

# SILVERTOWN TUNNEL

## 7.4 Design Principles

### TR010021

APFP Regulation 5(2) (q)

Revision 1

Planning Act 2008

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

December 2016

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# Silvertown Tunnel

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## Design Principles

### 7.4

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Planning Act 2008

Infrastructure Planning

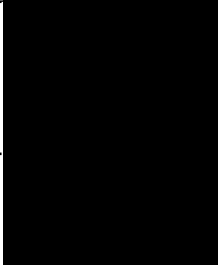
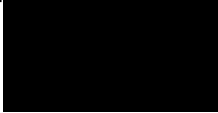
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## List of Abbreviations

BAP	Biodiversity Action Plan
CABE	Commission for the Built Environment
DAS	Design and Access Statement
DBFM	Design, Build, Finance, Maintain
DCO	Development Consent Order
DLR	Docklands Light Railway
EAL	Emirates Air Line
EIA	Environmental Impact Assessment
EPB	Earth Pressure Balance
ES	Environmental Statement
GLA	Greater London Authority
NN NPS	National Networks National Policy Statement
PINS	Planning Inspectorate
SS	Slurry Shield

SUDS	Sustainable Urban Drainage Systems
TBM	Tunnel Boring Machine
TLRN	Transport for London Road Network
UDL	Urban Design London

## Glossary of Terms

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 Review Panel	Transport for London has set up an independent design review panel, administered by Urban Design London, to provide design assurance throughout the design process. The panel will focus on the above ground elements of the Silvertown Tunnel. The panel will provide consistency through the life of the design process; ensure that the design principles are applied appropriately and that the eventual built design is of an appropriate quality.
Detailed Design	The design that defines precisely the works that is to be constructed to meet the specified outputs.
Development Consent Order (DCO)	<p>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.</p> <p><a href="http://infrastructure.planninginspectorate.gov.uk/help/glossary-of-terms/">http://infrastructure.planninginspectorate.gov.uk/help/glossary-of-terms/</a></p>
Docklands Light Railway (DLR)	An automated light metro system serving the Docklands and east London area. The DLR is operated under concession awarded by Transport for London to KeolisAmey Docklands, a joint venture between transport operator Keolis and infrastructure specialists Amey plc.
Emirates Air Line (EAL)	A cable car service for pedestrians and cyclists across the River Thames in east London, linking the Greenwich peninsula to the Royal Victoria Dock. The service is managed



	by TfL, and is part of the TfL transport network.
Earth Pressure Balance (EPB) Tunnel Boring Machine	A type of tunnel boring machine used in soft ground. The machine uses the excavated material to balance the pressure at the tunnel face. Pressure is maintained in the cutter head by controlling the rate of extraction of spoil through the removal Archimedes screw and the advance rate of the machine.
Illustrative Design	An example of how the proposals could be developed at the next stage of design as a result of engagement with the DBFM contractor, planning authority and other relevant stakeholders. This is an example of how the Scheme may look, but it is not the final design.
Launch Chamber	A cofferdam or other underground space created to commence bored tunnel construction using a TBM.
Mode share	The percentage of trips or people using a particular mode of transport. Also referred to as mode split.
Project Company	<p>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).</p> <p>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.</p> <p>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.</p>
Roads Task Force Street	The Roads Task Force (RTF) is an independent body set up by the Mayor of London in 2012 to tackle the challenges facing London's streets and roads. The RTF proposed a

Types	'street family' of nine Street Types, in which streets are defined by significance of their 'movement' and the intensity of their 'place'. TfL are working with the London boroughs to classify the network according to this new family of Street Types.
Semi-Natural Habitat	Generally considered to be any naturally occurring vegetative habitat that has been affected by human actions, and includes most, if not all, habitats in the UK
Service Building, Tunnel Service Building, Portal Building	The building housing all control, power supply, and other essential equipment for the operation of the tunnel. Also houses firefighting control and ventilation equipment. Serves as a maintenance base and has the facility to become a standby operations room.
The Scheme	The construction of a new twin-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.
Slurry Shield (SS) Tunnel Boring Machine	A form of soft ground closed face tunnel boring machine which is selected in certain types of ground containing sands and gravels, and where high groundwater pressures exists. The chamber containing the TBM cutter head is filled with pressurised slurry which applies pressure to the excavation face. The slurry acts as a ground support and transport medium for the excavated material, which is continuously circulated between the TBM and a slurry treatment plant, where the excavated material is separated out for disposal or reuse.
Streetscape Guidance	TfL Streetscape Guidance provides a standard for London's streets and spaces for those who will be working on or affecting London's streets. All works on the Transport for London Road Network must adhere to the guidance provided. A copy of the guidance can be found at : <a href="https://tfl.gov.uk/streets-toolkit">https://tfl.gov.uk/streets-toolkit</a>

Transport for London (TfL)	<p>A London 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.</p> <p>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.</p> <p>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.</p>
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 glossary for further explanation.
Tunnel Portal	A structure created which defines the end of a section of tunnel.

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# 1. INTRODUCTION

## 1.1 Purpose of this report

1.1.1 This document contains the Design Principles as stated in the Design and Access Statement (DAS) (Document Reference 7.3). It is presented as a separate document to enable it to be a certified document for the purposes of the DCO. As such it should be read alongside the DAS.

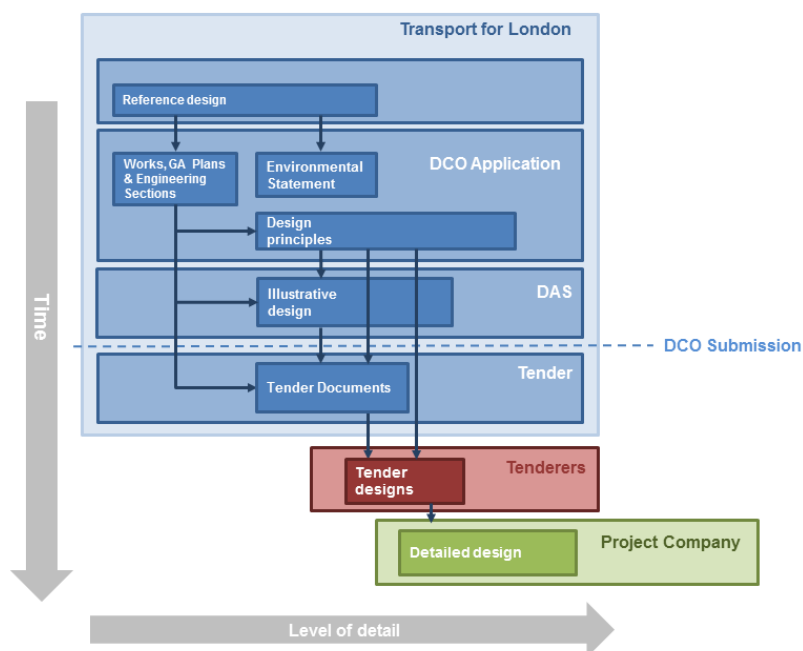
1.1.2 The purpose of this document is:

1. To define Design Principles which set the framework within which, through the DCO, the detailed design of the Scheme will be required to respond; taking account of the sites' rapidly changing context and contractor-led innovation.
2. To provide sufficient design information for the purposes of the Environmental Impact Assessment (EIA) of the Scheme and to enable essential measures for the mitigation of the significant effects to be identified.
3. To provide stakeholders with assurance that their reasonable requirements and aspirations for the Scheme infrastructure (including the road, landscape, portal buildings and associated buildings and structures) will be met.
4. To set out TfL design related commitments made in response to public consultation and ensure that these are followed through to detailed design.
5. To demonstrate how TfL will continue to take account of the criteria for good design set out in policy in order to ensure that the Scheme is as sustainable and as aesthetically sensitive, durable, adaptable and resilient as it can reasonably be. This policy includes the National Road and Rail Networks: National Policy Statement (the NN NPS) and other relevant TfL, Greater London Authority (GLA) and local policies as defined in the DAS.

## 1.2 Design assurance

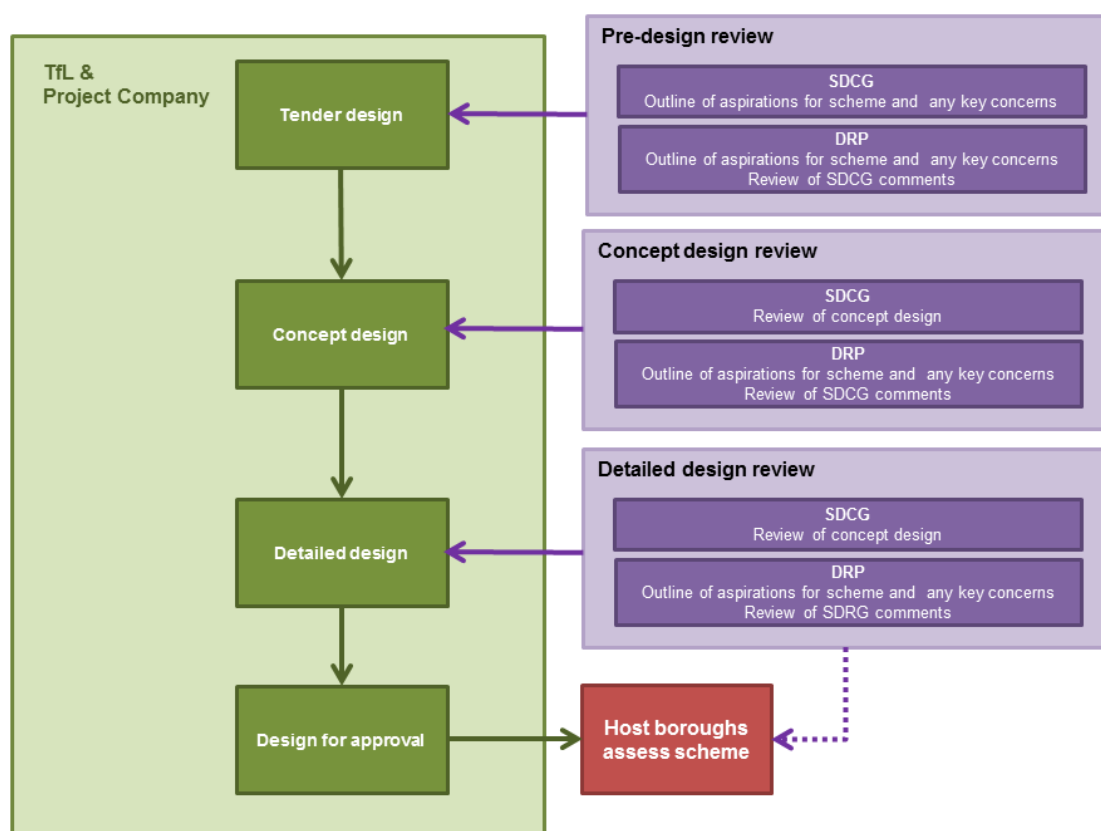
- 1.2.1 The Design Principles sit within the Design Assurance Framework described in the DAS. This includes the Design Principles, Illustrative Designs and Silvertown Tunnel Design Review Panel.
- 1.2.2 The Design Principles apply within the framework provided by the General Arrangement Plans, Works Plans, Engineering Section Drawings and Plans included within the application for development consent. They provide sufficient details of the design intent while allowing for appropriate flexibility to develop the detailed designs of the Scheme prior to its construction.
- 1.2.3 The Design Principles should be read in conjunction with the Illustrative Design presented in the Design and Access Statement. The Illustrative Design provides an example of how the Scheme could be developed to comply with the undertaking and requirements within the DCO whilst adhering to the Design Principles.
- 1.2.4 Each of the above elements sits within the design process as shown in Figure 1-1.

**Figure 1-1 Design Process**



- 1.2.5 TfL has set up an independent design review panel, administered by Urban Design London (UDL), to provide advice on the design of the above ground elements throughout the design process. The panel will ensure that the Design Principles are applied appropriately and that the eventual built design is of an appropriate quality. The Terms of Reference of the Silvertown Tunnel Design Review Panel can be found in Appendix A. TfL has also set up the Silvertown Tunnel Stakeholder Design Consultation Group to provide stakeholders and land interests (as defined in appendix B) an opportunity to provide input and review of the external appearance of the above ground elements of Silvertown Tunnel at detailed design. The Group will be chaired and administered by TfL, have sub groups for the north and south, and include a representative from the relevant host borough. The Group will provide comment and advice only and in the event that there is disagreement within the Group at the end of a session, the Design Review Panel will be asked to provide a recommended direction. Terms of Reference and initial membership of the Silvertown Tunnel Stakeholder Design Consultation Group can be found in Appendix B.
- 1.2.6 The Design Review Panel and Stakeholder Design Consultation Group will be consulted as a minimum at the points in the design process shown in Figure 1-2.

**Figure 1-2 Review**



### 1.3 Design Vision

1.3.1 The design vision for the Scheme sets the high level design aspirations for the above ground elements. The vision sets the context in which the Design Principles have been developed and the strategic goals that they are seeking to achieve. The principles in turn define measurable ways in which the achievement of the vision can be assessed.

1.3.2 The vision is that the Scheme should incorporate:

- **High quality and appropriate architecture.** Good architecture and urban design should reconcile the project with its environment by creating structures and associated facilities that respond to their context. The aspiration is to create simple, well-conceived infrastructure and buildings with a clear design rationale that reflect the purpose of the infrastructure but pay careful attention to their context. The design quality of the Scheme should significantly contribute to the overall appearance, reputation and impact of infrastructure projects and how



they can benefit society as a whole. The building's appearance should tell us something about what purpose it serves, its importance to the area and what goes on inside. The new tunnel, its portals and ancillary buildings should be integrated, as far as reasonably possible, with existing infrastructure and land uses, enable future change that is consistent with policy and be flexible in order to integrate with uncertain or undefined future change. The architecture of the Scheme should enable the Scheme to be celebrated and become an object of local, regional and national pride.

- ***Built in reliability, robust materials and detailing.*** High quality materials and careful detailing should limit the need for maintenance and allow the Scheme to weather and age well over the full life of the project. This cannot be achieved without appropriate, carefully chosen and installed materials. To be reliable, the Scheme and its design must be easily maintainable in order to maximise its availability to users. Maintainability must be designed into the Scheme from the outset and cover all modes of movement through the tunnel and in the adjacent areas. This includes continuity of the use of the tunnel by vehicles and the ability of pedestrians and cyclists to move along routes in the local area easily and safely at all times, as far as practical. The requirement to maximise availability extends to ensuring the continued availability of existing infrastructure during the construction of the Scheme.
- ***Integrative landscape design.*** The landscape design associated with the Scheme including planting and public realm should enhance its use, its setting and mitigate the visual impact of the road, portal and buildings along with any impacts of the associated traffic. The landscape design should create a sense of place and enable the public realm to be accessed and used by all in a safe and meaningful way that supports the local area. It should support the creation of consistent and coherent pedestrian and cycle networks that are fit for today and the future. The planting should protect and enhance biodiversity, including the creation of spaces remote from human activity that can become valuable habitats for a wide range of flora and fauna. The planting should also humanise the infrastructure by softening its appearance and helping to integrate it into its context.
- ***Sustainability through design.*** Aspects of the Scheme's buildings are likely to change their use over their lifetime, as will the technologies they contain. The design of these structures should be flexible, able to accommodate changing requirements without major alterations, and be

adaptable so that they can be altered or extended conveniently when necessary. Where possible, building materials should be locally sourced, reclaimed, recycled and have low carbon impact. The site development strategy should accommodate biodiversity, landscape planting and Sustainable Urban Drainage Systems (SUDS). The strategy should seek to remove or reduce where possible the environmental impact of traffic and highway infrastructure on workers and residents, be resilient to climate change, and enable the provision of sustainable public and private road transport.

- **Safe, secure and smart infrastructure.** The Scheme should meet the needs of all categories of road users enabling them to use the Scheme and the areas impacted by it safely. It should optimise traffic flows and create a safe environment for road construction, working and maintenance, including incorporation of safe road crossings at all times. The Scheme should result in a safer environment for all users of the local area. The critical nature of the infrastructure means that the design should be secure, resilient and designed to meet the latest counter-terrorism guidance.

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## 2. DESIGN PRINCIPLES

### 2.1 Introduction

2.1.1 The Design Principles that follow will be applied to guide the detailed design of the Scheme in accordance with the Design Vision. This includes the development of any designs required to be produced in order to discharge the requirements of the DCO. The Illustrative Design as presented in the DAS shows one example of how these Design Principles can be incorporated into the Scheme.

### 2.2 Design Process

2.2.1 The Scheme Design will be developed by the contractor appointed by TfL, known as the Project Company, and TfL. TfL and the project Company will consult the Silvertown Tunnel Design Review Panel and the Stakeholder Design Consultation Group in developing the design.

**Table 2-1 Design Process**

Reference	Design Process Design Principles
<b>DPRO.01</b>	The design of the scheme should be reviewed by the Silvertown Tunnel Design Review Panel in line with the Terms or Reference in Appendix A
<b>DPRO.02</b>	Consultation on the design of the scheme should be undertaken with the Stakeholder Design Consultation Group in line with the Terms or Reference in Appendix B

### 2.3 Landscape

2.3.1 The landscape design of the Scheme covers public realm, walking, cycling and planting. The landscape design objectives of the Scheme are to:

- enhance pedestrian and cycle provision and connectivity around the portal area including access to the EAL;
- provide access to Tunnel Service Buildings, where required;
- contribute to place-making and enhance the character of the area;

- minimise land take and optimise future development potential of adjacent sites; and
- provide appropriate protection and enhancement of the biodiversity of the area.
- take account of the Silvertown Tunnel Biodiversity Action Plan and Mitigation Strategy (BAPMS), Environment Statement Appendix 9.H.

2.3.2 This should be achieved by adhering to the following Design Principles:

**Table 2-2 Landscape**

Reference	Landscape Design Principles
<b>LSCP.01</b>	<p>The detailed design of the Scheme should adhere to TfL Streetscape Guidance and London Cycle Design Standards (LCDS).</p> <p>Particular consideration should be given to:</p> <ul style="list-style-type: none"> <li>• Streetscape Guidance Part B: Balancing Priorities</li> <li>• LCDS: 1.1.5 Design Outcomes and</li> <li>• LCDS 1.1.6 Guiding Principles</li> </ul>
<b>LSCP.02</b>	<p>The detailed design of the Scheme should be developed with reference to relevant guidance on safety and security, including Secured by Design, Design Council CABE guidance and the Centre for the Protection of National Infrastructure and National Counter-Terrorism Security Office’s Protecting Crowded Places design guidance.</p>
<b>LSCP.03</b>	<p>The detailed design of the Scheme should seek to improve access for pedestrians and cyclists, taking account of local community needs, whilst being functional, practical and economical. It should help to create a legible street network that promotes walking and cycling, and defines spaces through public realm not highways.</p>
<b>LSCP.04</b>	<p>Footways should be an adequate width and achieve an appropriate Pedestrian Comfort Level as defined in</p>

	TfL's Pedestrian Comfort Guidance for London and based on expected demand that will arise from all committed developments that would utilise such footways. The scheme should allow future (non committed) schemes to expand or add to footways to address anticipated demand
<b>LSCP.05</b>	Public realm materials should be robust, durable and meet the technical requirements of the Scheme. Materials should relate to and reflect the anticipated and emerging character of the surrounding townscape and be suitable for a high quality mixed use development. Materials should adhere to the highway authorities agreed local materials palate and be of a quality defined in the contract specification.
<b>LSCP.06</b>	The public realm design should promote interaction with existing and proposed developments.
<b>LSCP.07</b>	Any formal cycle or car parking spaces affected by the works should, where practicable, be re-provided to an equivalent standard.
<b>LSCP.08</b>	The placement of trees should help to reinforce public realm design elements such as: <ul style="list-style-type: none"> <li>• strengthening movement patterns;</li> <li>• connecting spaces and providing visual continuity across them;</li> <li>• aiding reinforcement of space and boundaries;</li> <li>• providing character and sense of space;</li> <li>• enhancing architectural elements; and</li> <li>• screening of visually unattractive vehicles.</li> </ul>
<b>LSCP.09</b>	The placement of trees should be located to consider; <ul style="list-style-type: none"> <li>• street signs and signals;</li> <li>• proximity to buildings and carriageway;</li> <li>• appropriate footway width;</li> <li>• underground and overhead utilities; and</li> <li>• accessibility for future maintenance.</li> </ul>

<b>LSCP.10</b>	<p>Where trees are planted in a streetscape setting, their siting should not only consider their visual impact, but also their capacity to work as part of an integrated SuDS system. This should be reflected in the design of tree pits, which should also be sized based on ultimate size of the tree, water availability and ground water storage. Large tree pits should be provided to increase growth potential to increase the tree's access to space and light and reduce the potential for vandalism. The tree planting should take account of standards and guidance that are presented in the BAPMS and where they are used as part of an integrated SuDS scheme, they should be designed in accordance with CIRIA 753 'The SuDS Manual' and TfL SUDS Guidance (2016)</p>
<b>LSCP.11</b>	<p>The detailed design of the Scheme should ensure green infrastructure assets are properly planned, maintained and managed by relevant arboriculture and landscape professionals; that they take into account the BAPMS, and have a strategic goal to enhance the built environment and tackle climate change. Wherever possible, green infrastructure should:</p> <ul style="list-style-type: none"> <li>• improve air quality and human health;</li> <li>• manage surface water run-off;</li> <li>• mitigate the urban heat island effect;</li> <li>• increase biodiversity and ecosystem variety; and</li> <li>• add amenity value through creating beautiful streets and spaces for people to enjoy.</li> </ul>
<b>LSCP.12</b>	<p>The landscape design should take account of the historic value and setting of the Blackwall Tunnel gatehouse and where possible enhance that setting.</p>
<b>LSCP.13</b>	<p>Where practical green infrastructure including green</p>

	walls and roofs should be considered in the design of the built structures as part of the mitigation for the environmental impact of the Scheme. Such green infrastructure shall be provided in accordance with the principles of the BAPMS.
<b>LSCP.14</b>	Replacement of the existing mature trees by the Boord Street bridge should be with semi-mature, broad leaf trees with a minimum girth of 20-25cm. The selected species should be in accordance with the Silvertown Tunnel Biodiversity Action Plan (BAP).

## 2.4 Integration of Permanent Structures

2.4.1 There are three common component parts to the Scheme at each end of the tunnel and these comprise:

- Portal Structure including retaining walls;
- Tunnel Services Buildings housing mechanical, electrical and fire suppression accommodation; and
- Tunnel Services Compound sited within operational land and containing the Tunnel Services Buildings and providing parking for operational and maintenance vehicles.

2.4.2 These elements may be physically separate or combined in a number of configurations subject to the detailed design of the Scheme portals and the emerging third party masterplan proposals adjacent to them.

2.4.3 A head house is also required at each portal. These should be located directly above the TBM launch chambers.

2.4.4 This should be achieved by adhering to the following Design Principles:

**Table 2-3 Integration of Permanent Structures Design Principles**

Reference	Integration of Permanent Structures Design Principles
<b>PRBD.01</b>	The detailed design of the Scheme should allow for the future development of the surrounding area as defined in existing and emerging planning policy. The detailed



	design of the Scheme should avoid creating constrained development sites or under utilised open space which cannot be developed.
<b>PRBD.02</b>	The layout and design of the buildings and compound should not unreasonably impede the development of adjacent sites.
<b>PRBD.03</b>	Where public realm is adjacent to the edge of the operational compound, portal buildings should, where practicable, be used to edge the compound rather than fences. In these cases the exposed façades should create a positive and meaningful relationship with the space.
<b>PRBD.04</b>	Where required, compound boundary fences and walls should be of high quality visual appearance, and suitable for their context and adjacent uses.
<b>PRBD.05</b>	The envelope of the Tunnel Services Compounds and Tunnel Service Buildings should be optimised in order to enable development of adjacent sites without compromising operability and safe access to the equipment for maintenance and replacement.
<b>PRBD.06</b>	In order to reduce the footprint of the portal buildings, the water tanks and other related functions should be located below ground where practicable.
<b>PRBD.07</b>	The new buildings and structures should have a common and recognisable language that enhances their setting and develops a sense of identity.
<b>PRBD.08</b>	The new buildings and structures should be of high quality architectural design, celebrating the function of the buildings and signifying their importance to the area. Buildings should, where practicable, be located over the portal and have well-designed architectural treatments that are fully integrated into their design. Where practicable and appropriate all buildings and the portal should be combined into a coherent composition.
<b>PRBD.09</b>	The design of buildings should consider their appearance from multiple viewpoints; particularly from the road by vehicle users, the public realm of cyclists and pedestrians,

	as well as the occupants of nearby buildings.
<b>PRBD.10</b>	High quality and robust building materials should be used in the Scheme construction to limit the need for maintenance. Materials that reflect the local and national importance of the scheme should be used. Local materials and traditional building methods should inform the detailed design of Scheme buildings where appropriate.
<b>PRBD.11</b>	Where an adjacent site masterplan has been prepared and approved by the statutory planning process, the detailed design of the Scheme proposals should seek to integrate with it where practicable and without prejudice to its functionality. Where the masterplan needs to evolve in order to accommodate the Scheme, TfL and the Project Company should endeavour to work with stakeholders where reasonably possible and appropriate to ensure the optimal integration of the Scheme with adjacent development.
<b>PRBD.12</b>	The detailed design of the portal and ancillary buildings should be developed with reference to relevant guidance on safety and security, including Secured by Design, and in particular, the section describing 'Resilient Design For Counter-Terrorism'. Particular attention should be given to the edges of the site and their impact on the safety and security of the public realm.
<b>PRBD.13</b>	The detailed design of the portal and ancillary buildings should be developed such that all routine maintenance of the buildings can be undertaken from ground level and without the need to close the Silvertown Tunnel.
<b>PRBD.14</b>	Tunnel head houses are to be designed so that they can be incorporated into future structures or standalone in open space, as required.
<b>PRBD.15</b>	Where required as part of the Scheme and within order limits, noise barriers should be of high quality visual appearance, and suitable for their context including

existing and committed adjacent uses.

### Silvertown Portal

- 2.4.5 The detailed design of the new tunnel portal at Silvertown should have regard to the need to coordinate in design terms with emerging adjacent future uses such as the Thames Wharf DLR station, mixed-use redevelopment and associated landscaping.
- 2.4.6 This should be achieved by adhering to the following Design Principles:

**Table 2-4 Silvertown Portal Design Principles**

Reference	Silvertown Portal Design Principles
<b>SILPO.01</b>	If it is found that locating ancillary buildings and uses adjacent to the tunnel portal would impede the optimum development of adjacent development sites, the possibility of locating buildings and other uses under the Silvertown Way slip road should be explored. This would be subject to appropriate access, maintenance, safety and security requirements.
<b>SILPO.02</b>	The detailed design of the tunnel portal and buildings should facilitate high quality pedestrian and cycle links between Royal Victoria DLR station and the proposed Thames Wharf DLR station.
<b>SILPO.03</b>	The detailed design of the tunnel portal and buildings should not compromise the existing link under Silvertown Way (at the south of the site) from Dock Road and the proposed Thames Wharf DLR station to Royal Victoria Dock.
<b>SILPO.04</b>	The detailed design of the approach road and portal structure should not prevent the future construction of a direct, pleasant foot and cycle bridge by a third party at a later date over the portal approach in between the proposed DLR station on Dock Road, Silvertown Way and Tidal Basin Roundabout.
<b>SILPO.05</b>	The detailed design of the portal structure should not prevent the future provision of an environmental canopy by a third

	party over the portal at a later date, in order to provide additional visual screening of the road. This would require all appropriate permissions and additional air quality modelling.
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### Greenwich Portal

2.4.7 The detailed design of the new tunnel portal at the Greenwich Peninsula should have regard for emerging future uses; mixed-use redevelopment and associated landscaping on the Greenwich Peninsula.

2.4.8 This should be achieved by adhering to the following Design Principles:

**Table 2-5 Greenwich Portal Design Principles**

Reference	Greenwich Portal Design Principles
<b>GREPO.01</b>	<p>The massing of any built development above the new portal on the Greenwich Peninsula should:</p> <ul style="list-style-type: none"> <li>actively contribute to the walking experience on Millennium Way through a high quality elevational treatment that animates the local street scene making it safe, attractive and easy to use; and</li> <li>not intrude into the footway on Millennium Way or impede the planting of trees (by others) along the kerb line.</li> </ul>
<b>GREPO.02</b>	<p>The location of the portal building should not impede views significantly from Edmund Halley Way westwards to the River Thames.</p>

### 2.5 Boord Street Pedestrian and Cycle Bridge

2.5.1 The replacement Boord Street pedestrian and cycle bridge should be of a design and alignment that facilitates easy and safe navigation across the A102 and provide an attractive route that helps to overcome the existing severance created by the road. The detailed design of the bridge should consider potential future change in the area and the likely impact of this change on the number of users of the bridge.

2.5.2 This should be achieved by adhering to the following Design Principles:

**Table 2-6 Boord Street Pedestrian and Cycle Bridge Design Principles**

<b>Reference</b>	<b>Boord Street Pedestrian and Cycle Bridge Design Principles</b>
<b>BRDFB.01</b>	The approaches to the bridge should be designed to take into account all committed regeneration proposals on adjacent sites and pay due consideration to emerging proposals.
<b>BRDFB.02</b>	The approaches and central span should be structurally independent to allow modification of the stairs and ramps at a later date. This could facilitate improved pedestrian and cyclist movement and integration with future adjacent development sites subject to all appropriate permissions.
<b>BRDFB.03</b>	The bridge should be aligned with Boord Street visible from Millennium Way.
<b>BRDFB.04</b>	The bridge should be fully accessible for cyclists and pedestrians, and meet TfL standards.
<b>BRDFB.05</b>	The bridge should be designed for the predicted level of usage based on the traffic generation of known committed developments and should consider the impact of emerging regeneration proposals on adjacent sites.
<b>BRDFB.06</b>	The bridge should be designed in such a way that a step free access route is maintained during construction and operation.
<b>BRDFB.07</b>	The bridge and approach structures should not compromise fire service access and egress to the existing Studio 338 or Brenntag Site.
<b>BRDFB.08</b>	The central span should have no intermediate supports.
<b>BRDFB.09</b>	The bridge should be designed as a landmark structure as experienced by pedestrians and cyclists, optimising and signalling its importance as the link between the east and west sides of the Greenwich peninsula.
<b>BRDFB.10</b>	In developing the detailed design for the bridge access ramps, thought should be given to shielding the ramp approach, in part, from the A102 Blackwall Tunnel Approach Road and the

	accompanying high volumes of traffic.
<b>BRDFB.11</b>	The detailed design of the Scheme should enable the bridge to be constructed and maintained without reducing the capacity of the A102. In developing the detailed design of the bridge, careful consideration should be given to the selection of materials, their finishes and the manner in which they are assembled, such that maintenance is minimised.
<b>BRDFB.12</b>	The design of the bridge should carefully consider the user experience of those crossing it, including the consideration and maintenance of short and long distance views from the main span in all directions.
<b>BRDFB.13</b>	The detailed design of the Scheme should make provision for the replacement of the line of trees adjacent to Boord Street.

## 2.6 Sustainability & Environment

2.6.1 The Scheme should ensure sustainability in the five themes of the TfL sustainability toolkit: economic progress; climate change; safety and security; quality of life; and transport for all. The sites are located in a highly urbanised industrial environment and habitats across the site are generally of poor quality, though are subject to high levels of pressure in terms of biodiversity loss due to development.

2.6.2 This should be achieved by adhering to the following Design Principles:

**Table 2-7 Sustainability and Environment Design Principles**

Reference	Sustainability & Environment Design Principles
<b>SUEN.01</b>	Where practical and viable, the design of buildings and other permanent structures should include low zero carbon technology such as solar photovoltaic panels to reduce carbon emissions resulting from operation of the Scheme.
<b>SUEN.02</b>	The detailed design of the Scheme should ensure that the species selected for the permanent landscaping should be native and of local provenance. Brownfield habitat should be introduced wherever possible.. All landscaping should be designed and carried out in accordance with the BAPMS.

<b>SUEN.03</b>	Opportunities to introduce Green Infrastructure design including biodiversity roofs and sustainable living walls should be considered within the building design and Scheme landscaping.
<b>SUEN.04</b>	All habitats that cannot be replaced on site should be offset to ensure there is an overall net gain in biodiversity. The loss has been monetised through Natural Capital Valuation and should be provided offsite in accordance with the Scheme specific BAP in the Environment Statement Appendices (Document Reference: 6.3)
<b>SUEN.05</b>	Where possible, building materials should be locally sourced, reclaimed, recycled and have low carbon impact. The entire life cost of all materials used should be considered.

## 2.7 Public Art

2.7.1 Public art can add value to the urban environment, and the Scheme could provide opportunities to deliver a range of types of public art in a way that integrates the infrastructure into the public realm and engages with the local communities. Such opportunities should be considered during the detailed design of the Scheme.

2.7.2 This should be achieved by adhering to the following Design Principles:

**Table 2-8 Public Art Design Principles**

Reference	Public Art Design Principles
<b>PBRT.01</b>	Public art should be considered as part of the Scheme design process and as one way of engaging with the local community, encouraging a sense of ownership and belonging in the public realm.
<b>PBRT.02</b>	Consideration should be given to both temporary and permanent art.
<b>PBRT.03</b>	The integration of public art should be considered as part of any night-time functional lighting Scheme.
<b>PBRT.04</b>	Where barriers are required for noise or visual mitigation, where practical they should be designed so that they also

	provide opportunities for public art or for signage and safety measures
<b>PBRT.05</b>	Public art should be designed to provide functional as well as aesthetic enhancement to the Scheme and its context. For example safety, security and wayfinding.

## 2.8 Advertising and Commercial Activity

2.8.1 Advertising and other commercial activity are increasingly important ways to raise revenue to support the delivery of transport schemes. This should be considered from the outset.

2.8.2 All advertising will be subject to the Town and Country Planning Act 1990 regime and the validation requirements of the relevant local planning authority. This should be achieved by adhering to the following Design Principles:

**Table 2-9 Advertising and Commercial Activity Design Principles**

Reference	Advertising and Commercial Activity Design Principles
<b>ADCA.01</b>	Any new advertising hoardings should be fully integrated into the design from the outset. The location, size and format of the advertising hoardings should be chosen considering their impact on the character of adjacent public realm, residential environments and highways safety.
<b>ADCA.02</b>	Modern LED advertising screens should be dynamic in form.
<b>ADCA.03</b>	Advertising screens could also be used where appropriate as a canvas for public art.
<b>ADCA.04</b>	Advertising hoardings should not cause a negative impact on the character or function of the public realm. In particular it should not add to clutter, hinder desire or sight lines, create unusable spaces, dominate the space or produce security risks whether real or perceived.

## 2.9 Signage & Wayfinding



2.9.1 Wayfinding for pedestrians, cyclists and motorists is integral to transport infrastructure. Poorly sited signage can be a distraction and an obstruction to movement, and harm legibility of the road network.

2.9.2 This should be achieved by adhering to the following Design Principles:

**Table 2-10 Signage & Wayfinding Design Principles**

Reference	Signage & Wayfinding Design Principles
<b>SGWF.01</b>	Clear lines of sight should be maintained throughout pedestrian environments to optimise ease of accessibility, enhance network legibility and wayfinding, and reduce dependence on signage and auditory information
<b>SGWF.02</b>	The detailed design of the Scheme should avoid unnecessary traffic signage, especially where it would act as a roadside distraction or visibility hazard or provide confusion to pedestrians and cyclists.
<b>SGWF.03</b>	Wayfinding should only be illuminated or reflective if it is essential to the use and operation of the scheme and its interaction with the surrounding area.
<b>SGWF.04</b>	<p>The Scheme design should provide wayfinding guidance to aid navigation and encourage people to walk, while avoiding excessive use of pedestrian signs and causing clutter. Wayfinding signs should therefore:</p> <ul style="list-style-type: none"> <li>• be located where pedestrians start their journey and at key decision points and landmark destinations;</li> <li>• be located to minimise physical intrusion into the streetscape, but be sufficiently visible so as to serve their intended purpose; and</li> <li>• be local authority signs where pedestrian routes cross the Transport for London Road Network (TLRN).</li> </ul>
<b>SGWF.05</b>	Wayfinding and other traffic signs should be in accordance, where practical, with relevant design standards and guidance.

## 2.10 Lighting

2.10.1 All Scheme lighting, including within the tunnel, should be in accordance with relevant design standards and guidance and use sustainable, energy efficient illumination throughout. Lighting should also be used to provide for personal safety and security including the illumination of cycleway and footways.

2.10.2 This should be achieved by adhering to the following Design Principles:

**Table 2-11 Lighting Design Principles**

Reference	Lighting Design Principles
<b>LTNG.01</b>	Wherever possible, lighting designs should adhere to TfL's Streetscape Guidance and should enhance place making night-time use, economy and enjoyment and provide safe passage for all users.
<b>LTNG.02</b>	The need for lighting to reduce the risk of accidents, help prevent crime and the fear of crime, should be balanced where practicable with the need to promote terrestrial and aquatic biodiversity.
<b>LTNG.03</b>	In pedestrian areas, dark patches and high light/dark contrasts should be avoided where they impair visibility.
<b>LTNG.04</b>	In order to reduce visual clutter, lighting should be integrated into seating, steps, walls, furniture and other similar design features where feasible to do so.
<b>LTNG.05</b>	Lighting units should be high quality and robust. The ease of their future maintenance should be a relevant consideration to the choice of detailed light fittings.
<b>LTNG.06</b>	Lighting units should be selected to be coherent, consistent, and contribute to place making. They should also limit light pollution, improve energy efficiency and ensure equipment longevity
<b>LTNG.07</b>	Notwithstanding the above requirements to reduce light pollution, lighting designs, wherever possible, should take into

	account the contribution made by lighting to create a sense of place, while complying with Streetscape Guidance or making an exception to the guidance where shown to be necessary.
<b>LTNG.08</b>	Lighting proposals should contribute to the legibility of the proposed streetscape with clear distinctions made between vehicle, cycle and pedestrian environments.
<b>LTNG.09</b>	Building structures and spaces should be made attractive and legible at night, their form highlighted and strengthened, by an intelligent lighting design. This should be the case particularly when viewed by drivers and passengers from the tunnel approach roads.
<b>LTNG.10</b>	A lighting assessment shall be carried out for the permanent above ground buildings which should be designed in accordance with <i>Guidance Notes for the Reduction of Obtrusive Light GN01:2011</i> .

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## Appendix A. SILVERTOWN TUNNEL DESIGN REVIEW PANEL TERMS OF REFERENCE

A.1.1 The Silvertown Tunnel Design Review Panel has been set up to provide design assurance throughout the Silvertown Tunnel design process. The design review panel is set up and administered by Urban Design London (UDL) and agrees to operate under the following terms of reference:

1. The panel will be administered by UDL and will remain independent at all times.
2. All panel members are responsible for declaring any conflicts of interest<sup>1</sup> or perceived conflict of interest; this may result in members leaving the panel.
3. The initial list of panel members is listed in A.1.1 below. The panel may be augmented by other design specialists as required upon agreement between TfL and UDL.
4. The panel will provide design review and assurance in respect of the above ground elements of the Scheme:
  - a. the service buildings;
  - b. portals structures, retaining walls and other highway structure;
  - c. landscape design, planting and terrestrial ecology; and
  - d. urban realm including pedestrian and cycling provision.
5. TfL and the Project Company will take design proposals for the Scheme elements listed above to the Design Review Panel at the following stages:
  - prior to DCO examination;
  - prior to discharge of requirements; and
  - generally to advise on the implementation of the Design Principles.

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<sup>1</sup> This could include any work undertaken by panel members for land owners or developers with an interest in the Silvertown Tunnel or work undertaken on behalf of consortia bidding for the tunnel contract

6. Panel sessions will be arranged at least four weeks in advance of each session.
7. A session pack will be circulated electronically at least one week before the session outlining the stage the project has reached, any additional constraints and the focus of the session. This will be summarised by TfL and the Project Company at the start of the session.
8. At certain points the panel may be asked to review material remotely. This process will be administered by UDL and panel members will be asked to provide comments within three days of receiving the material. Advance warning of the remote review will be given, where possible at least a week in advance.
9. The host boroughs are invited to send up to two representatives to observe any review sessions. If they choose to attend then one representative will be invited to make comments before the session starts but then act as observer during the session.
10. The panel's comments are not binding and should be treated as advisory only. TfL, the Project Company and the boroughs will at all times retain the responsibility to deliver and ensure good design regardless of the comments of the panel. As such, the borough will remain responsible for discharging any design related requirements of the DCO.
11. During the session the chair (as defined in appendix A.1.1 and appointed by UDL) will manage the debate. He/she will ensure that the Scheme is fully understood by the panel members and that the discussion is appropriate for the stage of the project and within the acknowledged constraints. The chair will also focus debate on the issues raised by the TfL, the Project Company and borough representatives, including the resolution of conflicting views. The chair will provide a short verbal summary at the end of the session.
12. UDL will prepare a brief note of the meetings which will record the discussion and suggestions made by the Panel. The note will be signed off by the chair and issued to TfL and the Project Company for distribution within four weeks of the meeting.

A.1.2 Initial list of Design Review Panel Members:

- |                   |                             |
|-------------------|-----------------------------|
| 1. Fred Manson    | Chair                       |
| 2. Kathryn Firth  | Publica                     |
| 3. Deborah Saunt  | DSDHA                       |
| 4. Sam Richards   | Crossrail Urban Integration |
| 5. Hiro Aso       | Gensler                     |
| 6. Esther Kurland | Urban Design London         |
| 7. Paul Dodd      | Urban Design London         |

## Appendix B. SILVERTOWN TUNNEL DESIGN CONSULTATION GROUP TERMS OF REFERENCE

The Silvertown Tunnel Stakeholder Design Consultation Group (SDCG) has been set up to provide stakeholders an opportunity to provide input and review of the external appearance of the above ground elements of Silvertown Tunnel at detailed design. The Stakeholder Design Consultation Group agrees to operate under the following terms of reference:

1. The group will be administered and chaired by a representative of Transport for London
2. Two groups will exist, one for Greenwich and one for Newham. The initial list of group members is listed in A1.1. The group may be augmented by other interested parties if they fulfil the criteria in A1.2 and with agreement from TfL
3. Members may only attend the group for the borough in which they have a recognised land interest
4. Each member will be permitted to send up to two representatives to each session
5. The group will provide stakeholder input in respect to the external appearance of the following above ground elements of the Scheme:
  - a. the service buildings;
  - b. portals structures, retaining walls and other highway structures;
  - c. landscape design, planting and terrestrial ecology; and
  - d. urban realm including pedestrian and cycling provision.

TfL will engage the Stakeholder Design Consultation during the design process. As a minimum this should involve:

- A. Meeting prior to commencement of detailed design

- B. Submission and discussion of designs mid way through the detailed design process
  - C. Submission and discussion of designs prior to submission of drawings to the planning authority for approval
6. SDCG sessions will be arranged at least four weeks in advance of each group meeting.
  7. A session pack will be circulated electronically at least one week before the session outlining the stage the project has reached, any additional constraints and the focus of the session. This will be summarised by TfL and the Project Company at the start of the session.
  8. At least one representative from the relevant host borough will be invited to observe each meeting.
  9. As a consultative group any comments will be treated as advisory. TfL, the Project Company and the borough local planning authorities will at all times retain the responsibility to deliver and ensure good design, taking account of any advisory comments of the group. As such, the borough will remain responsible for discharging any design related requirements of the DCO.
  10. During the session the chair will manage the discussion. He/she will ensure that the Scheme is fully understood by the group members and that the discussion is appropriate for the stage of the project and within the acknowledged constraints. The chair will also focus debate on the issues raised by TfL, Project Company and borough representatives, including the resolution of conflicting views. The chair will provide a short verbal summary at the end of the session.
  11. All members of the group recognise the constraints set by the DCO process and set in the PFI contract; and actively seek consensus among members of the group. In the event that consensus is not achieved this will be recorded in the minutes and will be discussed in the subsequent Design Review Panel section where a direction will be recommended.
  12. TfL will prepare a brief note of the meetings which will record the discussion and agreed comments and suggestions made by the Group.



The note will be signed off by the chair and issued to all members for distribution within four weeks of the meeting.

B.1.1 Initial Stakeholder Design Consultation Group Members are:

***Greenwich***

1. RB Greenwich (as observers)
2. GLA
3. Knight Dragon
4. SGN
5. National Grid
6. Morden College
7. U+I Group Plc
8. AnSCO Arena Limited
9. Lidoka Estates Limited
10. Tary Holdings Limited (Studio 338)
11. Brenntag Inorganic Chemicals Limited

***Newham***

1. LB Newham (as observers)
2. GLA
3. Quintain
4. ASD/Kloeckner Metals Ltd
5. European Metal Recycling
6. Waterfront Studios

B.1.2 Criteria for membership

Additional members may apply to join the Stakeholder Design Consultation Group if they meet the following criteria:

1. The stakeholder has an interest in the land within the DCO Order limits of the Silvertown Tunnel Scheme
2. The stakeholder agrees to these terms of reference