SILVERTOWN TUNNEL

Volume 6

6.10 Code of Construction Practice

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Planning Act 2008
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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Silvertown Tunnel

Code of Construction Practice 6.10

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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List of Abbreviations

AQMP	Air Quality Management Plan
BPM	Best Practicable Means
CEMP	Construction Environmental Management Plan
CEP	Community Engagement Plan
CMMP	Construction Materials Management Plan
CoCP	Code of Construction Practice
CTMP	Construction Traffic Management Plan
DCO	Development Consent Order
DLR	Docklands Light Railway
EAL	Emirates Air Line
EHO	Environmental Health Officer
EMP	Environmental Management Plan
EOD	Explosive Ordnance Disposal
EP	Emergency Plan
ES	Environmental Statement
FORS	Fleet Operator Recognition Scheme
HGV	Heavy Goods Vehicle

HMP	Heritage Management Plan
LFEPA	London Fire and Emergency Planning Authority
NVMP	Noise and Vibration Management Plan
PP	Passage Plan
RPA	Root Protection Area
RSA	Receptor Site Assessment
SRN	Strategic Road Network
SWMP	Site Waste Management Plan
TBM	Tunnel Boring Machine
TfL	Transport for London
WSI	Written Scheme of Investigation
UXO	Unexploded Ordnance

Glossary of Terms

Asset Control Limits	The predefined values, based on assessment, relating to safety and serviceability considerations that instigate a review of risk to third party assets.
Asset protection	Asset protection is a process by which the impacts to all structures (that is buildings, utilities and highways or other structures) potentially at risk of damage from ground movements, or other effects arising from construction of the Scheme, are kept to acceptable levels.
Beneficial use	• Ecological benefit or land reinstatement / landscaping: The activity will assist in ecological benefit and/or help to facilitate an approved change/alteration in land use or form. • Works (linked to a consented planning activity or permit) that aims to restore, enhance or be part of a land management scheme i.e. landfill or quarry. • Reduce the requirement for alternative material (waste or not) to be used for the purposes of any such Scheme.
Black redstart	The black redstart is a small robin-sized bird that has adapted to live at the heart of industrial and urban centres. Its name comes from the plumage of the male, which is grey-black in colour with a red tail. With fewer than 100 breeding pairs in the UK, the black redstart is on the amber list of Birds of Conservation Concern.
Blackwall Tunnel	An existing road tunnel underneath the River Thames in east London, linking the London Borough of Tower Hamlets with the Royal Borough of Greenwich, comprising two bores each with two lanes of traffic.
Considerate Constructors Scheme (CCS)	Construction sites, companies and suppliers can voluntarily register with the CCS and agree to abide by the Code of Considerate Practice, designed to encourage best practice beyond statutory requirements. The Code of Considerate

	Practice commits those sites and companies registered with the CCS to respect the community, protect the environment, secure everyone's safety and value their workforce.
Contractor	The Contractor will be the construction entity through which the Project Company would deliver the design and construction of the Scheme and includes anyone who directly employs or engages construction workers or manages construction work, including sub-contractors, or any individual self-employed worker or business that carries out, manages or controls construction work.
Detailed Design	A finalised design, complete in all aspects and suitable for construction of the Scheme.
Development Consent Order (DCO)	This is a statutory order which provides consent for the project and means that a range of other consents, such as planning permission and listed building consent, will not be required. A DCO can also include provisions authorising the compulsory acquisition of land or of interests in or rights over land which is the subject of an application. http://infrastructure.planninginspectorate.gov.uk/help/glossary-of-terms/
Dewatering	The process of removing groundwater from an aquifer.
Emergency Preparedness Plan	The plan which defines specific actions to be taken in response to observed asset/ground movements in accordance with the Asset Control Limits.
Excavated Material	Ground or other material removed during a construction process, usually by mechanical means.
Heavy Good Vehicle (HGV)	European Union term for any vehicle with a gross combination mass of over 3500kg.
Heritage Asset	A building, monument, site, place, area of landscape identified as having a degree of significance meriting consideration in planning decisions, because of heritage interest. Heritage

	asset includes designated heritage assets and assets identified by the local planning authority (including local listing).
Illustrative Design	An example of how the proposals could be developed at the next stage of design as a result of engagement with the Project Company contractor, planning authority and other relevant stakeholders. This is an example of how the Scheme may look, but it is not the final design.
Instrumentation and Monitoring Plan	The plan which defines the type and location of instrumentation used to monitor an asset, as well as the frequency of recording and reporting.
Jetty	A structure that projects from land out into water for the purposes of marine logistics.
Order Limits	The extent of land and rights over land that will be needed temporarily to construct the Scheme, and permanently to operate, maintain and safeguard the Scheme (often referred to as 'the red line boundary').
Pollution Prevention Guidelines	Best practice guidelines set out by the Environment Agency to advise industry and public on legal responsibilities and good environmental practice.
Project Company	A Project Company is typically a consortium of private sector companies, formed for the specific purpose of providing the services under a private finance contract. This is also technically known as a Special Purpose Vehicle (SPV). The Project Company will obtain funding to design and build the new facilities and then undertake routine maintenance and capital replacement during the remainder of the contract period. The total contract period is typically 30 years. The Project Company will repay funders from payments received from TfL during the post construction period of the contract. Receipt of payments from TfL will depend on the ability of the Project Company to deliver the services in accordance with the output specified in the contract.

Public health	All organised efforts to improve population health through prevention and promotion activities. The focus of public health is the population and not the individual.
Reference Design	The design proposals for the Scheme that the DCO application refers to, as modified and developed in response to the Statutory Consultation process. The Reference Design has been developed to a concept stage appropriate to prove engineering and construction feasibility and to inform the construction and operational land requirements, environmental impact assessments and Scheme cost estimate.
Settlement	Settlement is the technical term given to the way the ground moves around a hole after it has been dug out.
Site Waste Management Plan	A document that outlines how the Scheme will reduce, manage, and dispose of its solid waste.
Silt	The generic term for particles with a grain size of 4-63µm, i.e. between clay and sand.
Suitable Excavated Material	"Suitable Excavated Material" means all bored or excavated material from the tunnel works for which treatment is not technically feasible or which would not require treatment were it to be disposed of to a permitted facility.
Surface Water	Water that appears on the land surface that has not seeped into the ground, i.e. lakes, rivers, streams, standing water, ponds, precipitation.
The Scheme	The construction of a new bored tunnel with cut and cover sections at either end under the River Thames (the Silvertown Tunnel) between the Greenwich peninsula and Silvertown, as well as necessary alterations to the connecting road network and the introduction of user charging at both Silvertown and Blackwall tunnels.
Transportable	Transportable Moisture Limits are defined in The Merchant Shipping (Carriage of Cargoes) Regulations 1999 as the

Moisture Limits	9/10ths (or 90%) of the flow moisture point. This limit sets the standard for accepting cargoes which may liquefy for marine transport. Cargoes with a moisture content above the TML should not be transported by ship unless *"appropriate safety arrangements are made to the satisfaction of the Certifying Authority to ensure adequate stability in the case of cargo shifting, and the ship has adequate structural integrity."*
Transport for London (TfL)	A local government body responsible for most aspects of the transport system in Greater London. Its role is to implement transport strategy and to manage transport services across London. These services include: buses, the Underground network, Docklands Light Railway, Overground and Trams. TfL also runs Santander Cycles, London River Services, Victoria Coach Station and the Emirates Air Line. As well as controlling a 580km network of main roads and the city's 6,000 traffic lights, TfL regulates London's private hire vehicles and the Congestion Charge scheme
The Tunnel, Silvertown Tunnel	Proposed new twin-bore road tunnels under the River Thames from the A1020 in Silvertown to the A102 on Greenwich Peninsula, East London.
Tunnel Boring Machine (TBM)	A machine used to excavate tunnels with a circular cross section. There are two main types of closed face TBMs: Earth Pressure Balance (EPB) and Slurry Shield (SS). Please see those terms for further explanation.
Unexploded Ordnance	Unexploded ordnance are explosive weapons (bombs, shells, grenades, land mines, naval mines, etc.) that did not explode when they were employed and still pose a risk of detonation, potentially many decades after they were used or discarded.
Waste	Waste is defined in Article 1(a) of the European Waste Framework Directive 2008/98/EC as 'any substance or object in the categories set out in Annex I which the holder discards or intends to discard or is required to discard'. The term 'holder' is defined as the producer of the waste or the person

	who is in possession of it and 'producer' is defined as anyone whose activities produce waste. Waste can be further classified as hazardous, non-hazardous or inert.
Watching Brief	The watching of a situation by a suitably qualified person to ensure that works (e.g. an excavation) are being done correctly, and in accordance with relevant environmental standards.
Worksite	An area of land within the Scheme Order Limits which is temporarily occupied and used to undertake construction works.

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SUMMARY

S.1.1 The purpose of this Code of Construction Practice (CoCP) is to set a framework to control possible impacts arising from the construction of the Silvertown Tunnel, hereafter referred to as the Scheme. The CoCP covers environmental, public health and safety aspects of the Scheme that may affect the interests of local residents, businesses, the general public and the surroundings in the vicinity of the Scheme.

S.1.2 Transport for London (TfL) proposes to deliver the Silvertown Tunnel through a private finance contract, as this would best meet the project objectives and constraints, and achieve an appropriate risk balance between the public and private sector. The Contractor would be responsible for the design, construction, financing and maintenance of the tunnel and supporting infrastructure for a period of 25 years.

S.1.3 The Contractor would be responsible for undertaking the Detailed Design in accordance with the constraints and parameters of the DCO; TfL's specifications; and the requirements, and any other commitments given by TfL.

S.1.4 The Contractor will also be responsible for compliance with this CoCP, including production of an overarching Construction Environmental Management Plan and any other detailed plans required to be produced. A summary of these subsidiary plans is included in chapter 1 of the CoCP.

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1. INTRODUCTION

1.1 Purpose of the Code of Construction Practice

1.1.1 This document is the Code of Construction Practice (CoCP), for the Silvertown Tunnel (hereafter referred to as the Scheme), which has been prepared to accompany the Development Consent Order (DCO) Application.

1.1.2 The purpose of the CoCP is to set a framework to control possible impacts arising from the construction of the Scheme. The CoCP covers environmental, public health and safety aspects of the Scheme that may affect the interests of local residents, businesses, the general public and the surroundings in the vicinity of the Scheme.

1.1.3 The control measures set out in this CoCP are based on the findings and mitigation measures set out in the Environmental Statement (Document Reference: 6.1) prepared following consultation with stakeholders.

1.1.4 The CoCP will apply to all works authorised by the DCO and all works undertaken by the Contractor. The Contractor will also comply with all legislation relating to the construction activities.

1.1.5 Compliance with this CoCP is a requirement of the DCO. Non-compliance with the CoCP would therefore be a breach of the terms of the DCO. In the event of a breach, both TfL and the Contractor would be open to enforcement action under Section 161 of the Planning Act 2008.

1.1.6 TfL will direct and manage the Contractor's compliance with these controls and will specify that all construction activities shall be carried out in accordance with the terms of the DCO, including the CoCP. Further details are included in the relevant sections of the CoCP.

1.2 Description of the Scheme

1.2.1 The Silvertown Tunnel scheme (the Scheme) involves the construction of a twin bore road tunnel providing a new connection between the A102 Blackwall Tunnel Approach on Greenwich Peninsula (Royal Borough of Greenwich) and the Tidal Basin roundabout junction on the A1020 Lower Lea Crossing/Silvertown Way (London Borough of Newham). The Silvertown Tunnel would be approximately 1.4km long and would be able to accommodate large vehicles including double-deck buses. It would include a

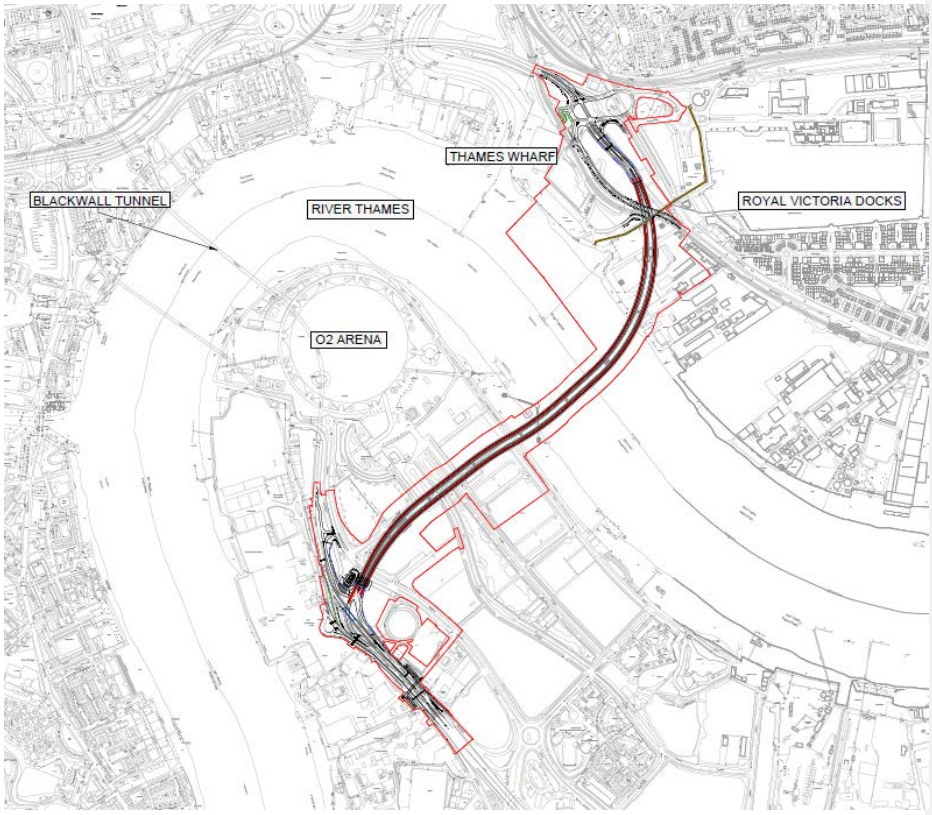
dedicated bus, coach and goods vehicle lane, which would enable TfL to provide additional cross-river bus routes.

1.2.2 The Scheme also includes the introduction of free-flow user charging on both the Blackwall Tunnel (northern portal located in London Borough of Tower Hamlets) and at the new Silvertown Tunnel. This measure is intended to play a fundamental role in managing traffic demand and supporting the financing of the construction, maintenance and operation of the Silvertown Tunnel.

1.2.3 Main construction works could commence in late 2018 and would last approximately four years with the new tunnel opening in 2022/23. The main construction Worksite would be located at Silvertown, enabling the utilisation of the existing barge facilities at Thames Wharf along with a new temporary jetty, if necessary, for the removal of spoil and delivery of materials by river. A secondary Worksite would be located adjacent to the alignment of the proposed cut and cover tunnel on the Greenwich Peninsula.

1.2.4 Figure 1-1 Order Limits, represents the 'envelope' within which the Scheme would be constructed.

Figure 1-1 Order Limits



1.3 Approach to Scheme delivery

1.3.1 TfL proposes to deliver the Silvertown Tunnel through a private finance contract, as this would best meet the project objectives and constraints. The contract would be competitively tendered in accordance with EU procurement procedures.

1.3.2 The successful tenderer, to be called the Project Company would be responsible for the detailed design, construction, financing and maintenance of the tunnel and supporting infrastructure for a period. TfL would retain control of traffic management for Silvertown Tunnel and Blackwall Tunnel as part of the strategic road network in London, and would continue to maintain and operate Blackwall Tunnel and approach roads under existing arrangements.

1.3.3 The Project Company would be responsible for undertaking the Detailed Design and constructing the works, in accordance with the constraints and parameters of the DCO; TfL's specifications; and any other commitments given to stakeholders by TfL.

1.3.4 TfL through the Contractor will ensure that the tunnel is built in accordance with all relevant and current environmental legislation and, where reasonably practicable, with good practice for minimising the environmental effects of construction.

1.4 Construction environmental management approach

1.4.1 Contractual arrangements will require the Contractor to provide suitably qualified environmental staff to monitor, manage and execute works for which they are responsible. TfL will require that the Contractor demonstrates an appropriate awareness of local sensitivities, expected codes of conduct, working knowledge of relevant legislation, codes of practice, and guidance relevant to the various construction activities in which they are engaged. TfL would require the Contractor to have an Environmental Management System in accordance with BS EN ISO14001[1] requirements.

1.4.2 Following the appointment of the Contractor for the works, it will be the Contractor's responsibility to produce and maintain an overarching Construction Environmental Management Plan (CEMP) for the construction

[1] BSI (2015). BS EN ISO14001 Environmental Management Systems.

works. The CEMP will be developed in consultation with the local authorities and the relevant statutory stakeholders for each topic area, and will be submitted for approval to TfL. The CEMP will set out the Contractor's roles and responsibilities, together with appropriate control measures, training and briefing procedures, risk assessments, stakeholder engagement responsibilities, monitoring systems, and operations to be employed during planning and constructing the works for all relevant environmental topics to demonstrate compliance with the measures and controls set out in the CoCP and the DCO (including its requirements and the Protective Provisions).

1.4.3 In addition to the measures specifically mentioned in the CoCP, the Contractor is required to produce and implement a number of subsidiary plans which are specific to particular environmental topics. As set out in the CoCP, these plans have to be produced in consultation with, or approved by, the relevant planning authorities or other stakeholders, and include the measures required for inclusion within these plans by the CoCP.

1.4.4 These subsidiary plans will set out the specific protection, mitigation and compensation measures to be taken by the Contractor to control the environmental effects for the individual topic. A summary of the subsidiary plans that are required to be produced under the CoCP is set out below:

~~1.4.4~~1.4.5 Nothing in this CoCP precludes any of the subsidiary plans set out below being amended by the Contractor following their approval or consultation with the relevant bodies set out below. Any amendment to these plans will be required to go through the same consultation and approval mechanisms set out in the table.

Table 1-1 Summary of subsidiary environmental management plans

	Document	Role	Role of Local Authorities and/or Stakeholders
1	Construction Environmental Management Plan (CEMP)	The CEMP will set out the Contractor's roles and responsibilities to demonstrate compliance with the measures and controls of the CoCP and the DCO (including its Requirements and the Protective Provisions).	The CEMP will be produced by the Contractor for approval by TfL in consultation with the relevant planning authorities and other relevant stakeholders.
Emergency Planning			
2	Emergency Plan (including Emergency Spill Response Plan)	The Emergency Plan will include: • notification procedures for Emergency Services in the event of an incident; • coordination procedures for TfL Customer Services and the Traffic Control Centre; • flood risk emergency procedures; • emergency spill response procedures; • emergency phone numbers; and • a Flood Warning and Evacuation Plan	The Emergency Plan will be produced by the Contractor in consultation with the local Emergency Services, and the relevant local authority emergency planning officer. It will include a Flood Warning and Evacuation Plan to be approved by the Environment Agency.
3	Fire Plan	The Fire Plan will include procedures for evacuation in the event of fire during construction including details of escape routes, emergency doors, meeting points, and fire training.	The Fire Plan will be produced by the Contractor in consultation with the London Fire and Emergency Planning Authority.
Construction Transportation			
4	Construction	The CTMP will include:	A CTMP will be produced by the

	Document	Role	Role of Local Authorities and/or Stakeholders
	Traffic Management Plan (CTMP)	• details of how logistics will be managed, e.g. lorry routes, diversions, main access/egress points; • traffic incidents plan dealing with incidents or severe congestion on agreed construction routes; and • construction workers travel plan, developed to encourage the use of sustainable modes of transport to and from the worksite by those working on the project.	Contractor for each worksite and approved by the relevant planning authority in consultation with the relevant highway authority.
5	Passage Plan	To establish cycle times for loading, unloading and both journeys for vessels in relation to tides and will permit an informed decision regarding the number of vessels required to meet the production rates achieved for the TBM and civil works, and will include an updated navigational risk assessment which will reflect the findings and recommendations of the Navigational Issues and Preliminary Risk Assessment submitted with the application.	The Passage Plan will be produced by the Contractor for approval by the PLA.
6	Construction Site River Strategy (CSRS)	The CSRS will include details of the approach adopted by the Contractor to maximise river transport for construction and excavated materials and to meet the commitments in respect of the use of river transport set out in this CoCP.	The CSRS prepared by the Contractor will be submitted to TfL for approval in consultation with the relevant planning authority.
Communication and Community Liaison			
7	Community	The CEP will identify how communication with	The Community Engagement

	Document	Role	Role of Local Authorities and/or Stakeholders
	Engagement Plan (CEP)	stakeholders will be managed and programmed throughout the construction period. It will include steps that will be taken to liaise with specific stakeholders, where they are potentially affected by the works.	Plan (CEP) will be prepared by the Contractor and submitted to the relevant planning authorities for approval.
Environmental Controls			
8	Air Quality Management Plan (AQMP)	The AQMP will contain details of the measures to limit vehicle, plant and dust emissions during construction.	An AQMP will be prepared for each worksite by the Contractor and submitted for approval to the relevant planning authority.
9	Archaeological Written Scheme of Investigation (AWSI)	An AWSI will outline the mitigation measures and recording proposals for dealing with the currently unknown sub-surface archaeological remains that could potentially be affected by the Scheme on both the north and south side of the Scheme.	The AWSI will be prepared by the Contractor in consultation with Historic England and submitted for approval to the relevant planning authority.
10	Ecology Management Plan	The Ecology Management Plan will set out measures to manage the risk of adversely affecting flora and fauna on and within the vicinity of the worksites, including method statements in the event invasive species are encountered and details how additional survey requirements would be accommodated in the programme for both the north and south side of the Scheme. A Site Clearance Plan will form part of each Ecology Management Plan.	The Ecology Management Plan will be prepared by the Contractor in consultation with Natural England and submitted for approval to the relevant planning authority.

	Document	Role	Role of Local Authorities and/or Stakeholders
11	Construction Materials Management Plan (CMMP)	• The CMMP will set out measures to ensure materials are handled and used in a way that prevents harm to human health and pollution of the environment.	The CMMP will be prepared by the Contractor and will be subject to approval by the relevant planning authorities.
12	Groundwater Monitoring and Verification Plan (GMVP)	The Groundwater Monitoring and Verification Plan will set out monitoring and reporting criteria during pre-construction, construction and post construction.	The GMVP will be prepared by the Contractor and will be subject to approval by the Environment Agency.
13	Noise and Vibration Management Plan (NVMP)	The NVMP will set out measures to control and limit noise and vibration levels in the vicinity of the construction works.	An NVMP will be prepared by the Contractor for each Worksite and will be subject to approval by the relevant planning authority.
14	Lighting Management Plan	The Lighting Management Plan will include appropriate industry standard procedures which will be implemented at both worksites.	The Lighting Management Plan for each worksite will be prepared by the Contractor in consultation with the relevant planning authority and the Environment Agency.
15	Site Waste Management Plan (SWMP)	The SWMP submitted with the DCO application will be updated by the Contractor. The updated SWMP will consider how the waste hierarchy will be applied and details of how all wastes will be managed. The SWMP will also provide a framework for checking compliance with waste legislation and the Duty of Care.	No consultation/approval needed.

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2. GENERAL SITE OPERATIONS

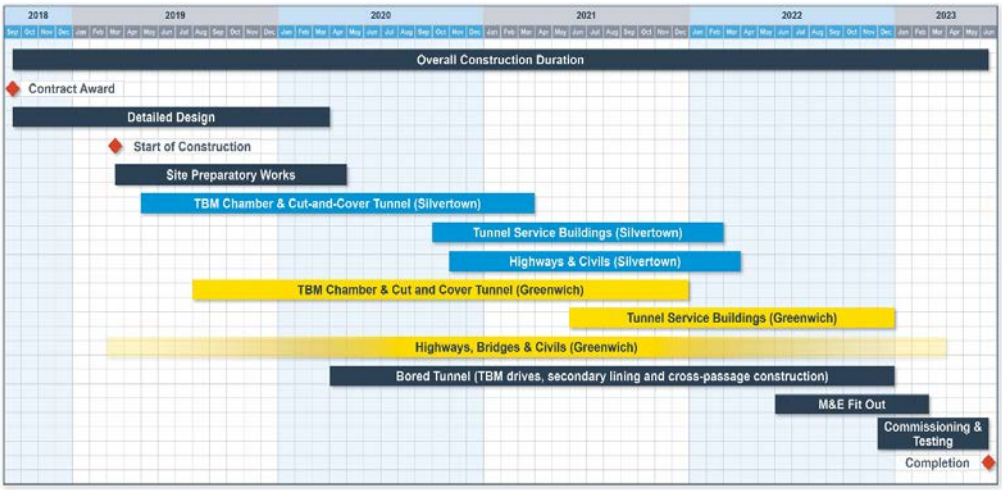
2.1 Construction process

2.1.1 The Scheme is a major construction project and will involve many different types of construction activities. These activities are likely to include but will not be limited to: demolition; site clearance; site investigation; treatment of excavated materials (as necessary); tunnelling; piling; excavation; services diversion and new installations; jetty works; new bridge works, highway works; and below ground and surface building works.

2.2 Construction programme

2.2.1 Main construction activities could commence at both Silvertown and Greenwich in late 2018 and will continue for approximately four years, as shown in Figure 2-1.

Figure 2-1 Envisaged construction programme



2.3 Construction hours of work

2.3.1 Hours of work would be in line with standard good practice for major construction works. Normal working hours for non-tunnel construction works will be from 08:00 to 18:00 Monday - Friday and 08:00 to 13:00 on Saturday with no work taking place on Sundays or bank/public holidays. To maximise productivity within the core hours, the Contractor will require a period of up to one hour before and up to one hour after normal working hours for start-up and close down of activities~~, e.g. general preparation works~~. Start-up and

close down activities can include, but are not limited to, preparation, maintenance, site briefings, meetings and training. Plant or machinery likely to cause a disturbance to local residents or businesses must not be operated during these start-up and close-down periods. These periods will not be considered an extension of core working hours.

2.3.2 Where feasible, operations likely to cause disturbance and/or disruption would be limited to within the core working hours. However, some activities may be required outside these hours, e.g. delivery of abnormal loads. Except where activities are safety critical or in an emergency, any works outside these hours must be subject to agreement with the relevant local Environmental Health Officers (EHO).

2.3.3 Some minor activities, such as changes in traffic management operations, may be required out of core working hours on a more frequent basis, but this would not be expected to have a significant impact in the context of the existing movements of traffic. A Construction Traffic Management Plan (CTMP) will be put in place and will include mechanisms to review the changes in traffic management operations and measures to minimise any impacts on the local residents of each borough.

2.3.4 Tunnel boring works and associated supporting activities, including river transportation, will be undertaken on a 24 hour, seven days per week basis.

2.4 Worksites

2.4.1 There will be two main worksites: the Silvertown worksite to the north of the River Thames and the Greenwich worksite to the south of the River Thames.

2.4.2 It is envisaged that the worksite located at Silvertown would likely contain offices, stores, plant maintenance facilities, materials testing laboratory, recycling facilities, blacktop and potential concrete batching plants, materials stockpiles and a wheel wash. This worksite has been selected as the best location for utilising Thames Wharf for marine logistics.

2.4.3 A further worksite would be located adjacent to the alignment of the proposed tunnel on the Greenwich Peninsula. It is envisaged that this would likely comprise site offices, spoil and material storage areas and plant storage areas. The Greenwich site does not have any direct wharf access.

2.4.4 The worksites would be established at the commencement of the works and will be removed and the worksites will be reinstated at the end of the construction phase.

2.4.5 The Contractor will be registered with, and comply with the principles of the Considerate Constructors Scheme or similar.

2.4.6 The layout and appearance of the worksites will be designed using the following principles:

- the size of worksite to be occupied at each of the locations would provide sufficient space to undertake the works in a safe manner without taking space that is non-essential to the construction;
- worksites will be secure and screened where necessary;
- storage sites, fixed plant, machinery, equipment and temporary offices will be located to limit environmental effects, as far as reasonably practicable, and have due regard to adjacent buildings, as far as allowed by the constraints of the worksite(s);
- site lighting will be located and directed so as not to intrude into occupied residential properties or disturb wildlife on sensitive areas or constitute a road hazard or affect navigation; and
- fixed site plant and facilities will be powered from mains electrical sources.

2.4.7 A helpline service will be set up and the helpline number, and a contact name and address will be displayed at appropriate locations on the boundaries of the worksites. Further details of the communication and community liaison are provided in Chapter 4 of this CoCP.

2.4.8 Access to the worksites would be limited to specified entry points only and all personnel entries/exits would be recorded and monitored for both security and health and safety purposes. The worksites boundaries will be secured and constructed such that they minimise opportunities for unauthorised entry.

2.5 Advance works

2.5.1 Advance works could be undertaken prior to the main works at both Silvertown and Greenwich worksites. These works may include but are not limited to:

- utility connections;
- utilities diversions:

- geotechnical, obstructions and UXO investigations;
- ecological surveys;
- archaeological surveys;
- site clearance;
- asset protection – condition surveys and establishment of monitoring baselines as necessary;
- design works for early TBM and segment procurement advance (pre-construction) surveys; and
- fencing and footway diversions; All advance works will be subject to the controls set out in the CoCP.

2.6 Access Arrangements

2.6.1 The Contractor will take measures to maintain reasonable access to premises during the construction works. These will include:

- Measures to ensure the continuation of access for premises including requirements for complementary measures to ensure that delivery and servicing access can take place.
- Localised temporary diversions will be sought during the cut and cover tunnel works.

2.6.2 Unless otherwise agreed with the O2 owners or provided for by third parties, the Contractor will provide temporary replacement car parking spaces for the O2 equivalent to the number occupied by the Greenwich worksites.

2.7 Emergency planning

2.7.1 The Contractor will ensure that emergency procedures for each worksite are developed. The procedures will be standardised as far as possible across both worksites and will be appropriate to the anticipated hazards and the specific layout. The Contractor will set these procedures out in an Emergency Plan (EP) which must be produced in consultation with the Emergency Services, the relevant local authority emergency planning officer and the Environment Agency where appropriate. The EP will include:

- notification procedures for Emergency Services , e.g. Police, in the event of an incident;
- coordination procedures for TfL operational services;
- flood risk emergency procedures, as set out in paragraph 2.7.4 and 2.7.5;
- an emergency spill response procedures that will take into account Environment Agency guidelines2; and
- emergency phone numbers and the method of notifying local authorities and statutory bodies. Contact numbers for the key TfL and the Contractor's staff will also be included.

Emergency access

2.7.2 The Contractor will ensure that the requirements of the London Fire and Emergency Planning Authority (LFEPA) will be followed for the provision of site access points.

Fire prevention and control

2.7.3 A Fire Plan will be prepared, in consultation with LFEPA, and will be updated as necessary, having due regard to relevant current guidance.

Flood risk

2.7.4 A Draft Flood Warning and Evacuation Plan (FWEP) (Document Reference: 6.3.16.3) has been prepared and contains information on flood emergency response actions for both construction and operational phases of the Scheme. A number of actions have been outlined within the plan, including registering both the northern and southern portals of the Scheme with the Environment Agency Floodline Warning Direct service, identifying appropriate access and egress routes and designating evacuation points.

2.7.5 The Contractor will be required to further develop and refine the procedures in the Draft FWEP specifically for the construction phase, to be approved by the Environment Agency. These flood risk emergency response procedures will be included in the Emergency Plan, as set out in paragraph 2.7.1.

[2] Environment Agency (2014). Incident Response Planning PPG21.

2.7.6 The Contractor will ensure that all site operatives are familiar with the emergency arrangements.

3. CONSTRUCTION TRANSPORTATION

3.1 Construction Traffic Management Plan

3.1.1 Construction worksites and proposed lorry routes have been developed in consultation with local authorities to minimise the impacts of construction traffic on the road network and local communities. The main access routes at both worksites will be further detailed by the Contractor as the Scheme construction solutions are finalised.

3.1.2 The management of construction logistics will be established in a Construction Traffic Management Plan (CTMP) to be prepared by the Contractor before construction commences. The plan will embed contractual requirements, the outcome of consultation with the relevant local authorities, and comprehensive logistics planning.

3.1.3 A CTMP will be produced by the Contractor for each worksite for approval by the relevant planning authority in consultation with the relevant highway authority, prior to commencing the relevant part of the authorised development The Contractor may bring forward changes to an approved CTMP during the construction of the Scheme, but changes must be approved by the relevant planning authority in consultation with the relevant highways authority.

3.1.4 The CTMP for each worksite will be developed in accordance with relevant best practice including for example TfL's guidance on Construction Logistics Plans (or equivalent). The CTMPs will include information on the following aspects:

- **Site information**

  This section will include details of the construction site locations and main access/egress points for vehicles and pedestrians.

- **Construction details**

  This section will set out the works programme, with indicative dates for stages of construction, and information on the level of deliveries required. Detailed construction and delivery traffic routes will be specified and agreed by the relevant planning authority in consultation with the relevant highway authority, with local roads only to be used for immediate access to the worksites or local businesses (including wharves).

Constraints and restrictions on road vehicle movements to be included in the CTMP are likely to include:

- days of the week and times of the day when road vehicle movements are not permitted;
- maximum number of vehicle movements permitted at defined periods of the day, e.g. between 08:00 and 09:00, or restrictions on the use of the Blackwall Tunnel by construction lorries at peak times; and
- procedures for abnormal loads.

- **Traffic management**

  This section of the CTMP will detail how non-construction traffic will be managed at each stage of construction, including temporary and permanent road closures and diversions and pedestrian and cycle facilities (pursuant to Article 10 of the DCO). Details of any changes that are required to signage and parking arrangements in the vicinity of the worksites will be set out in this section. Information on the process that will be followed by the Contractor in dealing with traffic incidents or severe congestion on agreed construction and delivery routes will also be set out.

- **Policies and procedures**

  The CTMP will incorporate the outcome of communications undertaken in accordance with the CEP.

  The CTMP must include a construction workers travel plan (CWTP) developed to encourage the use of sustainable modes of transport to and from the worksite by those working on the project.

- **Monitoring, compliance and reporting**

  The CTMP will also detail how, when and by whom it will be monitored, including, but not limited to, the ongoing review of the following:

  - Freight Operator Recognition Scheme (membership);
  - collision reporting;
  - driver licence checks;
  - vehicle safety equipment audits;

- number of vehicle movements to site;
- vehicle mileage;
- level of vehicle fill;
- CO2 emissions;
- delivery accuracy;
- breaches and complaints; and
- construction workers' travel behaviour to inform the ongoing monitoring of the CWTP.

3.1.5 The CTMP will ensure that safety measures are implemented to minimise road-related risks. The Contractor will specify the highest current standards in construction vehicle safety, including visibility. This includes but is not limited to FORS Gold (Fleet Operator Recognition Scheme), CLOCS (Construction Logistics and Cycle Safety), SLS (Safety Lorry Scheme) and WRRR (Work Related Road Risk) scheme. Signs identifying the Silvertown Tunnel project and Contractor contact numbers will be displayed in a prominent position on all construction vehicles. All vehicles working in the construction of the Silvertown Tunnel will be compliant with the Mayor's Direct Vision Standard.

3.1.6 The CTMP must provide contact details of key personnel, including key stakeholders and highway / planning authorities. These details must be reviewed and updated as necessary as part of the ongoing CTMP monitoring programme.

~~3.1.6~~3.1.7 The CTMP will specify the routes to be used by construction heavy goods vehicles (HGVs) to and from the worksites. Construction HGVs would be routed on the TLRN and principal roads as far as possible, with local roads only used to directly access the worksites, local businesses, and wharves used for the import and/or export of material by river. The principal routes to and from the worksites will be the A12, the A13, the A2 and the A102 with access between these routes and the worksite via Lower Lea Crossing, Royal Docks Road/Royal Albert Way/North Woolwich Road, Blackwall Lane and Millennium Way. Any deviations from this approach would need to be agreed in advance in the CTMP with the local planning authorities.

3.2 River transport

3.2.1 The Scheme would seek to maximise river transport for construction materials and excavated material.

3.2.2 The river transport objectives are to:

- minimise the effects of construction of the Scheme associated with the transport of construction materials and excavated materials;
- minimise the number and length of construction-related transport movements; and
- minimise the potential social and environmental impacts arising from construction-related transport associated with the Scheme.

3.2.3 Subject to any additional derogations approved under paragraph 3.2.9 the Contractor shall transport:

- at least 55% by weight of all materials associated with the Scheme by River; and
- 100% of suitable excavated material out by River.

3.2.4 For the purposes of the commitments given in paragraph 3.2.3, the following materials associated with the Scheme shall be deemed to have been transported by river:

- Materials which are transported to or from the worksite directly by river;
- Materials which are re-used on site;
- Materials which are transported by river to a wharf local to the Scheme, transferred to road vehicles and subsequently delivered to the worksite by road, provided that:
    - the worksite lies within a 4km radius of the wharf; and
    - the distance over which the materials are carried by road from the wharf to the worksite does not exceed the distance that the materials are transported by river from the point of loading up to the local wharf.
- Concrete for use in the Scheme which is produced at a batching plant sited at a wharf local to the Scheme and using aggregates delivered to

the wharf by river and which is delivered to a worksite by road, provided that:

- the worksite lies within 4km of the batching plant; and
- the distance over which the concrete is carried by road from the batching plant to the worksite does not exceed the distance that the aggregates are transported by river to the local wharf.

- Suitable excavated material which is transported by road from the worksite to a wharf local to the Scheme and subsequently transferred to a receptor site using the river, provided that:
  - The worksite lies within 4km of the wharf; and
  - the distance over which the suitable excavated material is carried by road from the worksite to the wharf does not exceed the distance over which the material is transported by river.

3.2.5 "Suitable Excavated Material" means all bored or excavated material from the tunnel works which would not require treatment were it to be disposed of to a permitted facility.

3.2.6 For the purposes of paragraph 3.2.5, the definition of treatment shall be in accordance with the Landfill Directive (1999/31/EC) and the Environmental Permitting Guidance: The Landfill Directive (Defra, 2008).

3.2.7 Before commencing construction of the Scheme, the Contractor must prepare a Construction Site River Strategy (CSRS), which must explain how the Contractor:

- will maximise river transport for construction and excavated materials;
- meet the commitments set out in paragraph 3.2.3.

3.2.8 Construction of the Scheme must not commence until the CSRS has been submitted to and approved by TfL in consultation with the relevant planning authority(s).

Additional derogations

3.2.9 Where circumstances arise which mean that additional material that is not identified in the CSRS may need to be transported by road, the Contractor shall submit an application for an Additional Derogation for approval to TfL, in consultation with the relevant planning authority. Examples of such

circumstances include where the river use is unavailable due to circumstances outside the control of the contractor such as poor weather or damage to the river transport system (conveyors/barges).

3.2.10 TfL may approve an application for an Additional Derogation only if is satisfied that river transport is not a reasonable option for that material but will request a Remedial Action Plan from the Contractor to ensure so far as reasonably practicable that the Additional Derogation (taken together with any other Additional Derogations) does not have the effect of meaning that the commitments given in paragraph 3.2.3 will not be met over the duration of the construction of the Scheme.

3.2.11 A Remedial Action Plan must identify measures to mitigate the effects of any Additional Derogation including traffic management, adherence to working hours, or permitted hours for HGV movements.

Monitoring

3.2.12 The Contractor shall submit quarterly monitoring reports to TfL on the performance of the Scheme in meeting the commitments in paragraph 3.2.3.

3.2.13 In the event that monitoring demonstrates that the commitments given in paragraph 3.2.3 are unlikely to be met over the duration of the construction of the Scheme, TfL may request the Contractor to put forward Further Remedial Measures for approval and implementation.

Navigational risk management

3.2.14 The Contractor will be responsible for producing a full Passage Plan (PP). The PP will establish cycle times for loading, unloading and journeys for vessels in relation to tides and will permit an informed decision regarding the number of vessels required to meet the production rates achieved for the TBM and civil works. The PP will be prepared for approval by the PLA.

3.2.15 The PP will include an updated navigational risk assessment which will reflect the findings and recommendations of the Navigational Issues and Preliminary Risk Assessment (Document Reference: 6.3.7.1) prepared for the Scheme. Risk control measures will include, but will not be limited to:

- appointing a berthing co-ordinator for the duration of the Scheme's riverine activities to assist with planning, managing and ensuring that safe berthing, approach and manoeuvring practices are adopted and maintained during the construction period;

- establishing a permanent construction River Response Team to manage the construction and river user vessel interface; in particular with any recreational users. The River Response Team would consult with the PLA and ensure that any exclusion zones are enforced and that safe distances are maintained between construction plant and construction related vessel movements in particular when and if river conditions change;
- engagement with the PLA; and
- employment of suitably qualified staff, Masters of Commercial Vessels and marine operators.

4. COMMUNICATIONS AND COMMUNITY LIAISON

4.1.1 Communication with local authorities and all key stakeholders will be undertaken throughout the construction period. Key stakeholders will include, but are not limited to; local residents, local businesses, community resources (such as schools and community centres) and vulnerable groups, where they are potentially affected by the works.

4.1.2 The Contractor will appoint a Community Construction Liaison Manager (CCLM) for the duration of the works. This manager will prepare and implement a Community Engagement Plan (CEP) which must be submitted to the relevant planning authority for approval. The CCLM will be the main point of contact for stakeholders on site, providing information and resolving issues of concern.

4.1.3 The CEP will identify how communication with stakeholders will be managed and programmed throughout the construction period. It will include steps that will be taken to liaise with specific stakeholders, such as schools, where they are potentially affected by the works. This may cover, but is not limited to, community meetings at key stages of work, one-on-one meetings with key resources, newsletters and ~~leaflet~~ letter drops (explaining forthcoming works).

4.1.4 The CEP will include the following measures:

- The Contractor will set up and maintain a 24 hour telephone helpline service. This will act as a first point of contact for information or queries raised by stakeholders. All calls will be actioned within a specified time and will be logged, including action taken. There will also be an agreed complaints procedure.
- The Contractor will be required to set up and maintain a website which will include the construction programme, main construction activities, and updates. There will also be a project email address, which will enable stakeholders to contact the construction team direct with any queries or concerns.
- The Contractor will establish and maintain a Community Liaison Group. This group will meet regularly before and during the construction period. It will comprise representatives from key local groups, user representatives, and the local authorities. Invitations to join the group

will also be sent to all affected landowners for the Scheme. The regular meetings will provide an opportunity for the Community Construction Liaison Manager to brief people about up and coming construction activity and answer questions. This will include, but not be limited to, informing the Group of upcoming construction traffic management measures and noisy works. The terms of reference (which will include provision for communications to the Group from the Community Construction Liaison Manager in between meeting dates), chair, and frequency of this group will be finalised at the first meeting.

- The CEP will explain how the needs of vulnerable groups will be met in terms of use of accessible media, English as a second language and appropriate formats for the visually impaired.
- The Contractor will develop a programme of community involvement through volunteering and educational activity.
- The Contractor shall establish co-ordination and communication meetings with key stakeholders. Such meetings will include regular road traffic meetings with TfL, the relevant highway authority, the relevant planning authority as well as affected businesses & developments, which shall include, but not be limited to, Ansco, Knight Dragon, Quintain, Brenntag, Kloeckner Metals UK, Royal Mail, and London City Airport. Where such meetings already exist the Contractor shall be obliged to attend and contribute.

5. AIR QUALITY

5.1 General

5.1.1 The Contractor will, as far as reasonably practicable, seek to control and limit emissions to the atmosphere in terms of gaseous and particulate pollutants from vehicles and plant used on the worksites, and dust from construction, demolition, vehicles and plant activities.

5.1.2 For each worksite, the Contractor will develop and implement an Air Quality Management Plan (AQMP) to be approved by the relevant planning authority. The AQMP will contain details of the measures to limit vehicle, plant and dust emissions during construction, including those set out in this chapter.

5.2 Vehicle and plant emissions

5.2.1 Vehicle and plant emissions will be controlled by implementing the following measures within the AQMP:

- all Non-road Mobile Machinery (NRMM) will comply with the standards set within the Greater London Authority's Control of Dust and Emissions During Construction and Demolition Supplementary Planning Guidance3. This outlines that, from 1st September 2015, all NRMM of net power 37 kW to 560 kW used on the site of a major development in Greater London must meet Stage IIIA of EU Directive 97/68/EC (Directive 97/68/EC of the European Parliament and of the Council, 1997) and its subsequent amendments as a minimum. From 1st September 2020 NRMM used on any site within Greater London will be required to meet Stage IIIB of the Directive as a minimum;
- engines of all vehicles, mobile and fixed plant on site will not be left running/idling unnecessarily;
- using low emission vehicles and plant fitted with catalysts, diesel particulate filters or similar devices;

[3] Greater London Authority (2014). The Control of Dust and Emissions during Construction and Demolition.

- using ultra low sulphur fuels in plant and vehicles;
- plant will be well maintained, with routine servicing of plant and vehicles to be completed in accordance with the manufacturer's recommendations and records maintained for the work undertaken;
- minimising the use of diesel or petrol powered generators and using mains electricity or battery powered equipment where practicable;
- maximising energy efficiency (this may include using alternative modes of transport, maximising vehicle utilisation by ensuring full loading and efficient routing);
- the Contractor's delivery vehicles will be required to comply with any low emission zone applicable to the worksite and delivery routes at the time;
- all members of the Contractor's staff who drive vehicles under the contract will undertake a fuel efficient driver training course; and
- all vehicles working on the construction of the Silvertown Tunnel will be Euro 6 unless otherwise agreed with the GLA and relevant local planning authorities.

5.3 Dust management

5.3.1 The Institute of Air Quality Management (IAQM) guidance[4] and Mayor's Dust and Emissions Supplementary Planning Guidance[5] provide a number of potential mitigation measures to reduce dust impacts during the construction phase. The measures to be included in the AQMP are set out in Table 5-1.

Table 5-1 Mitigation measures to reduce dust impacts

Issue	Control measure
Communications	• Develop and implement the CEP to include community engagement before work commences on site; • Display the name and contact details of person(s) accountable for air quality and dust issues on the site

[4] Institute of Air Quality Management (2015). Land-Use Planning & Development Control: Planning For Air Quality
[5] GLA (2014). The Control of Dust and Emissions Supplementary Planning Guidance.

Issue	Control measure
	boundary of both construction worksites; • Hold regular liaison meetings with other high risk construction sites within 500m of the site boundary, to ensure plans are co-ordinated and particulate matter emissions are minimised.
Site Management	• Record all dust and air quality complaints in a complaints log which may be made available to the Local Authority upon request; and • Record any exceptional incidents that cause dust/or air emissions, and the action taken to resolve the situation.
Monitoring	• Undertake on-site and off-site inspections to monitor dust; • Carry out regular site inspections to monitor compliance with the AQMP; • Increase frequency of site inspections when activities with a high potential to produce dust are being carried out; • Record inspection results in an inspection log; and • Make an inspection log available to the Local Authority upon request.
Preparing and maintaining the worksites	• Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible; • Erect suitable solid screens or barriers around dusty activities or the site boundary; • Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period; • Install green walls, screens or other green infrastructure where appropriate to minimise the impact of dust and pollution; • Avoid site runoff of water or mud; • keep site fencing, barriers and scaffolding clean using wet methods; • Use water as dust suppressant where applicable; • Remove waste materials that have a potential to produce dust from site as soon as practicable; • Cover, seed or fence stockpiles to prevent wind whipping; • carry out regular dust soiling checks of buildings within 100 m of site boundary and cleaning to be provided if necessary; and • provide showers and ensure a change of shoes and

Issue	Control measure
	clothes are required before going off-site to reduce transport of dust.
Operating Vehicle/ Machinery and Sustainable Travel	• Well maintained/low emission vehicles and equipment fitted with catalysts, diesel particulate filters or similar devices; • All vehicles to switch off engines - no idling vehicles; • Avoid the use of diesel or petrol powered generators where practicable; and • Impose a maximum-speed-limit of 25kph on surfaced and 15kph on un-surfaced haul roads and work areas.
Operations	• Cutting equipment to use water as dust suppressant or suitable local extract ventilation; • Ensure an adequate water supply on the site for effective dust/particulate matter suppression, using recycled water where possible and appropriate; • Use enclosed chutes and covered skips; • Minimise drop heights; and • Ensure equipment is readily available on site to clean any spillages.
Waste Management	• Reuse and recycle waste to reduce dust from waste materials; and • No bonfires and burning of waste materials.
Demolition	• Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust); • Ensure water suppression is used during demolition operations; • Avoid explosive blasting, using appropriate manual or mechanical alternatives; and • Bag and remove any biological debris or damp down such material before demolition.
Earthworks and Construction	• Re-vegetate earthworks and exposed areas; • Use hessian, mulches or trackifiers where it is not possible to re-vegetate; • Only remove the cover in small areas during work and not all at once; • Avoid removing a thin layer of concrete from structures by compressed air powered machines; • Ensure sand and other aggregates are stored and not able

Issue	Control measure
	to dry out; and • Ensure bulk cement and other fine power materials are delivered and stored to prevent escape.
Trackout	• Use water-assisted dust sweepers on the access and local roads; • Avoid dry sweeping of large areas; • Ensure vehicles entering and leaving worksites are covered to prevent escape of materials; • Inspect on-site routes for integrity, instigate necessary repairs and record in site log book; • install hard surfaced haul routes on site, which are regularly damped down with fixed or mobile sprinkler systems or mobile water bowsers, and regularly cleaned; • Implement a wheel washing system at a suitable location near site exit; • ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits; • Access gates at least 10m from receptors where possible; • Apply dust suppressants to locations where a large volume of vehicles enter and exit the construction site.

5.4 Monitoring

5.4.1 Automatic continuous PM_{10} monitoring will be required as part of the AQMP. It may be appropriate to determine the existing (baseline) pollution levels before work begins. Baseline monitoring will commence ~~at least~~ three months before main construction works begin. The AQMP will set out appropriate air quality monitoring procedures and timescales.

5.4.2 Automatic continuous dust monitors will be installed across the site and checked regularly. The locations of the dust monitors will be included in the AQMP and agreed with the Local Authority. Where possible, baseline monitoring will commence at least three months before the construction phase begins.

5.5 Odour

5.5.1 As contaminated materials may be excavated at Greenwich and Silvertown, the excavated materials could contain volatiles that may have a bad smell.

The following mitigation measures will be included in the AQMP and implemented by the Contractorto ensure that there is no significant effect to local residents:

- Contaminated and non-contaminated materials will be stockpiled separately following excavation;
- Early identification of contaminated material which could generate an odour issue;
- Covering up of any odorous materials;
- Locating contaminated materials as far away from residential receptors as possible; and
- Ensuring odorous material is prioritised for removal from the worksites.

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6. CULTURAL HERITAGE

6.1.1 The following measures in relation to Cultural Heritage will form part of Archaeological Written Scheme of Investigations (AWSI) to be prepared by the Contractor in consultation with Historic England ..

6.1.2 The AWSIs will provide the framework through which archaeological mitigation will be managed and monitored. The AWSI will be prepared for each work site to be approved by the relevant planning authority (in consultation with Historic England and GLASS) prior to commencing construction.

6.1.3 The Archaeological AWSIs will detail a programme of archaeological evaluation as part of the advance works. The programme of archaeological works will include adequate archaeological evaluation in order to properly characterise and quantify further archaeological mitigation works. The Contractor will consult with Historic England / GLAAS on the scope and methodologies for the programme of archaeological mitigation works prior to construction works commencing and ongoing consultations will be held during the archaeological works. .

6.1.4 Detailed measures to protect any known or unknown archaeological assets and an outline method of approach during the construction of the Scheme will be incorporated into the AWSI and will include but not be limited to:

- updated baseline to ensure the most up-to-date Archaeological Priority Areas information is taken into account;
- rationale of locations of various interventions based on the known assets that may be affected;
- requirement to consider the significance of unknown and known heritage assets,
- monitoring measures of any in-river works;
- contingency measures, including measures in the event that unexpected, highly significant remains are encountered; and
- method for preservation and the approach to post-construction phase assessment, analysis, local knowledge sharing and public dissemination of the results of the programme of archaeological work.

6.1.5 If any heritage assets are found, the Contractor must liaise with Historic England and GLASS to determine the need for any consents, or licences and whether a Heritage Management Plan (HMP) is required.

6.1.6 The HMP, if required, will set out how the Contractor will protect the heritage assets that have been identified in a consistent and integrated manner during the works. It will include general standards of good practice across the project and specific measures, in relation to individual worksites.

6.1.7 Impacts of dredging within the area of the proposed jetty on currently unknown archaeological remains will be mitigated through the monitoring of dredged material in order to identify and record any archaeological materials that are recovered. If any remains are recorded, the Contractor will liaise with Historic England/ GLASS as to any scour protection measures required.

6.1.8 Prior to construction, an assessment of the likely effects of settlement on the Grade II listed Blackwall Tunnel building will be undertaken in accordance with Chapter 10: (Settlement) of this Code of Construction Practice.

7. TERRESTRIAL ECOLOGY

7.1 General

7.1.1 Ecology Management Plans will be developed and implemented by the Contractor in consultation with Natural England and submitted for approval to the relevant planning authority for both the north and south sides of the Scheme. The Ecology Management Plan will detail measures to manage the risk of adversely affecting flora and fauna on and within the vicinity of the worksites. It will also include method statements in the event that invasive species are encountered and details about how additional survey requirements would be accommodated in the programme. The Ecology Management Plan will include a requirement for an ecologist to be present onsite during site clearance and when required throughout the duration of the construction works. The Ecology Management Plans will include an arboricultural impact assessment based upon the construction site layout, with the assessment including a schedule of trees to be retained and removed.

7.1.2 A pre-construction survey will be undertaken a maximum of two years prior to commencement of construction works. This should include an extended Phase 1 habitat survey followed by targeted surveys for protected species that may be using the worksites. The results of these surveys would inform the Ecology Management Plan developed by the Contractor.

7.1.3 Any site clearance would take account of seasonal constraints and will be carried out in accordance with a Site Clearance Plan (which will form part of the Ecology Management Plans described above) prior to carrying out the works.

7.1.4 Any clearance of vegetation suitable for breeding birds (namely scrub and trees) would be undertaken outside of the breeding bird season (February to August inclusive) or following a check for active bird nests by a suitably qualified ecologist in order to mitigate any potential impact on breeding birds.

7.1.5 Worksites will be screened where necessary to reduce adjacent disturbance.

7.1.6 All habitat, including trees, will be retained and protected where possible. Areas of temporary land occupation will be returned to their previous state, condition and owner following completion of construction.

7.1.7 Habitats of value with potential to be affected beyond the works footprint will be demarcated and avoided. Where there are sensitive habitats such as trees adjacent to the site, an appropriate barrier e.g. temporary fencing, would be put in place to ensure that the trees and their roots would be protected throughout the construction phase.

7.1.8 A Tree Survey to best practice standards[6] was undertaken by an arboricultural specialist in autumn 2015 to determine the Root Protection Areas (RPAs) of individual trees and demarcate and potentially fence the working corridor to prevent damage. All reasonably practicable measures will be implemented to minimise the loss of trees taking account of the results of the Tree Survey in the Ecological Management Plans.

7.1.9 This CoCP includes dust attenuation measures to prevent pollution, as described in detail in Chapter 5 (Air Quality), and pollution prevention measures following Environment Agency Guidelines, as described in detail in Chapter 9 (Geology, Soils and Hydrogeology).

~~7.1.9~~7.1.10 If Japanese Knotweed, or any other invasive species, is located within the Order Limits then special measures will be r~~equired~~used to deal with this vegetation, these measures will include classification and disposal of the waste as a 'controlled waste' under the Environmental Protection Act 1990 (c. 43) (as amended in 1996 and 1999). Further to this, non-native invasive species will be prevented from spreading in accordance with the latest Government guidance[7].

7.2 Monitoring

7.2.1 As part of the Ecological Management Plans, black redstart monitoring will be undertaken weekly during the construction period from April to July. If black redstart is recorded, the Contractor will determine whether there is a need for additional mitigation, demarcation of exclusion zones or whether discrete elements of the works, proximate to the recorded sighting area and which may give rise to local disturbance, are required to stop temporarily until the birds have left the area (i.e. following the breeding period) .

[6] BSI (2012) British Standard 5837: 2012 Trees in relation to design, demolition and construction – Recommendations.
[7] https://www.gov.uk/guidance/prevent-the-spread-of-harmful-invasive-and-non-native-plants

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8. MARINE ECOLOGY

8.1.1 The Contractor will employ the following measures to minimise any adverse effects from the construction and demolition of a temporary jetty and any in-river construction activities:

- the application of EA pollution prevention guidance throughout the construction phase;
- the development of a non-native species risk assessment and management plan (in liaison with the MMO, PLA and EA as necessary);
- the use of soft start procedures during piling for a minimum of 20 minutes. Should piling cease for a period greater than 10 minutes the soft start procedure must be repeated;
- percussive piling will be limited to November-March inclusive (unless otherwise agreed with the MMO, PLA and EA);
- the lighting on the jetty will be designed to minimise light levels in the marine environment. The lighting on the jetty head would have the lamps facing out to the watercourse, to facilitate unimpeded loading and unloading operations. Reflectors, that avoid excessive light pollution to surrounding areas, will be used.

8.1.2 The decommissioning programme of the jetty will adhere to the same seasonal restrictions for piling if hydraulic vibratory methods are used.

8.1.3 Any planned (i.e. non-emergency) dredging work must avoid the period of June-August inclusive. Any dredging within the months of June-August inclusive shall only be undertaken with the approval of the Environment Agency.

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9. GEOLOGY, SOILS AND HYDROGEOLOGY

9.1 General

9.1.1 The Contractor will prepare a Construction Materials Management Plan before construction commences which must be approved by the relevant planning authority. The Construction Materials Management Plan will set out measures to ensure materials are handled and used in a way that prevents harm to human health and pollution of the environment.

9.1.2 Furthermore, the Contractor will prepare a Groundwater Monitoring and Verification Plan which must be approved by the Environment Agency. The Groundwater Monitoring and Verification Plan will set out monitoring and reporting criteria during pre-construction, construction and post-construction.

9.2 Geology and soils

Detailed Measures

9.2.1 The following approach and mitigation measures to avoid and limit potentially adverse contamination impacts will be followed:

- consideration of existing detailed contaminated land and groundwater assessments based on information obtained from site investigation and desk study records of former site uses;
- completion of risk assessments in accordance with CLR 118 and development of a Remediation Strategy (where required);
- development of the Scheme design to reduce the need for material import and to minimise waste as set out in paragraph 3.2.3; and
- development of the Scheme design to minimise dewatering requirements.

9.2.2 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

[8] Model Procedures for the Management of Land Contamination (Contaminated Land Report 11), EA, 2004.

applied. The risk mitigation will comply with UK principles of “suitable for use”.

9.2.3 The Contractor will prepare detailed method statements for dealing with contaminated land and adopt appropriate controls and protocols prior to commencing the works. This is required to safeguard against risks to the environment.

9.2.4 For works on the Greenwich peninsula, the Contractor will follow measures outlined within the “The Greenwich Peninsula Environmental Method Statement (EMS)”, which details area specific development / construction measures to manage mobilisation potential of existing contamination.

9.2.5 Specific pollution prevention measures will be identified and adopted for the removal of historical (gasworks) sub-structures (where they exist) and any retained contaminated soils and liquids that have the potential to become mobilised as a result of construction.

9.2.6 With the possibility that unknown hydrocarbon contamination within soils and groundwater may yet still be encountered beneath the Greenwich site during excavation works, the Contractor will employ a watching brief to be maintained to cover the eventuality of unknown contamination. If visually contaminated or odorous material is encountered during those works, the assistance of a suitably qualified and experienced person (a geo-environmental engineer) would be sought.

Construction Materials Management Plan

9.2.7 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.

9.2.8 The Construction Materials Management Plan must comply with the Good Practice Guide for Handling Soils. Any contaminated soils encountered during excavation works will be screened, treated if necessary and either re-used on site or removed from site.

9.2.9 In the event that on-site treatment of excavated material is required, the regulator would be consulted and any requisite licences (e.g. Mobile Treatment Permit) sought.

9.3 Groundwater

Detailed Measures

9.3.1 When developing the final construction methodology, the Contractor will consider suitable control methods to manage groundwater ingress and dewatering. The Contractor will liaise with the Environment Agency to determine the need for detailed assessment of dewatering impacts.

9.3.2 The Contractor will ensure that good practice is employed to establish ground and groundwater conditions, including verifying the presence of geotechnical hazards such as scour features in the vicinity of the Scheme alignment, and that the most appropriate groundwater exclusion or management method is adopted to minimise risks.

9.3.3 In particular, the removal of historical piled foundations can be disruptive to ground in immediate contact with the pile shafts. The Contractor will develop a method for pile removal which will prevent potential groundwater flow between aquifers.

9.3.4 Some activities with the potential to affect watercourses or groundwater may require either consent or authorisation under the Environmental Permitting (England and Wales) Regulations 2010, and the Contractor will obtain these consents prior to commencing these activities.

9.3.5 The Contractor will control the abstraction of potentially contaminated water from excavations through the adoption of mitigation measures as outlined in the Environment Agency's PPG5[9].

9.3.6 To prevent additional land and groundwater contamination the Contractor will adhere to the EA Pollution Prevention Guidelines, including (but not be limited to) the following pollution prevention measures:

- Silt pollution potentially produced when working in surface water will be minimised by keeping water out of work areas, using appropriate isolation techniques or through operation of special excavation plant. Any water generated from such activities will be disposed of by following guidance set out in the Environment Agency's document PPG 5 – Works and maintenance in or near water;

[9] Pollution Prevention Guidance Notes, Works and maintenance in or near water, EA, 2014.

- Surplus waste slurry / water produced during tunnel construction will likely require filtration prior to its disposal, because of the anticipated quality. Where necessary, a permit and licence will be obtained;
- Polymers used for the TBM operation will be bio-degradable and non-hazardous to the water environment. Agreement with the Environment Agency will be sought prior to their use and any licences obtained (where necessary). Discharges which contain polymers will be tested to show that they are bio-degradable and low risk to the water environment;
- Provision of wheel washing facilities and defined clean down areas for vehicles and equipment;
- Regular cleaning of site access points;
- Defined areas for loading / unloading of plant and materials;
- Defined areas for the storage of plant and materials used during construction;
- Production of and adherence to an emergency spill response plan (as part of the Emergency Plan developed in consultation with the Environment Agency), and ready availability of associated equipment and materials;
- Groundwater and dewatering control measures (e.g. during concrete pouring, where necessary);
- Sediment control measures (compliant with the Site Waste Management Plan); and
- Methods for the removal and reinstatement of obstructions (e.g. piles).

9.3.7 The Contractor will apply for any permits and licences that may be needed for excavation and dewatering purposes. These are outlined below:

- Environmental Permit - a Discharge Licence (e.g. for discharge of excavation water into a watercourse, should waste water meet the Environmental Quality Standards (EQS) for discharge);
- Environmental Permit - a Mobile Treatment Plant Licence (e.g. for treatment of contaminated soils prior to their re-use on site)

9.3.8 The DCO will dis-apply the need for an abstraction (dewatering) licence. Abstraction will be controlled through the measures set out in a Groundwater Monitoring and Verification Plan to be prepared by the Contractor and approved by the Environment Agency.

Groundwater Monitoring and Verification Plan

9.3.9 The Groundwater Monitoring and Verification Plan will contain the following measures for the monitoring of baseline, construction and post construction effects:

- Pre-construction baseline monitoring will commence as soon as practicable and continue until the commencement of construction or the implementation of the construction phase of the Groundwater Monitoring and Verification Plan. The pre-construction monitoring will be used to establish a baseline which will inform the setting of alert and trigger levels, for both water quality and groundwater elevations, against which the construction phase monitoring will be compared.
- Monitoring will be undertaken throughout the construction and post construction of the relevant part of the Scheme, and reported to the Environment Agency. These reporting requirements will be outlined in the Groundwater Monitoring and Verification Plan.

9.3.10 Any changes to the Groundwater Monitoring and Verification Plan proposed by the appointed Contractor must be approved by the Environment Agency before being adopted.

9.3.11 The Groundwater Monitoring and Verification Plan will be ~~written~~ developed ~~in accordance with~~with regard to the Groundwater Monitoring Strategy (Appendix F).

9.4 Human Health

9.4.1 Health and safety risks to construction workers from contamination will initially be controlled by the Contractor's responsibility to design out risk, as per the requirements of the Construction Design and Management (CDM) Regulations[10].

[10] Construction, Design and Management Regulation, 2015, HSE

9.4.2 The Contractor will be required to produce health and safety risk assessments that specify appropriate precautionary measures during works. These shall be completed by a suitably qualified person appointed by the Contractor.

9.4.3 The Contractor will employ appropriate health and safety measures which will be incorporated within the general construction site safety standards at a level sufficient to protect both members of the public and site workers.

9.4.4 The Contractor will also employ specific measures to manage the risks of asphyxiation caused by the potential release of deoxygenated air where excavation is required within the Thanet Sand Formation.

9.5 Unexploded Ordnance

9.5.1 Linear UXO surveys of the Scheme have previously been undertaken to identify the risk within the Order Limits. The Contractor will carry out further assessment prior to undertaking any intrusive investigation works on the Scheme within areas identified as medium and high risk.

9.5.2 Once the assessment is complete, the Contactor will develop a detailed UXO mitigation strategy for the project prior to construction commencing.

10. GROUND SETTLEMENT

10.1 General

10.1.1 The construction of the Silvertown tunnel, cut-and-cover sections and retained cuttings will lead to settlement at the ground surface. The amount of settlement will depend on a number of factors including the depth and volume of the works below ground, soil conditions and the presence and nature of building foundations. The amount of settlement will vary across the area affected and for some buildings the magnitude of settlement may vary across the building; this is known as differential settlement.

10.1.2 The Contractor will design and undertake construction of the Scheme in a manner that will avoid or minimise the damage to land and property as a result of settlement. TfL has carried out an initial assessment of potential settlement attributable to the Scheme that assessed the risk of damage to all buildings and structures potentially affected by settlement.

10.1.3 The Contractor shall investigate the potential for ground movement (including settlement) associated with the construction methods. This investigation will be carried out in accordance with the Settlement Assessment and Mitigation Process appended to the CoCP (Appendix A).

10.1.4 Depending on the level of damage risk identified by the investigation, either no action will be required, or buildings and structures will be monitored during construction, or measures will be implemented to protect the buildings and structures.

10.2 Surveys

10.2.1 Defect surveys will be undertaken on all properties assessed to experience 1mm or more settlement in the assessment carried out in accordance with Appendix A. These will capture the condition of those properties immediately prior to tunnel construction commencing in an area. A defects survey will comprise a written and photographic record of existing cracking and the state of the finishes and structures. They will be carried out by a reputable firm of chartered building surveyors or chartered engineers commissioned by the Contractor on behalf of TfL but in joint names with the building owner and any other persons as TfL may determine. Owners are free to commission their own survey but this will be at their own cost since the survey undertaken by the Contractor is an objective survey/record of pre-existing defects and is not intended to draw any conclusions as to the cause.

10.2.2 An electronic copy of the report will be available to the Owner on request.

10.2.3 Following the construction of the Scheme in the vicinity of the building, a second survey will then be undertaken by the appointed professional to record changes from the first survey. The owner may request his own surveyor to attend when the second survey is undertaken and to comment on the draft survey report produced.

10.3 Repairs

10.3.1 TfL will reimburse property owners for the reasonable costs they incur in remedying material physical damage arising from ground movement (including settlement) caused by the Scheme, provided:

- the damage is caused by the Scheme;
- the owner gives not less than 28 days' notice in writing to TfL of the proposal to carry out the repair work;
- the owner takes reasonable steps to obtain 3 competitive quotes for the repairs beforehand where required by TfL; and
- any claim is made within two years of the opening of the Silvertown Tunnel.

10.3.2 The Contractor may, on receiving the advanced notice of the proposal to carry out the repair work, elect to undertake the repair work itself.

10.3.3 If there are any pre-existing defects which have worsened as a result of the Scheme then the recoverable loss will be limited to the additional cost of repair over and above that which would have been required to deal with existing defects.

10.3.4 If it can be demonstrated that the undertaking to assess the compensation claim based on the reasonable cost of repairs does not compensate the claimant fully for the reduction in value of his interest in the property the reimbursement of repair costs will not prejudice a further claim for compensation in accordance with the national compensation code within the normal limitation period applying to such claims.

10.4 Settlement Deed

10.4.1 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.

10.4.2 The Deed, the terms of which are subject to change during the DCO examination, is attached as Appendix B. Subject to paragraphs 10.4.3 and 10.4.4 below, TfL will enter into a deed in substantially the form of the final version of those terms.

10.4.3 To enter into a Settlement Deed the Owner must meet the legal definition of 'owner' in the Acquisition of Land Act 1981 which is as follows:

> *"a person, other than a mortgagee not in possession, who is for the time being entitled to dispose of the fee simple of the land, whether in possession or reversion, and includes also a person holding or entitled to the rents and profits of the land under a lease or agreement, the unexpired term of which exceeds three years [and a person who would have power to sell and convey or release the land to the acquiring authority if a compulsory purchase order were operative]."*

10.4.4 The requirement for TfL to enter into the Deed does not apply to new buildings that receive planning permission after the date on which the Silvertown Tunnel Order comes into force.

10.4.5 It is not necessary to enter into the deed in order to benefit from the process set out in this Chapter.

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11. NOISE AND VIBRATION

11.1 General

11.1.1 The Contractor will control and limit noise and vibration levels to minimise any disturbance to the environment and communities in the vicinity of the construction works.

11.2 Detailed measures

11.2.1 The Contractor will carry out an updated construction noise assessment based on the detailed design and construction methodology. This assessment will inform a Noise and Vibration Management Plan (NVMP), which will be prepared by the Contractor for each work site to be approved by the relevant planning authority prior to commencing construction.

11.2.2 The NVMP will contain details of the application of Section 61 of the Control of Pollution Act 1974. Where appropriate the Contractor will obtain consents from the relevant local authority under Section 61 of the Control of Pollution Act 1974 (which will include noise and vibration limits where relevant) for the proposed construction works. Any Section 61 consent that is obtained may contain site specific management and mitigation requirements for noise and vibration. The Section 61 process may not be appropriate in the case of some types of tunnelling operations.

11.2.3 As part of the NVMP, pre-construction noise monitoring surveys will be undertaken and agreed with the relevant planning authority to establish a pre-construction baseline for monitoring compliance with construction noise limits. Baseline monitoring will commence three months before main construction works begin. Night time works will be re-assessed in accordance with BS 5228 using specific manufacturer's data and position of equipment. The NVMP will require that the ~~R~~results of the assessment will be presented to the EHOs of the planning authorities prior to commencement of night time works.

11.2.4 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 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.

11.2.5 Best Practicable Means[11] (BPM) as defined under Section 72 of the Control of Pollution Act 1974 will be employed during the construction phase and included in the NVMP. These will include, but not be limited to:

- installing appropriate fencing around the construction areas likely to generate noise;
- providing contact details for a site representative in the event that disturbance due to noise or vibration from the construction works occurs; ensuring that any complaints are dealt with pro-actively and that subsequent resolutions are communicated to the complainant;
- keeping site access routes in good condition and well maintained with no potholes or other significant surface irregularities;
- turning off plant machinery when not in use;
- maintaining all vehicles and mobile plant such that loose body fittings or exhausts do not rattle or vibrate;
- using silenced equipment where possible, in particular silenced power generators and pumps;
- using the most modern equipment available where possible and maintaining and operating equipment properly by trained staff;
- locating static noisy plant, including generators, as far away from noise sensitive receptors as is feasible for the particular activity;
- speed limits of to reduce the effect of construction traffic noise;
- monthly condition assessments on site to inspect for defects such as pot holes which could cause an increase in noise levels. Indentations of greater than 20mm to be repaired when identified. Existing potholes would need to be considered by a condition assessments prior to the commencement of works;
- ensuring that the quietest plant and equipment, techniques and working practices available are selected and used; and

[11] Control of Pollution Act1974.

- no music or radios would be played on site.

11.2.6 The NVMP will require that noise and vibration from conveyor systems will be minimised through the implementation of a maintenance programme which includes regular inspection of the conveyor equipment.

11.2.7 The Contractor will be responsible for notifying the local residents of particularly noisy work prior to commencement. The mechanisms for notification will be detailed in the Community Engagement Plan. Effective communication should be established, keeping local residents informed of the type and timing of works involved, paying particular attention to potential evening and night time works and activities which may occur in close proximity to receptors.

11.2.8 During the construction phase, day time and night time noise and vibration monitoring will be undertaken at key sensitive receptors to ensure that the mitigation measures suggested are working effectively. The location and duration of the monitoring will be set out in the NVMP.

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12. TOWNSCAPE AND VISUAL AMENITY

12.1 Visual disruption

12.1.1 The Contractor will employ construction good practices to minimise townscape and visual disruption, for example protection of existing vegetation and targeted use of hoarding to screen construction worksites.

12.1.2 The visual intrusion of construction worksites on nearby residents and users of local facilities will be contained and limited. Signage, decoration or enhancement, for information or aesthetic purposes, on the hoarding will be in accordance with TfL's corporate requirements.

12.2 Lighting

12.2.1 For each worksite a Lighting Management Plan will be prepared by the Contractor in consultation with the relevant planning authority and the Environment Agency. The Contractor will implement the measures set out in the Lighting Management Plan.

12.2.2 The Lighting Management Plan will reflect appropriate industry standard procedures which will be implemented at both worksites. Lighting will be designed, positioned and directed so as not to unnecessarily intrude on adjacent buildings and so as to prevent unnecessary interference with local residents, the DLR, passing motorists, the navigation lights for air or water traffic, and wildlife breeding seasons.

12.2.3 Site specific lighting measures to minimise the adverse impacts on adjacent buildings, wildlife sites and land uses will be taken from and applied in accordance with the 'Guidance Notes for the Reduction of Obtrusive Light GN01:2011' (published by the Institution of Lighting Professionals).

12.2.4 The Contractor will use cowling, reflectors and other measures on the temporary jetty to avoid excessive light pollution to surrounding areas. These measures will be detailed within the Lighting Management Plan.

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13. MATERIAL RESOURCES AND WASTE

13.1 General

13.1.1 The Contractor will manage Construction Demolition and Excavation (CD&E) materials generated at worksites in accordance with the waste hierarchy to prevent, reduce, re-use, recycle, recover, and dispose of materials and within the relevant regulatory controls[12]. Measures would be implemented to reduce the impacts of material resources use and waste arisings from the Scheme.

13.1.2 A Construction Materials Management Plan (CMMP) will be prepared by the Contractor and approved by the local authorities. The CMMP will include appropriate mitigation measures to ensure that materials are handled and used in a way that prevents harm to human health and pollution of the environment.

13.2 Materials management

13.2.1 Measures to manage materials as part of the CMMP will include but are not limited to:

- Materials delivered to the project will be received and controlled by the Contractor's Logistics Team or appointed person.
- Materials will be stored to minimise the potential of damage or wastage. Measures will include off-ground storage e.g. on pallets, remaining in original packaging, protection from rain or collision by plant or vehicles.
- The materials storage area will be secured during out of hours to prevent unauthorised access.
- The Contractor will be encouraged to apply good practice to source construction materials from suppliers with responsible sourcing certification (as far as practicable).
- Local sources for aggregate supplies will be considered whenever possible.

[12] Mayor of London (2015). London Plan.

- Materials will be ordered, where possible, in sizes to prevent wastage e.g. in the form of off cuts and waste to be able to be returned to the original supplier e.g. plastic pipe.
- The procurement process shall ensure that materials are ordered so that the timing of the delivery (e.g. 'just in time' deliveries), the quantity delivered and the storage are optimised to reduce opportunity for oversupply and damage on site. A logistics hub will be considered to consolidate loads and reduce movements to site.
- Wherever possible, standardisation of materials and building elements will be incorporated into the Scheme design in order to minimise required material resources and the production of waste, e.g. the use of prefabricated components.
- Where possible, consideration will be given to the reuse of material (e.g. uncontaminated soils) back into the project.

13.2.2 The Contractor must deal with CD&E Materials in accordance with the CD&E Materials Commitments that have been agreed by TfL and are set out at Appendix C.

13.2.3 The Contractor will also, as part of measures to be included in the CMMP:

- where specification allows, utilise at least a 10% portion of construction materials to include reused and recycled content;
- minimise the use of primary aggregated by the selection of secondary materials, where possible;
- obtain all timber products from sustainable sources. All timber procured will be obtained from recycled, reclaimed sources or be accredited to meet sustainable forestry standard such as the Forestry Stewardship Council (FSC). Any remaining timber not sourced through the above will target a known temperate source using the Department for Environmental, Food and Rural Affairs (Defra) central point of expertise in timber (CPET);
- use low embodied carbon materials; and
- achieve a score of Very Good and ideally Excellent using CEEQUAL, adherence to materials and waste elements.

13.3 Waste

13.3.1 A Site Waste Management Plan (Appendix D) has been developed for the Scheme and will be refined and updated by the Contractor as the design and the Scheme progresses. The Contractor will manage waste in accordance with the SWMP. This includes the management of material dredged from the River Thames to facilitate the construction and operation of the temporary jetty and NAABSA at the Silvertown site (if required). All transport of waste will be in accordance with relevant waste legislation.

13.3.2 The SWMP will also provide a framework for checking compliance with waste legislation and the Duty of Care[13].

13.3.3 Waste on site will be managed through the implementation of the CMMP and SWMP. Waste management measures include but are not limited to:

- The Contractor will have a Waste Manager or Champion who will oversee the implementation of the waste control strategy and the handling of any waste material, as set out in the SWMP.
- The Contractor will consider setting off-cut/surplus targets for sub-contractors with a positive incentive scheme for on-site waste champions.
- A waste management compound will be established within the Silvertown site to handle incoming waste from construction activities. This will be designed to facilitate the segregation of key waste streams to maximise the opportunity to re-use, recycle and return wastes generated on site.
- Excavated materials, such as soils, will be carefully stored in segregated piles for subsequent reuse on the site, where possible. If the material is contaminated then it will be kept separate from clean material and sent for either treatment, recycling or recovery, where appropriate, or disposal at appropriately permitted facilities.

[13] Waste Framework Directive, Directive 2008/98/EC European Waste Framework Directive [2008] OJ L 312/3. Environmental Permitting (England and Wales) Regulations 2010. SI 675. EU Landfill Directive, Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste [1999] OJ L 182/1. The Waste (England and Wales) Regulations 2011.

- The Contractor will be required to divert all vegetation waste from landfill, unless identified as an invasive species and no other options are available. The greatest opportunity for the sustainable management of vegetation waste is through recycling into compost.
- A specific area will be laid out and labelled within the waste management compound to facilitate the separation of materials, where possible, for potential recycling, salvage, reuse and return. Recycling and waste bins/skips are to be kept clean and will be clearly marked/colour coded in order to avoid contamination of materials.
- Shelter will be provided to prevent materials such as cardboard and paper from deteriorating while being sorted or awaiting collection. Space will be provided to accommodate skips and the storage of reusable materials.
- For all waste management options on the site compound, consideration will need to be given for identifying whether waste exemptions or permits are required to enable for the storage and treatment of waste materials.
- Waste management options will be supported by the identification of appropriately permitted waste management and recycling facilities in close proximity to the site compound as set out within the SWMP.

13.3.4 A Receptor Site Assessment (RSA) (Appendix E) has been developed to provide a transparent process and methodology for the evaluation of worksites that may receive excavated material, including material dredged from the River Thames to facilitate the construction and operation of the temporary jetty and NAABSA at the Silvertown site (if required). The final output from the RSA will be a preferred list of receptor sites as well as a reserve list and their scores against each of the assessment criteria. The assessment criteria consider environmental impacts, the operation of the facilities, the proximity principle, and the impact on the local area.

13.3.5 The Contractor will be required to select receptor sites from the preferred list or reserve list of sites or to follow the RSA methodology to identify alternative sites.

13.4 Asbestos and health risks

13.4.1 Some of the materials generated by excavation activities will be contaminated or hazardous.

13.4.2 The Contractor will comply with all relevant legislation relating to protection of employees and others who may be affected from health risks within working environments, including COSHH regulations.

13.4.3 The risk from release of asbestos during alteration, demolition and excavation works will be managed in accordance with The Control of Asbestos Regulations 2012 and associated codes of practice and guidance. Measures for managing asbestos in excavation works will include but are not limited to:

- employing competent contractors to carry out the works;
- contractors implementing a procedure for dealing with potentially suspect materials exposed requiring sampling and analysis by an independent specialist consultant;
- formal exchange of information before start of work, including relevant information from the Asbestos Register to clearly identify location of asbestos-containing materials; and
- method statements for any works in the vicinity of asbestos-containing materials to avoid any disturbance to such materials.

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14. EFFECTS ON ALL TRAVELLERS

14.1 Pedestrians and cyclists

14.1.1 To minimise any adverse effects on pedestrian and/or cyclists during construction the following mitigation measures will be implemented as part of the Construction Traffic Management Plan for each worksite to be prepared by the Contractor, and agreed with the relevant planning authority, in consultation with the local highways authority, in accordance with Chapter 3:

- All existing public rights of way and provision for cyclists and pedestrians that are affected by the construction works will be clearly signed, fenced and diversion routes provided from the outset to ensure that their usage would not be unduly impaired by construction activities. Envisaged diversion routes are provided in the Transport Assessment (Document Reference: 6.5). The Scheme phasing would accommodate all revisions to the alignment of these public rights of way and any changes would occur progressively during the construction period.
- The alternative routes for pedestrian and cyclists will be kept to a minimum feasible length. Alternative safe routes will be provided for people with reduced mobility to ensure that they can access facilities in a safe manner. On completion of the works the pedestrian and cycle routes will be reinstated to their original or revised alignments.
- The existing footbridge over the A102 Blackwall Tunnel Approach at Boord Street will be demolished and replaced with a new foot and cycle bridge. Ramped access to the current footbridge or to the replacement foot and cycle bridge will be maintained during all stages of construction.

14.2 Active traffic demand management

14.2.1 Active traffic demand management during the works will be coordinated and controlled by TfL to ensure consistent and accurate information for the network users.

14.3 Additional mitigation

14.3.1 Table 14-1 summarises the additional mitigation measures which are envisaged to be likely to be required to be implemented at specific roads/junctions. These will be implemented by the Contractor if they are

determined to be necessary following consultation with the relevant highway authorities as part of the Construction Traffic Management Plan.

Table 14-1 Mitigation measures at roads/junctions

Road/Junction	Mitigation measures
Lower Lea Crossing between Leamouth Road and Tidal Basin Road	Improve lighting and increase effective width of footways by cutting back overgrown vegetation. Provide dropped kerbs at all crossing locations.
Temporary realignment of Millennium Way	Provide temporary pedestrian and cycle crossing facilities. Provide a shared use path or segregated cycle track.
Temporary link road through the worksite connecting Millennium Way to West Parkside to the south of the current alignment of Edmund Halley Way.	Provide temporary pedestrian and cycle crossing facilities.
Blackwall Lane/A102 junction	At pedestrian/cycle crossings, provide wider waiting areas and remove pinch points where feasible. Repaint road markings, repair tactile paving and remove rutting in the carriageway. Remove clutter in footways where feasible. Cut back overgrown vegetation. Improve footway drainage and improve lighting. Review signal timings for pedestrians and cyclists.
Millennium Way/John Harrison Way/Bugsby's Way/Blackwall Lane Junction	Repaint road markings and improve footway drainage. Review signal timings for pedestrians and cyclists.
Tidal Basin Roundabout	Improve lighting. Repair tactile paving. Provide safer pedestrian and cycle routes.

15. WATER ENVIRONMENT AND FLOOD RISK

15.1 General

15.1.1 The Contractor shall implement measures to protect surface water from pollution as well as measures to conserve water and manage flood risk during the construction of the Scheme.

15.1.2 The Contractor will employ the appropriate water conservation and pollution prevention measures and site drainage and in river works controls set out below.

15.2 Site drainage

15.2.1 The Contractor will ensure that the site drainage meets the effluent standards required by the sewerage undertaker, or Environment Agency, as appropriate, and will provide holding or settling tanks, separators, and other measures as may be required. It will be the Contractor's responsibility to ensure that access is provided to the sewerage undertaker so that samples of discharge can be obtained and analysed and the flows verified as required. The relevant sections of BS 6031:2009 Code of Practice for Earthworks[14] for the general control of site drainage will be followed.

15.2.2 Drainage systems will be inspected regularly and maintained as necessary to ensure they operate to the appropriate standard. Inspection and maintenance will be required more often in areas with a high level of construction activity.

15.2.3 Where required, new drainage outfalls, storage and pollution control systems will be built as early in the construction sequence as is practicable.

15.2.4 Consideration will be given to protecting any existing drainage when storing fill materials, aggregates and plant to prevent potential drainage and pollution issues.

15.2.5 Temporary site drainage systems will be put in place to retain surface water runoff within the Order Limits, where practicable.

[14] BSI (2009). BS 6031:2009 Code of Practice for Earthworks

15.2.6 Any ingress of water into excavations will be pumped to a suitable settlement lagoon or tank and the clear water discharged into the drainage system in a condition suitable to meet the requirements of the Environment Agency/ Thames Water as applicable. As outlined in paragraph 9.3.6, a Mobile Treatment Plant Licence (e.g. for treatment of dewatering water) will be obtained, if required.

15.3 Control of pollution

15.3.1 The Contractor will undertake the works and implement working methods which will be developed to protect surface water from pollution and other adverse impacts including change to flow volume, water levels and quality. This will be completed in accordance with relevant legislative requirements and appropriate industry guidance and in liaison with the Environment Agency.

15.3.2 The Contractor will utilise good practice pollution prevention methods for activities such as excavation and dewatering, storage of fuels, chemicals and oils, vehicle washing.

15.3.3 All refuelling, oiling and greasing by the Contractor will take place above drip trays or on an impermeable surface which provides protection to underground strata and watercourses and away from drains as far as reasonably practicable. Vehicles will not be left unattended during refuelling.

15.3.4 Access to pollution control equipment and spillage clean up facilities will be provided at all worksites and the Contractor must take measures to prevent pollution caused by severe weather.

15.3.5 Measures to deal with major pollution incidents at the worksites will be included within the Emergency Plan to be produced in accordance with Chapter 2. The measures will reflect the Environment Agency guidance on pollution incident response planning.

15.3.6 The Contactor will carry out an assessment of the mobilisation of off-site contamination, and if necessary, mitigation measures will be implemented to deliver protection of controlled waters.

15.4 In-river works

15.4.1 If necessary, a temporary jetty may be constructed to permit the operation of the proposed marine transportation system.

15.4.2 In order to mitigate against the potential for increases in turbidity and scour during construction of the jetty, works will be undertaken in accordance with good practice methods for pollution control. Other mitigation measures may include the use of drill water recycling and capture during piling and the deployment of silt curtains, if these are considered necessary at the detailed design stage.

15.4.3 Measures to minimise effects on water quality from dredging associated with the temporary jetty will include but are not limited to:

- the management of spill water decanting from the excavated material transport barge to minimise locally high concentrations of suspended sediment and changes in water quality;
- the minimisation of the loss of material from the back-hoe by optimising angle of dredge to the prevailing tidal current flow;
- avoiding summer/low river flow periods if possible; and
- limiting the areas of dredging to a minimal footprint to allow safe access to the jetty.

15.5 Water conservation

15.5.1 The Contractor will implement working methods that control water consumption and ensure water is used efficiently on the construction worksites to support water conservation wherever possible. The measures will include but will not be limited to:

- water audits that identify all water-using processes, activities and equipment on site (aligned with significant changes in site(s) activities throughout the construction phases);
- staff engagement and training, to reduce water consumption by all water-using processes, activities and equipment on site;
- a monitoring regime that assesses the effectiveness of water conservation measures;
- stored water collected by the drainage systems would be used for dust suppression and for other construction phase tasks, such as operation of the TBM; and
- if required, pumps will be provided at each storage lagoon for use in filling water bowsers.

15.5.2 Measures to encourage water use efficiency in the worksite offices and canteens will be adopted.

15.6 Flood risk

15.6.1 The existing flood defences provide a high standard of flood protection from the River Thames. The construction of the Scheme is not anticipated to affect the integrity of existing river walls.

15.6.2 The draft DCO (Document Reference: 3.1) requires that any works carried out under the DCO within 16m of the banks of the River Thames or River Lea, or which might affect flood defences require the prior approval of the Environment Agency, which may be given subject to requirements for the protection of water resources and the prevention of flooding.

15.6.3 During the construction phase flood warning and emergency procedures will be in place, as part of the Emergency Plan. Construction site operatives would use the plan to assess the need to put evacuation and Scheme shutdown procedures into action, thereby mitigating the residual risk of flooding in the very unlikely scenario of a breach on the River Thames defences during the construction period.

16. CARBON EMISSIONS

16.1.1 The Contactor will take measures to reduce energy consumption and improve energy efficiency onsite during construction, which may include but are not limited to the following:

- minimising the use of diesel or petrol powered generators and instead using mains electricity or battery powered equipment;
- powering down of equipment/plant during periods of non-utilisation;
- ensuring all vehicles and machinery is serviced at recommended intervals to guarantee optimum engine efficiencies and reduce waste energy;
- using fuel-efficient plant, machinery and vehicles wherever possible;
- implementing SMART targets for consumption during construction;
- deploying correctly sized generators for electrical provision onsite, where applicable; and
- providing appropriate levels of thermal insulation to the relevant areas of site accommodation to reduce energy demand for heating.

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Appendix A Settlement Assessment and Mitigation Process

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A.1 Settlement Assessment and Mitigation Process

A.1.1 The Contractor shall investigate the potential for ground movement associated with the design and possible construction methods using the process defined in paragraph 1.2 for the following purposes:

- to assess risk of building damage by identifying those zones where the implementation of the design is likely to cause ground movements which may result in Risk Category 2 ‘Slight’ being exceeded (see Table 1);
- to assess the degree of such damage risk occurring and consider alternative designs as necessary;
- to undertake an assessment of the potential consequences where there is a significant likelihood that Risk Category 2 ‘Slight’ will be exceeded and identify specifically what the risks are;
- to design protective measures where necessary to mitigate against the risk of damage exceeding Risk Category 2;
- to demonstrate that the environmental effects of excavation induced ground movements have been considered and taken account of in the design;
- to assess the risk of damage to utilities and to design mitigation measures in agreement with the utility owner;
- to assess the effects of excavation to existing above-ground and underground infrastructure and to design suitable mitigation measures;
- to indicate where property may require demolition or structural modification; and
- to enable the preparation of contingency plans to deal with residual risks.

A.1.2 A phased assessment process shall be followed to identify the risk and impact of construction activities on third parties. Five phases have been identified to assess the impact and risk from pre-construction to completion. The initial phases are aimed at assessing risk, whilst the latter are about limiting, managing and recording the impact of construction. The 5 phases are:

Phase 1 – Scoping

A.1.3 Schedules and plans shall be prepared to identify all third party assets assessed to experience ground movement exceeding 1mm using conservative parameters.

Phase 2 – Initial Assessment

A.1.4 The Contractor shall carry out initial assessment calculations using simple, empirically calibrated methods and moderately conservative parameters to classify the risk of damage to assets. For building structures the risk should be classified in accordance with Table A-1. For non-building infrastructure the level of risk will be determined by ensuring that deformations do not exceed tolerable values determined in consultation with the asset owner. These calculations shall be based on record drawings, where available and an inspection for assessment. Assets estimated to be at risk of damage greater than Risk Category 2 (Slight) or where damage exceeds the agreed tolerable limits will require further detailed assessment at Phase 3. A schedule and plans of predicted damage shall be prepared for that phase.

Table A-1 Building Damage Classification

Building damage classification				
Risk Category	Description of degree of damage+	Description of typical and likely forms of repair for typical masonry buildings	Approx. crack width*(mm)	Max. tensile strain %
0	Negligible	Hairline cracks		0.05
1	Very slight	Fine cracks easily treated during normal redecoration. Perhaps isolated slight fracture in building. Cracks in exterior visible upon close inspection	0.1 to 1.0	0.05 to 0.075
2	Slight	Cracks easily filled. Redecoration probably required. Several slight fractures inside building. Exterior cracks visible; some repainting may be required for weathertightness. Doors and windows may stick slightly	1 to 5	0.075 to 0.15
3	Moderate	Cracks may require cutting out and patching. Recurrent cracks can be masked by suitable linings. Tuck pointing and possible replacement of a small amount of	5 to 15 or a number of cracks greater	0.15 to 0.3

		exterior brickwork may be required. Doors and windows sticking. Utility services may be interrupted. Weather tightness often impaired	than 3	
4	Severe	Extensive repair involving removal and replacement of walls especially over door and windows required. Window and door frames distorted. Floor slopes noticeably. Walls lean or bulge noticeably. Some loss of bearing in beams. Utility services disrupted.	5 to 25 but also depends on number of cracks	> 0.3
5	Very Severe	Major repair required involving partial or complete reconstruction. Beams lose bearing, walls lean badly and required shoring. Windows broken by distortion. Danger of instability	Usually > 25 but depends on number of cracks	

+ In assessing the degree of damage, account must be taken of its location in the building or structure.

* Crack width is only one aspect of damage and should not be used on its own as a direct measure of it.

Burland, J.P. and Wroth, C.P., Settlement of Buildings and Associated Damage, Proceedings of a Conference on the Settlement of Structures, Cambridge, 1974, pp 611 – 54 and 764 – 810;

A.1.5 The heritage value of a Listed Building should be considered during the initial assessment by reviewing the sensitivity of the building structure and of any particular features together with the initial assessment calculations. The heritage assessment examines the following:

- the sensitivity of the building / structure to ground movements and its ability to tolerate movement without significant distress. The potential for interaction with adjacent buildings / structures is also considered. A score within the range of 0- 2 should be allocated to the building/structure in accordance with the criteria set out in Table A-2; and
- the sensitivity to movement of particular features within the building / structure and how they might respond to ground movements. A score

within the range of 0-2 should be allocated to the building in accordance with the criteria set out in Table A-2.

A.1.6 The scores for each of the two categories (a) and (b) should be added to the category determined in paragraph 3.1 to inform the decision making process. In general, Listed Buildings which score a total of 3 or higher should be subject to further assessment as part of the Phase 3 – Detailed Assessment. Buildings that score a total of 2 or less are predicted to suffer a degree of damage which may be easily repairable using standard conservation based techniques and hence no protective measures for the building's particular features should be required. However, ultimately the professional judgement of engineering and historic building specialists should be used to determine whether additional analysis is required.

Table A-2 Scoring for Sensitivity Assessment of Listed Buildings

Score	Criteria	
	Sensitivity of the structure to ground movements and interaction with adjacent buildings	Sensitivity to movement of particular features within the building
0	Masonry building with lime mortar not surrounded by other buildings. Uniform facades with no particular large openings.	No particular sensitive features
1	Buildings of delicate structural form or buildings sandwiched between modern framed buildings which are much stiffer, perhaps with one or more significant openings.	Brittle finishes, e.g. tight-jointed masonry, which are susceptible to small movements and difficult to repair.
2	Buildings which, by their structural form, will tend to concentrate all their movements in one location.	Finishes which if damaged will have a significant effect on the heritage of the building, e.g. cracks through frescos.

Phase 3 - Detailed Assessment and Mitigation Design

A.1.7 The Contractor shall carry out detailed assessments of structures assessed at being at Risk Category 3 or above so that any monitoring works and mitigation works can be designed and implemented.

A.1.8 The detailed assessment should determine:

- the influence of the structure and its foundations on the predicted ground movements;
- the volume loss at which the risk of damage to the structure (or any sensitive finishes/features) is 'slight' or better;
- whether this volume loss may be achieved by the proposed excavation design/control measures;
- any special control measures required to reduce the predicted damage to acceptable levels (i.e. Risk Category 2 or below) such as significantly higher face pressures with EPBM tunnelling and the practicality of these;
- the amount of ground movement that the structure (and or any sensitive finishes/features) can accommodate without exceeding Risk Category 2 or any other agreed damage level; and
- the level of residual risk if intrusive mitigation measures are not implemented.

A.1.9 The detailed assessments should include a number of iterations to determine how the risk of damage to a building may be reduced. Asset-specific empirical models shall be prepared successively using moderately conservative and best estimate parameters. If after these iterations the use of empirical methods do not reduce the risk of building damage to acceptable levels (i.e. Risk Category 2 (slight) and below), the damage assessment shall be refined by increasing the sophistication of the analysis with the aim of reducing the risk of asset damage to acceptable levels and to eliminate the asset from further assessment.

A.1.10 If the risk of damage cannot be shown to be reduced by detailed assessment to acceptable levels, then mitigation measures shall be designed.

A.1.11 The primary means of settlement mitigation shall be practical measures to control ground movement by good design and construction practice. This could include staged excavation sequences within sprayed concrete lining (SCL) works, ground treatment, face stabilisation, spiling / face dowels, increasing face pressure when using an tunnel boring machine (TBM), adopting stiffer walls/propping for rectangular shafts etc.

A.1.12 In the event that physical mitigation measures are still required (i.e. to control building damage to Risk Category 2 or lower or to meet the third party asset owner's requirements), the Contractor shall seek to obtain the owner's

approval or may use TfL's powers under the DCO to undertake protective works.

A.1.13 The Contractor shall also undertake a comparative risk assessment to demonstrate that the risks associated with installation/implementation of any intrusive mitigation measures (such as compensation grouting) are no worse than the risks associated with the base case.

A.1.14 The relevant Local Authority and Historic England shall be consulted on the results of the Listed Building assessment reports and the proposals for protective measures, if any are required. Historic England shall also be consulted in relation to Listed Buildings where they would normally be notified or consulted on planning applications or listed building consent applications.

A.1.15 When considering the need and type of protective measures for Listed Buildings, due regard should be given to the sensitivity of the particular features of the building which are of architectural or historic interest and the sensitivity of the structure of the building to ground movement. Where the assessment highlights potential damage to the features of the building which it will be difficult or impossible to repair and/or if that damage will have a significant effect on its heritage value, the assessment may recommend appropriate measures to safeguard those features either in-situ or by temporary removal and storage off-site if those with relevant interest(s) in the building consent.

A.1.16 The form of monitoring of Listed Buildings should be determined based on the results of the assessment process.

A.1.17 Where repair works are necessary they will require the consent of those with relevant interest(s) in the building.

A.1.18 For Docklands Light Railway (DLR) track and track support structures the Contractor shall:

- review the track surveys (including specifying additional surveys if required) and establish that ground movement can be accommodated without exceeding track standard operational tolerance in conjunction with the DLR Infrastructure Manager;
- identify locations where fettling of the track is required pre construction and /or during construction to ensure the track geometry and clearances are acceptable.

A.1.19 The Contractor shall prepare plans and sections showing the zone of influence of the works that is defined by ground movements exceeding 1mm.

A.1.20 The Contractor shall develop an instrumentation and monitoring plan to validate that ground movements within the zone of influence are in accordance with design assumptions and that the infrastructure remains within acceptable limits. The Contractor shall ensure that there is a clear distinction between parameters measured to confirm the change in any parameter is in accordance with the design and parameters measured to limit damage to the assets. This plan shall identify the minimum period of time required to obtain base line data for each monitoring point. Instrumentation adjacent to the railway, which will remain in place during traffic hours, shall conform to the standards of the asset owner.

A.1.21 Note: A competent engineer responsible for the works shall consider those factors which may influence the monitoring data and shall determine an appropriate period and frequency for baseline monitoring. This decision making process will include an element of engineering judgement to account for the possible effects of any underlying environmental trends in the assets under consideration.

A.1.22 The Contractor shall demonstrate that the monitoring system complies with the British Tunnelling Society Monitoring Underground Construction best practice guide.

A.1.23 Note: A review of the monitoring system against the checklists provided in Appendix B of the BTS Monitoring Underground Construction best practice guide may be used as a tool to demonstrate compliance.

A.1.24 The detailed assessments shall define the control limits that need to be imposed on the tunnel construction methods in the zone of influence. The Contractor shall state these control measures on drawings and specifications.

A.1.25 The Contractor shall identify the critical parameters to be monitored and define the Asset Control Limits based on:

- the ability of the asset or structure to withstand ground movement investigated during the assessments carried out in Phases 2 and 3.
- the risk to third party operations.

A.1.26 The Contractor shall link the Asset Control Limits to actions within the Emergency Preparedness Plan.

A.1.27 The Instrumentation and Monitoring Plan and Emergency preparedness Plan shall be agreed with the relevant third party asset Owner.

Phase 4 – Construction

A.1.28 Contingency plans shall be developed and agreed with third party asset Owners to cover the risks posed to third parties before commencement of the construction of the Scheme.

A.1.29 Contingency plans shall be implemented where the results of monitoring or inspection so indicate.

A.1.30 Ground movement and construction progress records shall be maintained and reported in regular reviews when construction processes are taking place within the zone of influence.

A.1.31 Predictions and assumptions made during design in respect of both ground movement and the effects which such ground movement will have on adjacent assets shall be verified by measurement during construction.

Phase 5 – Completion and Close-out

A.1.32 After ground movement has stopped as confirmed by instrumentation the Contractor shall prepare a “Completion Report”. This shall include the following:

- details of any modifications/mitigation measures to the existing structure;
- graphs that show the ground movement and construction progress over time with at least 3 months duration of readings which show no change;
- a schedule showing actual movement compared to predicted movement;
- a schedule of defects recording only the exceptions (changes) identified during the post construction defects survey;
- details of any remedial works undertaken; and
- as-built records (including any temporary works remaining in situ).

Appendix B. Settlement Deed

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Appendix C. CD&E Materials Commitments

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Appendix D. Receptor Site Assessment

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Appendix E. Site Waste Management Plan

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Appendix F. Groundwater Monitoring Strategy

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