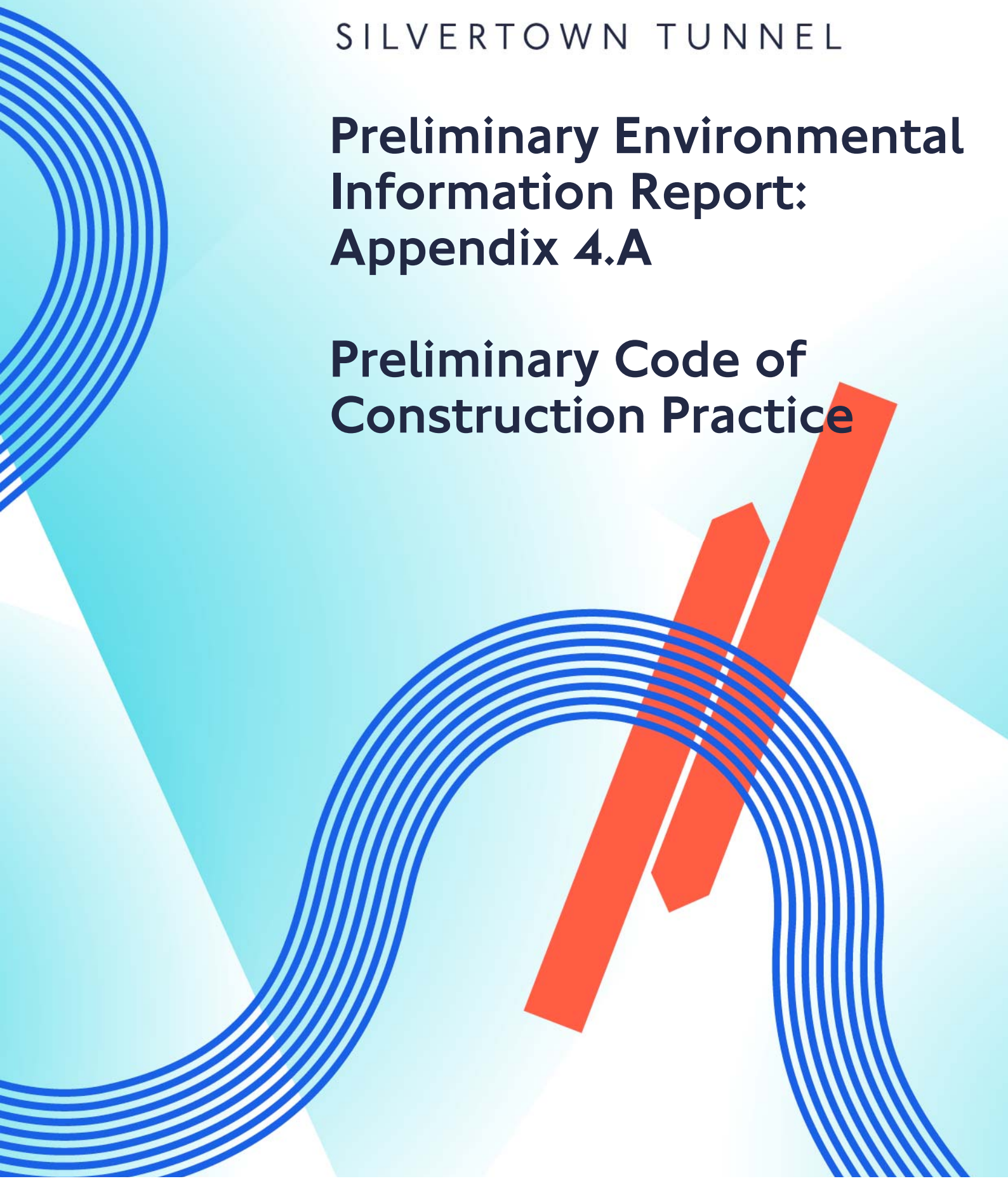
SILVERTOWN TUNNEL

Preliminary Environmental Information Report: Appendix 4.A

Preliminary Code of Construction Practice



MAYOR OF LONDON

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Silvertown Tunnel

Preliminary Code of Construction Practice

Planning Act 2008

Infrastructure Planning

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

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Contents

List of Abbreviations

AQDMP	Air Quality and Dust Management Plan
BPM	Best Practicable Means
CEMP	Construction Environmental Management Plan
CEP	Community Engagement Plan
CLP	Construction Logistics Plan
CoCP	Code of Construction Practice
DBFM	Design Build Finance and Maintain
DCO	Development Consent Order
DLR	Docklands Light Railway
EHO	Environmental Health Officers
EMP	Environmental Management Plan
EOD	Explosive Ordnance Disposal
EP	Emergency Plan
ES	Environmental Statement
ESRP	Emergency Spill Response Plan
FORS	Fleet Operator Recognition Scheme
FWEP	Flood Warning and Evacuation Plan

HGV	Heavy Goods Vehicle
HMP	Heritage Management Plan
LAS	London Ambulance Service
LFEPA	London Fire and Emergency Planning Authority
MMP	Materials Management Plan
PEIR	Preliminary Environmental Information Report
PP	Passage Plan
RPA	Root Protection Area
SRN	Strategic Road Network
SWMP	Site Waste Management Plan
TBM	Tunnel Boring Machine
TfL	Transport for London
UXO	Unexploded Ordnance

Glossary of Terms

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	A 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. The tunnel was originally opened as a single bore in 1897, as a major transport project to improve commerce and trade in London's east end. By the 1930s, capacity was becoming inadequate, and consequently, a second bore opened in 1967, handling southbound traffic while the earlier 19th century tunnel handled northbound.
Contractor	Anyone who directly employs or engages construction workers or manages construction work. Contractors include sub-contractors, any individual self-employed worker or business that carries out, manages or controls construction work
Design, Build, Finance and Maintain (DBFM)	A DBFM company is typically a consortium of private sector companies, formed for the specific purpose of providing the services under the DBFM contract. This is also technically known as a Special Purpose Vehicle (SPV). The DBFM Company will obtain funding to design and build the new facilities and then undertake routine maintenance and capital replacement during the contract period, which is typically 25 to 30 years. The DBFO Company will repay funders from

	payments received from TfL during the lifespan of the contract. Receipt of payments from TfL will depend on the ability of the DBFO Company to deliver the services in accordance with the output specified in the contract and will be subject to deductions if performance is not satisfactory.
Detailed Design	Design that delivers the required outcomes and is used as the basis of a contract for delivery of the physical outputs.
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.
Heavy Good Vehicle (HGV)	European Union term for any vehicle with a gross combination mass of over 3500kg.
Limits of Land to be Acquired or Used (LLAU)	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’).
Reference Design	Design proposals that the consultation and DCO application will refer to.
The Scheme	The construction of a new bored tunnel under the River Thames 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.
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	A new bored tunnel under the River Thames between the Greenwich peninsula and Silvertown.
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.

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SUMMARY

1 The purpose of this Preliminary Code of Construction Practice (CoCP) is to set a framework to control possible impacts arising from the construction of the Silvertown Tunnel Scheme. The Preliminary 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.

2 Transport for London (TfL) proposes to deliver the Scheme through a private finance initiative and has established that a Design, Build, Finance and Maintain (DBFM) structure would best meet the project objectives and constraints, and achieve an appropriate risk balance.

3 The DBFM contractor would complete the detailed design, construct the tunnel and supporting infrastructure and be responsible for maintenance during a 30 year concession period. TfL's specifications and any Development Consent Order (DCO) requirements (including the commitments and requirements of the CoCP) and other commitments given by TfL made under the DCO examination would be encased in the contract documents and the contractor's detailed proposals would be subject to further detailed review by TfL prior to construction to ensure that the final design and construction methodology have no greater adverse effects than those assessed for the DCO.

4 The DBFM contractor will be required to coordinate with relevant parties whose actions may affect the works to construct the Scheme. The DBFM contractor will also be responsible for the production and implementation of a number of Environmental Management Plans specific to particular issues. These plans will be prepared in liaison with the relevant stakeholder and will be subject to approval by the local authorities.

5 The Environmental Management Plan will include environmental control measures to avoid and minimise any potential effects during construction. These environmental control measures will be related but not limited to:

- emergency planning;
- control of vehicle and plant emissions;
- dust management and monitoring;
- avoidance of odour nuisance;

- protection of heritage assets;
- management of the risk of adversely affecting flora and fauna;
- protection of soil resources and groundwater;
- pollution prevention;
- remediation of contaminated land;
- health and safety measures;
- noise and vibration monitoring and management;
- minimisation of visual disruption;
- material resource management; and
- water management and conservation.

1. INTRODUCTION

1.1 Purpose of the Preliminary Code of Construction Practice

1.1.1 This report is a Preliminary Code of Construction Practice (CoCP), for the Silvertown Tunnel Scheme, which has been prepared to inform the statutory consultation for the Scheme.

1.1.2 The purpose of a 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 Preliminary CoCP are based on the preliminary findings set out in the Preliminary Environmental Information Report (PEIR). The PEIR describes the potential impacts of the Scheme on the environment and details a range of mitigation measures to be implemented during the construction phase in order to minimise the impacts on the environment. These proposed mitigation measures have been incorporated into this document.

1.1.4 The Preliminary CoCP will be updated after the consultation process to reflect the mitigation measures reported in the final Environmental Statement (ES), which will accompany the Development Consent Order (DCO) Application. Subject to award of the DCO, the CoCP will then be further developed by the appointed contractor in accordance with Transport for London (TfL) and relevant DCO requirements.

1.2 Description of the Scheme

1.2.1 The Scheme – known as the Silvertown Tunnel – involves the construction of a twin bore road tunnel providing a new connection between the A102 Blackwall Tunnel Approach on Greenwich Peninsula (London 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.

1.2.2 On the north side, the tunnel approach road connects to the Tidal Basin Roundabout, which would be altered to create a new signal-controlled

roundabout linking the Silvertown Way, Dock Road and the Lower Lea Crossing. Dock Road would be realigned to accommodate the new tunnel and approach road. On the south side, the A102 would be widened to create new slip-road links to the Silvertown Tunnel. A new flyover would be built to take southbound traffic exiting the Blackwall Tunnel over the northbound approach to the Silvertown Tunnel. The Boord Street footbridge over the A102 would be replaced with a pedestrian and cycle bridge [add this to end of previous para. in the short version].

1.2.3 New portal buildings would be located close to each portal to house the plant and equipment necessary to operate the tunnel, including ventilation equipment.

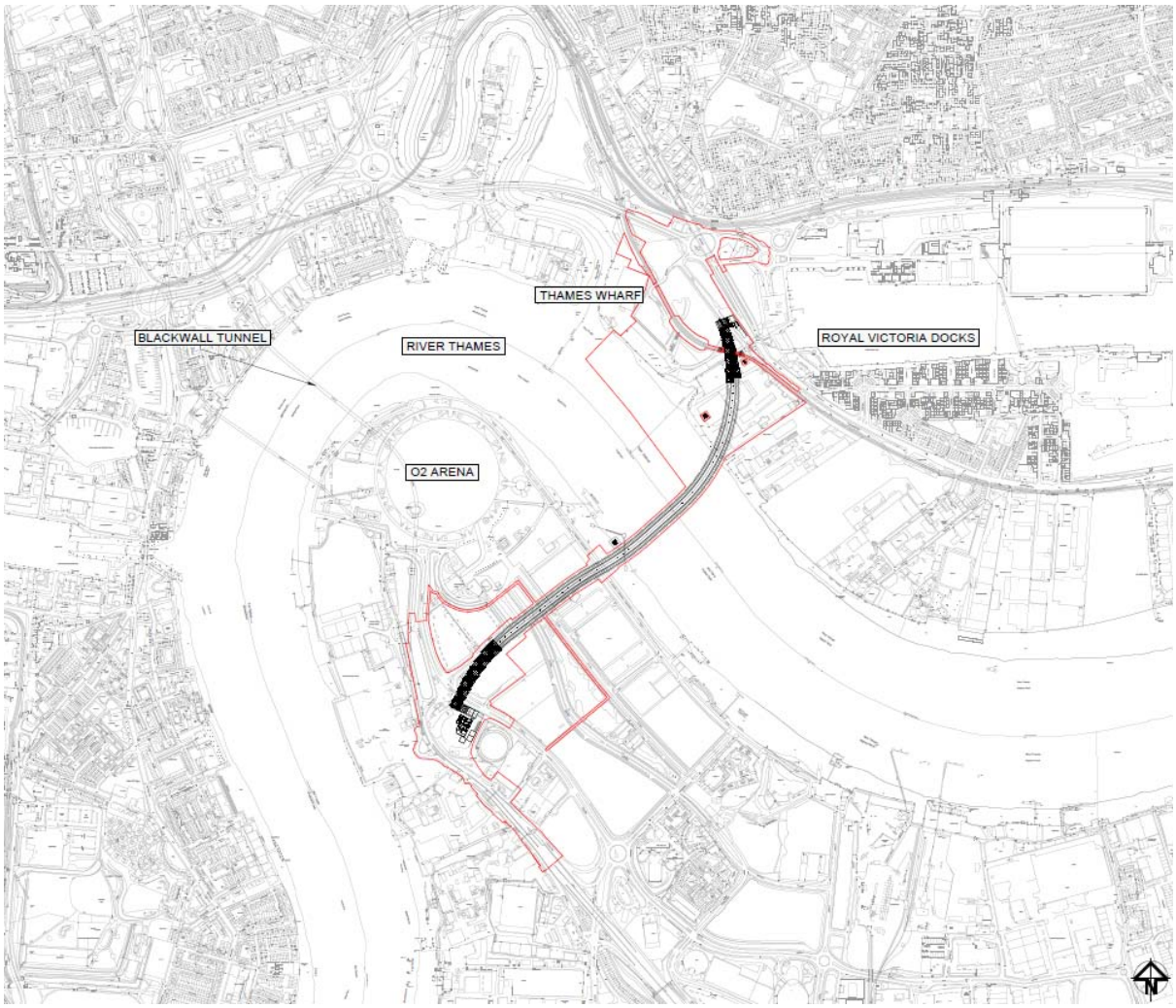
1.2.4 The introduction of free-flow user charging on both the Blackwall and Silvertown Tunnels would play a fundamental part in managing traffic demand and support the financing of the construction and operation of the Silvertown Tunnel.

1.2.5 The design of the tunnel would include a dedicated bus/coach and HGV lane, which would provide opportunities for TfL to provide additional cross-river bus routes.

1.2.6 Main construction works would likely commence in 2018 and would last approximately four years with the new tunnel opening in 2022/23. [A Tunnel Boring Machine (TBM) would be used to bore the main tunnel sections under the river with shorter sections of cut and cover tunnel at either end linking to the portals. The proposal is to erect and launch the TBM from a specially constructed chambers at Silvertown and Greenwich Peninsula where the bored and cut and cover sections connect.] The main site construction compound would be located at Silvertown to utilise Thames Wharf to facilitate the removal of spoil and delivery of materials by river. A secondary site compound would be located adjacent to the alignment of the proposed cut and cover tunnel on the Greenwich Peninsula.

1.2.7 Figure 1.1 Limits of Land to be Acquired or Used (LLAU), represents the ‘envelope’ within which the tunnel would be constructed.

Figure 1-1 Limits of Land to be Acquired or Used (LLAU)



1.3 General Principles

Approach to Scheme delivery

1.3.1 The engineering design for the Scheme has been developed in sufficient detail to enable a DCO application to be submitted. Termed the Reference Design, it defines the Scheme in sufficient detail to allow stakeholders to understand the scope and extent of the Scheme and to inform the studies assessing the environmental, socio-economic, construction and transport related impacts of the Scheme. The Reference Design includes illustrative examples of what a suitable solution might look like and how it could be built.

1.3.2 TfL proposes to deliver the Silvertown Tunnel through a private finance initiative and has established that a Design, Build, Finance and Maintain

(DBFM) structure would best meet the project objectives and constraints, and achieve an appropriate risk balance. A DBFM contract would be competitively tendered in accordance with EU procurement procedures.

1.3.3 The DBFM contractor would complete the detailed design, construct the tunnel and supporting infrastructure and be responsible for maintenance during a 30 year concession period. TfL would control the day to day operation (traffic management) of the Silvertown Tunnel while Blackwall Tunnel would continue to be managed by TfL under the existing operations and maintenance arrangements.

1.3.4 Once out to tender, bidders for the DBFM service would submit proposals to meet TfL's specification and requirements which will reflect the requirements of the DCO. Bidders' proposals will be subject to a robust technical and environmental evaluation in addition to financial evaluation to ensure a sympathetic enhancement of highway infrastructure is delivered to meet the Scheme objectives whilst also offering value for money.

1.3.5 TfL's specifications and any DCO requirements (including the commitments and requirements of the CoCP) and other commitments given by TfL made under the DCO examination would be encased in the contract documents and the contractor's detailed proposals would be subject to further detailed review by TfL prior to construction to ensure that the final design and construction methodology have no greater adverse effects than those assessed for the DCO.

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

1.4 Construction environmental management approach

1.4.1 Contractual arrangements will require the DBFM contractor to provide suitably qualified environmental staff to manage and execute works for which they are responsible. TfL will require that the DBFM 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 DBFM contractor to have an Environmental Management System in accordance with BS EN ISO14001[1] requirements.

1.4.2 Following the appointment of the DBFM contractor for the works, it will be the contractor's responsibility to produce and maintain a Construction Environmental Management Plan (CEMP) for the construction works. The CEMP will require approval from the local authorities and TfL in accordance with contractual procedures. The CEMP will set out the contractor's roles and responsibilities, together with appropriate control measures, training and briefing procedures, risk assessments, stakeholder engagement and monitoring systems to be employed during planning and constructing the works for all relevant topic areas.

1.4.3 The DBFM contractor will be required to coordinate with relevant parties whose actions may affect the works to construct the Scheme. This will be documented in the CEMP, as appropriate.

1.4.4 In addition to the CEMP, this Preliminary CoCP sets out the requirement for the production and implementation of a number of Environmental Management Plans (EMPs) specific to particular issues. The plans do not need to be separate documents to the CEMP. These may include but are not limited to:

- Community Engagement Plan;
- Construction Logistics Plan;
- Passage Plan;
- Air Quality and Dust Management Plan;
- Noise and Vibration Management Plan;
- Ecology Management Plan (including Site Clearance Plan);
- Heritage Management Plan;

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

- Site Waste Management Plan;
- Materials Management Plan;
- Soil Resources Plan;
- Remediation Strategy;
- Landscape Strategy;
- Lighting Management Plan;
- Water Conservation Plan;
- UXO mitigation strategy;
- Emergency Plan (including Emergency Spill Response Plan); and
- Flood Warning and Evacuation Plan.

1.4.5 These plans will set out the environmental objectives and targets of the Scheme, how the project will deliver the environmental requirements, and how environmental issues that arise are to be handled to ensure compliance with relevant legislation, regulations, and good practice. The EMPs will require approval from the local authorities prior to the commencement of construction and will be subject to ongoing TfL review and review with the relevant local authorities and other statutory agencies

2. GENERAL SITE OPERATIONS

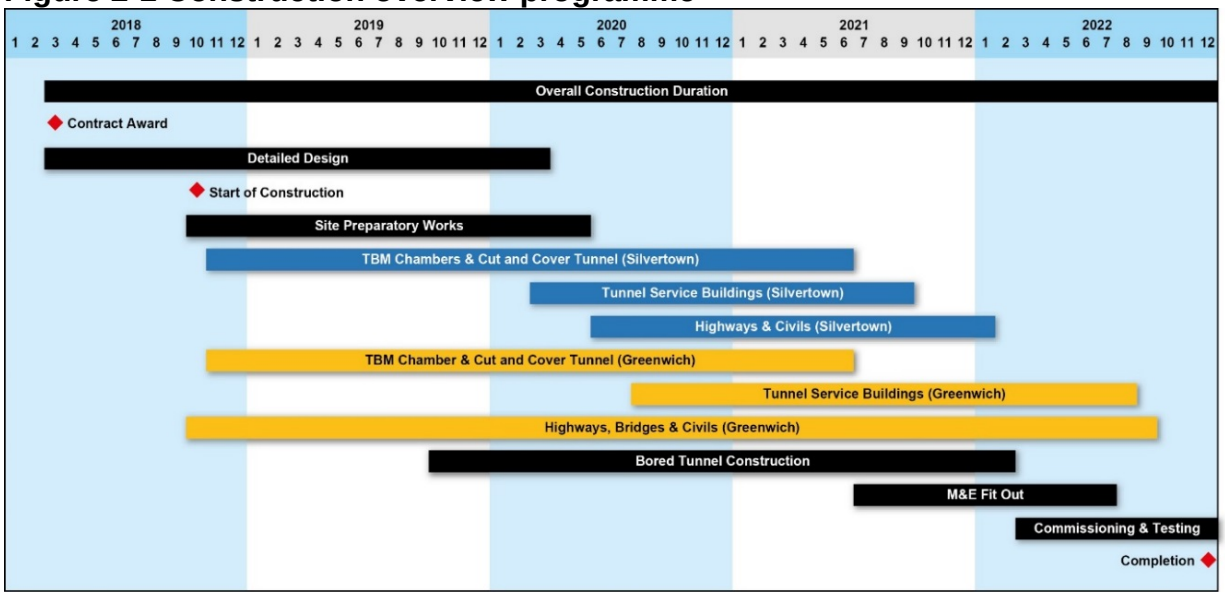
2.1 Construction process

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

2.2 Construction programme

2.2.1 Subject to receiving DCO consent and based on the current programme, main construction works could commence as early as autumn 2018 and would last approximately 4 years as shown in Figure 2-1.

Figure 2-1 Construction overview 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 are planned to be from 0700 to 1900 Monday - Saturday (excluding Bank Holidays), with the first and last hour typically involving start up and shut down activities including maintenance, site briefings, meetings and training.

2.3.2 Where feasible, operations likely to cause disturbance and/or disruption would be limited to within these hours. However, some activities may be required outside these hours. These activities would include works that can only be undertaken during periods of road or rail closure, such as bridge span removal or placement over existing transport corridors. Works outside these hours would be subject to agreement with the local Environmental Health Officers (EHO).

2.3.3 Some minor activities, such as changes in traffic management operations, may be required out of 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.

2.3.4 Tunnel boring works and associated excavated material stockpiling and transportation will be undertaken on a 24 hour, seven days per week basis on commencement of the Tunnel Boring Machine (TBM) launch for both tunnel drives. A 12 hour shift pattern has been assumed due to the relatively short nature of the tunnels to be constructed. Production has been assumed to occur for 6.5 days each week and the remaining half day is set aside for maintenance to ensure the on-going performance of the TBM and all associated equipment to prevent damage or breakdowns.

2.4 Construction sites

2.4.1 There will be two construction sites: Silvertown site to the north of the River Thames and Greenwich site to the south of the River Thames.

2.4.2 The site construction compound located at Silvertown would typically contain offices, stores, plant maintenance facilities, materials testing laboratory, recycling facilities, blacktop and potential concrete batching plants, materials stockpiles and a wheel wash. This site has been selected as the best location for utilising Thames Wharf for marine logistics. This would enable the efficient management of spoil removal and materials delivery by river and reduce the adverse impacts of construction traffic on the local highway network. A further site compound would be located adjacent to the alignment of the proposed tunnel on the Greenwich Peninsula. This would typically comprise site offices, spoil and material storage areas and plant storage areas.

2.4.3 The site compounds would be established at the commencement of the works and would be removed at the end of the construction phase. The size of compound to be occupied at each of the locations would provide

sufficient space to undertake the works in a safely manner without taking space that is non-essential to the construction.

2.4.4 The layout and appearance of the construction sites will be designed using the following principles:

- construction sites 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 site(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.

2.4.5 As part of the community communication and liaison, 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 sites. Further details of the community consultation and liaison are provided in section 2.9 of this Preliminary CoCP.

2.4.6 TfL, through the DBFM contractor, will enforce a ‘good housekeeping’ policy on the construction sites to ensure that they are clean, tidy and safe. Appropriate welfare facilities will be provided for construction personnel including toilets, showers, locker rooms and first aid posts. The facilities will be connected to mains services and drainage, where reasonably practicable.

2.4.7 Access to the sites 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 sites boundaries will be secured and constructed such that they minimise opportunities for unauthorised entry.

2.5 Site clearance and remediation

2.5.1 Advance works could be undertaken prior to the main works starting on site at both Silvertown and Greenwich sites. These works may include but not be limited to:

- advance (pre-construction) surveys;
- site clearance (to be completed during the ecological dormant season); and
- fencing and footway diversions;
- possible contaminated land remediation if required;
- archaeological evaluation (if required); and
- utilities diversions.

2.5.2 Early activity on the sites would be to set out the limits of the works followed by fencing and site clearance. In order for construction to take place, areas of vegetation, comprising mainly of grass and shrubs will require clearance. If any material deemed acceptable from the advance works is produced e.g. good quality topsoil, this will be stored and re-laid, within the project or if this is not possible will be sent for composting.

2.5.3 The site clearance would take account of seasonal constraints, for example the bird nesting season, and be carried out in accordance with a Site Clearance Plan prior to carrying out the works.

2.5.4 The ground investigation fieldwork and reporting undertaken to date provides an understanding of the prevailing conditions at each of the sites associated with the Scheme. The need for contaminated land remediation will be set out in a Remediation Strategy which would be prepared by the DBFM contractor prior to the commencement of construction.

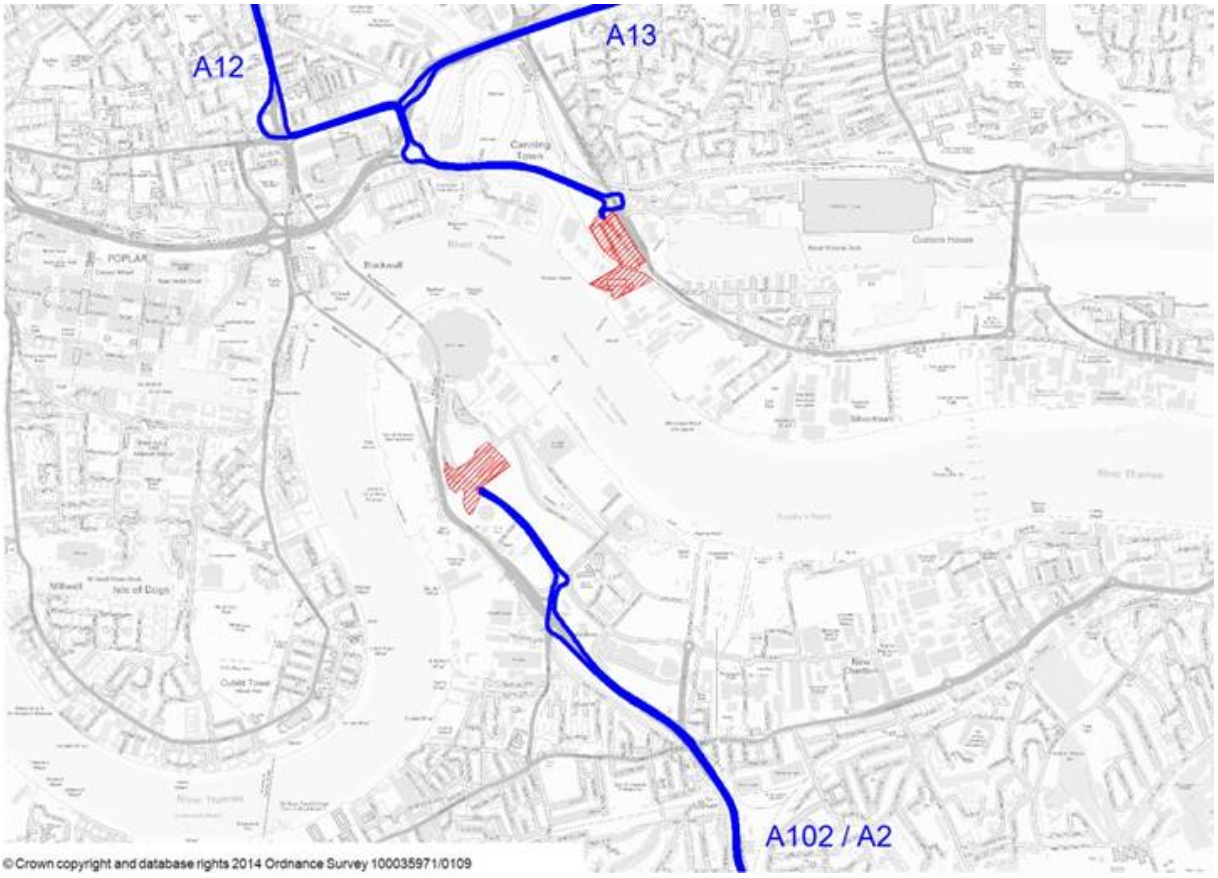
2.6 Access arrangements

2.6.1 A Construction Logistics Plan (CLP) will be produced, co-ordinated and then implemented by the DBFM contractor. The CLP will include details of the expected number of lorry movements per day during the construction phases, as well as:

- main access/egress points for the Silvertown and Greenwich sites;
- temporary and permanent closures and diversions of highways;
- traffic management strategy (including parking); and
- lorry holding areas, lorry route signing strategy, and means of monitoring lorry use and movements.

2.6.2 Figure 2- shows indicative access to and from the construction sites and proposed lorry routes. The main site access routes at both sites will be further detailed by the DBFM contractor as they develop their Scheme construction solutions. Adopting data provided by TfL, the DBFM contractor will be able to determine suitable routes that make reference to the TfL Road Network (TLRN), Strategic Road Network (SRN) and borough roads. When access routes are determined in the proximity of the sites, the Borough Road Hierarchy plan will be consulted to determine best routes to be adopted. The CLP will be submitted for agreement with the local authorities.

Figure 2-2 Indicative main primary lorry routes



2.6.3 All existing public rights of way affected by the construction works would be clearly signed, fenced and diversion routes provided from the outset to ensure that their usage would not be unduly impaired by construction activities. The Scheme design would accommodate all revisions to the alignment of these public rights of way and any changes would occur progressively during the construction period.

2.7 Construction logistics

2.7.1 The DBFM contractor would plan for the delivery of construction materials as part of their CLP. When the DBFM contractor progresses with the development of detailed proposals for the Scheme and there is certainty of where the construction materials will be obtained from and waste materials sent to for disposal, the contractor will be in a position to identify those routes that will be required to undertake the works with the necessary support for deliveries.

2.7.2 Lorry routings to the Silvertown and Greenwich sites will be assessed taking into account prohibited routes as identified by TfL, such as routes past local schools, hospitals and vulnerable road user accident black spots. The CLP will also ensure that safety measures are implemented to minimise road-related risks. The DBFM contractor will specify the highest current standards in construction vehicle safety, including visibility. This includes but is not limited to FORS (Fleet Operator Recognition Scheme), CLOCS (Construction Logistics and Cycle Safety), SLS (Safety Lorry Scheme) and WRRR (Work Related Road Risk) scheme.

2.7.3 Once the quantities for the works and methods have been established, the DBFM contractor will develop a time related forecast of vehicle movements, taking into account the following principles, as far as reasonably practicable:

- Design – optimising the design solution at detailed design stage to minimise material requirements and excavated material generated in order to reduce lorry movements.
- Construction techniques – reducing waste minimises quantities to be removed from the Silvertown and Greenwich sites but also reduce the quantities to be delivered to site to complete the works.
- Site landscaping – once the cut and cover section roof slabs are completed there is the need to reinstate above the structures. Suitable landscaping will reuse any suitable excavated material and hence reduce the quantities of material that will require to be removed from the Silvertown and Greenwich sites.
- Delivery solutions – Potential adoption of onsite batching and movement through the tunnel from the Silvertown site to the Greenwich site could reduce lorry movements and allow bulk pre-mix materials to

be delivered in off peak periods. Maximising the use of river logistics to minimise the required number of road movements.

2.7.4 The Scheme would seek to maximise marine transportation for construction materials and excavated material. The DBFM Contractor will be responsible for producing a full Passage Plan (PP) which will 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. When preparing the PP, the DBFM contractor will need to take into consideration the findings and recommendations in the Draft Navigational Issues and Preliminary Risk Assessment prepared for the Scheme, including:

- appointment of a berthing co-ordinator to communicate with all commercial operators in order to facilitate the safe berthing and departures from berths in close proximity to the project operations;
- establishment of a permanent response team for the duration of the works; and
- defining appropriate channels of communication, roles and responsibilities (including the above berthing co-ordinator or river response team) to liaise throughout the construction with project parties and stakeholders.

2.7.5 It is also recommended that temporary Navigational Rules are developed and temporary works exclusion zones are set up and defined during high risk project activities.

2.8 Emergency planning

2.8.1 The DBFM contractor will ensure that emergency procedures for each work site are developed. The procedures will be standardised as far as possible across both sites and will be appropriate to the anticipated hazards and the specific layout. The Emergency Plan (EP) will include Emergency Services, and notification procedures so that the Services can act accordingly in the event of an incident. The EP will include emergency pollution control measures that will take into account Environmental

Agency guidelines[2] . The EP will contain emergency phone numbers and the method of notifying local authorities and statutory authorities. Contact numbers for the key TfL and contractor's staff will also be included.

Emergency access

2.8.2 The DBFM 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

2.8.3 Both Silvertown and Greenwich sites will have in place appropriate plans and management controls to prevent fires. The site fire plans will be prepared, regularly reviewed, agreed with relevant authorities, and updated as necessary, and will have due regard to relevant current guidance.

Flood risk

2.8.4 A proposed Draft Flood Warning and Evacuation Plan (FWEP) has been prepared. The FWEP contains information on flood emergency response actions. The DBFM contractor would be required to further develop and implement the procedures in the FWEP and ensure that site operatives are familiar with the emergency arrangements.

2.8.5 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.

2.9 Community consultation and liaison

2.9.1 Communication with the local community, the local authorities and other relevant stakeholders will be undertaken throughout the construction period. The DBFM contractor will implement a Community Engagement Plan (CEP) following further consultation with the boroughs and representatives of local residents, local businesses and relevant

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

stakeholders. TfL will, in consultation with the boroughs, establish and maintain a Community Liaison Group and this group will meet regularly before and during the construction period.

2.9.2 The Community Liaison Group will be committed to providing community relations personnel who will be focussed on engaging with the community to provide appropriate information and to be the first line of response to resolve issues of concern. The Community Liaison Group will take reasonable steps to engage with residents including those who may be differentially affected by construction impacts. The Community Liaison Group will ensure that occupiers of nearby properties will be informed in advance of works taking place, including the duration and nature of the works. In the case of work required in response to an emergency, the local authorities and local residents shall be advised as soon as reasonably practicable that emergency work is taking place.

2.9.3 TfL will maintain a telephone helpline service which will include a complaints option during the construction period to handle enquiries and complaints from the general public. It will also act as a first point of contact and information in case of an emergency. All calls will be logged, together with a record of the responses and action taken. Appropriate contacts and response times will be the subject of a detailed procedure to be agreed prior to the commencement of construction.

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3. ENVIRONMENTAL CONTROLS

3.1 Air Quality

3.1.1 The DBFM contractor should, 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 sites, and dust from construction, demolition, vehicles and plant activities.

Vehicle and plant emissions

3.1.2 Vehicle and plant emissions would be controlled by implementing the following measures:

- production of a CLP to manage the sustainable delivery of goods and materials;
- engines of all vehicles, mobile and fixed plant on site are not left running/idling unnecessarily;
- using low emission vehicles and plant fitted with catalysts, diesel particulate filters or similar devices;
- 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 and delivery vehicles will be required to comply with the London Low Emission Zone applicable to the site at the time of tendering; and
- all members of the contractor's staff who drive vehicles under the DBFM contract would undertake a fuel-efficient driver training course within three months of the commencement of the contract. The training course shall consist of theoretical training and practical implementation

skills and shall be a minimum duration of one hour. Throughout the duration of the contract, any new staff employed by the DBFM contractor who drives for work shall also be required to undertake fuel-efficient driver training. The DBFM contractor shall encourage its sub-contractors to undertake similar fuel efficient driver training.

Dust management and monitoring

3.1.3 The Institute of Air Quality Management (IAQM) guidance[3] and Mayor's Dust and Emissions Supplementary Planning Guidance[4] provide a number of potential mitigation measures to reduce dust impacts during the construction phase. These are summarised in Table 3-1. These will be reviewed and developed by the DBFM contractor prior to the commencement of construction works and incorporated into the CEMP.

Table 3-1 Mitigation measures to reduce dust impacts could include but not limited to:

Issue	Control measure
Communications	• Develop and implement a CEP • Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary of both construction sites • Develop and implement an Air Quality and Dust Management Plan (AQDMP), approved by TfL and the local authorities. The AQDMP details controls to limit dust emissions, including damping down, the consideration of using green walls, screening and other green infrastructure to minimise the impact of dust and pollution and also to improve the local ambience during construction.
Site Management	• Record all dust and air quality complaints • Record any exceptional incidents that cause dust/or air emissions, and the action taken to resolve the situation
Monitoring	• Undertake daily on-site and off-site inspection to monitor

[3] Institute of Air Quality Management (2015). Land-Use Planning & Development Control: Planning For Air Quality

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

Issue	Control measure
	dust • Carry out regular site inspections to monitor compliance with the AQDMP • Increase frequency of site inspections when activities with a high potential to produce dust are being carried out
Preparing and maintaining the sites	• Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible • Fully enclose site or specific operations where there is a high potential for dust production and the site as activities for an extensive period • Avoid site runoff of water or mud • Use water as dust suppressant where applicable • Remove materials that have a potential to produce dust from site as soon as possible • Cover, seed or fence stockpiles to prevent wind whipping
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 of engines - no idling vehicles • Avoid the use of diesel or petrol powered generators where practicable • Impose a maximum-speed-limit of 25kph on surfaced and 15kph on un-surfaced haul roads and work areas • Produce a Construction Logistics Plan to manage deliveries • Implement a Travel Plan that supports and encourages sustainable travel of the construction staff
Operations	• Cutting equipment to use water as dust suppressant or suitable local extract ventilation • Use enclosed chutes and covered skips • Minimise drop heights • Ensure equipment is readily available on site to clean any spillages
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

Issue	Control measure
	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 to dry out • Ensure bulk cement and other fine power materials are delivered and stored to prevent escape
Trackout	• Use water-assisted dust sweeper on the access and local roads • Avoid dry sweeping of large areas • Ensure vehicles entering and leaving sites are covered to prevent escape of materials • Inspect on-site routes for integrity, instigate necessary repairs and record in site log book • Implement a wheel washing system at a suitable location near site exit • Access gates 10m from receptors where possible

Odour

3.1.4 It is not anticipated that the construction works will give rise to any odour nuisance, but if necessary the DBFM contractor will adopt appropriate measures so as to avoid the creation of statutory nuisance from odours.

3.2 Cultural heritage

3.2.1 Any impacts to sub-surface archaeological remains caused during the construction phase of the Scheme will be mitigated through archaeological recording. This would take the form of archaeological excavation and watching briefs prior to and/or during construction. The archaeological recording would be followed by an appropriate programme of assessment, analysis and reporting.

3.2.2 If any heritage assets are found during the watching brief, the DBMF contractor would need to obtain all necessary consents and licences, and provide supporting documentation. This includes the preparation of a Heritage Management Plan (HMP), if this is identified as necessary. TfL would consult with Historic England about the HMP.

3.2.3 The HMP would indicate how the contractor intends to protect the historic environment in a consistent and integrated manner during the works. It

shall include general standards of good practice across the project and specific measures, in relation to individual work sites.

3.3 Ecology

3.3.1 An Ecology Management Plan will be developed and implemented by the DBFM contractor in liaison with Natural England. The Ecology Management Plan will detail measures to manage the risk of adversely affecting flora and fauna on and within the vicinity of the site, including method statements in the event invasive species are encountered and details how additional survey requirements would be accommodated in the programme.

3.3.2 A pre-construction survey should 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 sites.

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

3.3.4 Black redstart monitoring will be undertaken annually during the construction period from April to July[5]. If black redstart is recorded, liaison will be undertaken between the ecologist and the contractors to determine whether there is a need for additional mitigation, demarcation of exclusion zones or whether works are required to stop temporarily until the birds have left the area (i.e. following the breeding period). Requirements would depend on the scale of the potential impact but options include initial weekly monitoring during the breeding season and during construction with bespoke recommendations from the ecologist such as temporary protection of the area from construction and the provision of additional areas of black redstart foraging habitat and/or additional black redstart nesting boxes/ledges and or singing posts.

[5] Wildlife and Countryside Act, Schedule I (as amended) 1981

3.3.5 Site hoardings will be erected surrounding the works which will reduce adjacent disturbance.

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

3.3.7 Tree Survey to best practice standards[6] will be 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.

3.3.8 The Preliminary CoCP includes dust attenuation measures to prevent pollution, as described in detail in Section 3.1, and pollution prevention measures following Environment Agency guidelines, as described in detail in Section 3.4.

3.3.9 The marine elements of the Scheme have not yet been finalised. Survey work and an assessment of the potential impacts from the construction and operation of the jetty will be completed for the final ES. Dredging techniques that limit the dispersal of intertidal sediments will be implemented where appropriate. More specific mitigation measures recommended for any in-river works will be included in the CEMP taking into account the recommendations in the ES chapter.

3.3.10 A risk assessment will be undertaken for the construction phase to identify measures to minimise the potential for the import of invasive species into the area and minimise the risk of spreading those which are already present.

[6] BSI (2012) British Standard 5837: 2012 Trees in relation to design, demolition and construction – Recommendations.

3.4 Geology and soils

Unexploded Ordnance (UXO)

3.4.1 An initial UXO survey was completed at the end of 2014 comprising a detailed magnetometer and sub-bottom profiler survey of the tunnel alignment across the Thames. The UXO survey provides the location of threats but does not identify the depth below river bed.

3.4.2 In order to gain a further understanding of the UXO risk, a side scan sonar survey which could provide further information on the depth of the 40+ anomalies along or close to the alignment is currently being undertaken.

3.4.3 A detailed Unexploded Ordnance (UXO) mitigation strategy will be developed for the project prior to construction. Prior to any intrusive investigation works for retrieving information for design purposes and to assess any potential risk from UXO during the construction of the Scheme. The survey would include:

- a down hole magnetometer for deep intrusive works;
- the presence of an Explosive Ordnance Disposal (EOD) engineer; and
- jack up barge intrusive magnetometer for any areas within the River Thames to target high risk areas. These will be required prior to the construction of the jetty.

3.4.4 An emergency response procedure will be prepared and implemented to respond to UXO.

Contaminated land

3.4.5 TfL will carry out site assessments, investigations and/or risk assessments wherever construction work is planned in order to assess the potential for contamination in both the land and groundwater. The necessary measures will be agreed with the Environment Agency and the local authorities as part of the construction planning process, in accordance with industry best practice.

3.4.6 A set of criteria for site investigation will be developed prior to the commencement of any intrusive works. Where site investigation reveals the presence of contaminated land, and groundwater, an appropriate remedial strategy will be developed to identify the most appropriate option for dealing with the presence of the contamination. The Scheme will also

follow measures outlined within 'The Greenwich Peninsula Environmental Method Statement'[7], which details how the Greenwich site should be developed to stop the mobilisation of existing contamination.

3.4.7 The production and adherence to a CEMP is required so that geology and soils are not negatively impacted or contaminated as a result of the Scheme activities. Health and safety risks to construction workers will be mitigated by the DBFM contractor's responsibility to design out risk embodied within Construction Design and Management Regulations[8] and the implementation of appropriate health and safety measures.

3.4.8 The DBFM contractor would be responsible for ensuring that members of the public and site workers are protected from the potential effects of any contamination encountered during construction. Measures utilised will be incorporated within the general construction site safety standards. The DBFM contractor will carry out a health and safety risk assessment with appropriate precautionary measures planned and recorded in advance by adequately training and qualified persons.

3.4.9 The DBFM contractor would need to prepare detailed method statements and appropriate controls would be employed to satisfy the general requirement to safeguard the environment. The CEMP would include method statements and protocols for activities.

3.4.10 Activities, pertinent to this Scheme that would be expected to be found within the CEMP, include:

- the provision of wheel washing facilities;
- site access points to be regularly cleaned;
- an Emergency Spill Response Plan (ESRP) would be produced, which site staff must have read and understood;
- areas for loading and unloading of plant and materials;

[7] Royal Borough of Greenwich (2013), Greenwich Peninsula Environmental Method Statement (EMS).

[8] Health and Safety Executive (2015). Construction Design and Management Regulations.

- defined access and haul roads for vehicles on site;
- clean down of vehicles and equipment;
- groundwater control to occur prior to concrete pouring, if required;
- defined areas for the storage of plant and materials used during construction; and
- sediment control measures (controlled in accordance with the Site Waste Management Plan (SWMP)).

3.4.11 To limit the potential for effects to the soil resource during excavation, a Materials Management Plan (MMP) and/or a Soil Resources Plan (as required by Good Practice Guide for Handling Soils[9] would be developed and linked to a SWMP. Surplus topsoil would be re-used (where possible) within the site.

3.4.12 The Scheme will adhere to Environment Agency Pollution Prevention Guidelines[10]. These will include pollution prevention measures, such as bunding which would be provided for fuel storage areas to prevent contamination of the surrounding soils and groundwaters.

3.5 Noise and vibration

3.5.1 The DBFM contractor will seek to control and limit noise and vibration levels to minimise any disturbance to receptors in the vicinity of the construction works. Noise and Vibration Management Plan will be prepared and agreed with local authorities prior to commencing construction.

3.5.2 The DBFM contractor will obtain consents from the relevant local authority under Section 61 of the Control of Pollution Act (which will include noise and vibration limits where relevant) for the proposed construction works. However, Section 61 process may not be appropriate in the case of some types of tunnelling operations. Site specific management and mitigation

[9] MAFF (2000), Good practice guide for handling soils. Defra.

[10] Environment Agency (2014). Pollution Prevention Guidance (PPG).

requirements for noise and vibration will be further defined in the Section 61 consents. By exception, the contractor may agree with the local authority that, for certain activities not anticipated to be noise sensitive, such as normal site investigation and site set up (subject to these being in accordance with this CoCP), that a Section 61 will not be necessary.

3.5.3 The DBFM contractor will be responsible for notifying the local residents of particularly noisy work prior to commencement. 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.

3.5.4 A set of generic good practice working practices referred to as Best Practicable Means[11] (BPM) would be employed during the construction phase. Examples of typical BPM include:

- 2.0m closed board fencing will be installed around the construction areas. Indicative locations are indicated on Drawing 14.5 Construction Noise Mitigation of Volume 2 Preliminary Environmental Information Report: Drawings;
- provision of 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;
- site access routes would be in good condition and well maintained with no potholes or other significant surface irregularities;
- plant machinery would be turned off when not in use;
- all vehicles and mobile plant would be well maintained such that loose body fittings or exhausts do not rattle or vibrate;
- silenced equipment would be used where possible, in particular silenced power generators and pumps;

[11] Royal Borough of Greenwich (2015). Noise from large construction sites. Best practicable means.

- where possible the most modern equipment available would be used and the equipment used would be properly maintained and operated by trained staff;
- static noisy plant, including generators, would be located as far away from noise sensitive receptors as is feasible for the particular activity;
- speed limits would be in place to reduce the effect of construction traffic noise. Limits would be inside the individual construction site on all non-surfaced roads restricted to 15kph and any surfaced roads would be restricted to 25kph;
- to minimise vibration from HGVs movements, there would be 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;
- as part of the plant selection process, the DBFM contractor should adopt a procedure to ensure the quietest plant and equipment, techniques and working practices available would be selected and used; and
- no music or radios would be played on site.

3.5.5 The following measures would also be undertaken prior to construction:

- Pre-construction noise monitoring surveys would be undertaken and agreed with the relevant local authority to establish a pre-construction baseline for monitoring compliance with construction noise limits.
- Night time works would be re-assessed in accordance with BS 5228 using specific manufacturer's data and position of equipment. Results of the assessment should be presented to the EHOs of the local authorities prior to commencement of night time works.
- Any changes to the Reference design, the DBFM contractor would ensure that an updated noise assessment is carried out to ensure there would be no additional or increase in negative effects on receptors.

3.5.6 During the construction phase, day time and night time noise and vibration monitoring will be undertaken at key sensitive receptors (to be defined through development of the CEMP) to ensure that the mitigation

measures suggested are working effectively. The regime would be agreed with the relevant Environmental Health Officer (EHO) prior to works commencing. Noise and vibration from the conveyor will be minimised through the implementation of a maintenance programme which includes regular inspection of the conveyor equipment.

3.6 Townscape and Visual Amenity

Visual disruption

3.6.1 Construction good practice will be employed to minimise townscape and visual disruption, for example protection of existing vegetation to be retained and targeted use of hoarding to screen construction sites. The visual intrusion of construction sites on nearby residents and users of local facilities will be contained and limited. The type of hoarding or fencing used and vehicle access and egress points will be agreed with TfL and the relevant local authority. Signage, decoration or enhancement, for information or aesthetic purposes, on the hoarding will be in accordance with TfL's corporate requirements.

3.6.2 Following completion of construction activities, all disturbed land will be reinstated in accordance with the indicative landscape proposals in the Preliminary Design and Access Statement and to the satisfaction of the relevant local authority.

Lighting

3.6.3 Lighting would be required at the site compounds for safety and security. This would be designed with consideration for visual impact and to minimise visual intrusion. The bored tunnelling works will be undertaken on a 24hr basis and this work will require activities on the surface. To ensure these activities are undertaken in a safe manner, a certain amount of safety lighting will be necessary.

3.6.4 Appropriate industry standard procedures will be implemented at both construction sites for site lighting. 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, or the navigation lights for air or water traffic and wildlife breeding seasons.

3.6.5 Bat activity surveys have not been completed at this stage. However, if bats are likely to be present at any of the construction sites, the DBFM

contractor shall consult an ecologist to ensure the design for the site lighting will not disturb or adversely affect bats in the area. This provision will apply particularly to the site where night working will be required. In addition, a Lighting Management Plan will be prepared and implemented. The plan will reviewed by TfL, relevant authorities, and the Environment Agency.

3.7 Material resources and waste

3.7.1 The DBFM contractor will manage demolition / construction / fit out and excavation wastes 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. The Preliminary CoCP requires the DBFM contractor to:

- maximise opportunities for the potential reusing and recycling of all material resources and waste;
- sort and segregate waste into different waste streams; and
- manage material use to maximise the environmental and Scheme benefits from the use of surplus materials.

3.7.2 There will be a number of activities along the length of the works that will generate material in addition to the bored tunnelling works. Examples are:

- piling activities;
- cut and cover works;
- retained cuts;
- site clearance/demolition;

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

CL:AIRE (2011). 'The Definition of Waste: Development Industry Code of Practice'

- landscaping; and
- roadworks.

3.7.3 The majority of these materials will require disposal as they will be unsuitable for re-use on site except for some of the clean excavated materials which can be used in the landscape strategy and some of the demolition materials which can be adopted for piling mats and site access roads etc. A Preliminary Site Waste Management Plan has been developed for the Scheme and will be refined and updated by the DBFM contractor as the design and the Scheme progresses. The SWMP will consider how the waste hierarchy can be applied and details how all wastes are to be managed. The SWMP will also provide a framework for checking compliance with waste legislation and the Duty of Care[13].

3.7.4 Some of the materials generated by these activities will be contaminated or hazardous and the SWMP will determine the course of action to be taken for each of these waste streams. It is likely that the hazardous and less standard materials will require disposal by road. The Construction Logistics Plan, which will be developed by the DBFM contractor, will manage all types of freight vehicle movement to and from the Scheme. Adoption of marine transport for the removal of excavated material will reduce the vehicle movements required on the local road network. The DBFM contractor should take measures to ensure that this resource is utilised to its full potential.

3.7.5 A Materials Management Plan will be prepared by the DBFM contractor to ensure that materials are handled and used in a way that prevents harm to human health and pollution of the environment.

3.7.6 The risk from release of asbestos during alteration and demolition works and excavation work will be managed in accordance with relevant

[13] Waste Framework Directive, Directive 2008/98/EC European Waste Framework Directive [2008] OJ L 312/3. Environmental Permitting (England and Wales) Regulations 2007. SI 3538. EU Landfill Directive, Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste [1999] OJ L 182/1.

legislation and good practice. Measures for managing asbestos in excavation works will include:

- 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.

3.8 Water environment

Site drainage

3.8.1 Water management would will be an important part of the tunnelling operation. The DBFM 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 is 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.

Control of pollution

3.8.2 The DBFM contractor will undertake the works and implement working methods which will be developed to protect surface and groundwater 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.

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

Contingency plans to deal with major pollution incidents at the work sites will be included within the overall emergency planning. Environment Agency guidance on pollution incident response planning[15] will be reflected in the emergency plans.

Surface water

3.8.3 The CEMP will document good practice pollution prevention methods for activities such as excavation and dewatering, storage of fuels, chemicals and oils, vehicle washing, pollution control, and emergency contingency. Access to pollution control equipment and spillage clean up facilities would be provided and a Spillage Prevention Plan would be in place and would include measures to be taken to prevent pollution caused by severe weather.

3.8.4 The following considerations would be taken into account during construction to ensure that an effective surface water drainage system would be operational throughout construction and risks of pollution would be appropriately controlled:

- New drainage outfalls, storage and pollution control systems should be built as early in the construction sequence as is practicable.
- Drainage systems should be inspected regularly and maintained as necessary to ensure the carriageway operates to the appropriate standard. Inspection and maintenance should be required more often in areas with a high level of construction activity.
- Access to pollution control and spillage facilities should be maintained and a Spillage Prevention Plan should be implemented.
- Consideration should be given to protecting any existing drainage when storing fill materials, aggregates and plant to prevent potential drainage and pollution issues.
- All refuelling, oiling and greasing will take place above drip trays or on an impermeable surface which provides protection to underground

[15] Environment Agency (2009). Incident Response Planning: PPG 21.

strata and watercourses and away from drains as far as reasonably practicable. Vehicles will not be left unattended during refuelling.

Groundwater

3.8.5 Protection measures to control the risk of pollution to groundwater will be included within the CEMP and in compliance with relevant legislation. It is the contractor's responsibility to avoid using materials in the permanent or temporary works that could pollute groundwater. This will include special consideration for the use of substances listed in relevant legislation[16].

Water conservation

3.8.6 The DBFM contractor will implement working methods that control water consumption and ensure water is used efficiently on the construction sites. Water use efficiency and water re-use is to be advocated by the CEMP. The plan will include but 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);
- action plan, including staff engagement and training, to reduce water consumption by all water-using processes, activities and equipment on site;
- monitoring regime that assess the effectiveness of water conservation measures in the plan;
- reporting effectiveness of the plan annually;
- 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 would be provided at each storage lagoon for use in filling water bowsers.

[16] Environment Agency (2013), Groundwater Protection: Principles and Practice (GP3). Health and Safety Executive (2002), Control Substances Hazardous to Health.

3.8.7 Water needed for site offices, canteens and laboratories would be taken from Thames Water mains piped potable supplies and measures to encourage water use efficiency would be adopted. Water for use in firefighting would be stored in a dedicated tank that would have an automatic top up from mains water supply if required.

Dredging

3.8.8 Measures to minimise effects on water quality and aquatic ecology impacts from dredging will be included in the draft CoCP which will accompany the DCO application.