smolt. Further to the comments above, there seems to be very little justification for such restrictive measures".	eel and fish spawning season, by protecting the water column (and fish) at a time when dissolved oxygen may be low, and subject to further crashes, if storm sewage enters from upriver. However, the dredging method is still to be determined following further assessment.

Table 1-7: Summary of comments received during the public consultation related to terrestrial water bodies and the WFD

Consultee	Summary of comments received relevant to terrestrial waterbodies (WFD)	Summary of how issue is being addressed
Comments received in response to the PEIR (*July/August 2017)*		
Environment Agency	**Works to Main Rivers** "The applicant is giving careful thought to the design of the road crossings, such as using open span bridges, and avoiding culverting unless absolutely necessary. We welcome this amendment to the plans. We would welcome discussions to allow the alignment of Pincocks Trough Sewer between the Tilbury Loop mainline and the southern edge of the approach corridor to be adapted to improve conveyance of water and reduce the number of culverts that require construction". **Water Framework Directive** "Previous guidance sent in response to the Scoping Report (25 April 2017) should be adhered to and followed as best practice. Culverting should be avoided where possible, and only used when there is no reasonable alternative. Implementing clear span bridges is an advisable alternative to avoid any detrimental effects on water bodies, and to avoid unnecessary loss of habitat on a scheme that already proposes a significant impact on biodiversity. Given that both Pincocks Trough (M1) and Chadwell Cross Sewer (M2) currently provide suitable habitat for aquatic macrophytes and macroinvertebrates, culverting would likely have a predictably negative environmental impact and therefore is not an appropriate course of action". environmental impact and therefore is not an appropriate course of action". "Sections 5.31, 5.83, and 5.86 mention the crossing of water courses, stating that "where necessary, these water courses will be diverted". The clear-spanning and/or diversion of Pincocks Trough is not mentioned in the PEIR chapter on terrestrial ecology, and so it is hard to gauge the effects of this measure. Diverting watercourses should be a last resort, and other options should be fully explored, including appropriate evidence. If necessary, new habitat is required to be of as good a quality as that to be lost, and enhanced where possible. More details are therefore required to ensure that development does not have a net-negative ecological effect and we would be happy to discuss options with you".	Team to engage with the Environment Agency on realignment of Pincocks Trough. Team to engage with the Environment Agency on design constraints/ opportunities on different crossing options. Diverting watercourses will be necessary for the infrastructure corridor. Natural channel design will be specified and channel designed to match any length lost. This will be able to be controlled through the protective provisions for the EA's benefit within the DCO. The loss of ditches and ponds on site will be mitigated against by matching at least the length of ditch lost or area of pond. Fish and eel passage will be

Environment Agency	"The WFD Assessment (Appendix 16.B) states that "the loss of an extensive network of drainage ditches and ponds is likely to result in a significant reduction in aquatic habitat available for biological quality elements, as well as other ecological receptors such as mammals and plants" (1.63). Also, as it states in the same paragraph, "the loss of seven watercourses and two ponds is considered to be significant at the local scale and impacts may potentially also be realised at the regional scale." Therefore, this recourse of aquatic ecosystems and wetland habitats needs to be fully mitigated for, and recreated off-site if there are no on-site compensation opportunities. These must be of at least equal condition to those watercourses being lost, and should be of a nature that there is free fish and eel passage through the ditch network, as per (amongst others) the Eel Regulations (2009)".	retained under any crossing.

Table 1-8: Summary of comments received during the public consultation related to Groundwater under the WFD

Consultee	**Summary of comments received relevant to groundwater bodies (WFD)**	**Summary of how issue is being addressed**
Comments received in response to the PEIR (*July/August 2017)*		
No comments were received that directly addressed impacts to groundwater.		

Table 1-9: Summary of additional stakeholder comments received during the public consultation related to the WFD

Consultee	**Summary of additional comments received relevant to WFD**	**Summary of how issue is being addressed**
Comments received in response to the PEIR (*July/August 2017)*		
Environment Agency	Invasive species "PEIR section 10.214 details the existing INNS identified on site, including Japanese Rose and Wall cotoneaster. Further survey work is required to fully identify the presence and distribution of INNS species on site, especially if material is to leave the site or be significantly moved around the site. This should follow standard guidance measures for identifying, reporting, and managing INNS". Mitigation "Landscaping proposals should demonstrate that thought has been given to maximising potential ecological enhancement. The NPS for ports sets out that planning should seek positive improvements and the applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity. The scheme should aim to move from a net loss of biodiversity to achieving net gains for nature in line with the Natural	Further survey work is being detailed in the ES for Invasive species. The landscape and ecological mitigation will be included in the Figures associated with the Landscape and Visual and Terrestrial Ecology Chapters.

Consultee	Summary of additional comments received relevant to WFD	Summary of how issue is being addressed
	Environment White Paper (2011). The scheme presents an opportunity to provide multi-functional benefits - providing, sustainable transport links, wildlife/ecological value, climate change resilience, improved water quality and flood risk management".	
Essex County Council	**Terrestrial Ecology – Invertebrates** "It is noted that Ports NPS requires development to preserve, protect and where possible improve marine and terrestrial biodiversity. The PEIR states that in paragraph 10.291 this NSIP will aim for minimal or no net loss which will require offsite compensation to meet the standard identified as scoping stage. However, all likely impacts are being assessed and the mitigation hierarchy applied. ECC welcomes confirmation that a shadow HRA will be provided with the DCO submission. Whilst potential impacts on all the relevant Priority (s41) habitats and species are being effectively assessed, there will be a residual loss of habitat as insufficient compensation is being provided and Para 10.45 states that "in time compensation may ameliorate negative effects" on Priority/RDB species. There is also a need to provide confirmation of offsite habitat compensation measures particularly for loss of habitats for invertebrates, recognised as nationally important. These issues require additional consideration to avoid them being included in the Local Impact Report (LIR) and allow the Secretary of State to demonstrate they have met their S40 biodiversity duty. This Council would be keen to see clarification in the Environmental Statement produced relating to Priority s41 Species, which are likely to be present and affected by the development. ECC would expect provision of both a Construction Environment Management Plan (CEMP) and Landscape and Ecological Management Plan (LEMP) to be Requirements of the DCO, and recommend that these documents are drafted before submission".	The loss of habitat is being assessed throughout the site and suitable mitigation will be detailed in the Terrestrial Ecology chapter of the ES. The CEMP will be prepared and the LEMP will be prepared for submission of the DCO application.
Essex County Council		
Natural England	**General comments** "Natural England remains concerned that "there is likely to be a net negative residual effect on the local and wider ecological resource during construction" as stated in paragraph 10.292 of the Preliminary Environmental Information Report (PEIR) and that "in an optimistic scenario" the aspiration is for "something close to a net neutral effect on local and regional biodiversity in perhaps ten or 15 years." Paragraph 3.3.3 of National Planning Statement (NPS) for Ports requires that new development	The loss of habitat is being assessed throughout the site and suitable mitigation will be detailed in the Terrestrial Ecology chapter of the ES.

Consultee	Summary of additional comments received relevant to WFD	Summary of how issue is being addressed
Natural England	should “preserve, protect and where possible improve marine and terrestrial biodiversity” and “provide high standards of protection for the natural environment.” We advise that this paragraphs10.292 and 10.293 should be seeking to achieve an aspiration of net environmental gain”. **Terrestrial Ecology – Invertebrates** “Natural England was directly provided with the “Land Adjacent to Tilbury Power Station, Essex: Invertebrate Survey Report (November 2016)” on the 20th July 2017 and notes that it is still not available on the website for general public viewing. The report confirms the findings of earlier reports; that the site is of high intrinsic importance to invertebrate ecology and forms an integral part of the “wider area of interest that has become known as the East Thames Corridor, within which there is an outstanding community of invertebrates that is of profound national value.” The number and diversity of rare invertebrate species is considerable and I refer to section 5.8 of the 2008 report, which states ‘It is unequivocally clear that Tilbury Power Station supports an invertebrate assemblage that is outstandingly significant at a national (British Isles) level; almost no other site in Britain that has been afforded an equivalent level of appropriate survey supports such a high number of UK Biodiversity Action Plan species.’ The significance of the Thames Terrace Invertebrates is recognised within Natural England’s Thames Estuary and Marshes Focus Area”. “Natural England notes from paragraph 10.281 and our previous DAS meeting that the applicant is keen to identify an offsite solution to compensate for the loss of these high value ecological areas. Whilst Natural England acknowledges that creative solutions may be necessary to achieve sustainable development solutions, we advise that it is important to follow the sequential processes of EIA and IEEM principles to adequately assess the environmental assets and the significance of the impacts on these assets, considering alternatives, avoidance, mitigation and compensation for residual impacts. This would be consistent with paragraph 3.3.3 of the NPS for Ports, which states that new port infrastructure should preserve and protect biodiversity and provide high standards of environmental protection”.	The loss of habitat is being assessed throughout the site and suitable mitigation will be detailed in the Terrestrial Ecology chapter of the ES.

Consultee	Summary of additional comments received relevant to WFD	Summary of how issue is being addressed
	"Paragraph 5.1.14 also advises that the decision-maker should give due consideration to local designations even if they should not be used in themselves to refuse development. Natural England is not yet satisfied of the need to destroy these significant environmental assets. Details of mitigation measures and compensation sites are not yet available. We are aware that the applicant wishes to discuss these with us and will be engaging further in the near future".	
Gravesham Council Gravesham Council	**Terrestrial and Marine Ecology** "The potential impacts that appear to need consideration within the likely significant effects test are: □ Impacts on coastal processes including: Disturbance of contaminated sediments, changes in erosion, deposition, sediment regimes and littoral drift patterns impacting on habitats. Habitat loss through dredging and construction of the project. Changes in these habitats may cause impacts to foraging birds and feeding fish. □ Habitat loss could impact on intertidal and subtidal benthic ecology. The assemblages of species may also be impacted from changes in sediments (deposition, suspension etc.), water quality, introduction of non-native species. Construction of the Project could cause displacement, disturbance and habitat loss impacts on Coastal birds. □ Construction could cause disturbance and mortality on Fish from the vibrations caused by the piling needed for the marine construction elements (para 5.79 explains that "Piling methods are likely to utilise both vibro and percussive techniques for different elements of the proposals"). Lighting, suspended sediment, artificial light, habitat loss could impact on fish including leading to barrier effects to migration. During operation of the project's fish could suffer mortality through being disturbed, loss of habitat and feeding areas and have their migration routes fragmented. □ Whilst it is recognised that, compared to other areas within the UK, the presence of marine mammals is low, the project during construction could cause a collision risk and disturbance to marine mammals through piling, capital dredging and general construction activity including to dolphins and porpoises for which there are added protection. The changes in sediment suspension and contaminants from the sediments could also impact on the marine mammals.	Discussion will continue to assess results from intertidal and subtidal sampling. Assessment will consider presence of protected /rare species e.g. tentacle lagoon worm or lagoon sea slug; and changes to species composition and biotope since last survey (2007-2008). Discussion will continue to assess results from extended Phase 1 intertidal habitat survey. Assessment will consider presence/absence of priority habitats, such as saltmarsh, and an estimation of loss of habitat (if any) from the baseline scenario. The footprint of the scheme during operation is small in terms of loss of habitat and feeding areas for fish. Although the scheme is unlikely to cause fragmentation to fish

Consultee	Summary of additional comments received relevant to WFD	Summary of how issue is being addressed
	We would also point out that even if the threshold of 'significant effect' is not passed so as to require HRA, there may still be impacts that potentially require mitigation and the ES should also consider this. We would also draw your attention to the point made above in relation to ship movements and SO2 emissions given an increase in such movements downstream as a result of Tilbury2 may also have implications that need to be taken into consideration. The Zoological Society London (ZSL) is working to ensure that important life stages of fish species and their habitats are protected in the Tidal Thames. With this aim they have published a Guidance Document on Conservation of Tidal Thames fish through the Planning Process. This document provides a single point of reference to Developers, Planners, Biodiversity Officers and Consultants on how Tidal Thames fish should be considered when planning developments on or beside the river and we recommend this document to the Port of Tilbury. We understand that the Port have been speaking to the fishing industry about their proposals.	migration routes, mitigation measures such as directional light and timing of dredging activities according to sensitive fish seasons will be implemented. Engagement will continue with the MMO, PLA, and EA to discuss results from sediment sampling for contaminants. This will inform assessment of impacts to marine mammals.

1.79 Key aspects that have been scoped in from the PEIR review which will be addressed within the full WFD impact assessment are detailed below.

Transitional Water bodies

- Results from Extended Phase 1 intertidal habitat survey to be taken into account. The assessment has considered presence/absence of priority habitats, such as saltmarsh, and an estimation of loss of habitat (if any) from the baseline scenario.
- Consideration of the guidance: 'Estuary Edges' for assessing impacts to saltmarsh.
- This WFD assessment includes a section on transitional water bodies, following the guidance 'Clearing the Waters for All', as previously done for the PEIR.
- Results from intertidal- and subtidal sampling for benthic fauna have been taken into account.
- The presence/absence of protected/rare species e.g. tentacle lagoon worm or lagoon sea slug; and changes to species composition and biotope since last survey (2007-2008) has been considered within the Marine Ecology chapter of the ES.

- The results from the hydrodynamic and sediment modelling study (e.g. pathways and deposition of material in protected areas) have been used to inform suggested controls on future dredging volumes, techniques and timings which will be able to be implemented through approvals under the DML that forms part of the DCO.

- The ES has taken into consideration the Guidance Document on Conservation of Tidal Thames fish through the Planning Process.

Terrestrial Water bodies

- Assess loss of ditch and pond network against mitigation detailed for these components.

- Assess the realignment of rivers in the infrastructure corridor.

- Review impacts of scheme on fish and eel passage, particularly in relation to channel crossings.

Groundwater Water bodies

- No specific studies to undertake.

WFD IMPACT ASSESSMENT

1.80 This detailed WFD impact assessment focuses on four key areas:

- Potential deterioration in quality elements;
- Ability to achieve Good status;
- Impacts on other water bodies; and
- Mitigation measures necessary to mitigate against any impacts.

These will be assessed with respect to the following water body types: a) Transitional water bodies, b) Terrestrial water bodies and c) Groundwater bodies.

a) Transitional water bodies

1.81 The key characteristics for the Thames Middle and Thames Lower water bodies are summarised in Table 1-10.

Table 1-10: Water bodies key characteristics summary table

Water body		**Middle Thames**	**Lower Thames**
Ecological potential (2015)		Moderate Potential	Moderate Potential
Water body ID		GB530603911402	GB530603911401
Hydromorphological status		Heavily modified	Heavily modified
Protected area designation		Natura 2000, Nitrates, Urban Waste Water	Bathing water, Natura 2000, Nitrates, Shellfish Waters
Status objective		Good by 2027	Good by 2027
Justification if overall objective is not good status by 2015		Disproportionately expensive, Technically infeasible	Disproportionately expensive, Technically infeasible
Water body specific quality elements		**Middle Thames**	**Lower Thames**
Biological Quality	Overall	Moderate	Moderate
	Angiosperms	Moderate	Moderate
	Fish	Good	Good
	Invertebrates	Good	Good
	Macroalgae	Good	High
	Phytoplankton blooms	High	High
Physico Chemical Quality	Overall	Moderate	Moderate
	Dissolved Inorganic Nitrogen	Moderate	Moderate
	Dissolved oxygen	Moderate	High
Hydromorphology Quality	Overall	Not assessed	Not assessed
	Hydrology	-	-
	Morphology	-	-
Specific Pollutants Quality	Overall	Moderate	High
	2-4 dichlorophenol	High	High
	2-4 dichlorophenoxyacetic acid	High	High
	Arsenic	High	High
	Cooper	High	High
	Dimethorate	High	High
	Iron	High	High
	Linuron	High	High
	Mecoprop	High	High
	Permethrin	High	High
	Toluene	High	High
	Un-ionised ammonia	High	High

	Zinc	Moderate	High

1.82 The impact assessment for each receptor identified during the scoping stage as being at risk from the proposed activities, is presented in the following sections.

Hydromorphology

Baseline

1.83 The Thames Middle is a Heavily Modified Water Body (HMWB) for the use of navigation, ports and harbours, coastal protection, and flood protection. Since this water body is heavily modified, it does not have a 'high status' classification for supporting biological elements.

1.84 The river is approximately 1km wide at the location of the proposed works, and its maximal depth at the navigation channel is approximately 14m. The river is wide enough to allow simultaneous bidirectional navigation.

1.85 The proposals will be located on a fairly straight section of the river, where natural water velocity at the bank is on average 0.4-0.8m/s, and 1.4-1.7m/s in the centre of the navigation channel.

1.86 Dredging has been undertaken regularly at Tilbury power station to maintain the berth pocket depth and allow operations during all tidal states for importing coal. Maintenance dredging to a depth of 13.8mCD was undertaken every six months during operation of the power station, mainly by trailer suction hopper dredger.

1.87 At Tilbury, the wave climate is dominated by waves propagating either down the estuary from the west or up the estuary from the east. The most common directions are from the west and southwest which is the direction of the prevailing winds. The largest waves come from the east, as this is the longer fetch and the estuary gradually widens eastward of the Tilbury2 site.

1.88 Wave heights are small, as expected for an enclosed location, with significant wave height of 0.6m. Through numerical modelling, wave heights were predicted to be less than 0.2m approximately 92% of the time. Wave periods are also short, as is typical of waves generated within a restricted fetch and mean periods do not exceed 2.5 seconds.

Construction Impacts

1.89 The obstruction to water flow caused by the jack-up rig, spud leg barges, and ancillary vessels that will be used during construction will cause localised increases and decreases in water velocity. Changes in water velocity can cause accretion and scour in areas adjacent to the plant and structures being constructed.

1.90 However, given the temporary nature of the works, the small water-flow-obstruction posed by the plant and the natural water velocity conditions on the bank of the river (0.4- 0.8 m/s), impacts from construction works to hydromorphology are considered localised, minimal and unlikely to cause significant changes to the morphology of the Thames Middle or Thames Lower water bodies.

Dredging Impacts

Capital dredging:

1.91 Up to 4m of dredging is required at the western berth to reach / attain the target depth; about 7m of dredging is required at the eastern end, adjacent to the existing jetty to reach the target depth.

1.92 Estimates of the dredged volumes required to achieve the target depths are the following (note that these are an approximation only):

- Western Ro-Ro berth pockets: 15,000m^3;
- Eastern bulk berth pocket: 70,000m^3; and
- Dredged approaches: 25,000m^3.

1.93 The dredging of the berth pockets to depths several metres below the natural regime depth will lead to ingress of sediments back into the berth pockets.

1.94 The effects of the proposed marine works were assessed through hydrodynamic modelling, to determine how and to which degree the features would change the river hydrodynamics when compared to the baseline conditions[8].

1.95 Figure 1-5 shows baseline average velocity of water during peak tidal times.

1.96 The changes in average velocity of water after dredging are shown in Figure 1-6 below.

1.97 The complete hydrodynamic and sediment study is available in Appendix 16.D of the ES.

1.98 The assessment shows that the effects of the proposed works are very localised. Within the dredged area, there is a reduction in speed caused by the increased water depth, with the largest magnitude of change being approximately 0.2m/s at the eastern end of the bulk berth dredging. The rest of the modelled speed reductions varied between 0.1-0.2m/s. A very small area of speed increase is seen to the north of the proposed Ro-Ro structure, due to the partial blockage in flow caused by the pontoon.

1.99 There is no effect on the water speed within the authorised navigation channel.

1.100 The hydrodynamic and sediment study concluded that the infill rate of the dredged pockets is expected to be up to 100,000m^3 per annum, and consist mostly of fine silt sediment. Whilst this total is likely to be reduced by vessel occupancy (i.e. by vessel scour through propeller wash and thrusters), regular maintenance dredging is expected to be required, which will need further consideration as is set out below.

[8] HR Wallingford (2017). Port of Tilbury Expansion – Hydrodynamic and sediment study. Appendix 16D

Maintenance dredging:

1.101 The preferred maintenance dredging method was determined following analysis of sediments for contaminants. The use of water injection dredging (WID) was selected as the preferred method for the following reasons: it is cheaper; and it preserves the dredged sediments within the sediment budget system. However, should larger size material accumulate, which is not suitable for removal through WID, an alternative method would be used, comprised most likely of backhoe dredging.

1.102 Morphological changes to the waterbodies arising from the WID are considered negligible, since this method will only remove fine superficial bed material, which will remain in the sediment system. Similarly, morphological changes to the waterbodies caused by backhoe maintenance dredging are considered to be negligible, based on the small volumes which would be removed by this dredging method which would be restricted to move only the material not suitable for WID.

1.103 The wave climate shows very short period waves with 99.9% with a mean period shorter than 2s. Short-period waves are not affected by the bottom unless the water depth is less than 4m, and the wave speed is only reduced by 3% in 2m of water. Therefore, the effect of the dredging on waves can be considered negligible.

Summary of capital and maintenance dredging:

1.104 The hydromorphological and sediment assessment suggests that the dredging works will only have a localised and minor impact upon the Thames Middle and Thames Lower morphology attributes (depth variation; quantity, structure, and substrate of the bed; and structure of the intertidal zone), and they will not have a significant effect on the overall morphology of the Thames Estuary.

1.105 Overall, the proposed capital- and maintenance dredging works are not expected to cause significant impacts to the hydromorphology of the Thames Middle and Thames Lower water bodies. Morphological pressure caused by dredging is not considered to pose a risk for these HMWBs to fail their environmental WFD objectives.

Operational Impacts

1.106 The hydrodynamic model was also run to simulate the presence of moored vessels according to the expected vessel characteristics, to recreate conditions during the operation of the port, as realistically as possible (see Figure 1-7). The results show that the presence of vessels, especially the bulk carrier, created additional blockages to the water flow, resulting in speed reduction extending 500m from the development.

1.107 Conversely, as the water flows around the hull of the vessels, some velocity increases are shown to the north of the ships. The largest increase in speed is associated with the bulk carrier during a flood tide when speed increases in the range of 0.2-0.3m/s, resulting in a total localised increase of 0.6-0.8m/s. However, it should be noted that these effects would also have occurred when the jetty for the Tilbury power station had vessels moored and engaged in unloading operations.

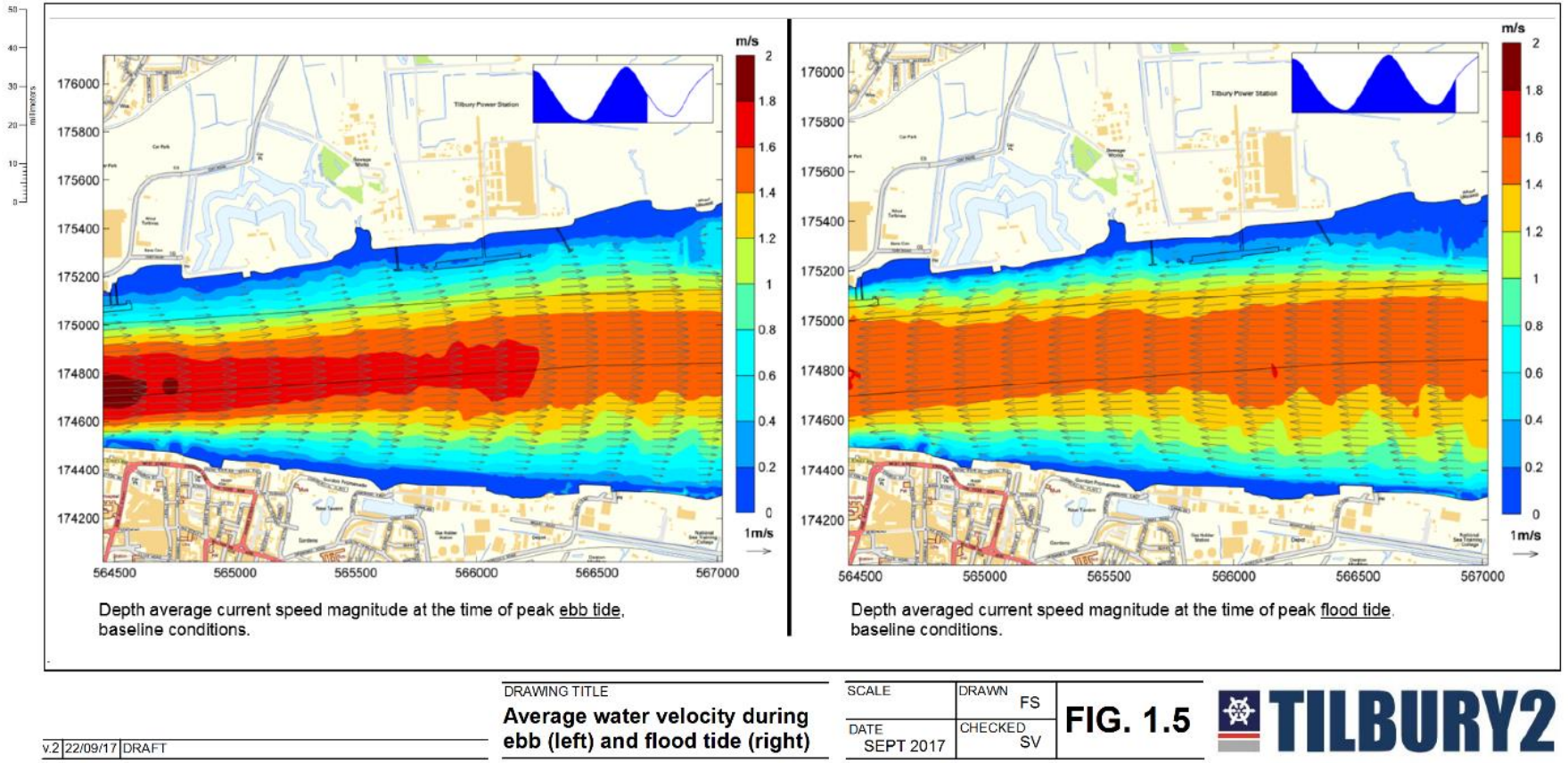

Figure 1-5: (Above) Average water velocity during ebb tide (left) and flood tide (right).

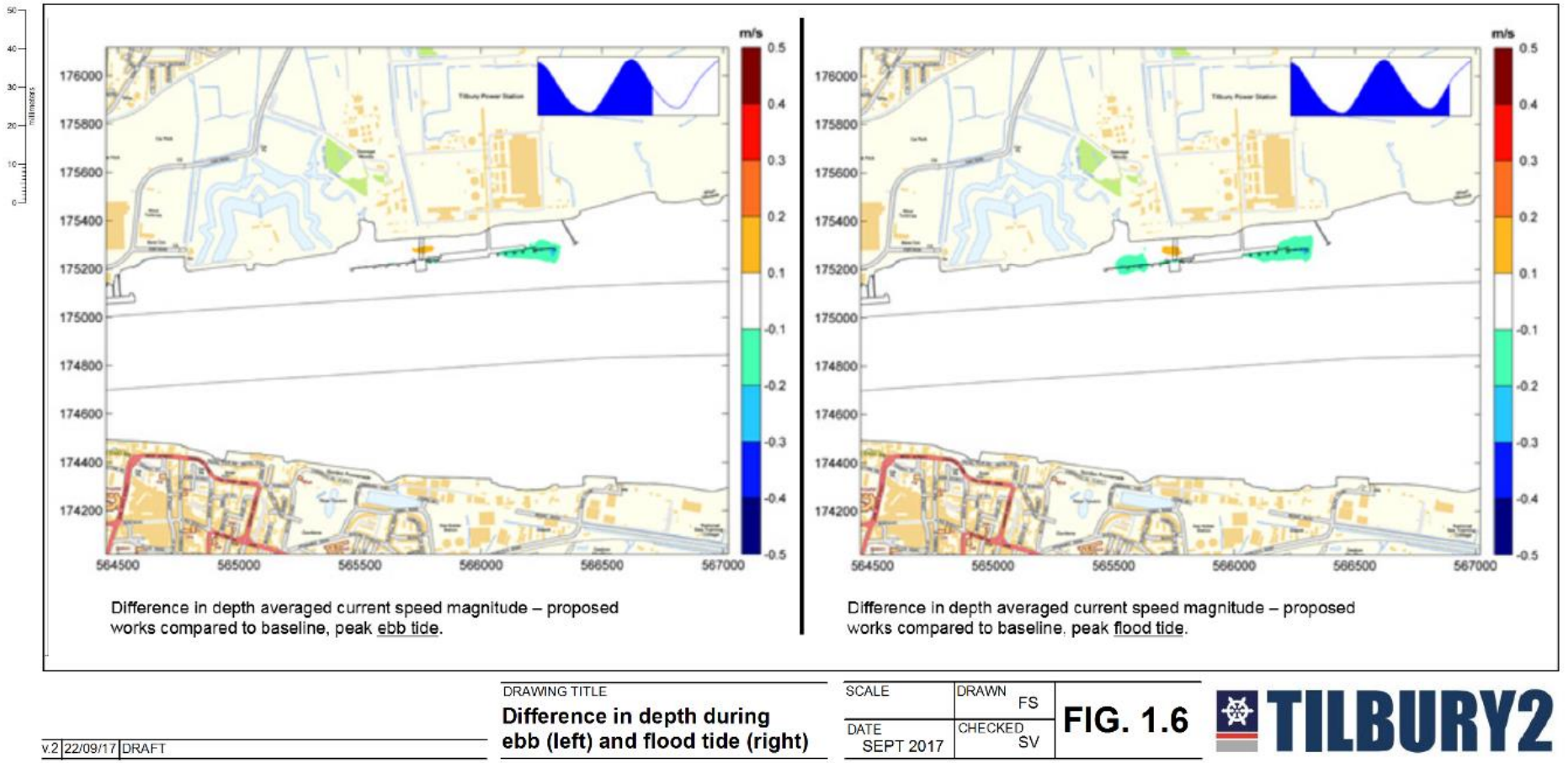

Figure 1-6: (Above) Difference in depth averaged current speed during ebb tide (left) and flood tide (right).

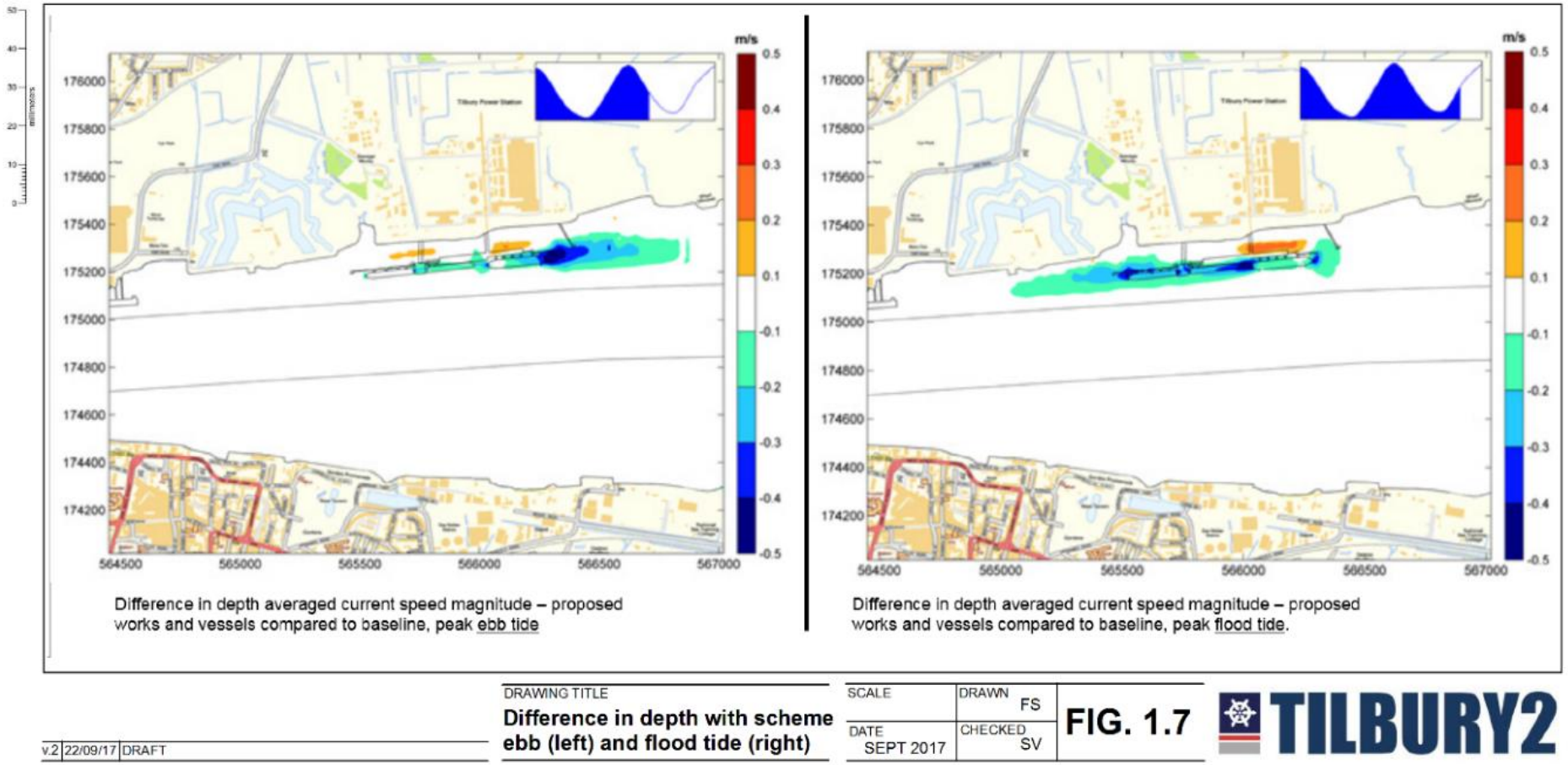

Figure 1-7: Difference in depth averaged current speed during ebb tide (left) and flood tide (right) created by the scheme and moored vessels.

1.108 The mooring dolphins and piles will scatter and dissipate some wave energy but this effect will be localised. The mooring dolphins are spaced out and the existing piled jetty of the power station presents a larger and denser obstacle. The Anglian Water jetty will be removed offsetting some of the obstruction caused to waves by the new dolphins. The proposed structures will not concentrate wave energy so the relatively small impact on the wave climate will not impact the river bank.

1.109 The conclusion is that the impact of the proposed structures on the wave climate will be small, primarily due to the wave climate being typically calm, comprising only small, short period waves; and the structures are mostly open piled and spread out, and present less of an obstacle than the existing power station jetty.

1.110 The hydrodynamic assessment demonstrates that the operation of the proposals, will only have a comparatively small impact upon the river flow condition, as it will not affect the overall hydrodynamic processes, and thus the hydromorphology of the Thames Middle and Thames Lower water bodies.

Biology – habitats

Baseline

1.111 To assess the impact of the construction of the proposed scheme, an extended Phase 1 habitat survey of the intertidal area around the existing and proposed jetty was undertaken on the 1st June 2017. Phase 1 habitat surveys are primarily rapid-mapping techniques to obtain baseline ecological information over a large area of land. For this survey, the technique was modified to provide more detail over a smaller area and give more consideration to fauna. The full Phase 1 habitat study is outlined in Appendix 11.D of the ES.

1.112 It is recognised that subtidal habitats were not covered by this survey. To determine the presence of subtidal WFD priority habitats, a desk-based study of Magic maps was undertaken. This complemented the Phase 1 habitat survey in establishing a baseline of the WFD priority habitats present at the Tilbury2 site.

1.113 Additionally, a subtidal and intertidal sampling survey was undertaken, which identified fauna and sediment particle size, and allowed for the establishment of the biotopes present. Four different biotopes were identified within the intertidal samples, all of which are variations of oligochaete dominated intertidal sediment habitat (i.e. mostly aquatic and terrestrial worms). The identified biotopes are shown in Table 1-11. The full benthic survey report is presented in Appendix 11.B of the ES.

Table 1-11: Biotopes at Tilbury2 identified in 2017 survey

Biotope code	**Biotope**	Sensitivity (Source: MarLIN, 2017)[9]
SS.SMu.SMuVS.PolCvol	***Polydora ciliata* and *Corophium volutator* in variable salinity infralittoral firm mud or clay**	• **Low sensitivity to tidal current changes** • **Not sensitive to contamination** • **Low sensitivity to de-oxygenation** • **Medium sensitivity to extraction of substrate** • **Low sensitivity to changes in suspended sediments** • **Low sensitivity to smothering**[10]
LS.LMu.MEst.HedMac	Hediste diversicolor and Macoma balthica in littoral sandy mud	• Low sensitivity to tidal current changes • Not sensitive to contamination • Not sensitive to de-oxygenation • Medium sensitivity to extraction of substrate • Not sensitive to changes in suspended sediments • Low sensitivity to smothering[11]
LS.LMu.MEst.HedMacScr	Hediste diversicolor, Macoma balthica and Scrobicularia plana in littoral sandy mud	• Low sensitivity to tidal current changes • Not sensitive to contamination • Not sensitive to de-oxygenation • Medium sensitivity to extraction of substrate • Not sensitive to changes in suspended sediments • Low sensitivity to smothering[12]
LS.LMu.UEst.Hed.Ol	*Hediste diversicolor* and oligochaetes in littoral mud	• Medium sensitivity to tidal current changes • Not sensitive to contamination • Not sensitive to de-oxygenation • Medium sensitivity to extraction of substrate • Not sensitive to changes in suspended sediments • Low sensitivity to smothering[13]

[9] MarLIN (2017). The Marine Life Information Network: http://www.marlin.ac.uk/
[10] The Marine Life Information Network (MarLIN) 2017. [online] Accessed August 2017 http://www.marlin.ac.uk/habitats/detail/193
[11] The Marine Life Information Network (MarLIN) 2017. [online] Accessed August 2017 http://www.marlin.ac.uk/habitats/detail/209/hediste_diversicolor_and_macoma_balthica_in_littoral_sandy_mud
[12] The Marine Life Information Network (MarLIN) 2017. [online] Accessed August 2017 http://www.marlin.ac.uk/habitats/detail/331
[13] The Marine Life Information Network (MarLIN) 2017. [online] Accessed August 2017 http://www.marlin.ac.uk/habitats/detail/1135

Biotope code	Biotope	Sensitivity (Source: MarLIN, 2017)[9]
LS.LMu.UEst.Hed.Str	Hediste diversicolor and Streblospio shrubsolii in littoral sandy mud	• Medium sensitivity to tidal current changes • Not sensitive to contamination • Not sensitive to de-oxygenation • Medium sensitivity to extraction of substrate • Not sensitive to changes in suspended sediments • Low sensitivity to smothering[14]

1.114 Angiosperms are considered a biological quality element of the Thames Middle water body, and their condition is 'Moderate'. However, the survey and review on Magic did not identify the presence of this group of plants on the site.

1.115 Phytoplankton and macroalgae are also biological quality elements of the Thames Middle, with 'High' and 'Good' status, respectively.

1.116 However, in spite of the high levels of nutrients present in the water column at the Tilbury2 site, the strong currents and the naturally high levels of turbidity (which obstruct light), result in negligible presence of phytoplankton and macroalgae. The proposed works are not deemed to cause any effect on phytoplankton and macroalgae.

Construction Impacts

1.117 By overlaying the information from the site survey and the desk-based study with the proposals, it was possible to establish which habitats could be affected by the proposed activities, through direct physical loss or shading (see Figure 1-8).

[14] The Marine Life Information Network (MarLIN) 2017. [online] Accessed August 2017 http://www.marlin.ac.uk/habitats/detail/1135

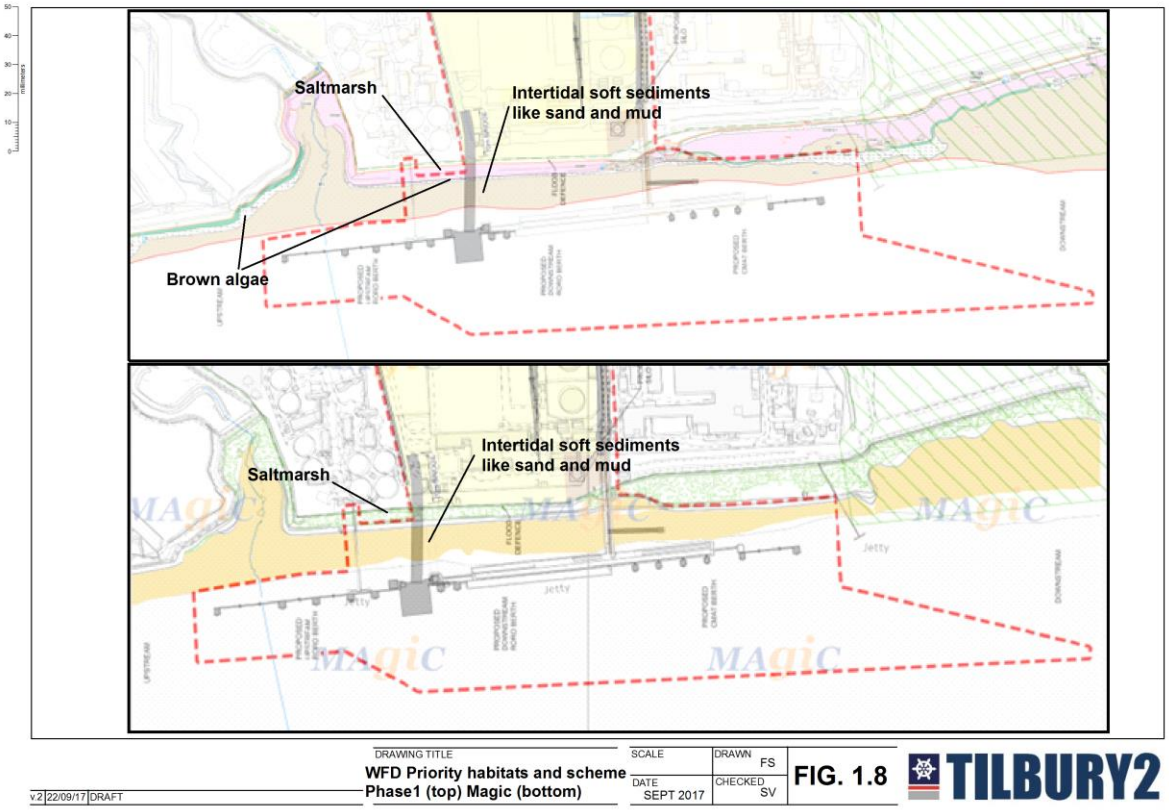

Figure 1-8: WFD priority habitats found during Phase 1 habitat survey (top), during the desk-based study with Magic (bottom), and the proposed development.

1.118 Table 1-12 shows the WFD priority habitats which could be impacted by the proposals through direct physical loss or shading.

Table 1-12: WFD priority habitats and habitats found during Phase 1 habitat survey and desk-based study (Magic, 2017).

Name of WFD priority habitat	Phase 1 habitat survey	Magic
High sensitivity		
Chalk reef		
Clam, cockle and ouster beds		
Intertidal seagrass		
Maerl		
Mussel beds, including blue and horse mussels		
polychaete reef		
saltmarsh	X	X
subtidal kelp beds		
subtidal seagrass		
Low sensitivity		
Cobbles, gravel and shingle		
Intertidal soft sediments like sand and mud	X	X
Rocky shore		
Subtidal boulder fields		
Subtidal rocky reefs		
Subtidal soft sediments		

1.119 The Phase 1 habitat survey found that the new linkspan (pontoon approach bridge) is likely to cause shade on a small stretch of dense saltmarsh, brown algae and intertidal sand and mud. This was confirmed with the Magic desk-study.

1.120 The proposed sheet piling works are taking place in the subtidal area, and have not been identified to take place within any of the WFD sensitive habitats.

1.121 While saltmarsh is a high sensitivity habitat which has experienced significant decline along the Thames, intertidal sand and mud habitats are classed as 'low sensitivity' and are very common on the Thames Lower riverbanks. Brown algae is not considered a priority habitat for WFD purposes, and the area of this habitat which could be impacted by the scheme is extremely small.

1.122 Piling in the intertidal area will result in the direct loss of intertidal sand and mud priority habitat. However, the small amount of permanent loss of this priority habitat (44.5m^2) from piling is offset by the gain in mudflat habitat from the removal of the Anglian Water jetty (384m^2). This results in an overall net gain of this feature.

1.123 The area of saltmarsh covered by the new linkspan and its extended shade is expected to be approximately 0.12ha or 0.09% of the total area covered by saltmarsh in the Thames Middle, and 0.02% of the total area of this habitat in the entire tidal Thames (i.e. the Thames Upper-, Middle, and Lower water bodies combined). Figure 1-9 shows the riverbank where it is planned to build the new linkspan.

Figure 1-9. Approximate location of the new linkspan. View taken from the waterline facing the power station.

1.124 The area of intertidal soft sediments (sand and mud) covered by the linkspan and extended shade is expected to be approximately 0.18ha or 0.02% of the total area covered by saltmarsh in the Thames Middle, and 0.002% of the habitat in the entire Thames waterbodies (Upper-, Middle, and Lower Thames combined).

1.125 The potential loss of saltmarsh habitat due to shading could be considered significant given the rate of decline of this habitat along the Thames. However, the net loss of intertidal habitat caused by the new linkspan, is likely to be offset by the removal of the Anglian Water jetty.

1.126 The off-site compensation planned to minimise against the land take from marshes will include an element of coastal grazing marsh restoration which could facilitate growth of saltmarsh.

1.127 Moreover, saltmarsh has shown to colonise and grow in the shade of bridges, as shown on Figure 1-10, taken at the existing CMAT bridge, and as such it is expected to grow in the shade of the new linkspan bridge.

1.128 The magnitude of effect on priority habitats is therefore minor.

Figure 1-10. Location of saltmarsh under the existing CMAT bridge.

1.129 The biotope assessment shows that the intertidal soft sediment habitats and communities that are present near Tilbury2 are not sensitive to changes in suspended sediment and have a low sensitivity to smothering. This Priority habitat is fed by suspended sediment that moves within the estuary and it is therefore assumed to have a low sensitivity to small increases in suspended sediments or deposition.

1.130 The installation of sheet piles along the northern edge of the dredge pocket, together with the installation of the mooring dolphins, may result in a localised increase in the level of turbidity in the water column which may deposit on the saltmarsh habitat near the works. However, given the nature of the works and the strong tidal currents along the banks, with naturally high levels of turbidity already occurring in the Thames, the impacts from mobilisation of sediments to saltmarsh habitat, and to intertidal soft sediment habitats are considered negligible.

1.131 The benthic communities of the Thames estuary, including invertebrates, are well adapted to living in areas with variable and typically high suspended sediment loads. The intertidal and subtidal habitats and communities that are present near Tilbury2 are not sensitive to changes in suspended sediment, have a low sensitivity to smothering and are not sensitive or have a low sensitivity to de-oxygenation.

1.132 Furthermore, the duration of the turbidity effect will be short-term, lasting only for the duration of each element of the construction works. For each element, this will be in the order of weeks. The magnitude of effect from increases in suspended sediment from the construction works is therefore considered negligible for piling and removal of the Anglian Water jetty, as changes will be undetectable from baseline conditions.

1.133 The proposed works are not expected to cause nutrient enrichment which could affect phytoplankton.

1.134 The piling works could result in physical loss of invertebrates present at the site. The worst case scenario would result in loss of the seabed in the subtidal area of 383.5m^2 and within the intertidal area of 44.5m^2. However, the species identified within the intertidal zone are common species, those typical for the area, without any rare species or species of conservation importance being recorded. The impacts to invertebrates are therefore not likely to result in a significant deterioration of this biological quality element.

Dredging Impacts

1.135 Mobilised sediments from dredging could deposit on the saltmarsh habitat. Similarly, sediments could travel and reach shores used by birds for foraging.

1.136 The results of the modelling (Appendix 16D) show that in the worst case, if WID were to be undertaken continuously throughout all states of the tide, suspended sediment would increase to greater that 20mg/l episodically over an area of up to 15km either side of the dredge area, and maximum increases of up to 200mg/l are limited to within 2km of the dredge area. Relative to background concentrations of 1600mg/l (near bed) and 1300mg/l mid depth for fines and 80mg/l (near bed) and 30mg/l (mid depth) for sand, elevated suspended sediment concentrations are limited to the immediate area of the dredge and minimal when compared to the natural background levels.

1.137 Due to the nature of the WID methodology, the suspended sediment plume is mostly confined to subtidal areas, and will result in limited increases in suspended sediment concentrations or sediment accumulation on the WFD Priority habits located along the intertidal area or along the shores downstream. Due to their methodology, increased suspended sediment resulting from backhoe dredging (and trailer suction hopper dredging if determined to be used) are considered negligible.

1.138 Overall, impacts from dredging to the biological-habitat receptor of the Thames Middle and Thames Lower water bodies are considered negligible.

Operational Impacts

1.139 As with most activities involving cargo vessels, there is a risk of spillage or accidental release of contaminants or pollutants which can impact sensitive habitats.

1.140 A navigational risk assessment was undertaken as part of the ES to minimise the risk of collision and consequential oil spill and other vessel related incidents to an acceptable level. This assessment is presented in Appendix 14.A of the ES.

1.141 In the unlikely case of a spillage, from vessels or land-based facilities, an oil spill contingency plan will be activated, as required by the navigational risk assessment. This is a standard industry procedure for large port facilities, and addresses the risk of spillage of material when loading and unloading, as well as oil and chemical spillage. Forth Ports (of which PoTLL is a part) has similar contingency plans in place for other ports.

1.142 The emergency oil-spill contingency plan will be drafted and presented to the Maritime and Coastguard Agency for their approval prior to operation of Tilbury2.

This plan will describe the procedure to follow in case of an emergency, the equipment available on site to contain and fight the pollution incident, and details of the relevant emergency contacts and oil spill clean-up contractors.

1.143 Given the low sensitivity of the intertidal and subtidal benthic community to contaminants the magnitude of effect from run off and accidental spillage is considered to be negligible.

1.144 The oil spill contingency plan for Tilbury2 will avoid, and mitigate impacts of, accidental spillages of contaminants or pollutants to fish and sensitive habitats. The existence and activation of such a contingency plan reduces the risk to the environment to an acceptable level, making residual risks, to the water bodies minor to negligible.

Biology – fish

Baseline and Methodology

1.145 Several fish species are present in the Thames water bodies. These include Atlantic salmon, allis shad, river lamprey, Anglerfish, bullhead, cod, common goby, mackerel, blue whiting, sand goby, sea trout, sole, European eel, plaice, smelt, herring, raitt's Sandeel, short-snouted seahorse, twaite shad, whiting, skate, and seabass.

1.146 An increase in suspended sediment caused by the works may clog gill filaments of fish, smother or damage eggs in spawning grounds, reduce the ability of fish to find prey, and in extreme cases create a barrier to migration.

1.147 Piling works has the potential to generate noise disturbance to fish. There is potential for noise to be transmitted through the water column and disturb fish migrating though the river, and in extreme cases it can cause physical damage to the fish.

1.148 An underwater noise survey was undertaken to determine the existing levels of noise, and underwater noise modelling was undertaken to estimate the likely level of noise from different construction activities and the distance of propagation under different tidal conditions. The underwater noise survey was undertaken in June/July 2017, and extended for 13 days to include a full tidal cycle. The full underwater noise study is presented in Appendix 17.A of the ES.

1.149 The underwater noise survey and modelling was undertaken to help assess the possible impacts from construction to fish[15].Potential effects from noise to marine mammals are assessed in the Marine Ecology chapter of the ES.

Construction Impacts

1.150 The installation of sheet piles along the northern edge of the dredge pocket, together with the installation of the mooring dolphins, and the removal of the Anglian Water jetty, may result in a localised increase in the level of turbidity in the water column which may affect fish.

[15] Subacoustech Environmental Ltd. (2017). *Monitoring background noise and modelling of construction noise at Tilbury Docks*. Bishop's Waltham. Appendix 17A

1.151 Fish species that live in the Thames estuary, or use it for certain stages of their life, will be adapted to and tolerant of the baseline environmental conditions which include large fluctuations in suspended sediment levels. In addition, fish are mobile species which have the ability to avoid areas of adverse conditions, therefore localised or temporary increases in suspended sediments are unlikely to significantly affect fish populations.

1.152 Given the nature of the works and the strong tidal currents, with naturally high levels of turbidity already occurring in the Thames, the impacts to fish from turbidity during construction are likely to be short term, minor to negligible.

1.153 The piling will cause an intermittent and temporary effect over a short duration (one spawning season) over a relatively small spatial extent.

1.154 Underwater noise modelling results show that piling of the largest piles that may be used for the project (3.5m diameter) could result in recoverable injury within 250m of the noise source and temporary hearing loss up to 3,600m from the noise source. Behavioural effects are anticipated to occur at intermediate ranges (of the order of hundreds of metres from the piling) where at least a moderate risk of behavioural effects exists. Beyond this a low risk exists, although there is a moderate risk for the most sensitive species of fish.

1.155 The width of the Thames at Tilbury2 is approximately 1km, which means that it is sufficiently wide for fish to passage up and down the river while piling is operational, and avoid the area where recoverable injury could occur. The predicted noise range for temporary hearing loss of 3,600m means that fish would not be able to avoid this level of noise while passing the construction works. As such they could suffer a temporary auditory injury if they continued past the works, or halt their passage until the noise has stopped. It is anticipated that piles would take approximately 6-8 hours to install and 1 pile would be installed per day. Further to this, the working hours during construction for noisy activities will be restricted to 08.00 to 18.00 Monday to Friday, and 08.00 to 16.00 on Saturdays and Sundays (as set out in the CEMP) therefore providing a non-piling window of at least 14 hours per day when fish would be able to migrate past Tilbury2 without noise effects. As such, any delay to movement/migration caused by piling noise would only last a few hours and would only occur during the marine piling phase of the works which is anticipated to take approximately 3 months to complete. The embedded mitigation of a daily non-piling window is considered more appropriate than seasonal piling restrictions as key internationally designated species including Atlantic salmon and river lamprey utilise the Thames Estuary year-round.

1.156 As piling will cause an intermittent and temporary effect over a short duration (one spawning season) and a relatively small spatial extent, the magnitude of effect is considered to be low.

1.157 The modelling results for the smaller piles (610mm) show that hearing specialist fish species are expected to experience permanent damage or temporal damage only in very close proximity (<10m) from the piling source, and the range over which behavioural effects would be felt is anticipated to be less than for a 3.5m diameter pile. As such the magnitude of effects is considered to be minor.

1.158 The installation of sheet piles could be undertaken using vibro-piling or percussive piling. Percussive piling of sheet piles has been seen to generate noise levels similar to a small tubular pile (600-800mm). As such, the modelling for the 610mm piles is considered to be a reasonable approximation for the percussive piling of

sheet piles. Noise levels from vibro-piling are expected to be less that for percussive piling. Noise levels would be expected to drop below the prevailing noise levels (140dB re 1 µPa) within 870m of the works. The magnitude of effects from vibro/percussive sheet piling is therefore considered to be minor.

1.159 The increase in marine traffic may result in disturbance to fish populations due to underwater noise and vibration. However, this increase will be localised and temporary during construction, resulting in a negligible impact.

1.160 During construction, the jetty and certain equipment would be lit during hours where there is low visibility. These marine-based construction activities could cause disturbance to fish due to increased visual stimuli from lighting, as fish use light for orientation, prey capture and predator avoidance. The presence of artificial light can cause both attraction and avoidance in fish species. Fish may move towards and aggregate around the light source to increase feeding efficiency or avoid the light source to remain hidden from predators. These potential impacts on behaviour could disrupt the movements of migratory species and delay them from their journey.

1.161 As there is an existing and operational jetty already in place at Tilbury2, which is lit for safety and operational purposes, much of the lighting required for the construction activities is already present and forms part of the existing environment. Any additional temporary light from construction equipment is anticipated to result in a temporary increase in illumination over a localised area. The impact of this on fish species would be limited, as the naturally high turbidity levels of the Thames estuary mean that light does not penetrate very far into the water column. This lighting will include directional luminaires to limit unwanted light spill, and will be directed away from the channel to minimise disturbance to fish. The magnitude of effect of construction lighting on the fish receptor group is therefore considered to be minor.

Dredging Impacts

1.162 The hydrodynamic modelling of WID shows that accumulation depths in the order of 1-2mm are predicted widely in the subtidal channel, and greater accumulations of more that 10mm are predicted only within 5km of the dredge site. The modelling report shows that dredging on the ebb tide only, will significantly reduce the spread of the dredge plume up river. This will be secured under approvals through the DML.

1.163 To prevent impact from low dissolved oxygen to fish and aquatic fauna, resulting from suspended sediments, WID will be undertaken outside the summer months (to be secured through the DML) when flows are at their lowest and water temperatures are at their highest.

1.164 The duration of suspended sediment effects from maintenance dredging through WID will be short term, lasting only a few weeks. The magnitude of effects to fish is therefore considered to be low as increases above background concentrations are localised and temporary.

1.165 The underwater noise associated with backhoe dredging works is anticipated to be similar to a small vessel, and significantly below the levels generated by large vessels underway, such as the ones frequently transiting through the project area. Noise modelling shows that noise levels would be expected to drop below prevailing noise levels (140dB re 1 µPa) within 20m and below the average baseline noise

level within 140m. As such the overall contribution to underwater noise from dredging is expected to be minimal if this method is used and is considered to be of negligible magnitude.

1.166 Noise data is not available for WID, but given that it utilises low pressure water and there are no moving parts in the water it has been assumed that it would generate noise levels similar to suction dredging, and as such this has been used as a proxy. Suction dredging generates higher noise levels than backhoe dredging but is not considered to be a significant contributor to overall noise levels.

1.167 Noise levels from suction dredging (and therefore WID) would be expected to drop to below prevailing noise levels (140dB re 1µPa) within 250m and below average baseline noise within 1,500m. As such the overall contribution to underwater noise from water injection dredging is expected to be minimal, localised and short term and is considered to be of negligible magnitude.

1.168 As such the overall contribution to underwater noise from dredging is expected to be minimal and is considered to be of negligible magnitude for the Thames Middle and Thames Lower water bodies.

1.169 With the implementation of mitigation measures for dredging (i.e. undertake WID outside summer months and during ebb tide only), the overall impact to fish caused by mobilised sediments from dredging is expected to be minor to negligible.

Operational Impacts

1.170 The increase in marine traffic has the potential to result in disturbance to fish populations though underwater noise and vibration. However, this is not expected to result in significant impacts, given that the river Thames is already a very busy environment with traffic passing throughout the day, and fish species would be accustomed to background noise levels.

1.171 The underwater noise survey undertaken confirmed that river traffic would need to double to produce a 3dB increase in average noise levels. Vessel traffic associated with Tilbury2 is expected to increase by 10.5% when in operation, and as such the overall increase in traffic as a result of the use of the jetty is unlikely to result in a measurable increase in average noise level.

1.172 Effects from noise and vibration to fish during operation of Tilbury2 are considered negligible.

Water quality

Baseline

1.173 Whilst the PLA has a responsibility to maintain the navigational fairways, the maintenance dredging of non-harbour-authority-berths and approaches is the responsibility of third party organisations under the regulation of the PLA and MMO. The majority of dredging within the Thames, by volume and frequency, is undertaken using WID. Other areas are maintained using trailer suction hopper dredging, plough dredging and backhoe excavator dredging.

1.174 Maintenance dredging (by the PLA and third party berth operators) occurs throughout the Thames estuary; by volume the outer part of the Inner Estuary sees the most frequent maintenance dredge activity[16].

1.175 The estuary is ebb-dominated downstream of Gravesend and wave heights are relatively small and have less or little influence on the sediment movements[17].

1.176 The Scoping Report submitted for Tilbury2, identified the site of the proposed works as having high turbidity levels, with sediment fluxes in the 1,000s of kg/s. A desk assessment has been undertaken to estimate the likely sediment release rate from the dredging operation and compare that to the natural sediment flux to inform potential impacts to water quality.

1.177 Further dredging has the potential to release historic contaminants into the water column resulting in an impact to water quality. A sediment sampling survey has been carried out to inform the baseline and determine the suitability of the material for dredging and disposal at sea.

1.178 Although the proposed activities do not involve a mixing zone or the release of specific pollutants or hazardous substances through an outfall or point source discharge, the dredging activity could disturb sediments which could contain chemicals.

1.179 Previously, sediment testing for contaminants at the Tilbury power station site was undertaken on a 2-year cycle. The results from 2007 showed slightly elevated concentrations of cadmium and mercury (above Cefas Action Level 1), with an elevated concentration of lead in one sample[18].

1.180 In 2017 sediment samples were collected from eight locations within the project site for the purposes of analysis for particle size and chemical contamination as agreed with the MMO and PLA. At each location, three samples were taken either via bailer (surface sample only, denoted as RBS) or from a borehole (denoted as BH) down to the maximum depth of potential dredging. The samples collected were tested for a suite of contaminants in line with the requirements of The London Convention, London Protocol and the OSPAR Convention. The suite of tests comprised analysis for heavy metals, organotins (TBT/DBT), PAHs and Polychlorinated Biphenyls (PCBs).

1.181 The location and depth of the samples are shown in Figure 1-11 along with the particle size analysis (PSA) results. The results of the latest survey are discussed below with reference to the 2007/2008 samples (as presented in the PEIR document) where relevant.

1.182 The results of the PSA from this survey are comparable to that of 2007 and 2008 which shows that the seabed is characterised by stable sedimentary conditions with generally homogenous soft muds with variable sand content, and very little to no gravel in the first few meters. The only exception to that being sample location No. 8 where samples RBS 08 (0-0.3m) and BH8 (0-0.m) were found to be comprised of

[16] PLA (2014). *Maintenance Dredge Protocol and Water Framework Directive baseline document.* Port of London Authority - Hydrographic Service, Gravesend.
[17] PLA (2009). *Dredging Conservation Assessment for the Thames Estuary.* Port of London Authority - Hydrographic Service, Gravesend.
[18] *Ibid.*

between 30-60% gravel. Below 3-4m, all samples comprised of predominantly gravelly sand or sandy gravel with very little silt content.

1.183 Many metals are essential for life in low concentrations. However, even at moderately elevated levels they can become harmful or even lethal to aquatic life. Several PAHs are highly toxic to aquatic organisms and a number are known to be carcinogenic and mutagenic. Anthropogenic activities represent an important input of PAHs to the environment with the major source being the incomplete combustion of organic materials such as wood, coal and oil.

1.184 In the UK, national Action Levels (ALs) for dredge sediment contamination have been established by Cefas. When applying for a Marine Licence (or deemed Marine Licence) to dredge and/or dispose of dredged material, chemical contamination data are used as part of a 'weight of evidence approach' to establish the suitability of material for dredging and disposal at sea. Results below AL1 are generally considered acceptable for dredging and/or disposal at sea, pending other considerations such as physical suitability for the disposal site and potential beneficial uses. Sediments with contamination levels above AL2 are considered unacceptable for uncontrolled disposal at sea without special handling and containment. Samples between AL1 and AL2 are assessed for suitability on a case by case basis.

1.185 Chemical analysis of the sediment samples collected in 2007-2008 and 2017 are shown in Table 1-13; for the 2017 results, sample RBS08 results are reported separately due to the results being very different to the rest of the samples.

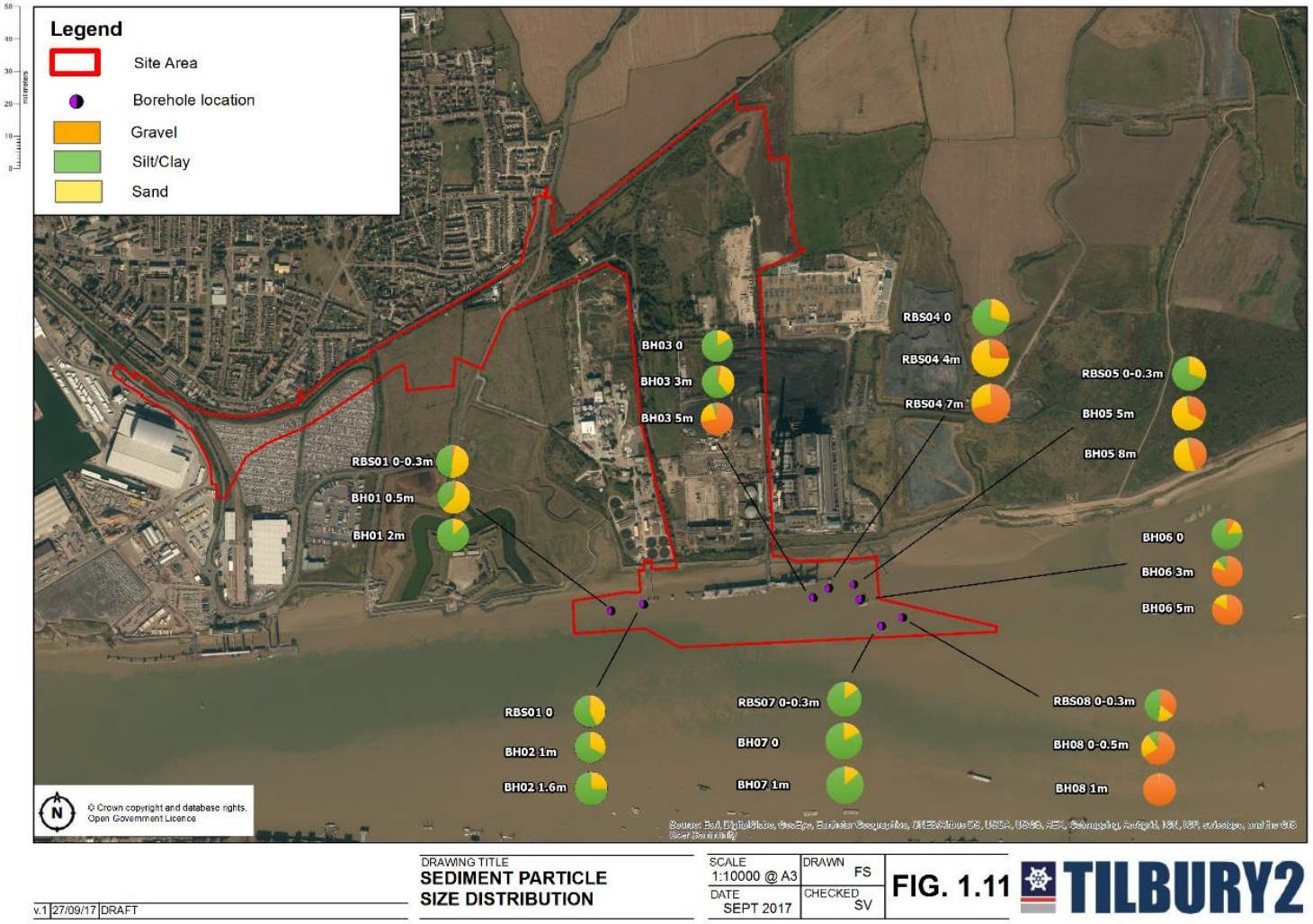

Figure 1-11. Location of samples and particle size.

Table 1-13: Summary of sediment contamination levels 2007/08 and 2017. For 2017 the results for sample RBS08 have been provided separately to the rest of the samples.

Determinant	Abbreviation	Tilbury 2007/2008 survey results range mg/kg	Tilbury 2017 survey result range mg/kg	Tilbury 2017RBS08 result mg/kg	National standard for dredge sediment	
					Cefas AL1 mg/kg	Cefas AL2 mg/kg
Copper	Cu	10-46	1.4-17.1	54.4	40	400
Zinc	Zn	51-146	9.72-114	153	130	800
Lead	Pb	24-89	1.9-36.3	207	50	500
Cadmium	Cd	0.1-0.13	0.01-0.18	0.43	0.4	5
Chromium	Cr	20-49	6.75-80.4	95.9	40	400
Nickel	Ni	9-27	7.91-43.2	48.8	20	200
Arsenic	As	5-10	3.24-33.1	33.7	20	100
Mercury	Hg	0.2-0.65	0.024-0.2	2.97	0.3	3
Polycyclic Aromatic Hydrocarbons	PAH	0.005-0.828	<LOD-2.250	0.124-1.910	0.1	No AL2 available
Polychlorinated Biphenyls	PCB	N/A	<LOD–0.0007	<LOD	0.02	0.2
Organotins	TBT/ DBT	N/A	<LOD–0.003	<LOD	0.1	1

Note: Cells highlighted yellow have results above AL1, cells highlighted orange have results above AL2.

1.186 The results suggest that sediment-bound metal concentrations within the project site are elevated above background levels when compared to a 'clean estuary'. In2007/2008 copper, zinc, lead, chromium, nickel and mercury were all recorded above AL1 at some of the sampling locations. Whereas in the latest sampling (2017), only arsenic, chromium and nickel were found to exceed AL1 values, in all sample sites. The majority of exceedances were noted in the surface samples collected via bailer, or the surface borehole sample. No AL1 exceedances were noted below 3m. AL1 values were exceeded for all heavy metals in sample RBS08.

1.187 Although a number of AL1 exceedances were recorded, all were well below AL2 with the exception of the mercury value recorded at RBS08 (2.97) which is just below AL2. On the whole, the levels of heavy metals observed, whilst elevated, are analogous with historical data for this part of the Thames estuary (*pers comm*. Cefas, 2017) and are comparable with those reported from other industrialised UK estuaries.

1.188 Hydrocarbon levels measured in 2007/2008 showed elevated levels above AL1 of some individual PAHs at most sampling stations. However, the latest sampling showed very few AL1 exceedances were recorded throughout the samples, with the exception of RBS08 where AL1 exceedances for all PAHs were recorded; and for perylene for which exceedances were recorded in 14 of the 23 samples analysed. The highest PAH value recorded was 2.250 mg/kg in sample BH03_3.

1.189 There is no AL2 for PAHs so the levels have been compared to Canadian Sediment Quality Guidelines[19] where possible as guidelines do not exist for all PAHs analysed for. Most notably, there is not a guideline for Perylene. For both datasets, this shows that the PAH results in some cases are greater than the relevant Threshold Effects Level (TEL), where adverse effects might occasionally occur, but do not exceed the Probable Effects Levels (PEL), where adverse effects frequently occur. The only exception to this being RBS08 where the results for Dimethylnaphthalene and Fluoranthene did exceed the PEL.

1.190 Data produced by the National Marine Monitoring Programme between 1999 and2001 reported that total PAHs in UK estuarine and coastal sediments ranged between less than the limit of detection (LOD) to over 200,000µg/kg (200mg/kg). The range for individual PAHs observed in both datasets is comparable with other major UK estuaries, and generally lower than heavily industrialised UK estuaries[20].

1.191 The levels of PAH contamination measured in the Tilbury 2007/2008 and 2017 surveys are comparable to other data for this part of the Thames Estuary (*pers. comm*. Cefas, 2017). The results can therefore be considered to show low to moderate levels of PAH contamination.

1.192 PCBs and TBT/DBTs were not analysed in the 2007/2008 survey, however, they were included in the analysis suite in the 2017 survey. The results for both were on the whole below the LOD for all samples, or very small amounts, well below the relevant AL1.

[19] CCME (2001). Canadian Council of Ministers of the Environment. *Canadian sediment quality guidelines for the protection of aquatic life: Introduction*. Updated. In: Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg.
[20] RWE 2012. Tilbury B Biomass Phase 2 Environmental Statement.

1.193 The degree of resuspension of sediments during the construction works and during dredging activities depends on several factors including the properties of the sediment (size, density and quality of the material); the method of construction/dredging/removal being used; the hydrodynamic regime in the area (current direction and speed, mixing rate, tidal state); and the existing water quality and characteristics (background suspended sediment levels).

1.194 Dredging, the activity that will cause the greatest increases in suspended sediment, has been modelled to predict the magnitude, duration and extent of the dredge plume for both planned dredging techniques: backhoe dredging and WID.

Construction Impacts

1.195 Water quality could be affected by the release of contaminants, which could occur from disturbance of sediment due to piling and removal of the Anglian Water jetty. Contaminants could also be released due to runoff from land and accidental spillage from construction equipment or vessels.

1.196 The results from the sediment sample analysis can be used to assess the potential impacts from sediments released into the water column during construction. The DML also contains a specific sediment sampling condition in relation to construction and maintenance dredging.

1.197 The modelling results for backhoe dredging show that depth averaged concentrations of suspended sediments never exceed 20mg/l which is well below average background concentrations. Given that disturbance of the sediment from construction activities will be minimal it is considered that any release of contaminants into the water column from piling or removal of the Anglian Water jetty would be undetectable from baseline conditions and the magnitude of effect would be negligible.

1.198 Run-off of contaminants from land and accidental spillage during construction will be minimised through embedded mitigation developed through the CEMP including using suitably qualified contractors who are aware of and adhere to industry standard pollution prevention measures, all equipment will be maintained in good working order and refuelling of machinery will be undertaken in suitably bunded areas. Any spillage would be cleaned up quickly and any contaminants released into the estuary would dilute and disperse quickly due to mixing of the water body from river flow and tidal exchange.

1.199 The removal of the jetty and the installation of sheet piles could also increase levels of suspended sediments which can cause changes in a range of water quality parameters including light penetration, turbidity and dissolved oxygen. The resuspension of sediments containing organic material can cause oxygen depletion within the water column.

1.200 Increases in suspended sediments can decrease levels of dissolved oxygen. The response of benthic species to low concentrations of dissolved oxygen is determined by a range of factors, including the duration of exposure, water temperature and the presence of other pollutants. During the summer months when river flows are lower and water temperatures are at their highest, the potential impacts of increased suspended sediment levels on dissolved oxygen concentrations will be at its greatest.

1.201 However, as levels of suspended sediments are within background concentrations, the dissolved oxygen levels are mostly predicted to be within baseline conditions.

1.202 Finally, due to the nature of the construction works and the naturally high levels of turbidity in this area of the Thames, increases in turbidity which may affect water quality are considered negligible.

Dredging Impacts

1.203 The hydrodynamic and sediment study shown in Appendix 16.D of the ES, concluded that given the fine sediment infill characteristics, the site appears to be suitable for the use of water injection dredging, although occasional removal of sandy material accumulating in the berth pockets may also be necessary.

1.204 Given the levels of contaminants found in sampling station No.8, the capital dredging is likely to consist of a combination of backhoe dredging and WID. Backhoe dredging has the advantage that most sediments are captured and can be disposed of at a suitable land site. WID has the advantage that it works with the natural tidal regime and sediments are kept within the natural sediment system, in this case, the river Thames. Dredging using a backhoe excavator will be used at the approach channel, where higher levels of contaminants were found in the sediments (sampling station No.8).

1.205 Backhoe dredging: The relatively small volume of capital dredging required (~110,000 m^3) and the anticipated mix of bed material as shown by the borehole data suggests that a backhoe dredger could be used, working continuously loading material into a fleet of barges. The losses from a backhoe occur as the bucket 'digs' into the riverbed and as the bucket is raised through and above the water column and deposits the material in a barge. Based on experience elsewhere a sediment loss rate of 1kg/s is considered a reasonable worst case. Typical production rates for backhoe dredgers are 10,000-20,000m^3/week assuming a 130-hour working week. This suggests the dredging could be completed within 10 weeks (approximately five spring-neap cycles).

1.206 The modelling results show that depth averaged concentrations of suspended sediments never exceed 20mg/l which is well below average background concentrations.

1.207 Deposition of suspended sediments from backhoe dredging is shown from the modelling to mostly occur within 1.5km of the dredge area. Within this area, the maximum depth of deposition ranges from 100mm in the immediate vicinity of the dredge to none. Outside of this area, deposition thickness is rarely more than 1mm. Net accumulation on the seabed is generally less than 1mm, apart from in the immediate vicinity of the Tilbury2 dredge where accumulation on the seabed at the end of 14 days of dredging is 50 – 100mm.

1.208 The simulation of dispersal of fine material arising from the backhoe dredging is shown in Figure 1-12. The depth averaged concentration never exceeds 20mg/l which compared to the ambient concentrations of up to thousands of mg/l, makes the increase negligible.

1.209 The dredging modelling is shown in Appendix 16.D. of the ES.

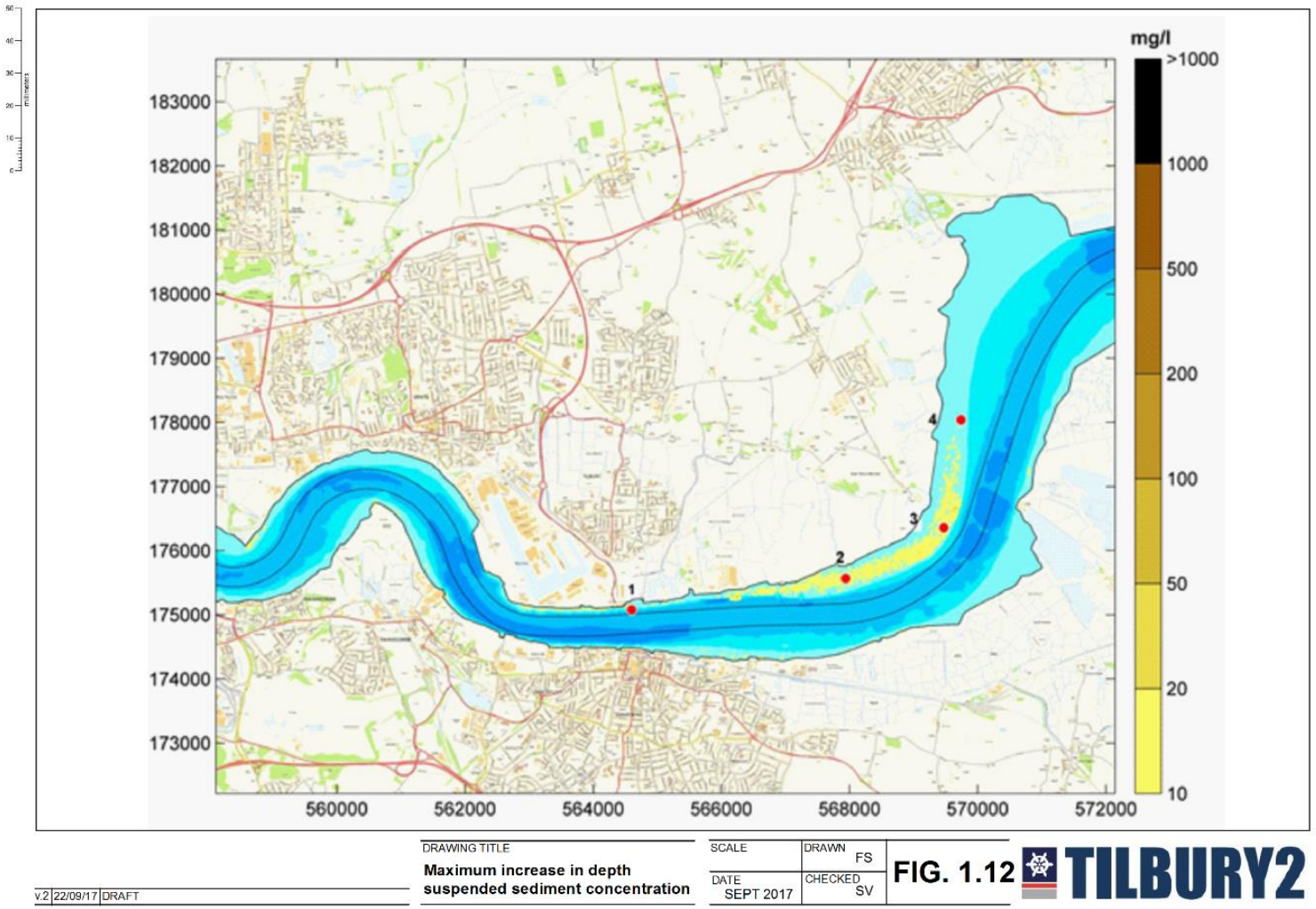

Figure 1-12: Maximum increase in depth average suspended sediment concentration.

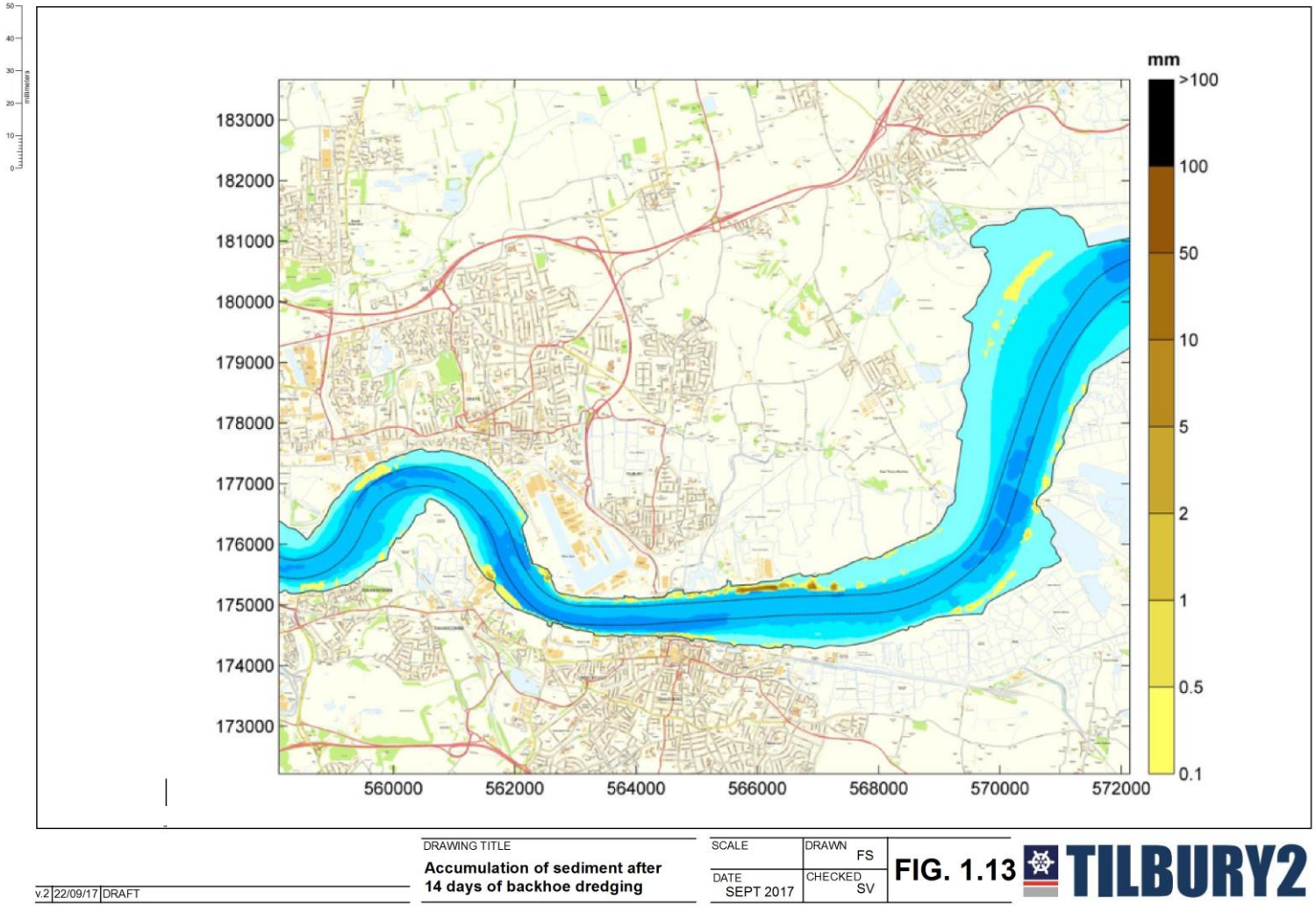

Figure 1-13: Net accumulation of the released sediment at the end of 14 days of backhoe dredging.

1.210 The total accumulation of the sediment released by the backhoe dredger is shown in Figure 1-13. This figure shows the areas where material will settle and remain at the end of 14 days of dredging. The majority of the material released by the dredging is deposited within 1.5km of the dredge; outside of this area deposition thickness is rarely above 1mm.

1.211 Water injection dredging requires large amounts of water to be injected at low pressure into surface seabed sediments. This generates a high-density sediment layer on the seabed, normally up to 1m deep, with the highest density part of the layer being around 0.5m above the bed. The dense liquid layer acts as a fluid and flows over the bed through the action of gravity in the direction of the bed slope encouraged by the tidal movement. The aim of this type of dredging is not to re-suspend sediment within the water column but rather to move sediments from one area to another. Some resuspension of fine sediment fractions can occur using this technique if sediment escapes from the dense near-bed layer (e.g. due to strong tidal currents or a pronounced bed gradient) but overall, dispersion of sediment into the overlying waters and into the far-field tends to be small and more gradual than in more conventional dredging techniques (e.g. trailer suction hopper dredger).

1.212 The modelling of WID assumed a disturbance rate of 113kg/s. This corresponds to release rates for the silt, very fine sand and fine sand fractions as follows: silt: 51kg/s; very fine sand (63-90 µm): 31kg/s; and fine sand (90-125 µm): 31kg/s. WID is only suitable for silty material and therefore the clays and gravels found under the silts would not be removable by WID. These would need to be removed using another technique, such as backhoe, which would have a lower sediment release rate. It is predicted that up to 70,000m^3 of material could be removed through WID, and the modelling of this represents the worst-case scenario.

1.213 The results of the modelling show that in the worst case, if WID were to be undertaken continuously throughout all states of the tide, suspended sediment would increase to greater that 20mg/l episodically over an area of up to 15km either side of the dredge area, and maximum increases of up to 200mg/l are limited to within 2km of the dredge area. Relative to background concentrations of 1600mg/l (near-bed) and 1300mg/l mid depth for fines and 80mg/l (near-bed) and 30mg/l (mid depth) for sand, elevated suspended sediment concentrations are limited to the immediate area of the dredge.

1.214 Due to the WID methodology, the suspended sediment plume is mostly confined to subtidal areas with limited increases in suspended sediment concentrations or sediment accumulation on the intertidal areas.

1.215 The elevated concentrations of mercury, lead, and hydrocarbons found in sampling station No.8 will be prevented from affecting water quality by removing sediments through backhoe dredging. The elevated concentrations for a number of PAHs also recorded in sampling station No.8 may be attributed to localised contamination from coal.

1.216 The concentrations of perylene (PAH) recorded in the 2017 sampling are high and are widespread throughout the sample area. However, sediment concentrations of this magnitude have been reported at other locations. It is also known that perylene exists in sediments from other parts of the Thames at these orders of magnitude.

1.217 Perylene is insoluble and lipophilic. Perylene will remain largely on the sediments and mostly in the silt, clay, organic particulates and lipid factions. The

concentrations of perylene in the sediments are of significantly higher orders of magnitude, than in the water. The distribution and transport of perylene is therefore likely to follow the sediment transport as it is attached to the carbons in the sediments.

1.218 It is expected that the perylene will remain on the sediments due to its physico-chemical properties as mentioned above. The elevated levels of perylene found are unlikely to pose a risk to the environment, given the low solubility properties of this chemical component, and the fact that sediments are likely to remain near the river bed during WID.

1.219 The proposed works do not involve a mixing zone nor a point source discharge which could affect water chemistry.

1.220 The concentrations of chromium, nickel and arsenic in the samples taken in 2017 are slightly above Cefas AL1 in a few locations, but they do not exceed AL2 in any case. It is unlikely that partition of these sediment-bound metals will result in significant increases in metal concentrations, which could lead to values exceeding environmental quality standards and result in a risk to the environment.

1.221 Table 1-14 shows the water quality elements (except Hydromorphology which is discussed in Section 1.81) of the Thames Middle water body and the potential for impact.

Table 1-14: Water quality elements for the Thames Middle and potential for impacts.

Water quality element	Current status	Potential for impact
Physico chemical elements		
Dissolved Oxygen	Moderate	The activities do not involve aeration other than that caused by navigation and the movement of vessels, and these are not anticipated to have any impact on the dissolved oxygen content of the water body. The scale of the works is unlikely to result in significant increases in dissolved oxygen which could impact phytoplankton or angiosperms within the water body. As levels of suspended sediments are within background concentrations, the dissolved oxygen levels are mostly predicted to be within baseline conditions
Dissolved Inorganic Nitrogen	Moderate	The activities do not involve any discharge of wastewater, septic tanks, animal waste or nitrogen prone agents, and are not anticipated to have any impact on the nitrogen content of the water body. The scale of the works is unlikely to result in any increase in dissolved inorganic nitrogen which could impact water quality.
Specific pollutants quality		
2-4 dichlorophenol	High	The activities do not involve the use of herbicides or any other source of this chemical component and are not anticipated to cause any impact to the concentration of this element in the water body.
2-4 dichlorophen-oxyacetic acid	High	The activities do not involve the use of herbicides or any other source of this chemical component and are not anticipated to cause any impact to the

Water quality element	Current status	Potential for impact
		concentration of this element in the water body.
Arsenic	High	The only potential pathway for the works to introduce arsenic into the water body, is by the partition of sediment-bound arsenic molecules. However, the sediment samples taken show that only a few samples had arsenic concentrations above the Cefas AL1. The concentration of this chemical component in the water will depend of the temperature, pH and partition coefficient. The concentration of this pollutant is unlikely to significantly increase overall background concentration downstream, which could cause deterioration of the water body.
Copper	High	The only potential pathway for the works to introduce copper into the water body, is by the partition of sediment-bound copper molecules. However, the sediment samples taken show that copper concentrations are well below the Cefas AL1, and this chemical component is not anticipated to cause any impact to the water body.
Dimethorate	High	The activities do not involve the use of pesticides or any other source of this chemical component and are not anticipated to cause any impact to the concentration of this element in the water body.
Iron	High	Iron could potentially be present in the metal structures of the pontoon, sheet piles, or construction equipment. To minimise the risk of introducing this element into the water the elements will not have exposed rust, but will, where possible, have protective paint coating suitable for water operations. With this mitigation measure in place, it is anticipated that the scheme will not increase the concentration of this element in the water body.
Linuron	High	The activities do not involve the use of herbicides or any other source of this chemical component and are not anticipated to cause any impact to the concentration of this element in the water body.
Mecoprop	High	The activities do not involve the use of herbicides or any other source of this chemical component and are not anticipated to cause any impact to the concentration of this element in the water body.
Permethrin	High	The activities do not involve the use of insecticides or any other source of this chemical component and are not anticipated to cause any impact to the concentration of this element in the water body.
Toluene	High	The activities do not involve the use of any toluene in liquid form. However, it is possible that in situ maintenance of the marine structures may require the use of

Water quality element	Current status	Potential for impact
		paint which could contain toluene. To mitigate against potential impacts, paint suitable for aquatic environments will be used, and spillage absorbent pads will be available. With these mitigation measures in place, the scheme is not anticipated to cause any increase to the concentration of this element in the water body.
Un-ionised ammonia	High	The activities do not involve the use of components with un-ionised ammonia which is mostly attributed to agriculture practices, and is therefore not anticipated to cause any impact to the concentration of this element in the water body.
Zinc	Moderate	The only potential pathway for the works to introduce zinc into the water body, is by the partition of sediment-bound zinc molecules. However, the sediment samples taken show that zinc concentrations are well below the Cefas AL1, and this chemical component is not anticipated to cause any impact to the water body.

1.222 It is anticipated that maintenance dredging will be undertaken by primarily using WID. This is commonly used for maintenance dredging on the tidal Thames. However, it is possible that backhoe dredging is required for removal of larger size sediments which are not suitable for WID.

1.223 Prior to maintenance dredging, chemical analysis of the sediments to be dredged would be required in line with OSPAR requirements to check that levels of contamination are within acceptable limits (as part of a condition of a DML approval). The results would be compared to Cefas AL and local historic data, and only permitted for dredging/disposal if levels of contamination are deemed acceptable. For the purpose of this assessment it has therefore been assumed that the sediment to be dredged during maintenance would be within acceptable limits, and if any material were unsuitable for WID, it would be removed using a technique such as backhoe dredging and disposed of appropriately. The magnitude of effects from the release of contaminants from maintenance dredging on water quality of the Thames Middle and Thames Lower is thus predicted to be minor.

1.224 As mentioned before, the results of the modelling show that in the worst case, if WID were to be undertaken continuously throughout all states of the tide, suspended sediment would increase to greater than 20mg/l episodically over an area of up to 15km either side of the dredge area, and maximum increases of up to 200mg/l are limited to within 2km of the dredge area. Relative to background concentrations of 1600mg/l (near bed) and 1300mg/l mid depth for fines and 80mg/l (near bed) and 30mg/l (mid depth) for sand, elevated suspended sediment concentrations are limited to the immediate area of the dredge and minimal when compared to the natural background levels.

1.225 Given the modelling results for WID, which show maximum increases of sediments to be up to 200mg/l within 2km of the dredge area, and episodically increase to 20mg/l over an area of up to 15km, impacts to turbidity and oxygen levels would be minor.

1.226 As mentioned previously, there will be two conditions for WID which will apply to both capital and maintenance dredging to prevent impacts to water quality: (1) There will be no dredging in the summer months to reduce potential issues of low dissolved oxygen which is exacerbated by warmer water and lower river flow; and (2) WID must be undertaken on the ebb tide only to reduce the spread of the dredge plume upstream and associated sediment deposition.

1.227 Overall, given the natural background conditions, the physical characteristics of the contaminants present in the sediments, the methodologies selected for dredging and their related conditions, it is expected that impacts from dredging to water quality will be minor, and will not cause deterioration in the status of the Thames Middle and Thames Lower water bodies.

Operational impacts

1.228 As with most activities involving cargo vessels, there is a risk of accidental spillages of contaminants or pollutants which can impact water quality. The mitigation measures used to mitigate impacts against habitats and fish, will also be applicable for water quality. This is mainly through the use of oil spill contingency plan (required by the Navigation Risk Assessment secured through the DCO) and adherence to industry best practice regarding site management, and storage of liquids, chemicals, and equipment (as set out in the CEMP and Operational Management Plan (OMP).

1.229 Contaminants could also be released due to run-off from land.

1.230 Run-off of contaminants from land would be managed through the Drainage Strategy which is secured through the DCO. The drainage strategy includes the use of sustainable urban drainage system techniques and where possible routing drainage through ordinary watercourses with swales rather than draining directly into the Thames. Accidental spillage will be minimised through embedded mitigation developed through the CEMP including using industry standard pollution prevention measures and having spill kits available to clean up any spills quickly. Any contaminants that are released into the estuary would dilute and disperse quickly due to mixing of the water body from river flow and tidal exchange. Therefore, any potential effects would be small scale and temporary.

1.231 Impacts to water quality caused by operation of Tilbury2 are therefore expected to be negligible.

Invasive non-native species

Baseline

1.232 INNS can displace native organisms by preying on them or outcompeting them for resources such as for food, space or both. In some cases, this has led to the elimination of indigenous species from certain areas. Occasionally non-native species can reproduce with native species and produce hybrids, which will alter the genetic pool, which is an irreversible change.

1.233 The INNS reported to be present in the tidal Thames include[21, 22, 23]:

- Chinese mitten crab (*Eriocheir sinensis*) – Marine and freshwater
- Asian clam (*Corbicula fluminea*) - Freshwater
- Zebra mussel (*Dreissena polymorpha*) - Freshwater
- Quagga mussel (*Dreissena rostiformis bugensis*) - Freshwater
- Killer Shrimps (*Dikerogammarus villosus* and *haemobaphes*) – Freshwater/brackish water
- Slipper limpet (*Crepidula fornicata*) - Marine
- Carpet sea squirt (*Didemnum vexillum*) – Marine
- Pacific oyster (*Crassostrea gigas*) – Marine and freshwater
- Polychaete (B. ligerica) – Brackish water

1.234 The species reported to be present within the Thames within a 5km radius of Tilbury2 is the Chinese mitten crab[24].Chinese mitten crabs originate from eastern Asia and have been recorded in the Thames estuary since 1935. The most likely pathway for them to have been introduced is in ballast water from shipping. The Thames is affected by the Chinese mitten crab as it is a voracious predator. It also poses a threat to habitats through the burrowing activity of adults, which can lead to the erosion of river banks[25].

Construction Impacts

1.235 The use of vessels, materials and equipment during construction poses the potential risk of introducing and/or spreading of INNS if these vessels and materials have been in other water bodies and have not been treated properly.

1.236 The construction works will adhere to good biosecurity practice, by checking that equipment is clean and dry prior to introduction into the water environment. If any element is found not to be clean during inspection, the item will be washed (away from the river), and checked again before deployment in the water column.

1.237 Further actions to prevent and mitigate impacts from INNS will be detailed in a Biosecurity Plan. This will include a biosecurity risk assessment of the marine construction works at Tilbury2 to assess the potential risk of introducing INNS, and outline a plan of suitable mitigation measures (to be discussed with MMO, EA and Natural England as appropriate). This plan will follow the Natural England Marine Biosecurity Planning Guidance[26]. This is secured in the CEMP for the construction phase.

[21] PLA (2017). *Guidance on Invasive Non-Native Species.* Port of London Authority – Accessed 08/09/2017 at: http://www.pla.co.uk/Environment/Guidance-on-Invasive-Non-Native-Species
[22] Thames21 (2017). Invasive Non-Native Species. Accessed 08/09/2017 at: https://www.thames21.org.uk/non-native-invasive-species/
[23] ZSL (2017). *Thames Invasive Species.* Zoological Society London. Accessed 08/09/2017 at: https://www.zsl.org/conservation/regions/uk-europe/thames-invasive-species
[24] NBN Atlas (2017). National Biodiversity Network – Mitten Crabs.
[25] NNSS (2017). *Chinese Mitten Crab, Eriocheir sinensis.* Non-Native Species Secretariat. Accessed 08/09/2017 at: http://www.nonnativespecies.org/factsheet/index.cfm
[26] Cook, E.J., Macleod, A. Payne, R.D., & Brown, S. (2014). Ed. by Natural England and Natural Resources Wales (2015). Marine Biosecurity Planning – Guidance for producing site and operation-based plans for preventing the introduction and spread of non-native species in England and Wales.

1.238 Applying best practice for mitigating and controlling INNS will reduce the risk of introducing or spreading to an acceptable level, and result in non-significant impact to the Thames Middle and Thames Lower water bodies.

Dredging Impact

1.239 The dredging vessels and equipment used bring the potential risk of introducing and/or spreading INNS, if these vessels and equipment have been in other water bodies and have not been treated properly.

1.240 Chinese mitten crabs have been found to be present within 5km of the Tilbury2 site. This means that it is possible that the seabed near to Tilbury2 is already inhabited by this species. It is therefore possible that Chinese mitten crabs that may already be present at Tilbury could be transported to the offshore disposal site with the dredged material and establish there. However, the process of dredging, transportation and disposal means that a large proportion of individuals may not survive. Those that do survive, are unlikely to find the deeper and more saline conditions at the disposal site suitable to establish as Chinese mitten crabs usually live in burrows in muddy river banks. As such, the magnitude of effects is considered to be minor.

1.241 Applying best practice for mitigating and controlling INNS will reduce the risk of spreading to an acceptable level, and result in non-significant impact to the Thames Middle and Thames Lower water bodies.

Operational Impacts

1.242 During operation of Tilbury2 there is a risk that vessels coming from other waters introduce INNS into the river Thames. As part of the Ballast Water Management Convention, measures to prevent spread of INNS are being implemented at a global level, such as ensuring the exchange of ballast water takes place at high seas only and the gradual fitting of ballast water treatment plants on board of the vessels.

1.243 Vessels should exchange ballast at sea before entering the Thames Lower water body. Further actions to prevent and mitigate impacts from INNS will be detailed in the Biosecurity Plan for maintenance dredging that could be imposed through a condition of the DML.

1.244 The introduction of new hard substrate, and changes in environmental conditions, such as hydrodynamics could lead to the spread of INNS.

1.245 New structures are often colonised by INNS owing to the absence of competition and predation, and their presence can facilitate the establishment and spread of newly introduced INNS. New substrates can also serve as ‘stepping stones’ in an otherwise inhospitable area (e.g. hard structures placed on soft sediment habitats can support the establishment of species associated with hard substrates), which can assist with the expansion of a species distribution. As the Thames is a HMWB that already contains a lot of artificial hard substrate features, it is considered a low risk that the introduction of a small amount of additional hard substrate at Tilbury2 would create a new pathway or stepping stone for INNS. The Tilbury2 jetty utilises the existing structure as much as possible and as such the introduction of new artificial features is minimised. As noted above, a biosecurity risk assessment as part of the biosecurity plan will be undertaken for the operation of Tilbury2 and measures will be put in place to reduce the risk of introducing INNS at the site. As

such, the magnitude of effect for the introduction and spread of INNS from the introduction of new substrate is considered to be minor.

1.246 Changes in physical conditions (such as hydrodynamics) can favour INNS. The hydrodynamic modelling results in Appendix 16.D of the ES, show that the changes during operation will only have an extremely small and local impact on water flow conditions, with effects on current magnitude limited to the area of the development itself. Current speeds will decrease by up to 2m/s in the areas of dredging due toincreased water depth, however most of the site is predicted to have speed reductions in the range 0.1-0.2m/s.

1.247 Modelling of flow conditions with vessels moored at the berths shows that vessels provide additional blockage to the flow resulting in speed reductions in line with the vessels. However, as the jetty is currently operational it is assumed that reduction in current speeds due to vessel presence would already occur at the site, and benthic survey data collected in June 2017 did not identify any INNS. As the changes to physical process from Tilbury2 will be small and localised, and a Biosecurity Plan will be put in place to reduce the potential for introduction and spread of INNS, the magnitude of effect is considered to be minor.

1.248 Applying best practice for mitigating and controlling INNS will reduce the risk of spreading to an acceptable level, and result in non-significant impact to the Thames Middle and Thames Lower water bodies.

Cumulative effects

1.249 The activities listed in Table 1-15 have been considered in conjunction with the proposed development at Tilbury2. These activities are taking place or are planned to take place in the area of Tilbury2. The activities listed are those identified in the Cumulative Impact Assessment Chapter of the ES, and other activities considered relevant for this WFD assessment.

Table 1-15: Activities which could create cumulative effects with the Tilbury2 development.

Activity	Assessment
LRCH – London Resort	Due to the lack of detailed information and having regard to Planning Inspectorate (PINS) guidance on these matters in its Advice Notes 9 and 17, PoTLL have concluded that it is not possible to define the nature of environmental impacts of London Resort and it is not at the present time included as a project within cumulative impact assessment.
Tideway – East Tilbury jetty (Goshems Farm)	Construction and operation of new jetty 1.14km east of Tilbury2. The construction and operation are of a small scale, and do not involve dredging. The risk of this project acting in combination with Tilbury2 to cause adverse impact to the waterbodies is unlikely.
Oikos Storage Proposals	Construction of a new deep water jetty facility and extension to the existing jetty. This development is 14km downriver (east) of Tilbury. An increase in vessel traffic could add to noise disturbance to fish in the river. However, the overall increase in noise/disturbance is considered minimal.
Land adjacent to Tilbury Power Station Fort Road	There are no pathways for this activity to act in combination with the proposed development at Tilbury2.
West Thurrock Biomass CHP (combined heat and power) plant	Waste-wood fuelled combined heat and power station to generate heat and energy from biomass. Assessment of the biomass CHP plant planning application (particularly Drawing No. 1652-01-01 showing the application boundary), it appears that there are no elements in the river environment which could impact on the WFD receptors.

Activity	Assessment
C.Ro Ports Ltd.- Purfleet Deep Wharf	Dredging of the berths and approaches at Purfleet Deep Wharf is undertaken by WID in order to maintain required navigational depths. This dredging has been typically undertaken three to four times per year since 2001. Annual dredging volumes range between 0 – 18,723m^3. Purfleet Deep is located approx. 11kms upstream (west) of Tilbury2 and given the relatively small volume of dredging, cumulative effects are considered minor.
Port of London Authority - Channel maintenance dredging	Ongoing programme of maintenance dredging using WID plough, backhoe, and trailer suction hopper dredger, is undertaken by PLA covering the area between Black Deep in the outer Thames and Richmond Shoal. Quantities and locations vary annually depending on requirements. The volume of material dredged per annum during the period 2004 – 2013 ranged between 1,000m^3 – 81,250m^3. Cumulative effects from this activity with Tilbury2 could be negligible if WID at the channel is undertaken during ebb, and minor if it takes place continuously (including flood) at the same time as Tilbury2 and other dredging activities.
Shell UK - Dredging at Coryton.	Maintenance dredging of the jetty at Coryton is undertaken four times per year using WID, on average once every three months. Up to 61,168 tonnes to be dredged per annum. This activity is 12km downriver (east) of Tilbury2. Cumulative effects from this activity with Tilbury2 could be negligible if WID at Coryton is undertaken during ebb, and minor if it takes place continuously (including flood) at the same time as Tilbury2 and other dredging.
Thames Oilport maintenance dredging	Maintenance dredging at Thames Oilport has been typically achieved by WID however in 2011 trailer suction hopper dredging was used. Dredging is typically undertaken every three months. The volumes dredged per annum between 2004 and 2013 range between 22,748m^3 and 208,025m^3. This activity is 12km downriver (east) of Tilbury2. Cumulative effects from this activity with Tilbury2 could be negligible if WID at Thames Oilport is undertaken during ebb, and minor if it takes place continuously (including flood) at the same time as Tilbury2 and other dredging.
London Gateway Port (LGP) – maintenance dredging	It is also estimated that up to 250,000m^3/year may require dredging from the navigation channel, mostly within Sea Reach. It is anticipated that dredging will be undertaken up to four times per year (i.e. every three months) through a combination of WID and trailer suction hopper dredging. This activity is 8km downriver (east) of Tilbury2. Cumulative effects from this activity with Tilbury2 could be negligible if WID at LGP is undertaken during ebb, and minor if it takes place continuously (including flood) at the same time as Tilbury2 and other dredging activities.

1.250 The proposed activities are unlikely to cause deterioration in the status of the Thames Middle and Thames Lower water bodies when acting in combination with other activities in the area. The activities do not have the scale to cause deterioration and are not programmed to take place at the same time, although there could be some overlap during dredging activities.

1.251 Overlap during dredging may create a cumulative negative effect on fish if maintenance dredging takes place at the same time in all (or most nearby) developments, and during the seasonal fish migration period. To avoid these negative effects, Tilbury2 will join the ongoing coordination of dredging activities in the river Thames and will liaise with the PLA. This will be undertaken through the operation of the protective provisions for the benefit of the PLA contained within the DCO.

Risk of jeopardising WFD measures to prevent status deterioration

1.252 The proposals have also been assessed to established the likelihood of jeopardising the water bodies to achieve their target status.

1.253 Table 1-16 sets out measures or actions to deliver WFD objectives for the water bodies in the vicinity of the proposed works, as indicated in the Thames RBMP. There are no specific actions targeted for the water body of the Thames Middle,

where the development will take place, although there are some actions at a RBMP level that could interact with the proposed works.

1.254 The proposed works are not considered to have an adverse impact on any of the actions set out in Table 1-16 and would not adversely affect the achievement of WFD objectives.

Table 1-16: Actions to deliver WFD objectives in the Thames RBMP.

	Description of the action			
Pressures	**What will happen**	**Where it will happen**	**Date**	**Lead organisation & partners**
Riverside development; waste water, flood risk, river traffic, commerce, fishing.	A misconnections project is being rolled out over 2015-16 targeting the issue of waste water going into the surface water network. The partnership will work with Thames Water to identify the polluted outflows in the Upper and Middle Tidal Thames water bodies. The partnership will engage with volunteers, schools and builders' merchants to deliver sustainable drainage systems (SuDS). The partnership is liaising with the EA's Thames Estuary 2100 project to achieve greater public access and habitat restoration, particularly inter-tidal habitat in the estuary, from any capital works on flood defence. An EU Horizon 2020 bid, worth £0.5 million to the catchment, is in the second stage. It will focus on ecosystem services and suitable mitigation measures for estuaries. It will include intertidal habitat creation, opportunities for vertical or artificial foreshore, and retrofitting of existing structures.	Thames (tidal) catchment	2021	The Your Tidal Thames partnership, EA and PLA.
Acidification; Direct biological pressures; Microbiology; Nutrients; Thames River Basin Organic pollutants; Physical modification; Priority Hazardous Substances, Priority Substances and Specific Pollutants; Sediments (as a direct pollutant)	Where appropriate, subject to the EA carrying out a 12-week public consultation and making an appropriate case to the Secretary of State, designate a limited number of Water Protection Zones (WPZ). Regulatory tool to control diffuse pollution in high risk areas where other mechanisms are not working or are unlikely to work Initially around eight candidate locations across England.	Thames RBMP	2012	EA
Hazardous substances and non-hazardous pollutants; Priority Substances & Specific Pollutants	Local Campaign: Southfleet Pesticide	North Kent Medway Chalk	2015	EA

	Description of the action			
Pressures	**What will happen**	**Where it will happen**	**Date**	**Lead organisation & partners**
Microbiology; Nitrate; Radioactivity; Hazardous substances and non-hazardous pollutants; Priority Substances & Specific Pollutants	Designation of Safeguard Zones - develop pollution action plan to identify specific measures to address known causes of impact on drinking water abstractions leading to failure/risk of failure of WFD Article 7.3 objective.	Basingstoke Chalk; Berkshire Downs Chalk; Burford Jurassic; Chiltern Chalk Scarp; Chipping Norton Jurassic; Dorking North Downs Chalk; Epsom North Downs Chalk; Godalming Lower Greensand; Greenwich Tertiaries; Kent Greensand Middle; Kent Weald Western - Medway; Lower Thames Gravels; Maidenhead Chalk; Mid-Chilterns Chalk; North Kent Medway Chalk; North Kent Swale Chalk; North Kent Tertiaries; South-West Chilterns Chalk; Upper Lee Chalk; Vale of White Horse Chalk; West Kent Darent and Cray Chalk	2010	EA
Microbiology; Nutrients; Organic pollutants; Priority Hazardous Substances, Priority Substances and Specific Pollutants; Sediments (as a direct pollutant)	Influence Town and Country Planning Act authorisation process to help minimise risk of diffuse pollution from new developments (e.g. implement SUDs and use of Water Resource Act Planning Guidance)	Thames RBMP	Implemented	Local Authorities
Physical modification	A central spatially-enabled hydromorphological database will be created, this will provide a system that will quickly and reliably, supply data to better understand hydromorphological impacts of modifications to water bodies. It will be used to provide available hydromorphological data as an input into the approval/assessment processes for new physical modifications to ensure compliance with WFD requirements, especially those related to Article 4(7).	Thames RBMP	2010	EA

	Description of the action			
Pressures	**What will happen**	**Where it will happen**	**Date**	**Lead organisation & partners**
Physical modification	Plans, processes and programmes (such as the EA Navigation and Recreation strategies) will be aligned to the requirements of hydromorphology to achieve WFD objectives (especially ecological potential). This will be twofold: i) Mitigation measures required to reach good ecological potential will be delivered through such plans will be identified; and ii) the prioritisation of environmental improvements will be influenced by the specific requirements to reach WFD objectives.	Thames RBMP	Implemented	EA
Abstraction and other artificial flow pressures	Investigations at sites identified under the Restoring Sustainable Abstraction Programme (where funded)	Thames RBMP	2012	EA
Abstraction and other artificial flow pressures	Review and improve Environmental Flow Indicators	Thames RBMP	2012	EA
Ammonia; Faecal indicator organisms; Hazardous substances and non-hazardous pollutants; Nitrate; Phosphate; Priority Substances & Specific Pollutants	Further investigation - 3D conceptual model of this Chalk groundwater body - Sittingbourne Groundwater Rise Study.	North Kent Swale Chalk	2015	EA
Faecal indicator organisms; Hazardous substances and non-hazardous pollutants; Ammonia; Nitrate; Phosphate; Priority Substances & Specific Pollutants	Improved monitoring in groundwater body.	Kent Greensand Western; Kent Weald Western - Medway; North Kent Tertiaries; West Kent Tertiaries	2012	EA
Hazardous substances and non-hazardous pollutants; Faecal indicator organisms; Nitrate; Ammonia; Phosphate; Priority Substances & Specific Pollutants	Further investigation - 3D conceptual model of Chalk groundwater beneath this groundwater body	North Kent Tertiaries	2015	EA

	Description of the action			
Pressures	**What will happen**	**Where it will happen**	**Date**	**Lead organisation & partners**
Microbiology; Hazardous substances and non-hazardous pollutants; Nitrate; Radioactivity; Priority Substances & Specific Pollutants	Designation of Safeguard Zones - investigation of source-pathway-target linkages to support development of a pollution action plan to identify specific measures	Basingstoke Chalk; Berkshire Downs Chalk; Burford Jurassic; Chiltern Chalk Scarp; Chipping Norton Jurassic; Dorking North Downs Chalk; Epsom North Downs Chalk; Godalming Lower Greensand; Greenwich Tertiaries; Kent Greensand Middle; Kent Weald Western - Medway; Lower Thames Gravels; Maidenhead Chalk; Mid-Chilterns Chalk; North Kent Medway Chalk; North Kent Swale Chalk; North Kent Tertiaries; South-West Chilterns Chalk; Upper Lee Chalk; Vale of White Horse Chalk; West Kent Darent and Cray Chalk	2010	EA
Nitrate; Hazardous substances and non-hazardous pollutants; Faecal indicator organisms; Ammonia; Phosphate; Priority Substances & Specific Pollutants	Ashdown Beds investigation	Kent Weald Western - Medway	2010	EA
Physical modification	Monitoring and investigation into mitigation measures techniques to establish the effectiveness of these measures and improve understanding of hydro-morph-ecological interactions. Outcomes will have a national application.	Thames RBMP	2011	EA
Priority Hazardous Substances, Priority Substances and Specific Pollutants; Organic pollutants; Nutrients	Carry out investigative monitoring and field work into the origins, causes of and solutions to pollution where we need to improve certainty.	Thames RBMP	Implemented	EA

Source: EA, Thames RBMP 2009. Annex C; and EA Thames RBMP 2015 (Update).

Summary of residual impacts

1.255 Construction and maintenance dredging will not cause deterioration of the quality elements or supporting habitats of the water bodies, because of the temporary and short-duration of the effects caused by the activities. The water bodies will recover naturally in a short time without additional mitigation measures.

1.256 To prevent impacts from dredging to fish and water quality, WID will only take place during ebb tides and backhoe dredging will be used to retrieve those sediments with higher level of contaminants, as will be able to be secured through the DML. This will result in negligible residual impacts to the water bodies.

1.257 To prevent impact from low dissolved oxygen to fish and aquatic fauna, WID will be undertaken outside the summer months when flows are at their lowest and water temperatures are at their highest.

1.258 In the Thames Middle, during operation, there is potential risk of introducing or spreading INNS. However, appropriate mitigation measures established through the CEMP and DML will reduce these impacts to an acceptable level which will not compromise the status of the water bodies.

1.259 In the Thames Lower, dredging works have the potential to impact the fish and water quality receptors if dredging at Tilbury2 also takes place at the different jetties near the mouth of the river Thames, identified in the cumulative effects table (Table 1-15). In discharging the protective provisions for the benefit of the PLA, PoTLL will bring the planned activities to the attention of the PLA, who will be to use the information provided to coordinate such dredging with other dredging activities in the Thames.

Conclusion

1.260 The site lies within the Thames RBMP. The proposed development is key national infrastructure and will contribute to the commercial use of the river. The Thames RBMP acknowledges the importance to protect water quality within the water body without precluding the important industrial and urban development functions served by the river.

1.261 Proposed works from Tilbury2, which include construction, dredging and operation, have been assessed against the WFD objectives for the Transitional water bodies: Thames Middle and Thames Lower.

1.262 Against a baseline understanding, the water bodies have been assessed with respect to the following:

- Potential to cause deterioration in any of the WFD quality elements.
- Impact on critical or sensitive habitats or species to cause deterioration.
- Potential to contribute to a cumulative affect alongside additional pressures to cause deterioration.
- Impact on water body improvement measures and the ability to meet WFD objectives.

1.263 The key findings are outlined in Table 1-17.

Table 1-17: Summary of findings –Transitional water bodies

Water body	Parameter	Assessment
Thames Middle	Potential to cause deterioration in WFD quality elements	Based on the assessment of the hydrodynamic modelling, the sediment sampling, underwater noise modelling, site survey, and desk study, the proposed activities will have negligible to minor impact on the water body quality elements, and will not reduce the status of any quality elements, and thus, do not pose a risk for status deterioration.
	Potential to impact on critical or sensitive habitats or species	Yes. The construction of the new linkspan will impact a small area of the sensitive habitat *saltmarsh*. However, negative impacts will be offset by the removal of the Anglian jetty, and are not considered significant.
	Potential to cause cumulative impacts	Yes. In the unlikely case that maintenance dredging takes place at all or at most locations on the Thames at the same time, and within peak fish migration season, this could result in minor impacts to fish and water quality. However, this scenario is considered highly unlikely, partly because of dredging vessel availability. Simple coordination with the PLA (pursuant to their protective provisions) should mitigate against this risk. These cumulative impacts are unlikely to result in water body status deterioration.
	Potential to impact on planned WFD actions and/or mitigation measures	No.
	Need for detailed compliance assessment	No.
Thames Lower	Potential to cause deterioration in WFD quality elements	No.
	Potential to impact on critical or sensitive habitats or species	No.
	Potential to cause cumulative impacts	Yes. In the unlikely event that maintenance dredging takes place at all or at most locations on the Thames at the same time, and within peak fish migration season, this could result in minor to moderate impacts to fish and water quality. However, this scenario is considered highly unlikely, partly because of dredging vessel availability. Simple coordination with the PLA (pursuant to their protective provisions) should mitigate against this risk, and does not require a detailed compliance assessment.
	Potential to impact on planned WFD actions and/or mitigation measures	No.
	Need for detailed compliance assessment	No.

b) Terrestrial water bodies

1.264 There are a variety of water features on the site that will be impacted by the scheme. In the Tilbury2 site, this is primarily as a result of the loss of the ditch and pond network. In the infrastructure corridor, the Main Rivers namely, Tilbury East Dock Sewer, Chadwell Cross Sewer Drain and Pincocks Trough, will all be impacted by the scheme. The predominant impacts are through the additions of culverts for the road and rail corridor. As a result of the culvert installations there is also a need to realign several channels.

Ditch and Pond network

1.265 The ditch and pond network illustrated on Figure 1-2 will all be impacted by the scheme as a result of the large area that will be required for the various facilities.

1.266 From a pond perspective, the impacts will include the loss of the TEEC Pond (P1) (217m^2) and the Gatehouse Pond (P2) (1932m^2) (See Figure 1-2). The Compensation Pond (P3) will remain untouched. The ecological mitigation developed for the scheme (illustrated in Figure 10.13 in the ecology chapter) (the on-going maintenance of which will be secured through the Landscape and Ecological Maintenance and Management Plan, compliance with which is secured through the DCO) shows that the two lost ponds will be replaced by two ponds located in the eastern side of the site to the south-east of the existing Compensation Pond in the area marked proposed open mosaic habitats. The northern pond will have an area of 1941m^2 and the southern pond an area of 876m^2. Therefore, **the pond mitigation will deliver 668m^2 of additional pond area compared to the existing situation.** The Compensation Pond was originally constructed to mitigate against previously proposed extensions on the site which never actually occurred. The pond has developed very successfully in this location and hence it is anticipated that new ponds, once constructed, will likewise evolve good habitat in this open area. It is expected that this would be suitable for water voles as the vegetation establishes.

1.267 The original ditch network was a mixture of both permanently wet and ephemeral systems. Overall, the calculated total ditch loss is 4657m which includes 3015m of wet /seasonal wet and 1642m of dry ditches which are dry most of the time (>90% of the time). The ecological mitigation detailed in Figure 10.13 in the ecology chapter shows the location of the replacement ditches. The total replacement ditch length amounts to 5614m of which 3922m will be wet and 1622m dry. The total length more than compensates for the loss of the original ditch network on site and thus will also provide suitable water vole habitat.

River realignments

1.268 The Main Rivers on site namely Tilbury East Dock Sewer, Chadwell Cross Sewer Drain and Pincocks Trough will all be impacted by the proposals, the details of which are outlined below. The main impacts are through the additions of culverts for the road and rail corridor. The installation of the linear infrastructure features has meant that there is also a need to realign several channels associated with these culvert installations.

1.269 The indicative culvert locations and realignments are illustrated in the culvert location plan in drawing number 5153187/ATK/ZZ/XX/DR/IF/1015 and General arrangement drawing sheet 2 of 2.. The majority of the channel realignments will

occur around the crossing of Fort Road and the infrastructure corridor around culverts 3a, 3b, 4a and 4b. Culvert 3b will replace the existing culvert under Fort Road (Figure 1-14). To the north of this area an unnamed drain will be diverted under the road and rail corridor under culvert 4b and 4a to join Pincocks Trough the other side of culvert 3b. The Pincock Trough is then being diverted in this section to form an improved alignment under culvert 3a as the proposed infrastructure corridor will go over the existing channel. The realignment will re-join the straightened section of Pincocks Trough downstream.

1.270 The total length of realignments (excluding culverts) in the proposed scheme is 210m compared to a total of 190m of channel lost as a result of the changes. **Therefore, there is a slight increase in new channel length gained to that lost.** Natural channel design will be adopted in the design of the new channels wherever possible. Harder bed and banks may be necessary in some places, such as the ditch between the road and rail scheme crossings between culverts 4b and 4a. Hard bank protection will only be considered where there is a potential risk to any asset from erosion or bank instability. The detailed design of such culverts will be approved by the Environment Agency and Thurrock Council (as LLFA) (as appropriate) pursuant to their protective provisions in the DCO.

	Existing culvert under Fort Road which is a small pipe and partially blocked.

Figure 1-14: Photograph showing existing culvert under Fort Road

Impacts on fish and eel passage

1.271 The desire to install clear span bridges and avoid culverting was considered through the design process. However, as a result of the following reasons box-culvert designs have been proposed instead of clear span structures:

i) there is a need to respect the setting of historic assets and limit obtrusive upstanding features which mitigates against the elevation of road and rail infrastructure to enable clear-span crossings of existing watercourses. This issue has been re-iterated as a considerable issue by other consultees. As the whole area is a low-lying and flat landscape this setting is of increasing importance.

ii) additional noise associated with raised infrastructure compared to infrastructure placed at a lower elevation.

1.272 Although full details of culverts will be approved by the Environment Agency and Thurrock Council (as LLFA) (as appropriate) pursuant to their protective provisions in the DCO, for the reasons detailed above PoTLL proposes to proceed to detailed design with r box culverts rather than clear span bridges. This situation actually represents an improvement from the existing culverts/pipes on site as illustrated in Figure 1-15. There will be no increase in the number of culverts on site as a result of the works.

1.273 The potential of ecological impact of selecting box culverts over clear span bridges would be off-set by the installation of mammal passes on both sides of the main culverts (2, 3a and 3b). Culvert 1 is only going to be a culvert extension so it will not be appropriate to install mammal passes on this structure. The culverts will also include an embedment depth (buried invert) to provide natural substrate at the bed of the channel. The box culverts installed will be an improvement to the existing structures which are largely undersized pipes.

1.274 Where it is possible, it is also proposed that light wells will be installed on any new culverts which are greater than 30m in length. The only culvert that is considered to be over this length at the moment in time is culvert number 2 on Chadwell Cross Sewer Drain.

c) Groundwater

1.275 The 2015 WFD survey of the South Essex Thurrock Chalk groundwater body deemed the water body to be at Good status, both for quantity and quality elements. Construction of the new access road and general infrastructure associated with the port and CMAT has the potential to cause deterioration of the groundwater body.

1.276 Scheme components with the potential to impact the groundwater body during the construction phase have been identified:

- Quantitative impacts - Deep foundations (piling) may form a barrier to groundwater flow, potentially reducing groundwater contributions to adjacent water courses and any groundwater abstractions in the water body;
- Qualitative impact - Potential for increased surface runoff from scheme to cause deterioration to water quality of groundwater body if runoff is contaminated; and
- Qualitative impact - Deep foundations may create rapid vertical flow pathways into the groundwater body for potentially contaminated runoff.

1.277 It is assumed that the following measures will be implemented through the CEMP, OMP and the DCO:

- A piling risk assessment in accordance with EA guidance will be undertaken as the design progresses;
- Piling techniques deemed appropriate[27]to identify and manage potential risks as a result of creating pathways to groundwater will be used;

[27] Environment Agency. Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention National Groundwater. 2001.

- Working methods during earthworks and ground stabilisation works to appropriately manage groundwater and surface water, ensuring that there is no run-off from the works, material / waste stockpiles, and storage containers into the aquifer, in accordance with Pollution Prevention Guideline (PPG): Working at Construction and Demolition Sites[28];

- The Site will be operated in accordance with the relevant regulations and best practice guidance in applying Best Available Techniques[29] and pollution prevention[30,31];

- An appropriate pollution incident control will be implemented on Site and any leaks / spills will be identified as soon as possible and dealt with appropriately to prevent aquifer contamination; and

- The drainage system will be designed so that any unplanned spillages can be contained and will not enter the aquifer underlying the Site.

1.278 Introduction of deep foundations may lead to deterioration in local habitats if appropriate local mitigation cannot be identified. This will be analysed further as the design progresses. It is anticipated that methods can be identified that will not cause this deterioration.

[28] Environment Agency (National Archives). [online]. Available from http://webarchive.nationalarchives.gov.uk/20140328084622/http:/www.environment-agency.gov.uk/business/topics/pollution/39083.aspx. August 2016. (N.B. These PPG have).
[29] CIRIA, Publication C736 Containment Systems for the Prevention of Pollution: Secondary, tertiary and other measures for industrial and commercial premises, 2014.
[30] Environment Agency as the Environment Agency no longer provides good practice guidance, however, the guidance within the PPGs are still valid).
[31] Environment Agency, 2013 - Groundwater protection: Principles and practice (GP3) [online]. Accessed May 2017: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/297347/LIT_7660_9a3742.pdf.

CONCLUSIONS

1.279 The WFD impact assessment examined various aspects for Tilbury2. This included:

- an assessment of the likely impacts to the transitional water bodies;
- an assessment of the impacts to more terrestrial water bodies; and
- an assessment of any impacts to the groundwater.

1.280 For each aspect within the WFD assessment an assessment was made on whether there was any potential to cause deterioration in quality elements to the water bodies; whether there was the possibility to help towards the achievement of Good status; whether there was the potential to cause an impact to other water bodies; and, whether there were sufficient mitigation measures developed to mitigate against any impacts identified.

1.281 In the Thames Middle water body the assessment of the hydrodynamic modelling, the sediment sampling, underwater noise modelling, site survey, and desk study all suggest that the proposed activities will have negligible to minor impact on the water body quality elements, and will not reduce the status of any quality elements, and thus, do not pose a risk for status deterioration. The construction of the new linkspan will impact a small area of the sensitive habitat saltmarsh. However, negative impacts will be offset by the removal of the Anglian Water jetty, and are therefore not considered significant. In the unlikely case that extensive maintenance dredging takes place on the Thames at the same time, and within peak fish migration season, this could result in minor impacts to fish and water quality. However, this scenario is considered highly unlikely, partly because of dredging vessel availability. Simple coordination with the PLA (achieved through the operation of their DCO protective provisions) should mitigate against this risk. As a result, cumulative impacts are unlikely to result in water body status deterioration.

1.282 For the Thames Lower water body, there is not considered to be a risk in deterioration in the WFD quality elements or any potential to impact critical or sensitive habitats. In the unlikely event that extensive maintenance dredging takes place on the Thames at the same time, and within peak fish migration season, this could result in minor to moderate impacts to fish and water quality. However, this scenario is considered highly unlikely, partly because dredging vessel availability. Simple coordination with the PLA should mitigate against this risk, and does not require a detailed compliance assessment.

1.283 For the terrestrial water bodies the main impacts were related to the contributing watercourse network as there were no WFD water bodies on the proposed site. This related specifically to the loss of ditch length and two ponds. As a consequence of the mitigation measures proposed there will be an increase in pond area and ditch length which more than compensates for the loss from the development. As a part of the infrastructure corridor there will be a number of channel realignments. The additional length of channel again exceeds that lost, so again there is a greater amount of mitigation provided. In addition, the channels will be designed predominantly without hard protection unless there is a risk to an asset but this is considered only to be appropriate in limited areas. The only other significant impact is on localised culverting associated with the infrastructure corridor. Some culverts are replacement or extensions but there will be some new culverts associated with road or rail crossings. In the larger of the new culverts

mammal passes will be installed to support ecological connectivity. A buried invert will also allow for positioning of a natural bed material and where possible, light wells will be installed on any culverts over 30m in length. Overall the impacts on the terrestrial water bodies are low and considered to be alleviated by the various mitigation measures adopted.

1.284 For groundwater, the potential impacts on the South Essex Thurrock Chalk groundwater body from the scheme were assessed. Assuming works are managed in accordance with the assumptions in paragraph 1.277, no deterioration of the quantitative or qualitative elements of this groundwater body is anticipated. However, this will need to be analysed further as the design progresses.

1.285 In summary, the impacts to terrestrial, transitional and groundwater bodies the impacts from the Tilbury2 development are considered not to cause a deterioration in water body status or critical habitats which are not able to be mitigated against. Thus, overall the Tilbury2 development is considered to be compliant. The WFD assessment will need to be reviewed as the project moves into detailed design phase.

Thames Lower WFD Scoping for activity 1 - Construction
Water Framework Directive assessment: scoping template for activities in estuarine and coastal waters

Use this template to record the findings of the scoping stage of your Water Framework Directive (WFD) assessment for an activity in an estuary or coastal water.

If your activity will:

- take place in or affect more than one water body, complete a template for each water body
- include several different activities or stages as part of a larger project, complete a template for each activity as part of your overall WFD assessment

The WFD assessment guidance for estuarine and coastal waters will help you complete the table.

Your activity	**Description, notes or more information**
Applicant name	Port of Tilbury London Ltd (POTLL)
Application reference number (where applicable)	*Not applicable*
Name of activity	Jetty and Marine construction works
Brief description of activity	CONSTRUCTION To facilitate the use of the jetty for both the RoRo terminal and the Construction Materials and Aggregates Terminal (CMAT), the existing jetty at Tilbury will require modification at both its upstream and downstream arms. *To create a two berth RoRo terminal the upstream works will comprise:* • An approach bridge comprising a three-lane roadway and adjoining footway; • A linkspan bridge connecting the bridge to the floating pontoon; • A floating pontoon; • Erection of a control office on the floating pontoon; • Footway link bridge, linking the floating pontoon to the existing jetty; • Seven mooring dolphins arranged east-west as an extension to the existing jetty connected by a footway link bridge; and • Removal of the existing Anglian Water Authority jetty (not in use). *Downstream works in association with the CMATCMAT will comprise:* • Installation of an extension to the existing conveyor system;

	• Erection of new feed hopper; and • Installation of six mooring dolphins to the front of, and downstream of, the existing jetty. *Berth pockets and approach dredging* Dredge pockets will be created and maintained for the life of the terminal around the improved terminal jetty. In relation to the downstream (CMAT) jetty, the depth of pocket will be circa 15m below chart datum and cater for the largest likely bulk aggregate vessels to visit the site in the future (100,000 tonnes). A sheet piled wall will be installed to run along the northern edge of the dredge pocket.
Location of activity (central point XY coordinates or national grid reference)	*X (Easting) 565929; Y (Northing) 175255; Grid reference: TQ 65929 75255*
Footprint of activity (ha)	23 hectares
Timings of activity (including start and finish dates)	Start works – Q1 2019 Finish works – Q1 2020
Extent of activity (for example size, scale frequency, expected volumes of output or discharge)	See description above. Detailed information is not available at this stage of the project.
Use or release of chemicals (state which ones)	No chemicals are expected to be used.

Water body	Description, notes or more information
WFD water body name	*Thames Lower*
Water body ID	*GB530603911401*
River basin district name	*Thames*
Water body type (estuarine or coastal)	*Estuarine*
Water body total area (ha)	*20103 hectares*
Overall water body status (2015)	*Moderate*
Ecological status	*Moderate*
Chemical status	*Good*
Target water body status and deadline	*Moderate by 2015*
Hydromorphology status of water body	- *(Not available)*
Heavily modified water body and for what use	*Yes, HMWB used for flood protection, navigation, ports and harbours.*
Higher sensitivity habitats present	*Intertidal seagrass 190 (ha); Polychaete reef 275 (ha); Saltmarsh 427 (ha)*
Lower sensitivity habitats present	*Cobbles, gravel and shingle 139 (ha); Intertidal soft sediment 7,777 (ha); rocky shore 0.5 (ha); Subtidal soft sediments 13,017 (ha)*
Phytoplankton status	*High*
History of harmful algae	*Yes*
WFD protected areas within 2km	- *(None)*

Specific risk information

Consider the potential risks of your activity to each of these receptors: hydromorphology, biology (habitats and fish), water quality and protected areas. Also consider invasive non-native species (INNS).

Section 1: Hydromorphology

Consider if hydromorphology is at risk from your activity.

Use the water body summary table to find out the hydromorphology status of the water body, if it is classed as heavily modified and for what use.

Consider if your activity:	Yes	No	Hydromorphology risk issue(s)
May impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status	Requires impact assessment	Impact assessment not required	No. The Thames Lower water body does not have a hydromorphology 'High status'.
May significantly impact the hydromorphology of any water body	Requires impact assessment	Impact assessment not required	No. The activity is unlikely to have a significant impact on the hydromorphology of the water body. Hydrodynamic and sedimentological modelling is being undertaken to confirm this.
Is in a water body that is heavily modified for the same use as your activity	Requires impact assessment	Impact assessment not required	The water body is heavily modified for the use of ports and navigation. However, the construction works are outside the water body and thus unlikely to pose a risk to hydromorphology.

Record the findings for hydromorphology and go to section 2: biology.

Section 2: Biology

Habitats

Consider if habitats are at risk from your activity.

Use the water body summary table and Magic maps, or other sources of information if available, to find the location and size of these habitats.

Higher sensitivity habitats	Lower sensitivity habitats
chalk reef	cobbles, gravel and shingle
clam, cockle and oyster beds	intertidal soft sediments like sand and mud
intertidal seagrass	rocky shore
maerl	subtidal boulder fields
mussel beds, including blue and horse mussel	subtidal rocky reef
polychaete reef	subtidal soft sediments like sand and mud
saltmarsh	
subtidal kelp beds	
subtidal seagrass	

Consider if the footprint of your activity is:	Yes	No	Biology habitats risk issue(s)
0.5km^2 or larger	Yes to one or more – requires impact assessment	No to all – impact assessment not required	The proposals is not located within this water body and has no footprint in this water body which may be above the stated criteria.
1% or more of the water body's area			
Within 500m of any higher sensitivity habitat			
1% or more of any lower sensitivity habitat			

Fish

Consider if fish are at risk from your activity, but only if your activity is in an estuary or may affect fish in or entering an estuary.

Consider if your activity:	Yes	No	Biology fish risk issue(s)
Is in an estuary and may affect fish in the estuary, outside the estuary but may delay or prevent fish entering it or may affect fish migrating through the estuary	Continue with questions	Go to next section	No. The small nature and temporary nature of the construction works together with the distance of the proposals to the Thames Lower water body make effects to fish in this water body unlikely.
May impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)	Requires impact assessment	Impact assessment not required	No.
May cause entrainment or impingement of fish	Requires impact assessment	Impact assessment not required	No.

Record the findings for biology habitats and fish and go to section 3: water quality.

Section 3: Water quality

Consider if water quality is at risk from your activity.

Use the water body summary table to find information on phytoplankton status and harmful algae.

Consider if your activity:	Yes	No	Water quality risk issue(s)
May affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)	Requires impact assessment	Impact assessment not required	The localised water turbidity caused by the construction works is unlikely to last longer than a spring neap tidal cycle within this water body.
Is in a water body with a phytoplankton status of moderate, poor or bad	Requires impact assessment	Impact assessment not required	The activity is in a water body with a high phytoplankton status.
Is in a water body with a history of harmful algae	Requires impact assessment	Impact assessment not required	Given the small nature and temporary nature of the works, an increase of harmful algae in the Thames Lower water body is unlikely.

Consider if water quality is at risk from your activity through the use, release or disturbance of chemicals.

If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if:	Yes	No	Water quality risk issue(s)
The chemicals are on the Environmental Quality Standards Directive (EQSD) list	Requires impact assessment	Impact assessment not required	The activity is likely to re-suspend riverbed sediments which may include chemicals from the EQSD list. However, given the distance from the works, these are unlikely to affect the Thames Lower.
It disturbs sediment with contaminants above Cefas Action Level 1	Requires impact assessment	Impact assessment not required	The sediment may contain contaminants above the Cefas Action Level 1. However, the volume of sediments re-suspended by construction works (excluding dredging) are likely to be less than 200 cubic meters and are therefore unlikely to cause a significant impact on the water quality of the Thames Lower.

If your activity has a mixing zone (like a discharge pipeline or outfall) consider if:	Yes	No	Water quality risk issue(s)
The chemicals released are on the Environmental Quality Standards Directive (EQSD) list	Requires impact assessment[5]	Impact assessment not required	No. The activity does not involve a mixing zone.

Record the findings for water quality go on to section 4: WFD protected areas.

Section 4: WFD protected areas

Consider if WFD protected areas are at risk from your activity. These include:

- special areas of conservation (SAC)
- special protection areas (SPA)
- shellfish waters
- bathing waters
- nutrient sensitive areas

Use Magic maps to find information on the location of protected areas in your water body (and adjacent water bodies) within 2km of your activity.

Consider if your activity is:	Yes	No	Protected areas risk issue(s)
Within 2km of any WFD protected area	Requires impact assessment	Impact assessment not required	There are no WFD protected areas within 2km of the proposed works.

Record the findings for WFD protected areas and go to section 5: invasive non-native species.

Section 5: Invasive non-native species (INNS)

Consider if there is a risk your activity may introduce or spread INNS.

Risks of introducing or spreading INNS include:

- materials or equipment that have come from, had use in or travelled through other water bodies
- activities that help spread existing INNS, either within the immediate water body or other water bodies

Consider if your activity may:	Yes	No	INNS risk issue(s)
Introduce or spread INNS	Requires impact assessment	Impact assessment not required	Unlikely. Material will be suitable for the marine environment, or will be treated before introduction in the estuarine environment.

Record the findings for INNS and go to the summary section.

Summary

Summarise the results of scoping here.

Receptor	Potential risk to receptor?	Note the risk issue(s) for impact assessment
Hydromorphology	No	-
Biology: habitats	No	-
Biology: fish	No	-
Water quality	No	-
Protected areas	No	-
Invasive non-native species	No	-

If you haven't identified any receptors at risk during scoping, you don't need to continue to the impact assessment stage and your WFD assessment is complete.

If you've identified one or more receptors at risk during scoping, you should continue to the impact assessment stage.

Include your scoping results in the WFD assessment document you send to your activity's regulator as part of your application for permission to carry out the activity.

Thames Lower WFD Scoping for activity 2 - Dredging
Water Framework Directive assessment: scoping template for activities in estuarine and coastal waters

Use this template to record the findings of the scoping stage of your Water Framework Directive (WFD) assessment for an activity in an estuary or coastal water.

If your activity will:

- take place in or affect more than one water body, complete a template for each water body
- include several different activities or stages as part of a larger project, complete a template for each activity as part of your overall WFD assessment

The WFD assessment guidance for estuarine and coastal waters will help you complete the table.

Your activity	**Description, notes or more information**
Applicant name	Port of Tilbury (POTLL)
Application reference number (where applicable)	*Not applicable*
Name of activity	Dredging of berth pockets
Brief description of activity	DREDGING *Berth pockets and approach dredging* Dredge pockets will be created and maintained for the life of the terminal around the improved terminal jetty. In relation to the downstream (CMAT) jetty, the depth of pocket will be circa 15m below chart datum and cater for the largest likely bulk aggregate vessels to visit the site in the future (100,000 tonnes). *Capital Dredging* It is anticipated that up to 6m depth of material may require removal for the capital dredge. Dredging is likely to be a combination of suction and bucket dredging. Water injection dredging will not be use during the months of May-July, due to impact to Salmon smolts migrating up the river. *Maintenance Dredging - Berth pockets and approach dredging* Maintenance dredging requirements are still being determined.

Location of activity (central point XY coordinates or national grid reference)	*X (Easting) 565929; Y (Northing) 175255; Grid reference: TQ 65929 75255*
Footprint of activity (ha)	No available at this stage of the project.
Timings of activity (including start and finish dates)	Start works – Q1 2019 Finish works – Q1 2150
Extent of activity (for example size, scale frequency, expected volumes of output or discharge)	See description above. Detailed information is not available at this stage.
Use or release of chemicals (state which ones)	No chemicals are expected to be used.

Water body	Description, notes or more information
WFD water body name	*Thames Lower*
Water body ID	*GB530603911401*
River basin district name	*Thames*
Water body type (estuarine or coastal)	*Estuarine*
Water body total area (ha)	*20103 hectares*
Overall water body status (2015)	*Moderate*
Ecological status	*Moderate*
Chemical status	*Good*
Target water body status and deadline	*Moderate by 2015*
Hydromorphology status of water body	- *(Not available)*
Heavily modified water body and for what use	*Yes, HMWB used for flood protection, navigation, ports and harbours.*
Higher sensitivity habitats present	*Intertidal seagrass 190 (ha); Polychaete reef 275 (ha); Saltmarsh 427 (ha)*
Lower sensitivity habitats present	*Cobbles, gravel and shingle 139 (ha); Intertidal soft sediment 7,777 (ha); rocky shore 0.5 (ha); Subtidal soft sediments 13,017 (ha)*
Phytoplankton status	*High*
History of harmful algae	*Yes*
WFD protected areas within 2km	- *(None)*

Specific risk information

Consider the potential risks of your activity to each of these receptors: hydromorphology, biology (habitats and fish), water quality and protected areas. Also consider invasive non-native species (INNS).

Section 1: Hydromorphology

Consider if hydromorphology is at risk from your activity.

Use the water body summary table to find out the hydromorphology status of the water body, if it is classed as heavily modified and for what use.

Consider if your activity:	Yes	No	Hydromorphology risk issue(s)
May impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status	Requires impact assessment	Impact assessment not required	No. The Thames Lower water body does not have a hydromorphology 'High status'.
May significantly impact the hydromorphology of any water body	Requires impact assessment	Impact assessment not required	No. The activity is unlikely to have a significant impact on the hydromorphology of the water body. Hydrodynamic and sedimentological modelling is being undertaken to confirm this.
Is in a water body that is heavily modified for the same use as your activity	Requires impact assessment	Impact assessment not required	The water body is heavily modified for the use of ports and navigation. However, the dredging works are outside the water body, approximately 7km upstream, and are unlikely to pose a risk to hydromorphology of the Thames Lower.

Record the findings for hydromorphology and go to section 2: biology.

Section 2: Biology

Habitats

Consider if habitats are at risk from your activity.

Use the water body summary table and Magic maps, or other sources of information if available, to find the location and size of these habitats.

Higher sensitivity habitats	Lower sensitivity habitats
chalk reef	cobbles, gravel and shingle
clam, cockle and oyster beds	intertidal soft sediments like sand and mud
intertidal seagrass	rocky shore
maerl	subtidal boulder fields
mussel beds, including blue and horse mussel	subtidal rocky reef
polychaete reef	subtidal soft sediments like sand and mud
saltmarsh	
subtidal kelp beds	
subtidal seagrass	

Consider if the footprint of your activity is:	Yes	No	Biology habitats risk issue(s)
0.5km^2 or larger	Yes to one or more – requires impact assessment	No to all – impact assessment not required	The dredging works are not near any high or lower sensitivity habitats of the Thames Lower water body.
1% or more of the water body's area			
Within 500m of any higher sensitivity habitat			
1% or more of any lower sensitivity habitat			

Fish

Consider if fish are at risk from your activity, but only if your activity is in an estuary or may affect fish in or entering an estuary.

Consider if your activity:	Yes	No	Biology fish risk issue(s)
Is in an estuary and may affect fish in the estuary, outside the estuary but may delay or prevent fish entering it or may affect fish migrating through the estuary	Continue with questions	Go to next section	No.
May impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)	Requires impact assessment	Impact assessment not required	The proposed dredging works may affect fish by increasing water turbidity through bed sediment mobilisation (e.g. silt). Sediment modelling is being undertaken which will inform likely silt dispersal patterns which may affect smelt and eels.
May cause entrainment or impingement of fish	Requires impact assessment	Impact assessment not required	No.

Record the findings for biology habitats and fish and go to section 3: water quality.

Section 3: Water quality

Consider if water quality is at risk from your activity.

Use the water body summary table to find information on phytoplankton status and harmful algae.

Consider if your activity:	Yes	No	Water quality risk issue(s)
May affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)	Requires impact assessment	Impact assessment not required	Modelling is being undertaken which will inform likely silt dispersal patterns and if silt may affect water clarity in the Thames Lower water body for a period longer than a spring neap tidal cycle (approximately 14 days).
Is in a water body with a phytoplankton status of moderate, poor or bad	Requires impact assessment	Impact assessment not required	Not applicable, phytoplankton status is high.
Is in a water body with a history of harmful algae	Requires impact assessment	Impact assessment not required	Given the small and temporary nature of the works, an increase of harmful algae in the Thames Lower water body is unlikely.

Consider if water quality is at risk from your activity through the use, release or disturbance of chemicals.

If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if:	Yes	No	Water quality risk issue(s)
The chemicals are on the Environmental Quality Standards Directive (EQSD) list	Requires impact assessment	Impact assessment not required	The activity is likely to re-suspend riverbed sediments which may include chemicals from the EQSD list. However, modelling is being undertaken which will inform about dispersion patterns, extent and duration, to determine if sediments may affect the Thames Lower water body.
It disturbs sediment with contaminants above Cefas Action Level 1	Requires impact assessment	Impact assessment not required	The sediment may contain contaminants above the Cefas Action Level 1. However, modelling is being undertaken which will inform about dispersion patterns, extent and duration, to determine if sediments may affect the Thames Lower water body.

If your activity has a mixing zone (like a discharge pipeline or outfall) consider if:	Yes	No	Water quality risk issue(s)
The chemicals released are on the Environmental Quality Standards Directive (EQSD) list	Requires impact assessment[5]	Impact assessment not required	The dredging may create a temporal mixing zone with riverbed sediments containing chemicals from the EQSD list. However, sediment modelling is being undertaken which will inform about dispersion patterns and duration, to determine if sediments may affect the Thames Lower water body.

Record the findings for water quality go on to section 4: WFD protected areas.

Section 4: WFD protected areas

Consider if WFD protected areas are at risk from your activity. These include:

- special areas of conservation (SAC)
- special protection areas (SPA)
- shellfish waters
- bathing waters
- nutrient sensitive areas

Use Magic maps to find information on the location of protected areas in your water body (and adjacent water bodies) within 2km of your activity.

Consider if your activity is:	Yes	No	Protected areas risk issue(s)
Within 2km of any WFD protected area	Requires impact assessment	Impact assessment not required	There are no WFD protected areas within 2km of the proposed works.

Record the findings for WFD protected areas and go to section 5: invasive non-native species.

Section 5: Invasive non-native species (INNS)

Consider if there is a risk your activity may introduce or spread INNS.

Risks of introducing or spreading INNS include:

- materials or equipment that have come from, had use in or travelled through other water bodies
- activities that help spread existing INNS, either within the immediate water body or other water bodies

Consider if your activity may:	Yes	No	INNS risk issue(s)
Introduce or spread INNS	Requires impact assessment	Impact assessment not required	There is a potential risk of introducing or spreading INNS through vessels, materials and equipment which have been in other water bodies.

Record the findings for INNS and go to the summary section.

Summary

Summarise the results of scoping here.

Receptor	Potential risk to receptor?	Note the risk issue(s) for impact assessment
Hydromorphology	No	-
Biology: habitats	No	-
Biology: fish	Yes	Possible risk of sediments affecting fish behaviour on the Thames Lower. Modelling results will inform this issue further.
Water quality	No	Possible risk of sediments affecting water quality on the Thames Lower. Modelling results will inform this issue further.
Protected areas	No	-
Invasive non-native species	Yes	There is a potential risk of introducing or spreading INNS through vessels, materials and equipment which have been in other water bodies.

If you haven't identified any receptors at risk during scoping, you don't need to continue to the impact assessment stage and your WFD assessment is complete.

If you've identified one or more receptors at risk during scoping, you should continue to the impact assessment stage.

Include your scoping results in the WFD assessment document you send to your activity's regulator as part of your application for permission to carry out the activity.

Thames Lower WFD Scoping for activity 3 - Operation
Water Framework Directive assessment: scoping template for activities in estuarine and coastal waters

Use this template to record the findings of the scoping stage of your Water Framework Directive (WFD) assessment for an activity in an estuary or coastal water.

If your activity will:

- take place in or affect more than one water body, complete a template for each water body
- include several different activities or stages as part of a larger project, complete a template for each activity as part of your overall WFD assessment

The WFD assessment guidance for estuarine and coastal waters will help you complete the table.

Your activity	Description, notes or more information
Applicant name	Port of Tilbury (POTLL)
Application reference number (where applicable)	*Not applicable*
Name of activity	Operation of RoRo terminal and CMAT
Brief description of activity	OPERATION Operation of the RoRo terminal: The RoRo terminal will operate 363 days per year, 24 hours per day. The capacity of the terminal is considered to be a maximum 500,000 units (trailers or containers) per annum, although short to medium term throughput will be 360,000 units per annum. The RoRo berth would accommodate two vessel movements per day once fully operational, resulting in 1,452 vessel movements per annum. Operation of the CMAT: The CMAT will operate 362 days per year (six days per week), 7am - 7pm Monday – Friday and 7am – 12pm Saturday. The proposed capacity of the CMAT will be 1,600,000 tonnes of aggregates per annum. This results in a 'worst case' capacity of 20 vessels per annum visiting the berth, or 40 'movements' per annum. It has been assumed that a total of circa 150,000 tonnes of material per annum will leave the CMAT by barge. Depending on size of barge, this may result in an estimated 150 vessels visiting

	the berth, or 300 movements per annum. However, this is an estimate and requires to be confirmed. Although details of the other operations at the CMAT will depend upon the tenant's operational decision, assumptions have been made to inform both traffic and other assessments of environmental effects. It has been assumed that a further 29,500 tonnes of other materials related to the asphalt plant (bitumen, limestone filler and reclaimed asphalt pavement) will be imported by river.
Location of activity (central point XY coordinates or national grid reference)	*X (Easting) 565929; Y (Northing) 175255; Grid reference: TQ 65929 75255*
Footprint of activity (ha)	23 hectares
Timings of activity (including start and finish dates)	Start works – Q1 2020 Finish works – Q1 2150
Extent of activity (for example size, scale frequency, expected volumes of output or discharge)	See description above. Detailed information is not available at this stage of the project.
Use or release of chemicals (state which ones)	No chemicals are expected to be used.

Water body	Description, notes or more information
WFD water body name	*Thames Lower*
Water body ID	*GB530603911401*
River basin district name	*Thames*
Water body type (estuarine or coastal)	*Estuarine*
Water body total area (ha)	*20103 hectares*
Overall water body status (2015)	*Moderate*
Ecological status	*Moderate*
Chemical status	*Good*
Target water body status and deadline	*Moderate by 2015*
Hydromorphology status of water body	- *(Not available)*
Heavily modified water body and for what use	*Yes, HMWB used for flood protection, navigation, ports and harbours.*
Higher sensitivity habitats present	*Intertidal seagrass 190 (ha); Polychaete reef 275 (ha); Saltmarsh 427 (ha)*
Lower sensitivity habitats present	*Cobbles, gravel and shingle 139 (ha); Intertidal soft sediment 7,777 (ha); rocky shore 0.5 (ha); Subtidal soft sediments 13,017 (ha)*
Phytoplankton status	*High*
History of harmful algae	*Yes*
WFD protected areas within 2km	- *(None)*

Specific risk information

Consider the potential risks of your activity to each of these receptors: hydromorphology, biology (habitats and fish), water quality and protected areas. Also consider invasive non-native species (INNS).

Section 1: Hydromorphology

Consider if hydromorphology is at risk from your activity.

Use the water body summary table to find out the hydromorphology status of the water body, if it is classed as heavily modified and for what use.

Consider if your activity:	Yes	No	Hydromorphology risk issue(s)
May impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status	Requires impact assessment	Impact assessment not required	No. The Thames Lower water body does not have a hydromorphology 'High status'.
May significantly impact the hydromorphology of any water body	Requires impact assessment	Impact assessment not required	No. The activity is unlikely to have a significant impact on the hydromorphology of the water body. Hydrodynamic and sedimentological modelling is being undertaken to confirm this.
Is in a water body that is heavily modified for the same use as your activity	Requires impact assessment	Impact assessment not required	The water body is heavily modified for the use of ports and navigation. However, the construction works are outside the water body and thus unlikely to pose a risk to hydromorphology.

Record the findings for hydromorphology and go to section 2: biology.

Section 2: Biology

Habitats

Consider if habitats are at risk from your activity.

Use the water body summary table and Magic maps, or other sources of information if available, to find the location and size of these habitats.

Higher sensitivity habitats	Lower sensitivity habitats
chalk reef	cobbles, gravel and shingle
clam, cockle and oyster beds	intertidal soft sediments like sand and mud
intertidal seagrass	rocky shore
maerl	subtidal boulder fields
mussel beds, including blue and horse mussel	subtidal rocky reef
polychaete reef	subtidal soft sediments like sand and mud
saltmarsh	
subtidal kelp beds	
subtidal seagrass	

Consider if the footprint of your activity is:	Yes	No	Biology habitats risk issue(s)
0.5km^2 or larger	Yes to one or more – requires impact assessment	No to all – impact assessment not required	There is a risk of contamination by accidental spillage of fuel and chemicals.
1% or more of the water body's area			
Within 500m of any higher sensitivity habitat			
1% or more of any lower sensitivity habitat			

Fish

Consider if fish are at risk from your activity, but only if your activity is in an estuary or may affect fish in or entering an estuary.

Consider if your activity:	Yes	No	Biology fish risk issue(s)
Is in an estuary and may affect fish in the estuary, outside the estuary but may delay or prevent fish entering it or may affect fish migrating through the estuary	Continue with questions	Go to next section	No.
May impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)	Requires impact assessment	Impact assessment not required	There is a risk of contamination by accidental spillage of fuel and chemicals.
May cause entrainment or impingement of fish	Requires impact assessment	Impact assessment not required	No.

Record the findings for biology habitats and fish and go to section 3: water quality.

Section 3: Water quality

Consider if water quality is at risk from your activity.

Use the water body summary table to find information on phytoplankton status and harmful algae.

Consider if your activity:	Yes	No	Water quality risk issue(s)
May affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)	Requires impact assessment	Impact assessment not required	No.
Is in a water body with a phytoplankton status of moderate, poor or bad	Requires impact assessment	Impact assessment not required	Not applicable as phytoplankton status is high
Is in a water body with a history of harmful algae	Requires impact assessment	Impact assessment not required	Marine traffic will pass through the Thames Lower water body, but no pathways have been identified which may lead to an increase of harmful algae from this activity.

Consider if water quality is at risk from your activity through the use, release or disturbance of chemicals.

If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if:	Yes	No	Water quality risk issue(s)
The chemicals are on the Environmental Quality Standards Directive (EQSD) list	Requires impact assessment	Impact assessment not required	No.
It disturbs sediment with contaminants above Cefas Action Level 1	Requires impact assessment	Impact assessment not required	No.

If your activity has a mixing zone (like a discharge pipeline or outfall) consider if:	Yes	No	Water quality risk issue(s)
The chemicals released are on the Environmental Quality Standards Directive (EQSD) list	Requires impact assessment[5]	Impact assessment not required	No. The activity does not involve a mixing zone.

Record the findings for water quality go on to section 4: WFD protected areas.

Section 4: WFD protected areas

Consider if WFD protected areas are at risk from your activity. These include:

- special areas of conservation (SAC)
- special protection areas (SPA)
- shellfish waters
- bathing waters
- nutrient sensitive areas

Use Magic maps to find information on the location of protected areas in your water body (and adjacent water bodies) within 2km of your activity.

Consider if your activity is:	Yes	No	Protected areas risk issue(s)
Within 2km of any WFD protected area	Requires impact assessment	Impact assessment not required	There are no WFD protected areas within 2km of the proposed works.

Record the findings for WFD protected areas and go to section 5: invasive non-native species.

Section 5: Invasive non-native species (INNS)

Consider if there is a risk your activity may introduce or spread INNS.

Risks of introducing or spreading INNS include:

- materials or equipment that have come from, had use in or travelled through other water bodies
- activities that help spread existing INNS, either within the immediate water body or other water bodies

Consider if your activity may:	Yes	No	INNS risk issue(s)
Introduce or spread INNS	Requires impact assessment	Impact assessment not required	There is a potential risk of introducing or spreading INNS through vessels, materials and equipment which have travelled though other water bodies (e.g. as fouling on the hull or in the ballast water).

Record the findings for INNS and go to the summary section.

Summary

Summarise the results of scoping here.

Receptor	Potential risk to receptor?	Note the risk issue(s) for impact assessment
Hydromorphology	No	-
Biology: habitats	Yes	There is a risk of contamination of habitat by accidental spillage of fuel and chemicals.
Biology: fish	Yes	There is a risk of accidental spillage of fuel and chemicals which may affect fish behaviour.
Water quality	No	-
Protected areas	No	-
Invasive non-native species	Yes	There is a potential risk of introducing or spreading INNS through vessels, materials and equipment which have travelled though other water bodies.

If you haven't identified any receptors at risk during scoping, you don't need to continue to the impact assessment stage and your WFD assessment is complete.

If you've identified one or more receptors at risk during scoping, you should continue to the impact assessment stage.

Include your scoping results in the WFD assessment document you send to your activity's regulator as part of your application for permission to carry out the activity.

Thames Middle WFD Scoping for activity 1 – Construction
Water Framework Directive assessment: scoping template for activities in estuarine and coastal waters

Use this template to record the findings of the scoping stage of your Water Framework Directive (WFD) assessment for an activity in an estuary or coastal water.

If your activity will:

- take place in or affect more than one water body, complete a template for each water body
- include several different activities or stages as part of a larger project, complete a template for each activity as part of your overall WFD assessment

The WFD assessment guidance for estuarine and coastal waters will help you complete the table.

Your activity	**Description, notes or more information**
Applicant name	Port of Tilbury (POTLL)
Application reference number (where applicable)	*Not applicable*
Name of activity	Jetty and Marine construction works
Brief description of activity	CONSTRUCTION To facilitate the use of the jetty for both the RoRo terminal and the CMAT, the existing jetty at Tilbury will require modification at both its upstream and downstream arms. *To create a two berth RoRo terminal the upstream works will comprise:-* • An approach bridge comprising a three lane roadway and adjoining footway; • A linkspan bridge connecting the bridge to the floating pontoon; • A floating pontoon; • Erection of a control office on the floating pontoon; • Footway link bridge, linking the floating pontoon to the existing jetty; • Seven no. mooring dolphins arranged east-west as an extension to the existing jetty connected by a footway link bridge; and • Removal of the existing Anglian Water Authority jetty (not in use).

	Downstream works in association with the CMAT will comprise: • Installation of an extension to the existing conveyor system; • Erection of new feed hopper; and • Installation of 6sixnumber mooring dolphins to the front of and downstream of the existing jetty. A sheet piled wall will be installed to run along the northern edge of the dredge pocket.
Location of activity (central point XY coordinates or national grid reference)	*X (Easting) 565929; Y (Northing) 175255; Grid reference: TQ 65929 75255*
Footprint of activity (ha)	23 hectares
Timings of activity (including start and finish dates)	Start works – Q1 2019 Finish works – Q1 2020
Extent of activity (for example size, scale frequency, expected volumes of output or discharge)	See description above. More information is not available at this stage of the project.
Use or release of chemicals (state which ones)	No chemicals are expected to be used.

Water body	**Description, notes or more information**
WFD water body name	*Thames Middle*
Water body ID	*GB530603911402*
River basin district name	*Thames*
Water body type (estuarine or coastal)	*Estuarine*
Water body total area (ha)	*4391 hectares*
Overall water body status (2015)	*Moderate*
Ecological status	*Moderate*
Chemical status	*Good*
Target water body status and deadline	*Moderate by 2015*
Hydromorphology status of water body	- *(Not available)*

Heavily modified water body and for what use	*Yes, HMWB used for coastal protection, flood protection, navigation, ports and harbours.*
Higher sensitivity habitats present	*Saltmarsh 130 (ha)*
Lower sensitivity habitats present	*Intertidal soft sediment 838 (ha)*
Phytoplankton status	*High*
History of harmful algae	*Not monitored*
WFD protected areas within 2km	- *(None)*

Specific risk information

Consider the potential risks of your activity to each of these receptors: hydromorphology, biology (habitats and fish), water quality and protected areas. Also consider invasive non-native species (INNS).

Section 1: Hydromorphology

Consider if hydromorphology is at risk from your activity.

Use the water body summary table to find out the hydromorphology status of the water body, if it is classed as heavily modified and for what use.

Consider if your activity:	Yes	No	Hydromorphology risk issue(s)
May impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status	Requires impact assessment	Impact assessment not required	No. The Thames Middles water body does not have a hydromorphology 'high status'.
May significantly impact the hydromorphology of any water body	Requires impact assessment	Impact assessment not required	No. The activity is unlikely to have a significant impact on the hydromorphology of the water body. Hydrodynamic and sedimentological modelling is being undertaken to confirm this.
Is in a water body that is heavily modified for the same use as your activity	Requires impact assessment	Impact assessment not required	Yes. The water body is heavily modified for the use of ports and navigation. There is a risk that further construction of port structures may impact the hydromorphology of the water body.

Record the findings for hydromorphology and go to section 2: biology.

Section 2: Biology

Habitats

Consider if habitats are at risk from your activity.

Use the water body summary table and Magic maps, or other sources of information if available, to find the location and size of these habitats.

Higher sensitivity habitats	Lower sensitivity habitats
chalk reef	cobbles, gravel and shingle
clam, cockle and oyster beds	intertidal soft sediments like sand and mud
intertidal seagrass	rocky shore
maerl	subtidal boulder fields
mussel beds, including blue and horse mussel	subtidal rocky reef
polychaete reef	subtidal soft sediments like sand and mud
saltmarsh	
subtidal kelp beds	
subtidal seagrass	

Consider if the footprint of your activity is:	Yes	No	Biology habitats risk issue(s)
0.5km^2 or larger	Yes to one or more – requires impact assessment	No to all – impact assessment not required	The footprint of the activity is within 500m of a high sensitivity habitat (saltmarsh), which covers the north bank of the river Thames, where the development is proposed to take place. The saltmarsh habitat may be affected by bed sediment mobilisation and/or changes in hydrodynamics affecting patterns of erosion and accretion.
1% or more of the water body's area			
Within 500m of any higher sensitivity habitat			
1% or more of any lower sensitivity habitat			

Fish

Consider if fish are at risk from your activity, but only if your activity is in an estuary or may affect fish in or entering an estuary.

Consider if your activity:	Yes	No	Biology fish risk issue(s)
Is in an estuary and may affect fish in the estuary, outside the estuary but may delay or prevent fish entering it or may affect fish migrating through the estuary	Continue with questions	Go to next section	Yes. The proposed construction works may affect fish migrating through the estuary, principally through underwater noise and possible riverbed sediment mobilisation.
May impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)	Requires impact assessment	Impact assessment not required	The proposed construction works may affect fish migrating through the estuary, principally through underwater noise and possible riverbed sediment mobilisation.
May cause entrainment or impingement of fish	Requires impact assessment	Impact assessment not required	Unlikely. Entrainment of eels in new pontoons will be mitigated at the design stage.

Record the findings for biology habitats and fish and go to section 3: water quality.

Section 3: Water quality

Consider if water quality is at risk from your activity.

Use the water body summary table to find information on phytoplankton status and harmful algae.

Consider if your activity:	Yes	No	Water quality risk issue(s)
May affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)	Requires impact assessment	Impact assessment not required	No. Changes to water clarity due to possible riverbed sediment re-suspension are unlikely to last longer than a spring neap tidal cycle.
Is in a water body with a phytoplankton status of moderate, poor or bad	Requires impact assessment	Impact assessment not required	Not applicable as plankton is at high status.
Is in a water body with a history of harmful algae	Requires impact assessment	Impact assessment not required	Harmful algae are not monitored in this water body.

Consider if water quality is at risk from your activity through the use, release or disturbance of chemicals.

If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if:	Yes	No	Water quality risk issue(s)
The chemicals are on the Environmental Quality Standards Directive (EQSD) list	Requires impact assessment	Impact assessment not required	The activity is likely to re-suspend riverbed sediments which may include chemicals from the EQSD list.
It disturbs sediment with contaminants above Cefas Action Level 1	Requires impact assessment	Impact assessment not required	The sediments may contain contaminants above the Cefas Action Level 1. However, the volume of sediments re-suspended by construction works (excluding dredging) are likely to be less than 200 cubic meters and is therefore unlikely to have a significant impact on the water quality.

If your activity has a mixing zone (like a discharge pipeline or outfall) consider if:	Yes	No	Water quality risk issue(s)
The chemicals released are on the Environmental Quality Standards Directive (EQSD) list	Requires impact assessment[5]	Impact assessment not required	No. The activity does not involve a mixing zone.

Record the findings for water quality go on to section 4: WFD protected areas.

Section 4: WFD protected areas

Consider if WFD protected areas are at risk from your activity. These include:

- special areas of conservation (SAC)
- special protection areas (SPA)
- shellfish waters
- bathing waters
- nutrient sensitive areas

Use Magic maps to find information on the location of protected areas in your water body (and adjacent water bodies) within 2km of your activity.

Consider if your activity is:	Yes	No	Protected areas risk issue(s)
Within 2km of any WFD protected area	Requires impact assessment	Impact assessment not required	There are no WFD protected areas within 2km of the proposed works.

Record the findings for WFD protected areas and go to section 5: invasive non-native species.

Section 5: Invasive non-native species (INNS)

Consider if there is a risk your activity may introduce or spread INNS.

Risks of introducing or spreading INNS include:

- materials or equipment that have come from, had use in or travelled through other water bodies
- activities that help spread existing INNS, either within the immediate water body or other water bodies

Consider if your activity may:	Yes	No	INNS risk issue(s)
Introduce or spread INNS	Requires impact assessment	Impact assessment not required	There is a potential risk of introducing or spreading INNS through vessels, materials and equipment which have travelled through other water bodies. To reduce this risk, material will be appropriate for the marine environment, or will be treated before introduction in the estuarine environment.

Record the findings for INNS and go to the summary section.

Summary

Summarise the results of scoping here.

Receptor	Potential risk to receptor?	Note the risk issue(s) for impact assessment
Hydromorphology	Yes	The water body is heavily modified for the use of ports and navigation. There is a risk that further construction of port structures may impact the hydromorphology of the water body. Although significant impact is unlikely, hydrodynamic and sediment modelling is being conducted to inform this assessment further.
Biology: habitats	Yes	The footprint of the activity is within 500m of a high sensitivity habitat (saltmarsh), which covers the north bank of the river Thames, where the development is proposed to take place.
Biology: fish	Yes	The proposed construction works may affect fish migrating through the estuary, principally through underwater noise and possible riverbed sediment mobilisation.
Water quality	Yes	The activity is likely to re-suspend riverbed sediments which may include chemicals from the EQSD list.
Protected areas	No	-
Invasive non-native species	No	-

If you haven't identified any receptors at risk during scoping, you don't need to continue to the impact assessment stage and your WFD assessment is complete.

If you've identified one or more receptors at risk during scoping, you should continue to the impact assessment stage.

Include your scoping results in the WFD assessment document you send to your activity's regulator as part of your application for permission to carry out the activity.

Thames Middle WFD Scoping for activity 2 - Dredging
Water Framework Directive assessment: scoping template for activities in estuarine and coastal waters

Use this template to record the findings of the scoping stage of your Water Framework Directive (WFD) assessment for an activity in an estuary or coastal water.

If your activity will:

- take place in or affect more than one water body, complete a template for each water body
- include several different activities or stages as part of a larger project, complete a template for each activity as part of your overall WFD assessment

The WFD assessment guidance for estuarine and coastal waters will help you complete the table.

Your activity	**Description, notes or more information**
Applicant name	Port of Tilbury (POTLL)
Application reference number (where applicable)	*Not applicable*
Name of activity	Dredging of berth pockets
Brief description of activity	DREDGING *Berth pockets and approach dredging* Dredge pockets will be created and maintained for the life of the terminal around the improved terminal jetty. In relation to the downstream (CMAT) jetty, the depth of pocket will be circa 15m below chart datum and cater for the largest likely bulk aggregate vessels to visit the site in the future (100,000 tonnes). *Capital Dredging* It is anticipated that up to 6m depth of material may require removal for the capital dredge. Dredging is likely to be a combination of suction and bucket dredging. Water injection dredging will not be used during the months of May-July, due to impact to Salmon smolts migrating up the river. *Maintenance Dredging - Berth pockets and approach dredging* Maintenance dredging requirements are still being determined.

Location of activity (central point XY coordinates or national grid reference)	*X (Easting) 565929; Y (Northing) 175255; Grid reference: TQ 65929 75255*
Footprint of activity (ha)	Exact footprint of dredging (ha) is still being determined.
Timings of activity (including start and finish dates)	Start works – Q1 2019 Finish works – Q1 2150
Extent of activity (for example size, scale frequency, expected volumes of output or discharge)	See description above. Detailed information is not available at this stage of the project.
Use or release of chemicals (state which ones)	No chemicals are expected to be used.

Water body	Description, notes or more information
WFD water body name	*Thames Middle*
Water body ID	*GB530603911402*
River basin district name	*Thames*
Water body type (estuarine or coastal)	*Estuarine*
Water body total area (ha)	*4391 hectares*
Overall water body status (2015)	*Moderate*
Ecological status	*Moderate*
Chemical status	*Good*
Target water body status and deadline	*Moderate by 2015*
Hydromorphology status of water body	- *(Not available)*
Heavily modified water body and for what use	*Yes, HMWB used for coastal protection, flood protection, navigation, ports and harbours.*
Higher sensitivity habitats present	*Saltmarsh 130 (ha)*
Lower sensitivity habitats present	*Intertidal soft sediment 838 (ha)*
Phytoplankton status	*High*
History of harmful algae	*Not monitored*
WFD protected areas within 2km	- *(None)*

Specific risk information

Consider the potential risks of your activity to each of these receptors: hydromorphology, biology (habitats and fish), water quality and protected areas. Also consider invasive non-native species (INNS).

Section 1: Hydromorphology

Consider if hydromorphology is at risk from your activity.

Use the water body summary table to find out the hydromorphology status of the water body, if it is classed as heavily modified and for what use.

Consider if your activity:	Yes	No	Hydromorphology risk issue(s)
May impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status	Requires impact assessment	Impact assessment not required	No. The Thames Middles water body does not have a hydromorphology 'High status'.
May significantly impact the hydromorphology of any water body	Requires impact assessment	Impact assessment not required	The activity is likely to change morphological conditions of the riverbed. However, these changes are unlikely to cause changes in tidal patterns, dominant currents, and wave exposure which may have a significant impact on the hydromorphology of the water body. Modelling is being undertaken which will inform this issue further.
Is in a water body that is heavily modified for the same use as your activity	Requires impact assessment	Impact assessment not required	Yes. The water body is heavily modified for the use of ports and navigation. There is a risk that dredging for navigation and the use of port facilities may impact the hydromorphology of the water body.

Record the findings for hydromorphology and go to section 2: biology.

Section 2: Biology

Habitats

Consider if habitats are at risk from your activity.

Use the water body summary table and Magic maps, or other sources of information if available, to find the location and size of these habitats.

Higher sensitivity habitats	Lower sensitivity habitats
chalk reef	cobbles, gravel and shingle
clam, cockle and oyster beds	intertidal soft sediments like sand and mud
intertidal seagrass	rocky shore
maerl	subtidal boulder fields
mussel beds, including blue and horse mussel	subtidal rocky reef
polychaete reef	subtidal soft sediments like sand and mud
saltmarsh	
subtidal kelp beds	
subtidal seagrass	

Consider if the footprint of your activity is:	Yes	No	Biology habitats risk issue(s)
0.5km^2 or larger	Yes to one or more – requires impact assessment	No to all – impact assessment not required	The footprint of the activity is within 500m of a high sensitivity habitat (saltmarsh), which covers the north bank of the river Thames, where the development is proposed to take place. Sediment modelling is being undertaken which will inform likely silt dispersal patterns and hydrodynamic modelling is being undertaken which will inform erosion and accretion patterns which may affect the adjacent saltmarsh habitat.
1% or more of the water body's area			
Within 500m of any higher sensitivity habitat			
1% or more of any lower sensitivity habitat			

Fish

Consider if fish are at risk from your activity, but only if your activity is in an estuary or may affect fish in or entering an estuary.

Consider if your activity:	Yes	No	Biology fish risk issue(s)
Is in an estuary and may affect fish in the estuary, outside the estuary but may delay or prevent fish entering it or may affect fish migrating through the estuary	Continue with questions	Go to next section	Yes. The proposed dredging works may affect fish migrating through the estuary, principally through riverbed sediment mobilisation (e.g. silt).
May impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)	Requires impact assessment	Impact assessment not required	The proposed dredging works may affect fish by increasing water turbidity through bed sediment mobilisation (e.g. silt). Sediment modelling is being undertaken which will inform likely silt dispersal patterns which may affect smelt and eels.
May cause entrainment or impingement of fish	Requires impact assessment	Impact assessment not required	Unlikely. Fish tend to avoid areas where dredging is taking place.

Record the findings for biology habitats and fish and go to section 3: water quality.

Section 3: Water quality

Consider if water quality is at risk from your activity.

Use the water body summary table to find information on phytoplankton status and harmful algae.

Consider if your activity:	Yes	No	Water quality risk issue(s)
May affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)	Requires impact assessment	Impact assessment not required	Yes. Water clarity may be affected for a period longer than a spring neap tidal cycle (approximately 14 days). Sediment modelling is being undertaken which will inform likely silt dispersal patterns, extent and duration.
Is in a water body with a phytoplankton status of moderate, poor or bad	Requires impact assessment	Impact assessment not required	Not applicable as phytoplankton status is high.
Is in a water body with a history of harmful algae	Requires impact assessment	Impact assessment not required	Harmful algae are not monitored in this water body.

Consider if water quality is at risk from your activity through the use, release or disturbance of chemicals.

If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if:	Yes	No	Water quality risk issue(s)
The chemicals are on the Environmental Quality Standards Directive (EQSD) list	Requires impact assessment	Impact assessment not required	The activity is likely to re-suspend riverbed sediments which may include chemicals from the EQSD list.
It disturbs sediment with contaminants above Cefas Action Level 1	Requires impact assessment	Impact assessment not required	The sediment may contain contaminants above the Cefas Action Level 1.

If your activity has a mixing zone (like a discharge pipeline or outfall) consider if:	Yes	No	Water quality risk issue(s)
The chemicals released are on the Environmental Quality Standards Directive (EQSD) list	Requires impact assessment[5]	Impact assessment not required	The dredging may create a temporal mixing zone while dredging riverbed sediments with chemicals from the EQSD list.

Record the findings for water quality go on to section 4: WFD protected areas.

Section 4: WFD protected areas

Consider if WFD protected areas are at risk from your activity. These include:

- special areas of conservation (SAC)
- special protection areas (SPA)
- shellfish waters
- bathing waters
- nutrient sensitive areas

Use Magic maps to find information on the location of protected areas in your water body (and adjacent water bodies) within 2km of your activity.

Consider if your activity is:	Yes	No	Protected areas risk issue(s)
Within 2km of any WFD protected area	Requires impact assessment	Impact assessment not required	There are no WFD protected areas within 2km of the proposed works.

Record the findings for WFD protected areas and go to section 5: invasive non-native species.

Section 5: Invasive non-native species (INNS)

Consider if there is a risk your activity may introduce or spread INNS.

Risks of introducing or spreading INNS include:

- materials or equipment that have come from, had use in or travelled through other water bodies
- activities that help spread existing INNS, either within the immediate water body or other water bodies

Consider if your activity may:	Yes	No	INNS risk issue(s)
Introduce or spread INNS	Requires impact assessment	Impact assessment not required	There is potential risk of introducing or spreading INNS through vessels, materials and equipment which have travelled though other water bodies.

Record the findings for INNS and go to the summary section.

Summary

Summarise the results of scoping here.

Receptor	Potential risk to receptor?	Note the risk issue(s) for impact assessment
Hydromorphology	Yes	The water body is heavily modified for the use of ports and navigation. There is a risk that dredging for navigation and the use of port facilities may impact the hydromorphology of the water body. Although significant impact is unlikely, hydrodynamic and sediment modelling is being conducted to inform this assessment further.
Biology: habitats	Yes	The footprint of the activity is within 500m of a high sensitivity habitat (saltmarsh), which covers the north bank of the river Thames, where the development is proposed to take place.
Biology: fish	Yes	The proposed dredging works may affect fish by increasing water turbidity through bed sediment mobilisation (e.g. silt).
Water quality	Yes	The activity is likely to re-suspend riverbed sediments which may include chemicals from the EQSD list. Re-suspended sediments may affect water clarity for a period longer than a spring neap tidal cycle.

		The sediment may contain contaminants above the Cefas Action Level 1.
Protected areas	No	-
Invasive non-native species	Yes	There is potential risk of introducing or spreading INNS through vessels and materials which have travelled though other water bodies.

If you haven't identified any receptors at risk during scoping, you don't need to continue to the impact assessment stage and your WFD assessment is complete.

If you've identified one or more receptors at risk during scoping, you should continue to the impact assessment stage.

Include your scoping results in the WFD assessment document you send to your activity's regulator as part of your application for permission to carry out the activity.

Thames Middle WFD Scoping for activity 3 - Operation
Water Framework Directive assessment: scoping template for activities in estuarine and coastal waters

Use this template to record the findings of the scoping stage of your Water Framework Directive (WFD) assessment for an activity in an estuary or coastal water.

If your activity will:

- take place in or affect more than one water body, complete a template for each water body
- include several different activities or stages as part of a larger project, complete a template for each activity as part of your overall WFD assessment

The WFD assessment guidance for estuarine and coastal waters will help you complete the table.

Your activity	**Description, notes or more information**
Applicant name	Port of Tilbury (POTLL)
Application reference number (where applicable)	*Not applicable*
Name of activity	Operation of RoRo terminal and CMAT
Brief description of activity	OPERATION *Operation of the RoRo terminal:* The RoRo terminal will operate 363 days per year, 24 hours per day. The capacity of the terminal is considered to be a maximum 500,000 units (trailers or containers) per annum although short to medium term throughput will be 360,000 units per annum. The RoRo berth would accommodate two vessel movements per day once fully operational, resulting in 1,452 vessel movements per annum. *Operation of the CMAT:* The CMAT will operate 312 days per year (six days per week), 7am - 7pm Monday – Friday and 7am – 12pm Saturdays.

	The proposed capacity of the CMAT will be 1,600,000 tonnes of aggregates per annum. This results in a 'worst case' capacity of 20 vessels per annum visiting the berth, or 40 'movements' per annum. It has been assumed that a total of circa 150,000 tonnes of material per annum will leave the CMAT by barge. Depending on size of barge, this may result in an estimated 150 vessels visiting the berth, or 300 movements per annum. However, this is an estimate and requires to be confirmed. Although details of the other operations at the CMAT will depend upon the tenant's operational decision, assumptions have been made to inform both traffic and other assessments of environmental effects. It has been assumed that a further 29,500 tonnes of other materials related to the asphalt plant (bitumen, limestone filler and reclaimed asphalt pavement) will be imported by river.
Location of activity (central point XY coordinates or national grid reference)	*X (Easting) 565929; Y (Northing) 175255; Grid reference: TQ 65929 75255*
Footprint of activity (ha)	23 hectares
Timings of activity (including start and finish dates)	Start – Q1 2020 Finish– Q1 2150
Extent of activity (for example size, scale frequency, expected volumes of output or discharge)	See description above. Detailed information is not available at this stage of the project.
Use or release of chemicals (state which ones)	No chemicals are expected to be used.

Water body	Description, notes or more information
WFD water body name	*Thames Middle*
Water body ID	*GB530603911402*
River basin district name	*Thames*
Water body type (estuarine or coastal)	*Estuarine*
Water body total area (ha)	*4391 hectares*
Overall water body status (2015)	*Moderate*
Ecological status	*Moderate*
Chemical status	*Good*
Target water body status and deadline	*Moderate by 2015*
Hydromorphology status of water body	- *(Not available)*
Heavily modified water body and for what use	*Yes, HMWB used for coastal protection, flood protection, navigation, ports and harbours.*
Higher sensitivity habitats present	*Saltmarsh 130 (ha)*
Lower sensitivity habitats present	*Intertidal soft sediment 838 (ha)*
Phytoplankton status	*High*
History of harmful algae	*Not monitored*
WFD protected areas within 2km	- *(None)*

Specific risk information

Consider the potential risks of your activity to each of these receptors: hydromorphology, biology (habitats and fish), water quality and protected areas. Also consider invasive non-native species (INNS).

Section 1: Hydromorphology

Consider if hydromorphology is at risk from your activity.

Use the water body summary table to find out the hydromorphology status of the water body, if it is classed as heavily modified and for what use.

Consider if your activity:	Yes	No	Hydromorphology risk issue(s)
May impact on the hydromorphology (for example morphology or tidal patterns) of a water body at high status	Requires impact assessment	Impact assessment not required	No. The Thames Middles water body does not have a hydromorphology 'High status'.
May significantly impact the hydromorphology of any water body	Requires impact assessment	Impact assessment not required	No. The activity is unlikely to have a significant impact on the hydromorphology of the water body.
Is in a water body that is heavily modified for the same use as your activity	Requires impact assessment	Impact assessment not required	Yes. The water body is heavily modified for the use of ports and navigation. There is a risk that additional navigation and operation of port structures may impact the hydromorphology of the water body.

Record the findings for hydromorphology and go to section 2: biology.

Section 2: Biology

Habitats

Consider if habitats are at risk from your activity.

Use the water body summary table and Magic maps, or other sources of information if available, to find the location and size of these habitats.

Higher sensitivity habitats	Lower sensitivity habitats
chalk reef	cobbles, gravel and shingle
clam, cockle and oyster beds	intertidal soft sediments like sand and mud
intertidal seagrass	rocky shore
maerl	subtidal boulder fields
mussel beds, including blue and horse mussel	subtidal rocky reef
polychaete reef	subtidal soft sediments like sand and mud
saltmarsh	
subtidal kelp beds	
subtidal seagrass	

Consider if the footprint of your activity is:	Yes	No	Biology habitats risk issue(s)
0.5km^2 or larger	Yes to one or more – requires impact assessment	No to all – impact assessment not required	The footprint of the activity is within 500m of a high sensitivity habitat (saltmarsh), which covers the north bank of the river Thames, where the development is proposed to take place. There is a risk of contamination by accidental oil spillage.
1% or more of the water body's area			
Within 500m of any higher sensitivity habitat			
1% or more of any lower sensitivity habitat			

Fish

Consider if fish are at risk from your activity, but only if your activity is in an estuary or may affect fish in or entering an estuary.

Consider if your activity:	Yes	No	Biology fish risk issue(s)
Is in an estuary and may affect fish in the estuary, outside the estuary but may delay or prevent fish entering it or may affect fish migrating through the estuary	Continue with questions	Go to next section	There is a risk of contaminating the water by accidental spillage of fuel and chemicals, which may kill fish by clogging sensitive gill structures or by poisoning.
May impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)	Requires impact assessment	Impact assessment not required	There is a risk of contaminating the water by accidental spillage of fuel and chemicals, which may kill fish by clogging sensitive gill structures or by poisoning.
May cause entrainment or impingement of fish	Requires impact assessment	Impact assessment not required	Unlikely.

Record the findings for biology habitats and fish and go to section 3: water quality.

Section 3: Water quality

Consider if water quality is at risk from your activity.

Use the water body summary table to find information on phytoplankton status and harmful algae.

Consider if your activity:	Yes	No	Water quality risk issue(s)
May affect water clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (about 14 days)	Requires impact assessment	Impact assessment not required	No.
Is in a water body with a phytoplankton status of moderate, poor or bad	Requires impact assessment	Impact assessment not required	Not applicable, phytoplankton is at high status.
Is in a water body with a history of harmful algae	Requires impact assessment	Impact assessment not required	Harmful algae are not monitored in this water body.

Consider if water quality is at risk from your activity through the use, release or disturbance of chemicals.

If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if:	Yes	No	Water quality risk issue(s)
The chemicals are on the Environmental Quality Standards Directive (EQSD) list	Requires impact assessment	Impact assessment not required	Potential release of harmful materials though accidental oil, fuel or chemical spillage during vessel operations.
It disturbs sediment with contaminants above Cefas Action Level 1	Requires impact assessment	Impact assessment not required	No.

If your activity has a mixing zone (like a discharge pipeline or outfall) consider if:	Yes	No	Water quality risk issue(s)
The chemicals released are on the Environmental Quality Standards Directive (EQSD) list	Requires impact assessment[5]	Impact assessment not required	No. The activity does not involve a mixing zone.

Record the findings for water quality go on to section 4: WFD protected areas.

Section 4: WFD protected areas

Consider if WFD protected areas are at risk from your activity. These include:

- special areas of conservation (SAC)
- special protection areas (SPA)
- shellfish waters
- bathing waters
- nutrient sensitive areas

Use Magic maps to find information on the location of protected areas in your water body (and adjacent water bodies) within 2km of your activity.

Consider if your activity is:	Yes	No	Protected areas risk issue(s)
Within 2km of any WFD protected area	Requires impact assessment	Impact assessment not required	There are no WFD protected areas within 2km of the proposed works.

Record the findings for WFD protected areas and go to section 5: invasive non-native species.

Section 5: Invasive non-native species (INNS)

Consider if there is a risk your activity may introduce or spread INNS.

Risks of introducing or spreading INNS include:

- materials or equipment that have come from, had use in or travelled through other water bodies
- activities that help spread existing INNS, either within the immediate water body or other water bodies

Consider if your activity may:	Yes	No	INNS risk issue(s)
Introduce or spread INNS	Requires impact assessment	Impact assessment not required	There is a potential risk of introducing or spreading INNS through vessels and materials which have travelled or been in other water bodies (e.g. as fouling on hulls and in ballast waters.). Operating vessels must adhere to good practice including ballast water management protocols.

Record the findings for INNS and go to the summary section.

Summary

Summarise the results of scoping here.

Receptor	Potential risk to receptor?	Note the risk issue(s) for impact assessment
Hydromorphology	Yes	The water body is heavily modified for the use of ports and navigation. There is a risk that additional navigation and operation of port structures may impact the hydromorphology of the water body.
Biology: habitats	Yes	The footprint of the activity is within 500m of a high sensitivity habitat (saltmarsh). There is a risk of contamination by accidental spillage of material when unloading.
Biology: fish	Yes	There is a risk of contaminating the water by accidental spillage of fuel and chemicals, which may kill fish by clogging sensitive gill structures or by poisoning.
Water quality	Yes	Potential release of harmful materials though accidental oil, fuel or chemical spillage during vessel operations.
Protected areas	No	-

Invasive non-native species	Yes	There is a potential risk of introducing or spreading INNS through vessels and materials which have travelled or been in other water bodies.

If you haven't identified any receptors at risk during scoping, you don't need to continue to the impact assessment stage and your WFD assessment is complete.

If you've identified one or more receptors at risk during scoping, you should continue to the impact assessment stage.

Include your scoping results in the WFD assessment document you send to your activity's regulator as part of your application for permission to carry out the activity.

APPENDIX 17.A: Construction Assessment Plant List Phase	Activity	Plant Type	BS5228 / CNP Ref	Plant noise level dB L_{Aeq} at 10m	Total no. in use	% on time
Site preparation	Topsoil strip	Tracked excavator (25t)	C.2.19	77	2	80
		Dozer	C.2.11	79	1	80
		Articulated dump truck (dumping fill)	C.2.32	74	2	25
	Haul Road Construction	Delivery lorry	Av C.6.21 & 23	81	1	25
		Vibratory roller	C.2.39	74	1	50
		Dozer (28t)	C.2.11	79	1	50
		Tracked excavator (25t)	C.2.19	77	1	50
Bridge construction	Substructure (Rotary bored Piles)	CFA piling - Crawler mounted rig	C3.22	80	1	80
		Tracked excavator (inserting cage)	C3.24	74	1	30
		Concrete pump	C3.25	78	1	50
		Lorry with lifting boom	C.4.53	77	1	25
		Delivery lorry	Av C.6.21 & 23	81	1	10
	Casting pile caps & abutment walls	Pumping concrete - mixer truck + pump	C.4.28	75	1	80
		Poker vibrator	C.4 34	69	3	50
		Compressor	D.6.19	72	1	50
	Wing walls	Tracked excavator (40t), compaction & lifting	C.2.14	79	1	80
		Vibratory plate (petrol)	C.2.41	80	1	50
	Lifting precast beams	Wheeled mobile crane (400t)	C.4.38	78	1	50
		Telescopic handler	C.4.54	79	1	25
		Diesel scissor lift	C.4.59	78	2	25
		Diesel generator for lighting	C.4.86	65	1	100
	Bridge deck - concreting	Pumping concrete - mixer truck + pump	C.4.28	75	1	80
		Poker vibrator	C.4 34	69	3	50
		Compressor	D.6.19	72	1	50
Road construction	Sub-layers	Articulated dump truck (dumping fill)	C.2.32	74	1	80
		Tracked excavator (25t)	C.2.19	77	2	80
		Dozer	C.2.11	79	1	80
		Grader	D.3.74	77	1	80
		Vibratory roller	C.5 20	75	1	80
	Surfacing	Asphalt paver (+ tipper lorry)	C.5 33	75	1	80
		Vibratory roller	C.5 20	75	1	80

APPENDIX 17.A: Construction Assessment Plant List Phase	Activity	Plant Type	BS5228 / CNP Ref	Plant noise level dB L_{Aeq} at 10m	Total no. in use	% on time
Rail construction	Track laying	Tracked excavator (25t)	C.2.19	77	2	80
		Articulated dump truck (dumping fill)	C.2.32	74	2	80
		Vibratory roller	C.2.39	74	1	50
		Wheeled mobile crane	C.4.43	70	1	80
		Hand-held welder	C.3.31	73	1	50
		Generator (power for welding, lighting etc)	C.4.85	66	1	50
Jetty construction	Piling & dredging works	Tubular steel piling- Hydraulic Hammer	C.3.3	88	1	80
		Crane, mobile/barge mounted (diesel)	CNP 048	84	1	80
		Long reach tracked excavator	C.7.1	78	1	50
		Grab hopper dredging ship	C.7.2	82	1	80
Building construction	Substructure works	Tracked excavator (25t)	C.2.19	77	1	80
		Pumping concrete - mixer truck + pump	C.4.28	75	1	80
		Poker vibrator	C.4 34	69	2	25
		Compressor	D.6.19	72	1	25
	Superstructure works	Delivery wagons - arrive/depart	C11.7	79	1	20
		Mobile telescopic crane	C4.43	70	1	50
		Lifting platform	C4.57	67	2	20
		Telescopic handler	C4.54	79	1	20
Pavement construction	Concrete hardstanding	Articulated dump truck (dumping fill)	C.2.32	74	1	80
		Tracked excavator (25t)	C.2.19	77	1	80
		Dozer	C.2.11	79	1	80
		Grader	D.3.74	77	1	80
		Vibratory roller	C.5 20	75	1	80
		Pumping concrete - mixer truck + pump	C.4.28	75	1	80
		Vibratory tamper	C.4.35	63	1	50