15 Chelsea Embankment Foreshore

15.1 Introduction

15.1.1 This section of the non-technical summary presents the preliminary environmental assessment for the Thames Tunnel project at Chelsea Embankment Foreshore (Figure 15.1).

15.1.2 At this site it is proposed that the existing Low Level sewer No1 and the Ranelagh sewer would be linked to the proposed main tunnel through a shaft and an underground connection tunnel. Currently, the existing combined sewer overflow discharges approximately 26 times a year. The total volume of this discharge is 283,000m³ each year.

15.1.3 In the following section a description of the existing site is given. This is followed by a description of the development proposed at this site.

15.1.4 The environmental topics which have been assessed for this site are listed in the ‘Assessment’ section (15.4). Preliminary assessment findings are then presented topic by topic.

15.2 Site context

15.2.1 The site is shown as site number 10 on Figure 28.1.

15.2.2 The site is located within the Royal Borough of Kensington and Chelsea (Figure 15.1). It is also close to the City of Westminster.

**Figure 15.1 Chelsea Embankment Foreshore site location**
15.2.3 The site is located on the foreshore on the River Thames, and at the edge of Ranelagh Gardens and a section of the pavement and roadway of Chelsea Embankment (A3212). Approximately 1¼ hectares is required for the temporary construction works. This is indicated by the red line shown on Figure 15.2. The area of land required for the permanent works would be substantially smaller than that required for construction.

15.2.4 Vehicular access to the site would be directly off Chelsea Embankment (A3212). The Thames Path is a public right of way and runs along the southern pavement of Chelsea Embankment through the northern extent of the site.

15.2.5 To the north of the site is Chelsea Embankment (A3212) and beyond this is the Royal Hospital and Ranelagh Gardens. To the east is Chelsea Bridge Gardens and to the south and west is the River Thames.

Figure 15.2 Aerial photograph of Chelsea Embankment Foreshore

*Note: The red line boundary is approximate in this image

15.3 Proposed development

15.3.1 The proposal is to intercept the existing combined sewer overflow and connect to the northern Low Level Sewer No.1. With the Thames Tunnel in place, instead of untreated sewage discharging at current volumes directly into the River Thames, flows would be diverted into the proposed main tunnel. For a typical year, this would reduce discharges to approximately twice a year and flows to an average of approximately 18,500m³ a year.

15.3.2 In order for this interception to be achieved, construction works at this site would take approximately four years. A shaft with an internal diameter of approximately 12m and approximately 45m deep would be constructed.
15.3.3 From the base of this shaft there would be an underground connection tunnel which would join up with the main tunnel. Through an interception chamber and an overflow weir chamber, flows from the existing Ranelagh sewer and the Low Level Sewer No.1 would be diverted into the connection tunnel and into the main tunnel, located deep underneath the River Thames.

15.3.4 Most of the construction would take place from 8am to 6pm, Monday to Friday. Limited works may be required beyond these hours.

15.3.5 In order to manage and mitigate the effects on the environment during construction, a Code of Construction Practice has been drafted. This sets out measures to be adhered to during the process of construction works.

15.3.6 Figure 15.3 shows an indicative plan of the construction works.

Figure 15.3 Indicative plan of construction works for Chelsea Embankment Foreshore

15.3.7 Once the works at this site have been built, a number of permanent features would remain (Figure 15.4 and Figure 15.5). There would be a structure built out onto the foreshore. This would form part of the public realm although access would be restricted periodically for inspection and maintenance purposes into the shaft and tunnel. Access for this would be required every three to six months. Once every ten years more substantial maintenance work would be required.
15.3.8 There would be two kiosks to control equipment located in the below ground chambers. There would also be two ventilation columns approximately 4m and 6m in height. Most of the time, air would be drawn into the tunnel via these columns to ensure that the air within the main tunnel is continuously circulated. From time to time when the tunnel is filling up, air may be expelled via filters and out through the ventilation columns.

15.3.9 In the case of Chelsea Embankment, the control kiosks and the 4m high ventilation column would be located on the new area of land created within the foreshore and the 6m high ventilation column would be located at the edge of the Chelsea Embankment north-side pavement next to the Ranelagh Gardens boundary wall.

15.3.10 There would be no fencing around any part of the development once it is built, however the river wall would extend around the edge of the new foreshore structure to maintain river defences.

**Figure 15.4 Chelsea Embankment Foreshore indicative plan of built development – image 1 of 2**
Section 15: Chelsea Embankment Foreshore

15.4 Assessment

15.4.1 Based on the existing site and the works proposed, the following environmental topics have been included in the scope of this preliminary environmental assessment:

a. Air quality and odour
b. Ecology – aquatic and terrestrial
c. Historic environment
d. Land quality
e. Noise and vibration
f. Socio-economics
g. Townscape and visual
h. Transport
i. Water resources (ground and surface)
j. Flood risk

15.4.2 In the following sections, information about the preliminary assessment of each of these topics is presented.
15.4.3 As part of the assessment process, consideration has been given to known major developments that may change future environmental conditions. It is assumed that the Chelsea Barracks redevelopment to the northeast of Ranelagh Gardens would be complete at the start of the Thames Tunnel construction period. It is also assumed that the Royal Hospital would continue to host the annual Royal Horticulture Society Flower Show and other temporary events within the Royal Hospital Gardens.

15.4.4 Further information on the topic specific methodology for conducting the assessment is given in section 4 of this non-technical summary.

15.5 Air quality and odour

15.5.1 The Chelsea Embankment Foreshore site is located within the Royal Borough of Kensington and Chelsea Air Quality Management Area. Local monitoring indicates that there are currently exceedences of the air quality standards in the vicinity of the site. The nearest people who may be sensitive to the development are occupiers of nearby residential dwellings and the Royal Chelsea and Lister Hospitals, as well as users of the adjacent Ranelagh Gardens and Royal Hospital Gardens.

15.5.2 Based on this preliminary assessment, it is considered that the overall effect on local air quality from construction road traffic, river barges and construction plant is likely to be minor adverse at the residential properties and hospitals and negligible at Ranelagh Gardens / Royal Hospital Gardens. In terms of construction dust, this is likely to have negligible effect at all these locations, taking account of the dust control measures in the Code of Construction Practice.

15.5.3 Preliminary assessment findings indicate that the effects of odours released from the ventilation structure is likely to be negligible.

15.5.4 Based on this assessment, it is considered that mitigation measures are not required.

15.6 Ecology – aquatic

The site is located within the designated River Thames and Tidal Tributaries Site of Metropolitan Importance. Surveys have been undertaken at the site to understand the aquatic ecology present within the site. There is an area of gravel foreshore exposed at low tide underlain mostly by pebbles. The site has a relatively high diversity of fish species, including common smelt, but a relatively low diversity of invertebrates.

15.6.1 Based on preliminary assessments findings, during construction there is likely to be a loss of habitat due to the presence of a retaining wall to create a dry working area within the river and also a levelled and filled river bed area, termed a campshed. The purpose of a campshed is to provide an area on the river bed adjacent to the land for barges to rest on during low tide. This ensures that barges do not get stuck to the river bed with a potential risk of flooding to the barge during high tide. These works would have a moderate adverse effect on habitats and fish whilst this would have a minor adverse effect on invertebrates. Construction effects would be managed in accordance with the Code of Construction Practice.
With the Code in place and based on initial findings, it is anticipated there would be minor adverse effects from noise and vibration impacts on fish and minor adverse effects (rising to moderate during piling) from increased suspended sediment in the river. All other effects on fish, invertebrates and mammals would be negligible.

15.6.2 During operation, the permanent loss of river habitat would have a moderate adverse effect on habitats and fish species but a minor adverse effect on invertebrates. The reduction in nutrient levels entering the river would have a moderate beneficial effect on fish, through reduced fish kills throughout operation and also in contributing to an increase in pollution tolerant and/or rare fish and invertebrate species in the longer term of operation. Increased invertebrate diversity and abundance would be minor beneficial in the longer term. Effects on mammals would be negligible.

15.6.3 Measures are included within the Code of Construction Practice to manage construction effects, and no further mitigation during construction is considered to be possible as the extent of the physical works in the river have been reduced as far as practicable. For the operational phase consideration will be given to providing compensation for the loss of habitat, for example through creating habitat elsewhere, and reported in the Environmental Statement.

**Figure 15.6 Foreshore at Chelsea Embankment**

15.7 **Ecology – terrestrial**

15.7.1 The site comprises hardstanding, scattered trees and foreshore habitat and is of value to foraging and commuting bats and to common invertebrates. There is also potential for wintering birds, breeding birds and black redstart on site. Surveys are ongoing and will be reported in the Environmental Statement. There are five Sites of Importance for Nature Conservation within 500m of the site including the adjacent Ranelagh Gardens, which is of Borough importance.
15.7.2 Based on preliminary assessment findings, no significant effects on designated sites are anticipated (aquatic ecology effects are considered in section 15.6). Site set-up would result in the loss of several trees, which would have a local adverse effect. The pruning of adjacent trees is unlikely to be significant. Habitat loss and disturbance effects to bats on the site and the loss of a small invertebrate community would have a site level adverse effect. Other effects on bats and invertebrates are likely to be negligible. The effects on wintering birds, breeding birds and black redstarts will be assessed and reported in the Environmental Statement.

15.7.3 It is anticipated that operational activity would be limited to occasional maintenance works, which is considered unlikely to have significant effects on terrestrial ecology.

15.7.4 In addition to measures in the Code of Construction Practice, measures to reduce construction effects are likely to include replacement planting, habitat creation and disturbance minimisation specific to notable species.

15.8 Historic environment

15.8.1 The site comprises the foreshore on the northern bank of the Thames and the Chelsea Embankment river wall (of medium heritage asset significance). Royal Hospital Chelsea South Grounds and Ranelagh Gardens, together a Grade II registered park and garden (of high heritage asset significance) are located on the northern side of Chelsea Embankment road, with part of the brick boundary wall and railings falling within the site. The site is located within the locally designated Thames Conservation Area, and the Royal Hospital Conservation Area lies directly to the north (both of high heritage asset significance).

15.8.2 There are no listed structures within the site, but there are a number in the near vicinity, with the closest being the Grade II listed Embankment located immediately to the southwest of the site (of high asset significance). The Grade I listed Royal Hospital Chelsea (of very high asset significance) lies to the north and a historic axis (known as Monument Walk) extends from this building to the Bull Ring Gate opposite the site.

15.8.3 The main potential of the site in terms of buried heritage is for palaeoenvironmental material, which may include pollens or plant fossil remains (of low or medium heritage asset significance), and for post-medieval timber structures and remains (of low heritage asset significance). There is high potential for redeposited prehistoric artefacts (of low heritage asset significance), and moderate potential for evidence of prehistoric activity (of medium heritage asset significance).

15.8.4 Based on preliminary assessment findings, during construction the parapet of the existing river wall would be locally dismantled, leading to a moderate adverse effect. Construction works would entail deep excavations which would entirely remove any buried assets within the footprint of each excavation. This would comprise a minor adverse effect for surviving palaeoenvironmental remains and post-medieval and isolated prehistoric remains, and a moderate adverse effect if evidence of prehistoric activity is present.
15.8.5 To mitigate the effect on the river wall, the structure would be recorded and photographed in line with accepted standards to form preservation by record. The desk-based study of the site suggests that no buried heritage assets of very high significance are anticipated that might merit a mitigation strategy of permanent preservation in situ. The adverse effects could be successfully mitigated by a suitable programme of archaeological investigation before and/or during construction, drawing on a range of techniques. This would include subsequent dissemination of the results and so achieve preservation by record.

15.8.6 Effects on the historic environment arising from the operation of the Thames Tunnel infrastructure at Chelsea Embankment Foreshore, on assets including the Thames Conservation Area, the Chelsea Embankment, and the historic setting of the Chelsea and Ranelagh Gardens and nearby listed structures, will be assessed and presented in the Environmental Statement. Effects could also include effects on buried heritage assets in the foreshore from scouring due to changes in river flows due to new infrastructure in the channel. Any mitigation requirements for operational effects will also be presented.

15.9 Land quality

15.9.1 A search of historical and environmental data identified no potentially contaminative activities in the area. Previous ground investigations close to the site have recorded no significant soil or groundwater contamination. Part of the ongoing ground investigations includes the assessment of foreshore sediment contamination. Desk based surveys have identified a medium/high risk from unexploded ordnance.

15.9.2 Preliminary assessment findings indicate that there may be a slight adverse effect on construction workers due to the potential for exposure to contaminated soils or other materials if they are present, although any exposure risk would be short-term. There would be a negligible effect on the built environment as it is considered unlikely that contaminants contained in subsurface materials would affect buried structures. This preliminary assessment therefore identified no need for mitigation during the construction phase although this will be clarified subject to further investigations and reported in the Environmental Statement.

15.9.3 During operation there would be negligible effect on future users and the built environment. The assessment identified no need for mitigation during the operational phase.

15.10 Noise and vibration

15.10.1 A noise survey has been carried out around the site (Figure 15.7). The site is dominated by road traffic noise. The nearest locations to the site which are sensitive to noise and vibration are residential dwellings at Pavilion Court and Chelsea Gardens (to the east of the site) and at Embankment Gardens (to the west of the site).

15.10.2 No significant noise or vibration effects as a result of construction activities are predicted. Also, no significant effects as a result of the operation of the site are predicted.
15.10.3 During construction, the contractor would be required to follow best practice (as described in the Code of Construction Practice) at all times to reduce noise and vibration effects upon the local community for example through suitable siting of equipment on site.

15.10.4 Beyond best practice measures it is anticipated that no additional mitigation would be required to address noise and vibration effects.

Figure 15.7 Noise monitoring – looking west along Chelsea Embankment

15.11 Socio-economics

15.11.1 The site comprises a stretch of pavement that forms part of the Thames Path and a national cycle route, and an area of foreshore on the River Thames. Residential dwellings and institutions (the Lister Hospital and Royal Chelsea Hospital), and two open spaces (Ranelagh Gardens and Royal Hospital Chelsea South Grounds) are located to the north of the site. The site and surrounding area is moderately well used for a range of purposes including walking, cycling, and passive recreation.

15.11.2 During construction, there are considered to be minor adverse effects on the amenity of residents of nearby dwellings and institutions and users of the two open spaces. Disruption to sections of the Thames Path and national cycle route and amenity impacts on users of these routes are considered to have negligible effects. Once operational, there would be a minor beneficial effect resulting from the gain in publicly accessible space associated with the extension of the Thames Path into the foreshore.
In completing the assessment, there is scope for further construction phase mitigation measures to be incorporated in the design with the aim of seeking to reduce significant adverse amenity effects which have been identified in this preliminary assessment.

For the operational phase, there are not expected to be any socio-economic effects at Chelsea Embankment which require mitigation.

15.12 Townscape and visual

The site is located within the Thames Conservation Area, on the foreshore of the River Thames adjacent to Chelsea Embankment, the Grade II registered Royal Hospital Chelsea South Grounds and Ranelagh Gardens. The surrounding townscape is dominated by the Royal Hospital Gardens on the north bank, and Battersea Park and Battersea Power Station on the south bank.

Based on preliminary assessment findings, during construction the presence of cranes, the site cofferdam and the intensity of construction activity in a linear stretch of the river is anticipated to have a major adverse townscape effect on the site, River Thames – Royal Hospital and Battersea Park Reach and Battersea Park Conservation Area. There is likely to be a moderate adverse townscape effect on the Ranelagh Gardens character area and the Royal Hospital Conservation Area. Once operational there would be moderate to major adverse townscape effects on the site and the River Thames – Royal Hospital and Battersea Park Reach. Minor to moderate adverse townscape effects are anticipated on Battersea Park Conservation Area and the adjacent residential area. Due to a slight change in setting arising from the foreshore structure in the river there would be minor adverse effects on Chelsea Residential, the Royal Hospital Conservation Area – Grounds and adjacent residential area. There would be a negligible to minor adverse effect on the River Thames - Nine Elms Reach.

Preliminary assessment findings indicate that in terms of visual amenity, during the construction phase there would be major adverse effects on views from Queenstown Road, Chelsea Bridge and the Royal Hospital. This is due to the visibility of construction activity, cranes and the cofferdam in a strong linear stretch of the river. There would be moderate adverse effects on views from West Road and the Royal Hospital Gardens. Due to background visibility of construction activity there would be minor adverse effects on views from Embankment Gardens and the Thames Path. Once operational there is likely to be a moderate adverse visual effect on the view from Chelsea Bridge and minor to moderate adverse effects on viewpoints from Queenstown Road, Chelsea Bridge and North Carriage Drive. This is due to visibility of the foreshore structure in the river and the above ground structures. At this stage of the assessment, there are expected to be minor adverse effects on views from Embankment Gardens, West Road and the Royal Hospital Gardens and negligible to minor adverse effects on views from the Thames Path due to background visibility of the protrusion into the river and above ground structures. The above levels of assessed significance are dependent on the final design and will be reported in the Environmental Statement.
15.12.4 Mitigation measures to be employed during the construction phase are being incorporated into the proposals, for example, through the protection of trees. In terms of operation, a process of iterative design and assessment has been employed to reduce adverse effects and improve beneficial effects, which will continue until the design is finalised and be reported in the Environmental Statement.

15.13 **Transport**

15.13.1 The Chelsea Embankment site has moderate public transport accessibility with numerous bus routes within the local area. The closest London Underground station is Sloane Square, approximately 1km away. Vehicle access is proposed from the Chelsea Embankment (A3212) using a left in, left out access arrangement.

15.13.2 During construction, the number of heavy goods vehicle movements would be comparatively low. Due to the location of the construction site it is considered likely to result in a moderate adverse effect on road network operation and delay. Effects on pedestrian and cyclist amenity and safety are expected to be moderate adverse due to footway closures and local diversions resulting in delays to journey time. A moderate adverse effect is expected on the operation of one bus service within the area, primarily as a consequence of the construction site layout proposals requiring a bus stop close to the site entrance to be relocated, and a negligible effect is expected on rail and river passenger services. During the operational phase there would be very occasional vehicle trips to and from the site for maintenance activities but these would have a negligible effect on the surrounding transport networks.

15.13.3 The project is being designed to limit the effects on the transport networks as far as possible. At this location, mitigation measures during the construction phase are likely to be required and would take the form of the provision of safe crossing points for pedestrians and cyclists along the diversion routes on the north and south sides of the river and traffic signal optimisation to improved pedestrian crossing times and junction capacity. Mitigation is not required for the operational phase.

15.14 **Water resources - ground water**

15.14.1 The proposed shaft and connection tunnel would pass through the upper aquifer and into the lower aquifer. Associated interception infrastructure would penetrate the upper aquifer. The main receptors are the upper aquifer which is defined as being of medium value and the lower aquifer which is defined as being high value.
15.14.2 Construction effects on the upper aquifer would be limited to physical obstruction to groundwater flow and the introduction of contaminants and creation of a pathway for pollution. Of these effects those on groundwater flow are anticipated to be negligible. The site contains low levels of contamination in groundwater and soil, this would be dealt with using a risk based approach and appropriate remediation ahead of construction. Construction effects on the lower aquifer would relate to dewatering which could impact groundwater resources and induce groundwater movement. The effect of dewatering in the lower aquifer is considered to be minor adverse on water resources but has the potential to have a major adverse effect on quality and requires further assessment and will be reported in the Environmental Statement.

15.14.3 Once operational the potential effects would be obstruction to groundwater flow and the seepage to and from the shaft. These are considered to be negligible at this stage.

15.14.4 Monitoring of groundwater levels and quality would continue throughout construction and operation.

15.15 Water resources – surface water

15.15.1 The site is located in the River Thames foreshore within the Thames Middle waterbody, as classified under the Thames River Basin Management Plan. There is also the possibility for effects on the upstream Thames Upper waterbody, which has also been considered in the assessment. The Thames Upper and Middle waterbodies are currently classified under the Water Framework Directive as being at moderate potential status, with a status objective of good potential by 2027. The Battersea Park Local Nature Reserve is located within the vicinity of Chelsea Embankment and is water dependent.

15.15.2 There is the potential for effects on surface water resources from the proposed construction works through surface water runoff and exposure of the drainage system to contaminants. After taking into account the measures incorporated into the design and Code of Construction Practice, such effects are expected to be manageable and not significant. No mitigation would therefore be required.

15.15.3 There is also potential for the loss in river bed from the construction to change the river flows, which could lead to scour at the flood defences. The effects would be largely temporary during construction as some natural foreshore restoration would occur after temporary construction structures are removed. Some additional mitigation may be required for the effects of the permanent works within the foreshore. Any mitigation measures required will be identified in the Environmental Statement.

15.15.4 Once operational the scheme would reduce the number of spills to a predicted level of two spills each year. This would have a beneficial effect on water quality. The number of risk days for river users being exposed to pathogens would be reduced by up to 100 days of risk of exposure annually. In addition, the tonnage of sewage derived litter arising from the Ranelagh combined sewer overflow can be expected to be reduced by from approximately 71 tonnes to 4 tonnes per year.
15.16   **Flood risk**

15.16.1 Due to its location within the foreshore, the main source of flood risk to the site during construction and operation is the tidal River Thames.

15.16.2 The site may also be at risk of surface water flooding in the future due to runoff generated from land to the north of the site. The presence of structures within the foreshore could impact flow within the River Thames and the works required to construct the tunnel beneath the site could potentially affect the local flood defences. Further studies are being completed to assess these potential impacts and will be reported in the Environmental Statement.

15.16.3 To protect the site from flooding, defences would be constructed during both the construction and operational phases, which would provide a level of protection equal to the existing defences along the Chelsea Embankment. The effects of changes in scour and the way sediments are deposited would be reduced through good practice design of the temporary and permanent structures, which would also be designed to ensure stable tidal water flows.

15.17   **Further information**

15.17.1 Further information regarding preliminary assessment findings for Chelsea Embankment Foreshore can be found in Volume 16 of the Preliminary Environmental Information Report.