

SILVERTOWN TUNNEL

Volume 7

7.12 Mitigation Route Map

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APFP Regulation 5(2)(h)

Revision 0

Planning Act 2008

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

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Silvertown Tunnel

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List of Abbreviations

AQMP	Air Quality Management Plan
CEMP	Construction Environment Management Plan
CoCP	Code of Construction Practice
CTMP	Construction Traffic Management Plan
DCO	Development Consent Order
EIA	Environmental Impact Assessment
ES	Environmental Statement
HGV	Heavy Goods Vehicle
MMO	Marine Management Organisation
MTS	Mayor's Transport Strategy
NN NPS	National Road and Rail Networks: National Policy Statement
PINS	The Planning Inspectorate

Glossary of Terms

Account holder	User of the tunnels who has registered their vehicle and payment details with TfL.
Blackwall Tunnel	An existing road tunnel underneath the River Thames in east London, linking the London Borough of Tower Hamlets with the Royal Borough of Greenwich, comprising two bores each with two lanes of traffic.
Charging period	For the purposes of the Assessed Case this has been defined as 6am to 10pm every day.
Development Consent Order	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.
Environmental Impact Assessment	There are categories of development that are required by European and UK domestic legislation to be made the subject of an assessment known as an Environmental Impact Assessment (EIA). The EIA regime in Europe is governed by Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of public and private projects on the environment. This directive is transposed into UK law by the Infrastructure Planning

	<p>(Environmental Impact Assessment) Regulations 2009 as amended by the Infrastructure Planning (Environmental Impact Assessment) (Amendment) Regulations 2012 (the EIA Regulations).</p>
<p>Habitats Regulations</p>	<p>Conservation of Habitats and Species Regulations 2010 (as amended).</p>

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1. INTRODUCTION

1.1.1 This mitigation routemap has been prepared in order to demonstrate that all necessary environmental controls and mitigation measures for the Scheme have been identified and secured. The purpose of this document is therefore to:

- a) provide an audit trail of the controls and mitigation measures on which the Environmental statement (ES), including related assessment documents, relies to avoid, reduce and/or offset significant (i.e. moderate or major) impacts of the Scheme (columns (3) and (4) of the table); and;
- b) set out the way in which they have been, or will be, translated into clear and enforceable controls (Column (6)); either via Development Consent Order (DCO) Requirements, development consent obligations or other consent regimes.

1.1.2 This mitigation routemap is not proposed to have any formal status, but is submitted to help both the Examining Authority and interested parties understand how and where mitigation relied on by the ES is to be secured. It is proposed that this document is kept 'live' by updating it throughout the examination process to ensure it captures all relevant issues, providing certainty that the DCO and ES are consistent.

1.1.3 The routemap is structured as follows:

- Column (1) provides the item number for individual issues identified;
- Column (2) gives the source and relevant reference of the issue and associated mitigation measures;
- Column (3) describes the potential significant effect (moderate or major);
- Column (4) gives the detail of the measure or mitigation set out in the ES or associated document:
- Scheme Design, e.g., a physical feature of the development that has been, or will be, complied with, such as landscape planting or a Design Principle,

- Construction Methods or Controls, e.g., a measure set out within the Code of Construction Practice, or Mitigation, e.g., a measure that is proposed to avoid or reduce significant impact.
- Column (5): gives the relevant timing or 'trigger' for when an identified mitigation or measure should be in place;
- Column (6): refers to the relevant securing mechanism(s). Wherever possible, we have also sought to identify compliance with the relevant section of the CoCP, or other relevant control document. The references to the DCO provisions and Requirements contained in this document relate to those as contained in the submission draft.

1.1.4 For ease, the structure of the mitigation routemap follows that of the topic chapters of the ES.

2. MITIGATION ROUTEMAP

2.1.1 The Mitigation Routemap is set out in Table 2-1 below:

Table 2-1 Mitigation Route Map

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
Air Quality					
1	ES Chapter 6 – Air Quality, section 6.5	Impacts on local air quality during construction.	<p>An Air Quality Management Plan (AQMP) will be prepared by the Contractor for each worksite and submitted for approval to the relevant planning authority. The AQMP will contain details of the measures to limit vehicle, plant and dust emissions during construction.</p> <p>CoCP Chapter 5 (Document Reference 6.10) sets out what the AQMP will cover.</p>	Prior to commencement of relevant works	<p>CoCP Chapter 5 (Document Reference 6.10).</p> <p>Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.</p>
2	ES Chapter 6 – Air Quality, section 6.5	Air quality during operation	<p>The user charges will be used to manage demand for the Silvertown and Blackwall Tunnels. By regulating traffic flows, the user charge can be used to manage air quality impacts associated with traffic using the crossings.</p> <p>The user charging power provides scope for discounts and exemptions which can be used to encourage the use of cleaner vehicles.</p>	Before opening of the tunnel to traffic and during its operation.	Article 52 of the draft DCO provides that the user charging Power must be exercised in accordance with the Charging Policy.

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
			<p>The charging power must be exercised in accordance with the Charging Policy (document ref 7.11). The Charging Policy sets out the factors which TfL must have regard to when setting and varying the charges, and these include air quality impacts.</p> <p>The Monitoring Strategy (document ref 7.6) contains details of how TfL will monitor the air quality impacts of the Scheme after opening. The results of this monitoring will be considered when setting and varying the user charges.</p> <p>The Traffic Impacts Mitigation Strategy (document ref 7.7) sets out the procedures that will apply for identifying and implementing and mitigation measures that are required as a result of localised impacts (including air quality impacts) as a result of the Scheme.</p>		<p>The implementation of the Monitoring Strategy and the Traffic Impacts Mitigation Strategy is secured by Requirement 7 in Schedule 2 to the DCO.</p>
Community and private assets					
3	ES Chapter 7, section 7.5	Construction impacts of the scheme on community and	The Contractor will register with and comply with the principles of the Considerate Constructors Scheme or similar (CoCP chapter 2).	Prior to commencement of relevant works	CoCP chapter 2, 4 and 11.2. Compliance

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
		private assets (e.g. local residents and businesses) – noise, dust, traffic etc.	<p>The Contractor will be responsible for notifying the local residents of particularly noisy work prior to commencement. The mechanisms for notification will be detailed in the Community Engagement Plan required under the CoCP (chapter 4).</p> <p>Effective communication will 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.</p>		with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.
4	ES Chapter 7, section 7.5	Construction impacts of the scheme on access for local residents and businesses.	<p>The Contractor will take measures to maintain reasonable access to premises during the construction works. These measures will include:</p> <p>Measures to ensure the continuation of access for premises off Dock Road, including requirements for complementary measures to ensure that all delivery and servicing access can take place from the junction of Dock Road and North Woolwich Road and the provision and management of</p>	Prior to commencement of relevant works	<p>CoCP section 2.6.</p> <p>Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.</p>

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
			<p>a turning facility for large vehicles in Dock Road.</p> <p>The active management of access arrangements to business premises that will continue to operate during the construction phase, whose existing accesses will be restricted.</p> <p>Access routes which avoid the total closure of Millennium Way during construction works have been identified to maintain access to facilities such as The O2. Localised temporary diversions will therefore be sought during the cut and cover tunnel works.</p>		
5	ES Chapter 7, section 7.6	Severance impacts for pedestrians and cyclists caused by construction.	<p>Temporary diversions will be put in place on some routes. All diversion routes for pedestrians and cyclists will be kept to a minimum feasible length.</p> <p>Envisaged diversion routes are shown in the Construction Method and will be finalised in the Construction Traffic Management Plan produced by the</p>	Prior to commencement of relevant works	<p>CoCP sections 3.1 and 14.1.</p> <p>Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.</p>

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
			Contractor for each work site (CoCP 3.1.3).		
6	ES Chapter 7, section 7.5,	Effects on O2 of the removal of a significant amount of parking currently used by The O2.	Mitigation includes the requirement to provide alternative parking capacity for The O2 during the construction works.	Prior to commencement of relevant works	CoCP section 2.6.2 Land for this purpose is included in Order Limits.
7	ES Chapter 7, section 7.5,	Employment and skills impacts	Employment of a proportion of local workers in construction jobs and delivery of apprenticeships. This will be based on TfL's Strategic Labour Needs and Training commitments.	Prior to commencement of relevant works	Legal agreement with local authorities.
8	ES Chapter 7, section 7.6	Effects of Scheme on river navigation and wharfage.	A Passage Plan for use of river will be prepared by the Contractor in consultation with the PLA. The PP will establish cycle times for loading, unloading and journeys for vessels in relation to tides and will permit an informed decision regarding the number of vessels required to meet the production rates achieved for the TBM and civil works.	Prior to commencement of relevant works.	CoCP section 3.2.14 Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.
9	ES Chapter 7, section 7.6	Effects on existing utilities infrastructure	Provisions will be necessary to divert or safeguard existing utilities infrastructure assets during construction works.	Prior to commencement of relevant	DCO Schedule 4 and Land Plans.

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
		assets during construction works	<p>Appropriate safeguarding measures will be identified as the detailed design progresses.</p> <p>Provision for utilities diversions has been made within the Order Limits for the Scheme, which includes plots which may be occupied temporarily and plots over which rights may be acquired to facilitate temporary and permanent utility diversions and their on-going protection.</p>	works.	Protective Provisions for utilities in Schedule 13 to the DCO.
Cultural Heritage and Archaeology					
10	ES Chapter 8, section 8.5	Impact on sub-surface archaeological remains considered to be of medium value due to their potential regional importance.	<p>‘Preservation by record’ during archaeological excavation and recording prior to construction.</p> <p>A Scheme of Investigation (WSI) will be produced in consultation with HE at the detailed design stage and updated as works progress. This will require watching briefs and archaeological excavations prior to construction excavations if proven to be necessary.</p>	Prior to construction of relevant works	<p>CoCP Chapter 6.</p> <p>Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.</p>
11	ES Chapter 8, section	Potential impacts to the	Prior to construction, an assessment of the	Prior to construction of	CoCP 6.1.8

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
	8.5	Grade II listed Blackwall Tunnel entrance building as a result of settlement.	likely effects of settlement on the Grade II listed Blackwall Tunnel building will be undertaken in accordance with Chapter 10: (Settlement) of this Code of Construction Practice.	relevant works	Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.
12	ES Chapter 8, section 8.5.6	Removal of sub-surface archaeological remains during construction and operation of the jetty due to dredging	Impacts of dredging within the area of the proposed jetty on currently unknown archaeological remains will be mitigated through the monitoring of dredged material in order to identify and record any archaeological materials that are recovered. If any remains are recorded, the Contractor will liaise with Historic England as to any scour protection measures required.	Prior to construction of relevant works	CoCP (section 6.1.7). Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.
13	ES Chapter 8, section 8.5.6	Scour to the river bed due to propeller wash from barges moored at the jetty.	Should significant archaeological remains be identified during monitoring of the dredging, within the areas subject to scour, the Contractor will liaise with Historic England as to any scour protection measures required.	Prior to construction of relevant works	CoCP (scetion 6.1.7). Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
Terrestrial Ecology					
14	ES Chapter 9, section 9.5	Terrestrial Ecology effects during construction.	<p>An Ecology Management Plan will be prepared by the Contractor prior to construction in consultation with Natural England.</p> <p>The Ecology Management Plan will detail measures to manage the risk of adversely affecting flora and fauna on and within the vicinity of the worksites. It will also include method statements in the event that invasive species are encountered and details about how additional survey requirements would be accommodated in the programme. The Ecology Management Plan will include a requirement for an ecologist to be present onsite during site clearance and when required throughout the duration of the construction works.</p>	Prior to construction of relevant works	<p>CoCP Chapter 7.</p> <p>Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.</p>
15	ES Chapter 9, section 9.5	Prevent a potential impact from dust on East India Dock Basin SINC, which is within 50m of a construction	<p>Dust attenuation measures forming part of the Air Quality Management Plan for each worksite (and approved by the relevant planning authority) will be used.</p> <p>The CoCP at section 5.3 sets out the mitigation measures to reduce dust impacts.</p>	Prior to construction of relevant works	<p>CoCP section 5.3.</p> <p>Compliance with the CoCP is secured by requirement 5 in Schedule 2 to</p>

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
		traffic route.			the DCO.
16	ES Chapter 9, section 9.5	Prevent impacts on mobile species.	A pre-construction survey will be undertaken a maximum of two years prior to commencement of construction works. This should include an extended Phase 1 habitat survey followed by targeted surveys for protected species that may be using the worksites.	Prior to construction of relevant works	CoCP section 7.1.2 Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.
17	ES Chapter 9, section 9.5	Prevent spread of non-native invasive species during construction.	<p>Invasive species (such as Japanese Knotweed and Virginia Creeper) will be cleared from the site during construction following Natural England guidelines.</p> <p>The Ecology Management Plan developed and implemented by the Contractor in consultation with Natural England will include method statements in the event that invasive species are encountered and details about how additional survey requirements would be accommodated in the programme.</p> <p>The Ecology Management Plan will include</p>	Prior to construction of relevant works	CoCP Section 7.1.1 Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
			<p>a requirement for an ecologist to be present onsite during site clearance and when required throughout the duration of the construction works.</p>		
18	ES Chapter 9, section 9.5	Avoiding direct mortality of species during construction.	<p>Any site clearance will take account of seasonal constraints and will be carried out in accordance with a Site Clearance Plan (which will form part of the Ecology Management Plan prepared by the Contractor in consultation with Natural England).</p> <p>Any clearance of vegetation suitable for breeding birds (namely scrub and trees) will 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.</p> <p>Site hoardings will be erected surrounding the works which will reduce adjacent disturbance.</p>	Prior to construction of relevant works.	<p>CoCP Chapter 7.</p> <p>Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.</p>
19	ES Chapter 9, section 9.5	Protecting the black redstart bird.	Black redstart monitoring will be undertaken weekly in areas that are suitable for black redstart when construction coincides with	Prior to construction of relevant works.	CoCP section 7.2.

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
			<p>the black redstart breeding season (April to July).</p> <p>If black redstart is recorded, the Contractor will liaise with the ecologist (who will be required to be on site as part of the Ecology Management Plan to be prepared by the Contractor in consultation with Natural England) 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).</p>		<p>Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.</p> <p>..</p>
20	ES Chapter 9, section 9.5	Degradation of adjacent habitats during construction due to ground breaking works, vehicle movements and dust during construction.	<p>Worksites will be screened where necessary to reduce adjacent disturbance.</p> <p>Habitats of value with potential to be affected beyond the Order Limits will be demarcated and avoided.</p> <p>Where there are sensitive habitats such as trees adjacent to the site, an appropriate barrier e.g. temporary fencing, will be put in place to ensure that the trees and their</p>	Prior to construction of relevant works.	<p>CoCP Chapter 7.</p> <p>Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.</p>

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
			<p>roots will be protected throughout the construction phase.</p> <p>The dust control measures set out in section 5.3 of the CoCP will be implemented to mitigate disturbance to adjacent habitats.</p>		
21	ES Chapter 9, section 9.5	Construction lighting affecting biodiversity, especially bats	Construction lighting will be designed in accordance with appropriate standards, as set out in ES Chapter 4 - <i>Scheme Description</i> . A Lighting Management Plan is proposed within the CoCP.	Prior to construction of relevant works.	CoCP (section 12.2). Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.
22	ES Chapter 9, section 9.5	Mitigate impacts on sensitive ecological features such as breeding birds and notable invertebrates.	The CoCP includes dust attenuation measures to prevent pollution, timing recommendations to avoid core activity periods and pollution prevention measures following Environment Agency guidelines.	Prior to construction of relevant works.	CoCP (section 7.1.9). Compliance with the CoCP is secured by requirement 5 in Schedule 2 to

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
					the DCO.
23	ES Chapter 9, section 9.5	Habitat loss caused by the permanent scheme.	The Design Principles (Document Reference 7.4) require that the detailed design of the Scheme must take into account the Scheme-specific BAP (Appendix 9.H: Biodiversity Action Plan and Mitigation Strategy (Document Reference Number: 6.3.9.H). This presents the important ecological features, the habitat design principles/ parameters and enhancement measures along with the quantum and natural capital value of on site replacement habitat and offsetting habitat required as part of the final design, based on the results of the assessment.	Prior to commencement of the operation of the Scheme.	Compliance with the Design Principles is secured by requirement 3 in Schedule 2 to the DCO.
Marine Ecology					
24	ES Chapter 10. Section 10.5	Construction impacts on marine ecology.	<p>The following measures will be included in the CEMP to minimise any adverse effects from the construction and demolition of a temporary jetty and any in-river construction activities:</p> <ul style="list-style-type: none"> • the application of EA pollution prevention guidance 	Prior to commencement of construction	<p>CoCP Chapter 8.</p> <p>Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.</p>

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
			<p>throughout the construction phase;</p> <ul style="list-style-type: none"> • the development of a non-native species risk assessment and management plan (in liaison with the MMO, PLA and EA as necessary); • the use of soft start procedures during piling for a minimum of 20 minutes. Should piling cease for a period greater than 10 minutes the soft start procedure must be repeated; • no piling between March and October to avoid fish migration periods (unless otherwise agreed with the MMO, PLA and EA); • the lighting on the jetty will be designed to minimise light 		

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
			<p>levels in the marine environment. The lighting on the jetty head would have the lamps facing out to the watercourse, to facilitate unimpeded loading and unloading operations. Reflectors, that avoid excessive light pollution to surrounding areas, will be used.</p> <p>The decommissioning programme of the jetty will adhere to the same seasonal restrictions for piling if hydraulic vibratory methods are used</p>		
Effects on all travellers					
25	ES Chapter 11, section 11.5	Need to minimise road disruption during construction.	The Contractor will produce a Construction Traffic Management Plan (CTMP) for each worksite. The CTMP will contain measures to minimise road disruption during construction and must be approved by the relevant highway authority. The measures to be included in the CTMP are set out in the CoCP at section 3.1.4.	Prior to commencement of works.	CoCP Chapter 3. The CoCP is secured by requirement 5 in Schedule 2 to the DCO.

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
26	ES Chapter 11, section 11.5	Ensure that all walking and cycling routes in the vicinity of the tunnel portals are re-instated or are replaced with direct, safe and comfortable alternative routes.	<p>The following mitigation measures will be implemented as part of the Construction Traffic Management Plan (CTMP) for each worksite to be prepared by the Contractor, and approved by the relevant planning authority:</p> <p>All existing public rights of way and provision for cyclists and pedestrians that are affected by the construction works will be clearly signed, fenced and diversion routes provided from the outset to ensure that their usage would not be unduly impaired by construction activities. Envisaged diversion routes are provided in the Transport Assessment (Document Reference 6.5). The Scheme phasing would accommodate all revisions to the alignment of these public rights of way and any changes would occur progressively during the construction period.</p> <p>The alternative routes for pedestrian and cyclists will be kept to a minimum feasible</p>	<p>Prior to operation of the Scheme.</p> <p>Prior to commencement of works.</p>	<p>CoCP Chapters 3 and 14</p> <p>Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.</p>

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
			<p>length. Alternative safe routes will be provided for people with reduced mobility to ensure that they can access facilities in a safe manner. On completion of the works the pedestrian and cycle routes will be reinstated to their original or revised alignments.</p> <p>The existing footbridge over the A102 Blackwall Tunnel Approach at Boord Street will be demolished and replaced with a new foot and cycle bridge. Ramped access to the current footbridge or to the replacement foot and cycle bridge will be maintained during all stages of construction.</p>		
27	ES Chapter 11, section 11.5	Minimising lorry movements during construction by maximising river transport.	<p>The Scheme will seek to maximise river transport for construction materials and excavated material as detailed in the CoCP at section 3.2.</p> <p>The river transport objectives are to:</p> <ul style="list-style-type: none"> • minimise the effects of construction of the Scheme associated with the transport of construction materials and excavated materials; 	During construction works.	<p>CoCP section 3.2</p> <p>Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.</p>

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
			<ul style="list-style-type: none"> • minimise the number and length of construction-related transport movements; and • minimise the potential social and environmental impacts arising from construction-related transport associated with the Scheme. <p>Subject to any additional derogations TfL will transport:</p> <ul style="list-style-type: none"> • at least 50% by weight of all materials associated with the Scheme by River; and • 100% of suitable excavated material out by River. 		
28	ES Chapter 11, table 11-18	Amenity and severance impacts on all travellers – pedestrians and cyclists.	Monitor the amenity and severance impacts and mitigate as appropriate through the Monitoring Strategy (document reference 7.6), TIMS (document reference 7.7) and STIG.	Commencement of operation.	Monitoring Strategy (document reference 7.6) and TIMS (document reference 7.7) secured by requirement 7 in

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
					Schedule 2 to the DCO.
Geology and Soils					
29	ES Chapter 12, para 12.5.56	Need for groundwater monitoring. Detailed assessment of potential dewatering impacts is required to enable understanding of ground conditions ahead of works; and ensure that most appropriate groundwater exclusion or management method is adopted to minimise risks.	<p>A Groundwater Monitoring and Verification Plan will be prepared by the Contractor which will set out a groundwater monitoring programme for levels and quality which will be initiated ahead of construction (CoCP section 9.3.9).</p> <p>Monitoring will be designed to allow comparison of pre-construction predictions of any water level or quality change and to initiate trigger and control measures in the event of an identified risk.</p> <p>Good practice will be employed to establish ground and groundwater conditions, including the use of the most appropriate groundwater exclusion or management method to minimise risks.</p>	Prior to commencement of works	<p>CoCP section 9.3</p> <p>Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.</p>
30	ES Chapter 12, para	Human health impact on	The Contractor will prepare a Construction Materials Management Plan setting out	Prior to commencement	CoCP sections 9.4 and chapter

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
	12.5.23	construction workers and surrounding land users from contamination from excavation works.	<p>measures to ensure excavated materials are handled and used in a way that prevents harm to human health and pollution of the environment.</p> <p>The Construction Materials Management Plan must be approved by the relevant planning authority. See CoCP section 13.2.</p> <p>Health and safety risks to construction workers from contamination will initially be controlled by the Contractor's responsibility to design out risk, as per the requirements of the Construction Design and Management (CDM) Regulations¹.</p> <p>As part of the CEMP, the Contractor will be required to produce health and safety risk assessments that specify appropriate precautionary measures during works. These shall be completed by a suitably qualified person appointed by the</p>	of works.	<p>13</p> <p>Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.</p>

¹ Construction, Design and Management Regulation, 2015, HSE

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
			<p>Contractor. See CoCP section 9.4.</p> <p>The risk from release of asbestos during alteration and demolition works and excavation work will be managed in accordance with The Control of Asbestos Regulations 2012 and associated codes of practice and guidance. See CoCP section 13.4.</p>		
31	ES Chapter 12, section 12.5.24 – 12.5.34	The impact of settlement on the built environment, including potential indirect impacts from dewatering.	<p>The Contractor will design and undertake construction of the Scheme in a manner that will avoid or minimise the damage to land and property as a result of settlement.</p> <p>TfL has carried out an initial assessment of potential settlement attributable to the Scheme that assessed the risk of damage to all buildings potentially affected by settlement.</p> <p>The Contractor will investigate the potential for ground movement (including settlement) associated with the detailed design and construction methods. This investigation will be carried out in accordance with the <i>Settlement Assessment and Mitigation Process</i> appended to the CoCP (Appendix</p>	Prior to commencement of works	<p>CoCP Chapter 10.</p> <p>Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.</p>

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
			<p>A).</p> <p>Depending on the level of risk identified by the investigation, either no action will be required, or buildings will be monitored during construction, or measures will be implemented to protect the buildings.</p> <p>Defect surveys will be undertaken on all properties assessed to experience 1mm or more settlement in the assessment carried out in accordance with <i>Settlement Assessment and Mitigation Process</i>. These will capture the condition of the properties immediately prior to tunnel construction commencing in an area.</p> <p>Following the construction of the Scheme in the vicinity of the building, a second survey will then be undertaken by the appointed professional to record changes from the first survey.</p> <p>Subject to specified conditions, TfL will reimburse property owners for the reasonable costs they incur in remedying material physical damage arising from ground movement (including settlement)</p>		

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
			<p>caused by the Scheme.</p> <p>The Contractor may, on receiving the advanced notice of the proposal to carry out the repair work, elect to undertake the repair work itself.</p>		
32	ES Chapter 12, section 12.5.44	Construction contamination to geology, soils and groundwater from disturbance of contaminated ground & creation of new pathways.	<p>The Construction Environmental Management Plan (CEMP) to be produced by the Contractor will set out measures to avoid and limit potentially adverse contamination impacts. These will include:</p> <ul style="list-style-type: none"> • consideration of existing detailed contaminated land and groundwater assessments based on information obtained from site investigation and desk study records of former site uses; • completion of risk assessments in accordance with CLR 117 and development of a Remediation Strategy (where required); • development of the Scheme design to reduce the need for material import and to minimise waste as set 	Prior to commencement of works	<p>CoCP Chapter 9</p> <p>Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.</p>

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
			<p>out in paragraph 3.2.3; and</p> <ul style="list-style-type: none"> development of the Scheme design to minimise dewatering requirements. <p>Site specific contaminated land risk assessments will be refined based on any new findings. Should contaminant linkages be proven, the principles of CLR11 will be adopted, and appropriate mitigation measures applied.</p> <p>For works on the Greenwich peninsula, the Contractor will follow measures outlined within the “The Greenwich Peninsula Environmental Method Statement (EMS)”.</p> <p>Full details are in the CoCP at chapter 9.</p>		
33	ES Chapter 12, section 12.5.35	Risk of unexploded Ordnance (UXO) within the Order limits.	Linear UXO surveys of the Scheme have previously been undertaken to identify the risk within the Order Limits. The Construction Environmental Management Plan (CEMP) will include a requirement for the Contractor to carry out further assessment prior to undertaking any	Prior to commencement of works.	CoCP section 9.5. The CoCP is secured by requirement 5 in Schedule 2 to the DCO.

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
			<p>intrusive investigation works on the Scheme within areas identified as medium and high risk.</p> <p>Once the assessment is complete, the CEMP will require the Contactor to develop a detailed UXO mitigation strategy for the project prior to construction commencing.</p>		
34	ES Chapter 12, section 12.5.37	<p>Drivability of piles and the TBM in hard layers and through ground obstructions (such as existing redundant piles) is a potential hazard during construction.</p>	<p>The CEMP will require that the method developed for pile removal will prevent potential groundwater flow between aquifers.</p> <p>The envisaged construction method is contained within Appendix 4.A - CMS (Document Reference 6.3.4.1) that proposes removal of obstructing piles by either an adapted tracked excavator to pull the piles, or by the over-coring of the pile using a standard piling rig and single or double steel casing.</p> <p>All piles extracted will be stockpiled and removed from site following material categorisation.</p>	Prior to commencement of works.	<p>CoCP (Chapter 9.3.3).</p> <p>The CoCP is secured by requirement 5 in Schedule 2 to the DCO.</p>
Materials and Waste					

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
35	ES Chapter 13, para 13.5.2 – 13.5.3	Need to reduce the impacts of material resources use and waste arisings from the Scheme.	<p>Measures to be taken in the management of materials produced by the Scheme will be set out in a Construction Materials Management Plan and Site Waste Management Plan prepared by the Contractor for each site.</p> <p>The Contractor must deal with CD&E Materials in accordance with the <i>CD&E Materials Commitments</i> set out at Appendix C of the CoCP.</p> <p>The SWMP, will be updated and will be used to record how waste will be reduced, reused, recycled and disposed of by the Scheme.</p> <p>The Construction Materials Management Plan will help to ensure that materials are handled and used in a way that prevents harm to human health and pollution of the environment.</p> <p>The Construction Traffic Management Plan and the Scheme's river transport commitments, set out in the CoCP, will enable better management of all types of freight vehicle movement to and from the</p>	Prior to commencement of works and during works.	<p>CoCP section 13.2</p> <p>Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.</p>

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
			<p>Scheme.</p> <p>Full details are contained in the CoCP at chapter 13.</p>		
Noise and Vibration					
36	<p>ES Chapter 14, section 14.5</p> <p>ES Chapter 11, section 11.5</p>	Construction noise and vibration	<p>Noise impacts from the construction phase of the Scheme will be mitigated through the use of best available techniques and the implementation of measures to be set out in a Noise and Vibration Management Plan (NVMP) which must be approved by the relevant planning authority.</p> <p>Measures to be employed during the construction phase are set out in the CoCP at section 11.2.</p> <p>The NVMP will require that noise and vibration from conveyor systems will be minimised through the implementation of a maintenance programme which includes regular inspection of the conveyor equipment.</p> <p>The Contractor will be responsible for notifying the local residents of particularly noisy work prior to commencement and for</p>	Prior to commencement of works.	<p>CoCP Chapter 11.</p> <p>Compliance with CoCP is secured by requirement 5 in Schedule 2 to the DCO.</p>

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
			<p>providing contact details for a site representative in the event that disturbance due to noise or vibration from the construction works occurs; ensuring that any complaints are dealt with pro-actively and that subsequent resolutions are communicated to the complainant</p> <p>As part of the NVMP pre-construction noise monitoring surveys will be undertaken and agreed with the relevant planning authority to establish a pre-construction baseline for monitoring compliance with construction noise limits.</p>		
37	ES Chapter 14, section 14.5	Operational road traffic noise.	1.8m high visual/acoustic barrier around both northern and southern tunnel portals; and low noise/thin surfacing system surface to be laid within the Order Limits.	Prior to opening of the Scheme	Requirement 12 in Schedule 2 to the draft DCO will require the details of noise mitigation measures to be submitted to and approved by the relevant planning authority.

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
38	ES Chapter 14, section 14.5	Tunnel ventilation noise during operation.	Tunnel ventilation noise impacts will be mitigated to be below existing background noise levels through the use of intelligent design and silencer units.	Commencement of operation of the authorised development.	Requirement 12 in Schedule 2 to the draft DCO requires details of noise mitigation measures to be submitted to and approved by the relevant planning authority.
Townscape and Visual					
39	ES Chapter 15, section 15.5	Minimising visual disruption during construction.	The Construction Environmental Management Plan prepared by the Contractor will require the Contractor to employ best practice to minimise townscape and visual disruption, for example protection of existing vegetation to be retained, where possible, and targeted use of hoarding to screen construction sites.	Prior to commencement of works.	CoCP Chapter 12 Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
			<p>The visual intrusion of construction sites on nearby residents and users of local facilities will be contained and limited. Signage, decoration or enhancement, for information or aesthetic purposes, on the hoarding will be in accordance with TfL's corporate requirements.</p>		
40	ES Chapter 15, section 15.5	Minimising significant night-time visual effects.	<p>For each worksite a Lighting Management Plan will be prepared by the Contractor in consultation with the relevant planning authority. The Contractor will implement the measures set out in the Lighting Management Plan.</p> <p>The Lighting Management Plan will reflect appropriate industry standard procedures which will be implemented at both worksites. Lighting will be designed, positioned and directed so as not to unnecessarily intrude on adjacent buildings and so as to prevent unnecessary interference with local residents, the DLR, passing motorists, the navigation lights for air or water traffic, and wildlife breeding seasons.</p>	Prior to commencement of works.	<p>CoCP Chapter 12.</p> <p>Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.</p>

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
Water Environment					
41	ES Chapter 16, section 16.5	Measures to prevent or reduce water quality impacts by ensuring adequate drainage and preventing pollution.	<p>The Construction Environmental Management Plan prepared by the Contractor will specify the appropriate water conservation and pollution prevention measures and site drainage controls required.</p> <p>The CoCP sets these out at section 15.2 site drainage and 15.3 control of pollution.</p>	Prior to commencement of works.	<p>CoCP Chapter 15</p> <p>Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.</p> <p>Environment Agency Protective Provisions in Schedule 13 to the DCO.</p>
42	ES Chapter 16, section 16.5	Potential for increases in turbidity and scour during construction of the jetty.	Works would be undertaken in accordance with good practice methods for pollution control as detailed in the CoCP at section 15.3.	Prior to commencement of works.	<p>CoCP (section 15.4.2 and 15.3).</p> <p>Compliance with the CoCP is secured by requirement 5 in</p>

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
					Schedule 2 to the DCO.
43	ES Chapter 16, section 16.5	Need to minimise effects on water quality from dredging associated with the temporary jetty.	<p>Measures will include but are not limited to:</p> <ul style="list-style-type: none"> the management of spill water decanting from the excavated material transport barge to minimise locally high concentrations of suspended sediment and changes in water quality; the minimisation of the loss of material from the back-hoe by optimising angle of dredge to the prevailing tidal current flow; avoiding summer/low river flow periods if possible; and limiting the areas of dredging to a minimal footprint to allow safe access to the jetty. 	Prior to commencement of works.	<p>CoCP section 15.4.4.</p> <p>Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.</p>
44	ES Chapter 16, section 16.5	Potential for an impact on the integrity of the flood defences protecting the Scheme and	Any works which could affect flood defences will be subject to EA approval which may be given subject to reasonable conditions in respect of the protection of flood defences.	Prior to commencement of works.	Environment Agency Protective Provisions in Schedule 13 to the DCO.

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
		wider areas due to settlement	<p>To minimise the impact of settlement, good tunnelling practice would be implemented including continuous working, erecting linings immediately after excavation, grouting, management of the tunnel face pressures and the measurement of excavated material quantities.</p> <p>Settlement monitoring would also be undertaken at the river walls during the tunnelling works and would be carried out for a period of up to two years post construction.</p>		
45	ES Chapter 16, section 16.5	Ability of river walls to withstand foreseeable construction activities association with the Scheme and to identify whether the Scheme would affect the feasibility of the future raising of	<p>Any works which could affect flood defences will be subject to EA approval which may be given subject to reasonable conditions to ensure the works do not affect the feasibility of raising the wall in the future.</p> <p>Prior to commencing the works, an intrusive survey of the river wall will be undertaken to establish its structural condition.</p>	Prior to commencement of works.	Protective Provisions for the Environment Agency in Schedule 13 to the DCO.

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
		the walls to TE2100 defence levels.			
46	ES Chapter 16, section 16.5	Residual risk of flooding in the very unlikely scenario of a breach on the River Thames defences during the construction period.	During the construction phase a Flood Warning and Evacuation Plan (FWEP) would be in place, a draft of which has been prepared (see document reference 6.3.16.3). This draft plan would be updated prior to construction and approved by the EA, as secured by the CoCP	Prior to commencement of works.	Protective Provisions for the Environment Agency in Schedule 13 to the DCO.
47	ES Chapter 16, section 16.5	Measures to prevent or reduce impacts on water resources.	<p>The Construction Environmental Management Plan (CEMP) to be produced by the Contractor will include measures relating to water conservation. The measures will include but will not be limited to:</p> <p>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);</p> <p>staff engagement and training, to reduce water consumption by all water-using</p>	Prior to commencement of works.	<p>CoCP section 15.5.</p> <p>Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.</p>

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
			<p>processes, activities and equipment on site;</p> <p>a monitoring regime that assesses the effectiveness of water conservation measures;</p> <p>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</p> <p>if required, pumps will be provided at each storage lagoon for use in filling water bowsers.</p>		
48	ES Chapter 16, section 16.5	During operation – prevent or reduce water quality impacts.	<p>The Scheme would provide a permanent drainage system for the new structures and highways created by the Scheme that is fit for purpose overall, improving the quality of drainage discharges to receiving waters, namely the Cut and the River Thames.</p> <p>Details of the surface water drainage system, must be prepared prior to commencement of the Scheme development, and submitted to the relevant</p>	Prior to commencement of works.	Requirement 8 in Schedule 2 to the DCO.

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
			planning authority for approval.		
Health					
49	ES Chapter 18, table 18-1 HEqIA Table 15-1	Road safety - Increased risk of road traffic accidents as a result of changes in traffic flows and patterns during construction and operation.	The CoCP at Chapter 3 sets out measures to minimise any road safety risks related to construction. It includes the following: Maximising use of river transport. Identification of appropriate construction traffic routes via the production of a Construction Traffic Management Plan. Specific mitigation at junctions/crossings where required. Detailed measures on vehicle safety in the CoCP, and measures in the Community Engagement Plan.	Prior to commencement of works.	CoCP Chapter 3. Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.
50	ES Chapter 18, section 18.4.1 HEqIA Table 15-1	Active travel – need to maintain pedestrian and cycle links.	Ensuring diversions are in place and walking and cycling routes re-instated post-construction. See section 14.1 of the CoCP.	Prior to commencement of works.	CoCP Chapters 3 and 14 Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
51	ES Chapter 18, section 18.4.1 HEqIA Table 15-1	Accessibility - access to local services and facilities during construction.	The CoCP sets out at 2.6 and 14.1 how access will be provided during construction, providing diversions where necessary and well sign-posted routes.	Prior to commencement of works.	CoCP sections 2.6 and 14.1 Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.
52	ES Chapter 18, section 18.4.1 HEqIA Table 15-1	Access to work and training	Employment of a proportion of local workers in construction jobs and delivery of apprenticeships. This will be based on TfL's Strategic Labour Needs and Training commitments.	Prior to commencement of works.	Legal agreement with local authorities
53	ES Chapter 18, section 18.4.1 HEqIA Table 15-1	Noise impacts during construction.	The CoCP details at Chapter 11 the types of noise control measure which the contractor will set out in a Noise and Vibration Management Plan for each work site. This must be approved by the relevant planning authority.	Prior to commencement of works.	CoCP Chapter 11. Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.
54	ES Chapter 18, section 18.4.1	Air quality effects during construction.	Air quality control measures, which include control of dust will be set out in the Air Quality Management Plan (AQMP) which	Prior to commencement of works.	CoCP Chapter 5.

(1)	(2) Source	(3) Issue	(4) Mitigation or measure to prevent, reduce, offset and minimise impacts	(5) Trigger	(6) Securing mechanism
	HEqIA Table 15-1		will be prepared by the Contractor for each worksite and submitted for approval to the relevant planning authority. The CoCP at Chapter 5 sets out what this will include.		Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.
55	ES Chapter 18, section 18.4.1 HEqIA Table 15-1	Social Capital	<p>Contractor to develop a programme of community engagement and involvement through volunteering and educational activity.</p> <p>The Contractor will appoint a Community Construction Liaison Manager (CCLM) for the duration of the works. This manager will prepare and implement a Community Engagement Plan (CEP) which must be submitted to the relevant planning authority for approval. The CCLM will be the main point of contact for stakeholders on site, providing information and resolving issues of concern.</p> <p>The CoCP at Chapter 4 sets out what the CEP will include.</p>	Prior to commencement of works.	CoCP Chapter 4. Compliance with the CoCP is secured by requirement 5 in Schedule 2 to the DCO.

Silvertown Tunnel

Mitigation Route Map

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