

SILVERTOWN TUNNEL

**Preliminary Environmental
Information Report:
Appendix 10.A**

**Water Framework Directive
(WFD) Screening Exercise**

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List of Abbreviations

AWB	Artificial Water Body
DCO	Development Consent Order
EQS	Environmental Quality Standard
GES	Good Ecological Status
GEP	Good Ecological Potential
HMWB	Heavily Modified Water Body
NVZ	Nitrate Vulnerable Zone
PEIR	Preliminary Environmental Information Report
PSD	Priority Substances Directive
RBMP	River Basin Management Plan
SAC	Special Area of Conservation
SPA	Special Protection Area
TBT	Tributyltin Compounds
WFD	Water Framework Directive

1. WATER FRAMEWORK DIRECTIVE (WFD) SCREENING EXERCISE

1.1 Introduction

1.1.1 The marine works for the proposed Silvertown Tunnel Crossing Scheme, described in Volume 1, Chapter 4 – Scheme Description of the PEIR, include the construction of a temporary jetty, along with an associated dredge and the disposal of the dredge arisings. At this stage it is understood that the dredge arisings will either be disposed of on land at an appropriate receptor site or at a licenced facility if they are found to be contaminated. This will be determined as part of a Detailed Waste Disposal Strategy.

1.1.2 Consideration of the Water Framework Directive (WFD) (2000/60/EC) is required for Development Consent Order (DCO) applications which have the potential to cause deterioration in the ecological and chemical status of a water body or to compromise improvements which might otherwise lead to a water body meeting its WFD objectives. Therefore, it is necessary to consider the potential for the marine works, along with the wider proposed Scheme (e.g. tunnel excavation), to impact WFD water bodies.

1.1.3 The WFD aims to protect and enhance water bodies (i.e. inland water bodies, estuaries and coastal waters out to one nautical mile from low water mark) within Europe. This is to be accomplished by implementing the measures necessary to achieve the following objectives:

- prevent deterioration of the status of waters;
- protect, enhance and restore all bodies of surface waters and ground waters;
- promote sustainable water use (through effective pricing of water services);
- progressively reduce discharges of priority substances and cease or phase discharges of priority hazardous substances for surface waters;
- ensure progressive reduction of pollution of groundwater;

- mitigate the effects of floods and droughts;
- ensure sufficient supply of water; and
- protect the marine environment.

1.1.4 A WFD compliance assessment is undertaken in four stages:

1. Screening – An initial exercise (reported here) to collate the information requirements to scope the necessity for a WFD compliance assessment¹;
2. Scoping – The potential for the project to cause a ‘deterioration’ or failure of the water body to meet its WFD objectives is reviewed (scoped). This involves consideration of each parameter reported for the water body to identify if the development could be a potential cause of failure²;
3. Assessment – Consideration of whether the activity will compromise the achievement of measures set out in the River Basin Management Plan (RBMP) programme of measures, and/or cumulative effects. For all projects where the water body is not at good status, there is a need to consider whether it is possible for the activity to contribute to the WFD ‘protect, enhance and improve’ objective³; and
4. Identification and evaluation of measures – The selection of mitigation and improvement measures required to support WFD objectives. This includes actions to remove or reduce the effect on status to an acceptable level and/or exploiting opportunities for environmental improvements⁴.

1.1.5 This initial WFD screening exercise (Stage 1) identifies the water bodies potentially affected by the proposed Scheme and the WFD parameters which need to be considered to inform scoping (Stage 2). New dredging

¹ Environment Agency (EA) (2012); Clearing the waters. Marine dredging and the Water Framework Directive. Stage one: the screening stage.

² Environment Agency (EA) (2012); Clearing the waters. Marine dredging and the Water Framework Directive. Stage two: the scoping process.

³ Environment Agency (EA) (2012); Clearing the waters. Marine dredging and the Water Framework Directive. Stage three: assessment.

⁴ Environment Agency (EA) (2012); Clearing the waters. Marine dredging and the Water Framework Directive. Stage four: identification and evaluation of measures.

and disposal projects, such as the proposed Scheme at Silvertown, are assumed to require scoping due to the uncertainty of their potential effects. Similarly, the potential impacts of the tunnel construction at water body level are unknown. Therefore, while it can be confirmed that scoping the potential effects will be required, this screening exercise provides a useful precursor. The potential for the construction of a jetty and dredge/disposal activities to cause a 'deterioration' or failure of the water body to meet its WFD objectives will be reviewed once further Scheme assessment work (particularly physical processes, water/sediment quality and marine ecology) has been completed.

1.2 Water body information

Overview

- 1.2.1 Under the WFD, coastal waters, estuaries, rivers, man-made docks and canals are divided up into a series of discrete water bodies. The WFD sets ecological as well as chemical targets (objectives) for each water body. However, as other factors can affect the ability of a water body to meet its ecological targets, objectives are also set under the WFD in respect of:
- changes in 'hydromorphological' parameters such as hydrology (tidal flows) and geomorphology (bed forms); and
 - changes in 'physico-chemical' parameters such as dissolved oxygen, salinity and nutrients.
- 1.2.2 Each water body has a hydromorphological designation that describes how modified a water body is from its natural state. Water bodies are either undesignated, designated as a heavily modified water body (HMWB) or designated as an artificial water body (AWB). HMWBs are defined as bodies of water which, as a result of physical alteration by human activities (such as flood protection, port/harbour use, commercial fin-fish and shellfisheries and resource extraction), are substantially changed in character and cannot therefore meet 'good ecological status' (GES), whereas AWBs are artificially created. The default target for HMWBs and AWBs under the WFD is to achieve 'good ecological potential' (GEP). This status recognises the importance of their human use whilst ensuring ecology is protected as far as possible. Good surface water chemical status should also be achieved by 2015 or 2027. Ecological potential and status are measured on a scale of high, good, moderate, poor and bad, while chemical status is measured as either

good or fail. It should be noted that groundwater water bodies are assessed against qualitative status, based on the amount of groundwater present, and chemical (groundwater) status.

- 1.2.3 Compliance with chemical status objectives is assessed in relation to environmental quality standards (EQSs) for a specified list of 'priority' and 'priority hazardous' substances. These priority (hazardous) substances were first established by the Priority Substances Directive (PSD) (2008/105/EC) which entered into force in early 2009. The PSD set objectives, amongst other things, for the reduction of these substances through the cessation of discharges or emissions. As required by the WFD and PSD, a proposal to revise the list of priority (hazardous) substances was submitted in 2012. Subsequently, an updated PSD (2013/39/EU) was published in 2013, identifying new priority substances, setting EQSs for those newly identified substances, revising the EQS for some existing substances in line with scientific progress and setting biota EQS for some existing and newly identified priority substances.
- 1.2.4 It is intended that the 'new' Priority Substances Directive will be transposed into UK legislation in September 2015, ahead of the publication of the second cycle RBMPs (see below), along with revised directions for the Environment Agency. Therefore, at the time of writing, the original Priority Substances Directive (2008/105/EC) effectively remains in force; however, it is considered appropriate to report against revised EQS values (i.e. those presented in Directive 2013/39/EU) where relevant data is available.
- 1.2.5 RBMPs are a requirement of the WFD, setting out measures for each river basin district to improve water quality in rivers, lakes, estuaries, coasts and in groundwater. In 2009, the Environment Agency published the first cycle (2009 to 2015) of RBMPs for England and Wales, reporting the status and objectives of each individual water body. The proposed works at Silvertown are located within the catchment of the Thames RBMP⁵.
- 1.2.6 The Environment Agency is currently updating RBMPs in preparation of the second cycle (2015 to 2021). Draft versions were made available for

⁵ Environment Agency (2009); Thames River Basin Management Plan (RBMP): Thames River Basin District.

consultation in late 2014, including the draft Thames RBMP6. The draft RBMPs present interim results from 2013 and, therefore, provide an indication of water body status that will be reported in the updated RBMPs in 2015. In addition, interim results from 2014 are now available via the Environment Agency Catchment Data Explorer⁷. As the draft RBMPs have not been formally adopted and remain under consultation, it is considered prudent to continue to refer to the existing RBMPs in this assessment and exercise caution in the use of interim results.

Potentially affected water bodies

- 1.2.7 Water bodies to be considered have been selected on the basis of the following criteria:
- all surface water bodies that could potentially be directly impacted by the proposal (i.e. those within the direct footprint of the proposed works);
 - any surface water bodies that have direct connectivity and could potentially be indirectly affected by the proposed works; and
 - any groundwater water bodies that have direct or indirect connectivity to the proposed works.
- 1.2.8 The proposed works are to be located wholly within the Thames Middle water body. Therefore, this surface water body could be affected by the proposed works and is discussed in the following section (Table 10.A-1 provides a summary, including water body status for each parameter assessed).
- 1.2.9 Numerous surface water bodies are located upstream and downstream of the Thames Middle water body. These more distant surface water bodies, all more than 5 km from Silvertown and are therefore not considered to be affected by the proposed works as there will be no physical or environmental effects. Equally, these upstream and downstream water

⁶ Environment Agency (2014); A consultation on the draft update to the river basin management plan for the Thames River Basin District. Part 1: Summary and consultation questions.

⁷ Environment Agency Catchment Data Explorer; <http://environment.data.gov.uk/catchment-planning>; Accessed: 01 September 2015

bodies will not be benefited by the project. Therefore, upstream and downstream water bodies have been scoped out of the assessment.

1.2.10 The Greenwich Tertiaries and Chalk groundwater water body (ID: GB40602G602500), for which the proposed scheme at Silvertown partially overlaps, could be affected by the proposed Scheme. While the construction methods to excavate the material are anticipated to restrict the leaching of contaminants (e.g. drill head lubricants) into the surrounding sediments, it is not possible to scope out the possibility of a significant effect on the groundwater at this time Table 10.A-1 provides a summary of current groundwater status).

1.2.11 Therefore, the water bodies potentially affected are the Thames Middle transitional water body and the Greenwich Tertiaries and Chalk groundwater water body.

Thames Middle water body

1.2.12 The Thames Middle water body (ID: GB530603911402) is a transitional water body, designated a HMWB for coastal protection, flood protection and navigation. The water body currently has an overall moderate potential, based on moderate (uncertain) ecological potential and failing (very certain) chemical status⁸. The overall, ecological and chemical status/potential is determined by the “one-out, all-out” principle, whereby the poorest individual parameter classification defines the assessment level. Therefore, if any ecological parameter is assessed as less than good (e.g. moderate), then the ecological status/potential for that water body is reported at that level.

1.2.13 Moderate ecological potential, based on the assessment of three WFD quality elements (biological, physico-chemical and hydromorphological), is due to the parameters ‘invertebrates’, ‘dissolved inorganic nitrogen’ and ‘dissolved oxygen’ being assessed as moderate (uncertain). In addition, the supporting condition ‘tidal regime – freshwater flow’ has been assessed as ‘does not support good’ (uncertain) and the ‘mitigation measures assessment’ identified numerous measures which are not in place (technically infeasible), both of which contribute to moderate ecological potential.

⁸ Environment Agency (2009); Thames River Basin Management Plan (RBMP): Thames River Basin District.

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- 1.2.14 Chemical status is failing to achieve good as a result of ‘benzo (ghi) perelyene and indeno (123-cd) pyrene’, ‘diuron’ and ‘tributyltin compounds’ (TBT). These three determinands have been assessed as fail, albeit with varying degrees of confidence (quite certain, uncertain and very certain, respectively).
- 1.2.15 The current RBMP classification (2009) is reflected in the latest interim results (2014) whereby the Thames Middle water body is considered to have overall moderate potential, with moderate ecological potential and failing to achieve good chemical status. However, in terms of ecological potential, the biological quality element ‘angiosperms’ has also been assessed as moderate (not assessed in 2009), the biological quality element ‘macroalgae’ has been downgraded from high to good and the specific pollutant ‘zinc’ has been downgraded from high to moderate. With regard to chemical status, the priority (hazardous) substances ‘benzo(a)pyrene’ and ‘fluoranthene’ have been downgraded from good to fail and ‘dichlorvos’ has been assessed as fail (not assessed in 2009) in the interim classifications.
- 1.2.16 It should be noted that in the interim classifications (2014) the biological quality elements ‘invertebrates’ and ‘fish’ were assessed as good and the biological quality element ‘phytoplankton blooms’ was assessed as high. While invertebrates were assessed as moderate in 2009, fish and phytoplankton blooms were not previously assessed.

Table 10.A-1 WFD parameters for the Thames Middle water body based on 2009 RBMP classifications and 2014 interim results

Parameter	Thames Middle	
	2009	2014
Water Body ID	GB530603911402	
Water Body Area	44.21 km ²	
Water Body Type	Transitional	
Hydromorphological Designation	HMWB	
Overall Potential	Moderate	Moderate
Ecological Potential	Moderate	Moderate
Chemical Status	Fail	Fail
Angiosperms	-	Moderate

Parameter	Thames Middle	
	2009	2014
Fish	-	Good
Invertebrates	Moderate	Good
Macroalgae	High	Good
Phytoplankton Blooms	-	High
Dissolved Inorganic Nitrogen	Moderate	Moderate
Dissolved Oxygen	Moderate	Moderate
Hydrological Regime (Freshwater Flow)	Does not support good	-
Mitigation Measures Assessment	Moderate (measures not in place)	Moderate (measures not in place)
2,4-Dichlorophenol	High	High
2,4-Dichlorophenoxyacetic Acid	High	High
Arsenic	High	High
Copper	High	High
Dimethoate	High	High
Iron	High	High
Linuron	High	High
Mecoprop	High	High
Permethrin	High	High
Toluene	High	High
Un-Ionised Ammonia	High	High
Zinc	High	Moderate
Supporting Elements (Surface Water)	Moderate	Moderate
Aldrin, Dieldrin, Endrin and Isodrin	Good	Good
Carbon Tetrachloride	Good	Good
DDT Total	Good	Good

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Parameter	Thames Middle	
	2009	2014
Para - para DDT	Good	Good
Tetrachloroethylene	Good	Good
Trichloroethylene	Good	Good
Benzo (b) and (k) fluoranthene	Good	-
Benzo(ghi)perelyene and Indeno(123-cd)pyrene	Fail	-
Benzo(a)pyrene	Good	Fail
Cadmium and Its Compounds	Good	Good
Endosulfan	-	Good
Hexachlorobenzene	Good	-
Hexachlorobutadiene	Good	-
Hexachlorocyclohexane	Good	Good
Mercury and Its Compounds	Good	-
Nonylphenol	-	Good
Tributyltin Compounds	Fail	Fail
Trifluralin	Good	Good
1,2-Dichloroethane	Good	Good
Atrazine	Good	Good
Benzene	Good	Good
Dichlorvos	-	Fail
Diuron	Fail	-
Fluoranthene	Good	Fail
Lead and Its Compounds	Good	Good
Napthalene	Good	Good
Nickel and Its Compounds	Good	Good
Pentachlorophenol	Good	Good
Simazine	Good	Good

Parameter	Thames Middle	
	2009	2014
Trichlorobenzenes	Good	Good
Trichloromethane	Good	Good

1.2.17 The Thames Middle water body is designated under various legislation, including:

- Freshwater Fish Directive (2006/44/EC);
- Natura 2000 - Habitats/Birds Directive (92/43/EEC and 2009/147/EC);
- Nitrates Directive (91/676/EEC); and
- Urban Waste Water Treatment Directive (91/271/EEC).

1.2.18 In addition to the individual WFD parameters outlined in Table 10.A-1, water quality directives and protected areas must be considered. For example, nitrate vulnerable zones (NVZs), Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) within 2km of the proposed works will be scoped into the assessment.

Greenwich Tertiaries and Chalk groundwater water body

1.2.19 The Greenwich Tertiaries and Chalk water body (ID: GB40602G602500) is a groundwater water body, designated as a Drinking Water Protected Area. The water body currently has an overall poor status based on poor quantitative status and poor chemical (groundwater) status⁹. Poor quantitative status is due to the elements 'Quantitative Dependent Surface Water Body Status' and 'Quantitative Saline Intrusion' being assessed as poor. Chemical (groundwater) status is poor as a result the elements '*Chemical Drinking Water Protected Area*' and '*Chemical Saline Intrusion*'.

1.2.20 The current RBMP classification (2009) is reflected in the latest interim results (2014) whereby the Greenwich Tertiaries and Chalk groundwater water body is considered to have overall poor status, with poor quantitative status and poor chemical (groundwater) status.

⁹ Environment Agency (2009); Thames River Basin Management Plan (RBMP): Thames River Basin District.

Table 10.A-2 WFD parameters for the Greenwich Tertiaries and Chalk groundwater water body based on 2009 RBMP classifications and 2015 interim results

Parameter	Greenwich Tertiaries and Chalk	
	2009	2015
Water Body ID	GB40602G602500	
Water Body Area	81.5 km ²	
Water Body Type	Groundwater	
Overall Status	Poor	Poor
Quantitative Status	Poor	Poor
Chemical (Groundwater) Status	Poor	Poor
Quantitative Dependent Surface Water Body Status	Poor	Good
Quantitative GWDTEs test	Good	Good
Quantitative Saline Intrusion	Poor	Poor
Quantitative Water Balance	Good	Poor
Chemical Dependent Surface Water Body Status	Good	Good
Chemical Drinking Water Protected Area	Poor	Good
Chemical GWDTEs test	Good	Good
Chemical Saline Intrusion	Poor	Poor
General Chemical Test	Good	Good

1.3 WFD compliance assessment

1.3.1 The WFD compliance assessment must determine whether the proposed works could cause a change to the status of WFD water bodies or change the ability of a water body to meet its future objectives. The assessment terminology must refer to the objectives set under the WFD for all water bodies, whereby developments/schemes must:

- Not cause deterioration in status/potential;
- Not prevent the achievement of good status/potential by 2027;

- Not infringe or be in breach of other legislation; and
- Where possible, attempt to enhance the environment.

1.3.2 The proposed works at Silvertown, including the construction of a temporary jetty, an associated dredge and a potential disposal at sea of the dredge arisings (although currently assumed to be going to land), as well as the tunnel construction, are not considered to contradict other legislation and they are not anticipated to contribute towards an improvement in WFD status/potential of the Thames Middle water body or Greenwich Tertiaries and Chalk groundwater water body.

1.3.3 Based on the suite of WFD parameters reported for the Thames Middle water body in Table 10.A-1, the following parameters (i.e. those currently failing to achieve good status/potential) will be assessed against the first two objectives listed above:

- Angiosperms;
- Invertebrates (although assessed as good in 2014);
- Macroalgae (assessed as good in 2014, but was high in 2009);
- Dissolved inorganic nitrogen;
- Dissolved oxygen;
- Hydrological regime (freshwater flow);
- Mitigation measures assessment;
- Zinc;
- Supporting Elements (Surface Water);
- Benzo(ghi)perelyene and indeno(123-cd)pyrene;
- Benzo(a)pyrene;
- Tributyltin Compounds;
- Dichlorvos;
- Diuron; and
- Fluoranthene.

- 1.3.4 The remaining parameters will be assessed against the objective of not causing deterioration in status/potential from their current classification of good or high. In some instances, WFD parameters will not be assessed as part of the EIA and, therefore, the potential impact(s) of the project will be considered separately.
- 1.3.5 Similarly, the following parameters (i.e. those currently failing to achieve good status) will be assessed against the first two objectives listed above with regards the Greenwich Tertiaries and Chalk groundwater water body (Table 10.A-2):
- quantitative dependent surface water body status (although assessed as good in 2015);
 - quantitative saline intrusion;
 - quantitative water balance (assessed as good in 2009, but was poor in 2015);
 - chemical drinking water protected area (although assessed as good in 2015); and
 - chemical saline intrusion.
- 1.3.6 There is currently no specific guidance about the application of the WFD to marine/estuarine construction projects. Therefore, the WFD compliance assessment will include consideration of the guidance set-out in the existing Environment Agency '*Clearing the waters*' user guide for marine dredging activities^{10,11,12}. The guidance sets out a staged approach to ensuring WFD compliance i.e. screening, scoping, assessment and evaluation. As a new dredging and disposal project, and considering the associated tunnel construction, the proposed development is screened directly to the scoping stage.

1.4 Further work to be done

¹⁰ Environment Agency (EA) (2012); *Clearing the waters*. Marine dredging and the Water Framework Directive. Stage two: the scoping process.

¹¹ Environment Agency (EA) (2012); *Clearing the waters*. Marine dredging and the Water Framework Directive. Stage three: assessment.

¹² Environment Agency (EA) (2012); *Clearing the waters*. Marine dredging and the Water Framework Directive. Stage four: identification and evaluation of measures.

- 1.4.1 The potential for the proposed Scheme to cause a 'deterioration' or failure of the water body to meet its WFD objectives will be reviewed once further Scheme assessment work (particularly physical processes, water/sediment quality and marine ecology) has been completed.
- 1.4.2 Scoping (Stage 2) will consider each parameter reported for the Thames Middle (see Table 10.A-1) and Greenwich Tertiaries and Chalk groundwater (Table 10.A-2) water bodies to identify if activities could be a potential cause of failure of WFD objectives. This scoping stage will be consulted on with the Environment Agency and other relevant stakeholders. For those parameters for which a failure could occur, this will be followed by an assessment (Stage 3) to consider whether the proposed Scheme will compromise the achievement of measures set out in the Thames RBMP programme of measures and/or cumulative effects. Finally, where necessary, measures to remove or reduce the effect on the status of the Thames Middle and/or Greenwich Tertiaries and Chalk groundwater water bodies to an acceptable level and/or exploiting opportunities for environmental improvement will be identified (Stage 4).
- 1.4.3 This will be presented as a technical appendix within the Environmental Statement.