SILVERTOWN TUNNEL

Volume 8

Development Consent Order Application

Response to ExA's First Written Questions:

8.8 Principal Issue: Geology, soils and contaminated land

The Infrastructure Planning (Examination Procedure) Rules 2010

November 2016

MAYOR OF LONDON

TRANSPORT FOR LONDON

EVERY JOURNEY MATTERS

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Geology, soils and contaminated land

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GS GEOLOGY, SOILS AND CONTAMINATED LAND

GS.1 Question

The ExA notes that a number of reports are referenced in Chapter 12 of the ES [APP-031] including the 'Silvertown Tunnel Ground Investigation Report'. (Ref 12-25 of ES Chapter 12), Ref 12-23 (Desk Study), Report on a Ground Investigation for Silvertown Tunnel (Ref. 12-24), Preliminary Dewatering Risk Assessment (Ref 12-26) and UXO Survey Reports (Ref 12-37, Ref 12-38 and Ref 12-39, see ES paragraph 12.4.9). Although these reports have been summarised in the ES they are not provided to the Examination.

Please submit copies of these reports into the Examination.

Response

GS.1.1 The following reports referenced in Chapter 12 of the ES (APP-031) are appended:

- Ref 12-23 Mott MacDonald (2013), TfL River Crossings – Ground Investigation Desk Study, Preliminary Sources Study Report (Part 1 to 4), located in Appendix A to D.
- Ref 12-24 Soil Engineering (June 2015), Report on a Ground Investigation for Silvertown Tunnel (Volume 1 to 5), located in Appendix E to I.
- Ref 12-25 Atkins (October 2015) Silvertown Tunnel Ground Investigation Report located in Appendix J.
- Ref 12-26 Atkins (February 2016), Silvertown Tunnel Preliminary Dewatering Risk Assessment (Part 1 to Part 11), located in Appendix K to U.
- Ref 12-39 EGS International Ltd (2014), Silvertown Tunnel UXO Survey (Part 1 to 4), located in located in Appendix V to Y.
- Ref 12-38 Alpha6 Associates (2015), Technical Analysis Concerning Prospective UXO, located in Appendix Z.

- Ref 12-37 SeaStar Survey (February 2016), Thames Estuary Unexploded Ordnance (UXO) Survey – Silvertown Tunnel, Field Report", Appendix AA.

GS.2 Question

Baseline conditions at the Greenwich peninsula are described in terms of the Greenwich Peninsula Remediation Strategy Framework Report. Ground conditions across the Greenwich site are described at ES paragraph 12.4.58, including that there is a "barrier" layer of material separated from contaminated ground by a marker (usually an orange coloured plastic mesh sheet) with contaminants underneath including tars (PAH), mineral oil and petroleum hydrocarbons, benzene, cyanide, phenols, ammonia, sulphate and sulphide, and heavy metals, with further potential for asbestos. Please explain whether this has any bearing on Compulsory Acquisition (CA) issues? For example, if the works affect the release of contamination within the "barriered material" to offsite areas that are not under CA or within the order limits, who has the obligation to remediate or otherwise deal with the issue?

Response

GS.2.1 As set out in the CoCP (APP-092), aspects of construction of the Scheme will be controlled through a Construction Environmental Management Plan (CEMP), which includes procedures for dealing with contamination. The CoCP also makes provision for groundwater monitoring (as part of a Groundwater and Monitoring Verification Plan) to be undertaken as part of the construction works, to ensure that there are no impacts to groundwater as a result of the Scheme

GS.2.2 The main regime which deals with contamination in the UK is the Contaminated Land Regime, set out in Part 2A of the Environmental Protection Act 1990.

GS.2.3 The Contaminated Land Regime provides for a person who caused or knowingly permitted contamination to be an "appropriate person", on whom a remediation notice can be served by the relevant local authority in whose area the contamination arises, or by the Environment Agency (EA) in the case of contamination involving controlled waters.

GS.2.4 In the unlikely event that the works cause the release of contamination within the "barriered material" to offsite areas, including areas that are not under CA or within the order limits, and the relevant land was or was in such a state that it could be designated as "contaminated land", the Applicant, as the developer undertaking the works which caused the new contaminant linkage, would therefore be responsible for remediating or

otherwise dealing with the escaped contamination, under the Contaminated Land Regime. This is often undertaken on a voluntary basis following discussions with relevant regulators, but a remediation notice can also be served by the relevant local authority or the EA, requiring specific remedial actions to be undertaken.

GS.2.5 The Contaminated Land Regime provides for a person whose consent is required in order to access land for the purpose of implementing a remediation notice to be required to grant access rights to enable such implementation, and for the person undertaking the relevant works to pay compensation in respect of the access rights granted.

GS.2.6 The Applicant would therefore be obliged under the Contaminated Land Regime to undertake remediation of a contaminant linkage caused by works in connection with the Scheme.

GS.2.7 Section 78G of the Environmental Protection Act 1990 creates a process by which TfL would be able to obtain access to neighbouring land not within the CA or Order Limits for the purposes of doing so (in the event that this was necessary).

GS.3 Question

The ES, at paragraph 12.4.56 [APP-031] states that an environmental permit will be required for the Greenwich Peninsula Environmental Method Statement (EMS)/Integrated Management System (IMS) however this is not listed in paragraph 12.5.17, which lists all environmental permits.

Please review the list of required permits and ensure that all required permits are listed, and provide an updated list, if necessary, as well as updating the consents and agreements position statement [APP-106].

Response

GS.3.1 The consents and agreements position statement (APP-106) does not need to be updated on the basis of the following:

GS.3.2 Paragraph 12.4.56 of the ES (APP-031) states that '*prior to physical works commencing, an environmental permit to excavate is needed to comply with the EMS*.'

GS.3.3 The wording used in the ES, paragraph 12.4.56 (last sentence), page 12-56 is in error, and should read as follows:

'*In addition, prior to physical works commencing, all necessary environmental permits to excavate need to be obtained to comply with the EMS*.'

GS.3.4 Only two key environmental permits are required for excavation, as listed in paragraph 12.5.22 of the updated Chapter 12 (submitted at deadline 1), they include:

- Discharge Licence; and
- Mobile Treatment Plant Licence.

GS.3.5 The Greenwich Peninsula EMS includes a number of Codes of Practice with respect to excavation and environmental permit needs, including:

GS.3.6 Code of Practice for Waste Management (Ref. EMS-COP-03) states that:

'*All works shall seek to minimise the generation of waste, where treatment of waste is proposed, appropriate Waste Management Licensing, as*

outlined within the Environmental Permitting Regulations 2015 shall be followed….'

GS.3.7 With respect to the proposed Scheme, the Environmental Permitting Regulations 2015 includes provisions for water discharge activities, mobile plant, waste operations, and groundwater activity. The Waste Management Licence (required by the EMS for the Scheme) would fall under the Environmental Permitting Regulations requisite for a Mobile Plant Licence (paragraph 12.5.22 of the updated Chapter 12, submitted at deadline 1), no other licences would be required in this regards.

GS.3.8 Code of Practice for Dewatering (Ref. EMS-COP-04) states that:

'*Consents must be obtained for all water discharges.'* And that, *'All discharge of groundwater must have the explicit consent of either the EA and/or statutory water company as appropriate*.'

GS.3.9 This has been identified as a permitting requirement in the updated Chapter 12, paragraph 12.5.22 (submitted at deadline 1).

GS.3.10 The CoCP for Dewatering (Ref. EMS-COP-04) also notes that:

'*Dewatering is expected to become a licensable activity from 2016. Abstraction above certain rates will require an abstraction licence. The Environment Agency should be contacted from 2016 onward regarding planned or ongoing dewatering to determine if a licence is required.*'

GS.3.11 The EA were consulted on this matter during the meeting held on 16 November 2015 (Table 12-2, page 18). The EA confirmed that dewatering was currently exempt but that licensing is likely to come into force in 2016. Paragraph 12.5.24 of the Updated Chapter 12 (submitted at deadline 1), recognises a potential need for a dewatering licence, but identifies that the '*draft DCO includes a provision disapplying the requirement under Section 24 of the Water Resources Act. Management of abstraction would instead be managed by the controls enforced through the Groundwater Monitoring and Verification Plan, which is secured through the CoCP*'.

GS.3.12 Code of Practice for General Earthworks (Ref. EMS-COP-05) states that:

'*General earthworks do not require an Environmental Permit*.' And that, '*In certain circumstances, temporary stockpiling may require an Environmental Permit. The Environment Agency shall be consulted specifically in respect to this activity.*'

GS.3.13 Any temporary stockpiling located in Greenwich may therefore require an Environmental Permit. Although the EA have not identified this as a specific requirement during the consultation period, the EA shall be consulted at the detailed design stage to determine if a permit is required.

GS.3.14 Pending the outcome of consultation with the EA at detailed design, the list of environmental permits included in the ES, paragraph 12.5.22, page 12-66 may need to be updated to include for Temporary Stockpiling within the Greenwich Peninsula area.

GS.3.15 An updated version of ES Chapter 12 has been submitted at deadline 1, this includes the amendment to paragraph 12.4.56. The wording in the updated CoCP (submitted at deadline 1) at paragraph 9.3.7 identifies the environmental permits required and does not require amendment.

GS.4 Question

A number of Work Method Statements (WMS) are required for the Greenwich Peninsula EMS.

Can the Applicant please explain how and when the WMSs would be produced and how they would to be secured in the dDCO?

Please can the Applicant provide a copy of the Greenwich Peninsula EMS document to the Examination as a PDF?

Response

GS.4.1 Work Method Statements (WMS) would need to be produced by the appointed Contractor and prior to works commencing on site. As stated in Chapter 12 of the ES (updated and submitted at deadline 1), paragraph 12.5.8:

'*As described in the ES within Chapter 4 – Scheme Description, the Contractor will be obliged to prepare* ***detailed method statements*** *and adopt appropriate controls and protocols prior to commencing the enabling works. This is required to satisfy the general requirement to safeguard against risks to the environment.*'

GS.4.2 These measures are secured through the updated CoCP (submitted at deadline 1), which in turn is secured by Requirement 5 to the dDCO. For example, in the case of contaminated land, paragraph 9.2.3 of the CoCP (page 57) states that:

'*The Contractor will prepare the detailed method statements for dealing with contaminated land and adopt appropriate controls and protocols prior to commencing the works*.'

GS.4.3 In relation to the Greenwich Peninsula specifically, paragraph 9.2.4 of the updated CoCP (submitted at deadline 1) states that:

'*..the contractor will follow measures outlined within "The Greenwich Peninsula Environmental Method Statement" (EMS), which details area specific development / construction measures to manage mobilisation potential of existing contamination.*'

GS.4.4 Where necessary, these statements (and wherever applicable) have been updated in Chapter 12 to say that '*Work Method Statements will be produced in accordance with the EMS'* and a definition will be included in

the glossary to relate 'WMS' to 'detailed method statements' terminology. An updated Chapter 12 has been submitted at deadline 1.

GS.4.5 The Applicant is aware that the Greenwich Peninsula EMS has been updated since the Application was submitted, the most recent version, dated 2016 is included in Appendix BB to DD.

GS.5 Question

Please can the EA provide an update on the status of the Greenwich EMS and explain whether it is to be further reviewed/updated during the examination?

Please can the Applicant provide a response to the EA's RR [RR-299] in relation to the need to update the groundwater monitoring programme to ensure that it includes actions to be taken when alert or trigger levels are reached?

How would this be secured in the dDCO?

Response

GS.5.1 The Groundwater Monitoring Strategy (provided as appendix F to the updated CoCP) has been prepared in consultation with the Environment Agency. The document sets out a strategy to monitor and manage the effects of the Silvertown Tunnel development, during and post construction, on groundwater quality and quantity within both the Upper and Lower Aquifers across affected areas of Greenwich Peninsula and Silvertown as a result of construction (including dewatering if required). The strategy sets out the development and implementation of baseline groundwater monitoring, where the data will be used to inform development of alert and trigger levels for construction.

GS.5.2 As set out in Section 4.3 of the Draft Groundwater Monitoring Strategy:

'Alert levels will be used on a day-to-day basis by the Contractor. Alert levels aim to draw the attention of the Contractor's site management team to the development of adverse trends in groundwater conditions. The alert levels should be treated primarily as an early warning system to enable appropriate investigative or corrective measures to be implemented so that the risk of breaching a compliance limit can be reduced and before impacts can cause harm to the environment or human health.

Comparison of measured water quality with trigger levels will be used to demonstrate compliance with agreed water quality standards to stakeholders. Trigger levels are standards to be agreed with the Environment Agency through the approval of the Groundwater Monitoring and Verification Plan. Breaches of the trigger levels should be prevented. Should a breach of a trigger level occur a Contingency Action plan will be

implemented, this is outlined in Section 4.7 of the Ground Monitoring Strategy.

Alert and trigger levels will not be derived for every water quality monitoring determinant. Instead, key indicator parameters will be identified using a risk-based approach that reflects the baseline water quality dataset, extent of dewatering required, discharge points and identified receptors. The indicator parameters will be agreed with the Environment Agency through the approval of the Groundwater Monitoring and Verification Plan. The choice of indicator parameters will be reviewed by the Contractor at least annually for adequacy; any proposed changes must be approved by TfL and the Environment Agency prior to implementation.

Alert and trigger levels may be derived on a borehole-specific basis. The levels will be based on the baseline dataset and will take into account existing variability and trends. Statistical methods will be used, where possible, to derive appropriate alert and trigger levels. The alert and trigger levels will be reviewed at least annually by the Contractor for adequacy; any proposed changes must be approved by TfL and the Environment Agency prior to implementation.

The alert and trigger levels, and associated procedures, will determine whether contingency plans need to be activated. The assessment process will involve evaluation of the significance of a departure from baseline conditions.'

GS.5.3 The EA has been consulted on the draft Groundwater Monitoring Strategy and in a letter dated 24th August 2016 (Appendix EE) the EA confirmed they have no objections to the general strategy which is proposed.

GS.5.4 Section 1 of the Draft Groundwater Monitoring Strategy states the document provides the necessary overarching framework to allow for production of a detailed Groundwater Monitoring and Verification Plan, as part of detailed design and as required by the Code of Construction Practice.

GS.5.5 Paragraph 9.3.9 of the updated CoCP (APP-092) outlines the Groundwater Monitoring and Verification Plan to be prepared prior to construction and approved by the Environment Agency. This is secured by Requirement 5 of the dDCO (APP-013), which requires that the development must be carried out in accordance with the Code of Construction Practice.

GS.5.6 The updated CoCP has been submitted at Deadline 1. Para 9.3.11 has been included to ensure the Groundwater Monitoring and Verification Plan is prepared in accordance with the Groundwater Monitoring Strategy.

GS.6 Question

Please can the Applicant explain the discrepancy between the ES assessment, where a limit of deviation (LoD) of 3 metres above and below the scheme parameters are assessed (as specified in ES paragraph 12.3.18), and the dDCO at Article 5(1)(b)(ii) where the downwards LoD appears to be unlimited?

Should works be required outside the 3 metre downwards deviation, the Applicant is requested to explain how this has been assessed in the ES on a topic-by-topic basis.

In particular, please could the Applicant clarify the effect that a downward deviation greater than that specified in ES paragraph 12.3.18 would have on the conceptual model developed and described in table 12-6 of the ES [APP-031]?

Response

GS.6.1 It should be noted that Chapter 4 Scheme Description of the ES (APP-31), paragraph 4.4.2 states the 'maximum vertical deviation of the Scheme design is +0.5m for above ground elements, and +3.0m for the below ground tunnel elements. The Scheme may deviate downwards to any extent necessary.'

GS.6.2 The terminology the '….extent downwards that is found to be necessary or convenient' used in Article 5(1)(b)(ii) of the dDCO is well precedented, having also been used on the Thames Tideway Tunnel DCO, the M1 Junction 10A DCO, all of the rail DCOs made to date, and the Northern Line Extension Transport and Works Act Order. Section 1(4) of the Crossrail Act 2008 also allows for any deviation downwards (with no restriction on it needing to be found necessary or convenient). Such wording provides flexibility should a currently unknown obstruction be encountered.

GS.6.3 In practice, design parameters for road tunnels (alignment and environmental) would effectively limit the amount of downward deviation. However, if tunnelling works were required at an LoD greater then 3 metres, effects would be limited to those described in Chapter 12 of the ES (as updated at Deadline 1). This considers the effects of the Scheme in relation to geology and soils, groundwater, human health, the built environment, unexploded ordnance, obstructions, and scour hollows, and

with respect to strata deeper than the 3 metres stated in the baseline assessment.

GS.6.4 Chapter 12 of the ES (APP-31) paragraph 12.3.18 sets out the assumptions that the assessment in that Chapter is based on, and states a LoD of 3 metres below the Scheme. However dDCO article 5(1)(b)(ii) is correct and the downward LoD will be unlimited. Paragraph 12.3.18 of Chapter 12 has been amended to state 3 metres above and any depth below (submitted at Deadline 1).

GS.6.5 Paragraphs 12.5.11 – 12.5.13 of the updated ES (submitted at Deadline 1) address the possibility that unforeseen conditions may require the vertical alignment to deviate downwards, and discusses how the detailed scheme design will take this into account. This has led to this issue being considered within the assessments in the ES as follows:

Geology and Soils

GS.6.6 A description of the geology and soils is given in the ES (paragraph 12.4.4 to paragraph 12.4.13) that extends to and includes the Chalk formation, the lowest potential formation that could be feasibly affected by the Scheme (including any vertical deviation downwards to any extent necessary).

GS.6.7 A summary of contamination potential is then provided (paragraph 12.4.32 to paragraph 12.4.65) based upon desk studies and ground investigations undertaken, and other relevant evidence. This considers contamination of soils encountered and groundwater within the deeper and lower aquifers.

GS.6.8 The need to undertake a risk based approach to mitigate against potentially adverse impacts of contamination identified (as above) is then considered on the basis of limiting potentially adverse impacts that are sensitive to the final detailed design (paragraph 12.5.6 to paragraph 12.5.8).

GS.6.9 No further assessment is therefore required in the ES in this regard.

Groundwater

GS.6.10 A description of groundwater conditions is given in the ES (paragraph 12.4.14 to paragraph 12.4.27) that extends to and includes the Chalk formation, the lowest potential formation that could be feasibly affected by the Scheme (including any vertical deviation downwards to any extent

necessary). This includes consideration of groundwater levels and flows, existing abstractions, and significant hydrogeological features.

GS.6.11 Controls to manage groundwater effects are then discussed (paragraph 12.5.9 to paragraph 12.5.26) , recognising that "further detailed assessment of dewatering requirements and any related potential impacts may be required at detailed design stage, depending on the final design outcomes." The discussion also includes unexpected ground and groundwater conditions, and identifies a monitoring strategy and what permits and licences are required to manage the process.

GS.6.12 No further assessment is therefore required in the ES in this regard.

Human Health

GS.6.13 Assessment of impacts to human health is linked back to the Geology and Soils section (see above).

GS.6.14 No further assessment is therefore required in the ES in this regard.

Built Environment (Settlement)

GS.6.15 The mitigation of risks associated with settlement potential is considered in the ES (paragraph 12.5.28 to paragraph 12.5.38) including excavation induced settlement and that which could be caused by large scale dewatering (i.e. dewatering from the lower aquifer) and will therefore account for any changes to the final design depth. Measures are proposed that are secured within the updated CoCP (submitted at deadline1).

GS.6.16 No further assessment is therefore required in the ES in this regard.

Unexploded Ordnance

GS.6.17 The mitigation of risks associated with unexploded ordnance is considered in the ES (paragraph 12.5.39 to paragraph 12.5.40) recognising that 'a detailed UXO mitigation strategy will be developed for the project prior to construction commencing' and will therefore account for any changes to the final design depth. Such measures will be secured within the updated CoCP (submitted at deadline 1).

GS.6.18 No further assessment is therefore required in the ES in this regard.

Built Environment (Obstructions)

GS.6.19 Obstructions are considered in relation to any (e.g. piles) extending down to the London Clay (paragraph 12.5.41 to paragraph 12.5.43). A downward deviation of the design has no bearing on the assessment considered.

GS.6.20 No further assessment is therefore required in the ES in this regard.

Geotechnical Hazards – Scour Features

GS.6.21 No scour features have yet been identified as a part of the design. Should a scour feature be encountered this will likely lead to the need to consider a downward deviation in the Scheme design. A geophysical and bathymetric survey is proposed that will feed into the detailed design requirements of the Scheme.

GS.6.22 No further assessment is therefore required in the ES in this regard.

GS.6.23 The conceptual model presented in the ES, Table 12-6 already considers strata and groundwater lower than the 3 m LoD described. This includes a description of the Chalk, which is present greater than 30 m below ground level on the Greenwich side and increasing to 50 m below ground level on the Silvertown side.

GS.6.24 The comment column of Table 12-6 has been updated in Chapter 12 (submitted at deadline 1) to reflect the potential increase in LoD beyond the 3 m LoD stated in the ES baseline assessment. The update has not resulted in any change to the assessment presented and no further amendments are required.

GS.7 Question

Please confirm that the ES [APP-031] has assessed all construction scenarios in relation to effects on ground water barriers?

If there is a likelihood of other construction methods which may cause different effects, how can the approach taken justify the worst case scenario?

Response

GS.7.1 The ES (updated and submitted at deadline 1) identified the potential for groundwater barrier effects created from the tunnel construction (paragraph 12.5.77 and paragraph 12.6.41 to paragraph 12.6.50). Whilst the potential for barrier effects will develop during construction, the impacts would remain during operation due to the finished tunnel and cut-and-cover sections (e.g. secant pile or diaphragm walls).

GS.7.2 The ES describes the likely effects from damming of groundwater as a result of the Scheme as follows(paragraph 12.6.49). '..*given the likelihood of high permeability conditions in the RTD (River Terrace Deposits) and the diurnal and tidal nature of groundwater level changes, any risk is likely to be small. Where damming effects are identified as being significant (relatively), suitable mitigation ...such as passive groundwater level management.. would be included in the detailed design'.*

GS.7.3 These likely effects (or effects not greater than these) would arise from any sequence and method of tunnel construction utilised to construct the Scheme. Thus this assessment would cover all construction scenarios and can therefore be justified as the worst case scenario.

GS.7.4 This is because the greatest risk of groundwater barrier effects would result from complete cut-off of near-surface deposits and shallow groundwater by the cut-and-cover tunnel section, which (where present) could lead to a (surmountable) rise in groundwater levels. Any such rise could affect buried services (for example) in the local vicinity of the construction footprint. However, this could easily be mitigated in design, such as inclusion of passive groundwater level management and drainage control measures, which would be approved by the Environment Agency, pursuant to the Protective Provisions in the dDCO (as described in response to GS9).

GS.7.5 The risk is reduced for TBM sections of the tunnel as '*..the effective thickness of the lower aquifer is large enough to enable some flow to simply bypass the obstruction caused by the works.*' (ES paragraph 12.6.46).

GS.7.6 Furthermore, paragraph 12.6.45, states:

'Given the tidal nature of groundwater in the shallow aquifer and the curvature of the River Thames in the vicinity of the Scheme, the tunnel is unlikely to cause an elevation of groundwater levels once construction is complete because groundwater flow is more likely than not to be multi-directional.'

GS.8 Question

The ES makes a number of references to further detailed design assessments that are to be carried out and that these may require alterations to the construction techniques employed and the mitigation. Examples of this are at paragraphs 12.5.2 and 12.5.13 [APP-031].

(a) How would these further assessments be secured through the dDCO?

(b) How would these further assessments be consulted upon?

(c) How would the results of these assessments be approved?

(d) What is the process, should an impact be uncovered that is outside that which has been assessed in the ES?

Response

GS.8.1 The Applicant considers that the ES references detailed design assessments in the following places:

Cultural Heritage and Archaeology

GS.8.2 This chapter (Chapter 8) explains that preliminary assessments have identified the potential for settlement effects to the Grade II listed Blackwall Tunnel entrance building, and that appropriate mitigation measures would be developed further to detailed design assessments.

GS.8.3 However, as set out in paragraph 8.6.9 of the ES, this will be dealt with through the settlement process set out in Chapter 10 and Appendix A to the Code of Construction Practice ('the CoCP') secured by Requirement 5 in Schedule 2 to the dDCO. Paragraph A.1.4 of Appendix A to the CoCP also explains that Historic England shall be consulted on the results of the Listed Building assessment reports and the proposals for protective measures, if any are required.

GS.8.4 As set out in that paragraph, the assessment in the ES is based on these settlement mitigation measures being applied if necessary. No further provision therefore needs to be made for them through the dDCO.

Terrestrial Ecology

GS.8.5 Similarly, the terrestrial ecology assessment, as set out in paragraphs 9.6-9.11 of the ES, has been carried out on the basis that a detailed design assessment will need to be taken to ascertain the full extent of off site replacement habitats.

GS.8.6 This is further secured by requiring the Scheme to comply with the Biodiversity Action Plan and Mitigation Strategy (APP-065) through the Design Principles (APP-096). It is therefore considered that no additional provision is needed in the dDCO on this topic.

Geology, Soils and Hydrogeology

GS.8.7 It is acknowledged that Chapter 12 of the ES makes a number of references to further assessments at the detailed design stage.

GS.8.8 However, the Applicant considers that suitable provision for their control is included within the CoCP; the documents, consent, licences and plans required to be produced or procured under it; and by the fact that detailed plans for works affecting water quality and the distribution of water resources will be required to be approved by the Environment Agency, pursuant to the protective provisions for their benefit contained within Schedule 13 to the dDCO.

GS.8.9 Thus, the references to dewatering in paragraphs 12.5.4 and 12.5.9 of the ES will be dealt with by the obligation to minimise dewatering requirements at paragraph 9.2.1 of the CoCP and the measures within section 9.3 of the same.

GS.8.10 Furthermore, controls and monitoring in relation to groundwater, as referenced at paragraph 12.5.13 will be dealt with by the measures in section 9.3, and in particular the Groundwater Monitoring and Verification Plan, which will be approved by the Environment Agency.

GS.8.11 However, the Applicant also notes that the need for further assessment is expressed within the Scheme design section of the ES. The assessment and suggested mitigation measures therefore reflect the fact that it is acknowledged that these further assessments will be needed. Thus, for example at paragraph 12.5.13, there is an assumption that if the detailed design indicates an unacceptable risk, adequate mitigation will be included in the detailed design to address it and thereby ensure that the resultant effects are no worse that the assessed in the ES.

GS.8.12 The Applicant therefore submits that the DCO does not need to make provision for detailed design assessments that could find results outside the scope of the ES, as the ES already takes the potential for such results into account.

GS.8.13 ***Noise***

GS.8.14 Paragraph 14.5.2 of the ES refers to an updated construction noise assessment being undertaken based on the detailed design and construction methodology.

GS.8.15 This is secured by paragraph 11.2.2 of the CoCP, which will inform the Noise and Vibration Management Plan as necessary. This plan will be approved by the relevant planning authority prior to commencing construction. Compliance with both the CoCP and the Noise and Vibration Management Plan is secured by Requirement 5 in Schedule 2 to the dDCO.

GS.8.16 To aid in the understanding of this, the revised CoCP submitted at Deadline 1 makes it explicitly clear that the updated construction noise assessment will inform the Noise and Vibration Management Plan.

GS.8.17 As set out at paragraph 14.3.102 of the ES, the assessment for construction noise for the Scheme has been undertaken on the basis of reasonable likely effects, and so it is considered very unlikely that the revised assessment will identify impacts other than those reported in the ES.

GS.8.18 However, to make allowances for this, the following wording has been added to the revised CoCP submitted at Deadline 1 in respect of the Noise and Vibration Management Plan:

"The Noise and Vibration Management Plan referred to above must either reflect the mitigation measures included in the environmental statement or, where the mitigation proposed materially differs from the mitigation identified in the Environmental Statement, the Contractor must provide evidence with the Noise and Vibration Management Plan submitted for approval to the relevant planning authority that the mitigation proposed would not give rise to any materially new or materially worse adverse environmental effects than those reported in the Environmental Statement taking into account the mitigation identified in it."

GS.9 Question

Paragraph 12.7.5 of the ES [APP-031] sets out a number of scenarios which will require further consideration in designing groundwater barriers.

Why is it not possible for the Applicant to undertake this assessment now, so that the results may be considered through the Examination process?

How would such an assessment and the outcomes be agreed with the relevant authorities?

How would the results and outcomes be secured in the dDCO?

Response

GS.9.1 There is a typographic error in the text, paragraph 12.7.5 should read:

'Effects outside of the Order Limits will likely be limited. Consideration of damming effects will need to take into consideration for any future rise in groundwater levels due to building development in the area and climate change. As outlined in Section 12.5 the Scheme will likely need to be designed to create passive groundwater ***controls*** *around underground structures where damming effects are possible.'*

GS.9.2 At the time of writing, there was insufficient data to produce a detailed impact assessment of damming effects (e.g. hydraulic properties of the shallow aquifer, location of all underground structures etc.).

GS.9.3 The ES does though describe the likely effects from damming of groundwater (paragraph 12.6.49). i.e. '*..given the likelihood of high permeability conditions in the RTD (River Terrace Deposits) and the diurnal and tidal nature of groundwater level changes, any risk is likely to be small."* Where damming effects are identified as being significant (relatively), suitable mitigation "*...such as passive groundwater level management*..' would be included in the detailed design.

GS.9.4 Control of the assessment of 'groundwater barrier effects' and any mitigation measures required as a result is secured through the dDCO by the requirement in the protective provisions with the Environment Agency for their approval of the Applicant's plans, specifications and method statements for any work that would impact groundwater flow.

GS.10 Question

ES Paragraph 12.5.14 [APP-031] explains that a Groundwater Environmental Monitoring Strategy has been produced and is listed as reference 12-49.

Please submit a copy of that document to the Examination?

Please explain the relationship between the Groundwater Environmental Monitoring Strategy and the Groundwater Monitoring and Verification Plan listed in Requirement 5(2) of the dDCO, which would be "approved by the Environment Agency", as part of that draft Requirement, as currently worded?

Response

GS.10.1 The Groundwater Monitoring Strategy is now included as an appendix to the updated version of the CoCP, submitted at deadline 1.

GS.10.2 The Groundwater Monitoring Strategy is intended to outline the requirements for the monitoring of groundwater during the baseline, construction and post construction phases of the project.

GS.10.3 The Groundwater Monitoring Strategy also contains and outlines the requirements to be included within, and to allow production of, the Groundwater Monitoring and Verification Plan, which will be prepared by the contractor as a part of detailed design, as required by the updated CoCP (submitted at deadline 1) (paragraph 9.3.9 to paragraph 9.3.11). This includes the overarching management protocols for the construction phase (and post construction phase) and outlines content for a Groundwater Monitoring Plan to be produced by the appointed Contractor.

GS.11 Question

Mitigation during excavation is set out in the Construction Method Statement (CMS) [APP-046]. However, this document is not secured within the dDCO.

Please clarify how these mitigation details would be approved and secured in the dDCO, such as specifying it as a listed document in Requirement 5(2) and as a certified document in Schedule 14?

Response

GS.11.1 The final detail of the mitigation measures during excavation referred to in the CMS is secured by the Code of Construction Practice (APP-092).

GS.11.2 This is set out in chapters 9, 10 and 12 of that document which refers to the measures that will form part of a Construction Environmental Management Plan, and the processes and procedures that are required to form part of the Settlement Assessment and Mitigation Process, Construction Materials Management Plan, the Groundwater and Monitoring Verification Plan, and the Site Waste Management Plan, which are to be consulted upon and/or approved by local planning authorities or the Environment Agency as set out in the CoCP.

GS.11.3 Compliance with the CoCP and these subsidiary plans is secured by Requirement 5 contained in Schedule 2 to the dDCO (APP-013).

GS.12 Question

The National Planning Policy Framework (NPPF) Paragraph 120 states that "Where a site is affected by contamination or stability issues, responsibility for securing a safe development rests with the developer and/or landowner."

Please can the Applicant explain where in the ES it provides details which satisfy this NPPF requirement that the proposed development would result in a safe development in respect of contamination and land stability?

Response

GS.12.1 Chapter 12 of the ES (updated and submitted at deadline 1) presents an assessment of construction and operational impacts, including contamination and settlement, on human health, the environment and ecology at paragraphs 12.6.6 to 12.6.36 and 12.6.37 to 12.6.52.

GS.12.2 The underlying geology and soils are associated with a brownfield designation and are therefore considered to be a low sensitivity receptor. Both contaminated and uncontaminated soils will be excavated from within the built Scheme alignment. In accordance with the waste hierarchy, excavated material will either be considered for retention and re-use on site, off site or residual treatment and disposal as stated in paragraph 12.6.11 of the ES and therefore no new pollutant linkages will be created. Soils with a historical contaminated impact outside of the built alignment will generally not be disturbed.

GS.12.3 Paragraph 9.2.7 of the updated CoCP (submitted at deadline 1) states:

'To limit any potential adverse impacts upon geology, soils, and hydrogeology, the Contractor will prepare a Construction Materials Management Plan setting out measures to ensure excavated materials are handled and used in a way that prevents harm to human health and pollution of the environment. The Construction Materials Management Plan must be approved by the relevant planning authority prior to commencing the relevant part of the authorised development.'

GS.12.4 As stated in paragraph 12.6.39 of the ES a cover system consistent with the Greenwich Peninsula EMS will be provided where ground has been excavated and/or disturbed within the Order Limits of the Scheme on the relevant parts of Greenwich Peninsula to which the EMS applies. A similar system would be employed at Silvertown should contaminated soil be

identified. This would break the pathway to potentially contaminated soils beneath and deliver suitable protection to human health through setting of appropriate soil quality standards.

GS.12.5 These measures are secured in the updated CoCP (submitted at deadline 1) at Paragraphs 9.2.3 to 9.2.6.

GS.12.6 The mitigation of risks to construction workers and adjacent site users (from identified contaminant pathways) are stated in Section 12.5 of the ES and paragraph 12.5.67. Mitigation includes the adoption of suitable measures stipulated in associated Method Statements and Risk Assessments. This will primarily include the provision for use of appropriate Personal Protective Equipment (PPE) and adherence to good practice construction methods and pollution prevention measures. The requirement to undertake a health and safety risk assessments is stated in paragraph 9.4.2 of the CoCP.

GS.12.7 Groundwater quality is identified as being at potential risk of degradation from contamination at paragraph 12.6.50 of the ES, for example following a tanker spillage in the tunnel. However the tunnel is designed as a fully sealed, closed system with containment measures to capture pollutants generated within the tunnel, as set out in Section 12.5 of the ES.

GS.12.8 Paragraph 9.2.2 of the CoCP (submitted at deadline 1) states that:

'Site specific contaminated land risk assessments will be refined based on any emerging findings. Should contaminant linkages be proven, the principles of CLR11 will be adopted, and appropriate mitigation measures applied. The risk mitigation will comply with UK principles of "suitable for use".

GS.12.9 In addition to those measures outlined in the CoCP powers to deliver pollution control are also secured by Schedule 1 to the dDCO in para (p) of 'other works and development'.

GS.12.10 Taking into account the design with mitigation outlined in Section 12.5 of the ES (updated at deadline 1) and described above, there is not considered to be a significant effect on receptors from contamination. This results in a safe development in respect of contamination as required in the NPPF.

GS.12.11 Paragraph 12.6.51 of the updated Chapter 12 of the ES (submitted at deadline 1) states it is expected that extended periods of high volume dewatering will be either not required, or minimal during construction, as groundwater control is expected to apply exclusion methods. Therefore

any future potential settlement impacts would be limited. The Settlement Assessment and Mitigation Process is included in Appendix A of the updated CoCP (submitted for deadline 1). As stated in paragraph 10.1.4 of the CoCP '*Depending on the level of damage risk identified by the investigation, either no action will be required, or buildings will be monitored during construction, or measures will be implemented to protect the buildings.'*

GS.12.12 In addition as stated in paragraph 10.4.1 of the CoCP states that:

'A Settlement Deed will be offered to owners in a standard form, setting out the procedures to determine the need for the monitoring of buildings and other structures and, if necessary, the carrying out of protective and/or remedial works. This is a formal legal undertaking concerning ground movement (including settlement), giving effect to the matters set out in this CoCP.'

GS.12.13 Taking this potential requirement for construction and operational mitigation into account, the magnitude of impact is considered minor adverse and the significance of effect on settlement on the built environment during operation would be Slight Adverse.

GS.12.14 The ES (updated Chapter 12, submitted at deadline 1) therefore also satisfies the NPPF requirement that the proposed development would result in a safe development in respect of land stability.